UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Association of Businesses Advocating Tariff Equity, *et al.*	)	
v.	)	Docket No. EL14-12-003
Midcontinent Independent System Operator, Inc., *et al.*	)	
Arkansas Electric Cooperative Corporation, *et al.*,	)	
v.	)	Docket No. EL15-45-000
ALLETE, Inc., *et al.*	)	

CONDITIONAL MOTION TO INTERVENE OUT-OF-TIME AND CONDITIONAL MOTION TO LODGE OF THE AMERICAN PUBLIC POWER ASSOCIATION AND TRANSMISSION ACCESS POLICY STUDY GROUP

Pursuant to Rules 212 and 214 of the Rules of Practice and Procedure of the Federal Energy Regulatory Commission ("Commission" or "FERC"),[1] the American Public Power Association ("APPA") and Transmission Access Policy Study Group ("TAPS") hereby each conditionally request leave to: (1) intervene out-of-time in the above-captioned dockets; and (2) lodge the initial and reply comments filed by APPA and TAPS in Docket No. PL19-4-000.[2]

The APPA/TAPS motions to intervene and to lodge are being filed on a conditional basis because APPA and TAPS have been advised that the MISO Complainant-Aligned Parties

[1] 18 C.F.R. §§ 385.212 and 385.214 (2019).

[2] *Inquiry Regarding the Commission's Policy for Determining Return on Equity*, 166 FERC ¶ 61,207 (2019) (the "ROE NOI"). The ROE NOI comments filed by APPA and TAPS also included the Aluminum Association, American Chemistry Council, American Forest and Paper Association, Electricity Consumers Resource Council, Industrial Energy Consumers of America, and National Rural Electric Cooperative Association. The APPA/TAPS ROE NOI initial and reply comments are attached hereto as Attachments A and B, respectively.

("MISO CAPS") will be filing in opposition to the various late motions to intervene and other non-party filings submitted by transmission owners and their representatives in response to the Commission's Opinion No. 569 in the above-captioned dockets.[3] If the Commission agrees with MISO CAPS that these late interventions and other submissions should be rejected, the Commission should treat the instant APPA and TAPS motions to intervene and to lodge as withdrawn.[4] If, however, the Commission grants late intervention to the Edison Electric Institute ("EEI"), WIRES LLC ("WIRES"), or any of the transmission owners that have moved to intervene out-of-time in response to Opinion No. 569 (collectively, "Late Intervenors"), the Commission should likewise permit APPA and TAPS to intervene out-of-time. Similarly, if the Commission grants the motions to lodge filed by EEI and others, the Commission should grant the APPA/TAPS motion to lodge. APPA and TAPS are authorized to state that the MISO CAPS do not oppose the APPA and TAPS motions to intervene if the Commission allows the Late Intervenors to intervene out-of-time.

I. BACKGROUND

The proceedings in these dockets involve two complaints filed under section 206 of the Federal Power Act ("FPA") challenging the base return on equity ("ROE") reflected in the transmission rates of public utility transmission owners ("TOs") in the Midcontinent Independent System Operator ("MISO") region. In an order issued on November 15, 2018, the Commission directed the participants in these dockets to submit briefs addressing: (1) a proposed revised framework for evaluating whether a public utility's authorized ROE is just and reasonable under the first prong of the two-part analysis required to modify an existing rate under FPA section

[3] *Association of Businesses Advocating Tariff Equity*, *et al. v. Midcontinent Indep. Sys. Operator, Inc.*, *et al.*, Opinion No. 569, 169 FERC ¶ 61,129 (2019).

[4] Certain of the MISO CAPS are members of APPA and TAPS.

206; and (2) a proposed revised method for establishing a just and reasonable ROE under the second prong of FPA section 206.[5] Among other proposed policy changes, the MISO and *Coakley* Briefing Orders proposed to rely on three financial models – the discounted cash flow ("DCF") model, the capital-asset pricing model ("CAPM"), and the Expected Earnings model – to establish a composite zone of reasonableness for purposes of assessing whether an existing public utility ROE remains just and reasonable.[6] Where an existing ROE is shown to be unjust and unreasonable under the first prong of FPA section 206, the MISO and *Coakley* Briefing Orders proposed to establish a new just and reasonable ROE based on the three models referenced above, plus the Risk Premium model.[7] In response to the MISO Briefing Order, parties to the above-referenced dockets submitted extensive briefs and additional evidence.

Several months after the Commission issued the MISO Briefing Order, the Commission issued the ROE NOI requesting comments on the proposed changes to the Commission's ROE method described in the MISO and *Coakley* Briefing Orders and other issues. The Commission explained in the ROE NOI that "[a]lthough the Commission requested briefing on some of the issues below in the *Coakley* and MISO Briefing Orders, this proceeding will provide all interested stakeholders with the opportunity to comment on the Commission's ROE policy in light of the decision in *Emera Maine*."[8] As evidenced by the materials included as Attachments A and B to this filing, APPA and TAPS submitted extensive comments, supported by expert

[5] *Association of Businesses Advocating Tariff Equity*, *et al. v. Midcontinent Indep. Sys. Operator, Inc.*, *et al.*, 165 FERC ¶ 61,118 at PP 16-20, 62 (2018) ("MISO Briefing Order"); *see also* Opinion No. 569 at P 1. The MISO Briefing Order was issued in the wake of the D.C. Circuit's remand in *Emera Maine v. FERC*, 854 F.3d 9 (D.C. Cir. 2017) ("*Emera Maine*"), and was preceded by the issuance of a similar briefing order on October 16, 2018 in the Commission proceedings on remand from *Emera Maine*. *See Coakley v. Bangor Hydro-Elec. Co.*, 165 FERC ¶ 61,030 (2018) ("*Coakley* Briefing Order").

[6] *See* Opinion No. 569 at PP 11-12.

[7] *See id.* at P 16.

[8] ROE NOI at P 28.

affidavits, in response to the ROE NOI.

In Opinion No. 569, the Commission adopted a new method for determining whether a public utility's authorized ROE is just and reasonable under FPA section 206. The new method generally adheres to the framework proposed in the MISO and *Coakley* Briefing Orders, with some important differences. In particular, the new approach relies on the DCF and CAPM models, but not Expected Earnings, to establish a composite zone of reasonableness to assess whether an existing base ROE remains just and reasonable under the first prong of FPA section 206. The Commission will also utilize the DCF/CAPM composite zone of reasonableness to establish the new just and reasonable base ROE under the second prong of FPA section 206, without utilizing the Expected Earnings or Risk Premium models. Applying this revised framework, the Commission found in Docket No. EL14-12 that the MISO TOs' existing ROE is unjust and unreasonable and established a new ROE of 9.88 percent.[9] Opinion No. 569 dismissed the complaint in Docket No. EL15-45-000, concluding that the "existing" ROE for purposes of this second complaint was the 9.88 percent ROE adopted in response to the first complaint, which the Commission found to be presumptively just and reasonable.[10]

The Commission has not yet issued a further substantive order in the *Coakley* proceedings. Nor has the Commission taken any action in response to the extensive comments and evidence submitted in response to the ROE NOI.

Numerous non-MISO transmission owners moved to intervene out-of-time in these proceedings in response to Opinion No. 569, as did EEI and WIRES – trade groups that represent the interests of public utility transmission owners.[11] A number of these motions to intervene are

[9] Opinion No. 569 at P 20.

[10] *Id.* at P 21.

[11] The following entities have filed motions to intervene out-of-time following the issuance of Opinion No. 569,

accompanied by requests for rehearing and/or motions to lodge material filed in the ROE NOI docket or other documents.[12] Several non-party filings provide comments without seeking to intervene.[13]

II. CONDITIONAL MOTION TO INTERVENE OUT-OF-TIME

If the Commission grants the Late Intervenors' motions to intervene, the Commission should also permit APPA and TAPS to intervene out-of-time, as many of the rationales offered by Late Intervenors in support of intervention apply with equal force to APPA and TAPS. This is particularly true with respect to the proposed intervention of EEI and WIRES – both of which are associations that, like APPA and TAPS, represent members in and beyond the MISO region that could be impacted by the disposition of the new ROE policies described in Opinion No. 569. APPA and TAPS are mindful that the Commission does not typically allow late intervention following the issuance of an order on the merits, and, as noted above, APPA and TAPS are informed that the MISO CAPS oppose Late Intervenors' requests for leave to intervene out-of-time. Accordingly, APPA and TAPS are conditionally requesting leave to intervene only if the Commission grants late intervention to the Late Intervenors.

---

with a number of the motions to intervene accompanied by requests for rehearing and/or motions to lodge: AEP Indiana Michigan Transmission (motion to intervene only); AEP PJM Transmission Owners (motion to lodge); EEI (request for rehearing and motion to lodge); FirstEnergy Service Company (request for rehearing); PPL Electric Utilities Corporation (motion to lodge); Public Service Electric and Gas Company (motion to intervene only); San Diego Gas & Electric Company (motion for clarification, or, in the alternative, request for rehearing); and WIRES (request for rehearing and motion to lodge).

[12] *See* footnote 11, *supra*.

[13] The following entities made filings – including requests for rehearing and motions to lodge – without seeking late intervention: New England Transmission Owners (letter); Southern California Edison Company (motion to comment); and Southwest Power Pool Transmission Group (comments). The Indicated PJM Transmission Owners filed a request for rehearing and motion to lodge while noting that the signatories had either intervened or were intervening in the proceeding. *See* Motion to Lodge and Request for Rehearing of the Indicated PJM Transmission Owners at 1 n.1.

A. Description of APPA and TAPS

APPA is the national service organization representing the interests of not-for-profit state, municipal and other locally owned electric utilities throughout the United States. More than 2,000 public power utilities provide over fifteen percent of all kilowatt-hour sales to ultimate customers and to businesses in every state except Hawaii. Collectively, public power systems serve over 49 million people. APPA utility members' primary goal is providing customers in the communities they serve with reliable electric power and energy at the lowest reasonable cost, consistent with good environmental stewardship. This orientation aligns the interests of APPA member electric utilities with the long-term interests of the residents and businesses in their communities.

TAPS is an association of transmission-dependent utilities ("TDUs") in more than thirty-five states promoting open and non-discriminatory transmission access.[14] Representing entities entirely or predominantly dependent on transmission facilities owned and controlled by others, TAPS has long recognized the need for a robust transmission infrastructure to provide non-discriminatory transmission access and foster competition, thereby enabling TAPS members to meet their load reliably and affordably. As TDUs, TAPS members pay transmission rates that are substantially increased when the Commission allows ROEs that exceed the cost of equity. TAPS has therefore participated actively in numerous Commission proceedings concerning transmission planning, pricing, and incentives policies.

[14] David Geschwind, Southern Minnesota Municipal Power Agency, chairs the TAPS Board. Jane Cirrincione, Northern California Power Agency, is TAPS Vice Chair. John Twitty is TAPS Executive Director.

B. Basis for Intervention Out-of-Time

APPA and TAPS members include electric utilities that take transmission service over facilities owned by public utilities, both within and outside the MISO region. The interests of these members may be directly affected by the disposition of these proceedings, particularly given the generic nature of the changes to the Commission's ROE policies announced in Opinion No. 569. APPA and TAPS wish to intervene to represent the interests of these members.[15] APPA and TAPS have actively represented the interests of their members with respect to the Commission's ROE policies, including the submission of detailed comments and evidence in response to the Commission's ROE NOI.[16]

The influx of late interventions by non-party transmission owners and their representatives indicate, moreover, that these entities hope to vigorously contest, in the context of these dockets (and potentially on appeal), policies adopted in Opinion No. 569 that may produce allowed ROEs lower than the Late Intervenors believe are sufficiently remunerative. If the Commission allows these late interventions to consider the arguments and evidence advanced by the Late Intervenors, the Commission should also permit APPA and TAPS to intervene to represent the interests of their members within and outside the MISO region that could be impacted by the policies adopted in Opinion No. 569.

When a movant seeks to intervene in a proceeding out-of-time, the Commission may consider whether: (i) the movant had good cause for failing to file a timely motion to intervene; (ii) any disruption of the proceeding might result from permitting the late intervention; (iii) the movant's interest is not adequately represented by other parties in the proceeding; and (iv) any

[15] *See* 18 C.F.R. § 385.214(b)(2)(ii) (2019).

[16] *See* Attachments A and B.

prejudice to, or additional burdens upon, the existing parties might result from permitting intervention.[17] Considering these factors in this proceeding, the Commission should permit APPA and TAPS to intervene out-of-time if it finds that these factors warrant allowing Late Intervenors to intervene out-of-time in these dockets.

If the Commission is persuaded that Late Intervenors had good cause not to intervene in a timely manner, then the same logic should apply to APPA and TAPS, as they are similarly situated to the Late Intervenors, particularly EEI and WIRES. These dockets involve complaints that challenged the MISO TOs' authorized ROE as unjust and unreasonable as determined under the Commission's ROE policies at the time each complaint was filed. APPA and TAPS typically focus on Commission proceedings that could have broad significance for their members, and they did not initially intervene in these MISO-specific proceedings. While these dockets are doubtless significant and potentially impactful for utilities and customers in the MISO region, APPA and TAPS could not have known at the time the complaints were filed (and motions to intervene were originally due) that these dockets might ultimately be a vehicle for the Commission to adopt significant generic changes to its ROE policies.[18] And although it was foreseeable that the Commission might apply a revised ROE policy in this case following the MISO Briefing Order, the existing parties to the case, including the MISO CAPS, were actively litigating the issues in this proceeding.[19] Further, there was no influx of parties from outside the MISO footprint asking to intervene following the MISO Briefing Order in order to address "the

[17] 18 C.F.R. § 385.214(d) (2019).

[18] *See, e.g.*, Motion to Intervene Out-of-Time, Motion to Lodge, and Request for Rehearing of Edison Electric Institute ("EEI Filing") at 19.

[19] As noted above, APPA and TAPS actively participated in the ROE NOI proceeding, heeding the Commission's admonition that the NOI docket would "provide all interested stakeholders with the opportunity to comment on the Commission's ROE policy in light of the decision in *Emera Maine*." ROE NOI at P 28.

broader industry implications" of any decision in this case, as EEI and other Late Intervenors now argue they should be permitted to do in response to the policy changes adopted in Opinion No. 569.[20] If the Commission finds that Late Intervenors had good cause for not filing timely interventions at this stage, APPA and TAPS also had good cause.

Similarly, if the Commission concludes that allowing Late Intervenors to intervene at that stage will neither disrupt the proceedings nor prejudice or burden existing parties, the same finding should be made as to APPA and TAPS. If, for example, the Commission finds that consideration of the voluminous further argument and evidence that Late Intervenors and other commenters seek to have included in the record at this stage will not disrupt the proceedings or prejudice the existing parties to the dockets, then there would be no basis to deny late intervention to APPA and TAPS (or their motion to lodge). Finally, while the MISO CAPS have expertly represented their respective organizations and interests in these proceedings, if the Commission agrees that Late Intervenors representing interests beyond the MISO region (including trade groups for public utility transmission owners) are not adequately represented by the current parties to the proceeding,[21] the Commission should likewise find that current parties do not adequately represent the interests of APPA and TAPS.

[20] *See* EEI Filing at 19.

[21] *See, e.g.*, EEI Filing at 21; Motion to Intervene Out-of-Time, Motion to Lodge, and Request for Rehearing of WIRES LLC at 11-12.

C. Service and Communications

Communications regarding these proceedings should be directed to the following individuals, who should also be included on the Commission's official service list:

John Twitty
Executive Director
TRANSMISSION ACCESS POLICY STUDY GROUP
PO Box 14364
Springfield, MO 65814
(417) 838-8576
jtwitty@tapsgroup.org

John E. McCaffrey
Senior Regulatory Counsel
American Public Power Association
2451 Crystal Drive
Suite 1000
Arlington, VA 22202
(202) 467-2900
jmccaffrey@publicpower.org

Cynthia S. Bogorad
David E. Pomper
SPIEGEL & MCDIARMID LLP
1875 Eye Street, NW
Suite 700
Washington, DC 20006
(202) 879-4000
cynthia.bogorad@spiegelmcd.com
david.pomper@spiegelmcd.com

III. CONDITIONAL MOTION TO LODGE

APPA and TAPS also conditionally move to lodge their ROE NOI comments in the above-captioned dockets. A number of the Late Intervenors, including EEI and WIRES, have asked the Commission to accept their respective ROE NOI filings into the record of these complaint proceedings as the Commission considers requests for rehearing of Opinion No. 569.[22] If the Commission grants these requests, it should similarly accept the ROE NOI comments submitted by APPA and TAPS.

EEI argues, for example, that its comments from the ROE NOI "are directly relevant to the issues in Dockets Nos. EL14-12 and EL15-45 because they are directly responsive to the

[22] The following entities seek to lodge ROE NOI comments in the instant dockets: AEP PJM Transmission Owners; EEI; Indicated PJM Transmission Owners; PPL Electric Utilities; and WIRES.

proposal in the [MISO and *Coakley*] Briefing Orders."[23] EEI further contends that, in Opinion No. 569, "the Commission did not consider or respond either to the Initial or Reply Comments that EEI submitted to the Commission in the NOI proceeding, nor did it adequately explain how Opinion No. 569 relates to the NOI proceeding."[24] If this argument and the similar arguments made by other Late Intervenors are found to be persuasive, the Commission should also accept the APPA/TAPS ROE NOI comments into the record of this proceeding, as they are also "directly responsive" to the proposals contained in the MISO and *Coakley* Briefing Orders, and the Commission did not specifically address the APPA/TAPS comments in Opinion No. 569. Further, if it is deemed proper to consider on rehearing arguments and evidence from the ROE NOI submitted by EEI and other Late Intervenors, it would be inappropriate, and, indeed, arbitrary and capricious, to exclude arguments and evidence offered by APPA and TAPS that might provide a contrary perspective.

An example of an issue on which the APPA/TAPS ROE NOI comments would provide a more complete record is the use of the Expected Earnings model in evaluating and/or setting an allowed ROE. EEI, WIRES, and other Late Intervenors devote significant portions of their filings to arguments that the Commission erred in Opinion No. 569 by not relying on the Expected Earnings model in evaluating whether an existing ROE is just and reasonable, or in setting a new ROE. EEI indicates that its submissions from the ROE NOI proceeding, including witness affidavits, are germane to the Commission's consideration of this issue on rehearing.[25] The ROE NOI comments filed by APPA and TAPS also addressed these issues, showing that it

[23] EEI Filing at 22.

[24] *Id.* at 23-24.

[25] *See, e.g.*, EEI Filing at 30-31.

is inappropriate to rely on the Expected Earnings model in setting public utility ROEs, as the Commission correctly found in Opinion No. 569. As with the EEI filings, the APPA/TAPS comments in the ROE NOI proceeding were supported by expert witness statements, including statements from Bradford Cornell, Emeritus Professor of Finance at Anderson Graduate School of Management at the University of California, Los Angeles.[26] One of Dr. Cornell's principal recommendations was that the Expected Earnings model not be used in the Commission's ROE framework.[27] Any consideration given to ROE NOI material submitted by EEI, WIRES, and transmission owners in response to Opinion No. 569 should also take into account the ROE NOI comments submitted by APPA and TAPS.

IV. CONCLUSION

For the reasons set forth above, APPA and TAPS each conditionally moves to intervene out-of-time in Docket Nos. EL14-12-003 and EL5-45-000. If the Commission grants late intervention to some or all of the Late Intervenors, the Commission should likewise permit APPA and TAPS to intervene out-of-time. If the Commission denies the motions to intervene filed by the various Late Intervenors, the Commission should treat the instant APPA and TAPS motions to intervene as withdrawn. Further, APPA and TAPS each conditionally moves to lodge in Docket Nos. EL14-12-003 and EL5-45-000 their ROE NOI comments. If the Commission grants the motions to lodge filed by some or all of the Late Intervenors (and by Indicated PJM Transmission Owners), the Commission should grant the APPA/TAPS motion to lodge. If the Commission denies the motions to lodge filed by the various Late Intervenors (and by Indicated

[26] *See* Attachments A and B.

[27] *See* Attachment A, Associations Exh. No. A-1 at 4; Attachment B, Associations Exh. A-7 at 2-4.

PJM Transmission Owners), the Commission should treat the instant APPA and TAPS motions to lodge as withdrawn.

Respectfully submitted,

/s/ John E. McCaffrey
Delia Patterson
Senior Vice President, Advocacy & Communications and General Counsel
John E. McCaffrey
Senior Regulatory Counsel
THE AMERICAN PUBLIC POWER ASSOCIATION
2451 Crystal Drive
Suite 1000
Arlington, VA 22202
(202) 467-2900
dpatterson@publicpower.org
jmccaffrey@publicpower.org

The American Public Power Association

/s/ David E. Pomper
Cynthia S. Bogorad
David E. Pomper
SPIEGEL & MCDIARMID LLP
1875 Eye Street, NW
Suite 700
Washington, DC 20006
(202) 879-4000

Attorneys for the Transmission Access Policy Study Group

ATTACHMENT A

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Inquiry Regarding the Commission's Policy for Determining Return on Equity	Docket No. PL19-4-000

COMMENTS OF THE ALUMINUM ASSOCIATION, THE AMERICAN CHEMISTRY COUNCIL, THE AMERICAN FOREST & PAPER ASSOCIATION, THE AMERICAN PUBLIC POWER ASSOCIATION, THE ELECTRICITY CONSUMERS RESOURCE COUNCIL, THE INDUSTRIAL ENERGY CONSUMERS OF AMERICA, THE NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION, AND THE TRANSMISSION ACCESS POLICY STUDY GROUP

June 26, 2019

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

TABLE OF CONTENTS

I. INTRODUCTION 1

II. DESCRIPTION AND INTERESTS OF ASSOCIATIONS 2

III. COMMENTS 6

A. The Commission's base ROE policy should be designed to keep allowed base ROEs aligned with the cost of equity 6

1. A sound approach will detect changes to financial market conditions or to the riskiness of the subject utility, and otherwise hold steady 6

2. "Vintage" ROEs would fail to track the capital costs of continued ownership 11

B. Pipeline stocks' E/B ratios illuminate those ratios' disconnection from the cost of equity 14

C. The DCF model performs well across wide variations in interest rates and stock prices 15

D. When setting electric utility ROEs, dividend-paying U.S. electric utility stocks screened by credit ratings can provide risk-comparable and amply-sized proxy groups 21

1. Risk comparability is the core consideration in forming proxy groups, and in most cases can be achieved through bright-line standards 21

2. A properly distribution-based use of proxy group results would diminish the need to filter outlier results; with an (erroneous) range-based approach, improved filtering would be needed 26

3. Credit ratings should continue to be used to form risk-comparable proxy groups 34

4. A properly distribution-based use of proxy group results would enable simplified, bright-line screening of proxies for significant merger and acquisition activity 35

5. When a reasonably risk-representative proxy group cannot be formed, the available proxy group's results should be distilled to a percentile other than the median 36

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

6. Midpoints are inherently erratic and unrepresentative; the Commission should extend to RTO-wide ROEs the statistically superior policy, already applicable to most public utilities and all pipelines, of relying instead on medians 37

7. Associations are not commenting on proxy group size in pipeline cases 43

E. Combining multiple financial models advances reasonable ratemaking only if the added models are well-designed to identify the market cost of equity 43

1. Models based on E/B ratios or unrealistic equity portfolio returns do not aid in identifying the cost of equity 43

2. Combining multiple market-based models is reasonable *if* each applied model is well-designed 48

3. The technique used for combining multiple models should integrate model results for each proxy 53

4. Simple versus complex models 54

5. Models versus "judgment" 55

6. If properly used, state-allowed ROEs can provide a lagging, but useful, indicator of utilities' equity costs. 56

F. No "mismatch" results from applying the market cost of equity to net plant rate base 58

1. The cost that utilities incur to attract equity is determined in financial markets 58

2. The M/B ratios of utilities' *parents* exceed unity by much more than do the M/B ratios of utilities themselves 64

3. As nearly as is practical, allowed base ROEs should be set at the cost of equity 68

4. The DCF model's dividend yield term should not be replaced with dividends divided by book value 70

5. ROEs should be set so as to track the cost of equity, not to drive M/B ratios towards unity 71

G. Base ROEs exceeding the cost of equity should not be presumed just and reasonable 74

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

1. To assess whether existing ROEs remain just and reasonable, the Commission should compare them to the cost of equity indicated by well-designed market-based methods 74

2. Base ROEs exceeding the indicated equity cost should not be presumed to remain reasonable 75

3. Base ROE Complainants should remain obliged to present a *prima facie* case that the Base ROE being charged exceeds the equity cost indicated by applicable market-based empirical models 85

4. Any sub-range that would be added to the indicated equity cost of equity to determine the presumptively shielded level *should* be narrow, in both single-utility and regional ROE cases 88

H. The "mechanics and implementation" of equity cost estimation models should be designed to identify the study-period cost of equity 90

1. General and multi-model issues 90

a) Where the DCF distribution is what matters, analyst growth estimates should use a sources-weighted combination of IBES and a comparable aggregator 90

b) The Commission should rely on market-based models applied to exchange-traded proxies 94

2. Model-specific questions 96

a) DCF 96

(1) The longstanding composite-growth DCF model remains appropriate for electric utilities; if it were to be re-considered, the Commission should apply a multi-stage model 96

(2) A six-month DCF study period remains reasonable 98

b) CAPM 99

(1) Assuming perpetual growth at analysts' near-term rate does not produce a plausible equity-market risk premium 99

(2) Value Line betas for electric utilities are conservatively high, and should not be used in conjunction with a DCF-based equity market return for which the growth rate reflects analyst forecasts with only a five-year horizon 109

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

(3) Selective changes to the standard CAPM model should be rejected 111

c) Expected earnings 113

(1) The ratio of earnings to book equity is disconnected from the cost of equity, and therefore circular 113

(2) The justifications proffered for using E/B ratios in the vacated Opinion No. 531-B were not valid 121

(3) If E/B ratios are used, they should reflect multiple years' ratios 123

(4) If used, E/B ratios should be adjusted to account for how the proxies' equity ratios differ from those of the subject utility, and for how the proxies' M/B ratios differ from those of operating utilities 124

d) Risk premium 126

(1) Risk premium studies should compare the cost of equity as found for prior study periods to those study periods' contemporaneous actual bond yield 127

(2) The risk premium method assumes a linear relationship between cost of equity and bond yields; that assumption is not compatible with a finding of "anomalous capital market conditions" 129

(3) If used, the risk premium method should be adjusted for the subject utility's relative risk 130

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

I. INTRODUCTION

The Aluminum Association, American Chemistry Council, American Forest and Paper Association, American Public Power Association, Electricity Consumers Resource Council, Industrial Energy Consumers of America, National Rural Electric Cooperative Association, and Transmission Access Policy Study Group (collectively, "Associations") hereby provide their comments in response to *Inquiry Regarding the Commission's Policy for Determining Return on Equity*, 166 FERC ¶ 61,207 (2019) (the "NOI").[1] Associations appreciate the opportunity to provide their collective view[2] on these important issues.

The Federal Power Act's consumer-protection standard, as elaborated upon by decades of Commission and judicial case law, requires that base Returns on Equity ("ROEs") stay attuned to the cost of equity, as that cost rises or falls over the years. Considered in light of that objective, the approach floated in the NOI (and in the *Coakley* and MISO Briefing Orders it references[3]) is seriously flawed. Among other problems, three stand out as especially grievous:

- There is no rational basis to treat the expected Earnings-to-Book ("E/B") ratios of exchange-traded holding companies as estimates of the return opportunities available to utility investors;
- The Capital Asset Pricing Model ("CAPM") should not be distorted by pretending that a market-wide equity portfolio can sustain long-term growth vastly exceeding GDP growth; and

---

[1] Abbreviations and defined terms are used as those terms are used in the Notice of Inquiry. We refer to particular stocks by their exchange tickers.

[2] These Comments respond to the NOI, and necessarily (like the NOI itself) reference other pending proceedings to which individual members of the various associations are parties. Nothing in these Comments is intended to modify the position of individual parties in those proceedings.

[3] *Coakley v. Bangor Hydro-Elec. Co.*, 165 FERC ¶ 61,030 (2018) ("*Coakley* Briefing Order"); *Ass'n of Bus. advocating Tariff Equity v. Midcontinent Indep. Sys. Operator, Inc.*, 165 FERC ¶ 61,118 (2018) ("MISO Briefing Order").

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

- There is no statutory basis to presume that existing allowed ROEs remain just and reasonable despite exceeding the current cost of equity.

The Associations have sponsored expert testimony from two witnesses. The first is Dr. Bradford Cornell, Emeritus Professor of Finance at Anderson Graduate School of Management at the University of California, Los Angeles, who is a leading academic in the field of finance. His testimony, marked Exhibit A-1, addresses the choice between financial models, issues related to book values and market/book ratios, as well as details of how the Discounted Cash Flow ("DCF") and CAPM models should be used. Dr. Cornell's principle recommendations are that the Expected Earnings model not be used and that the specification of the DCF and CAPM models account for long-term limits to growth.

The second is Michael Gorman, Managing Principal of Brubaker & Associates, who has frequently testified on cost of capital issues before the Commission and numerous state regulatory commissions. His testimony, marked Exhibit A-2, addresses issues that have arisen in the Commission's cases, including specific issues related to the conduct of the DCF, CAPM, Expected Earnings, and Risk Premium methodologies.

II. DESCRIPTION AND INTERESTS OF ASSOCIATIONS

The American Public Power Association ("APPA") is the national service organization representing the interests of not-for-profit state, municipal and other locally owned electric utilities throughout the United States. More than 2,000 public power utilities provide over fifteen percent of all kilowatt-hour sales to ultimate customers and to businesses in every state except Hawaii. Collectively, public power systems serve over forty-nine million people. APPA utility members' primary goal is providing customers in the communities they serve with reliable electric power and energy at the lowest reasonable cost, consistent with good environmental

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

stewardship. This orientation aligns the interests of APPA member electric utilities with the long-term interests of the residents and businesses in their communities.

The National Rural Electric Cooperative Association ("NRECA") is the national service organization representing the interests of the nation's almost 900 member-owned, not-for-profit rural electric utilities. Rural electric cooperatives provide electric service to approximately forty-two million people in forty-seven states, representing twelve percent of the nation's electric customers, while delivering about thirteen percent of all electric energy (kilowatt-hours) sold in the United States. NRECA's member cooperatives include 831 distribution cooperatives and sixty-two generation and transmission ("G&T") cooperatives. The distribution cooperatives provide power directly to their end-of-the-line member-consumers. Nearly eighty percent of the distribution cooperatives are member-owners of G&T cooperatives that generate and transmit power to them. The remaining distribution cooperatives receive power directly from other generation sources within the electric utility sector. Both distribution and G&T cooperatives share an obligation to serve their members by providing safe, reliable, and affordable electric service. Many electric cooperatives are transmission customers of public utilities subject to the Commission's jurisdiction and thus will be directly affected by the Commission's policies to determine the allowed ROE in public utilities' transmission rates.

The Electricity Consumers Resource Council ("ELCON") is the national association representing large industrial consumers of electricity. ELCON member companies produce a wide range of products from virtually every segment of the manufacturing community. ELCON members operate hundreds of major facilities and are consumers of electricity in the footprints of all organized markets and other regions throughout the United States. Reliable electricity supply at just and reasonable rates is essential to our members' operations.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

The Transmission Access Policy Study Group ("TAPS") is an association of transmission-dependent utilities ("TDUs") in more than thirty-five states promoting open and non-discriminatory transmission access.[4] Representing entities entirely or predominantly dependent on transmission facilities owned and controlled by others, TAPS has long recognized the need for a robust transmission infrastructure to provide non-discriminatory transmission access and foster competition, thereby enabling TAPS members to meet their load reliably and affordably. As TDUs, TAPS members pay transmission rates that are substantially increased when the Commission allows ROEs that exceed the cost of equity. TAPS has therefore participated actively in numerous Commission proceedings concerning transmission planning, pricing, and incentives policies.

The Aluminum Association ("Association"), based in Arlington, VA, represents U.S. producers and sellers of primary aluminum, aluminum recyclers, producers of fabricated aluminum products, and industry suppliers. Overall, the aluminum industry directly and indirectly contributes nearly 1% of the U.S. GDP. The Association's policy priorities are focused on trade, infrastructure and transportation, environment and recycling, energy, and workforce development. In the energy area, the Association helps facilitate industrial access to diverse, affordable and reliable energy and raw materials and supports market-oriented, transparent and modernized regulations on energy transmission and ratemaking that reflect the needs of energy-intensive industries and other electricity consumers.

The American Chemistry Council ("ACC") represents the leading companies engaged in the business of chemistry. ACC members apply the science of chemistry to make innovative products and services that make people's lives better, healthier and safer. ACC is committed to

[4] David Geschwind, Southern Minnesota Municipal Power Agency, chairs the TAPS Board. Jane Cirrincione, Northern California Power Agency, is TAPS Vice Chair. John Twitty is TAPS Executive Director.

improved environmental, health and safety performance through Responsible Care®; common sense advocacy designed to address major public policy issues; and health and environmental research and product testing. The business of chemistry is a $526 billion enterprise and a key element of the nation's economy. It is among the largest exporters in the nation, accounting for ten percent of all U.S. goods exports. Chemistry companies are among the largest investors in research and development. Safety and security have always been primary concerns of ACC members, and they have intensified their efforts, working closely with government agencies to improve security and to defend against any threat to the nation's critical infrastructure.

The American Forest & Paper Association ("AF&PA") serves to advance a sustainable U.S. pulp, paper, packaging, tissue and wood products manufacturing industry through fact-based public policy and marketplace advocacy. AF&PA member companies make products essential for everyday life from renewable and recyclable resources and are committed to continuous improvement through the industry's sustainability initiative –Better Practices, Better Planet 2020. The forest products industry accounts for approximately 4% of the total U.S. manufacturing GDP, manufactures over $200 billion in products annually, and employs approximately 900,000 men and women. The industry meets a payroll of approximately $50 billion annually and is among the top 10 manufacturing sector employers in 45 states. AF&PA members own and operate facilities throughout the United States that rely upon the transmission of electricity by FERC-jurisdictional transmission owners. Accordingly, any changes to the Commission's transmission incentives policy will have a direct financial impact on AF&PA members.

The Industrial Energy Consumers of America ("IECA") is a nonpartisan association of leading manufacturing companies with $1.0 trillion in annual sales, over 3,700 facilities

nationwide, and with more than 1.7 milling employees worldwide. It is an organization created to promote the interests of manufacturing companies through advocacy and collaboration for which the availability, use and cost of energy, power or feedstock play a significant role in their ability to compete in domestic and world markets. IECA membership represents a diverse set of industries including: chemicals, plastic, steel, iron ore, aluminum, paper, food processing, fertilizer, insulation, glass, industrial gases, pharmaceutical, building products, automotive, brewing, independent oil refining, and cement.

III. COMMENTS

Our comments are organized to track the NOI outline. Each subpart begins by quoting (in italics) the NOI Question(s) to which it principally responds. Where doing so adds clarity and avoids repetition, we group and respond collectively to multiple consecutive questions.

A. The Commission's base ROE policy should be designed to keep allowed base ROEs aligned with the cost of equity

1. A sound approach will detect changes to financial market conditions or to the riskiness of the subject utility, and otherwise hold steady

A1. To what extent would the ROE methodology described in the Coakley *and MISO Briefing Orders impact the predictability of ROE determinations and the costs for market participants of making or intervening in such proceedings?*

A2. How would using the ROE methodology described in the Coakley *and MISO Briefing Orders affect an investor's ability to forecast the ROE the Commission would establish in a litigated proceeding and the ability of participants to propose, contest, and settle base ROEs as compared to using only the DCF methodology?*

A3.Currently, public utilities in different Independent System Operators (ISOs) or RTOs may receive different ROEs, despite all using national proxy groups, due primarily to differences in when FPA section 205 or 206 proceedings were initiated. Are such variations justified, and, if not, should the Commission consider applying the same ROE to all utilities in RTOs/ISOs based on the most recent proceeding?

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

These three questions are inter-related; they all concern the predictability and variability of the proposed "new approach"[5] described in the *Coakley* and MISO Briefing Orders (hereinafter, the "Proposed New Approach" or "PNA"). Before addressing them, it is worth taking a step back to identify the objectives that should frame review and adjustment of base ROEs. These objectives should not be controversial.

- Base ROEs should be set at, and adjusted to stay attuned to, the cost of equity, as that cost rises or falls over the years.[6]
- The approach[7] used to estimate the cost of equity should achieve reasonably consistent and predictable results across cases and over time. This objective requires that the approach and its underlying methods take account of changed financial market conditions, without being overly sensitive to minor variations in proxy group composition or study period. When the regulated entity at issue is more or less risky (compared to one at issue in another contemporaneous case), or when financial market conditions change moderately, the approach used should produce *commensurately* higher or lower results.
- The approach used to identify the cost of equity should be designed to do that specific job well. Base ROEs (which apply to utilities' entire rate bases, including facilities built long ago) should not be distorted in pursuit of policy goals related to providing incentives for new construction or other initiatives. Rather, those policy goals should be addressed through explicit, tailored, and explicitly justified incentives. And the approach used to determine base ROEs should not be distorted in an effort to produce ranges that have a desired effect in allowing or cabining incentive ROE adders.
- These objectives, not past practice, should drive the resolution of the issues raised in the NOI. This means that techniques other than the Commission's longstanding DCF

[5] *Coakley* Briefing Order PP 19, 31.

[6] *See* Part III.F.3, *infra* (addressing NOI Question F3).

[7] As discussed in Parts III.E and III.H.1.b), *infra*, in future cases, the Commission could reasonably employ a combination of market-based techniques for estimating the cost of equity, such as DCF, CAPM, and risk premium. We will hereafter use the singular "approach" to encompass integration of multiple techniques—but we do so for ease of reading, not to prejudge that issue.

> method should be used *if but only if* doing so promotes accurate and predictable equity cost estimation. It also means that practices that were adopted to deal with past case-specific situations should be discarded if they are no longer useful.

An approach that meets these objectives will advance the Commission's primary mission of keeping regulated rates cost-based, and produce a host of other benefits. If the ROE determination method is sound, it will produce similar results over time, absent a substantial change to financial market conditions or to the riskiness of the subject utility. Consequently, absent such changes, neither regulated entities nor potential complainants would find it worthwhile to seek to change an existing allowed ROE. And if they did, by producing consistent and predictable results, a well-designed approach will promote settlement and otherwise enable more rapid resolution of ROE litigation. Relatedly, a well-designed approach would keep the focus of ROE litigation on issues that will be instructive for subsequent cases, rather than on one-off controversies such as whether particular companies belong in the proxy group for a particular case.

Unfortunately, the PNA does not meet these design objectives. The particular flaws in its underlying cost-estimating methods will be addressed below, in the Parts addressing specific techniques.[8] But one over-arching flaw bears discussion here, because it goes directly to NOI Question A1 regarding predictability.

Any approach that relies on *ranges* of proxy results (that is, on the single lowest and single highest retained result among the larger number of results generated by a sizeable proxy group), rather than utilizing all of the information found in the *distribution* of retained proxy group results, is antithetical to predictability. Elementary statistics teach that the extremes of ranges vary widely from sample to sample. Consequently, discarding information on the

[8] *See* Parts III.E and III.H, *infra*.

distribution of proxy results and considering only their extremes is statistically indefensible.[9] Reviewing courts have likewise recognized this point.[10] *Emera Maine v. FERC*[11] found it significant that the 10.57% percent base ROE of Opinion No. 531 "was higher than 35 of the 38 data points FERC used to construct its DCF zone of reasonableness."[12] The reason is obvious: each of the retained proxy results from a properly-conducted study provides important information on the cost of equity. The midpoint of a range is "'an obvious place to begin'" only when there is no other information provided by the distribution of results within that range. *See Emera Maine* at 30 (quoting *Tenn. Gas Pipeline Co. v. FERC*, 926 F.2d 1206, 1213 (D.C. Cir. 1994)).

Here is an experiential proof of this point. Select at random fifteen of the U.S.'s fifty states, and rank them by land area.[13] Your sample's median-size (eighth-largest) state is similar in size to Wisconsin and Florida (each about 53,000 square miles), right? But what's the sample's smallest state? It will vary widely, depending on whether or not you happened to draw Rhode Island, or Delaware, or neither. And what's the sample's largest state? It too will vary widely, depending on whether or not you happened to draw Alaska, or Texas, or neither.

Objections have frequently been raised regarding the Commission's use of the midpoint of the proxy group range of returns to set the authorized base ROE for transmission owners ("TOs") in ISO-NE and MISO, with parties arguing that use of the midpoint places too much emphasis on highest and lowest proxy group results. While Associations are gratified that the

---

[9] *See, e.g.*, *S. Cal. Edison Co.*, 131 FERC ¶ 61,020 (2010), *reh'g denied*, 137 FERC ¶ 61,016 (2011) *review granted in part and denied in pat sub nom. S. Cal. Edison Co.*, 717 F.3d 177 (D.C. Cir. 2013); *Nw. Pipeline Corp.*, 99 FERC ¶ 61,305 (2002).

[10] *See S. Cal. Edison Co v. FERC*, 717 F.3d 177 (D.C. Cir. 2013).

[11] 854 F.3d 9 (D.C. Cir. 2017).

[12] *Id.* at 28.

[13] This example is based on the sortable list of state land areas by size at column six of https://en.wikipedia.org/wiki/List_of_U.S._states_and_territories_by_area.

Commission may be willing to consider revisiting that policy,[14] the PNA, as proposed, would rely on ranges in contexts where that problematic measure has not previously been used. For example, if "applying the same ROE to all utilities in RTOs/ISOs based on the most recent proceeding" (as proposed in Question A3) meant extending to other Regional Transmission Operators ("RTOs") the range-based (midpoint, or upper midpoint) technique heretofore used only in MISO and New England, the result would be arbitrary. Such an approach would erroneously discard the Commission's correct and judicially-affirmed determination that medians serve better than midpoints in capturing the representative value from a proxy distribution. Much the same can be said of the PNA's "quartile" proposal, under which an existing ROE would be presumed to remain just and reasonable unless it exceeded the center of a composite range by one eighth of a composite range width.[15] Beyond the other shortcomings of that proposal,[16] relying on one eighth of the range width would give erratic, range-based measures new and wider significance.

A fortiori, the Commission should not consider applying the same ROE to all utilities in RTOs/ISOs based on the most recent ROE proceeding, as proposed in Question A3. Such an approach would err in ignoring differences between different RTO participants and rate contexts. For example, in *New York Independent System Operator, Inc.*[17] the Commission approved a settlement agreement that incorporated a 9.65% base ROE for New York Transco, LLC, an RTO participant[18]. In Docket No. ER19-1553, Southern California Edison ("SCE") is contending that wildfire-related risks make California transmission ownership uniquely risky and warrant a base

[14] *See* Part III.D.6, *infra* (addressing Question D10).

[15] *See* Part III.G, *infra*.

[16] *See id*.

[17] 161 FERC ¶ 61,161 (2017).

[18] *See* N.Y. Transco LLC, Explanatory Statement in Support of Offer of Settlement at 6 (Aug. 21, 2017), eLibrary No. 20170821-5036.

ROE of 17.12%.[19] An approach under which the most recent RTO-participant transmission ROE result controls the ROE for all RTO-participating TOs, such that both SCE and N.Y. Transco would receive the same base ROE, would imply either *per se* disregard of SCE's claim to unique risks, or that SCE's allowed ROE would control the allowed base ROE for N.Y. Transco, notwithstanding its 2017 settlement. Neither approach would be reasonable. SCE's allowed ROE should reflect the record evidence as to SCE's particular cost of transmission equity, and that outcome should not be imputed to N.Y. Transco.

2. "Vintage" ROEs would fail to track the capital costs of continued ownership

A4. Should the ROE reflect the cost of capital at the time of the investment or be subject to adjustment to reflect the contemporary ROE required by investors?

A4.a. Should the Commission consider a "vintage approach," with ROE fixed for the life of the asset at the time that each asset was completed?

A4.b. Would such a "vintage approach" need to be coupled with an annual national default ROE for investments made in that year, so as to minimize the need for numerous annual litigated ROE proceedings for each public utility that made an investment during that year? What procedure should be used to determine such a default ROE?

A utility company's cost of equity is the return that equity investors require in order to be induced to have their capital invested in the company's assets used to provide regulated utility service.[20] But investors invest in the utility company, not in particular assets. The utility company's current cost of the equity invested in a long-lived utility asset is not the cost (or, rather, costs[21]) of equity when the asset was built, or its costs when the asset entered service, any

[19] *See* SEC, Transmission Owner Tariff Transmission Rate Filing, Transmittal Letter at 11 (Apr. 11, 2019), eLibrary No. 20190411-5001; *see also S. Cal. Edison Co.*, 167 FERC ¶ 61,214 (2019) (establishing hearing procedures).

[20] *See Coakley* Briefing Order P 36 n.73 ("A utility's cost of equity is the return that the utility must provide its shareholders in order to induce them to invest their capital in that utility. A utility's ROE is the return that the utility generates by using that invested capital in its operations."); MISO Briefing Order P 38 n.68 (same).

[21] Construction takes time, and transmission projects may be completed and placed into service in phases. Thus, in addition to the conceptual error addressed in the text, a "vintage approach" would require more than one allowed base ROE per rate base asset.

more than the cost of natural gas or coal burned in a generating plant stays tied to the low, or high, costs that the relevant fuel had when the plant was being built or entered service. Because capital is mobile, at any given time the original cost of inducing it to stay invested in a utility company is the market-based cost of capital attraction, which equals the return then available in capital markets for other investments of comparable risk. For example, the vast majority of new equity capital raised by utilities or their parents is raised by retaining earnings (rather than issuing new stock). The cost of inducing shareholders to allow their company's earnings to be reinvested rather than paid out to shareholders is those shareholders' "opportunity cost," meaning the return that "stockholders themselves could earn on alternative investments of equivalent risk."[22]

If a "vintage approach" to ROEs were correct, a logical way to apply it to electric utilities would be to permanently tie each asset's ROE to its Allowance for Funds Used During Construction ("AFUDC") rate, as specified in the Uniform System of Accounts, 18 C.F.R. pt. 101, Electric Plant Instruction No. 3(17), including its weighted reflection of the cost of short-term debt. But that approach would be erroneous, because the short-term debt and other funds that finance the initial construction of a long-lived asset do not remain invested in that asset permanently. Rather, they are refinanced when they mature or the cost of capital declines, whichever comes first.

The proposed approach likewise runs contrary to settled law. The capital attraction standard of *Hope*[23]and *Bluefield*[24] contemplates that ROE results will vary over time as the cost

---

[22] Michael C. Ehrhardt & Eugene F. Brigham, *Corporate Finance: A Focused Approach* at 344-45 (4th ed. 2011), https://epdf.pub/download/corporate-finance-a-focused-approach-4th-edition-2010.html.

[23] *FPC v. Hope Nat'l Gas Co*., 320 U.S. 591, 603 (1944) ("*Hope*") (A just and reasonable return is "commensurate with returns on investments in other enterprises having corresponding risks" and "should be sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain [a utility's] credit and to attract capital.").

[24] *Bluefield Waterworks & Improvement Co. v. Pub. Serv. Comm'n*, 262 U.S. 679, 693 (1923) ("*Bluefield*") ("The

of capital changes: "A rate of return may be reasonable at one time and become too high or too low by changes affecting opportunities for investment, the money market and business conditions generally."[25] When the cost of capital rises, that means investors expect a correspondingly higher cost-based return, even if the utility in which their capital has been invested does not issue new shares or increase its net rate base. As debt rolls off a prudent utility's balance sheet and is replaced with new debt bearing a different interest rate (whether due to re-financing or bond issuances reaching maturity), the utility's cost of debt changes. In effect, a comparable form of capital cost updating applies to equity, only it occurs continuously rather than as debt revolves. Indeed, a utility's capital structure generally will vary over time, in part because the relative cost of debt and equity changes over time. Nobody would contend that a utility that meets the standards for application of an actual capital structure should have multiple asset-by-asset capital structures with each asset's capital structure permanently tied to what it was during construction. Capital structures change. This variation proves that over the course of its long life, a given utility asset is not funded exclusively by the financing that was in place when it entered service.

In short, the capital cost of continuing to own an asset is not fixed at the cost of capital prevailing when it was built or completed. Accordingly, a "vintage approach" would depart from the ongoing cost of continuing to finance assets.

In addition to being conceptually erroneous, a "vintage approach" risks causing financial distress to utilities or their customers. When inflation, interest rates, and the cost of equity soared

---

return should be reasonably sufficient to assure confidence in the financial soundness of the utility and should be adequate, under efficient and economical management, to maintain and support its credit and enable it to raise the money necessary for the proper discharge of its public duties.").

[25] *Id.*; *see also Hope* at 615 ("This is not an order for all time. The Act contains machinery for obtaining rate adjustments.").

in the 1970s, utility rate bases largely consisted of assets that had entered service when capital costs were much lower. If their allowed ROEs had been pegged to pre-1970s costs of equity, they would have greatly under-recovered their capital costs, suffering an extreme version of "regulatory lag" at a time of rising costs. Conversely, vintage ROEs established when capital costs are high could become excessive when capital costs decline. If adopted, the "vintage approach" described in the NOI would set the industry up for either scenario. In extreme circumstances, a public utility might claim a vintage approach deprives it of the return required by the Constitution and the FPA, and measures to avoid that result could devolve into a one-way street in which too-low vintage ROEs are raised to market levels but excessive vintage ROEs remain in place—inflating the company's overall allowed return.

B. Pipeline stocks' E/B ratios illuminate those ratios' disconnection from the cost of equity

B3. Given the tendency of the Expected Earnings methodology to produce more high-end outliers than the other methodologies, would there be a sufficient number of natural gas and oil pipeline proxy members to implement the Expected Earnings methodology for gas and oil pipelines?

Associations' relevant interests center on electric transmission issues, and Associations therefore take no collective position in these comments on issues specific to ROEs for pipelines. However, Question B3 bears on electric transmission ROEs, because the E/B ratios of pipeline stocks illuminate how arbitrary it would be to view E/B ratios as indicating the cost of equity. The "Expected Earnings" component of the PNA would look to the E/B ratios forecast by Value Line for the period three-to-five years ahead.[26] For exchange-traded major stocks classified by Value Line as in the "oil/gas distribution" industry (the sector in which Value Line classifies pipeline stocks), those forecasts currently include 37.0% for Cheniere Energy;[27] 22.0% for

[26] *Coakley* Briefing Order PP 49-50.

[27] May 31, 2019 Value Line report for LNG (forecast return on shareholder book equity).

Enterprise Product Partners, L.P.;[28] 42.0% for Magellan Midstream Partners, L.P.;[29] 26.5% for Oneok, Inc.;[30] and 16.0% TransCanada Corp.[31] Because Commission-allowed pipeline ROEs are much lower, if those E/B ratios corresponded to pipelines' actual costs of equity, pipelines would be vastly under-recovering their cost of equity, and consequently would not be investing in new assets. But the facts are to the contrary.

Accordingly, the fundamental problem with the E/B method is not that it produces too few data points to be used for pipelines. The fundamental problem is that the data points it produces do not indicate the cost of equity.

C. The DCF model performs well across wide variations in interest rates and stock prices

C1. The DCF model assumes stock prices are equal to the present value of projected future cash flows. Is there evidence of situations when these assumptions are inaccurate?

C2. Have current and projected proxy company earnings over the last 10 to 20 years increased in a manner that would justify any increases in their stock prices over the same period, consistent with DCF model assumptions?

C3. How does the DCF methodology perform over a wide range of interest rate conditions?

C3.a. What specific assumptions of the DCF model, if any, do not work well in low or high interest rate environments?

C3.b. Is there evidence that the volatility of price-to-earnings ratios over the last 10 to 20 years, assumed to be constant in the DCF methodology, has been driven by the wide swings in interest rates over this period? If so, would the constant P/E assumption impact the award of reasonable ROEs?

The use of DCF modelling is well-accepted among both academic researchers and finance industry practitioners, including for electric utility stocks. The DCF model does assume that stock prices are equal to the present value of projected future cash flows, but that is an

[28] May 31, 2019 Value Line report for EPD (forecast return on partners' book capital).
[29] May 31, 2019 Value Line report for MMP (forecast return on partners' book capital).
[30] May 31, 2019 Value Line report for OKE (forecast return on shareholder book equity).
[31] May 31, 2019 Value Line report for TRP (forecast return on book common equity).

entirely reasonable assumption: future cash flows are what investors receive in exchange for putting present liquid funds into stocks, and there is no evidence that stock prices fail to reflect the discounted present value of investors' projected future cash flows. As Mr. Gorman explains,[32] the DCF method is especially well-suited to electric utility stocks, given that both the method and utility stocks focus on present and future dividends as the means through which investors obtain returns.

Contrary to the NOI's implicit premises, none of the DCF method's assumptions depends on a specific interest rate environment or on a constant price-to-earnings ("P/E") ratio. Indeed, when the Commission first embraced the DCF method—in the early 1980s—interest rates were much more historically atypical than they are now. *See, e.g.*, *Generic Determination of Rate of Returns on Common Equity for Pub. Utils.*, Order No. 420 31 FERC ¶ 61,168, FERC Stats. & Regs. at 31,344 (concluding that DCF-based benchmark public utility ROE of 15.25% was consistent with the "12.0-12.25 percent average interest rate on U.S. government bonds for the base year" and the "13.5 percent interest rate on newly issued public utility bonds for the base year").[33] Similarly, P/E ratios varied widely from the time the Commission began considering use of the DCF method (in the late 1970s[34]), through its early 1980s embrace of the method, and thereafter.[35]The Commission relied on the DCF method, alone, through widely diverse financial

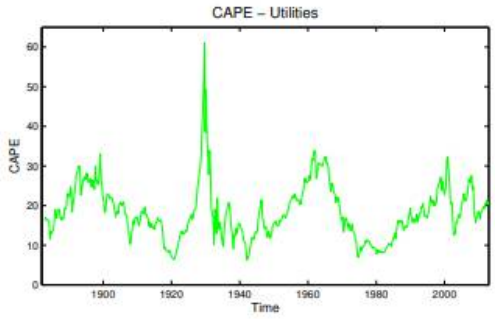
[32] *See* Ex. No. A-2, § C3.

[33] *Reh'g denied*, Order 420-A, 32 FERC ¶ 61,257 (1985).

[34] *See Coakley v. Bangor Hydro-Elec. Co.*, Op. No. 531, 147 FERC ¶ 61,234, P 14 n.26 (2014) ("The Commission first took cognizance of the DCF methodology in public utility cases as far back as the 1970's. *See, e.g.*, *Minn. Power and Light Co.*, 3 FERC ¶61,045, at 61,132-33 (1978). . . . ")

[35] *See* Oliver D. Bunn & Robert J. Shiller, Cowles Found. Discussion Paper No. 1950, *Changing Times, Changing Values: A Historical Analysis of Sectors Within The US Stock Market 1872-2013 at* 17 (June 2014), https://cowles.yale.edu/sites/default/files/files/pub/d19/d1950.pdf . These leading authors on P/E ratios present this chart of cyclically-adjusted utility P/E ratios:

market conditions, such as those of study periods that encompassed the exceptionally strong economic recovery of 1984–85,[36] the market turmoil following the terrorist attacks of September 2001,[37] the financial crisis of late 2008,[38] and the recovery of mid-2010.[39] Dr. Morin, in the textbook cited by the NOI, enumerates both "[t]he four crucial assumptions of the general DCF model" and four additional assumptions underlying the mathematically more tractable "standard DCF model."[40] None of these eight assumptions requires a constant interest rate or a constant P/E ratio.[41] In a later passage labelled "Musings on DCF," Morin asserts that the "infinite growth DCF model assumes a constant market valuation multiple, that is, a constant price/earnings (P/E) ratio,"[42] but this assertion is tied to the flawed model in which first-stage earnings growth is assumed to continue forever.[43]



[36] *See Bos. Edison Co. v. FERC*, 885 F.2d 962, 965-66 (1st Cir. 1989) (affirming exclusive reliance on DCF analysis for a study period of November 1984–April 1985).

[37] *See Midwest Indep. Transmission Sys. Operator, Inc.*, 99 FERC ¶ 63,011, P 33, *aff'd*, 100 FERC ¶ 61,292 (2002), *reh'g denied*, 102 FERC ¶ 61,143 (2003), *remanded sub nom. Pub. Servs. Comm'n of Ky. v. FERC*, 2004 WL 222900, *on remand*, 106 FERC ¶ 61,302 (2004) ("*MISO*"), *aff'd in part sub nom. Pub. Serv. Comm'n of Ky. v. FERC*, 397 F.3d 1004 (D.C. Cir.) ("*PSCKY*"), *on remand*, 111 FERC ¶ 61,355 (2005).

[38] *See S. Cal. Edison Co. v. FERC*, 717 F.3d 177, 180 (D.C. Cir. 2013).

[39] *See Atl. Grid Operations A LLC*, 135 FERC ¶ 61,144, PP 94-95 & n.62 (2011).

[40] Roger A. Morin, *New Regulatory Finance* at 251-52, 255-56 (Pub. Utils. Reports 2006).

[41] The terminal stock price variant of the DCF model assumes a constant ratio, but the Commission has not used that variant, and should not adopt it now.

[42] *Id.* at 432.

[43] *See id.*; *see also id*. at 433-34 (providing a hypothetical that turns on equating investors' expected return with their return over a single year next during which the P/E ratio rises, rather than the long-term expected return provided through expected dividends and the price appreciation they induce).

Thus, when Question C2 asks whether utility proxy company earnings have increased in recent decades "in a manner that would justify any increases in their stock prices over the same period, consistent with DCF model assumptions," it misstates what the DCF model assumes. This error has multiple dimensions. First, the DCF model is forward-looking, and forward expectations of utility earnings can increase even if past earnings have been flat. Second, the earnings-related factor that is central to the DCF method projects earnings *growth* (not earnings as such), because the earnings growth rate is a key factor in predicting the sustainable rate of growth in dividends. Third, if investors' willingness to defer consumption increases—that is, if the discount rate for which the DCF method solves decreases—then share prices will increase even if nothing else changes, because future dividends will have a higher present value. Fourth, "[a] utility's cost of equity is determined, at least in part, by comparison with other potential investments. As the return on those investments fluctuates, so too will the utility's cost of equity and, by extension, the ROE needed to service that cost of equity."[44]

Fifth and most fundamentally, the market price of stocks, including the electricity sector stocks referenced in Question C2, reflects supply and demand. Both of those factors reflect the returns available on other, risk-comparable investments, [45] and both can change for reasons independent of the stock's risk. As shown in the figure below (reproduced from the Credit Suisse *Global Wealth Report*[46]), total global wealth has nearly *tripled* since 2000, as China's economy boomed, Eastern Europe transitioned to market economics, *etc*. Even before most of this growth,

---

[44] *Coakley* Briefing Order P 29; MISO Briefing Order P 31.

[45] The demand side of this equation is intuitively obvious. The supply side may not be as obvious, but it too exists; low debt costs make it more likely that utilities needing new financing will issue debt rather than new equity shares.

[46] Credit Suisse Research Inst., *Global Wealth Report 2018*, at 13 fig. 2 (2018) https://www.credit-suisse.com/corporate/en/research/research-institute/global-wealth-report.html.

Ben Bernanke, who subsequently chaired the Federal Reserve, observed[47] the existence of a "global savings glut" that was increasing security prices. Meanwhile, population growth has slowed,[48] and with it the demand for investments in new durable assets to serve growing populations. For example, the sizeable increase in European wealth (shown in the second-from-bottom band of Credit Suisse's Figure 2 below) occurred even while "[f]ertility in all European countries is now below the level required for replacement of the population in the long run (around 2.1 births per woman, on average) and, in most cases, has been below the replacement level for several decades."[49] Contemporaneously, foreign capital has flooded into U.S. utility ownership. As of 2017 (the most recent year available), foreign *direct* investment in U.S. electric power generation, transmission, & distribution totaled almost $76 billion, a 23% increase over five years,[50] and foreign ownership of shares of U.S. utility equities is likely several times larger.[51] Much as electricity consumers should benefit when fuel supplies outstrip fuel demand

---

[47] Ben S. Bernanke, *The Global Saving Glut and the U.S. Current Account Deficit* (Mar. 10, 2005), http://www.federalreserve.gov/boarddocs/speeches/2005/200503102/.

[48] *See* U.N. Dep't of Econ. & Soc. Affairs, Population Div., *World Population Prospects 2019*, https://population.un.org/wpp/ (last visited June 21, 2019). Using the U.N.'s interactive data query function, from 1950-1990, the average annual rate of population change (averaged in five-year increments) ranged from 1.78% to 2.05%. That average declined steadily from 1990 to 2015, declining from 1.51% to 1.18%. Currently (from 2015 to 2020, combining actual data with projections), it is 1.09%. Over the succeeding 40 years, it is projected to continue declining steadily, from 0.98% to 0.38%.

[49] U.N. Dep't of Econ. & Soc. Affairs, Population Div., *World Population Prospects: Key Findings and Advance Tables*, at 5 (rev. 2017), (https://population.un.org/wpp/Publications/Files/WPP2017_KeyFindings.pdf).

[50] Org. for Int'l Invest., *Foreign Direct Investment in the United States 2018*, App. B (2018), https://ofii.org/dmfile/FDIUS-2018-Report.pdf.

[51] Data on such ownership broken out by sector is not readily available, but taking U.S. equities as a whole, non-U.S. investors currently hold approximately $7.3 trillion of U.S. corporate equities. *See* Bd. of Governors of the Fed. Reserve Sys., *Financial Accounts Guide*, tbl.L.133 (June 6, 2019), https://www.federalreserve.gov/apps/FOF/guide/L133.pdf. That is 24% of U.S. equities' market capitalization, which was $30.4 trillion as of year-end 2018. *See* World Bank, *Market Capitalization of Listed Domestic Companies (Current US$)*, (last visited June 21, 2019) https://data.worldbank.org/indicator/CM.MKT.LCAP.CD?locations=US. Applying that 24% ratio to the year-end 2018 market capitalization of the 43 utility equities included in the Edison Electric Institute Index ($731 billion, *see* Edison Elec. Inst., Stock Performance tbl.XI (Q4 20-18), http://www.eei.org/resourcesandmedia/industrydataanalysis/industryfinancialanalysis/QtrlyFinancialUpdates/Pages/default.aspx, one can estimate that non-direct, portfolio investment by foreign investors in U.S. utilities is approximately $175 billion.

and thereby decrease the market price of fuel, electricity consumers should benefit when capital supplies outstrip capital demand and thereby decrease the market price of capital.

In short, the cost of equity identified by the DCF method reflects factors such as investors' relative preference for current dollars in comparison to future dollars, investors' risk perceptions of utilities, returns on alternative investments, and capital supply and demand. Consequently, utility stock prices can vary if any of these factors change, even with no change to realized or expected utility earnings.[52]

[52] *See Generic Determination of Rate of Return on Common Equity for Pub. Utils.*, Order No. 489, 42 FERC ¶ 61,122, FERC Stats. & Regs. at 30,990 (finding that prices in the DCF model change in response to "expectations about the real interest rates, the expected rate of inflation, and the 'risks' associated with owning a particular stock."), *reh'g denied*, Order No. 489-A, 42 FERC ¶ 61,390 (1988); Berry Aff., Initial Paper Hearing Brief of MISO Complainant-Aligned Parties, Ex. No. OMS-100, P 23, *Ass'n of Bus. Advocating Tariff Equity v. Midcontinent Indep. Sys. Operator, Inc.*, No. EL14-12-003 (Feb. 13, 2019), eLibrary No. 20190213-5140; *See also id.,* Solomon Test., Ex. No. JCI-100, at 22-23 (the required rate of return for which the DCF formula solves "certainly changes over time and is influenced by a myriad of factors in addition to expected growth in earnings/dividends. Such factors include expected opportunity costs, or expected returns that might be earned on alternative investments, changes in risk perceptions, changes in risk tolerance, changes in a desire for current income versus longer-term capital gains, expectations about inflation, expectations about real interest rates, expectations about the U. S. economy in general and various sectors of the U. S. economy specifically as well as expectations about the global economy, among others. Under the DCF theory, as those factors change, stock prices will change even if earnings or expected growth

D. When setting electric utility ROEs, dividend-paying U.S. electric utility stocks screened by credit ratings can provide risk-comparable and amply-sized proxy groups

1. Risk comparability is the core consideration in forming proxy groups, and in most cases can be achieved through bright-line standards

D1. Should proxy groups for electric utilities, as well as natural gas and oil pipelines, consist only of companies with corresponding regulated businesses?

D1.a. For companies with a combination of regulated and unregulated businesses, should a company be required to derive a certain percentage of its revenues from the applicable regulated business in order for that company to be included in the proxy group that is used to determine an ROE for a company in that regulated business?

D1.b. Are the corresponding proxy groups sufficiently large given the continued consolidation in the industries?

D2. Should risk be considered both in the proxy group selection and in the placement within the zone of reasonableness?

D2.a. Should the Commission's approach to proxy group selection change depending on which financial models it considers when determining the just and reasonable ROE and, if so, how?

D3. Should the Commission consider non-energy companies when selecting proxy groups?

D3.a. What non-energy industries or securities have comparable risk to public utilities and natural gas and oil pipelines, if any?

D3.b. Do certain non-energy industries or securities feature fewer outliers?

Opinion No. 531 correctly recited precedent setting forth the purpose of proxy groups, and the corresponding touchstone in determining what companies to include:

> [T]he purpose of the proxy group is to 'provide market-determined stock and dividend figures from public companies comparable to a target company for which those figures are unavailable. . . . It is thus crucial that the firms in the proxy group be comparable to the regulated firm whose rate is being determined. In other words, as the court emphasized in *Petal*, the proxy group must be risk-appropriate.[53]

---

in earnings/dividends do not change.")

[53] Opinion No. 531, P 46 n.184 (quoting *Petal Gas Storage, L.L.C. v. FERC*, 496 F.3d 695, 699 (D.C. Cir. 2007)) (internal quotation marks omitted); *Composition of Proxy Groups for Determining Gas and Oil Pipeline Return on*

Thus, the primary consideration in forming proxy groups is that they be tightly representative of the subject utility's risk. An important secondary consideration is that all else equal, a larger group provides more assurance that a reasonable statistical interpretation of the results from financially modelling that group will resemble what would result if the subject utility could be modeled directly.[54] In practice, those two goals are in tension: loosening proxy group composition criteria enlarges the resulting proxy group, but brings in companies that are less representative.

The best way to balance these competing considerations depends on how the proxy group results are used. If the Commission were to focus on the *range* of proxy results (erroneously, in our view[55]) then the proxy group should be small and very tightly representative, as the disparate results from modeling less-representative proxies are likely to determine the range.[56] In the remainder of this subpart, however, we will assume that the Commission avoids that error, and looks to the median (or other applicable percentile) of the proxy group distribution.[57] In that case, the best way to balance individual-proxy representativeness with larger-group statistical reliability would involve three principles. The Commission should

- One, promulgate generally-applicable criteria for proxy group formation that will produce amply-sized proxy groups in the great majority of cases;

Equity, 123 FERC ¶ 61,048, at P 48 (2008).

[54] All else equal, with a larger proxy, the unavoidable respects in which any one proxy group member differs from the subject utility will be offset by countervailing differences of other proxy group members.

[55] *See* Part III.A.1, *supra*, and Parts III.D.2 and III.D.6, *infra*.

[56] *See Ark. Elec. Coop. v. ALLETE, Inc.*, 155 FERC ¶ 63,030, PP 51-53 (2016) (characterizing as "sound," and applying, argument that where range ends determine the allowed ROE, a "conservative" (i.e., restrictive) approach should be taken in admitting candidate stocks into the proxy group), *corrected*, No. EL15-45-000 (July 1, 2016), 156 FERC ¶ 63,004 (2016), and 165 FERC ¶ 63,021 (2018).

[57] The *Coakley* Briefing Order suggests an intention to "continue to use the midpoint of the zone of reasonableness as the appropriate measure of central tendency for a diverse group of average risk utilities and the median as the measure of central tendency for a single utility." *Id.* P 17 n.46. The representative distribution's median (or other risk-appropriate percentile) certainly should continue to be used in single utility cases, but, as discussed herein, the Commission should reconsider its proposal to rely on the midpoint of the zone of reasonableness when establishing an RTO-wide ROE.

- Two, identify a minimum number of proxies and provide that some criteria may be relaxed if necessary to gather that minimum number; and
- Three, provide that where proxy group composition criteria are relaxed in order to gather more proxies, the placement of the allowed base ROE within the proxy group distribution will be adjusted to reflect any resulting lack of proxy-utility risk comparability.

We further suggest the following specific population targets for the first and second principles, in electric utility cases. The generally-applicable proxy group criteria should be designed to usually produce initial proxy groups with ten to thirty members. That is, the generally-applicable criteria should be considered overly stringent if they usually identify fewer than ten candidate proxies, and overly loose if they usually produce more than thirty candidate proxies. In a particular case where the standard bright-line criteria and any further judgmental criteria (such as excluding companies engaged in substantial mergers or acquisitions) produce a group with fewer than four members (the minimum proxy group size identified in prior case law, and reasonably so[58]), the proxy group composition criteria should be loosened for that case, and the third principle should then come into play.

In that framework, each of the PNA's three bright-line exclusion criteria is reasonable. These criteria require exclusion of companies that either (1) are not classified by Value Line as exchange-traded U.S. electric utility stocks; (2) have no credit rating from either Moody's or S&P, or have a rating from either source that is more than one notch different from that of the subject utility; or (3) either pay no dividends or have made or announced a dividend cut during

[58] *See High Island Offshore Sys., L.L.C.*, 110 FERC ¶ 61,043, PP 117, 118, 124, *reh'g denied*, 112 FERC ¶ 61,050, *clarified*, 113 FERC ¶ 61,280 (2005), *aff'd in part and vacated in part sub nom. Petal Gas Storage L.L.C. v. FERC*, 496 F.3d 695 (D.C. Cir. 2007); *Kern River Gas Transmission Co.*, Op. No. 486, 117 FERC ¶ 61,077 (2006), *on reh'g*, Op. No. 486-A, 123 FERC ¶ 61,056 (2008), *on reh'g*, Op. No. 486-B, 126 FERC ¶ 61,034, *reh'g denied*, Op. No. 486-C, 129 FERC ¶ 61,240 (2009), *reh'g denied*, Op. No. 486-D, 133 FERC ¶ 61,162 (2010); *S. Cal. Edison Co.*, Op. No. 445, 92 FERC ¶ 61,070 (2000), *reh'g denied*, 108 FERC ¶ 61,085 (2004).

the six month study period.[59] Each of these criteria is simple to apply and usefully promotes risk comparability between the proxy group and the subject utility. There is no need to degrade risk comparability by referencing as proxies entities that lack qualifying utility-industry participation or risk-comparable bond ratings, or which have recently been forced to take the extraordinary step of cutting dividends. Applied conjunctively, these criteria will usually leave ten to thirty eligible proxy candidates, as there are currently around forty stocks classified by Value Line as U.S. electric utilities, and in most cases the credit rating and dividend screens will admit more than one-quarter but fewer than three-quarters of those forty stocks. Absent extraordinary circumstances, therefore, it would not be productive to invite litigants to argue that companies excluded by one or more of these bright-line tests are nonetheless "comparable" to companies engaged in rate-regulated electric transmission.

The Question D1.a suggestion of a further criterion requiring a minimum percentage of revenues from the applicable regulated business is sound in theory, but not practical as applied to electric transmission ROEs. Few, if any, exchange-traded companies consistently receive the majority of their revenues from rate-regulated electric transmission.[60] Segmented reporting is not uniform across companies, making it difficult to compare across candidate proxies the share of revenues, earnings, or assets associated with rate-regulated electric transmission. Accordingly, the practical test for substantiality of regulated electric business, which should be retained, is the PNA's bright-line requirement that a stock be classified by Value Line as a U.S. electric utility in order to be included in an electric case proxy group. That said, the use of proxy results should

[59] *See Coakley* Briefing Order, P 49.

[60] ITC Holdings did so, but has been acquired by Fortis, Inc. Eversource Energy may now be the stock with the highest share of its revenues derived from U.S. electric transmission, but even for it, electric transmission contributed only about 41% ($427.2 million of $1.033 billion) of 2018 earnings. *See* News Release, Eversource Energy, *Eversource Energy Reports Full Year 2018 Results* (Feb. 20, 2019), https://www.eversource.com/content/docs/default-source/investors/eversource-fourth-quarter-earnings-2018.pdf?sfvrsn=2909cb62_0.

recognize that exchange-traded stocks are imperfect proxies for regulated operating utilities, and even less perfect as proxies for those utilities' transmission segments. The fact that no individual proxy maps directly to regulated utilities' transmission risks is another reason to reference the distribution rather than range of proxy group results. Relatedly, to the extent ranges are referenced, the share of revenues, earnings, or assets associated with the business segment for which an ROE is at issue should be considered as a basis for excluding outliers.

A further criterion is needed, however, if the Commission relies on the "Expected Earnings" method, despite that method's lack of cost basis and other flaws.[61] Candidate proxies' E/B results are highly correlated with their M/B ratios[62] and capital structure equity ratios.[63] Accordingly, a study of proxy companies' E/B ratios will not meaningfully indicate the E/B ratio that subject utility would have as a stand-alone entity, unless the proxies, for purposes of that study, are limited to companies that are similar to the subject utility in terms of M/B ratios and equity ratios. As operating utilities that are not publicly traded generally[64] have no visible M/B ratio, it will generally be unclear whether the first of these two criteria is met, but the equity ratio criterion can readily be applied. One way to do so would be to utilize, for purposes of an E/B study, a proxy group consisting of a subset of the proxies used for other purposes, selecting those with equity ratios closest to that of the subject utility. For example, if thirty proxies were used for

---

[61] *See* Parts III.A.1, III.E.1, III.F, III.H.1, and III.H.2.c).

[62] Woolridge Aff., Ex. No. CAP-500, at 50-51, CAPS' Paper Hearing Principal Initial Brief, *Coakley v. Bangor Hydro-Elec. Co.*, No. EL11-66 (Jan. 11, 2019), eLibrary No. 20190111-5238 ("CAP-500"); Solomon Test., Ex. No. JCI-200, at 33 n.47, Initial Paper Hearing Brief of the MISO Complainant-Aligned Parties, *Ark. Elec. Coop. Corp. v. ALLETE, Inc.*, No. EL15-45 (Feb. 13, 2019), eLibrary No. 20190213-5141 ("The market-to-book ratios for the MISO II Proxy Group, before the application of economic outlier tests, range from 1.15 to 3.38 and the median and midpoint values are 1.60 and 2.27, respectively"); *id*. at 46-49 ("there is a clear trend where utilities that have a higher expected return on book common equity generally have a higher market-to-book ratio, demonstrating that investors bid up the share price as a result of their required rate of return being less than the utility's projected book rate of return"); *id.*, Ex. No. JCI-205, at 1.

[63] *See* Ex. No. CAP-500, at 55-57 and the subsidiary exhibits cited therein.

[64] As discussed in Part III.F.2, *infra,* there are exceptions to this generality: from time to time, operating utilities or an asset-defined portion thereof are purchased at an identifiable price, thus identifying an operating utility M/B ratio.

the DCF and CAPM studies, the E/B study could look to the ten of those proxies whose equity ratio is closest to that of the subject utility.

If the application of proxy group formation criteria results in a group that is not representative of the subject utility, that difference should be taken into account in placing the allowed ROE within the proxy group distribution. The need for the latter measure should generally be avoidable, because it should usually be possible to form a representative proxy group. However, there will be exceptions, as where it is necessary to relax proxy group formation criteria in order to form a proxy group of sufficient size. Another such exception would arise if the filtering for equity ratios discussed above does not produce a proxy group with equity ratios resembling that of the subject utility. In that case, if E/B ratios are referenced, an adjustment based on equity ratios should be made to the proxy group E/B result in inferring the expected E/B ratio of the subject utility. The need for an above- or below-center placement of the allowed base ROE on such grounds should be considered on a case-by-case basis.

2. A properly distribution-based use of proxy group results would diminish the need to filter outlier results; with an (erroneous) range-based approach, improved filtering would be needed.

D4. What, if any, are appropriate high- and low-end outlier tests?

D4.a. The Commission currently excludes from the proxy group companies whose ROE fails to exceed the average 10-year bond yield by approximately 100 basis points. Should the low-end outlier test continue to be based on a fixed value relative to the costs of debt or (a) should it be based on its value relative to the median (i.e., less than 50 percent of the median); or (b) still reflect the cost of debt but vary based on interest rates?

D4.b. How, if at all, should the Commission's approach to outliers vary among different financial models?

When the Commission applies range-based ROE determination methods—when it (a) uses midpoints (or lower or upper midpoints) to distill the distribution of proxy results to a single value; or (b) uses a range-based measure (such as the midpoint of a range plus half a

"quartile" of the range, i.e., the point 5/8 of the way up a range); or (c) uses the top of a range rather than some other metric to cap ROE incentive adders—it elicits erratic outcomes and an undue focus on locating the range ends. As the Commission recognized in 1984, "[t]he data used in cost of capital analyses of individual companies may vary for reasons having nothing to do with those companies' cost of equity capital. In the industry average, these spurious variations tend to cancel each other out."[65] The same is true of the median statistic, as the "spurious variation[]" present in a proxy value taken from the thick of a results distribution is bounded by countervailing variations related to its near neighbors.[66] But it is not true of range statistics, as the two most extreme values in a proxy distribution may well have come to occupy those positions because of such spurious variation.

The erratic outcomes that result from reliance on ranges are exemplified by the implausibly different proxy-result ranges found in, respectively, Opinion No. 551 and the Docket No. EL14-86 Initial Decision.[67] These two decisions applied virtually identical proxy groups[68] and virtually identical study periods.[69] For these very similar studies, Opinion No. 551 found and retained proxy results ranging from 7.23% to 11.35%, whereas the EL14-86 Initial Decision

---

[65] *Generic Determination of Rate of Return on Common Equity for Electric Utilities*, Order No. 389, 28 FERC ¶ 61,068, FERC Stats. & Regs. at 31,021, *reh'g denied*, Order No. 389-A, 29 FERC ¶ 61,223 (1984).

[66] CAP-500, § VI.D, at 75-77; *Woolridge Test.*, Ex. No. CAP-1, at 54-74, *ENE (Env't Ne.) v. Bangor Hydro-Elec. Co.*, No. EL13-33 (Dec. 30, 2014), eLibrary No. 20141230-5278; *Rebuttal Testimony and Exhibits of Professor J. Randall Woolridge*, Ex. No. CAP-19, at 47-52, *ENE (Env't Ne.) v. Bangor Hydro-Elec. Co.*, No. EL13-33 (May 18, 2015), eLibrary No. 20150518-5306.

[67] *Ass'n of Bus. Advocating Tariff Equity v. Midcontinent Indep. Sys. Operator, Inc.*, Op. No. 551, 156 FERC ¶ 61,234 (2016); *ENE (Env't Ne.) v. Bangor Hydro-Elec. Co.*, 154 FERC ¶ 63,024, *corrected*, 155 FERC ¶ 63,006 (2016).

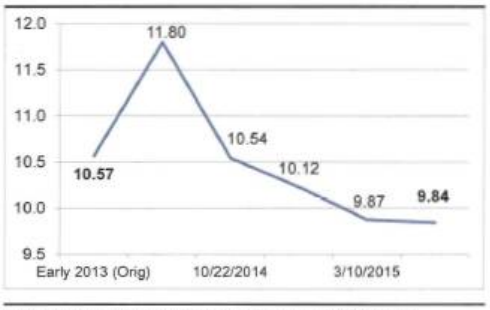
[68] The groups were formed using identical criteria (Value Line U.S. electric utility stocks, and credit ratings ranging from BBB- to A. All 33 members of the Opinion No. 551 proxy group likewise appear as members of the EL14-86 proxy group. The only difference is that the latter added four proxies due to merger activity having ended (SCANA Corp., Exelon Corp., PNM Resources, and Unitil Corp.); none of those added proxies affected the latter decision's results range.

[69] Respectively, November 2014-April 2015 and January-June 2015. Thus, four overlapping months were used for both decisions' study periods.

found and retained proxy results ranging from 7.04% to 12.19%.[70] The 84 bias-point rise of the range top reflected a transient fluctuation in the last-published IBES growth estimate for TECO. The IBES estimate for TECO was "6.43 percent on January 31, 2015, 7.08 percent in February and March, 9.20 percent from March through June, and 7.68 percent on July 13, 2015."[71] Opinion No. 551 used TECO's IBES growth rate as of July 13, 2015—7.68%,[72] whereas the EL14-86 ID used TECO's IBES growth rate as of May 22, 2015—9.20%.[73]

The unstable capriciousness of range-based measures has troubled Wall Street. Deutsche Bank cited this "quirk" as an example of "the considerable uncertainty and volatility inherent in the commission's two-step DCF model as currently formulated."[74] Deutsche Bank also noted that basing ROEs on such fluctuating ranges is an "inherent inefficienc[y] in FERC's new model which is creating significant uncertainty for investors—precisely the opposite of FERC's intent in last year's New England decision," and characterized this effect on the DCF model as "capricious."[75] Similarly, UBS has taken to producing frequent updates of its "MtM" (mark-to-market) quantification of the Top Quarter of an Op. No. 531 method "FERC ROE," highlighting to investors the variability of that quantification, as depicted in the inset "Figure 3."[76] Wolfe Research has similarly noted that with

Figure 3: Changes in UBSe FERC ROE MtM



Source: Company Filings, FactSet, Yahoo! Finance, and UBS Estimates

[70] Op. No. 551, P 65; *ENE (Env't Ne.)*, 154 FERC ¶ 63,024, P 524.

[71] *See Ass'n of Bus. Advocating tariff Equity v. Midcontinent Indep. Sys. Operator, Inc.*, 153 FERC ¶ 63,027, P 101 (2015), *aff'd*, Op. No. 551, 156 FERC ¶ 61,234 (2016).

[72] *See id.*, P 90, P 102, App. B.

[73] *See ENE (Env't Ne.)*, 154 FERC ¶ 63,024, P 909 (Initial Decision reproducing Ex. No. NET-2004).

[74] Deutsche Bank Mkt. Research, *Transmission ROE Flash* at 1 (June 8, 2015), Ex. No. CAP-135, *ENE (Env't Ne.) v. Bangor Hydro-Elec. Co.*, No. EL13-33, eLibrary No. 20150709-5192.

[75] Deutsche Bank Mkt. Research, *Transmission ROE Flash* at 1 (June 12, 2015), Ex. No. CAP-135, *supra*.

[76] "Figure 3" (numbering in the original) is excerpted from Ex. No. CAP-119, at 3, *ENE (Env't Ne.) v. Bangor*

a range-based approach, the "timing of the data is key," as the "ALJ rec[commendation] in the latest NE-ISO case will use 6-months of data through 5/26/15" [sic], thereby "determin[ing] the ZoR [zone of reasonableness]", making the DCF input timing "everything."[77] Wolfe's appraisal: "FERC seems to not appreciate the uncertainty it is creating."[78]

While these criticisms focused on erratic variation of the DCF range (because under the Commission's then-applicable approach, only the DCF range factored directly into the result), their gist also applies to ranges found using other methods. For example, over the course of the four New England complaints, the E/B range top, as presented by NETO's paper hearing witness, varied from 16.1% to 15.66% to 18.24% to 19.59%. Focusing on Dominion Resources (which generally set the E/B range top during 2012-17, due to its contemporaneous, especially high, M/B ratio and capital structure equity ratio), its E/B as calculated by the same witness rose from 15.12% as of a study period that ended January 2015[79] to 18.24% as of a study period that ended three months later.[80]

More recently, FirstEnergy Corp. ("FE") has commonly provided transmission owner witnesses' highest E/B result.[81] It does so because Value Line's fifth-year E/B projection for that company jumped from 12.5% as of February 16, 2018 to 15.5% as of May 18, 2018.[82] Between those two consecutive quarterly Value Line reports, FE's projected share count and projected

---

Hydro-Elec. Co., No. EL13-33, eLibrary No. 20150709-5192 (UBS Global Research, *US Electric Utilities & IPPs: How Low is Too Low? MISO Transcos Strike Back* (Apr. 27, 2015)).

[77] Wolfe Res., Utilities & Power: Don't you FERCed about ROE, Don't Don't Don't Don't! at 1, 11 (Apr. 6, 2015), Ex. No. NET-1602, *ENE (Env't Ne.) v. Bangor Hydro-Elec. Co.*, No. EL13-33, eLibrary No. 20150709-5128.

[78] *Id*. at 1.

[79] *See* MTO-8 in EL14-12 (providing E/B for D as of pre-update study period in that docket).

[80] *See* NET-1706 in EL14-86. Elimination of outliers based on the 150%-of-median test discussed the *Coakley* and MISO briefing orders (at PP 54 and 55, respectively) may mitigate some of this variability, but introduces a different form of erraticism, as high values may come in and out of the retained proxy results depending on whether they are just over or just under the outlier test.

[81] Ex. No. A-2, at 61:3-4.

[82] *Id.* at 61:4-6.

dividends did not change, and its projected earnings and earnings/share actually declined. The change that drove the increase in FE's projected E/B ratio was a 25% decrease in projected book value per share, from $24 to $18, apparently due to accounting changes associated with the bankruptcy filing of FE's nonregulated subsidiaries.[83] While that drastic decrease in the denominator of FE's E/B ratio had an outsized effect on the highest E/B ratio to be found among electric utility stocks, there is no basis to infer a corresponding change to such stocks' *representative* E/B ratio, much less the ratio representative of operating utility companies.

An undue focus on non-representative results can be seen in the NOI itself. The NOI devotes considerable attention to outlier screening and to tests for excluding companies engaged in merger and acquisition ("M&A") activity. Seven NOI questions focus on these issues directly,[84] and other NOI questions relate to them as well.[85] Case-specific ROE adjudications before the Commission also commonly focus on these issues.[86] This NOI, of course, is not the place to address case-specific issues; the disputes referenced in the preceding footnote will have to be resolved based on the records of those dockets. We note them here because the NOI's rethinking of ROE determination policy presents a golden opportunity to return ROE litigation to its proper focus: not which proxy companies and sample results should be trimmed or added at

---

[83] *Id.*

[84] Questions D3.b, D4, D4.a, D4.b, D8, D8.a, and H.1.4.a.

[85] *See, e.g.*, Questions G3, G4, and G4.a.

[86] For example, Opinion No. 531 addressed at length whether PSEG should be excluded at the DCF range bottom, and whether the growth rate used for UIL Holdings at the DCF range top should be sampled according to the *ex ante* procedural schedule or based on NETOs' motion for an *ad hoc* further update. The pending paper hearing briefs in the subsequent New England ROE complaint matters address at length the New England TOs' proposal to add ITC Holdings to the DCF range top in Docket No. EL13-33, customers' proposal to remove TECO from the DCF range top in Docket No. EL14-86, and the New England TOs' proposal to add Algonquin Utilities to the DCF range top, while excluding NWE, IDA, AEP, and PCG from the range bottom, in Docket No. EL16-64. Similarly, the pending paper hearing briefs in the MISO ROE complaint matters address at length the MISO TOs' proposals in Docket No. EL14-12 to remove OGEE, ED, and PSEG from the DCF range bottom and add ITC to the E/B range top; MISO CAPs' proposal in Docket No. EL14-12 to exclude TECO from the proxy group due to M&A activity; MISO TOs' proposals in Docket No. EL15-45 to remove IDA, CNP, and OGEE from the DCF range bottom; and MISO CAPs' proposal in Docket No. EL15-45 to exclude Vectren from the E/B range top.

the margins, but rather, for the many stocks whose use as proxies is not subject to genuine dispute, what study-period cost of equity they collectively imply.

As a policy for future cases, therefore, we recommend a new approach. The Commission should stop relying in any respect on the *range* of proxy results. Instead, the Commission should look to an applicable percentile[87] of the proxy distribution, both to evaluate whether an existing base ROE remains just and reasonable and to set a replacement ROE.[88] The Commission should do so both in individual-utility cases or when determining a common ROE for multiple utilities. (By referring to an "applicable percentile," we contemplate that the median (i.e., the 50th percentile) would be the principal measure employed, while recognizing that in cases where an accurately risk-comparable proxy group cannot be assembled, it may be necessary to apply a higher or lower percentile.[89]) With that change and the continued availability of large proxy groups in most cases, the significance of whether low and high outlier results are retained would be greatly diminished, as the median or other applicable percentile would be determined from the thick cluster of proxy results at the distribution's center, and the addition or exclusion of results at either end of the distribution would have little or no effect. Accordingly, it would be

[87] By "applicable percentile," we contemplate that the median (i.e., the 50th percentile) would be the principal measure employed, while recognizing that in cases where an accurately risk-comparable proxy group cannot be assembled, it may be necessary to apply a higher or lower percentile, such as the 25th percentile applied in *Potomac-Appalachian Transmission Highline, LLC*, Opinion No. 554, 158 FERC ¶ 61,050 (2017) ("*PATH*").

[88] As we discuss in Part III.G, *infra*, Associations maintain that the statutory evaluation of whether an existing base ROE remains reasonable requires a direct comparison of the ROE charged at a given time to the contemporaneous study-indicated cost of equity. However, even if the Commission were to adopt a rebuttable presumption that existing ROEs exceeding the cost of equity by some margin remain just and reasonable, that margin should be based on a percentile of the proxy results distribution rather than some fraction of the range of proxy results. Whether ranges should serve as a bound on incentive ROE adders is at issue in Notice of Inquiry, *Inquiry Regarding the Commission's Electric Transmission Incentives Policy*, Docket No. PL19-3, particularly Question No. 97. As the Commission noted in that question, an upper bound on ROE adders can be established without using ranges of proxy results to quantify that upper bound.

[89] For example, the Commission set the ROE at the 25th percentile where the subject utility was not an operating company and served solely to recover the abandoned plant costs associated with a cancelled project. *See PATH*.

reasonable in that context to adopt bright-line tests for filtering of low and high proxy results, thereby eliminating most or all judgment calls and the associated litigation of these issues.

One such approach would be to retain all proxy results (of an amply-sized proxy group) for purposes of determining the proxy group median, eliminating at one swoop all disputes over "natural break" tests, comparisons to bond yields at the low end, and statistical tests for skew at the high end. Tests for the economic "logic" of low and high proxy results are can be dispensed with where the effect of a sample result that is arguably illogical on its own is limited to influencing the determination of which *other*, central, individually logical proxy results are most representative of the distribution of results for the proxy group as a whole. For example, when the first-stage growth rate estimates for a proxy company are so low that its DCF-implied cost of equity is below the benchmark utility bond yield, the specific DCF result found for that proxy may be economically "illogical," but it is not illogical to conclude that the true DCF-indicated cost of equity for that proxy company is somewhere below the DCF median, and to therefore retain that proxy result solely for the purpose of identifying the proxy group median. A parallel observation applies to high outliers. Retaining all proxy results while using those retained results only to identify the median (or other applicable percentile) of a large proxy group would both simplify ROE litigation and produce results that, over the run of cases, would be both more stable and more accurately cost-based. This approach would also go a long way toward addressing the arbitrariness and unpredictability that has troubled Wall Street commentators.

If range-based measures are applicable, however, outlier tests will be needed, and should be stringent, transparent, and evenhandedly applicable to low-end and high-end outliers alike. The specific tests suggested in the PNA do not meet those standards, and should be reconsidered.

First, the PNA provides no reasoned basis for its use of a large multiplier (150%) in identifying the high-outlier threshold.[90] Under any regimen that places significance on range ends, some such test is needed to, in the Commission's words (*id.*), "identify those companies whose cost of equity under the model in question is so far above the cost of equity of a typical proxy company as to suggest that it is the result of atypical circumstances not representative of the risk profile of a more normal utility."[91] However, the PNA's proposed high-end outlier test (under which the median of a pre-exclusions proxy distribution would be multiplied by 150%) is arbitrary and unsupported. There are several accepted and objective statistical tests for outliers.[92] From among them, Associations would recommend using two standard deviations as the high-outlier threshold.[93]

Second, the PNA's "natural break" standard is too vague and open to dispute, thus inviting result-oriented manipulation of its application.[94] To avoid arbitrary results, if the ROE determination relies on ranges rather than medians (or other percentiles), an objective quantification of the "natural break" standard would be necessary. Witness in the MISO and

---

[90] *See Coakley* Briefing Order P 53.

[91] *Cf. PSCKY* at 1011 (approvingly citing the Commission's "acknowledge[ment] that some distributions are *too* skewed for such an analysis," i.e., to support reliance on their midpoint).

[92] *See, e.g.*, Frank Grubbs, *Sample Criteria for Testing Outlying Observations*, 21 Annals of Mathematical Statistics 27 (1950), https://projecteuclid.org/download/pdf_1/euclid.aoms/1177729885; Armin Böhrer, *One-Sided and Two-Sided Critical Values for Dixon's Outlier Test for Sample Sizes up to n = 30*, 23 Econ. Quality Control 5 (2008), http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.560.8754&rep=rep1&type=pdf.

[93] *See Affidavit of Dr. J. Randall Woolridge*, Ex. No. CAP-500, at 7-9, Docket Nos. EL11-66 *et al.*, eLibrary No. 20190111-5238 (Jan. 11, 2019) (describing the merits of using two standard deviations as the high-outlier threshold).

[94] For example, the PNA would continue to apply the Opinion No. 531, P 123 finding that the 101 bp jump in the Opinion No. 531 Appendix (First Complaint DCF) distribution between El Paso Electric (7.03%) and PSEG (5.62%) constitutes a "natural break" that supports excluding PSEG's low result, while not finding that the nearly identical (107 bp) jump from Dominion to UIL warrants excluding UIL at the high end. Similarly, *MISO* Briefing Order, P 55, proposes to retain Vectren's 15.21% E/B ratio (because it is 116 bp below the next-highest result) even though that 15.21% is also 127 bp above the next-lowest result (13.94% for CMS), indicating that the "natural break" in that distribution is located *below* Vectren.

New England paper hearings have suggested specific tests for this purpose.[95] The Associations support those tests.

3. Credit ratings should continue to be used to form risk-comparable proxy groups

D5. How, if at all, does the Commission's use of credit ratings in ROE determinations incentivize public utilities to behave in certain ways, such as issuing more debt, and does this affect public utilities' credit ratings?

D6. What would be the impact of the Commission modifying the credit rating screen to include all investment-grade utilities in the proxy group?

D7. To what extent do credit ratings correspond to the ROE required by investors?

Credit ratings are a primary indicator of relevant risks—widely publicized, produced by reputable third-party sources, easy to apply, and well-established in Commission precedents and practice.[96] Although it is sometimes claimed that credit ratings address debt rather than equity risks, in fact they address both: if revenues are insufficient to cover debt obligations, equity investors must make up the difference. And notwithstanding contrary data-mining in an EEI whitepaper, credit ratings do correspond to DCF results and the cost of equity[97]—as one would expect, given the fundamental relationship between risk and return. Consequently, the impact of modifying the credit rating screen to include as proxies all stocks with investment-grade credit

---

[95] *See, e.g.*, *Affidavit of Dr. J. Randall Woolridge*, Ex. No. CAP-500, at 7-9, Docket Nos. EL11-66 *et al.*, eLibrary No. 20190111-5238 (Jan. 11, 2019); *Affidavit of Jonathan A. Lesser*, Ex. No. EMC-0200, Docket No. EL11-66 *et al.*, eLibrary No. 20190111-5120 (Jan. 11, 2019); *Direct Testimony and Exhibits of J. Bertram Solomon*, Ex. No. JCI-200, at 12-16, Docket No. EL15-45-000, eLibrary No. 20190213-5141 (Feb. 13, 2019).

[96] *See* Op. No. 531, P 106; Op. No. 445, at 61,264; *Potomac-Appalachian Transmission Highline, L.L.C.*, 122 FERC ¶ 61,188, P 101-102 (2008), *on reh'g*, 133 FERC ¶ 61,152 (2010).

[97] *Compare* Edison Elec. Inst., *Transmission Investment: Revisiting the Federal Energy Regulatory Commission's Two-Step DCF Methodology for Calculating Allowed Returns on Equity* at 22 (Dec. 2017), http://www.eei.org/issuesandpolicy/transmission/Documents/ROE%20White%20Paper.pdf, *with* Am. Pub. Power Ass'n, *A Customer Coalition Response to the Edison Electric Institute's Whitepaper on the Federal Energy Regulatory Commission's Two-Step DCF Methodology for Calculating Allowed Returns on Equity* at 9 & attachment 2 (June 2018), https://www.cooperative.com/programs-services/government-relations/regulatory-issues/Documents/Final%20Customer%20Coalition%20Whitepaper%20Response.pdf.

ratings would be to make proxy groups less risk-representative, degrading the accuracy of the resulting studies of equity's cost.

We are not aware of any evidence that utilities game their credit ratings as suggested by Question D5—issuing debt in order to secure a lower credit rating and thereby obtain a higher ROE associated with higher-risk companies. That would likely be a losing game: even though it might marginally raise the ROE allowed to the utility in rates regulated by FERC, those rates represent a small share of most utilities' business, and an increase therein would be offset by higher costs of debt for both the utility and its parent.

4. A properly distribution-based use of proxy group results would enable simplified, bright-line screening of proxies for significant merger and acquisition activity

D8. The Commission excludes from the proxy group companies with merger activity during the six-month study period that is significant enough to distort study inputs. Should the Commission continue using our existing merger screen?

D8.a. If so, should the Commission revise its standards for what conduct constitutes merger and acquisition activity?

The Commission should continue screening for M&A, although it may be possible to simplify and improve this screening. In Part III.D.2, *supra*, we explain that by relying on *distribution* rather than the *range* of proxy results, the Commission could reduce judgment calls about proxy group composition and the filtering of results. This point also applies to ex ante screening for M&A activity by candidate proxies. If distortion of an individual proxy's result due to M&A activity will be attenuated through reference to the distribution (not range) of a large proxy group, each individual proxy result will have relatively little effect on the ultimate decision. In that context, therefore, the test for significant M&A activity that leads to exclusion from the proxy group could be made simpler and more bright-line. For example, a candidate proxy could be excluded for M&A activity if, but only if, the candidate is directly or indirectly

acquiring or disposing of assets or entity/ies valued at or above some large fraction (say, one third) of the candidate proxy.[98]

5. When a reasonably risk-representative proxy group cannot be formed, the available proxy group's results should be distilled to a percentile other than the median

D9. What circumstances or factors, if any, warrant an adjustment from the midpoint/median to other points within the zone of reasonableness (e.g., lower or upper midpoint/median)?

In electric utility ROE cases, it will usually be possible to form a proxy group that is both risk-representative and adequately sized. *See* Part III.D.1. In that prevalent situation, the evaluation of whether the existing base ROE remains reasonable, and the selection of a replacement base ROE if it does not, should apply the median of the resulting, representative distribution.

In the few cases where a risk-representative proxy group is infeasible, the best available course is to form a sub-optimally representative proxy group of adequate size, and apply a percentile other than the median, deviating from the median based on an informed judgment as to the direction and extent to which the sub-optimal proxy group's median overstates or understates the subject utility's equity cost. Opinion No. 554 rightly followed this approach, applying the 25th percentile because the subject utility, as the owner of a non-operating, abandoned transmission project for which cost recovery is assured by a formula rate, is less risky than the operating utility parents that are available as exchange-traded proxies.[99]

However, it would be arbitrary to restrict the choice of percentiles to the 50th percentile (median) in cases where the proxy group is risk-representative, the 25th percentile where it is riskier than the subject utility, and the 75th percentile it is less risky than the subject utility. As

[98] Such a bright-line test would exclude from the proxy group a candidate proxy that is being acquired, as in that case the acquisition would be of the entire candidate proxy, not a fraction thereof.

[99] Op. No. 554, PP 268-273.

the Commission held, and the D.C. Circuit confirmed in *Emera Maine*, "requiring the ROE to be set at one of only three possible positions in the range established by reference to the proxy companies does not give the Commission the necessary flexibility required to evaluate the specific circumstances of each case."[100] For example, where the subject utility is operating and has a credit rating, but the standard "one notch" credit rating screen would leave too few proxies to form an adequately-sized proxy group, the screen criteria can be relaxed until sufficient proxies are identified. The equity cost significance of each notch of deviation can then be assessed, by, e.g., quantifying the change in the equity cost indication that results from varying the credit rating criteria and/or benchmarking against the bond yield differences associated with different bond ratings. Such comparisons can lead to the identification of a reasonable case-specific substitute percentile, rationally connected to, and selected on the basis of, the record evidence in that proceeding.

6. Midpoints are inherently erratic and unrepresentative; the Commission should extend to RTO-wide ROEs the statistically superior policy, already applicable to most public utilities and all pipelines, of relying instead on medians

D10. The Commission currently uses midpoints to determine the central tendency of the zone of reasonableness when determining RTO-wide ROEs. Should the Commission adopt a policy of using medians for this purpose?

D10.a. Would the use of multiple ROE methodologies, as proposed in the Coakley *Briefing Order, undercut the Commission's current rationale for using the midpoint in RTO-wide base ROE?*

D10.b. Should the size of the proxy group be considered in this decision?

[100] *Transcontinental Gas Pipeline Corp*., Op. No. 414-A, 84 FERC ¶ 61,084, at 61,427-3 (1998) (subsequent history omitted); *see also* Op. No. 531, P 151 n.306 (quoting same); *Emera Me. v. FERC*, 854 F.3d 9, 30 (D.C. Cir. 2017) (quoting Op. No. 531, and holding that by assuming the upper midpoint was the only available above-midpoint ROE, the Commission failed to rationally connect its base ROE placement to the record).

ROE determinations should reflect all retained proxy results, not just the extreme ones, so that estimation errors cancel out instead of being amplified.[101] Each proxy result contains measurement error, and a more accurate cost of equity result is obtained by combining those results in a way that makes those errors tend to cancel out. Medians do that; midpoints don't.

The witness most commonly employed by TOs nationwide, including both the MISO and New England TOs for the ongoing paper hearings, has conceded that there is no basis to vary the measure of central tendency as between regional and single-utility cases. He testifies that using midpoints in one and medians in the other is unreasonable, because "differentiating between a proceeding involving a single transmission utility and a joint filing of multiple RTO members ignores the requirements of investors, which are based on comparable-risk opportunities available in the capital markets."[102] Given the Commission's correct and judicially-affirmed finding that the median best represents investor requirements in single-utility cases, it follows that the median should be applied in all cases.

The Commission has previously offered only two rationales for using the midpoint rather than the median in regionwide-ROE cases: *stare decisis*, and minimizing the extent to which a single regional base ROE is unsuited for the region's least- and most-risky utilities. But neither has any rational application in conjunction with the PNA.

---

[101] *See* Ex. No. A-2, §§ D9-D10; *see also Direct Testimony of Professor J. Randall Woolridge*, Ex. No. CAP-1 at 54-74, Docket No. EL13-33-002 *et al.*, eLibrary No. 20150709-5192 (focused on estimation errors in the context of a DCF study, though applicable to estimation errors in CAPM and E/B studies); Brief on Exceptions of the Complaint-Aligned Parties, at 55-56, Docket No. EL16-64-002, eLibrary No. 20180426-6392 (Apr. 26, 2018) (demonstrating that the inclusion or exclusion of companies in the proxy group has significant impact on the midpoint results but very little impact on the median results).

[102] *McKenzie Answering Test.* at 20-21, Ex. No. SER-0001, *Ark. Elec. Corp. v. ALLETE Inc.*, EL17-41 (Mar. 20, 2019), eLibrary No. 20190320-5185.

Stare decisis. Past practice is the PNA's only stated basis for referencing the midpoint.[103] But the PNA's proxy group screening criteria provide for inclusion of proxies whose bond ratings are within "one notch" of those of the group of firms at issue, thus potentially encompassing a range of risks that is even broader than the broad risk range of the public utilities participating as TOs in an RTO with a region-wide rate. Given the resulting proliferation of proxies and the PNA's radical changes to what had been established Commission methodology,[104] adherence to a past practice cannot support the continued use of a statistically invalid midpoint approach. Even if reference to the *DCF* midpoint could somehow be considered a settled practice, there is *no* precedent, nor any statistical basis, for referencing the midpoint of E/B and CAPM distributions, rather than their medians (to the extent they are considered at all). There is no one-to-one mapping of proxy results to the cost of equity of individual public utility RTO participants; rather, given the large number of proxies with relatively high risks, the proxy group results will tend to include a highest result that exceeds the costs of equity of the riskier participants.

Moreover, the PNA does not actually propose to set the base ROE at the midpoint of its proposed zone of reasonableness. As illustratively quantified in *Coakley* Briefing Order (PP 57 and 59), the *midpoint* of the zone of reasonableness would be 10.3%. Yet the PNA would set the base ROE higher, at 10.41%, by bringing a risk premium result into the average. This eleven-basis-point difference belies the statement in *Coakley* Briefing Order that "[w]e are not making an adjustment above the midpoint/median as we did in Opinion No. 531."[105]

---

[103] *See Coakley* Briefing Order P 17 nn.45-46, P 57 n.114.

[104] If *stare decisis* does not prevent, for example, direct reliance on expected earnings on book equity, notwithstanding the contrary precedents cited in Part III.H.2.c)(1), *infra*, then neither does it justify reference to the midpoint.

[105] *Coakley* Briefing Order P 44.

Second, in *Midwest ISO*, the Commission also required that all of the proxy companies be located in the same region as the subject companies.[106] The Commission subsequently abandoned the regional proxy group requirement and currently relies on national proxy groups for electric utilities. [107]Third, the Commission is now proposing to reference risk premium studies that include no screening of the risk premium inputs for risk comparability to MISO TOs, and studies of per-book earnings in which there is no screening of the proxies for capital structure and market/book comparability to the MISO TOs.

Because the PNA would deviate from the DCF midpoint, and because there is no precedent for referencing the midpoints of other methods, the Commission cannot reasonably stand on precedent in failing to address the equity cost indications provided by the medians of its adopted studies.

Fitting disparate-risk RTO participants. The past practice referenced in *Coakley* rests on *Midwest Independent Transmission System Operator, Inc.*, 106 FERC ¶ 61,302 (2004) ("*MISO*"), *aff'd in relevant part sub nom. Pub. Serv. Comm'n of Ky. v. FERC*, 397 F.3d 1004 (D.C. Cir. 2005) ("*PSCKY*"). The Commission there reasoned that where the members of the proxy group and the Regional Transmission Organization participants sharing a single regional ROE were substantially identical, using the midpoint as the single regional base ROE would make that ROE a better fit for the region's least- and most-risky utilities. That is, under "unique . . . circumstances" where "the proxy group used to define the range of reasonableness . . . consist[ed] of a subset of the Midwest ISO TOs to which the ROE will

[106] *Midwest Indep. Transmission Sys. Operator, Inc.*, 100 FERC ¶ 61,292 (2002), *remanded sub nom. Pub. Serv. Comm'n of Ky. v. FERC*, 2004 WL 222900 (D.C. Cir. 2004).
[107] *S. Cal. Edison Co.*, 13 FERC ¶ 61,020, PP 27-30.

actually apply,"[108] the midpoint rationally "emphasize[d] the endpoints of the proxy group range, ensuring that outlier as well as average TOs receive just and fair compensation."[109]

The PNA approach, in contrast, presents no reason to assume that the range ends of the retained DCF, CAPM, and E/B results correspond to the return requirements for the least and most risky RTO participants. Any such rationale would fail at the outset given the Commission's declarations that MISO TO and NETOs are "of average risk."[110] And even if the Commission were to set those declarations aside, there still would be no basis to infer any correspondence between the proxy group range ends and the most disparate-risk public utilities that place their transmission systems under RTO functional control. In fact, any such inference would fail for multiple reasons:

- In each of the six pending MISO TO and NETO ROE cases, there is no remaining dispute that the proxy group will be national, with many more members than there are respondents in those cases. A larger proxy group inherently tends to produce a more dispersed range of proxy group results.[111] Consequently, the dispersion of proxy group results does not indicate the dispersion of RTO participants' costs of equity.
- Under the "one notch" test used in forming those proxy groups,[112] the proxy groups' risk range as measured by bond ratings is intentionally broader than that of the respondent TOs.
- The distribution of the proxies' bond ratings is skewed toward the risky end of their range.
- Other proxy characteristics that raise the top of the CAPM and Expected Earnings distributions, when those methods are applied in the manner suggested by the PNA—

[108] *MISO* PP 8-9.

[109] *PSKCY*, 397 F.2d at 1008 (summarizing *MISO* at 62,192-93).

[110] *See* MISO Briefing Order P 58; *Coakley* Briefing Order P 57.

[111] Observe the mid-day traffic passing by Commission headquarters outside 888 First Street NE. The range of passing vehicle lengths will be wider over the course of an hour than over a minute. *See* Ex. No. A-2, at 35.

[112] *See* MISO Briefing Order P 50; *Coakley* Briefing Order P 49.

e.g., the "size adjustment" made to the CAPM results, and the use of proxies with unusually high market-to-book ratios in referencing E/B ratios)—disconnect the tops of those ranges from any correspondence to specific respondent TOs.

- The PNA's reference to *separate* DCF, CAPM, and Expected Earnings ranges, rather than using those three methods together to estimate each proxy's equity cost and *then* identify the range of those estimates, makes the three methods' range ends and midpoints especially susceptible to the *Coakley* and MISO Briefing Orders' asserted "model risk." *See* Part III.E.3, *infra.*

- As referenced in the PNA, the E/B ratio for each proxy is based on the projection of a single Value Line analyst[113] for a single five-year-ahead period, which Value Line then rounds using its idiosyncratic convention.[114] Given this basis, the range ends under that application of the E/B method are inherently imprecise.

- When RTO planning processes function properly and in compliance with Order No. 1000[115], they result in major new transmission projects being assigned to, and built by, entities whose capital and other costs are relatively low. Thus, construction assignments will be inversely proportionate to equity costs. This is an important change in circumstances from *PSCKY*. In this new context, those RTO participants who have relatively high equity costs will tend to avoid the risks associated with building new facilities, which over time will reduce their riskiness and cost of equity.[116]

---

[113] *See Coakley v. Bangor Hydro-Elec. Co.*, 166 FERC ¶ 61,013, P 8 & n.26 (2019) (identifying bases for illustrative calculations, including NET-709 as the basis for the E/B portion); Docket No. EL11-66, NET-709 (sourcing its forecast E/B ratios from Value Line); Op. No. 551, P 62 (Value Line estimates represents a single analyst estimate, not a consensus); *Nw. Pipeline Corp.* 87 FERC ¶ 61,266, at 62,059 (1999) (same), *on reh'g*, 92 FERC ¶ 61,287 (2000), *review denied in part and dismissed in part sub nom. Canadian Ass'n of Petroleum Producers v. FERC*, 308 F.3d 11 (D.C. Cir. 2002).

[114] *See, e.g.,* NET-709, col. a, and the underlying workpapers at NET-710 at 1-56. The expected returns on book equity (prior to the column c adjustment to "covert year-end return to an average rate of return") are presented as if they were precise to a tenth of a percent, but they all end with a zero or five.

[115] *Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities*, Order No. 1000, 136 FERC ¶ 61,051 (2011), *reh'g denied*, Order No. 1000-A, 139 FERC ¶ 61,132, *on reh'g*, Order No. 1000-B, 141 FERC ¶ 61,044 (2012), *review denied sub nom. S.C. Pub. Serv. Auth. v. FERC*, 762 F.3d 41 (D.C. Cir. 2014) (per curiam), *reh'g en banc denied*, No. 12-1232 (D.C. Cir. Oct. 17, 2014).

[116] *Cf.* Op. No. 554.

The bottom line is that in both New England and MISO, the distribution of proxy results provides useful information on the cost of equity for the public utility operating companies participating as transmission owners in the respective RTO, and that information should not be discarded in identifying the region-wide base ROE. The median (or other risk-appropriate percentile) reflects that distribution information and should be the take-away from the proxy-based methods; the midpoint does not, and it should not be used.

7. Associations are not commenting on proxy group size in pipeline cases

D11. Can the Commission continue to construct proxy groups of sufficient size for natural gas and oil pipeline companies using the DCF methodology, or in general for the alternative methodologies, particularly considering the increased amount of merger and acquisition activity involving master limited partnerships (MLPs) and the multiple recent conversions of MLPs to C-corporations?

Associations take no collective position on this pipeline-related question.

E. Combining multiple financial models advances reasonable ratemaking only if the added models are well-designed to identify the market cost of equity

1. Models based on E/B ratios or unrealistic equity portfolio returns do not aid in identifying the cost of equity

E1. What models do investors use to evaluate utility equities?

E2. What role do current capital market conditions play in the choice of model used by investors to evaluate utility equities?

E2.a. If capital market conditions factor into the choice of model, how do investors determine and evaluate those conditions?

E3. Are any models thought to be superior or inferior to others? If so, why?

We read these questions as inquiring about widely applied models for inferring the values of exchange-traded utility-sector stocks from financial market information.[117] The common

[117] There are so many investors, and so many investment decisions are made in private, that it is impossible to characterize all of the methods investors apply. And it is clear that some investors apply irrational methods that would not withstand judicial review if applied by the Commission, such as astrology. *See* Simon van Zuylen-Wood,

foundation of such models is the Efficient Market Hypothesis, which is solidly established among not only investors but also academia and the D.C. Circuit.[118] It holds that publicly available information is efficiently incorporated into the prices of exchange-traded stocks.[119] *All* of the methods collected in the NOI's touchstone textbook as "Cost of Capital Methodologies"—namely, DCF, CAPM, and risk premium[120]—build on that analytical foundation. The investment community's practical application of this bedrock understanding is exemplified by Credit Suisse, *Estimating the Cost of Capital: A Practical Guide to Assessing Opportunity Cost* (2013).[121] Consistent with the DCF model, it states that "[t]he cost of capital is the rate at which you need to discount future cash flows in order to determine the value today."[122] In explaining how to estimate that discount rate for a particular company, it emphasizes a CAPM model, in which (as of the guide's publication date, October 8, 2013) "the model developed by Credit Suisse's equity strategy group implied a warranted ERP [Equity Risk Premium] of 4.5 percent."[123]

Dr. Cornell explains that surveys of financial professionals in 2010 and 2013 showed that between 79% and 87% of respondents use DCF techniques for investment valuation generally and the CAPM model for estimating a firm's cost of equity.[124] The academic literature confirms that the DCF and CAPM are the most established and widely used financial models.[125]

Is the Key to Beating the Market Written in the Stars?, Business Week (July 27, 2018), https://www.bloomberg.com/news/features/2018-07-27/is-the-key-to-beating-the-market-written-in-the-stars.

[118] *See* Part III.H.1.b), *infra*; *Tenn. Gas Pipeline Co. v. FERC*, 926 F.2d 1206, 1210-11 (D.C. Cir. 1991).

[119] *See id*.

[120] *See* Morin, *supra*, at 427-28. Morin's list includes a separate entry for a CAPM variant known as the "Arbitrage Pricing Model" ("APM"). It too is based on the Efficient Market Hypothesis.

[121] https://research-doc.credit-suisse.com/docView?language=ENG&source=ulg&format=PDF&document_id=805810190&serialid=OI/G4SnL/qh5FOlYS9MKXLzznvRJnu1XiYUvUZAo%2BlE%3D.

[122] *Id*. at 3.

[123] *Id*. at 13.

[124] Ex. No. A-1, § E1.

[125] *Id.*

Notwithstanding the claims, based on supposedly "anomalous" market conditions, that advocates of high ROEs have presented to the Commission in recent years, there is no evidence that actual investors in electric utility stocks—that is, those who want to accurately assess what a given security will yield and what other investors will be willing to pay for that security—have lost faith in DCF or other market-based valuation techniques, or peg their choice of financial models (as distinguished from model inputs) to particular points on the business cycle.

The contrary is evidenced by the many years of annual documentation of "Long-Term Capital Market Assumptions" published by J.P. Morgan Asset Management ("J.P. Morgan").[126] In 2012, the earliest year for which full documentation remains readily available, J.P. Morgan stated that for "as in previous years," it used a "building blocks" approach to equity valuation under which its expectations for equity returns equaled "Inflation + real earnings growth + dividend yield +/- impact of valuation changes."[127] This was essentially a DCF model, in which the long-term earnings growth term is decomposed into inflation plus real earnings growth, and provision is then made for other factors that might impact valuation. While the 2009 iteration of this document predates J.P. Morgan's posted archive, a contemporaneous J.P. Morgan presentation shows that it employed the same approach then.[128] Following a non-cyclical refinement of this model in 2015, for 2019, J.P. Morgan continues to base its equity return forecasts on "EPS growth . . . × Price return / EPS growth (valuations) + Dividends"[129]—again, essentially a DCF model, adjusted for reversion of P/E ratios toward historical norms. Thus, J.P.

---

[126] https://am.jpmorgan.com/global/institutional/library/ltcma-previous-versions.

[127] J.P. Morgan Asset Mgmt., *Long-Term Capital Market Return Assumptions: 2012 Estimates and the Thinking Behind the Numbers* at 6 (2011), https://am.jpmorgan.com/blobcontent/1414922158825/83456/ltcmra-2012.pdf.

[128] J.P. Morgan Asset Mgmt., *On the "non-normality" of Asset Classes*, at 32 (2009) (estimating 9.0% return over 10-15 years on U.S. large cap stocks purchased at that market low, based on "Sum of below building blocks (U.S. Large Cap EPS Growth (nominal) + Dividend Yield + P/E return impact").

[129] J.P. Morgan Asset Mgmt., *Turning a Corner: Returns Hold Steady* at 2 (2018), https://am.jpmorgan.com/gi/getdoc/1383581777246.

Morgan has applied a DCF-based model for at least ten years (and likely longer), encompassing the Great Recession, today's much better financial market and economic conditions, and all intervening years and conditions. Dr. Cornell confirms that there is no basis in academic theory for the claim that investors' model choices vary with capital market conditions.[130]

Notably, none of these sources reference E/B ratios as a measure of the cost of equity. By 1985, that approach had been "thoroughly discredited" and "replaced by three market-oriented (as opposed to accounting-oriented) approaches: (i) the DCF method, (ii) the bond-yield-plus-risk-premium method, and (iii) the CAPM, which is a specific version of the generalized bond-yield-plus-risk-premium approach."[131] As summarized by a leading textbook on corporate finance:

> [W]e can employ the principles described in Chapters 6 and 7 to produce reasonably good estimates for the cost of equity. Three methods are typically used: (1) the Capital Asset Pricing Model (CAPM), (2) the discounted cash flow (DCF) method, and (3) the over-own-bond-yield-plus-judgmental-risk-premium approach. These methods are not mutually exclusive: When estimating a company's cost of equity, we generally use all three methods and then use an average, weighted on the basis of our confidence in the data used for each method.[132]

A published, peer-reviewed "comprehensive survey that describe[d] the current practice of corporate finance"[133] based on responses by 392 chief financial officers, concludes that "executives use the mainline techniques that business schools have taught for years, NPV[[134]]

---

[130] Ex. No. A-1, § E2.

[131] Eugene F. Brigham, Dilip K. Shome, & Steve R. Vinson, *The Risk Premium Approach to Measuring a Utility's Cost of Equity*, 14 Fin. Mgmt. 33, 33 (1985).

[132] Ehrhardt & Brigham, *supra*, at 345.

[133] John R. Graham & Campbell R. Harvey, *The Theory and Practice of Corporate Finance: Evidence from the Field*, J. Fin. Econ. 61 (2001), https://faculty.fuqua.duke.edu/~jgraham/website/SurveyPaper.PDF.

[134] NPV refers to Net Present Value, discount-rate-based project-specific technique that is based on the same principles as the DCF method for estimating the discount rate investors apply to an entire publicly-traded company.

and CAPM, to value projects and to estimate the cost of equity."[135] It found *no* evidence that anyone uses E/B ratios.

Although investors consider earnings in gauging utilities' future profitability and financial health, they "parse the information in earnings in order to estimate *growth*."[136] Even that use is limited: A comprehensive study of the information affecting stock market prices over twenty years (1993-2013) found that

> [W]hereas the information contribution of analysts and SEC nonaccounting filings increased markedly over the past 20 years (in 2013, SEC filings and analysts forecasts contributed 25 percent and 20 percent, respectively, of total information used by investors), the contribution of the financial reports (including earnings announcement and quarterly and annual filings with the SEC) decreased by almost a half (from 10 percent to 5-6 percent).[137]

More to the point, there is simply no evidence that investors consider earnings/book equity (E/B) *ratios*—the focus of the "Expected Earnings" method—to be any kind of measure of the return that investors expect, or require, from their investments in market-priced utility stocks.[138] One will search in vain to find any institutional investor, investment analyst, market opinion leader, chief financial officer, or academic economist still referencing E/B ratios as a measure of equity's cost. The reason is plain: Investors have no opportunity to purchase stock at its book rather than market value.

As explained by Ehrhardt and Brigham, the "opportunity cost" that companies must pay their equity investors to attract their reinvestment through retained earnings is what

---

[135] *Id*. at 21.

[136] Stephen D. Hasset, *The RPF Model for Calculating the Equity Market Risk Premium and Explaining the Value of the S&P with Two Variables*, 22 J. Applied Corp. Fin. 118, 120 (2010) (emphasis added).

[137] Baruch Lev & Feng Gu, *The End of Accounting and the Path Forward for Investors and Managers* 45 (John Wiley & Sons 2016).

[138] *See* Ex. No. A-1 at 6.

"stockholders themselves could earn on alternative investments of equivalent risk."[139] Or as explained to investors by Credit Suisse: "The opportunity cost an investor demands is based on the prevailing asset price, not the level at which the company recorded the debt or equity on the balance sheet."[140] Accordingly, there is no rational basis to conclude that E/B ratios indicate the return that investors expect to receive on their alternative, comparable-risk investment opportunities, and, therefore, would require in order to be attracted to having their funds invested instead in the subject utility's regulated operations.[141]

To be sure, current investors' expectations of utility stocks' earnings per book equity are generally high. But that is because utility stocks' market/book ratios are generally well above unity, which signifies that the earnings/book that investors expect utilities' parent companies to realize significantly exceeds the returns that investors require on their own investments. As the Commission is well aware, the *Hope* and *Bluefield* standards do not guarantee investors any particular level of expected profits, only the level of return required to attract investment and maintain the financial health of the utility.[142] That level is tied to what investors require on their own investment, not their expectations as to utility holding companies' earnings/book ratios.

2. Combining multiple market-based models is reasonable *if* each applied model is well-designed

E4. How are alternative models redundant or complementary with each other and/or the DCF model?

E5. To what extent do alternative models avoid any deficiencies of the DCF model and/or operate better in diverse capital market conditions?

---

[139] Ehrhardt & Brigham, *supra*, at 344-45 (emphasis omitted).

[140] *Estimating the Cost of Capital*, *supra* n.121, at 8.

[141] *See also* Parts III.A, III.E.1, III.F, III.H.1.b) and III.H.2.c).

[142] *FPC v. Hope Nat. Gas Co.*, 320 U.S. 591 (1944) ("*Hope*"); *Bluefield Waterworks & Improvement Co. v. Pub. Serv. Comm'n*, 262 U.S. 679, 692-693 (1923) ("*Bluefield*").

Estimating the unobservable cost of equity somewhat resembles estimating the length of an unseen fish that slipped the hook. If you know what fish were running that day, you can attempt to infer what species it may have been, and then consult data on those species' usual size in that season; if you know what fish were caught in those same waters on the same day, you can apply a statistically valid summary (such as the median) of that sample, etc. Associations are not contesting herein the common-sense proposition that applying multiple good techniques can assist in reaching a best feasible estimate. But common sense also instructs that if you want an accurate estimate, you won't get one by asking anglers to tell tales about "the one that got away." In short, the issue facing the Commission is not whether multiple models are better than one, but whether the specific models that have been proposed for use alongside the proven DCF model are well-founded and well-designed, such that they deserve similar trust. As Dr. Cornell observes, it would not be unreasonable for the Commission to continue using DCF alone, adhering to an established and judicially affirmed agency practice. *See* Ex. No. A-1, § E1, at 5 n.4.

The burden to prove the trustworthiness of each proposed additional model properly lies on those advancing a change in Commission policy to reference non-DCF methods. Prior to Opinion No. 531, the Commission had consistently rejected reliance on CAPM, E/B, and Risk Premium studies. Eleven years ago, the Commission noted that DCF "is a well established method of determining the equity cost of capital, and other methods such as the risk premium model have [i.e., had then] not been used by the Commission for almost two decades [now three decades]."[143] The Commission continued to reject CAPM, E/B, and RP studies in electric transmission ROE cases decided both shortly before and after Opinion No. 531.[144]

[143] *Composition of Proxy Grps. for Determining Gas & Oil Pipeline Return on Equity*, 123 FERC ¶ 61,048, P 53

The burden to prove the trustworthiness of each proposed additional model cannot be carried by a claim of "anomalous" market conditions. The rationale originally invoked for referencing risk premium and other non-DCF methods in Opinion No. 531—that financial market conditions were "anomalous" as of the underlying October 2012-March 2013 study period, in a way that made the DCF model less reliable—has not withstood the test of time, as the supposedly short-term "anomaly" of 10-year treasury yields below 3% persisted for years, and can now be seen to be aligned with the long-term decline in treasury yields from their Volker-era peak.[145] In any event, a conclusion that the DCF model should not be relied upon on its own cannot validate the specific additional models that would be used to dilute its result. Thus, claims of "anomalous market conditions" provide no insight as to what additional models should be used, nor as to how to specify those additional models' implementing parameters.

Nor is the burden to prove the trustworthiness of each proposed additional model carried by assertions that "the DCF methodology may no longer singularly reflect how investors make their decisions" because they "have increasingly used a diverse set of data sources and models to inform their investment decisions," and that reliance on multiple models reduces "'model risk.'"[146] Accepting those unsupported assertions for the sake of argument, they provide no basis

---

(footnote omitted), *reh'g dismissed*, 123 FERC ¶ 61,259 (2008).

[144] *See, e.g.*, *Pac. Gas & Elec. Co.*, 141 FERC ¶ 61,168 (2012); *S. Cal. Edison Co.*, 131 FERC ¶ 61,020, PP 114-116 (2010), *reh'g denied*, 137 FERC ¶ 61,016 (2011), *aff'd in relevant part sub nom. S. Cal. Edison Co. v. FERC*, 717 F.3d 177 (D.C. Cir. 2013); Op. No. 554, PP 270-271 & n.489 (placing the ROE at 8.11% and relying exclusively on DCF analysis and the riskiness of the subject company relative to the DCF proxy group, after considering the company's "Brief on Exceptions 35-39"). The referenced Brief on Exceptions (Brief on Exceptions of Potomac-Appalachian Transmission Highline, LLC, on Behalf of PATH West Virginia Company, LLC and PATH Allegheny Transmission Company, LLC, *Potomac-Appalachian Transmission Highline, LLC*, Docket No. ER09-1256-002 (Oct. 14, 2015), eLibrary No. 20151014-5330), cites (at 38) "Dr. Avera's analyses of the same alternative benchmark methodologies that the Commission found reliable in Opinion No. 531."

[145] *See Rebuttal Testimony and Exhibits of Professor J. Randall Woolridge*, Ex. No. CAP-19, at 11-12 & Figure 2, *ENE (Env't Ne.) v. Bangor Hydro-Elec. Co.*, No. EL13-33 (May 18, 2015), eLibrary No. 20150518-5306 (reproducing and discussing chart and study by former Federal Reserve Chairman Bernanke which displayed and concluded that "[l]ow interest rates are not a short-term aberration, but part of a long-term trend").

[146] *Coakley* Briefing Order PP 38, 40.

for reliance on E/B, or on the particular forms of CAPM or RP commonly urged by transmission owners seeking higher allowed returns. There is no evidence that investors rely on *those* models, or anything like them.

Tellingly, the support cited in the *Coakley* Briefing Order for the proposition that investors "appear to base their decisions on numerous data points and models, including the DCF, CAPM, Risk Premium, and Expected Earnings methodologies" consisted of: (1) testimony and an academic reference to the effect that *CAPM* analysis is widely used; (2) NETOs' testimony that risk premium analysis was referenced in Opinion No. 531; and (3) NETOs' testimony that "'expected earned returns on invested capital provide a direct benchmark for investors' opportunity costs.'"[147] Investors' widespread use of CAPM analysis is not evidence that they likewise rely on E/B or RP methods, and the CAPMs on which they rely do not utilize equity risk premiums or equity portfolio returns nearly as high of those of NETOs' witnesses. The Commission's reference to RP analysis in Opinion No. 531 is not evidence that investors rely on that method. And expected returns on book-value equity are *not* a direct benchmark for the returns available on investors' *market*-priced investment opportunities.

It is also significant that the only indicator of financial market anomaly cited in Opinion No. 531 was that "bond yields are at historic lows."[148] Relatedly, the *Coakley* Briefing Order (PP 41-42) notes that yields on U.S. treasuries generally exceeded 4% from the mid-1980s to 2008. Unlike the DCF method, the risk premium method (and to a lesser extent, the CAPM method) rely directly on bond yields. They are therefore *more* exposed to distortion due to the claimed anomalous market conditions than is the DCF method. Moreover, the risk premium method requires a linear relationship (not necessarily 1:1, but necessarily linear) between debt yields and

[147] *See Coakley* Briefing Order P 40 & nn.81-82.
[148] Op. No. 531, P 145 n.285.

equity costs. It also implicitly assumes that the subject utility's equity is risk-comparable to the utilities at issue in the historic data-set cases used in estimating past risk premiums (that is, it makes no provision for comparing the risks of the subject utility and data-set utilities, and thus implicitly assumes they are identical). Due to these inherent features of the risk premium approach, if low interest rate conditions somehow make the DCF method unreliable, they make the risk premium method even less reliable.

E/B ratios are likewise more susceptible than the DCF method to behaving strangely during periods of low bond yields or other "unusual" financial market conditions. When the earnings of utilities' exchange-traded parents increase because they or their subsidiaries are able to refinance high-cost debt at reduced interest rates, their equity market prices increase commensurately, but their equity book value does not. Consequently, E/B ratios are *more* exposed to distortion by "unusual" interest rates than is the DCF method. Similarly, when expected or realized corporate tax cuts or inflation produce heightened nominal-dollar forecast earnings, they have no effect on accounting book values per share, and they therefore increase E/B ratios. In contrast, the DCF method accounts for the effect of taxes and inflation in ways that properly offset—e.g., inflated dollars produce both higher nominal-dollar dividends and higher nominal-dollar stock prices, producing a dividend yield that is not distorted by inflation.

To support referencing multiple methods, the *Coakley* Briefing Order cites (indirectly) *Distrigas of Massachusetts Corp.*, Op. No. 241, 41 FERC ¶ 61,205, at 61,550 (1987) ("*Distrigas*"), *reh'g granted*, Op. No. 291-A, 42 FERC ¶ 61,225, *reh'g denied*, 43 FERC ¶ 61,192 (1988).[149] *Distrigas* explains that "[t]he weight to be given the results of each such methodology rests on the accuracy and sensibleness of the judgmental i[n]puts and factors that

[149] *See Coakley* Briefing Order P 40 n.82 (citing NET-1300 at 27, which in turn cites *Distrigas*).

the respective witnesses employed."[150] By that standard, the "Expected Earnings" method should be given no weight, because E/B ratios do not measure at all, much less measure accurately and sensibly, the return that investors require in order to invest in the market-priced equity that in turn funds public utilities' transmission-related assets. Moreover, the E/B method produces excessive ROEs when utility holding companies are looking profitable and insufficient ROEs when those companies are looking distressed, and is thus poorly equipped to provide sound regulatory outcomes over time.

3. The technique used for combining multiple models should integrate model results for each proxy

E6. To the extent that investors use multiple models, should the Commission combine them in its analysis or use the "best" one that would apply in all market conditions?

E7. If the Commission were to consider multiple models, how should it weigh them?

If the use of multiple methods improves cost estimation accuracy (as the PNA posits), then it follows that the identification of each proxy's equity cost is improved if the multiple methods are combined in identifying *that proxy's* equity cost. Accordingly, rather than forming the "composite range" by averaging the range bottoms of the DCF, CAPM, and E/B methods to set the composite range's bottom, and then averaging the range tops of the DCF, CAPM, and E/B methods to set the composite range's top, the order of operations should produce a composite distribution in which each proxy's return is estimated by averaging that particular proxy's DCF and CAPM results (along with its E/B result, if used). That modified composite distribution would then be used to locate the composite median, or other applicable percentile.

The range-based computational sequence used in the PNA would wrongly treat its three proxy-based methods as if they were studying three different proxy groups. Doing so would

[150] *Distrigas* at 61,550-51.

erroneously ignore that each of the three methods is attempting to estimate the same thing: each proxy's cost of equity. *See Coakley* Briefing Order P 53 (recognizing that each model's result for each proxy company represents an estimate of *that proxy's* "cost of equity"). Given that common underlying reality, the proper sequence is: (i) determine each proxy's cost of equity under each of the utilized methods, (ii) average those multiple results to get a single cost of equity estimate for each member of the proxy group, and (iii) create a composite proxy group distribution and range using these averaged results for each proxy group member.

Because the methods that would be combined presently remain under review, it is difficult to speak to what weighting should be applied in that combination. As a general proposition, leaving the weighting for resolution in a case-specific dispute would invite unproductive, result-driven testimony and briefing in which each side seeks greater weight for those studies currently producing a result closer to their desired allowed ROE. Better use would be made of participant and Commission resources by devoting ample attention now to ensuring that all utilized methods are well-designed to produce reliably market-based indications of a subject utility's market-based cost of equity and then weighting those models' results equally.

4. Simple versus complex models

E8. To what extent is it reasonable for the Commission to use a simplified version of a model that does not reflect all the variables that investors consider?

E8.a. Is the use of a simplified model justified for ease of administration and predictability of result?[151]

The Commission cannot practicably hope, and should not try, to capture every one of the myriad models or variables employed by some subset of the world's many equity investors. It should apply no more than a handful of well-tested, market-based, academically-supported

[151] We intentionally skip here from Question E8.a to Question E11. Questions E9–E10, concerning reference to state-allowed ROEs, are addressed in Part III.E.6, *infra*.

methods.[152] And those methods' integrity should be respected. That is, the Commission should not let itself be led into selective complexification, in which standard models are "refined" by adding features that tend to move their result in a particular direction, while omitting other refinements, supported by the same sources or reasons, that would have a countervailing effect. *See, e.g.*, Part III.H.2.b)(3), *infra* (addressing attempts to selectively make a "size effect" adjustment to the CAPM while ignoring countervailing adjustments supported by the same sources used to justify a size adjustment). As Dr. Cornell explains, adding more variables can actually increase measurement error and is almost certain to lead to unnecessary controversy.[153]

5. Models versus "judgment"

E11. To what extent, if any, should the Commission exercise judgment in using financial models to set ROEs under various capital market conditions?[154]

The Commission should exercise careful judgment in selecting methods and the continuing features of implementing models. A good model will work in a very wide range of capital market conditions (as the DCF model does), so there is no good reason to vary the choice of model (as distinguished from the specific study-period data that is input to the model) by financial market condition. *See* Part III.C, *supra*.

Having specified reliable models, the Commission should trust them. Applying "judgment" to override good models' indication of what equity costs would amount to allowing preconceived notions of what ROEs should be allowed to override the best available empirical

[152] *See* Ex. No. A-1, § E8 ("All models are simplifications. Adding more variables does not necessarily increase accuracy. Importantly, the Commission should use models tested and endorsed by the academic literature as well as investors.")

[153] *Id.*

[154] *See, infra,* Section III.E.6 for responses to Questions E9 and E10.

evidence of what equity actually costs.[155] As such, it would evoke this exchange from the Marx Brothers movie *Duck Soup* (Paramount 1933):

> Teasdale: Your Excellency, I thought you left.
> Chicolini: Oh no. I no leave.
> Teasdale: But I saw you with my own eyes.
> Chicolini: Well, who ya gonna believe me or your own eyes?

Market-based empirical models are the only available "eyes" through which the Commission can perceive the cost of equity, and they should be believed.

To be clear, model-based determination of what equity *costs* does not preclude the application of regulatory judgment to decide to set the allowed ROE for a particular utility above or below the costs of equity, on incentive or other grounds. For example, if the Commission seeks to avoid large, rapid changes in allowed ROEs (as Opinion No. 551 stated[156]), it could craft stabilization rules that would limit the rapidity with which a utility's allowed ROE may change, in either direction. As discussed in Part III.E.6, *infra*, such stabilization could be accomplished by referencing state-allowed ROEs. But all such deviations from cost-based ROEs should be explicit, explicitly justified, and designed to be fair to both ratepayers and shareholders as the cost of equity varies bi-directionally over time.

6. If properly used, state-allowed ROEs can provide a lagging, but useful, indicator of utilities' equity costs.

E9. How, if at all, should the Commission consider state ROEs?

E9.a. How and why do state ROEs vary by state?

E9.b. How are certain state ROEs more or less comparable to Commission ROEs?

---

[155] *See* Ex. No. A-1, § E11 ("both the CAPM and the DCF model reflect capital market conditions and offer different perspectives on the same problem. . . . However, without a new and better model, exercising judgment to adjust the ROEs determined by academically tested and endorsed models likely introduces additional measurement error and speculation.")

[156] *See* Op. No. 551, PP 262-63.

E10. If the Commission considers state ROEs, how should it compare FERC-jurisdictional transmission ROEs with state ROEs that apply to utilities that are (a) distribution and transmission companies; or (b) distribution, generation, and transmission companies?

State ROEs exhibit considerable gradualism and lag,[157] which presently (in the current declining-equity-cost era) means they tend to overstate the cost of equity. Nonetheless, there are reasonable ways in which the Commission can reference state-allowed ROEs. One way is through a Risk Premium study.[158] To the extent the Commission relies on Risk Premium results based on past regulatory outcomes, it could look to ROEs allowed by state commissions. Notwithstanding the intuitive appeal of using past FERC allowances to set FERC-jurisdictional rates, reference to state allowances is reasonable if they are properly used. State-allowed ROEs:

- Are collected and published by third-party sources—in particular, by Regulatory Research Associates ("RRA"), the source recommended by Morin's *New Regulatory Finance*.[159]
- Are closely aligned with the information on which investors rely, as RRA's reports are part of S&P Market Intelligence (formerly SNL Financial), an investor-oriented research service.[160]
- Are generally the allowed base ROE for a specific company, not a group of unrelated companies, and without inventive adders.
- Provide a large and thus reliable set of recent inputs.
- Reflect the fact that most transmission-owning public utilities receive the lion's share of their transmission revenues through bundled retail rates, outside of federal rate regulation.

---

[157] *See* Ex. No. A-2, at 41.

[158] The Commission could also moderate ROE changes in either direction by consistently referencing the representative value from a large number of recent state-allowed ROEs for comparable utilities.

[159] *See* Morin, *supra*, at 123.

[160] *See* CAP-500 at n.70 & accompanying text.

- As compiled by RRA, have formed the basis for risk premium studies endorsed and presented by witnesses sponsored by transmission owners.[161]

When taken out of context, certain state-allowed ROEs may appear to be out of line with industry norms, even though the resulting pre-incentive WACC is in line with industry norms. Such variations make the *range* of state-allowed ROEs uninformative in identifying either the cost of equity or a reasonable ROE stabilization method.[162] Thus, for any purpose, in regulating typical transmission ROEs, the Commission should look to recent state commission decisions concerning non-generator electric utilities, because investors perceive the cost-recovery risks associated with the transmission segment and distribution segment as being similar, and perceive both of these "wires" segments as being less risky than generation.[163]

F. No "mismatch" results from applying the market cost of equity to net plant rate base

1. The cost that utilities incur to attract equity is determined in financial markets

F1. Does the mismatch between market-based ROE determinations and a book value rate base support current market values? Is this mismatch a problem?

Question F1 seeks comment on the theory that market-based ROE determinations are conceptually mismatched with rate bases measured by depreciated original cost. It thereby raises

---

[161] *See* testimony submitted by the New England Transmission Owners in EL11-66 *et. al.* (NET-02200, at 94:10-12; NET-1320; NET-1708). We are not suggesting that any aspect of this study be repeated for use in future proceedings, other than the general fact of its reference to state commission allowances, as it included a clearly erroneous mismatch. It used *average* utility bond yields to compute the bond yield difference between the multi-year baseline period and the six-month study period, and then added the resulting equity risk premium to higher-yield, *Baa-rated* bond yields. This study also made a dubious choice by including ROEs for retail power sales by generation-owning utilities.

[162] Ex. No. A-2 at 41 (explaining the problem, and stating that it "can be avoided through an approach that combines a large number of recent state-allowed ROEs, by utilizing them for risk premium analysis or by referencing their median or mean").

[163] *Id.* at 43. For example, Standard & Poor's documentation of its credit rating methodology for utilities, S&P Global RatingsDirect, *Key Credit Factors for the Regulated Utilities Industry* (Nov. 19, 2013) categorizes as less risky (and is therefore more tolerant of higher leveraging) if "[a] vast majority of operating cash flows come from regulated operations that are predominantly at the low end of the utility risk spectrum (e.g., a 'network,' or distribution/transmission business unexposed to commodity risk and with very low operating risk)." *Id*. at 17.

the question whether the allowed ROE should reflect the E/B method, which divides projected earnings by an equity book value that supposedly matches the net book value rate base to which the allowed ROE will apply. While we address the main issues with the E/B method in Parts III.H.1 and III.H.2.c), *infra*, we here address this "matching" theory. For multiple reasons, the E/B approach does *not* provide an allowed ROE that better matches a net book value rate base than the longstanding approach of applying a market cost of equity to net plant rate base.

First, the "mismatch" theory is based on a fundamental conceptual error. The cost of equity to a regulated utility is not the accounting return that it, or comparable firms, have received or expect to receive on book value equity. Several leading academic texts confirm that economic rates of return are not the same as accounting-based rates of return. Dr. Cornell cites several leading academic texts that demonstrate that "accounting based rates of return do not provide meaningful estimates of economic rates of return," and that accounting-based rates of return should not be used to estimate ROEs for regulated utilities.[164]

As the Commission has recognized, the cost of equity to the utility is the return that equity investors require in order to be induced to have their capital invested in the assets used to provide regulated utility service.[165] Because capital is fungible and mobile, at any given time the original cost of inducing it to stay invested in utility assets is the market-based cost of capital attraction, which equals the return then available in capital markets for other investments of comparable risk. Thus, there is no mismatch in applying a cost-based ROE found by estimating the market cost of equity capital to a cost-based net plant rate base. When utilities procure other inputs (e.g., land or labor) at a price determined by competitive markets, nobody contends that including those competitively-priced costs in rates based on net original cost is any kind of

[164] Ex. No. A-1, § F1 (citing Fisher & McGowan (1983), Robichek (1978), and Lev & Gu (2016)).
[165] *See Coakley* Briefing Order P 36 n.73.

"mismatch." There is likewise no "mismatch" when ROEs set at the market-indicated cost of equity are applied to net plant values. Rather, the reasonableness of this approach is the fundamental teaching of *Hope*, which has served long and successfully as the bedrock of ROE determination and rate-setting policy under the Federal Power Act and Natural Gas Act. In the modern financial world, where more than a hundred trillion dollars in fluid global capital hunts opportunities to earn returns, utilities that offer such risk-comparable market returns will be able to attract capital.

If the allowed return on the equity-funded share of the rate base is kept in line with the market cost of equity as it varies over time, then at any given time, investors will (by definition) be allowed the same return on their rate-based investments as they would have earned on an investment in a comparable-risk unregulated enterprise. It follows that over the economic life of each rate base asset, the cumulative allowed return will align with what investors would have received by investing in comparable-risk unregulated enterprises. An example provided by Alfred Kahn demonstrates that the supposed "inconsistency" between a market-determined cost of equity and original-cost accounting incoherently "assumes at one and the same time that the commission allows returns on equity (r) in *excess* of and *equal* to the cost of capital (k)"[166] More recent academic texts confirm that a firm's "market-to-book value exceeds 1.0 when investors expect ROE to consistently exceed the cost of equity for the firm."[167]

It might be contended that the market value of utility assets generally exceeds their regulatory book value, and that it would somehow promote fairness to apply a higher ROE to a rate base valued by the latter measure. That argument was rejected in *Hope*. It is also belied by

---

[166] I Alfred E. Kahn, *The Economics of Regulation: Principles and Institutions* at 49-50 & n.72 (M.I.T. Press 1988) (emphasis altered).

[167] Ex. No. A-1, § F2 (citing Penman (2016) and Holthausen & Zmijewski (2019)).

the Commission's provision for recovery of "stranded investment" in Order No. 888.[168] Utilities argued then that the advent of robust competition for generation sales left the market value of certain generation investments below their regulatory book value. The Commission accepted that premise and provided procedures for recovery of the difference. The Commission has similarly protected "stranded" investment in transmission assets whose market value, due to technological progress, has fallen below their book value.[169] If it is fair to provide for recovery of a market cost of equity on book value that exceeds market value, then it is likewise fair to provide for recovery of a market cost of equity on book value that is below market value.

Second, the factual premise of the "mismatch" theory is false. The equity book value of utility companies' traded parents (the divisor of the E/B ratio) is *not* equivalent to utilities' book-value rate base. To be sure, transmission owner witnesses have repeatedly suggested this analogy, as a rationalization for referencing the E/B ratio. But even at the parent (consolidated financial statement) level, large and pervasive differences exist between equity book value and net plant book value. This difference can readily be seen in the same Value Line reports from which the proposed E/B method would take its inputs.

For example, consider the February 15, 2019 Value Line for FirstEnergy Corp. (focusing on that parent company because it provided the highest proxy E/B ratio in a recent study presented to the Commission), looking to the same projection period (2022-24) as would be used

---

[168] *See Promoting Wholesale Competition Through Open Access Non-Discriminatory Transmission Services by Public Utilities; Recovery of Stranded Costs by Public Utilities and Transmitting Utilities*, Order No. 888, 75 FERC ¶ 61,080, FERC Stats. & Regs. at 31,788-89 (1996), *on reh'g*, Order No. 888-A, 78 FERC ¶ 61,220, *on reh'g*, Order No. 888-B, 81 FERC ¶ 61,248 (1997), *on reh'g,* Order No. 888-C, 82 FERC ¶ 61,046 (1998), *aff'd in relevant part sub nom. Transmission Access Policy Study Grp. v. FERC*, 225 F.3d 667 (D.C. Cir. 2000), *aff'd sub nom. New York v. FERC*, 535 U.S. 1 (2002).

[169] *See Smart Grid Policy*, 128 FERC ¶ 61,060, P 141 (2009) ("the Commission will allow single issue rate treatment of otherwise stranded costs for jurisdictional legacy systems being replaced by jurisdictional smart grid equipment, provided that proposals to recover these costs are supported by an equipment migration plan that minimizes the stranding of unamortized costs of legacy systems").

under the NOI's contemplated approach. For that company and period, the expected book value common equity is about $10.7 billion.[170] Yet for the same company and period, the "Net Plant" is $36 billion, and the equity ratio share of Net Plant is about $12.1 billion.[171] Thus, the supposedly equivalent book value and net plant values diverge by about $1.4 billion, exceeding 13% of the book value common equity—a percentage larger than a typical allowed return on transmission equity. And in this case, the >13% difference relates to a holding company that has almost entirely shed its non-utility operations. For most proxies, the purported analogy between the equity book value of utility companies' traded parents and utility net plant is further confounded by the fact that at the parent-level, consolidated earnings commonly include substantial earnings on unregulated or diversified operations, which may well have a higher ratio of earnings to net plant.

For an example of this difference between parent-level and utility-level E/B ratios, consider Wisconsin Energy ("WEC"), which provided the highest proxy E/B ratio in the illustrative calculations of *Coakley* Briefing Order P 54, and referencing the March 22, 2013 Value Line report underlying that calculation.[172] As of that study, WEC's most recent actual E/B (for 2012) was 13.2%, and its fifth-year projected E/B was a roughly similar 14.0%. But the same year's actual E/B at the operating-utility level, for WEC's principal subsidiary Wisconsin Electric Power Company, was 10.8%.[173] WEC's corporate annual report for that year[174] explains this difference. It shows that 36% of WEC's 2012 consolidated earnings came from "Non-

---

[170] Book value/share of $19.50 x 550.00 million shares outstanding = $10.725 billion.

[171] "Net Plant" of $36.000 billion x "Common Equity Ratio" of 33.5% = $12.06 billion.

[172] *See* Docket No. EL11-66, Ex. No. NET-709 and Ex. No. NET-710, at 55.

[173] *See* WEPCO's FERC Form 1 for 2012, eLibrary No. 20130501-8001, at 117, l. 78 (Net Income of $367,328,610) and 112, l. 16 (Proprietary Capital of $3,396,880,705). Taking those accounting entries' ratio, WEPCO's utility-level realized E/B for 2012 was 10.81%.

[174] Wis. Energy Corp., *Standing the Test of Time: 2012 Annual Report* (2013), https://s22.q4cdn.com/994559668/files/doc_financials/annual/wec2012_annualreport.pdf.

Utility Energy," which "consist[ed] primarily of our PTF units (PWGS 1, PWGS 2, OC 1 and OC 2)," i.e., Port Washington Generating Station Units 1&2, and Oak Creek expansion Units 1 & 2.[175]

Large differences between equity book value and net plant book value can arise for any number of reasons. These include timing differences in depreciation and tax accounting, and the application of "mark to market" accounting for some purposes at the parent-company level.[176] Major differences in E/B ratios also arise due to differences equity ratios at the traded parent and operating utility levels. Almost without exception, traded parents are more leveraged (have lower equity ratios) than their operating subsidiaries. In the same FE Value Line referenced above, FE's most recent fully-historical (2017) equity ratio was only 15.7%, whereas the equity ratio of its transmission-owing subsidiary was approximately 58.0%.[177] Consequently, FirstEnergy's parental E/B was exceptionally high in part because highly leveraged parental debt represented a balance sheet liability that reduced the divisor of that ratio.

Real-world differences like these belie the hypothetical example that Dr. Morin (showing his background as a witness retained by utilities to support their requested ROEs) presents as purported demonstration that "the DCF cost rate understates . . . the investor's required return when stock prices are well above . . . book."[178] His example is based on a simplistic, and factually incorrect, assumption that the rate base to which allowed ROE is applied equals the equity book value divisor of the M/B ratio. It also assumes a 100% equity capital structure for a

---

[175] *Id.* at F-13; *see id.* at F-7 (explaining acronyms and describing "Non-Utility Energy Segment"), F-9 (reporting consolidated earnings by segment).

[176] *See* Ex. A-1 at 15-17.

[177] *See* Am. Transmission Sys., Inc., Annual Report (FERC Form 1), at 112, ll. 16, 24, (Mar. 30, 2018), eLibrary No. 20180330-8022) (Total Proprietary Capital of $1,514,011,052, and Total Long-Term-Debt of $1,096,346,454; the ratio of the first figure to the sum of the two figures is 58.0%).

[178] Morin, *supra*, at 435.

publicly-traded operating company that has only rate-regulated revenues. In this unrealistic hypothetical, a utility with a 2:1 M/B ratio (per share, $100 market price/$50 book value) is allowed a 10% ROE, developed on a DCF-like basis by adding a 5% dividend yield to 5% growth, and applied to a rate base of $50/share that exactly equals the $50/share book value. On those contrived premises, the DCF-based 10% allowed ROE appears to produce only enough return to fund dividends, with no retained earnings left to fund growth. But suppose the true cost of equity is a constant 10%, and the utility again has per-share market value of $100 and share book value of $50, but also has net plant rate base of $90/share, exceeding its share book value. (As shown above, there is no reason to assume the latter two amounts are identical, and ample reason to expect the plant asset base to exceed share book value.) In this revised scenario, the utility would be allowed $9/share in return and would have $4/share in retained earnings from which to fund growth. Moreover, while in this hypothetical the DCF method would initially produce a return 1% below the assumed cost of equity (9% rather than 10%), that model error would be self-correcting, because investors would value (price) the stock such that its dividend yield would rise until the sum of its dividend yield and growth aligned with the utility's cost of equity. That is because the DCF method's reference to market prices makes it self-correct differences between allowed returns and the cost of equity, whereas the E/B method perpetuates those differences.

2. The M/B ratios of utilities' *parents* exceed unity by much more than do the M/B ratios of utilities themselves

F2. Why have most or all utility market-to-book ratios consistently exceeded one?

Question F2 asks why "utility" market-to-book ratios typically exceed unity. This question, however, is imprecisely worded. As is recited elsewhere in the NOI, utility operating

companies are not publicly traded and, therefore, have no readily visible "market" stock price.[179] Accordingly, the market-to-book ratios of utilities themselves cannot be said to typically exceed unity.

One can, however, with considerable effort, extract benchmark M/B ratios at the operating company level from time to time, by scrutinizing the prices paid by holding companies or their subsidiaries to acquire operating utilities, such as NextEra's recent acquisition (from Southern Company) of Gulf Power Company. The difficulty of such benchmarking is indicated by the fact that the price paid by NextEra does not appear in the public record of Docket No. EC18-117, where the Commission reviewed that transaction. It seems, however, that NextEra paid approximately Gulf Power Company's net book value: On January 1, 2019, it paid "approximately $4.47 billion in cash consideration" and assumed "approximately $1.3 billion of Gulf Power debt,"[180] thus committing approximately $5.77 billion. In exchange, it acquired an operating utility with a year-end 2018 regulatory book value of $5.32 billion.[181] Thus, this transaction indicates a utility-level M/B ratio of approximately 1.08, much closer to unity than the contemporaneous M/B ratios of NextEra (approximately 2.53[182]) or Southern (approximately 1.78[183]).

---

[179] *See* NOI Question H.1.3 ("The Commission adjudicates cases at the operating company level, for which there is no public data like stock prices, growth rates, and betas.").

[180] NextEra, Inc., Annual Report (SEC Form 10-K) at 98 (Feb. 15, 2019).

[181] Gulf Power Co., Annual Report (FERC Form 1) at 111, l. 85 (Apr. 17, 2019), eLibrary No. 201901418-8005 ("Total Assets" of $5,320,620,672).

[182] Yahoo Finance identifies NextEra Energy's (ticker NEE) year-end 2018 market price as $172.67. *See* https://finance.yahoo.com/quote/NEE/history?p=NEE&.tsrc=fin-srch. The February 15, 2019 Value Line for NEE estimates a year-end 2018 book value per share of $68.30. Applying those amounts' ratio, NEE's year-end 2018 M/B was approximately 2.53.

[183] Yahoo Finance identifies The Southern Company's (ticker SO) year-end 2018 market price as $43.38. *See* https://finance.yahoo.com/quote/SO/history?p=SO. The February 15, 2019 Value Line for SO estimates a year-end 2018 book value per share of $24.35. Applying those amounts' ratio, SO's year-end 2018 M/B was approximately 1.78.

An even lower M/B ratio for an operating utility is indicated by the April 2013 acquisition of Atlantic Path 15 by Duke-American Transmission Company. The seller received "a total sale price of approximately $56 million,"[184] in exchange for an entity whose book value equity ("Total Proprietary Capital") exceeded $60 million.[185] Thus, the M/B ratio indicated[186] by that transaction is below unity.

Circa 2007, Alliant subsidiary Interstate Power and Light Company ("IPL") sold its transmission system to the nascent ITC Midwest—not only selling the associated transmission assets, but doing so as a going concern with its transmission personnel transferred to ITC Midwest.[187] IPL expected to receive approximately $165.7 million in "Net Proceeds Above Net Book Value of Assets," which were estimated to be $432.2 million at the anticipated time of closing.[188] Thus, this transaction indicates a utility-level M/B ratio of approximately 1.38,[189] a significant portion of which presumably reflected the market value of ITC Holdings' substantial non-cost incentive ROE adders and ability to profit through double-leveraging. At the exchange-traded parent level, as of year-end 2007, ITC Holdings' M/B ratio was approximately 4.3.[190]

Similarly, when Monongahela Power Company sold its Ohio operations to Columbus Southern (a subsidiary of AEP) at year-end 2005, it did so for a utility-level M/B ratio of

---

[184] Atl. Power Corp. Quarterly Report (SEC Form 10-Q), at 12 (May 8, 2013).

[185] Atl. Path 15, LLC, Quarterly Report (FERC Form 3-Q), at 112, l. 16 (Apr. 30, 2013), (eLibrary No. 20130430-8004. The transaction also included assumption of debt, which is excluded from both sides of the foregoing comparison.

[186] The SEC Form 10-Q also states (at 12) that Atlantic Power "recorded a gain on sale of approximately $7.0 million," which would suggest an M/B ratio slightly more than unity rather than slightly less than unity.

[187] *See generally ITC Holdings Corp.* 121 FERC ¶ 61,229 (2007).

[188] *See In re Interstate Power & Light Co.*, No. SPU-2007-0011, Ex. No. CAH-1, sched. K (Iowa Utils. Bd. Mar. 30, 2007).

[189] That is, in $ millions, (165.7 + 432.2)/432.2=1.38.

[190] According to the September 16, 2016, Value Line for ITC Holdings, its split-adjusted, year-end 2007 book value per share was $4.37, and its contemporaneous market price was between $12.6 and $19.5; Historic Stock Price.com. https://www.historicalstockprice.com, specifies $18.81. The ratio $18.81/$4.37 exceeds 4.3.

approximately 1.17—much closer to unity than the M/B ratios of either FE (1.64) or AEP (1.58).[191]

The logical next question is why the M/B ratios of extant[192] proxy companies such as AEP, FE, NEE, and SO exceed unity by so much more than is the case for their operating electric utility subsidiaries. The reasons will vary by company, but the likely explanations include the following. One, proxies' business commonly includes substantial profitable activities that generate revenues mainly from human and intellectual capital rather than booked assets. Examples include power trading, non-utility home maintenance and energy efficiency services,[193] infrastructure services,[194] and more. Such revenue enlarges the numerator of the M/B ratio, without a corresponding increase to the divisor. A 2012 academic publication[195] explains:

> In a growing number of companies, the role and the amount of intangibles (e.g., human, structural, managerial, technological and customer capital, patents, etc.) increase to such points that their value completely overwhelms the value of all the other assets combined (Hirschey et al. 2001; Daum 2003, Hand and Lev 2003). Nevertheless, these important assets are not captured on the balance sheet. For example, R&D and advertising expenditures are often regarded as investments in future value creation but, due to their uncertain nature, are being expensed, contributing to the gap between book and market value of equity.[196]

Two, post-restructuring, power is sold at market prices disconnected from net plant. Again, the resulting revenue enlarges the numerator of the M/B ratio, without a corresponding increase to

---

[191] Ex. No. A-2, at 64:1-4.

[192] ITC Holdings is no longer publicly traded, having been acquired by Fortis and an entity owned by Singapore. *See Consumers Energy Co. v. Int'l Transmission Co.*, 165 FERC ¶ 61,021, P 10 (2018).

[193] *See, e.g.*, BGE Home, https://www.bgehome.com/.

[194] *See, e.g.*, CenterPoint Energy and Vectren Merger: Delivering Energy, Service and Value at 10 (Apr. 23, 2018), http://investors.centerpointenergy.com/static-files/344a0236-4d9a-4aeb-bf04-ec646b55d75f (Vectren Infrastructure Services Corp. is "[o]ne of the largest US providers of underground construction and repair services to LDCs and pipelines" and contributed 14% of Vectren's 2017 net income; Vectren Energy Services, which provides project services involving "energy performance contracting" and "sustainable infrastructure," contributed another 5%) .

[195] M. Aleksanyan & K. Karim, *Searching for Value Relevance of Book Value and Earnings: a Case of Premium vs. Discount Firms*, 41 Rev. Quantitative Fin. & Acct 489 (2013), http://eprints.gla.ac.uk/68615/.

[196] *Id*. at 491-92 (footnote omitted).

the divisor. Three, market and book values diverge due to regulatory timing differences related to depreciation, taxes, and the like. Four, differential leveraging at the parent and operating subsidiary levels means that operating subsidiaries commonly receive an equity return on a higher equity ratio than applies at the consolidated, parental level.[197] In effect, the consolidated entity receives an equity-level return on assets funded by debt. The numerator of the M/B ratio is raised by the equity-level return, while the liability for the associated debt reduces the numerator of that ratio.[198] None of these situations constitute reasons to diverge from the longstanding rule that the market-based cost of equity is applied to book-value rate base.

3. As nearly as is practical, allowed base ROEs should be set at the cost of equity

F3. How should the ROE level be set relative to the cost of equity?

NOI Question F3 asks a simple question: "How should the ROE level be set relative to the cost of equity?" The correspondingly simple answer is that, in principle, the allowed ROE should be set *at* the cost of equity. As the Commission stated in 1988:

> There is compelling economic justification for relying on the market cost of capital as the standard for rate of return decisions. Furthermore, a market cost of capital approach addresses both the comparable earnings and attraction of capital standards of the *Hope* decision. [199]

The Federal Power Act aims to protect consumers from "exorbitant rates,"[200] completely prevent "excessive rates and charges,"[201] and does not permit "even 'a little unlawfulness.'"[202] As summarized by a leading textbook on corporate finance: "Because it has a monopoly, an

---

[197] *See, infra,* Part III.H.

[198] *See generally*, Ex. No. A-1, § F.2.

[199] Order No. 489, FERC Stats. & Regs. at 30,993.

[200] *Am. Pub. Power Ass'n v. FPC*, 522 F.2d 142, 147 (D.C. Cir. 1975) (Bazelon, J., concurring).

[201] *Atl. Ref. Co. v. Pub. Serv. Comm'n*, 360 U.S. 378, 388 (1959).

[202] *Consumers Fed'n of Am. v. FPC*, 515 F.2d 347, 358 n.64 (D.C. Cir. 1975) (quoting *FPC v. Texaco, Inc.*, 417 U.S. 380, 399 (1974)).

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

unregulated electric . . . company could exploit its customers. Therefore, regulators (1) determine the cost of the capital investors have provided the utility and then (2) set rates designed to permit the company to earn its cost of capital, no more and no less."[203] The "no more" portion of this restatement has dispositive support in governing D.C. Circuit case law: "'The cost of capital is the *minimum* rate of return necessary to attract capital to an investment.'"[204]

There are, of course, practical and statutory-procedures limitations to that principle. The cost of equity cannot be directly observed and must, therefore, be inferred through one or more of the time-tested techniques that translate study-period financial market data into a comparable-risk equity cost estimate. Consequently, each utility's cost of equity cannot be re-studied and re-set every day. The proper occasions to do so are whenever an entity with standing to do so seeks an ROE change pursuant to FPA section 205 or 206. Incentive adders present separate questions; we address them in the companion response to the Docket No. PL19-3 Incentives NOI. But none of those qualifiers alter the basic principle: As nearly as practicable, the base ROE allowed in FERC-regulated rates should be set at the best available estimate of the contemporaneous market cost of the equity invested by utilities in the assets used to provide the associated FERC-regulated services. Allowing less risks depriving the utility of needed capital and compromising its ability to serve the public. Allowing more risks exploits consumers and allows utilities to earn monopoly rents, contrary to the Commission's consumer-protection mission.

---

[203] Ehrhardt & Brigham, *supra*, at 336 n.1.

[204] *Tenn. Gas Pipeline Co. v. FERC*, 926 F.2d 1206, 1208 (D.C. Cir. 1991) (emphasis added) (quoting A. Lawrence Kolbe, *et al*., *The Cost of Capital: Estimating the Rate of Return for Public Utilities* at 13 (1984)).

4. The DCF model's dividend yield term should not be replaced with dividends divided by book value

F4. Should the Commission revise our use of these models to account for the mismatch between market-based ROE determinations and book-value rate base? If so, how? For example, should the Commission adjust the dividend yield used in the DCF model to represent a yield on book value rather than a yield on stock price?

Replacing the dividend yield term of the DCF model with dividends divided by book value would violate the basic principles of the DCF method, and was rightly rejected in *Orange & Rockland Utilities, Inc.*[205]

As explained by the D.C. Circuit, "The premise of the DCF model is that the price of a stock is equal to the stream of expected dividends, discounted to their present value." *Williston Basin Interstate Pipeline Co. v. FERC*, 165 F.3d 54, 57 (D.C. Cir. 1999). Thus,

> DCF analysis works from the proposition that the price of a stock is the current value of all expected future cashflows, discounted at the rate of return.[6] The key equation, $[k] = D_1 / P_0 + g$, employs the current price of the utility, because that price is understood to represent the best possible assessment of the available information about the utility. See, e.g., Morin, Utilities' Cost of Capital 119-20.
>
> [6] This can be stated as $P_0 = D_1 / ([k] - g)$, i.e., the price of a stock equals the value of next year's dividends divided by the cost of capital net of the steady future growth rate of dividends. *See* Kolbe, The Cost of Capital 54; Morin, Utilities' Cost of Capital 82. This can then be restated to focus on what the regulator is seeking to discover, the cost of capital: $[k] = D_1 / P_0 + g$.

Tenn. Gas Pipeline Co., 926 F.2d at 1210 & n.6.[206]

Dividends/Book Value have no place in these equations, for the simple and dispositive reason that the price paid by study-period investors ("P_0") is the market price, not book value.

---

[205] Op. No. 314, 44 FERC ¶ 61,253, at 61,952, *on reh'g*, Op. No. 314-A, 45 FERC ¶ 61,252 (1998), *reconsideration denied*, 46 FERC ¶ 61,036 (1999).

[206] To avoid confusion when this passage is read together with other sources, we have re-lettered the variable representing the cost of equity as "k," rather than "r" as in the original. Re-labelling the variable, of course, makes no substantive difference.

Consequently, substituting book value for the P_0 term of the equation "$[k] = D_1 / P_0 + g$" would result in miscalculation of k, the cost of equity.

5. ROEs should be set so as to track the cost of equity, not to drive M/B ratios towards unity

F5. Should the Commission consider adjusting ROEs to account for market-to-book ratios above or below one? Would doing so introduce circularity into Commission ROEs by setting the ROE at whatever level of earnings the market expected, rather than making an independent assessment of the appropriate ROE?

Question F5 appears to ask whether ROEs should be set so as to drive M/B ratios towards unity. We do not argue for doing so. There may have been arguments for that approach when operating utilities' stock was traded publicly, utility revenues derived almost exclusively from regulated return on net plant, and utilities' net plant rate bases and equity book values were equivalent. In that context, it was commonly argued that an M/B ratio exceeding unity indicated a market expectation that the utility would receive more than its cost of equity (and, conversely, that an M/B ratio below unity indicated a market expectation that the utility would receive less than its cost of equity), and that regulators could home in on allowing only the cost-based return by raising or lowering returns until M and B converged.[207] But that context no longer applies.

First, utilities' net plant rate bases and equity book values are not equivalent. As the Commission can readily confirm from the FERC Form 1 accounting information it collects, the equity-financed shares of utilities' net plant rate bases consistently exceed their proprietary capital. For example, consider Florida Power & Light ("FPL"), one of the nation's largest electric[208] utility operating companies. Its 2018 FERC Form 1 reports factors that produce an

[207] *See, e.g.*, Robert J. Gelhaus & Gary D. Wilson, Note, *An Earnings-Price Approach to Fair Rate of Return in Regulated Industries*, 20 Stanford L. Rev. 287 (Jan. 1968); *see also* Kahn, *supra*, 48-50 & nn.69-70.

[208] We use FPL for this example rather than, e.g., Pacific Gas & Electric, because FPL is not a combination gas-electric utility.

equity-ratio net book value of $24.6 billion,[209] considerably exceeding its $21 billion[210] in proprietary capital. This difference arises, in part, because Accumulated Deferred Income Tax is subtracted only from the latter. Second, regulated investor-owned operating utilities are now generally owned as subsidiaries of holding companies and not exchange-traded themselves, and their parents are not rate-regulated. This parent-subsidiary relationship further disconnects the actual and projected E/B ratios of proxy companies from operating utilities' returns on net plant. It also means that trying to make the M/B ratios of exchange-traded, non-regulated holding companies converge on unity would be a dubious regulatory goal, if it could even be accomplished, as those companies' M/B ratios may well result from expectations of the profitability of non-utility and/or non-regulated business.

Conversely, however, high M/B ratios at the holding company level should not produce high allowed ROEs at the operating company level. Yet that would be the consequence if actual or projected E/B ratios were used to determine allowed ROEs. High M/B ratios translate directly into high E/B ratios, as the two ratios share a common denominator, and their respective numerators (M for Market value, also known as "P" for market Price) tend to move in tandem, because earnings inure to shareholders' benefit. Consequently, "[c]ompanies with relatively high rates of return on [book] equity generally sell at higher multiples of book value than those with low returns."[211] But for the same reasons that counsel against attempting to steer the M/B ratios of utilities' exchange-traded parent toward unity, high M/B and E/B ratios at the exchange-traded parent level do not indicate the cost of equity to operating utilities. Consequently, the E/B

---

[209] *See* Fla. Power & Light Co., Annual Report (FERC Form 1) at 112, ll. 16, 24, eLibrary No. 20190419-8034 (Total Proprietary Capital of $21,021,282,579 and Total Long-Term Debt of $11,636,301,317, i.e., an equity ratio of 64.4%); *id*. at 200, l. 15 (Net Utility Plant of $38,213,486,574; multiplying that amount by 64.4% produces the referenced $24.6 billion).

[210] *See id.* at 112, l. 16.

[211] Ehrhardt & Brigham, *supra*, at 101.

method should not be used, and if it were to be used, it would be necessary to adjust its results to recognize that the E/B ratios of proxies (exchange-traded parents) with high M/B ratios are not representative of the E/B ratios associated with operating utilities.[212]

Ironically, the difference between exchange-traded parents and operating utility companies attenuates concerns that proxy company earnings (whether actual or expected) are affected by the ROEs allowed by regulators, including FERC. Such a feedback loop could formerly be seen in the E/B studies wherein ITC Holdings Corp., with its entirely FERC-jurisdictional business model, former large incentive earnings, and an equity-heavy ratemaking capital structure at the operating utility level, had E/B ratios at or near the top of the E/B distribution.[213] However, where the FERC-allowed ROEs for the operating subsidiaries of ITC Holdings Corp. used to represent the lion's share of that parent's earnings, they now represent a considerably smaller share of the earnings of Fortis, Inc.[214] And because ITC's FERC-regulated allowed ROEs now represent a smaller portion of the numerator of its parent's E/B ratio, that ratio is now less sensitive to FERC-allowed ROEs. Such mixture of FERC-regulated earnings with larger non-FERC-regulated earnings is now typical of the exchange-traded parents that could be included in a risk-representative proxy group. Thus, there is now more reason to be concerned about whether the financial metrics associated with exchange-traded parents are representative of operating utilities than about whether operating utilities' allowed ROEs will feed back into parent-level financial metrics. To the limited extent that exchange-traded parents are representative proxies for operating utilities, however, allowing parental E/B ratios to feed

---

[212] *See* Part III.F.2, *supra*.

[213] *See, e.g.*, Docket No. EL14-12, Ex. No. MTO-31.

[214] *See, e.g.*, Fortis's 2018 annual report to shareholders, *The Power of Focus: 2018 Annual Report* at 34 (2019), https://www.fortisinc.com/docs/default-source/finance-regulatory-reports/annual-reports/fortis-2018-annual-report-final1.pdf (the ITC segment contributed only $361 million to Fortis' $1,100 million in "Net Earnings Attributable to Common Equity Shareholders).

into operating companies' allowed ROEs would create an unreasonable feedback loop in which utilities' above-cost allowed ROEs would raise parental E/B ratios, and both would spiral up from there.

We address that feedback loop in case such feedback is what Question F5 means by "circularity." As used in the relevant academic literature, however, "circularity" has a different, and more important sense. It means a method that does not reference securities prices, and thus never enables market price information to correct starting-point differences between allowed ROEs and the cost of equity. As shown in Part III.H.2.c)(1) below, the E/B method is circular in that way.

G. Base ROEs exceeding the cost of equity should not be presumed just and reasonable

1. To assess whether existing ROEs remain just and reasonable, the Commission should compare them to the cost of equity indicated by well-designed market-based methods

G1. How should the Commission determine if existing ROEs are just and reasonable?

The "just and reasonable" standard of FPA sections 205 and 206 is meant to "afford consumers a complete, permanent and effective bond of protection from excessive rates and charges," *Atl. Ref. Co.*, 360 U.S. at 388, and permits "not even 'a little unlawfulness.'" *Consumers Fed'n of Am.*, 515 F.2d at 358 n.64 (quoting *Texaco*, 417 U.S. at 399). "The 'just and reasonable' lodestar is no loftier under section 206 than under section 205. . . . "[215] Accordingly, FPA section 206 empowers the Commission to reduce any rate that is not the "'lowest reasonable rate,'" even if the existing rate is within a "zone of reasonableness," *FPC v. Nat. Gas Pipeline Co. of Am.*, 315 U.S. 575, 585-86 (1942) (quoting Natural Gas Act § 5(a), 15

[215] *FirstEnergy Serv. Co. v. FERC*, 758 F.3d 346, 353 (D.C. Cir. 2014).

U.S.C. § 717d(a)), and mandates that whenever a rate is found to be unjust, unreasonable, or unduly discriminatory, the Commission "*shall*" fix a substitute rate.[216]

These authorities, and the Commission's foundational policy that base ROEs should track the cost of equity,[217] cannot be squared with the "quartile approach" discussed in Part III.A.1, *infra*, under which complaints would be dismissed unless the existing ROE, having been shown to exceed the cost of equity, was further shown to exceed the cost of equity by an arbitrarily wide margin. Such a policy would be legally erroneous, as the Commission has an unquestioned statutory obligation to reduce existing rates that are shown to have become unjust, unreasonable, or unduly discriminatory.

In short, the substantive standard for assessing whether an existing base ROE remains just and reasonable should be that an existing base ROE is no longer just and reasonable if it is found to exceed the cost of equity, as measured by the best available empirical tool(s), applied to an appropriate study period. As discussed elsewhere in these Comments,[218] the reasonable set of such empirical tools includes neither actual E/B ratios, nor forecast E/B ratios, nor implausible equity market risk premiums, nor miscalculated utility rate case risk premiums. We address an associated procedural issue in Part III.G.3, *infra*.

2. Base ROEs exceeding the indicated equity cost should not be presumed to remain reasonable

G2. Is the quartile approach that the Commission proposed in the Coakley *and MISO Briefing Orders appropriate? If not, how should the Commission revise this methodology?*

The referenced "quartile approach" would create a presumption under which FPA section 206 complainants challenging an existing base ROE would bear a special burden to show that it

[216] FPA § 206(a), 16 U.S.C. § 824e(a) (emphasis added).

[217] *See, e.g.*, *Coakley* Briefing Order P 36 & n.73.

[218] *See* Parts III.E.1, III.F.1, III.H.2.b)(1), III.H.2.c), & III.H.2.d).

exceeds a level set above the indicated cost of equity (hereinafter, the "shield" level"). The shield level would be set above the center of a composite range, by adding one-eighth of that range's width. If adopted, the presumption would contravene the FPA's consumer-protection purpose, as cited in Part III.G.1, *supra*. It would also introduce an illegal asymmetry between the treatment of FPA section 205 and 206 filings; distort the D.C. Circuit's *Emera Maine* decision; and be arbitrary in its specifics. The vague potential for "rebutting" the presumption does not cure its legal infirmities.

Illegal asymmetry: Such a presumption would introduce an unfair asymmetry between FPA section 205 and FPA section 206. Public utilities filing changes in rates under section 205 apparently would continue to be able to obtain approval of a proposed rate increase if they could show that their cost of equity exceeds their existing allowed ROE by *any* amount. But under the proposed presumption, customers filing section 206 complaints would have to show that the cost of equity is so far below the existing allowed ROE that the difference exceeds the "shield" margin.

Such divergent treatment cannot be squared with the statutory structure. As explained in the foundational *Mobile* and *Sierra* cases,[219] a rate increase filing made and suspended under FPA section 205 and rate decrease complaint filed under FPA section 206 are both subject to the same "scope and purpose"[220] of Commission review. In both instances, the rates at issue are "subject to being modified by the Commission upon a finding that they are unlawful."[221]

This asymmetry also contravenes the 1988 Regulatory Fairness Act, Pub. L. No. 100-473, 102 Stat. 2299 ("RFA"), which, the Commission has found (citing legislative history), was

---

[219] *United Gas Pipe Line Co. v. Mobile Gas Serv. Corp.*, 350 U.S. 332 (1956) ("*Mobile*"); *FPC v. Sierra Pac. Power Co.*, 350 U.S. 348 (1956) ("*Sierra*").

[220] *Mobile* at 341.

[221] *Id*.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

"'intended to add symmetry' between the Commission's treatment of section 205 rate-increase filings and section 206 complaints seeking rate decreases."[222] As described by its principal Senate sponsor, the 1988 Regulatory Fairness Act was intended to make "the system for bringing utility rates down . . . similar to the system for bringing rates up."[223] The RFA's principal House sponsor explained: "[w]hen utility costs go up, utilities deserve a rate adjustment. We do not change that. But . . . when the economic factors go in the other direction, consumers deserve just and reasonable rate reductions," in "the same way that utilities receive just and reasonable rate increases."[224] Moreover, Congress expected that under the RFA, the Commission would "grant refunds under section 206 with comparable frequency to its granting of refunds under section 205."[225]

Under section 205, when the Commission determines that a rate previously accepted subject to refund exceeds the just and reasonable cost-based rate by *any* amount, the Commission typically requires refunds such that the ultimately settled rate is conformed to the just and reasonable cost-based level. Correspondingly, refunds in FPA section 206 complaint proceedings should be applied such that refunds are due and owing if the existing ROE is found to exceed the

---

[222] *ENE v. Bangor Hydro-Elec. Co.*, 151 FERC ¶ 61,125, P 28 & n.73 (2015) (quoting *Consumer Advocate I*, 67 FERC ¶ 61,288 at 62,000, *order on reh'g*, *Consumer Advocate II*, 68 FERC ¶ 61,207, at 61,997 (citing 133 Cong. Rec. S10925 (daily ed. July 30, 1987) (statement of Sen. Chafee) ("[u]nder the current law, . . . section 205 and section 206 filings are not treated in the same manner, and this inequality serves to favor the wholesale supplier over the wholesale customers and their residential and commercial customers"); 134 Cong. Rec. H9030 (daily ed. Oct. 27, 1987) (statement of Rep. Bruce) (the Regulatory Fairness Act, in setting a "refund effective date for consumers . . . [uses] essentially the same system used to grant rate increases"); 134 Cong. Rec. H8095 (daily ed. Sept. 23, 1988) (statement of Rep. Gejdenson) ("[t]his legislation represents an attempt to make the current regulatory process more equitable, giving electric consumers the same protections and considerations that supplying utilities currently receive . . . ")).

[223] *Regulatory Fairness Act: Hearing Before the Comm. on Energy & Nat. Res.*, 100th Cong., S. Hrg. No. 100-542 at 2 (Nov. 18, 1987) (statement of Sen. Bumpers).

[224] *Id*. at 26 (statement of Rep. Bruce).

[225] S. Rep. No. 100-491, at 6 (1988), *reprinted in* 1988 U.S.C.C.A.N. 2684, 2688.

just and reasonable cost-based ROE, any amount, without application of a presumption that says an overcharge of up to one eighth of a composite range width is permissible.

Emera Maine: The *Coakley* Briefing Order (P 27) presents its shield level as responding to the D.C. Circuit's observation in *Emera Maine* that there exists a "broad range of potentially lawful ROEs."[226] But nothing in *Emera Maine* calls for the Commission to create a range within which an existing ROE that is found to exceed the cost of equity is nonetheless shielded from section 206 challenge. *Emera Maine*'s reference to "broad range of *potentially* lawful ROEs" was to the full breadth of the DCF range,[227] as to which *Emera Maine* specifically affirmed the Commission's Opinion No. 531 ruling that the range is not one of immunity from section 206 rate reduction.[228] Moreover, in the same passage, *Emera Maine* took no issue with the Commission "eventually reduc[ing] the zone of reasonableness to a *single* ROE."[229] Thus, *Emera Maine* held that although there is a broad range within which an existing ROE *potentially* remains just and reasonable, at any given time, and for the particular circumstances of each case, there is ultimately a *single* level that *is* just and reasonable. Nothing in *Emera Maine* contemplates a presumption that a broad range of base ROEs—extending well above the central estimated equity cost value—are all *finally* reasonable for use in setting cost-based transmission rates, such that an existing ROE anywhere in that range should be presumptively immunized against change. Such a presumption would fly in the face of the D.C. Circuit's agreement that the zone of reasonableness finally collapses to a single ROE.

Rather than stating that a range of ROEs is presumptively shielded from reduction via section 206, *Emera Maine* presented the quoted observation about a "broad range" by way of

---

[226] *Emera Maine* at 26.
[227] *Id*. (emphasis added).
[228] *See id*.
[229] *See id*. (emphasis added).

explaining that bare identification of a new and lower cost of equity, *standing alone*, was not sufficient to explain why a prior, higher ROE was *necessarily* unreasonable. The court read Opinion No. 531-B as containing only a "bare conclusion" that any prior ROE standing below the newly determined level was "*per se* unjust and unreasonable," without making any discernable "actual finding as to the lawfulness of Transmission Owners' existing base ROE," and without providing "*any* further explanation."[230] The court remanded the First Complaint so that the Commission could supply the required finding and explanation, not to vindicate the NETOs' judicially-rejected argument that "FERC must accept as just and reasonable all ROEs within the discounted cash flow zone"[231] by adopting a similar policy of accepting as just and reasonable all ROEs within a sub-range of a broadened and elevated composite zone.

The court demanded further explanation because "a number of factors" might bear on the question whether an existing ROE remains reasonable,[232] and the Commission had not stated clearly which of those factors led it to conclude that the prior 11.14% ROE had become unreasonable. The "mere fact"[233] that the Commission had found 10.57% to be reasonable did not inherently supply that explanation, because the Commission, having been overly terse, *might* have reached that conclusion on a basis that did not rule out other ROEs also being reasonable. Now, however, the *Coakley* Briefing Order has stated that the Commission intends to set base ROEs at the estimated cost of equity. The *Coakley* Briefing Order refers to the "cost of equity" repeatedly and pervasively—some 46 times in all, and recognizes that "a comparison between the existing ROE and the just and reasonable ROE that the Commission would establish under

[230] *Id.* (emphasis added).
[231] *Id*. at 23.
[232] *Id*.
[233] *Id*. at 26.

current circumstances is relevant—and, in some cases, determinative—for whether the existing ROE remains just and reasonable."[234]

The policy that the Commission seeks to set the base ROE at its best estimate of the cost of equity was left implicit, not stated clearly, in Opinion No. 531-A. Paragraph 10 of that opinion, in which the Commission explicitly (albeit, perhaps overly tersely) explained what made the prior base ROE no longer reasonable, relied on but did not explicitly reference that policy. Once properly placed in the context of that policy, a finding that the rationally identified cost of equity is less than the existing base ROE compels the conclusion that the existing base ROE is no longer just and reasonable.

While this reasoning was unfortunately omitted from Opinion No. 531-A, it is far from novel. Opinion No. 551 affirmed rulings that a base ROE that "'authorized a utility to collect more than is necessary to satisfy the requirements of *Hope* and *Bluefield* would exploit consumers and, therefore, would be unjust and unreasonable,'" and that the burden borne by complainants is that of "'proving that [the existing] . . . Base ROE exceed[s] that level.'"[235] In *Bangor Hydro-Elec. Co.*, 122 FERC ¶ 61,038, P 14 (2008), the Commission explained that once it "determines the just and reasonable rate, here, an ROE, that particular rate should be used to calculate refunds, rather than the zone of reasonableness, because that specific rate is the product of the Commission's considered reflection about what is just and reasonable in that particular case." And in the foundational *Sierra* case, the Commission concluded that a contract rate that produced a 2.6% rate of return was unreasonably low, simply because it was determined (by stipulation) "that 5.5% was normally a reasonable rate of return for PG&E's operations."[236] On

[234] *Coakley* Briefing Order P 20.

[235] Op. No. 551, PP 10, 13 (quoting Initial Decision, 153 FERC ¶ 63,027, P 24 (2015)).

[236] *Sierra* at 353-54.

review, the Supreme Court stated that if the Commission had been correct in disregarding the contract rate, "no further findings were necessary"[237]—meaning that in a context where (as here) the allowed return is dictated by cost rather than contract, a finding that the existing return diverges from the cost-based return is a sufficient basis to find the existing return unreasonable.

Nothing in *Emera Maine* finds fault with, or casts any doubt on, that logic. Where the base ROE is intended to be cost-based, it is clearly logical to proceed from a rational finding that X represents the cost of equity to a ruling that it is not reasonable to continue setting rates using a base ROE of X+Y. The only problem with Opinion No. 531-A, in this respect, is that it left this logic unstated.

Emera Maine, in short, does not contemplate, let alone require, a presumption that an above-cost ROE remains just and reasonable unless it exceeds the cost-based level by more than one eighth of the composite range. *See Farmers Union Cent. Exch., Inc. v. FERC*, 734 F.2d 1486, 1503 (D.C. Cir. 1984) (holding that FERC may not, other than as a well-calibrated incentive, allow "'creamy returns'" that exceed the cost-based level, and citing as an example of such non-statutory excess *San Antonio v. United States*, 631 F.2d 831, 851-52 (D.C. Cir. 1980), in which rates would have been allowed to exceed the cost-based level by "seven percent.").

The proposed presumption, moreover, would have the effect of presumptively barring small ROE reductions unless and until the difference between the indicated cost of equity and the allowed ROE became so large as to trigger a major reduction. In Opinion No. 551[238] and in its brief to the D.C. Circuit in *Emera Maine*,[239] the Commission expressed concern that investors

---

[237] *Id*. at 354.

[238] Op. No. 551, PP 262-63.

[239] Brief of Respondent Federal Energy Regulatory Commission at 66, *Emera Maine* (D.C. Cir. 2016) (No. 15-1118) ("a 175 basis point decline . . . could be of a sufficient magnitude to undermine Transmission Owners' ability to attract capital") (citing Op. No. 531, P 150).

might be disconcerted by an overly large decrease implemented all at once. But the approach proposed in the *Coakley* Briefing Order would create a presumption against small ROE decreases. The proposed change of policy direction, from seeking to limit the size of large ROE decreases, to seeking to limit the frequency of small ROE decreases, is both striking and unexplained. The only consistent theme is that demonstrated reductions in the cost of equity would not to be fully tracked by reductions in allowed ROEs. The resulting bias towards investors and upward departure from cost-based ROEs would be inconsistent with *Hope*, *Bluefield*, and the Federal Power Act.

Arbitrary "Quartile": The PNA would use one eighth of the composite range's width as the increment by which the existing base ROE can exceed the composite range's center and still be found reasonable. The *Coakley* and MISO Briefing Orders rationalize reliance on this one-eighth increment by stating that if the subject utilities were riskier than average, their ROE would be set at the upper midpoint, and it "would be unjust and unreasonable for an average-risk utility to receive an ROE that is closer to the ROE that would be just and reasonable for a utility of above- or below-average risk."[240] While we take no issue with the quoted statement, it does not support the converse proposition, namely, that an ROE is reasonable if it exceeds the risk-appropriate ROE but is *closer* to the risk-appropriate ROE than it is to an even more risk-inappropriate ROE. The rates charged by an average-risk utility should be set using a base ROE that is no more than what would be just and reasonable for an average-risk utility. The observation that an ROE lies closer to the just and reasonable ROE than to some risk-inappropriate unjust ROE does not render that ROE just and reasonable. ROEs within the zone of reasonableness that are close to the just and reasonable ROE may be a little less unjust and

[240] *Coakley* Briefing Order P 26; MISO Briefing Order, P 27.

unreasonable, but remain unjust and unreasonable nonetheless. As the D.C. Circuit has ruled, the just and reasonable standard does not permit "'even a little unlawfulness.'"[241]

The reference to "quartiles" and the resulting application of one eighth of the composite range rests an implicit and unfounded assumption that there are only three categories of utilities (low-risk, average-risk, and high-risk), as illustrated by the three brackets at the top of the *Coakley* Briefing Order's Figure 1. The Commission could just as well divide the universe of utilities into, say, five categories (very-low-risk, moderately-low-risk, average-risk, and moderately-high-risk, and very-high-risk). In that case there would be five brackets at the top of a revised Figure 1, and the Order's purported logic would then indicate that the presumptively reasonable additional increment should be measured by one twelfth, not one eighth, of the width of the composite range. *Emera Maine* specifically rejected the proposition that the midpoint of the upper half was the only available above-midpoint ROE.[242] It follows that it would be reversible error to set the shield level on the basis of the same unfounded assumption.

Even if some form of presumption were permissible, the arbitrariness of the Commission's shield proposal is exacerbated by relying on the width of the composite range to determine the increment by which the shield level may exceed the distribution-indicated cost of equity, because that approach disregards the distribution of results within the composite range. *See* Response to NOI Question A2, *supra*. This arbitrariness echoes an error for which *Emera Maine* reversed Opinion No. 531. The 10.57% base ROE adopted in Opinion No. 531 exceeded 35 of the 38 DCF proxy values, which the *Emera Maine* court noted as a ground for skepticism as to that placement of the base ROE.[243]

---

[241] *Consumer Fed'n of Am.*, 515 F.2d at 358 n.64 (quoting *Texaco*, 417 U.S. at 399).

[242] *See Emera Maine* at 29-30.

[243] *See Emera Maine* at 28 (noting, skeptically, that the Commission had adopted a base ROE that "was higher than

"Rebuttable" character of presumption. The *Coakley* Briefing Order describes its identified "quartile" as one within which continued reasonableness would be merely "presumed," but the Commission has provided only scant and self-contradictory guidance as to what showing could rebut the presumption. The *Coakley* Briefing Order states (P 29) that the presumption could be rebutted by "changes in the returns on investments in other enterprises having corresponding risks." Well-conducted DCF and CAPM studies of corresponding-risk proxy groups *are* evidence of those returns, as are returns recently allowed by state commissions to generation-divested electric utilities. If such studies point to results below the existing allowed ROE, then those studies, by themselves, meaningfully "indicate that the existing ROE has become unjust and unreasonable," *id*. *See Richmond Power & Light v. FPC*, 481 F.2d 490, 498 (D.C. Cir. 1973) (a Commission finding that a new rate is reasonable implies "that the [former] rate was unreasonable"). A Commission policy of rejecting the results of meaningful studies of what equity costs would be arbitrary, especially when those same studies are deemed sufficiently reliable to form the basis for the shield level. Thus, the same evidence used to quantify the presumption inherently rebuts it, making the presumption logically self-defeating.

To bootstrap its way out of that self-contradiction, the *Coakley* Briefing Order suggests (at P 28) that any rebuttal would have to involve "additional evidence." But what that additional evidence might be is unknown. Under the Order's proposed sequence, the presumption would be applied *after* all of the data and evaluation needed to apply four approved methodologies has been gathered, reviewed, and deemed sufficiently reliable to form the basis for quantifying the shield level. And the shield level then comes into play when that extensive analysis shows that

35 of the 38 data points FERC used to construct its DCF zone of reasonableness").

the existing base ROE exceeds the cost of equity. Such a showing itself rebuts the presumption, and the presumption therefore serves no statutorily valid purpose.

3. Base ROE Complainants should remain obliged to present a *prima facie* case that the Base ROE being charged exceeds the equity cost indicated by applicable market-based empirical models

G3. When a successive complaint is filed while the current ROE is being adjudicated (i.e., a pancake complaint), should the subsequent complainant be required to make a prima facie showing of sufficient change in market conditions to meet the Coakley *and MISO Briefing Order's proposed determination of whether an existing ROE remains just and reasonable? If so, what type of information or showing should the complainant provide to demonstrate that market conditions have changed, and what standard should the Commission apply when assessing whether to deny the subsequent complaint without setting it for hearing?*

Whether or not a prior complaint remains pending, complainants challenging an existing base ROE should be required to make a *prima facie* showing that it exceeds the cost of equity. That is longstanding Commission policy; the Commission has, in fact, rejected ROE complaints that failed to present a sufficient *prima facie* showing.[244] If by "sufficient change in market conditions" Question G3 means a change in the subject utility's equity cost that brings its equity cost below its existing allowed base ROE, that is an appropriate standard. The straightforward way to meet it is to present equity cost studies, using the Commission's approved market-based equity cost estimation method(s)—that is, a DCF study of a risk-comparable proxy group, accompanied by, and combined with, studies applying any other methods that will have been adopted by the Commission—and compare the resulting empirical indication of what equity now costs the subject utility to that utility's allowed base ROE.

Importantly, a change in general financial market conditions is *not* the only type of change that could result in this approach indicating that an existing base ROE is excessive. If the

[244] *See, e.g.*, *La. Pub. Serv. Comm'n v. Sys. Energy Res., Inc.*, 124 FERC ¶ 61,003, P 15 (2008) (dismissing ROE complaint that failed to present essential supporting data, "such as a list of the utilities in the comparison group or the DCF methodology used for the DCF analysis," and "only provided statistical evidence of a change in bond yields, without making clear what effect this information alone has on [the target utility's] cost of equity.").

subject utility has become less risky, then its cost of equity, as indicated by good empirical tools, will decline, even if general financial market conditions remain essentially unchanged. Such utility-specific cost reduction is currently prevalent, as the operating margins and credit ratings of operating utilities have improved markedly in recent years.[245]

Equally important, the pendency of a prior challenge to an existing base ROE should not preclude consideration of a subsequent challenge that can meet the *prima facie* standard. Because general financial market conditions and the riskiness of subject utilities changes over time, the allowed ROE resulting from a first-filed complaint, which will be pegged to a study period corresponding to the refund period for that complaint, may exceed the cost of equity that would result from a second-filed complaint. "Utilities are free to file for successively higher rate increases based on later common equity cost data without regard to the status of their prior requests, and a fair symmetry requires that complainants also be free to file complaints requesting further rate decreases based on later common equity cost data without regard to the status of their prior complaints." *Consumer Advocate Div. v. Allegheny Generating Co.*, 67 FERC ¶ 61,288, at 62,000 (footnote omitted), *on reh'g*, 68 FERC ¶ 61,207 (1994). The FPA requires that complaints supported by a showing of equity-cost decline be reviewed on their merits. As described by its principal sponsors, the 1988 Regulatory Fairness Act was intended to make "the system for bringing utility rates down . . . similar to the system for bringing rates

[245] *See, e.g.*, S&P Global Ratings, *Industry Top Trends 2019: North America Regulated Utilities* at 2, chart 3 (Nov. 8, 2018), https://www.spratings.com/documents/20184/5665906/ITT+2019+North+America+Regulated+Utilities.pdf/28fe982a-3e70-5795-005c-965bf8f28e69 (showing that for "North America Regulated Utilities" from 2011 through 2018, there were far more ratings upgrades than ratings downgrades); Moody's Investors Service, *Announcement: US Regulated Utilities 2018 Outlook Remains Stable* (Nov. 2, 2017), https://www.moodys.com/research/Moodys-US-regulated-utilities-2018-outlook-remains-stable--PR_374886 ("Since 2007, revenues have increased at an average rate of 2% per year, the majority of which has been spurred through investments in property, plant and equipment (PP&E). Additionally, utilities' efforts to cut costs have paid off, as operating margins have grown to 36% today from 25% in 2007."); Docket No. EL11-66, Ex. No. CAP-500 at 4-5 & fig. 1 ("the vast majority of utility bond rating changes in this time frame [2013 to 2017]—97.2% of them in 2014, and 70% to 75% of them in the other years—were rating upgrades").

up."[246] That is, "[w]hen utility costs go up, utilities deserve a rate adjustment. We do not change that. But . . . when the economic factors go in the other direction, consumers deserve just and reasonable rate reductions," in "the same way that utilities receive just and reasonable rate increases."[247] Moreover, any kind of "one complaint at a time" rule, under which the pendency of a section 206 proceeding would raise a hurdle to additional section 206 proceedings, would incent respondents to drag out complaints, by, e.g., insisting that they be litigated rather than settled.

The argument for a "one complaint at a time" rule rests on a false legal formalism. It is contended that because section 206(a) requires ROE complainants to identify the ROE that is in effect at the time they file, complaints may not be pursued where that ROE is subject to change through a prior proceeding.[248] But section 206(a) requires only what it says—that complaints seeking to "initiate" a section 206 proceeding "state the change or changes to be made in the rate . . . *then* in force"[249]; it does not require that complaints predict the rate that will be in force at the time an extended section 206 proceeding ends. And a parallel (indeed, stronger) requirement to identify the rate to be changed appears in section 205(d), which provides that notice of section 205 rate changes "shall be given by filing with the Commission . . . new schedules stating plainly the change or changes to be made in the schedule . . . then in force . . . ."[250] Thus, if a rate change made in one proceeding were deemed to nullify all unresolved rate change filings that had identified the rate thereby superseded as the pre-existing

---

[246] S. Hrg. No. 100-542, at 2.

[247] *Id*. at 26 (statement of Rep. Bruce).

[248] *Compare* Carmen Gentile, *Time to Put Kibosh on Pancaking Section 206 Complaints: FERC Must Act*, 157 Pub. Utils. Fortnightly, Apr. 2019, at 42 (Apr. 2019) *with* David Pomper, *Response to "Time to Put the Kibosh on Pancaking Section 206 Complaints,"* Pub. Utils. Fortnightly, June 2019, at 100.

[249] 16 U.S.C. § 824e(a) (emphasis added).

[250] 16 U.S.C. § 824d(d).

rate, then that rule would have to apply symmetrically to sections 205 and 206. The Commission, however, has long entertained, and addressed on their cost-based merits, pancaked rate increase filings under section 205. *See, e.g.*, *Boston Edison Co.*, Op. No. 53, 8 FERC ¶ 61,077, at 61,277, *reh'g denied*, Op. No. 53-A, 9 FERC ¶ 61,002 (1979). The statutory language and history discussed above make clear that the Commission must symmetrically consider the cost-based merits of section 206 rate decrease filings.

In short, the statutory way to discourage unmeritorious follow-on complaints, without improperly burdening meritorious ones, is straightforward. The Commission should adhere consistently to an empirical approach that accurately estimates what utility equity costs at any given time. Filing and following through on an ROE complaint requires substantial legal and expert fees, and ratepayer representatives know that ratepayers ultimately bear both sides' litigation costs (especially if the utility has a formula transmission rate). Accordingly, they file and prosecute ROE complaints only when they predict that equity costs will be found to have declined substantially below the ROEs stated in rates. If the Commission's empirical approach is transparent, known, and stable, and produces predictable results, then all stakeholders will be able to predict litigation outcomes. With such predictability, complaints will be brought only when a utility's equity cost as measured by the Commission's known empirical approach has declined significantly, and is expected to stay low or decline further.

4. Any sub-range that would be added to the indicated equity cost of equity to determine the presumptively shielded level *should* be narrow, in both single-utility and regional ROE cases

G4. In single utility rate cases, the Commission determines the central tendency of the zone of reasonableness based on the median of the proxy group ROEs. Is the approach outlined in the Coakley *and MISO briefing orders appropriate in single utility rate cases given that the proxy company ROEs tend to cluster near the center of the zone of reasonableness, making the middle quartile relatively narrow?*

G4.a. Would it be reasonable to determine the central tendencies of the upper and lower halves of the zone of reasonableness for single utilities based on a midpoint analysis, so as to produce approximately equal ranges of presumptively just and reasonable ROEs for below average, average, and above average risk utilities?

The shield-level presumption underlying Questions G4 and G4.a should not be adopted. *See* Parts III.G.1-2, *supra*. If the Commission were, nonetheless, to adopt a shield-level presumption, the shield level should not be tied in any way to the range ends of proxy results. This means it should not be set by adding one eighth of the composite range width to either the median or the midpoint of the composite distribution or range. Instead, following the *Coakley* Briefing Order's suggestion that the shield level should not be closer to that upper central tendency measure than it is to the middle central tendency measure, the shield level should be placed halfway between the median and the upper median. In this context, "halfway" could mean either the 62.5th percentile, or the average of the indicated returns for the proxies at the 50th and 75th percentiles. The former would be more statistically reliable, as it more fully embraces reliance on distributions rather than ranges.

The potential for such a percentile-based approach to produce "relatively narrow" quartiles—that is, the fact that the distance from the 50th percentile to the 62.5th percentile (or to the average of the indicated returns at the 50th and 75th percentiles) may be less than one eighth of the composite range width—is not a problem. Rather, the narrower the referenced increment, the narrower the difference between the process of evaluating existing base ROEs and the statutorily appropriate approach. Again, the existing base ROE (a point value) should be compared to the best available estimate of the cost of equity (another point value).

Moreover, if any increment must to be added to the point-value indication of the cost of equity in evaluating whether an existing base ROE remains just and reasonable, it would be arbitrary to tie that increment to the width of the composite range, which varies erratically, and

effectively randomly, with variations in the most extreme study results.[251] At the broadest, any such increment should be measured by the number of basis points that will result in a rate consequence greater than the regulatory expense of re-determining the utility's equity cost. A recent Commission decision quantified a rate case's expense at $1.103 million, for a case that encompassed ROE and numerous other issues.[252] Even at that hefty level, four years of a 20 basis point reduction applicable to a utility with a 50% equity ratio, 30% income tax-gross-up factor, and $500 million rate base would more than justify the expense.

H. The "mechanics and implementation" of equity cost estimation models should be designed to identify the study-period cost of equity

1. General and multi-model issues

a) Where the DCF distribution is what matters, analyst growth estimates should use a sources-weighted combination of IBES and a comparable aggregator

H.1.1 Are IBES data a good proxy for "investor consensus?"

H.1.1.a If not, are there better alternatives, such as Bloomberg, Zacks, S&P Capital, Morningstar, and Value Line?

H.1.1.b Should the Commission combine data from multiple sources?

H.1.1.c What weight, if any, should be given to an estimate if the number and identity of analysts contributing to the estimate is not available?[253]

H.1.5. Should growth rates be based on Value Line, IBES, or alternative estimates?

H.1.6. Should the same growth rate sources be used across models, if more than one model is used to determine the ROE?

The ideal sourcing of analysts' growth rates would capture all of the sources referenced by investors, weighted in proportion to their followership and influence; show transparently

---

[251] *See* Part III.D.6, *supra*.

[252] *See Midwest Indep. Transmission Sys. Operator, Inc.*, Op. No. 534, 148 FERC ¶61,206, P 218 (2014) (quantifying expense of rate case involving myriad issues; the ROE issues therein were litigated through prefiled testimony but settled prior to trial).

[253] In order to streamline our discussion of analyst growth rate sourcing, we intentionally skip here from Question H.1.1c to Question H.1.5. The intervening questions are addressed in Part III.H.1.b), *infra*.

which and how many analysts contributed to each source; exclude estimates not contemporaneous with the applicable study period; exclude growth estimates for which the baseline period precedes the period reviewed in screening proxies for comparability; prevent gaming in which parties selectively reference only those sources that include growth rates favorable to their position; be sufficiently small in number to make data entry manageable; and cost nothing. Unfortunately, these multiple ideals are not all compatible.

The sources referenced by investors are myriad. Two-plus sources of "consensus" growth rates are currently available to the public without charge: IBES, as posted on either Yahoo Finance or reuters.com, and Zacks. However, the Yahoo Finance version of IBES shows neither the number of contributing analysts nor their identity, and the reuters.com version of IBES does not show the latter. Zacks shows neither. Value Line is widely available at low or no cost (e.g., through public libraries), but it presents an estimate from one source, not a consensus,[254] and unlike the analysts who contribute to consensus estimates, it generally does not adjust baseline earnings (on which growth estimates depend) to remove nonrecurring events that can distort the resulting growth rate.[255] Instead, its baseline uses GAAP-style earnings averaged over three past years—including years predating the period used in screening proxies for dividend cuts, M&A activity, and the like.

The other consensus growth rate sources recently referenced in DCF studies presented to the Commission by ROE witnesses are private or proprietary. These include (to extents that vary both across witnesses and in the same witness's presentation as tailored from case to case) Bloomberg, S&P Capital IQ (each listed in the NOI[256]), and also FactSet, Nasdaq IR Insight

[254] *See* Op. No. 551, PP 62-65, and other sources cited therein.

[255] Ex. No. A-2, at 49.

[256] Morningstar is also listed in the NOI, but it does not compile consensus estimates, and its proprietary standard.

(a.k.a. First Call), and SNL. Bloomberg and Nasdaq IR Insight are relatively transparent in their sourcing (showing the number of contributing analysts, and their identity where not masked by the contributor). But each of these sources requires a subscription, and according to recent testimony, these subscriptions cost $15,000-$30,000 per source, annually. If the Commission were to reconsider its prior statements indicating a preference for reliance on IBES,[257] and instead invite reference to any or all of these sources, regulatory expenses would increase, and the Commission would find it difficult to guard against submissions that selectively rely on those sources that happen to collect favorable growth rates at a particular time.

The key to harmonizing the foregoing considerations, as on so many ROE issues, is to incorporate a reasonably comprehensive set of inputs into a combined proxy distribution, and then utilize all of the information in that distribution, instead of proliferating ranges and relying on their extremes. While the highest and lowest (and associated midpoint) growth rates applicable to a large proxy group will vary widely across sources, the median growth rate will not. For example, testimony on behalf of the transmission owners in Docket No. EL16-64 included six separate DCF distributions, based on analyst growth rates from six different aggregators: the midpoints of the six resulting distributions varied widely, ranging from 7.29% to 11.65%; the medians of the six resulting distributions were much closer to each other, ranging from 7.91% to 8.60%. Consequently, reliance on distributions rather than ranges will considerably lower the stakes involved in growth rate sourcing, reducing the incentive to data-

---

reports on individual stocks, while widely available at low cost, do not systematically present a multi-year earnings growth rate forecast. *Id.* at 50.

[257] *See* Op. No. 551, PP 62-65; *Composition of Proxy Grps.*, 123 FERC ¶ 61,048, at P 84 ("the growth projections to be used in the DCF model are those reported by IBES. If they are the same growth projections posted by Thomson Financial Data on Yahoo.com, then they are acceptable for the DCF model."); *Enbridge Pipelines (KPC)*, 100 FERC ¶ 61,260, P 234 (2002), *reh'g denied*, 102 FERC ¶ 61,310 (2003); *Nw. Pipeline Corp.*, 87 FERC ¶ 61,266, at 62,058-59 (1999), *on reh'g*, 92 FERC ¶ 61,287 (2000), *review dismissed in part and denied in part sub nom. Canadian Ass'n of Petroleum Producers v. FERC*, 308 F.3d 11 (D.C. Cir. 2002).

shop. Furthermore, if multiple sources are combined at the outset (averaging each of the utilized sources' growth rates for each proxy company to produce a composite growth rate for that company, rather than using each source to generate a distinct range), the resulting estimate of each proxy's DCF cost of equity will better mirror the process by which multiple analyst estimates contribute to price formation in the market for each proxy's stock. Doing so will also address the Commission's concern about relatively few analysts contributing to IBES.

Accordingly, the Commission should consider adopting the following policy, prospectively,[258] for DCF studies of electric-utility parent stocks,[259] and subject to case-specific variation where justified. The first-stage growth rate for each proxy could be based on the weighted average of two sources: the IBES aggregate (as reported on reuters.com or another IBES-based source that identifies the number of contributing analysts) and either Bloomberg or First Call (whichever is the witness's usual source), weighted by the number of contributing analysts.[260] This averaged first-stage growth rate, combined with the GDP-based second-stage growth rate and other DCF inputs, would produce a combined-source DCF distribution, from which the median (or other applicable percentile) would provide the DCF component of the indicated cost of equity.

The foregoing is addressed mainly to actual DCF studies of electric-utility proxies, as distinguished from DCF studies of large-cap stocks (dividend paying members of the S&P 500) that are sometimes used in estimating an equity portfolio return for purposes of a CAPM study.

---

[258] Given their considerable cumulative cost and the Commission's past statements that IBES is its preferred source, it would be unfair to penalize participants for not having referenced these sources in the past. On the other hand, the subscription cost it is not so large that it would be unreasonable to expect professional expert witnesses to subscribe to one (or more) of these sources following an announced change in the Commission's preferred sourcing.

[259] Subscription cost aside, while referencing multiple sources would be feasible for proxy groups of several dozen utility-industry stocks, it would not be practical if that approach were extended to CAPM-input DCF studies of the approximately 400 dividend-paying members for the S&P 500, as suggested in NOI Question H.2.b.1.

[260] Ex. No. A-2 at 51 (describing this approach).

In the latter context, the choice of growth rate sources is relatively unimportant, as each source will supply estimates for approximately 400 stocks, and the DCF-for-CAPM study will be used to produce a single portfolio growth value, inherently diminishing the significance of an unrepresentative growth rate for any one stock. In that context, a requirement to use sources that identify the number of analysts and to weight by the number of analysts (as recommended above for DCF studies proper) may not be warranted. It remains the case, however, that Value Line's earnings baselines, and thus Value Line's earnings growth rates, are derived differently than those aggregated by IBES and comparable sources. Consequently, Value Line growth rates should not be used for this purpose either.

b) The Commission should rely on market-based models applied to exchange-traded proxies

H.1.2. To what extent does model risk affect all ROE methodologies?

*H.1.3. The DCF model incorporates data at the parent/holding company level (*e.g.*, stock price). The Commission adjudicates cases at the operating company level, for which there is no public data like stock prices, growth rates, and betas. What impact does this disparity have on the results of the DCF and other models?*

H.1.4. Should the Commission continue to rely on the efficient market hypothesis, which underlies the DCF and CAPM models? Why or why not?

H.1.4.a. If yes, should the Commission continue to employ outlier screens, M&A screens, etc., for the DCF and CAPM models since these models need to incorporate all relevant information?

Some models are better than others; no model is perfect. Therefore, combining multiple credible market-based models can be sensible. But that is no reason to include models that are inherently disconnected from the market cost of equity. Models that apply well-honed techniques to market data on equity prices provide sound estimates of the cost of equity, because the efficient market hypothesis is sound.

That fundamental tenet is solidly established in the economic and financial literature, and in D.C. Circuit case law. The Commission has long been "quite wedded to DCF analysis," and,

"as its theoretical mainstay," to the "efficient market" proposition that the stock market "assimilates . . . with lightning speed" information concerning "money supply, inflation, [and] real economic activity." *See Tenn. Gas*, 926 F.2d at 1211. The textbook cited pervasively in the NOI and related orders rightly calls the efficient market hypothesis a "cornerstone of modern investment theory."[261] A leading corporate finance textbook explains:

> [I]f stock prices deviate from their intrinsic values, investors will *quickly* take advantage of this mispricing by buying undervalued stocks and selling overvalued stocks. Thus, investors' actions work to drive prices to their new equilibrium level based on new information. Even if some investors behave irrationally, as by holding losers too long and/or selling winners too quickly, this does not imply that the markets are not efficient. . . .
>
> . . . .
>
> What is the bottom line on market efficiency? Based on our reading of the evidence, we believe that for most stocks, for most of the time, it is generally safe to assume that the market is reasonably efficient in the sense that the intrinsic price is approximately equal to the actual market price . . . .[262]

The efficient market hypothesis holds that all stocks (including proxy stocks) efficiently incorporate into their price all relevant public information. But that doesn't mean that every stock must be included in a study based on security market prices, and does not make every stock a good proxy for a non-traded operating utility. The screening criteria and related issues discussed in Section III.D, *supra*, are designed to, and if properly applied will suffice to, assure that the distribution of results from models applied to referenced proxies is reasonably representative of what those models would show if they could be applied to the subject utility itself. Well-designed models will make their median results representative of the subject utility's cost of equity.

---

[261] Morin, *supra*, at 279 n.3.

[262] Ehrhardt & Brigham, *supra*, at 292.

In order for a model's results to benefit from the wealth of information incorporated into security market prices, however, the model must *use* security market prices. Both the DCF and CAPM methods do so: The DCF method is based directly on study-period dividend yields (combined with forecasts of growth rates related to future dividends), and the CAPM method uses the relative volatility of proxy and market-wide equity prices. The RP method uses actual bond market prices to derive bond yields, and compares those yields to past ROE allowances that, if the RP data set is well selected, will in turn reflect past financial market prices. But the E/B method is completely disconnected from security market prices and, therefore, cut off from any reality check on the cost of attracting capital. This can be seen vividly in the E/B ratios of leading stocks such as Apple ("AAPL"), Amazon ("AMZN"), Facebook ("FB"), Alphabet ("GOOG"), and Microsoft ("MSFT"), as forecast by Value Line for the 2022-24 period in recent (circa May 2019) company-specific reports. The forecast E/B ratios for these titans of American industry are, respectively, 41.0%, 17.5%, 20.0%, 15.0%, and 39.0%. If these companies' costs of attracting capital were anything like those E/B ratios, they would not be attracting capital, as investors buying those stocks now have no hope of sustaining returns in that neighborhood. But they are attracting capital, because investors do not require returns resembling forecast E/B ratios to be attracted to market-priced stocks.

2. Model-specific questions

a) DCF

(1) The longstanding composite-growth DCF model remains appropriate for electric utilities; if it were to be re-considered, the Commission should apply a multi-stage model

H.2.a.1. Should the Commission continue to use a dividend DCF model or should the Commission use a different DCF model, for example, one based on free cash flow?

H.2.a.2. Could terminal stock value be used in place of long-term growth projections? If so, how should terminal stock value be determined?

H.2.a.3. Do investment analysts project earnings/dividends growth beyond five years, and if not, why not, and is GDP an appropriate proxy for long-term growth?

H.2.a.4 How should the Commission weight short-term and long-term earnings/dividend growth projections?

H.2.a.5. The Commission uses a constant growth DCF model. Should the Commission consider using a multi-stage DCF model? If so, how would the Commission determine the length of each stage of a proxy company's growth?

The composite-growth form of the DCF model, which the Commission has used for pipelines (both natural gas and oil) for over two decades,[263] and for electric utilities since 2014,[264] remains reasonable. When its outputs are distilled through a statistically valid measure (i.e., the median rather than midpoint), the group-indicated cost of equity is appropriately responsive to broader market trends, without being erratic, and is consistent with the results of other market-based estimation methods when those methods are reasonably applied. By weighting near-term earnings growth rates at two thirds in projecting the constant rate of dividend growth, the Commission's composite-growth method already assumes that this near-term growth will continue for decades.[265] Accordingly, there is no compelling reason to revise the DCF model that the Commission uses to estimate each proxy's cost of equity.

---

[263] *See Nw. Pipeline Corp.*, Op. No. 396-B, 79 FERC ¶ 61,309 (adopting constant dividend growth DCF model, with dividends' constant growth rate estimated as the simple average of the first-stage consensus (IBES) earnings growth rate forecast and a long-term multi-source GDP growth rate forecast), *reh'g denied*, Op. No. 396-C, 81 FERC ¶ 61,036 (1997), *review dismissed in part, remanded in part, and denied in part sub nom. Canadian Ass'n of Petroleum Producers v. FERC*, 254 F.3d 289 (D.C. Cir. 2001); *Transcontinental Gas Pipe Line Corp.*, Op. No. 414-A, 84 FERC ¶ 61,084 (modifying the weighting of the short-term and long-term growth forecasts used to produce the composite dividend growth rate, such that the short-term rate receives double weighting), *on reh'g*, Op. No. 414-B, 85 FERC ¶ 61,323 (1998), *review denied sub nom. N.C. Utils. Comm'n v. FERC*, 203 F.3d 53 (2000) (*per curiam*).

[264] *See* Ops. Nos. 531, 551, 554, and *Midcontinent Indep. Sys. Operator, Inc.*, Op. No. 556, 161 FERC ¶ 61,059 (2017).

[265] *See generally Williston Basin Interstate Pipeline Co*., 104 FERC ¶ 61,036, P. 29 (2003) (this method "is equivalent to averaging 33 years of the short-term growth projection with 17 years of the lower long-term GDP growth rate"), *reh'g granted*, 107 FERC ¶ 61,164 (2004).

If any such revision were to be made, the Commission should switch from a fractional weighting of the first-stage and terminal-stage growth rates within a constant-growth form of the DCF model to a formally multi-stage DCF model that permits more precise intertemporal modeling of dividend growth rates. Dr. Cornell elaborates on this point. *See* Ex. No. A-1, § H.2.a.5.

Elimination or reduced weighting of the second-stage, GDP-based constraint on the per-share earnings that fund dividend growth would be error, for the reasons explained in Part III.H.2.b)(1), *infra*.

(2) A six-month DCF study period remains reasonable

H.2.a.6. Are six months of average high/low historical monthly stock prices an appropriate measure for the current stock price "P"?

As now-Justice Breyer explained in *Boston Edison Co. v. FERC*, 885 F.2d 962, 966 (1st Cir. 1989) ("*Boston Edison*"), the length of the DCF study period balances "such factors as the risk that aberrations will unfairly distort the results of a shorter time period against the risk that the longer time period will inappropriately weight the earlier results in a changing market." The Commission has long held that a six-month study period appropriately balances these factors. *See id.; see also Generic Determination of Rate of Return on Common Equity for Public Utilities*, Order No. 442, 33 FERC ¶ 61,426, FERC Stats. & Regs. at 30,086 (1985) ("The Commission believes the use of a 12-month moving average as suggested by some commenters would not provide a sufficiently current estimate of the dividend yield . . . [whereas] the use of the last preceding quarter, as originally proposed, creates too great a risk that an abrupt change will occur or that short-run volatility will greatly affect the outcome."), *on reh'g*, Order No. 442-A, 35 FERC ¶ 61,323 (1986). After adopting six months as its standard DCF study period length

in the mid-1980s,[266] the Commission has continued to apply that length through a wide variety of financial market conditions, ranging from the highly bullish markets of the mid-1980s, later 1990s, and later 2010s, to the multiple intervening recessions and bear markets. We see no reason to change it now.

b) CAPM

The *Coakley* Briefing Order explains that "the CAPM methodology estimates the cost of equity by taking the 'risk-free rate' and adding to it the 'market-risk premium' multiplied by 'beta.'"[267] Rearranging terms and noting that the "market risk premium" is the difference between the "equity market return"—that is, the return on a fully-diversified equity portfolio—and the risk-free rate, this basic CAPM equation can be restated as providing that each proxy's implied equity cost equals: *equity market return – [market risk premium x (1 – β)]*. For typical utility stocks (which invariably have betas smaller than one), this equation means that the implied cost of equity will be less than the expected returns on a fully diversified equity portfolio. As we show below, the expected equity market return is now well under ten percent.

(1) Assuming perpetual growth at analysts' near-term rate does not produce a plausible equity-market risk premium

H.2.b.1. If the market risk premium is determined by applying the DCF methodology to a representative market index, should a long-term growth rate be used, as in the Commission's two-step DCF methodology?

For a CAPM study to produce meaningful results, it is essential that the market-wide return used to identify the equity risk premium realistically represent the return that investors expect from a market-wide equity index or portfolio. Dr. Cornell, citing Aswath Damodaran's influential paper, explains that the solution is to use a proper two-stage model and solve for the

[266] The six-month study period that was affirmed in *Boston Edison* ended in April 1985. *See Bos. Edison Co*., Op. No. 299, 42 FERC ¶ 61,374, at 62,093, *reh'g denied*, Op. No. 299-A, 43 FERC ¶ 61,309 (1988), *aff'd sub nom. Bos. Edison Co. v. FERC*, 885 F2d 962 (1st Cir. 1989).

[267] *Coakley* Briefing Order at 61,182 (quoting Morin, *supra*, at 150); *see also* Op. No. 551, P 138.

discount rate.[268] If that return is estimated using a DCF model (one of the several reasonable ways to do so), the DCF model should recognize what the NOI states at P 11 n.24:

> Incorporating a long-term growth estimate in the DCF methodology is consistent with the underlying theory of the constant growth DCF model because
>
> > from the standpoint of the DCF model that extends into perpetuity, analysts' horizons are too short, typically five years. It is often unrealistic for such growth to continue in perpetuity. A transition must occur between the first stage of growth forecast by analysts for the first five years and the company's long-term sustainable growth rate. . . . It is useful to remember that eventually all company growth rates, especially utility services growth rates, converge to a level consistent with the growth rate of the aggregate economy.
>
> Roger A. Morin, New Regulatory Finance 308 (Public Utilities Reports, Inc. 2006) (Morin).

Morin's textbook makes a similar point in its discussion of the CAPM model, in a passage cited by the *Coakley* Briefing Order (P 14): "The expected common stock return is based on long-term cash flows, regardless of an individual's holding time period. Utility asset investments generally have long-term useful lives and should be correspondingly matched with long-term maturity financing instruments."[269]

For the same reason that Opinion No. 531 et seq. extended to electric utilities the two-stage DCF method long used for pipeline ROEs, any DCF study used as the basis for the market risk premium must also account for the long-term constraints on near-term earnings growth forecasts. Neither utility stocks nor large-cap stocks can perpetually grow their earnings more rapidly than the economy as a whole. *See, e.g.*, Shlomit Azgad-Tromer & Eric Talley, *The Utility*

---

[268] Ex. No. A-1, § H.2.b.1.

[269] Morin, *supra*, at 151-52. *See also* Docket Nos. EL11-66 et al., CAP-500, Sections III.A & III.C (explaining that in conducting a CAPM study, the risk-free rate and the market-risk premium must be estimated over the same timeframe).

of Finance at 13 (Columbia Univ. School of Law, Ctr. for Law and Economic Studies, Working Paper No. 569, 2017) ("a long-term perpetuity growth rate for a firm in excess of the anticipated GDP growth rate would imply that the firm in question would mechanically come to dominate the entire economy in the long term . . . ."); Order No. 420 FERC Stats. & Regs. at 31,344 (finding that inflated equity cost estimates result when analyses estimate risk premiums using "DCF estimates of the investors' required rate of return" on "common stock," because "the use of analysts' short-term forecasts overstate[s] investors' long term growth expectations").

The witness appearing for respondents in both the *Coakley* and MISO paper hearings has elsewhere recognized that a CAPM study should reflect investors' long-horizon expectations:

> Unlike debt instruments, common equity is a perpetuity and as a result, any application of the CAPM to estimate the return that investors require must be predicated on their expectations for the firm's long-term risks and prospects. This does not mean that every investor will buy and hold a particular common stock into perpetuity. Rather, it recognizes that even an investor with a relatively short holding period will consider the long-term, because of its influence on the price that he or she ultimately receives from the stock when it is sold. This is also the basic assumption underpinning the DCF model, which in theory considers the present value of all future dividends expected to be received by a share of stock.[270]

In inferring what investors expect as the long-term earnings growth associated with a market-wide equity portfolio, the Commission should heed Warren Buffet's plain-spoken caution against believing that stocks' long-term earnings growth could exceed GDP growth:

> You know, someone once told me that New York has more lawyers than people. I think that's the same fellow who thinks profits will become larger than GDP. When you begin to expect

[270] Prepared Rebuttal Testimony and Exhibits of William E. Avera and Adrien M. McKenzie on Behalf of Entergy Services, Inc., Ex. No., ESI-123, at 57:4-12, *Entergy Ark., Inc.*, No. ER13-1508-001 (Dec. 11, 2014), eLibrary No. 20141211-5192.

> the growth of a component factor to forever outpace that of the aggregate, you get into certain mathematical problems.[271]

Mr. Buffet owns much of Berkshire Hathaway and, thus, indirectly owns large shares of MidAmerican Energy Co., NV Energy, and PacifiCorp, and as such may well be both the largest and most-followed individual investor in U.S. electric utilities.

Indeed, the caution against assuming long-term continuation of analysts' growth projections for a horizon ending at five years is *especially* applicable to the large-cap stocks that constitute the dividend-paying members of the S&P 500, as they already have large earnings and must find commensurately large new sources of profit if they are to sustain their dividend growth. Investors are well aware of these realities. For example, J.P. Morgan's 2019 annual report on "Long-Term Capital Marked Assumptions" reminded investors that "[a]lthough the size of the gap between economic growth and returns varies, both as a function of the starting point and of the high volatility inherent in emerging equities, over most periods and most countries [equity market] returns lag real GDP growth on an average annualized basis."[272] The 2015 edition of this annual report explained why:

> One common mistake is to assume that earnings and dividends received by investors can grow in line with—or even in excess of—overall economic growth (GDP) in perpetuity. Granted, it is almost a truism that *aggregate* earnings must grow at the same pace as the overall economy in the very long run; otherwise, profits would eventually outstrip the size of the entire economy or dwindle to an insignificant share of it. But not all of this earnings growth accrues to *existing* shareholders. On the contrary, a large portion of economic growth comes from the birth of new enterprises. Some commentators suggest (for example, Bernstein and Arnott, 2003; Cornell 2010) that new enterprises account for more than half of GDP growth in the U.S., while in some rapidly

---

[271] *Mr. Buffet on the Stock Market*, Fortune, Nov. 22, 1999, at 212, https://money.cnn.com/magazines/fortune/fortune_archive/1999/11/22/269071/.

[272] J.P. Morgan Asset Mgmt., *Long-Term Capital Market Assumptions: Time-Tested Projections to Build Stronger Portfolios* at 64 (2019), https://am.jpmorgan.com/gi/getdoc/1383581744857.

> developing economies new enterprises may account for the lion's share of overall economic growth.[273]

There is no evidence that real-world investors expect sustained returns on a fully diversified equity portfolio (the foundation of the CAPM model) at the stratospheric levels (exceeding 12%) commonly presented by TO-sponsored witnesses. To the contrary, the 2019 release of J.P. Morgan's Long-Term Capital Market Assumptions projects a 5.25% total return on U.S. large-cap stocks.[274]

When the Commission adopted a two-stage DCF methodology, it did so as a general rule absent an industry-specific exception, based on a finding that "a projection limited to five years, with no evidence of what is anticipated beyond that point, is not consistent with the DCF model and cannot be relied on in a DCF analysis."[275] This precedent correctly recognizes that, as summarized by a leading textbook on corporate finance, "analysts' forecasts often involve nonconstant growth," and should be averaged in the DCF model with a longer-term growth rate.[276] Dr. Morin likewise favors "[a] multiple-stage DCF model that better mirrors the pattern of future dividend growth . . . ."[277]

The Opinion No. 531 ruling that extended this approach to electric utilities terminated what had been an electric-industry-specific *exception* to that general rule, which had rested on two findings that differentiated electric utilities from all other industries. One, the Commission

---

[273] David Sharp et al., J.P. Morgan Asset Mgmt., *Long-Term Capital Market Assumptions 2015 Estimates and the Thinking Behind the Numbers* at 25 (2014) (as quoted in Docket No. EL13-33, CAP-19, at 73-74), https://am.jpmorgan.com/blobcontent/1413613727995/83456/LTCMA_Assumptions_White_Paper_2015_US.pdf.

[274] Pete Klingelkofer, et al., J.P. Morgan Asset Mgmt., *Turning a Corner: Returns Hold Steady* at 5 (2018), https://am.jpmorgan.com/gi/getdoc/1383581777246.

[275] *Ozark Gas Transmission Sys.*, 68 FERC ¶ 61,032, at 61,105 (1994), *reh'g dismissed*, 71 FERC ¶ 61,138 (1995); *see also, e.g.*, *Williston Basin Interstate Pipeline Co.*, 87 FERC ¶ 61,264, at 62,006, *on reh'g*, 88 FERC ¶ 61,301 (1999) ("in the absence of a reliable, industry-specific long-term growth projection, the best economy-wide approach to projecting long-term growth is to use growth in GDP").

[276] Ehrhardt & Brigham, *supra*, at 354.

[277] Morin, *supra*, at 308.

found that as of the turn of the millennium, one major investment firm "treat[ed] electric utilities *differently from all of the other industrial companies* when estimating growth rates."[278] Two, the Commission found that the electric industry was then just beginning a major restructuring transition from regulated, cost-based pricing to de-regulated, market-based pricing.[279] Thus, the one-stage DCF methodology that was used for a time for electric utilities but has since been abandoned was an exception to the general rule. The exception applied only to a particular industry that had recently begun to transition from being regulated to being unregulated. Present electric utility stocks fall outside that exception, as do the non-utilities that make up most of the equity market (and, thus, most of the S&P 500).

In the subsequently-vacated Opinion No. 531-B, the Commission asserted that the earnings of the 390-company portfolio used to derive the market-wide return for the CAPM analysis referenced therein could be assumed to sustain those companies' near-term growth rates, because "[w]hile an individual company cannot be expected to sustain high short-term growth rates in perpetuity, the same cannot be said for a stock index like the S&P 500 that is regularly updated to contain only companies with high market capitalization."[280] This assertion glossed over four fatal flaws. First, the referenced CAPM analysis was based on a DCF analysis of 390 specific large-cap stocks, not the S&P index itself. Second, it referenced those 390 dividend-paying members of the S&P 500 *as a proxy* for the entire equity market, and, regardless of index

---

[278] *S. Cal. Edison Co.*, Op. No. 445, 92 FERC ¶ 61,070, at 61,262 (2000) (emphasis added), *reh'g denied*, Op. No. 445-A, 108 FERC ¶ 61,085 (2004).

[279] *See id.* at 61,261 ("We find that our rationale in Opinion No. 396-B does not support the use of GDP data in developing a growth rate estimate in this proceeding. Unlike the gas pipeline industry, which was nearly through with major restructuring at the time we issued Opinion No. 396-B, on June 11, 1997, the electric industry is just beginning a significant new phase of its restructuring. In particular, SoCal Edison had just begun to restructure from a vertically integrated utility when it made its filing in the instant proceeding."). At that time, California was transitioning from traditional rate-regulated, service-territory retail service to de-regulated "retail choice."

[280] Opinion No. 531-B, P 113; *see also* NET-02700 (Revised) at 115:22-116:1.

composition, the equity market as a whole cannot sustainably grow faster than the economy.[281] Third, the S&P 500 index does *not* grow through this substitution effect; rather, when a stock that has recently reached the level of large-cap valuation (meaning it has a high price) replaces one that has recently lost that status (meaning it has a low price), the index value is held constant, as if the indexed portfolio traded a large number of shares representing a cross-section of the portfolio for a small number of the shares of the newly-added, high-priced stock. For example, when Amazon replaced AT&T in the S&P 500, the Wall Street Journal noted that "[w]henever S&P adds a company, it recalculates its divisor—the figure used to calculate the value of the index—to account for the difference in market capitalization between the company being added and the one deleted."[282] Consequently, there is no basis to assume that such substitution results in a net increase in the earnings that will flow through to a portfolio investor. Fourth, multiple independent projections of the five-year earnings growth for the S&P 500 have been presented to the Commission in recent proceedings, and in each case, they are much lower than the result of assuming perpetuation of analysts' near-term growth forecasts.[283]

Opinion No. 551 similarly asserted that "While it is often unrealistic and unsustainable for high short-term growth rates for an individual company to continue in perpetuity, the S&P 500 is regularly updated to only include companies with high market capitalization."[284] Again, regardless of its market capitalization, *no* company can continue in perpetuity short-term growth rates that outpace the growth of the economy into which it sells, and companies with high market

---

[281] *See* Ex. No. A-1, at 28.

[282] David A. Gaffen, *Amazon Joins Few Web Names In S&P 500*, Wall St. J. (Nov. 16, 2005), https://www.wsj.com/articles/SB113207902652797811.

[283] *See*, *e.g.*, Docket No. EL13-33, CAP-22 (Goldman Sachs report projecting 2013-18 S&P 500 EPS growth of 7.0%); CAP-19 at 87 & n.105 (discussing and extracting Goldman Sachs' projection); Docket No. EL16-64EMC-0001 (Revised) at 50:12-13 ("The most recent IHS forecast shows average earnings growth for the S&P 500 as a whole for the five-year period 2017-2022 is 5.82%.").

[284] Op. No. 551, P 170.

capitalization and/or high initial growth rates are likely to hit their limits to growth even *sooner* than other companies. To contend otherwise is like contending that because baseball teams replace veterans with rookies, they can eventually hit more than one home run per at-bat.

Historically achieved returns provide a useful reference point in inferring a realistic forward-looking expected return on a market-wide equity portfolio. Historical returns are useful notwithstanding the forward-looking nature of investors' expectations for long-run equity market returns, because investors look to the past as a guide to the future. Indeed, the textbook cited in the NOI recommends averaging a forward-looking equity market risk premium with an historical one.[285] The historical record demonstrates the absurdity of imputing to investors an expectation that the growth rates projected by analysis for the next three to five years will continue forever. Such imputation would suggest a long-term equity market return exceeding 12%,[286] thus nearing or exceeding 10% after adjusting for inflation,[287] even though long-term realized inflation-adjusted equity market returns have been approximately 7%,[288] and even though future U.S. economic growth and equity market returns are expected to be *lower* than they were in the past.[289]

Duff & Phelps, whose forward-looking CAPM model is widely used in valuing U.S. investments, is currently projecting an equity market return of 9.0%, consisting of a 3.5%

---

[285] *See* Morin, *supra*, at 157 ("The best estimate of the future risk premium is the historical mean," because "over very long periods, investor expectations coincide with realizations; otherwise, investors would never invest any money").

[286] *See, e.g.*, Docket No. NET-708 (applying, in the CAPM study referenced in the *Coakley* Briefing Order, a 12.5% equity market return derived on that basis).

[287] In the Energy Information Administration's 2019 Annual Energy Outlook central ("Reference") case projection, the Consumer Price Index is expected to rise from 2.51 in 2018 to 5.24 in 2050, i.e., at a long-term annual average rate of 2.33% ((5.24/2.51)^(1/(2050-2018)=1.02327). *See id.*, App. B (Macroeconomic growth cases), tbl. B4, https://www.eia.gov/outlooks/aeo/section_appendices.php.

[288] *See* Roger Grabowski, Carla Nunes, & James Harrington, *U.S. Equity Risk Premium Recommendation* (Feb. 19, 2019), https://www.investopedia.com/ask/answers/042415/what-average-annual-return-sp-500.asp.

[289] *See* Robert J. Gordon, *The Rise and Fall of American Growth: The U.S. Standard of Living Since the Civil War* (2016); Bradford Cornell, *Economic Growth and Equity Investing*, Fin. Analysts J., (Jan.-Feb. 2010), at 54.

normalized risk-free return and an equity risk premium of 5.5%.[290] Its past forecasts have been similar, and consistently far below the spurious equity market returns and equity risk premiums suggested by assuming perpetual growth at analysts' near-term forecast rates. After a comprehensive survey of both historical and forward-looking approaches to estimating the market-wide equity risk premium, the authors of a leading corporate finance textbook provided their similar bottom line: "we'd be suspicious of an estimated market premium that is less than 3.0% or greater than 6.5%."[291]

Many of the Commission's international peers rely on CAPM models to estimate the cost of equity invested in electric transmission and other utility assets. When they reference equity portfolio DCF returns to estimate the equity market return and equity risk premium, their models apply two-stage or multi-stage growth rates that apply macroeconomic limits to growth.[292] The Commission should do so as well.

H.2.b.2. Beta is a measure of a security's risk relative to the broader market, such as the S&P 500, not of its absolute risk. Do CAPM's assumptions break down if both *utility stocks and the broader market become riskier over time on an absolute basis, but the relative increase in risk in utility stocks rises more slowly?*

As worded, NOI Question H.2.b.2 is ahistorical: There is no basis to conclude that utility stocks or the overall equity market have become riskier over time. For the overall market, risk as measured by volatility—the relevant measure for CAPM purposes, as it is the basis for the "beta" measure of risk used in that model—has generally declined over the almost three-decade history of the VIX index; it soared during the 2008 financial crisis and the Great Recession that followed, but more recently has been, and remains, below its average level from the index's 1990

---

[290] https://www.duffandphelps.com/insights/publications/valuation-insights/valuation-insights-first-quarter-2019/us-equity-risk-premium-recommendation.

[291] Ehrhardt & Brigham, *supra*, at 351.

[292] *See Reply Affidavit of Dr. J. Randall Woolridge*, Ex. No. CAP-600 at 37-47, *Coakley v. Bangor Hydro-Elec. Co.*, No. EL11-66 (Mar. 8, 2019), eLibrary No. 20190308-5263.

launch through 2007.[293] Applying a related measure that is available for a longer historical period, "stock market volatility since 2010 has been quite similar to past decades."[294]

Nor have utility stocks become more risky. To be sure, studies of the overall equity market have indicated that the betas of most stocks tend to converge toward unity— high-beta stocks tend to become as volatile as the market, which means they tend to become less risky over time, and low-beta stocks tend to become as volatile as the market, which means they tend to become more risky over time.[295] This general convergence is the basis of the "Blume" adjustment that Value Line and certain other sources of betas make to their observed results. Because utilities generally have betas below 1.0, it might therefore be expected that their betas will likewise converge toward 1.0, which in their case would mean they rise over time. However, a 2013 study of the betas of 57 exchange-traded U.S. public utility stocks from 1962-2007 demonstrated empirically that "public utility betas do not have a tendency to converge to 1"; rather, they converge toward 0.59.[296] This utility-specific trend means that any CAPM study that uses utility proxy betas that include the usual "Blume" adjustment inflates the estimated equity costs for utilities.

In any event, the CAPM model does not depend on these absolute or relative risks staying constant over time, as Question H.2.b.2 seems to presume. Changes in the absolute risk of a diversified equity portfolio or index will be reflected in updated forward-looking measures of the equity risk premium, whether derived from surveys, properly-constructed DCF studies, or other

---

[293] *See* https://finance.yahoo.com/quote/%5EVIX/chart/; *see also* Ex. No. A-1 § H.2.b.2 (charting market volatility and concluding there is no evidence of an upward trend).

[294] Ray E. Levitre, *Is the Stock Market More Volatile Now Than Ever Before?* (July 5, 2018), https://www.kiplinger.com/article/investing/T047-C032-S014-is-the-stock-market-more-volatile-now-than-ever.html.

[295] Marshall E. Blume, *On the Assessment of Risk*, 26 J. Fin. 1 (1971).

[296] Richard A. Michelfelder & Panayiotis Theodossiou, *Public Utility Beta Adjustment and Biased Costs of Capital in Public Utility Rate Proceedings*, 60 Elec. J. 60, 67 (2013).

valid sources. Changes in the risk of proxy companies relative to the overall equity market will be reflected in their updated betas, as the sources of published betas use a defined look-back period that inherently focuses on recent information.[297] To be sure, the CAPM method assumes continuity between the past and future when it uses data from the past several years to identify a proxy stock's volatility relative to that of the entire market. If a proxy stock's relative volatility was greatly different over the multi-year period used to derive betas than it was over an ROE case study period, then that stock's beta would not produce an accurate estimate of that stock's study-period cost of equity. However, the continuity in average betas for utility stocks over time[298] indicates that this is not really a problem, provided the focus is properly kept on the distribution rather than range of proxy results.

(2) Value Line betas for electric utilities are conservatively high, and should not be used in conjunction with a DCF-based equity market return for which the growth rate reflects analyst forecasts with only a five-year horizon

H.2.b.3. What are appropriate data sources for the beta value?

The conventional source of betas used in CAPM studies presented to the Commission (e.g., those referenced in the *Coakley* Briefing Order) has been Value Line. Other reputable sources publish estimates of beta too, though there are differences between their calculation methodologies.[299] For example, Value Line observes each utility stock's weekly volatility compared to that of the NYSE Composite Index over the past five years, and then makes a "Blume" adjustment toward unity, i.e., generally upward.[300] That is not an ideal source, when

---

[297] *See* note 299, *infra*.

[298] *See* note 296, *supra*.

[299] Ex. No. A-1, § H.2.b.3.

[300] See Andrew J. Cueter, *Using Beta* (Oct. 2, 2012), http://www.valueline.com/Tools/Educational_Articles/Stocks/Using_Beta.aspx#.XMIhVDBKhjU ("At Value Line, we derive the Beta coefficient from a regression analysis of the relationship between weekly percentage changes in the price of a stock and weekly percentage changes in the NYSE Composite Index over a period of five years. In the

paired with an equity risk premium based, in part, on the expected growth of the approximately 400 dividend-paying members of the S&P 500. "For reasons of consistency, the market index employed should be the same as the market index used in deriving estimates of beta."[301] Value Line betas are derived from a volatility comparison to the New York Stock Exchange (NYSE) Composite Index, which contains more than 2000 stocks and is, therefore, stabilized by diversification effects.[302] Thus, Value Line betas compare the proxy companies to a larger and more diverse set of stocks than are used for those studies' equity risk premium. This imperfectly-matched comparison produces betas that are higher than would be found if the proxies' volatility was compared to the same stocks as are used to estimate the equity market return.

Although their use of NYSE market variation and a "Blume" adjustment makes Value Line betas for electric utility proxy companies err on the high side, their use would remain on the reasonable side of "conservatively high," provided it is recognized that utility stocks do not converge upward toward unity with any observable rapidity. Accordingly, Value Line betas should not be used in conjunction with a DCF-based equity market return for which the growth rate reflects analyst forecasts with only a five-year horizon. Also, the Commission should not make adjustments to the beta calculated by Value Line (or any other reputable publisher), as "such adjustments are likely to increase, not decrease, measurement error."[303]

---

case of shorter price histories, a shorter time period is used, but two years is the minimum. Value Line then adjusts these Betas to account for their long-term tendency to converge toward 1.00. (Though the scope of this convergence is beyond our purposes here, readers can refer to M. Blume, "On the Assessment of Risk," Journal of Finance, March 1971 for further details.)").

[301] Morin, *supra*, at 159-160.

[302] Cueter, *supra*. This documentation of Value Line's Beta is available to the Commission as Docket No. EL13-33, Ex. No. NET-1705. *See id*. at 1.

[303] Ex. No. A-1, § H.2.b.3.

(3) Selective changes to the standard CAPM model should be rejected

H.2.b.4. Should the Commission employ more sophisticated versions of the CAPM model that consider more variables instead of only beta, such as the Fama-French Model?

The standard CAPM model, as accurately described in the NOI (at P 14), requires only three inputs: (i) the risk-free rate, (ii) the equity market return (from which the risk-free rate is subtracted to identify the market-risk premium), and (iii) the beta for the subject stock (or for Commission purposes, the beta for each proxy stock). This simple model is widely used by investors and regulators.

Dr. Cornell recommends, and Associations urge, that the Commission rely on the basic version of the CAPM model unless and until the academic literature concludes that another model is clearly superior.[304] Neither the original three-factor Fama-French model (which disaggregates the simple, volatility-based "Beta" measure of risk into three components: volatility, size, and M/B ratios) nor the subsequent five-factor Fama-French model (which adds two additional components, namely operating profitability and the rate of change in total assets)[305] currently meets this standard.

In any event, the Commission should not accept selective "refinements" that systematically increase the resulting indicated cost of equity, such as the "size adjustment" that has been applied by transmission owner witnesses in recent cases. When either version of the Fama-French model applies a version of a size adjustment, it does so in conjunction with other factors, and it multiplies the size factor by a regression slope specific to that factor. In particular, the Fama-French model posits at least two factors beyond the standard Beta factor: (a) the

---

[304] *See* Ex. No. A-1, § H.2.b.4.

[305] *See* Eugene F. Fama & Kenneth R. French, *A Five-Factor Asset Pricing Model* (2014), https://www8.gsb.columbia.edu/programs/sites/programs/files/finance/Finance%20Seminar/spring%202014/ken%20french.pdf.

realized (and thus expected) returns of relatively small companies have been higher than predicted by a one-factor model, and (b) the realized (and thus expected) returns of companies with relatively low M/B ratios have been lower than predicted by a one-factor model. The former is known as the "SMB" (small minus big) factor, and the latter is known as the "HML" (high minus low) factor. *Both* of these revisions to the standard CAPM model should be used, if either is. Because operating utilities' parent companies have lower M/B ratios than the overall market[306] (and because the M/B ratios of operating utilities are even lower[307]), the "HML" factor produces a downward adjustment to the beta-indicated result. That adjustment should not be ignored if the "SMB" factor is applied in the other direction.

Similarly, when Morningstar/Duff & Phelps[308] applies a different "size adjustment," it does so in the context of a further industry-classification adjustment that, for utilities, points in the offsetting direction.[309] And its quantification of its size adjustment is meant for use with observed betas, not betas which have been regressed toward 1.0 (i.e., increased, in the case of electric utility betas). Combining that adjustment with proxy CAPM results that use regression-increased betas wrongly exaggerates the size adjustment.[310]

Taking a "size adjustment" out of these contexts and applying it on its own is not appropriate. To the contrary, academic research indicates that the size adjustment does not apply to electric utilities,[311] and the same historical data that underlies application of the "size

---

[306] *See Price and Value to Book Ratio by Sector (US)* (Jan. 2019) http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/pbvdata.html

[307] *See* Part III.F.2, *supra*.

[308] The data commonly used to "size adjust" CAPM results is the "Stocks, Bonds, Bills, and Inflation" series of yearbooks, also known as "SBBI." This series was formerly published by Morningstar, and is now published by Duff & Phelps. Accordingly, we refer to these successive sources in the singular.

[309] *See* Ex. No. A-2, § H.2.b.4.

[310] *See* Docket No. EL14-12, JC-100 at 18-19.

[311] *See* Annie Wong, *Utility Stocks and the Size Effect: An Empirical Analysis*, 33 J. Midwest Fin. Ass'n 95 (1993).

adjustment" to non-utility firms demonstrates that no size adjustment is appropriate for firms that, like utility company proxies, have betas below 1.0.[312]

The so-called "Empirical" CAPM advanced by certain transmission owner witnesses involves similar cherry-picking. This adjustment is identical in form to the "Blume" adjustment discussed in III.H.2.b)(2), *supra*, but uses a factor of 0.25 rather than 0.33 to regress observed betas toward unity. It rests on a study of the relationship between achieved equity returns and non-Blume-adjusted betas for the period 1926-1984, in which "the risk-free rate . . . was approximately 6% and . . . the [historical] market risk premium was 8%."[313] There is no empirical or theoretical basis for applying this adjustment together with a "Blume" adjustment, especially given today's much different financial market conditions, which feature a lower risk-free rate and a lower market risk premium.[314]

c) Expected earnings

H.2.c.1 Should the use of utilities in the proxy group for the Expected Earnings model be predicated on the Expected Earnings analysis being forward-looking?

H.2.c.2. What, if any, concerns regarding circularity are there with using the Expected Earnings analysis to determine the base ROE, as opposed to using the analysis for corroborative purposes?

H.2.c.2.i. If there are circularity concerns, are there ways to mitigate these concerns for the Expected Earnings analysis? If these concerns exist, are these concerns more significant than those surrounding the DCF methodology, which effectively separates Expected Earnings and ROE into its dividend yield and growth rate subcomponents?

(1) The ratio of earnings to book equity is disconnected from the cost of equity, and therefore circular

The "Expected Earnings" method, also known as E/B, is inherently circular, irrespective of whether the E/B ratios on which it is based are achieved or forecast, because at no point does

[312] *See* Ex. No. A-2 at 60.

[313] Morin, *supra*, at 190 n.12.

[314] *See* Parts III.C and III.H.2.b)(1), *supra*.

that method reference security prices or other measures of *investor* opportunity costs and thereby align its outputs with financial market realities.

The circularity of E/B ratios and the need to reference *investors'* opportunity cost were explained in in a seminal 1972 article by Stewart C. Myers, *The Application of Finance Theory to Public Utility Rate Cases*.[315] Myers explained that reference to E/B ratios "ignores capital markets," which is seriously problematic because "the variable of interest," as specified by the Supreme Court in *Hope*, is "'the return to the equity owner,'" and

> The shareholder is not directly interested in the ratio of book earnings to the book value of a company he invests in. He looks at anticipated dividends and capital gains relative to the stock price he has to pay. Thus, it is more relevant to interpret the opportunity cost of capital as the return on securities with risks similar to the stock of the utility in question.[316]

Myers further explained that E/B ratios are circular, because utilities' book returns "reflect past regulatory actions and thus do not provide an independent standard."[317]

Alexander A. Robichek, the President of the American Finance Association, elaborated on this circularity problem.[318] Robichek explained that the "comparable earnings" E/B approach "leads to circularity. If all regulatory commissions looked merely at each other, no deviations of any magnitude would ever occur even if economic conditions were to warrant a change." He also identified the key to breaking this vicious circle: "Investments in equity shares are made by the purchase of shares at market prices. Therefore, the fairness of the rate of return to the investor

---

[315] 3 Bell J. Econ. & Mgmt. Sci. 58, 62 (1972) (quoting *Hope* at 603).
[316] *Id*.
[317] *Id.* at 77.
[318] Alexander A. Robichek, *Regulation and Modern Finance Theory*, 33 J. Fin. 693, 700 (1978).

must be judged from the investor's point of view in the market place and not on the basis of book value."[319]

The inherent disconnect between investors' opportunity costs and utility stocks' E/B ratios was explained in depth by economists associated with the Massachusetts Institute of Technology and Charles River Associates, published in the *American Economic Review*. It concluded that even *after* making numerous heroic assumptions, "[I]t is impossible to infer either the magnitude or direction of differences in economic rates of return from differences in accounting rates of return. This is because such inferences require not only correction for growth rates, but *also* knowledge of the time shapes of returns."[320]

Rejection of reference to E/B ratios rapidly became the financial academy's equivalent of black-letter law. "This [E/B] procedure has now been thoroughly discredited (see Robichek [15]), and it has been replaced by three market-oriented (as opposed to accounting-oriented) approaches: (i) the DCF method, (ii) the bond-yield-plus-risk-premium method, and (iii) the CAPM, which is a specific version of the generalized bond-yield-plus-risk-premium approach."[321] Even a textbook authored by experts who have often appeared before this Commission as witnesses for utilities seeking increased ROEs states emphatically: "[A]re book rates of return estimates of the cost of equity? . . . [T]he answer to this question is a resounding 'no.'"[322]

From the 1980s until the about-face attempted in the vacated Opinion No. 531, the Commission agreed. It held that E/B does not measure the cost of equity; rather, it reports

---

[319] *Id*. at 701.

[320] Franklin M. Fisher & John J. McGowan, *On the Misuse of Accounting Rates of Return to Infer Monopoly Profits*, 73 Am. Econ. Rev. 82, 89 (1983).

[321] Eugene F. Brigham, Dilip K. Shome, & Steve R. Vinson, *The Risk Premium Approach to Measuring a Utility's Cost of Equity*, 14 Fin. Mgmt. 33 (1985).

[322] Bente Villadsen, et al., *Risk and Return for Regulated Industries* 129 (Academic Press 2017).

"[a]ccounting rates of return are not reliable measures of the current cost of capital, since they do not reflect the current market prices that are determined in competitive capital markets."[323] The same perspective was advanced by the Edison Electric Institute ("EEI") at that time, arguing in the Order No. 461 proceeding[324] that returns on book equity were unrelated to the cost of equity and that ROEs should be set at "[t]he current market cost of common equity,"[325] estimated via the DCF method.[326]

For the three decades that followed (until the arbitrary and subsequently vacated change of course attempted in Opinion No. 531), the Commission sought to base ROEs on the DCF-indicated "current market cost of common equity." Attempts to revive the "thoroughly discredited" E/B method were rare, and never successful. For example, Opinion No. 429 reiterated that a methodology based on earnings divided by book value equity is not a "market oriented methodolog[y]," [327] and that "[n]o direct market-determined cost rate can be derived from this approach because the nature of the analysis is related to book values."[328] It remains true that base ROEs should reflect the current market cost of common equity, even though E/B ratios now exceed, rather than understate, that market cost. Base ROEs should be set at the cost-based return that investors require on their *market-priced* equity investments—that is, "the return that

---

[323] Order No. 420, FERC Stats. & Regs. at 31,367.

[324] *Generic Determination of Rate of Return on Common Equity for Pub. Utils.*, Order No. 461, 37 FERC ¶ 61,287 (1986), *reh'g denied*, Order No. 461-A, 38 FERC ¶ 61,160 (1987).

[325] Reply Comments of the Edison Electric Institute at 12, *Generic Determination of Rate of Return on Common Equity for Pub. Utils.*, No. RM86-12-000 (Sept. 30, 1986), eLibrary No. 19861002-0263. EEI advanced this position in response to comments by APPA, which had discussed the difference between the market-based cost of equity and book returns. Based on a risk-adjusted version of the latter, APPA had argued that allowed returns could be set below the market-indicated DCF level. *See* Comments of American Public Power Association, *Generic Determination of Rate of Return on Common Equity For Pub. Utils.*, No. RM86-12-000 (Sept. 2, 1986), eLibrary No. 19860904-0078. The Commission disagreed with APPA's position, and the issue is now well-settled (or was, prior to Opinion No. 531).

[326] *See* Reply Comments of the Edison Electric Institute, *supra*, at 5.

[327] *Consumers Energy Co.*, Op. No. 429, 85 FERC ¶ 61,100, at 61,362 (1998), *on reh'g*, Op. No. 429-A, 89 FERC ¶ 61,138 (1989), *reh'g denied*, Op. No. 429-B, 95 FERC ¶ 61,084 (2001).

[328] *Id.* (quoting Ex. CP 4, at 39).

the utility must provide its shareholders in order to induce them to invest their capital in that utility."[329]

The NOI proposal to discard all of that learning and return to referencing E/B ratios—even though the significance of accounting reports in determining stock market prices has sharply *declined* in the interim[330]—is premised on the notion that these ratios "are relevant to determining [a regulated] utility's cost of equity, because those returns on book equity help investors determine the opportunity cost of investing in that particular utility instead of other companies of comparable risk."[331] But that notion is not factual. Investors cannot buy into any investment's actual or expected E/B ratio, because they must transact at shares' market price. As stated in the textbook repeatedly cited in the NOI,

> Accounting rates of return are not opportunity costs in the economic sense. . . . Only stock market price is sensitive to a change in investor requirements. Investors can only purchase new shares of common stock at current market prices and not at book value.[332]

The esteemed regulated-utilities economist Alfred Kahn made the same point: "comparable earnings" on book-value equity does not reflect what "purchasers of their [public utility companies'] stocks could obtain on their dollars elsewhere," because "[t]he cost of capital, which is what a utility company must match if it is to attract funds, is what investors could obtain by buying the *securities* of other companies in the open market—not what the companies themselves earn on a dollar of additional investment."[333]

---

[329] *Coakley* Briefing Order, P 36 & n.73.
[330] *See* note 137, *supra*.
[331] NOI P 15.
[332] Morin, *supra*, at 393.
[333] Kahn, *supra*, at 52 & n.79.

Similarly, one of the witnesses most commonly employed by transmission owners has admitted that investors contemplating an equity investment in regulated utilities' parents have no opportunity to do so at the *book* value of those shares, but rather must pay the market price,[334] and that E/B ratios therefore do not provide a market-based measure of transmission owners' cost of equity.[335] Indeed, this method does not "attempt[] to estimate the cost of equity" at all.[336]

In other words, investors can only buy into shares' E/M ratio (a.k.a. E/P) — which is always smaller when M exceeds B, as it almost universally does for reasons discussed in Part III.F.2, *supra*. When an investor must pay more than book value to gain the right to the future expected earnings on book value, that investor must be expecting to earn something less than the forecast earnings per book value on the higher amount of investment in the company.[337] That is why financial theory holds, as the Commission recognized in Opinion No. 314, that "when the price-to-book ratio is greater than one, the rate of return investors expect [the company] to earn on [book] common equity is greater than the rate of return investors require from their investment in [the company's] common stock."[338]

The mistaken contention that E/B ratios reflect "opportunity cost" is often attributed[339] to Judge Learned Hand's opinion in *Consolidated Gas Co. v. Newton*, 267 F. 231, 237 (S.D.N.Y. 1920). But Judge Hand's discussion of opportunity costs was a comparison of investors' *market-priced* opportunities, i.e., "profits *available* elsewhere":

---

[334] EL16-64 Tr. at 784:5-20.

[335] *Id.* at 783:20-21 ("The expected earnings approach is not a market-based method" (McKenzie)); *Id.* at 786:6-7 ("It's not a market-based model"); *see also id.* at 447:1-20 (expected earnings model is not linked to the Efficient Market Hypothesis).

[336] *Id*. at 786:6-7.

[337] Morin, *supra*, at 395.

[338] *Orange & Rockland Utils., Inc.*, Op. No. 314, 44 FERC ¶ 61,253, at 61,952, *on reh'g*, Op. No. 314-A, 45 FERC ¶ 61,252 (1988), *reconsideration denied*, 46 FERC ¶ 61,036 (1989).

[339] *See, e.g.*, Charles F. Phillips, Jr., *The Regulation of Public Utilities: Theory and Practice* 397 & n.124 (Pub. Utils. Reports 1993).

> The recurrent appeal to a just rate and a fair value assumes that the effort is to insure such a profit as would induce the venture originally and that the public will keep its faith so impliedly given. That, I think, involves a tacit comparison of the profit possible under the rate with *profits available elsewhere*; i.e., under those competitive enterprises which *offer an alternative investment*. The implication is that the original adventurer would compare future rates, varying as they would with the going profit, and would find them enough, but no more than enough, to induce him to choose this investment. By insuring such a return it is assumed that the supply of capital will be secured necessary to the public service. As the *profits in the supposed alternative investment* will themselves vary, so it is assumed to be a condition of the investors' bargain that their profit shall measurably follow the general rates.

Id. (emphasis added). "Stated another way, the opportunity cost of capital concept holds that 'capital should not be committed to any venture unless it can earn a return commensurate with that *prospectively available* in alternative employments of similar risk.'"[340] E/B ratios are disconnected from prospectively available returns because "[t]he book value is a record of the past, showing the cumulative amount that stockholders have invested, either directly by purchasing newly issued shares or indirectly through retaining earnings. In contrast, the market price is forward-looking, incorporating investors' expectations of future cash flows."[341] Thus, while the opportunity-cost concept supports using market-based financial metrics of comparable-risk companies to estimate the cost of equity for a particular at-issue utility, it does not support using those proxies' E/B ratios.

Relatedly, NOI Question H.2.c.2.i. creates a false similarity between the DCF method and E/B models when it asserts that the DCF method "effectively separates Expected Earnings and ROE into its dividend yield and growth rate subcomponents." In the E/B method, earnings (realized and/or expected) are divided by equity book value. In the DCF method, the divisor of

---

[340] Phillips, *supra*, at 397 & n.123 (quoting testimony of a witness for Tampa Electric Company in the Florida Public Service Commission Docket No. 800011-EU; emphasis added).

[341] Ehrhardt & Brigham, *supra*, at 102.

the dividend yield term reflects market rather than book values; the growth rate term connects actual recent earnings to projected future earnings, and neither baseline nor projected earnings are divided by book value equity.

A clarifying hypothetical[342] will demonstrate the circularity inherent in the E/B method. Suppose that the U.S. electric transmission industry consisted of eleven public utilities, each exchange-traded, and each with a constant equity ratio that, multiplied by its net plant value rate base, happens to equal its equity book value. The utilities are regulated exclusively by this Commission, which adopts as its ROE determination method the median of the eleven utilities' expected E/B ratios, and does not allow incentive ROE adders. Investors expect that regulatory regimen to continue. In Year 1, they are earning (and are expected to continue earning) from 10.0% to 11.0% returns on their mid-year[343] book value equity (and rate base), distributed equally over that range. Applying the proxy group median E/B ratio, the Commission sets the utilities' allowed ROEs at 10.5%. Now suppose that from Year 2 forward, those utilities' actual financial market equity cost is 12.5%. Because every utility in the proxy group would be expected to continue receiving the 10.5% ratio of every utility's earnings to its equity book value, their 10.5% allowed ROE would never change; updated financial market information would never interrupt the ceaseless replication of the starting-point 10.5%. Or, rather, it would change only when the utilities, unable to attract capital because their allowed ROEs fall short of equity's market cost and, thus, unable to replace aging facilities, began to suffer service

[342] That these assumptions are unrealistic creates further problems for the E/B method. *See* Parts III.F.2. .5, *supra*. But we here focus on what would be the best possible scenario for use of the E/B method, by assuming validity of the false analogy (between holding company equity book values and operating utility net plant values) that has been used to rationalize it.

[343] To keep this hypothetical simple, we gloss over the minor adjustment for mid-year versus year-end book value that was made in the E/B exhibits referenced in the PNA.

degradation and lose load to self-supply and the like, leading to lower expected earnings, even further below the capital attraction level.[344]

(2) The justifications proffered for using E/B ratios in the vacated Opinion No. 531-B were not valid

In the vacated Opinion No. 531-B, criticisms of Expected Earnings studies were dismissed on several invalid grounds. In light of the PNA's use of E/B ratios, we address those grounds here.

First, Opinion No. 531-B asserted, with no substantial evidentiary basis,[345] that "[i]nvestors rely on both the market cost of equity and the book return on equity in determining whether to invest in a utility, because investors are concerned with both the return the regulator will allow the utility to earn *and* the company's ability to actually earn that return."[346] The proxy companies' "book return on equity," i.e., their returns divided by their book equity, do not indicate utility companies' ability to actually earn a return on each dollar invested by present investors, because the proxy companies' book equity is not aligned with the market-priced equity sold to present investors.

Second, Opinion No. 531-B responded (P 128) to CAPs' citation of Opinion No. 314 by asserting that the specific proposal at issue there was to use the book value return on equity (r) for the subject utility as the divisor for its DCF dividend yield, and that the rejected proposal

---

[344] Alternatively, suppose that from Year 2 forward, the actual cost of capital for those utilities is 8.5%. Again, that updated financial market information would never interrupt the ceaseless replication of the starting-point 10.5%. Or, rather, it would change only when the utilities, flush with cash in excess of their system re-investment needs because their allowed ROEs are well above the market cost of equity, used it to purchase diversified lines of business with even higher returns, leading to higher expected earnings, even further above the capital attraction level.

[345] As its only basis for this assertion, Opinion No. 531-B, P 129 nn. 277-78, cited "Tr. 637:6-12." But the referenced transcript citation has nothing to do with this subject; it consists of inapposite cross-examination testimony regarding NETOs' risk premium study. Although the cited transcript includes the truism that "[t]he allowed ROE is a starting point, and then there is the ability of the company to actually earn that," nothing in that testimony supports reference to the proxies' return on *book* equity rather than on *market-priced* equity. Tr. at 637:8-9, May 8, 2013, *In re Coakley*, Docket No. EL11-66-001, eLibrary No. 20130508-4007.

[346] Op. No. 531-B, P 129.

"would have had the effect of *setting* Orange & Rockland's base ROE at Orange & Rockland's own expected return on book equity." Notwithstanding those attempted distinctions, the underlying finding in Opinion No. 314 (at 61,952) that "market determinations of capital cost" require reference to the expected return on market-priced equity (k) rather than expected return on book equity (r) is directly relevant to NETOs' "expected earnings" studies. Those studies' *only* input (prior to a minor adjustment for the difference between year-end and year-end book value equity) is expected return on book equity, (r), exactly the same input that was rejected in Opinion No. 314. Nor is there any meaningful distinction in the fact that the (r) rejected in Opinion No. 314 was the subject utility's own (r) rather than proxy group (r) values. Whether the (r) belongs to a single utility or a group, it represents expected return on book equity, not expected return on any opportunity available to present utility investors.

Third, Opinion No. 531-B asserted that "all else being equal, an investor is more likely to invest in a utility that it expects will have the opportunity to earn a comparable amount on its book equity as other enterprises of comparable risk are expected to earn."[347] This assertion misses the point: "all else" is not equal, because market-to-book ratios vary, which makes the assertion meaningless as a justification for considering per-book earnings rather than earnings on market price.[348] As explained by a leading treatise on public utility ratemaking:

> If a . . . stock is selling for two times its book value, and earning 20 percent per year on book equity, it would be erroneous to suggest that a new or prospective investor in this stock would receive a return on his or her investment of 20 percent. The investor's "book" value is the purchase price, and that return, given the assumptions would be 10 percent. Thus, comparing book returns of

[347] Op. No. 531-B, P 129.

[348] *See* CAP-500 at 47-51.

> companies with quite different market to book ratios is highly questionable at best.[349]

For all these reasons, reference to proxy group E/B ratios distorts and inflates the estimation of investors' required return on market-priced equity. Accordingly, E/B analysis should be disregarded.

(3) If E/B ratios are used, they should reflect multiple years' ratios

If return on holding companies' book equity is to be referenced at all, it is important that the referenced return accurately capture what investors can expect to earn from long-held investments in utility stock. Accordingly, rather than rely solely on Value Line's estimate of per-book earnings five years ahead (as was done in the NET-709 study that Op. No. 531 illustratively cites), any such study should be based on the proxies' representative return over the longest readily available period, both historic and projected.

At least four considerations commend this approach. First, the textbook cited in the NOI recommends that in any study of per-book earnings, "the time period should include at least one full business cycle that is representative of prospective economic conditions for the next cycle."[350] Dr. Morin warns that selecting a short-term period may not be reflective of the firm's expected long-run earnings, and recommends that in order "to dampen cyclical aberrations and remove the effects of cyclical peaks and troughs in profitability, an average over several time periods should be employed."[351] Similarly, the pipeline witness in the *Trailblazer* case referenced in NOI P 32, Question B4 n.59, while not affirmatively supporting reliance on E/B

---

[349] James C. Bonbright, Albert L. Danielsen & David R. Kamerschen, *Principles of Public Utility Rates* 330 (2d ed. 1988). Although the full quoted statement refers at the ellipsis to "nonregulated" stock, its mathematical observation obviously applies also to the stock of publicly-traded utility holding companies.

[350] Morin, *supra*, at 383-84.

[351] *Id.* at 383.

ratios, testified that "[i]t is appropriate to consider a relatively long measurement period in the Comparable Earnings approach [encompassing both historical E/B ratios and projections] in order to cover conditions over an entire business cycle."[352] One estimate five years out does not capture a full business cycle. Second, including in the reference period past years in which per-book earnings represent actual accounting figures will help to address the PNA's stated reluctance to rely on the forward estimates of a single analyst.[353] Third, including all three projection periods would be consistent with the Commission's former use of multi-period Value Line "r" estimates as part of the *br+sv* form of DCF analysis.[354] Fourth, the only utility investors with an "opportunity" to earn a return matching their firm's E/B ratio are those who bought in decades ago, before market-to-book ratios grew to exceed unity. Thus, the only measure of E/B that bears even a passing resemblance to the *Coakley* Briefing Order's basis for referencing E/B is long-term E/B.

(4) If used, E/B ratios should be adjusted to account for how the proxies' equity ratios differ from those of the subject utility, and for how the proxies' M/B ratios differ from those of operating utilities

Proxy companies typically have considerably thinner equity ratios than do operating transmission-owning utilities, i.e., are considerably more leveraged.[355] This equity ratio difference directly affects the proxies' "expected earnings," as more leverage entails more earnings for each dollar of book equity, raising the E/B ratio that (after a small adjustment for the difference between year-long and year-end earnings) constitutes each proxy's "Expected

[352] Supplemental Direct Testimony of Paul R. Moul on Behalf of Trailblazer Pipeline Company LLC, Ex. No. TPC-0117, at 37:11-13, *Trailblazer Pipeline Co.*, No. RP19-922-002 (May 21, 2019), eLibrary No. 20190521-5165.

[353] *See Coakley* Briefing Order, P 47.

[354] *See, e.g.*, *Midwest Indep. Transmission Sys. Operator, Inc.*, 100 FERC ¶ 61,292, PP 14-17 (2002).

[355] *See, e.g.*, Docket Nos. EL11-66 et al., Ex. No. CAP-500, § IV.A.

Earnings." It is no surprise, therefore, that statistical analysis shows that proxies' expected earnings correlate to their equity ratios.[356]

Accordingly, to the extent that the proxies' expected earnings are referenced at all, the resulting indication of the *proxy companies'* expected earnings cannot be considered a meaningful indicator of *subject utilities*' expected earnings without adjusting for the difference between the equity ratios of proxy companies and operating utilities. With such adjustment, the expected earnings results align much more closely with the DCF results.[357]

Accounting for the equity ratio difference between the proxies and subject utilities themselves is essential to a meaningful application of E/B ratios, because E/B ratios themselves take no account of the proxy stocks' market price. The Commission has declined to adjust *DCF* results for differences between proxy and subject-utility equity ratios, reasoning that the subject utilities' equity ratios affect their credit ratings, which in turn bound the selection of proxies, so the DCF results already select for stocks with appropriately high credit ratings and associated low risk, and less-risky proxies generally have lower DCF results.[358] But the reasons that less-risky proxies generally have lower DCF results is that investors bid up the market price of equities that offer a favorable reward for a given level of risk, reducing such proxies' dividend yields and DCF results. No such effect reduces the E/B ratio of proxy companies whose equity ratio is not comparable to that of the subject utilities. Because the difference between proxy and subject utility equity ratios is not accounted for directly through E/B inputs, it must be accounted for after identifying the proxies' E/B ratios.

---

[356] *See id*.

[357] *See id*.

[358] *See* Opinion No. 551, P 288.

d) Risk premium

The Risk Premium ("RP") method seeks to extrapolate a present cost of equity from past regulatory decisions by identifying a linear relationship between the cost of equity and cost of debt implicit in those decisions, and then adding the implied current difference to the present cost of debt. This method is inherently less accurate than a well-constructed DCF or CAPM study, as it relies on echoes of the financial market conditions referenced in past cases, whereas the DCF and CAPM methods apply a market-based method to primary data. Moreover, RP results tend to replicate the regulatory lag and inertial continuation of past returns that affected past regulatory decisions. Consequently, in this period of declining equity costs, RP results will tend to exceed the current cost of equity. Nonetheless, the RP method directly reflects current financial market conditions (at least, current bond market conditions) and given that feature and its simplicity, it remains in fairly common regulatory use. Accordingly, while we do not favor reference to RP, neither do we strongly oppose it, as a general method.

But that acquiescence is limited to the general concept of referencing some version of the RP method. It does not encompass the particular versions of RP that transmission owners have commonly presented to the Commission in recent cases. In particular,

- RP studies should not use two different bond yield measures to calculate the equity minus debt yield risk premium and the bond yield to which that risk premium is added—that is, after calculating the risk premium using low actual bond yields, they should not add the resulting risk premium to high projected bond yields;
- The data set of past regulatory decisions used in RP studies to identify the past cost of equity as an input to the equity risk premium should exclude, or adjust the bond yield comparison dates of, decisions that did not determine an updated base cost of equity; and

- RP studies should account for risk differences between the subject utility and the utilities at issue in the data set cases.

Below, we elaborate on these points and relate them to NOI Questions H.2.d.1 through H.2.d.3.ii.

(1) Risk premium studies should compare the cost of equity as found for prior study periods to those study periods' contemporaneous actual bond yield

H.2.d.1 Should the analysis be historical or forward-looking?

The MISO I Initial Decision relied on MISO TOs' historical risk premium analysis, and rejected reliance on projected bond yields as "speculative":

> Dr. Avera also produces a risk premium analysis using bond yields projected for 2016-20. This Initial Decision rejects those studies. Projected yields are speculative, and, therefore, a less reliable basis for a study than historical yields. [359]

On exceptions, the Commission affirmed this determination:

> The Presiding Judge held that projected yields used in risk premium analyses are speculative and less reliable than historical yields, and rejected Dr. Avera's use of projected Baa-rated bond yields. . . . [W]e agree with the Presiding Judge. . . .[360]

That ruling remains sound. The issue here is not really one of choosing between "historical" and "forward-looking" analyses; it is which measure of bond yields should be added to the risk premium derived from historical data in order to produce a reliable forward-looking estimate of equity's cost. Given that purpose, as Mr. Gorman explains,[361] it would not be rational to derive a risk premium based on actual past utility bond yields, and then add that risk premium

---

[359] *Ass'n of Bus. Advocating Tariff Equity v. Midcontinent Indep. Sys. Operator, Inc.*, 153 FERC ¶ 63,027, P 257 (2015) (footnote omitted), *aff'd*, Op. No. 551, 156 FERC ¶ 61,234 (2016).

[360] Op. No. 551, P 194. *See also Potomac-Appalachian Transmission Highline*, *L.L.C.*, 122 FERC ¶ 61,188, P 102 (rejecting "speculative forecasting of th[e] indexed cost of debt" as a basis to raise the low-end test used to filter proxies' DCF results).

[361] *See* Ex. No. A-2, H.2.d.1.

to current forecasts of future utility bond yields. We have seen no instance in which transmission owners advocating for use of projected bond yields have presented an internally consistent RP study in which projected bond yields are used to derive the risk premium as well as the yield to which it is added.

Even if projected bond yields were used consistently to derive the risk premium as well as the yield to which it is added, such a study would not be useful. Projected bond yields are not actually available to study-period investors, and thus do not represent the known and measurable cost of capital. Projected bond yields are also highly unreliable, as bond investors know—which is why they price bonds at their present yield rather than waiting for bonds' prices to fall and yields to rise.[362] In recent years, economists' projections of future yields have generally exceeded current yields, and with equal consistency, their projections of yield increases have proved to be incorrect. Through a comparison of actual observable yields and projections of future changes in yields over the period December 2000 through December 2014, Mr. Gorman's study for the MISO ROE paper hearing demonstrated that using analysts' projected changes in yield does not produce a reliable estimate of what the actual cost of capital will be at some point in the future. Investors are aware of that reality, as the prices in bond markets demonstrate. Thus, projected bond yields do not accurately reflect investor return requirements, are not an actual depiction of changes in return requirements for future periods, and are not a known and measurable estimate of what the investor-required return on a bond or stock will be. Therefore, using projected bond yields in a Risk Premium analysis to measure the current market cost of equity is not reasonable.

Using actual utility bond yields consistently, a reasonable risk premium study can be conducted by comparing those bond yields to the base ROEs contemporaneously allowed by

[362] *See* Docket No. EL14-12, Ex. No. JCA-11, at 24-26; *id*. at 37-38 (Stephen Hill explaining why the use of projected bond yields in determining the current cost of equity capital produces unreliable results).

state commissions for generation-divested electric utilities.[363] Use of state-allowed rather than FERC-allowed ROEs brings to bear a larger set of case results. It also avoids the distortion caused by treating cases in which FERC did not re-study the base cost of equity (e.g., simply approved an incentive ROE adder, extended to new MISO participants the 12.38% base ROE that had been identified as cost-based using a six-month study period encompassing September 11, 2001) as if they identified a refreshed cost of equity. As numerous witness have demonstrated,[364] that misdirected approach makes false comparisons between older base ROEs and later bond yields, and thereby upwardly distorts the indicated risk premium and cost of equity.

(2) The risk premium method assumes a linear relationship between cost of equity and bond yields; that assumption is not compatible with a finding of "anomalous capital market conditions"

H.2.d.2. Is a Risk Premium analysis compatible with a finding of anomalous capital market conditions? Why or why not?

As discussed in the introduction to this Part III.H.2.d), *supra*, the RP method relies directly on bond yields, requires a linear relationship between debt yields and equity costs, and assumes that the subject utility's equity is risk-comparable to the utilities at issue in past cases. These assumptions make the risk premium method incompatible with a finding that bond yields, or other market conditions, are "anomalous."

---

[363] *See, e.g.*, Dockets No. EL11-66 et al., Exhibit No. CAP-500, Affidavit of Dr. J. Randall Woolridge (Jan. 11, 2019), Part V.B., and the supporting exhibits referenced therein. Similarly, in *System Energy Resources, Inc.*, Docket Nos. EL17-41, et al., Dr. S. Keith Berry has presented risk premium studies based on annual average state-allowed ROEs collected by Regulatory Research Associates, for the 1991-forward period covered by RRA's summary. *See* Ex. No. SAM-0001 (Direct Testimony of) at 38-41 and associated Exs. Nos. SAM-0015 and SAM-0023.

[364] *See, e.g.*, Dockets No. EL11-66 et al., Ex. No. CAP-500, Affidavit of Dr. J. Randall Woolridge (Jan. 11, 2019), Parts V.A and V.C.; Docket No. EL15-45, Ex. No. RPG-9 at 18-26, and the supporting exhibits cited in each of these testimonies.

This conceptual incompatibility was directly visible in two decisions issue on June 19, 2014: Opinion No. 531, and the contemporaneous decision in *SCE*,[365] which has not been vacated and remains good law. Prior to those June 2014 decisions, the Commission had a policy of adjusting the allowable ROE as indicated by study-period DCF results so as to track trends in treasury yields from the study period to the final order date.[366] Although not labelled as such, this was a risk premium method: it combined a measure of what equity cost in the past with bond yield trends to infer equity's updated cost. In the cited June 2014 decisions, the Commission determined that the relationship between bond yields and the cost of equity had become non-linear, and that it therefore would no longer apply an adjustment to track bond yield trends.[367] Logically, that same finding also precludes use of the risk premium method.

(3) If used, the risk premium method should be adjusted for the subject utility's relative risk

H.2.d.3. Unlike the financial models discussed above, the Risk Premium analysis produces a single ROE rather than a zone of reasonableness. Does this characteristic require the Commission to use the Risk Premium model differently than the other models?

H.2.d.3.i. Is there a method by which the Risk Premium ROE could be adjusted upward for an above average utility or downward for a below average risk utility? If not, is it reasonable to consider the results of a Risk Premium analysis when determining the ROE of an above or below average risk utility?

H.2.d.3.ii. Is it appropriate to use a Risk Premium analysis when conducting the first prong of the section 206 evaluation?

By combining erroneous assumptions about the RP method and the section 206 evaluation of whether an existing ROE remains reasonable, Question H.2.d.3 and its subparts create avoidable dilemmas. These questions assume that the first-prong section 206 evaluation must be based on ranges, rather than distributions, of proxy-based results. They also assume that

[365] *So. Cal. Edison Co.*, 147 FERC ¶ 61,240 (2014) ("*SCE*").

[366] *See id.* P 8 and cases cited therein.

[367] *See id*. P 9.

the RP method necessarily produces only a single point value, applicable only to an average-risk utility. Although it would follow from these premises that the RP method should not be used within the first prong, nor used within the second prong for atypically low-risk or high-risk subject utilities, all of these premises are false. If the risk premium method is applied reasonably, it will produce alternately a risk-appropriate single indicated ROE, or a range of risk-appropriate ROEs; either measure can then be combined with other methods' results within both section 206 prongs.

Nature of first prong. Contrary to the PNA, the first prong of the section 206 evaluation—the assessment of whether an existing ROE remains just and reasonable—does not require that the assessment be restricted to methods that generate a range of results. Just as it would be unreasonable to continue a challenged 5.5% allowance for debt cost when the single best estimate of the utility's cost of debt is 5%, it would be unreasonable to continue a challenged 10% allowance for equity cost when the single best estimate of the cost of equity is 9.5%. *See* Part III.G.2, *supra*.

Risk comparability within RP method. It is true that in the versions described in the PNA and used by TO witnesses in the pending New England and MISO paper hearings, the RP method takes no explicit or systematic account of whether the subject utility and the data-set utilities are risk comparable. Rather, this version of the RP method purports[368] to gather all transmission ROE allowance orders over a specified historical period. However, this is not an inherent characteristic of the RP method. The current bond yield to which the risk premium is added can be selected to match the utility's specific bond rating. As a clarifying hypothetical,

[368] We say "purports" because as applied by TO witnesses, orders allowing relatively low transmission ROEs are commonly excluded based on claims that they involved non-risk-comparable utilities, whereas orders allowing relatively high transmission ROEs are included without undertaking any risk comparison between the utilities at issue therein to the subject utility for which the RP study is being performed.

suppose that the data set cases used to quantify the relationship between bond yields and the cost of equity all concerned utilities with BBB bond ratings, whereas both credit rating agencies maintain an A rating for the subject utility. To obtain an RP-based, risk-comparable indication of the subject utility's cost of equity, a risk premium that represents the difference between BBB utility bonds and BBB utilities' cost of equity could be added to the yield on A-rated utility bonds.[369] Alternatively, the data set cases used to quantify the relationship between bond yields and the cost of equity could be screened to be limited to cases involving bond yields or other characteristics comparable to the subject utility. For example, if state-allowed ROEs are used as the data set,[370] they can be limited to cases involving ROEs for generation-divested utilities, thus focusing on the lower risk of delivery services.

Output spread of the RP method. The NOI's statement that "the Risk Premium analysis produces a single ROE rather than a zone" should be reconsidered. Although most (though not all) of the TO exhibits referenced in the PNA distilled their risk premium results to a single value per study, that is not an inherent characteristic of the RP method. For example, rather than using only BBB bond yields to identify the data-set-period risk premium and the current bond yield to which it is added, the Commission could use a pair of ratings, each placed one (or two) "notch(es)" above and below that of the subject utility. Alternatively, the RP method could use an annual-average approach,[371] modified to group each year's allowed ROEs into those falling below and exceeding the annual average, and thereby identify low and high risk premiums each

---

[369] While this approach would use different bond yields to (a) derive and (b) sum with the risk premium, that difference would not be a "mismatch" because it would serve to account for the risk difference between the data set utilities and subject utility.

[370] *See* Part III.E.6, *supra*.

[371] Whereas RP studies referenced in the *Coakley* Briefing Order generated separate risk premiums for each of the dozens of cases in its 2006-forward data set, the RP study referenced in the MISO Briefing Order averaged case outcomes and bond yields within each calendar year so as to generate one risk premium per year. The suggestion made here is a variant of the latter approach.

year. Either of these approaches would generate a range of RP results rather than a point value. As discussed above, we see no need to generate a results range rather than point value, and we therefore do not affirmatively advocate either of these variants. But if it were deemed necessary to limit the section 206 first prong to methods that produce ranges of results, there is no technical reason why RP could not be one of those methods—and RP would serve better than E/B in that capacity.

CONCLUSION

The PNA referenced in the NOI is contrary to the Federal Power Act and the standards of reasoned decision-making. It should be revised as recommended above. Principally:

- The Commission should continue to rely heavily on the central value indicated by DCF studies of risk-representative proxy groups, using its longstanding DCF model, including its recognition that long-term GDP growth constrains long-term growth of earnings and dividends.
- E/B ratios should play no role in identifying the just and reasonable base ROE, as such estimates do not measure the return that investors require to be induced to invest in market-priced utility equities.
- CAPM studies should use a realistic market risk premium, such as one that recognizes long-term Gross Domestic Product growth as a normalizing constraint on the perpetual continuation of near-term forecasts of earnings growth.
- Any referenced risk premium study should be based on actual bond yields and exclude spurious data points.
- Base ROE determinations should be based on the medians (or for non-average-risk subject utilities, a different, risk-appropriate percentile), not the midpoints, of the utilized proxy groups and methods. There is no *stare decisis* basis for using midpoints in the new way contemplated by the PNA. Nor is that statistically unfounded and error-prone approach consistent with reasoned decision making.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

- The three proxy-based methods (DCF, CAPM, and E/B) should not be treated as if they studied three different proxy groups. If those three studies are all to be referenced and given equal weight, then their individual-proxy outputs should be averaged to produce a composite return estimate for each proxy, before forming the composite range.
- With ranges (as distinct from distributions) of proxy results properly removed from playing any decisional role, many of the issues raised in the NOI and perpetually litigated in case-specific proceedings, such as proxy group composition and the tests for excluding high and low results outliers, will have appropriately diminished significance, and can therefore be resolved through bright-line tests.
- Complaints should not be dismissed based on a rebuttable presumption that existing ROEs remain just and reasonable unless they exceed a shield level set above the indicated cost of equity. Under the cost-based ratemaking, and consistent with *Emera Maine*, an existing ROE should be remedied if it exceeds the cost-based just and reasonable level, and not only if it exceeds an even higher level.

Respectfully submitted,

/s/ John E. McCaffrey
Delia Patterson
Senior Vice President, Advocacy & Communications and General Counsel
John E. McCaffrey
Regulatory Counsel
THE AMERICAN PUBLIC POWER ASSOCIATION
2451 Crystal Drive
Suite 1000
Arlington, VA 22202
(202) 467-2900
dpatterson@publicpower.org
jmccaffrey@publicpower.org

The American Public Power Association

/s/ David E. Pomper
David E. Pomper
Cynthia S. Bogorad
Latif M. Nurani
SPIEGEL & MCDIARMID LLP
1875 Eye Street, NW
Suite 700
Washington, DC 20006
(202) 879-4000

Attorneys for the Transmission Access Policy Study Group

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

/s/ Robert A. Weishaar, Jr.
Robert A. Weishaar, Jr.
McNees Wallace & Nurick LLC
1200 G Street, NW
Suite 800
Washington, DC 20005
(202) 898-5700
bweishaar@mcneeslaw.com

Vasiliki Karandrikas
McNees Wallace & Nurick LLC
100 Pine Street
Harrisburg, PA 17101
(717) 237-5274
vkarandrikas@mcneeslaw.com

Counsel to the American Forest and Paper Association and on behalf of The Aluminum Association, The American Chemistry Council, The Industrial Energy Consumers of America, and The Electricity Consumers Resource Council

/s/ Randolph Elliott
Randolph Elliott
Senior Director, Regulatory Counsel
The National Rural Electric Cooperative Association
4301 Wilson Boulevard
11th Floor
Arlington, VA 22203
(703) 907-6818
randolph.elliott@nreca.coop

The National Rural Electric Cooperative Association

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

ASSOCIATIONS EXHIBIT NO. A-1

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

STATEMENT OF BRADFORD CORNELL, PH.D.

I, Bradford Cornell, Ph.D., hereby state:

I make this statement in support of the comments submitted by the Aluminum Association, American Chemistry Council, American Forest and Paper Association, American Public Power Association, Electricity Consumers Resource Council, Industrial Energy Consumers of America, National Rural Electric Cooperative Association, and Transmission Access Policy Study Group (collectively, "Associations") to *Inquiry Regarding the Commission's Policy for Determining Return on Equity*, 166 FERC ¶ 61,207 (2019) (the "NOI"). I have personal knowledge of the matters stated herein.

I am currently Emeritus Professor of Finance at Anderson Graduate School of Management at the University of California, Los Angeles. Previously, I was a Visiting Professor of Financial Economics at the California Institute of Technology and I was a Professor of Finance and Director of the Bank America Research Center at the Anderson Graduate School of Management at the University of California, Los Angeles for 26 years.

I earned a master's degree in Statistics from Stanford University in 1974 and earned my doctorate in Financial Economics from Stanford in 1975. I have served as an editor of numerous journals relating to business and finance and have written more than 120 articles and three books on finance and securities: *Corporate Valuation: Tools For Effective Appraisal and Decision* Making (1993), published by McGraw-Hill, *The Equity Risk Premium and the Long-Run Future of the Stock Market* (1999), published by John Wiley and Sons, and *Conceptual Foundations of Investing* (2018), published by John Wiley and Sons. To complement my academic writing, I have also authored articles published in the Wall Street Journal and the Los Angeles Times.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

In 1988, I was cited by the Financial Management Association as one of the ten most prolific authors in the field of finance. I have received prizes and grants from my research from the Chicago Board of Trade, The Chicago Mercantile Exchange, and the Institute for Quantitative Research in Finance. My article, "Corporate Stakeholders and Corporate Finance," received the 1987 Distinguished Applied Research Award from the Financial Management Association. In 1999, I was awarded the Institutional Brokers' Estimate System ("I/B/E/S") prize for empirical work in finance and accounting (with Wayne Landsman and Jennifer Conrad). I received a Graham and Dodd Scroll Award in 2006 from the Financial Analyst Society with Richard Roll for our work on delegated agent asset pricing theory. I won this award again in 2011 for my work on economic growth and equity investing. My paper entitled "Luck, Skill, and Investment Performance" in The Journal of Portfolio Management won an Outstanding Article prize from the 11th Annual Bernstein Fabozzi/Jacobs Levy Awards. I won this award again in 2015 for my article "Tesla: Anatomy of a Run Up" (with Aswath Damodaran) and a third time in 2017 for my article, Does Past Performance Matter in Investment Manager Selection (with Jason Hsu and David Nanigian).

I have served as a Vice President of the Western Finance Association. I am also a past director of both the American Finance Association and the Western Finance Association. I have served as an associate editor on numerous journals including The Journal of Finance, The Journal of Futures Markets, The Journal of Financial Research, and The Journal of International Business Studies. I have served as a reviewer of nearly a dozen other professional journals.

My teaching and writing have focused on a number of different financial and economic issues, many of which are relevant to the subject matter of this statement. I currently teach

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Applied Corporate Finance and Investment Banking at Caltech. Examples of other classes I have taught over the course of my academic career include Corporate Valuation, the Law and Finance of Corporate Acquisitions and Restructurings, Corporate Financial Theory, Security Valuation and Investments, and Applied Corporate Finance and Investment Banking.

I also provide fundamental valuation analysis as a senior advisor to Rayliant Global Advisors and the Cornell Capital group. In this capacity, I am a registered Investment Adviser Representative.

I have served as a consultant and have given testimony for both plaintiffs and defendants in a variety of securities, regulatory, and commercial lawsuits. During my many years of experience as an expert witness and consultant, I have provided economic analyses and expert testimony (again, for both plaintiffs and defendants) related to valuation, corporate finance, portfolio management, and damages issues. I have been engaged as a damages expert in numerous high-profile cases that revolved around complex financial and securities transactions. My work in valuation has also been cited and relied upon by the Delaware Court of Chancery and the Delaware Supreme Court.[1]

My background is described more fully in my curriculum vitae, which is attached as Appendix A. A list of my publications may also be found in Appendix A. A list of testimony I have given in deposition or at trial over the past four years may be found in Appendix B.

---

[1] *See, e.g., Delaware Open MRI Radiology Associates, P.A. v Kessler*, 898 A.2d 290, 331 n.102 (Del. Ch. 2006); *Andaloro v. PFPC Worldwide*, C.A. No. 20336, C.A. No. 20289, 2005 Del. Ch. LEXIS 125, at *71 n. 75 (Del. Ch. August 19, 2005); *In re Appraisal of Dell Inc.*, C.A. No. 9322-VCL, Memorandum Opinion (Del. Ch. May 31, 2016); and *ACP Master, LTD. v ClearWire Corporation*, Memorandum Opinion (Del. Ch. July 21, 2017).

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

I have been asked by counsel for the Associations to respond to various questions included in the NOI. I have organized this statement to track the NOI outline. Note, however, that I do not address all the questions in the NOI and in some cases questions have been combined to improve the exposition. I directly address the following NOI Questions:

- E1–E8 and E11, concerning the choice among possible financial models;
- F2 and F4–F5, concerning book values and market/book ratios;
- H2.a.1–5, concerning the DCF model;
- H2.b.1–4, concerning the CAPM model; and
- H2.c.1–2, concerning the Expected Earnings model.

My principal recommendations are that the Expected Earnings model not be used and that the specification of the DCF and CAPM models account for long-term limits to growth.

E1. What models do investors use to evaluate utility equities?

Investors are highly heterogeneous, so identifying which models investors use to evaluate utility equities cannot be answered in an unambiguous fashion. The manner in which investors determine their required rate of return on equity for utilities is likewise highly heterogeneous. However, surveys conducted in October 2010 and July 2013 by the Association for Financial Professionals ("AFP") found that 79% and 85% of respondents in 2010 and 2013 respectively used discounted cash flow techniques for investment valuation generally,[2] and found that the Capital Asset Pricing Model ("CAPM") is the most frequently used model for estimating a firm's cost of equity for all industries. The 2010 survey reported that 87% of respondents used the

[2] 2011AFP Current Trends in Estimating and Applying the Cost of Capital: Report of Survey Results, March 2011, Association for Financial Professionals ("AFP 2010 Survey"); and 2013 AFP Estimating and Applying Cost of Capital: Report of Survey Results, October 2013, Association for Financial Professionals ("AFP 2013 Survey").

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

CAPM. This percentage changed to 85% in the 2013 survey. The Dividend Discount Model (referred to by the Commission and below as the DCF model, for Discounted Cash Flow) was used by 3% of respondents in 2010 and 4% in 2013. The only other model individually identified by the AFP surveys was the Arbitrage Pricing Model (a "factor model," as I will discuss later), which was used by 1% of respondents in 2010 and 2% in 2013. In both 2010 and 2013, 9% of respondents indicated using other, unnamed models.

The academic literature is consistent with the AFP surveys' results. In the academic literature, there are two classes of models; the DCF model and various asset pricing models. The CAPM and various factor models, including the Arbitrage Pricing Model and the Fama-French model, are asset pricing models. Leading textbooks such as Damodaran; Bodie, Kane and Marcus; Reilly and Brown; and Holthausen and Zmijewski describe the CAPM and DCF models in detail.[3] Both of these models have been established for at least half a century and are widely used in practice. Until a consensus has been established regarding the use and specification of factor models or other alternative asset pricing models, I suggest using only these two models.[4] Both the CAPM and the DCF model should work relatively well in the case of utilities as they typically have relatively stable earnings, relatively stable and sustainable growth rates, low firm-

[3] Damodaran, Aswath, 2012, *Investment Valuation*, Wiley, New York, NY; Bodie, Zvi, Alex Kane and Alan J. Marcus, 2018, *Investments*, McGraw-Hill, New York, NY; Reilly, Frank, K. and Keith C. Brown, 2012, *Investment Analysis and Portfolio Management*, South-Western, Mason, OH; Holthausen, Robert W. and Zmijewski, Mark E., 2019, *Corporate Valuation Theory, Evidence & Practice*, Cambridge Business Publishers, LLC.

[4] In my view, it also would not be unreasonable for the Commission to continue using DCF alone, as a matter of continued adherence to an established agency practice that has been judicially reviewed and approved. However, that would be a judgment based more on legal than financial analysis grounds. A potential third method, "Risk Premium," is based on comparing and combining market-based bond yields and regulators' past estimates of the cost of equity. It is being addressed by another expert sponsored by Associations in this proceeding, namely Michael Gorman.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

specific volatility, more-predictable dividends, and more limited use of stock buybacks.

In regard to what the Commission calls the "Expected Earnings" model, it is important to distinguish between analyzing expected earnings and the book value of a firm in relation to an investment decision and using the Expected Earnings model (i.e., the anticipated ratio of earnings to book value, "E/B") to estimate the cost of equity capital. Investors routinely forecast expected earnings and analyze a firm's financial statements, including a firm's book value, in making investment decisions. However, forecasting expected earnings and analyzing the book value of a firm is not the same as using the Expected Earnings model to estimate the cost of equity capital.

The academic literature does not endorse the Expected Earnings model as a procedure for estimating the cost of equity capital, because it is based on accounting measures rather than economic measures. Because it is an accounting-based method, it does not give a meaningful estimate of the rate of return that investors require to be attracted to invest in utilities' market-priced equities. None of the leading textbooks recommend using an accounting based Expected Earnings model to estimate the required equity return.

E2. What role do current capital market conditions play in the choice of model used by investors to evaluate utility equities?

As noted above, investors are highly heterogeneous, so the models used by investors to evaluate utility equities cannot be answered in an unambiguous fashion. The same is true of the role that current capital market conditions play in investors' choices among available models. However, the DCF model, CAPM, and factor models are designed to take account of current capital market conditions. As long as current inputs are used, the models will reflect current

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

market conditions. In the case of the CAPM, this preferably means using the long-term Treasury rate observed on the appraisal date and using estimates for Beta and the equity market risk premium based on information available as of that date.[5] In the case of the DCF model, this preferably means using the stock price set as of the appraisal date and dividend growth expectations as of that date.[6] If such current inputs are used, further adjustments are unnecessary and are likely to lead to estimation errors because they introduce ad hoc changes into the models.

In short, I am not aware of evidence demonstrating that investors' model choices vary with capital market conditions, and there is no basis in academic theory for such variation. In my opinion, any assertion that either the CAPM or DCF model receives less investor credence because of current capital market conditions than they did formerly is baseless.

E3. Are any models thought to be superior or inferior to others? If so, why?

Within the classes of asset pricing models, there is a long and ongoing debate in the academic community regarding whether to use the CAPM or a new factor model such as the Fama-French model. It is my opinion that this is a debate the Commission should avoid. As Harvey, Liu and Zhu (2016) report, there are currently dozens of different versions of the factor

[5] I note that it is important to use the same long-term Treasury rate when applying the model as is used in estimating the equity risk premium.

[6] The Commission has traditionally used a six-month study period rather than "spot" (single-date) model inputs. While I would not recommend that approach as a matter of economic theory, I recognize that it is an established practice by the Commission, and legal-prudential rather than strictly economic considerations may support its continuation. The difference between a six-month and spot study period is secondary compared to the problems I discuss with using the proposed "Expected Earnings," a DCF model with an inappropriately high constant growth rate, or a CAPM with a mis-specified equity risk premium.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

models.[7] Fama and French alone have proposed three different versions. Virtually none of these models are developed from first principles like the CAPM.

As evidenced by the AFP surveys discussed previously, the CAPM is still widely used in practice, in part because its inputs are readily available, and it is straightforward to apply. All that is required is a measure of the risk-free rate, the company's Beta, and an estimate of the equity market risk premium. There is widespread agreement that the best estimate to use for the risk-free rate is the yield on long-term Treasury bonds, which is the rate used by the Commission. I discuss the Beta and the equity risk premium below.

I note that there remains a debate regarding whether a size premium should be added to the output of the CAPM model. This debate has gone on for almost forty years since the publication of the original article by Rolf Banz in 1981 and remains unresolved today.[8] I think the current state of affairs is best summarized by Damodaran (2015). Regarding including a size adjustment in the CAPM, he states,

> I question the adjustment for three reasons:
>
> 1. On closer scrutiny, the historical data, which has been used as the basis for the argument, is yielding more ambiguous results and leading us to question the original judgment that there is a small cap premium.
>
> 2. The forward-looking risk premiums, where we look at the market pricing of stocks to get a measure of what investors are

[7] Harvey, Campbell, Yan Lui and Heging Zhu, 2016, *…and the Cross-Section of Expected Returns*, Review of Financial Studies 29 (1): 5-68 (available at https://faculty.fuqua.duke.edu/~charvey/Research/Published_Papers/P118_and_the_cross.PDF; ellipsis and capitalization in original title).

[8] Banz, Rolf, 1981, The relationship between return and market value of common stocks, *Journal of Financial Economics*, 9 (1) 3-18.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

> demanding as expected returns are yielding no premiums for small cap stocks.
>
> 3. If the justification is intuitive, i.e. that smaller firms are riskier than larger firms, much of that additional risk is either diversifiable, better adjusted for in the expected cash flows (instead of the discount rate) or double counted.
>
> The small cap premium is a testimonial to the power of inertia in corporate finance and valuation, where once a practice becomes established, it becomes difficult to challenge, even if the original reasons for it have long since disappeared.[9]

Domodaran goes on to observe:

> After all, if the proponents of small cap premiums are right, bundling together small companies into a larger company should instantly generate a bonus, since you are replacing the much higher required returns of smaller companies with the lower expected return of a larger one. In fact, small companies should disappear from the market.[10]

Even if it is accepted that a small cap premium applies to typical industrial corporations, that does not mean it applies to utilities. The two standard "intuitive" rationalizations for a premium are that small firms are riskier and less liquid. However, in the case of utilities, risk is primarily a function of regulation which has nothing to do with firm size. In addition, utility investors tend to be long-run holders interested in dividends, not in-and-out traders. As a result, liquidity is not likely to be an important consideration.

At an empirical level, there is almost no research on whether a size premium exists for utility stocks. The one notable exception is Wong (1993) who reported that there was no small

---

[9] Domodaran, Aswath, 2015, The small cap premium: Where is the beef?, *available at* http://aswathdamodaran.blogspot.com/2015/04/the-small-cap-premium-fact-fiction-and.html.

[10] *Id.*

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

cap premium for utilities.[11] Zepp (2003) revisited the issue, but his work was limited to a small sample of water utilities, and did not adjust for risk, so no meaningful conclusion can be drawn from his analysis.[12] Over all, neither theory nor evidence supports adding a size premium in the case of utilities.

Turning to the DCF model, it is an entirely different procedure for estimating the required return. This does not make it superior or inferior to the CAPM. It is simply a different approach to the problem of estimating required returns. For regulated utilities, I recommend the Commission use both approaches because by combining the two results the Commission can arrive at a more stable and reliable measure of the required return on equity.

As discussed previously, the academic literature does not endorse the Expected Earnings model as a procedure for estimating the cost of equity capital because it does give a meaningful estimate of the rate of return on equity required by investors.

E4. How are alternative models redundant or complementary with each other and/or the DCF model?

As I noted above, the different models offer different perspectives on the same problem. They are not redundant, but they are not completely complementary either. They are different ways of analyzing the same problem. That is why considering the results from both the CAPM and the DCF model is a wise approach.

---

[11] Wong, Annie, 1993, Utility stocks and the size effect: An empirical analysis, *Journal of the Midwest Finance Association*, 95-101.

[12] Zepp, Thomas, M, 2003, Utility stocks and the size effect – revisited, *Quarterly Review of Economics and Finance*, 34: 578-582.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

E5 & E6. To what extent do alternative models avoid any deficiencies of the DCF model and/or operate better in diverse capital market conditions? To the extent that investors use multiple models, should the Commission combine them in its analysis or use the "best" one that would apply in all market conditions?

Because the CAPM and the DCF model are different ways of analyzing the same problem, using both, with reliable inputs, can provide useful information. From a financial analysis perspective, my recommendation is that the Commission apply both. Going further and attempting to include unproven factor models would be an unnecessary distraction. Including an E/B model would be worse than an unnecessary distraction—doing so would only distort the useful information provided by valid market-based models.

E7. If the Commission were to consider multiple models, how should it weigh them?

There is no scientific way to weight them. Accordingly, I suggest simple averaging of the accepted market-based models. In determining through this proceeding which models are accepted and how they should be specified, a significant deviation between the results of the two models should provide an impetus for further analysis, especially whether the deviation is a function of the models themselves or the nature of the inputs used in each model. Again, the "Expected Earnings" model is not market-based and should not be given any weight.

E8. To what extent is it reasonable for the Commission to use a simplified version of a model that does not reflect all the variables that investors consider?

All models are simplifications. Adding more variables does not necessarily increase accuracy. Importantly, the Commission should use models tested and endorsed by the academic literature as well as investors. The Commission should not rely on untested, simplified models

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

potentially used by certain investors. If properly implemented, the CAPM and the DCF models require relatively few inputs and for established, stable firms these inputs are generally ascertainable within a reasonable range. Adding more variables can actually increase measurement error and is almost certain to lead to unnecessary controversy. The more important consideration is that the right inputs be used. In the case of the CAPM, this means appropriate choices for Beta and the equity market risk premium. In the case of the DCF model, this means appropriate treatment and weighting of the expected short-term and long-term dividend growth rates.

E11. To what extent, if any, should the Commission exercise judgment in using financial models to set ROEs under various capital market conditions?

As stated earlier, both the CAPM and the DCF model reflect capital market conditions and offer different perspectives on the same problem. Therefore, it is reasonable for the Commission to determine the ROE by using both models. However, without a new and better model, exercising judgment to adjust the ROEs determined by academically tested and endorsed models likely introduces additional measurement error and speculation.

Whatever method is used for reconciling the models, it should be applied consistently. For instance, if the Commission decides to average the results produced by the CAPM and the DCF model, it should do so on a consistent basis. Changing the weights applied to the two models is likely to lead to "cherry picking" and unreliable results.

F1. Does the mismatch between market-based ROE determinations and a book value rate base support current market values? Is this mismatch a problem?

Market-based ROEs, i.e., ROEs based on the DCF, CAPM, or factor models, provide

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

estimates of the expected return on equity. In other words, market-based ROEs are economic rates of return. Economic rates of return are not the same as accounting-based rates of return, and Fisher and McGowan (1983) demonstrate that accounting based rates of return do not provide meaningful estimates of economic rates of return.[13] Furthermore, as discussed by Alexander Robichek (1978), using accounting-based rates of return for regulated utilities to estimate ROEs introduces circularity whereas using accounting-based rates of return on unregulated firms to estimate utility ROEs results in lack of comparability and potential differences in accounting.[14] A more recent book, Lev and Gu (2016), stresses the difference between accounting returns and the economic returns that investors require and warns against using accounting data to estimate economic returns.[15] Because of these issues, in my opinion, accounting based rates of return should not be used to estimate the required return on equity capital.

Economic models, including the residual earnings valuation model discussed below, demonstrate that applying market-based ROE determinations to a book-value rate base should not introduce a significant mismatch problem if the book value rate base is a reasonable measure of the firm's invested capital. If the book value rate base is not a reasonable estimate of the firm's invested capital, the Commission should endeavor to adjust the rate base calculation to better reflect invested capital.

---

[13] Fisher, Franklin M. and John H. McGowan, 1983, On the misuse of accounting rates of return to infer monopoly profits, American Economic Review, 73 (1): 82-97.

[14] Robichek, Alexander A., 1978, Regulation and Modern Finance Theory, *Journal of Finance*, 693 (3): 693-705.

[15] Lev, Baruch and Feng Gu, 2016, The End of Accounting and the Path Forward for Investors and Managers, Wiley, New York, NY.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Finally, the difference between current market values and book values of utilities' publicly traded parent stocks is likely not solely the result of a mismatch between market-based ROEs and a book value rate base. That difference may reflect differences between utility operating companies and their parents. It is also a result of regulators' past and anticipated future over-estimates of the cost of equity. As discussed below, if regulators use a DCF model (whether directly or as a component of a CAPM model) that incorporates an unrealistically high long-term growth rate, the resulting ROE estimate will overstate the firm's cost of equity capital.

F2. Why have most or all utility market-to-book ratios consistently exceeded one?

Lev and Gu (2016) explain that under standard accounting, there are quite substantial "intangible" aspects of modern enterprises (such as human resources, research & development, proprietary business processes, customer relationships, branding, and reputation) that contribute to earnings and market value but often do not appear in the balance sheet as assets and are therefore omitted from the balance sheet "equity book value."[16] As equity book value provides the divisor of both the M/B ratio and the E/B ratio, these intangible assets go a long way toward explaining both why M/B ratios often exceed one and why E/B ratios often exceed the cost of equity.

Another key relation for understanding M/B ratios is the residual earnings valuation model. As described in leading textbooks, such as Penman (2016) and Holthausen and Zmijewski (2019), the residual earnings valuation model states that the market value of the firm equals the book value plus the present value of all expected future residual earnings. Residual

[16] *See id*. at 81-91.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

earnings are defined as (ROE – Cost of Equity) * Book Value. The model makes it clear that the market-to-book value exceeds 1.0 when investors expect ROE to consistently exceed the cost of equity for the firm.[17]

For regulated utilities, estimation error can cause the expected ROE to consistently exceed the cost of equity if the ROE estimation process is based on models with inappropriately defined inputs or inappropriate models. For example, as discussed above, the expected constant growth rate is a critical input in the Commission's DCF model. If the expected constant growth rate used in the DCF model is unrealistically high, the resulting ROE overstates the cost of equity capital required by investors.

As noted earlier, Fisher and McGowan (1983) show that, using accounting-based measures of return, e.g. the Expected Earnings model, to estimate economic measures of return can lead to significant errors in estimating the cost of equity capital. Therefore, including ROEs based on the Expected Earnings model in the Commission's ROE determination process will likely increase, not decrease, estimation errors.

Estimation error in the ROE set by the Commission can also arise from reliance on faulty proxy groups. For example, including companies with inappropriately high ROEs in a proxy group for a specific utility will likely result in estimation error. For many regulated utilities, the market-to-book ratio is not readily available because the regulated utility is a subsidiary of a

[17] It is possible for the market-to-book ratio to consistently exceed one if economic depreciation, the decrease in the economic value of the firm's capital stock is less than accounting depreciation. This can occur for several reasons, including inflation and the use of accelerated depreciation methods for accounting purposes. Under these circumstances, the market-to-book ratio can consistently exceed one even though the ROE is equal to the cost of equity capital.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

publicly traded holding company, which frequently includes non-regulated operations.[18] In this scenario, if the market-to-book ratio consistently exceeds one, it is difficult to isolate whether the market expects the ROE for the combined firm to exceed the cost of equity for the combined firm due to regulated or non-regulated operations. It is possible that the ROE for the regulated subsidiary is equal to the cost of equity for that subsidiary while the non-regulated operations provide opportunities for the ROE to exceed the cost of capital for those operations. It is also possible for the market to expect the allowed ROE for the regulated operations to consistently exceed the utilities' actual cost of equity capital. This will occur if the ROE for the regulated operations is not determined in an unbiased fashion. For example, it will occur if the market expects the constant growth rate in the Commission's DCF model to be set unrealistically high, or expects companies with inappropriately high ROEs to be included in utilized proxy groups. Therefore, the Commission should determine realistic expected constant growth rates, and proxy groups for regulated utilities should properly reflect the risk of the regulated entity.

F4. Should the Commission revise our use of these models to account for the mismatch between market-based ROE determinations and book-value rate base? If so, how? For example, should the Commission adjust the dividend yield used in the DCF model to represent a yield on book value rather than a yield on stock price?

As discussed above and evidenced by the residual earnings valuation model, adjustments to

[18] Acquisition transactions involving regulated subsidiaries can provide some information regarding the market-to-book ratio of the regulated operations. However, relying on these transactions to form conclusions regarding the market-to-book ratio is problematic because typically publicly available information does not allocate the acquisition price between the stand-alone value of the acquired operations and potential synergies associated with the transaction.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

unbiased market-based ROE estimates should not be required to equate market-based ROEs with a book value rate base if the book value rate base is a reasonable estimate of the firm's invested capital. The key is that the Commission make an effort to estimate the cost of equity as accurately as possible. As I stressed previously, relying on accounting-based measures to estimate economic rates of return is likely to result in measurement errors. Those errors can cause the market value and the book value of assets to diverge.

F5. Should the Commission consider adjusting ROEs to account for market-to-book ratios above or below one? Would doing so introduce circularity into Commission ROEs by setting the ROE at whatever level of earnings the market expected, rather than making an independent assessment of the appropriate ROE?

Finance theory suggests that, in order for utilities to attract capital, the Commission should set allowed ROEs at utilities' cost of equity, meaning the level necessary to enable investors to expect to earn their required rate of return on the capital they invest. Any adjustment away from that level to account for market-to-book ratios above or below one would be based on policy and law, not finance theory.

If the Commission adjusted ROEs in an attempt to cause market-to-book ratios to equal one, both the adjustments themselves and the expectation of the adjustments would introduce circularity. Under that scenario, the expectation that an adjustment would be made if the market-to-book ratio deviated from one would impact the observed market-to-book ratio. In my opinion, this practice should be avoided. Rather, the Commission should try to estimate the cost of equity as accurately as possible.

H2.a.1. Should the Commission continue to use a dividend DCF model or should the

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Commission use a different DCF model, for example, one based on free cash flow?

The dividend DCF model used by the Commission to estimate the required return on equity is derived from the dividend discounted cash flow model. On a per share basis, the dividend discounted cash flow model is generally expressed as

$$P_0 = \frac{DIV_1}{(1+r_E)^1} + \frac{DIV_2}{(1+r_E)^2} + \frac{DIV_3}{(1+r_E)^3} + \cdots + \frac{DIV_\infty}{(1+r_E)^\infty} \quad (1)$$

In equation (1), P_0 equals the value of a share of the firm's common equity today, DIV_t equals the expected dividend paid per share to common equity (and share repurchases per share of common equity) at time t, and r_E equals the cost of common equity capital.

Assuming constant growth, equation (1) becomes

$$P_0 = \frac{DIV_1}{(r_E - g)} \quad (2)$$

In equation (2), P_0 continues to equal the value of a share of the firm's common equity today, DIV_1 equals the expected dividend payment per share to common equity (and share repurchases per share of common equity) for the next year, r_E continues to equal the cost of common equity capital, and g equals the expected constant growth rate for dividend payments to common equity (and share repurchases of common equity). Rearranging equation (2) results in the general formula for the constant growth DCF model

$$r_E = g + \frac{DIV_1}{P_0} \quad (3)$$

Notably, g, the expected rate of constant growth in equations (2) and (3) represents constant growth <u>in perpetuity</u>.

As explained by Holthausen and Zmijewski, "[t]he dividend discounted cash flow valuation method…is similar to the Equity DCF valuation method. In fact, if expected dividend

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

distributions equal expected equity free cash flows, the two methods are identical."[19] This result is apparent when the general formula for the dividend discounted cash flow model is compared to the general formula for equity discounted cash flow model, which is

$$V_E = \frac{EFCF_1}{(1+r_E)^1} + \frac{EFCF_2}{(1+r_E)^2} + \frac{EFCF_3}{(1+r_E)^3} + \cdots + \frac{EFCF_\infty}{(1+r_E)^\infty} \qquad (4)$$

In equation (4), V_E equals the value of the firm's common equity, $EFCF_t$ equals the expected free cash flow to common equity at time t, and r_E equals the cost of common equity capital. Although equation (4) is stated in terms of the firm's total common equity, it can be converted to a per share formula by converting EFCF to a per share value.

A comparison of equation (1) and the per-share version of equation (4) reveals their conditional equivalence: The two formulas are identical if the timing and amount of the expected dividend distributions (and share repurchases) represented by the DIV values in equation (1) are equal to the expected free cash flows per share to common equity represented by those equation (4) per-share EFCF values. Moreover, if the timing of dividend payments (and share repurchases) does not match the timing of free cash flows per share to common equity, but the inputs are estimated consistently, the valuations derived based on equation (1) or equation (4) converted to a per share equivalent will be the same.

Therefore, as between the dividend discounted cash flow model and the equity discounted cash flow model, the preferred model is dependent on the ability to estimate dividends versus free cash flows to equity. Between the two, for regulated utilities, free cash flows to equity are likely more difficult to estimate, because (a) estimates of future capital

[19] Holthausen and Zmijewski (2019), page 225.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

expenditures and non-recurring items increases the variability of expected free cash flows to equity more than the variability of expected dividends, and (b) electric utility parent companies generally make limited or no use of stock repurchases.

H2.a.2. Could terminal stock value be used in place of long-term growth projections? If so, how should terminal stock value be determined?

Many valuation textbooks discuss the calculation of a firm's terminal common stock value. That calculation typically relies on the basic constant-growth valuation equation

$$P_t = \frac{DIV_{t+1}}{(r_E - g)} \qquad (5)$$

where P_t equals the terminal (or continuing) value of a share of the firm's common equity at time t, DIV_{t+1} equals the expected dividend payments per share to (and share repurchases per share of) common equity at time t+1, r_E equals the firm's cost of common equity capital, and g equals the expected constant growth rate of the firm's expected dividend payments to (and share repurchases of) common equity at time t.

Notably, a key input in equation (5) and the terminal value of a firm's common equity is the expected constant growth rate, which incorporates the expected long-term growth rate. Therefore, deriving a terminal value of a firm's common equity requires a determination of the expected long-term growth rate. Using the terminal value to estimate the expected long-term growth rate would introduce circularity into the model.

Furthermore, the terminal value of a firm's common equity reflects the expected long-term growth rate regardless of the model used to estimate the terminal value. For example, if a net income multiple is used to derive the terminal value of the firm's common equity, that multiple should reflect the expected long-term growth rate at the time the terminal value is

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

estimated, time t. The expected long-term growth rate at time t may differ from current growth expectations. In this scenario, the unadjusted net income multiple based on current expectations should not be used to estimate the terminal value. Rather, the multiple should be adjusted to properly reflect the long-term growth rate at time t. Again, the process of making this adjustment would introduce circularity because the adjustment would reflect, among other things, any difference between current expected growth rates and the expected long-term growth rate at time t.

H.2.a.3. Do investment analysts project earnings/dividends growth beyond five years, and if not, why not, and is GDP an appropriate proxy for long-term growth?

Typically, investment analysts do not project earnings/dividend growth beyond five years because longer term growth projections become increasingly speculative. However, economic reasoning puts an upper limit on long-term dividend growth. Over the long run, dividends have remained an approximately constant fraction of GDP. This means that the long-run growth rate of dividends must be the same as GDP. Clearly, dividend growth cannot exceed GDP growth or dividends would eventually become bigger than the entire economy. This means that GDP growth is an upper limit for long-term dividend growth.

While dividend growth cannot exceed GDP growth in the long run, it can fall short for individual companies. As Bernstein and Arnott (2003) and Cornell (2010) point out, part of aggregate dividend growth is accounted for by new enterprises.[20] As a result, the growth rate in

[20] Bernstein, William J. and Robert D. Arnott, 2003, Earnings growth: The Two Percent Dilution, *Financial Analysts Journal*, 59 (5): 47-55. Cornell, Bradford, 2010, Economic growth and equity investing, *Financial Analysts Journal*, 66 (1): 54-64.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

dividends for existing enterprises may fall short of aggregate GDP growth. Consequently, the Commission should use a long-run dividend growth rate that does not exceed the expected long-run nominal growth of GDP. Forecasts for long-run GDP growth are prepared by various private forecasters and government agencies.

H.2.a.4. How should the Commission weight short-term and long-term earnings/dividend growth projections?

The formulas set forth in equations (2), (3), and (5) above work properly only if *g*, the expected constant growth rate, for each equation is truly constant. If it is not constant, the Commission should not "weight" short-term and long-term growth projections to arrive at an expected constant growth rate. Rather, the Commission should model short-term and long-term projections to account for differences and the durations of the expected growth rates.

One modeling method would be to create detailed annual forecasts of expected dividend payments (and share repurchases) or expected free cash flows to common equity and use a spreadsheet based on equations (1) or (4) respectively to solve for the cost of common equity capital. This method requires long-term forecasts because firms are typically assumed to have an indefinite life.

Alternatively, a multi-stage model based on equation (6) below can be used.

$$P_0 = \sum_{t=1}^{C} \frac{DIV_t}{(1+r_E)^t} + \frac{DIV_{c+1}}{(r_E - g)} * \frac{1}{(1+r_E)^C} \qquad (6)$$

In equation (6), P_0 equals the value of a share of the firm's common equity today, DIV_t equals the expected dividend paid per share to common equity (and share repurchases per share of common equity) at time t, r_E equals the cost of common equity capital, and g equals the expected constant growth rate at time C. If equation (6) is used, detailed forecasts are created until year C,

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

the year the firm is expected to reach stable state and is expected to grow at a constant rate, g, thereafter. Using a spreadsheet, the detailed forecast, and P_0 one can solve for r_E.

If an equation similar to equation (3), which assumes a single constant growth rate, is used to estimate the cost of common equity capital, and the expected growth rate for the firm is not truly constant, an effective constant growth rate must be calculated. To arrive at a reasonable estimate, the short-term and long-term growth must be modeled explicitly, and a spreadsheet used to solve for the constant growth rate implied by the combination of the expected short-term and long-term growth rates. This exercise should include explicit growth projections for each year until it is reasonable to assume that the firm has reached a stable long-term growth rate which are used to calculate annual expected payouts to equity. From the projection of expected equity payouts and the beginning indexed value, one can solve for the internal rate of return ("IRR"), which is the effective discount rate. The implied constant growth rate is equal to the IRR minus the equity payout yield in year 1.

Table 1 below provides an example of this approach. In Table 1, I have created a 500-year projection. I assumed an expected growth rate for the next five years of 10%. Thereafter, I have assumed a constant long-term growth rate of 3.8%. The year 1 equity payout yield, equal to the expected dividend (and share repurchase) yield, is assumed to be 3%. From this yield and the expected future growth rates, equity payouts are calculated for each year based on a beginning index value of 100. From these payouts and the beginning index value, the IRR is determined to be 7.5163%, implying a constant long-term growth rate of 4.5163% (7.5163% - 3.0%).

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

TABLE 1

Expected Long-Term Growth Rate:		3.80%
Indexed Equity Value at Year 0:	[1] = P_0	100.0
Equity Payout Yield at Year 1:	[2] = D_1/P_0	3.00%
Internal Rate of Return (IRR) at Expected Growth Rates:	[3]	7.5163%
Implied Contstant Long-Term Growth:	[4] = [3] - [2]	**4.5163%**

Data for Calculation of IRR

Year	Expected Growth Rate	Indexed Equity Payout at Expected Growth Rates
1	10.00%	3.0
2	10.00%	3.3
3	10.00%	3.6
4	10.00%	4.0
5	10.00%	4.4
6	3.80%	4.6
7	3.80%	4.7
8	3.80%	4.9
9	3.80%	5.1
10	3.80%	5.3
|	|	|
500	3.80%	457,490,398.7

Check of Implied Constant Growth Rate

Year	Indexed Equity Payout at Implied Constant Growth Rate	Net Present Value @ 7.5163%
1	3.0	2.8
2	3.1	2.7
3	3.3	2.6
4	3.4	2.6
5	3.6	2.5
6	3.7	2.4
7	3.9	2.4
8	4.1	2.3
9	4.3	2.2
10	4.5	2.2
|	|	|
500	11,220,885,265.3	0.0
	Total NPV	**100.0**

Table 1 also includes a check on this calculation. Using the implied constant growth rate, I have calculated implied equity payouts for the same time period as my original projection. The net present value of these payouts, discounted at the IRR, should be and is equal to the beginning index value.

The implied ROE based on a constant growth rate of 4.5163% is substantially less than an estimated ROE based on a weighting methodology using 2/3 times the short-term expected

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

growth rate and 1/3 times the long-term expected growth rate. If one had applied a 2/3 weight to the expected short-term growth rate of 10.0%, and a 1/3 weight to the expected long-term growth rate of 3.8%, the result would be 7.9333%. This estimate is more than 1.75 times greater than the implied constant growth rate calculated in Table 1. As stated previously, overstating the long-term growth rate results in the DCF model overstating the ROE. In this example, the appropriate ROE is 7.5163%, whereas the weighting approach would result in an estimated ROE of 10.9333%.

Modeling expected growth rates in this manner reveals the relationship between expected short-term growth rates, expected long-term growth rates, and the implied constant growth rate. Notably, the implied constant growth rate will be close to the expected long-term growth rate unless there is substantial growth for an extended period of time prior to reaching the start date for the expected long-term growth assumption. Again, the constant growth rate for a single stage DCF model is expected to continue in perpetuity.

If expected growth rates are not modeled properly and short-term growth rates, which are typically higher than long-term growth rates, are weighted too heavily, the likely outcome is an overstatement of both the expected constant growth rate and the required ROE. The amount of the overstatement will increase as the difference between the expected short-term growth rate(s) and expected long-term growth rate rises.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

H.2.a.5. The Commission uses a constant growth DCF model. Should the Commission consider using a multi-stage DCF model? If so, how would the Commission determine the length of each stage of a proxy company's growth?

A multi-stage DCF model using detailed annual forecasts as described above would be preferable to a single-stage DCF model. As shown in Table 1, however, a single, implied constant growth rate can be determined once the annual expected growth rates are known.

A multi-stage model likely provides a more robust estimate of the ROE, because it explicitly addresses the timing of differences between short-term and long-term growth rates. It is true that if a multi-stage model is used, multiple growth rates are required, and the length of each growth rate must be specified. Typically, analyst projections provide details regarding the timing and length of their estimates. If analyst estimates are used to derive expected short-term growth rates, a multi-stage model should use the analyst projections for the duration of those projections. For utilities with expected short-term growth rates similar to the expected long-term growth rate, it may be reasonable to use a two-stage model where the first stage reflects analyst growth rates and the second stage reflects the expected long-term growth rate. However, for utilities with expected short-term growth rates which are substantially above the expected long-term growth rate, it would be preferable to allow for a transition between short-term growth and long-term growth. In valuation models, typically, these transition periods are 5 or 10 years. In my view, this is a reasonable procedure. I have used it to model growth rates on numerous occasions, including testimony for appraisal matters in Delaware.

It is also possible to create an implied constant growth rate using this convergence approach. Table 2 below applies the convergence approach using the assumptions underlying

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Table 1. Table 2 shows that the implied constant growth rate is 4.9738%.

TABLE 2

Expected Long-Term Growth Rate:		3.80%
Indexed Equity Value at Year 0:	[1] = P_0	100.0
Equity Payout Yield at Year 1:	[2] = D_1/P_0	3.00%
Internal Rate of Return (IRR) at Expected Growth Rates:	[3]	7.9738%
Implied Contstant Long-Term Growth:	[4] = [3] - [2]	**4.9738%**

Data for Calculation of IRR

Year	Expected Growth Rate	Indexed Equity Payout at Assumed Growth Rates
1	10.00%	3.0
2	10.00%	3.3
3	10.00%	3.6
4	10.00%	4.0
5	10.00%	4.4
6	8.97%	4.8
7	7.93%	5.2
8	6.90%	5.5
9	5.87%	5.8
10	4.83%	6.1
11	3.80%	6.4
12	3.80%	6.6
13	3.80%	6.9
14	3.80%	7.1
15	3.80%	7.4
|	|	|
500	3.80%	529,762,010.1

Check of Implied Constant Growth Rate

Year	Indexed Equity Payout at Implied Constant Growth Rate	Net Present Value @ 7.9738%
1	3.0	2.8
2	3.1	2.7
3	3.3	2.6
4	3.5	2.6
5	3.6	2.5
6	3.8	2.4
7	4.0	2.3
8	4.2	2.3
9	4.4	2.2
10	4.6	2.2
11	4.9	2.1
12	5.1	2.0
13	5.4	2.0
14	5.6	1.9
15	5.9	1.9
|	|	|
500	99,216,987,160.5	0.0
	Total NPV	**100.0**

In summary, it is critical that the expected constant growth rate in a DCF model reflect growth in perpetuity. To accomplish this goal, either models with detailed annual forecasts should be developed and the ROE determined from those forecasts or, if a single-stage DCF

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

model is used based on a combination of short-term and long-term growth rates, the constant growth rate should be estimated in a manner similar to those shown in Tables 1 and 2.

H.2.b.1. If the market risk premium is determined by applying the DCF methodology to a representative market index, should a long-term growth rate be used, as in the Commission's two-step DCF methodology?

The solution is to use a proper two-stage model and solve for the discount rate. Damodaran (2018) provides an excellent example.[21] In his extensive paper on the implied equity risk premium, Damodaran states, "After year 5, we will assume that earnings on the index grow at 3.84%, the same rate as the entire economy."[22] His application in this context is consistent with what I recommended above when applying the DCF model to individual companies. Applying it to the market as a whole is just a special case.

H.2.b.2. Beta is a measure of a security's risk relative to the broader market, such as the S&P 500, not of its absolute risk. Do CAPM's assumptions break down if *both* utility stocks and the broader market become riskier over time on an absolute basis, but the relative increase in risk in utility stocks rises more slowly?

Both the CAPM and the DCF model work fine if the volatility of the market changes as long as the proper inputs are used. This is because the models incorporate such changes. For example, if an increase in the market volatility leads investors to require higher returns, then market prices will fall. This will cause both models to produce higher results for the required

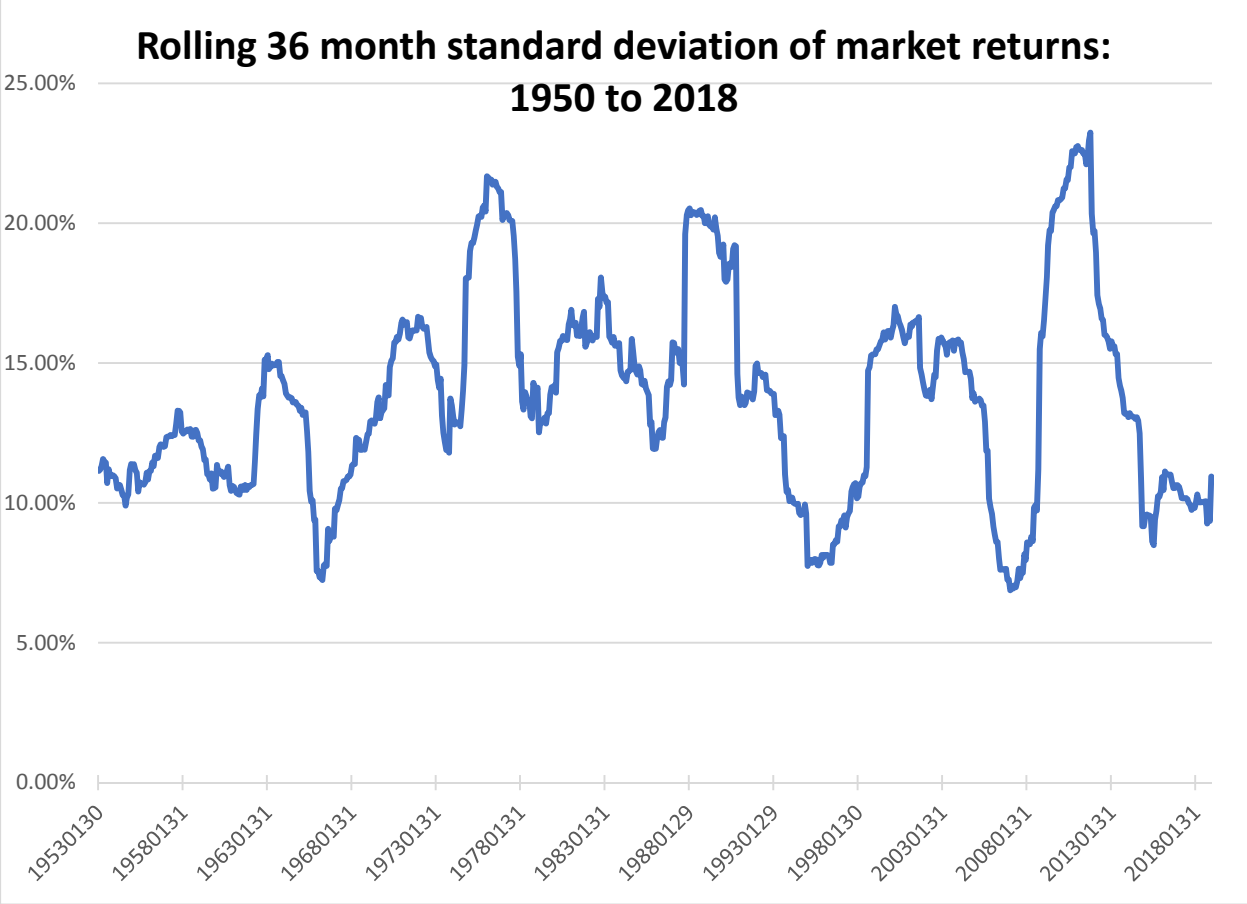
[21] Damodaran, Aswath, 2018, Equity risk premiums: Determinants, estimation and implications – The 2018 edition, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3140837.

[22] *Id*. at 79.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

return. In the case of the DCF model, for example, the lower market prices, holding dividend growth rates constant, will mean that the model produces a higher discount rate, i.e. a higher indicated cost of equity, to connect current lower market prices to the expected stream of growing dividends. For the same reason, the implied equity risk premium used in the CAPM will rise. There is no need to adjust either model as long as the appropriate inputs are used.

I do note, however, that evidence suggest that to the extent market risk has changed, it has declined. The figure below plots the rolling 36-month standard deviation of aggregate stock market returns. It shows ups and downs associated with recessions, booms and financial crises, but there is no trend. Currently, market volatility has been near record lows.



20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

H.2.b.3. What are appropriate data sources for the beta value?

Several reputable sources publish estimates of beta, including, Bloomberg and Valueline. The AFP 2013 Survey mentioned previously also reported on the sources investors used for beta. The majority of respondents, 59% and 65% in 2010 and 2013 respectively used Bloomberg as the source for beta.[23] In comparison, 10% of respondents in 2010 and 9% in 2013 reported using Ibbotson as the source for beta and 5% in 2010 and 4% in 2013 reported using Valueline's beta.[24]

Each supplier typically specifies the manner in which it calculates beta; however, certain suppliers, e.g. BARRA, have proprietary models which cannot be easily replicated. Because differences between calculation methodologies exist, for estimating utility ROEs, a source or sources of beta should be determined and used consistently. Furthermore, it is not advisable to adjust the beta calculated by a reputable supplier. Such adjustments are likely to increase, not decrease, measurement error.

H.2.b.4. Should the Commission employ more sophisticated versions of the CAPM model that consider more variables instead of only beta, such as the Fama-French Model?

As noted earlier, attempting to use more complex, but as yet unproven, models is not advisable. The CAPM and the DCF model are established approaches that have been in widespread use for more than half a century. In distinction there are dozens of factor models in

[23] AFP 2013 Survey, page 7.

[24] I note that Ibbotson was acquired by Morningstar and is no longer an independent source.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

addition to the Fama-French. In fact, there are three versions of the Fama-French model using different numbers of factors.[25] Virtually none of these factor models have been developed from theoretical first principles, and all of them remain highly controversial. In addition, many of the factor models are cumbersome to implement and require complex and still unproven statistical techniques. I recommend that the Commission rely on the DCF model and on the basic version of the CAPM model unless and until the academic literature concludes that another model is clearly superior.

H.2.c.1. & H.2.c.2. Should the use of utilities in the proxy group for the Expected Earnings model be predicated on the Expected Earnings analysis being forward-looking? What, if any, concerns regarding circularity are there with using the Expected Earnings analysis to determine the base ROE, as opposed to using the analysis for corroborative purposes?

As noted earlier, the academic literature does not endorse the Expected Earnings model as a procedure for estimating the cost of equity capital because it is based on accounting measures and does not provide a reliable estimate of the rate of return on equity required by investors. None of the leading textbooks recommends using an accounting-based Expected Earnings model to estimate the equity return required by investors.

If an Expected Earnings model is used, selection of a proper proxy group raises additional concerns. For the sake of comparability, a proxy group for use in an Expected

[25] The three Fama-French models are presented in the following papers. Fama, Eugene F. and Kenneth R. French, The cross section of expected returns, *Journal of Finance*, (47): 427-465. Fama, Eugene F. and Kenneth R. French, 2012, Size, value and momentum in international stock return, *Journal of Financial Economics*, 105: 457-472. Fama, Eugene F. and Kenneth R. French, 2015, A five factor asset pricing model, *Journal of Financial Economics*, 117: 470-488.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Earnings model should focus on stocks in the regulated utility sector that have M/B and E/B ratios similar to those of operating utility companies. This comparability requirement applies whether the utilized E/B ratio is based on historical E/B, expected E/B, or both. Either way, it is likely that regulated utilities will be heavily represented in a proxy group of companies comparable to a regulated utility. On the other hand, if such a proxy group is selected and the ROE for companies in the group is determined based on the Expected Earnings model, this approach introduces circularity. Furthermore, circularity is introduced whether the model is based on historical results or forward-looking results, because both set of results are impacted by rates set based on the ROE. If historical data is used, the historical results were based on the ROE(s) previously determined by regulators. If forward-looking expected results are used, the expected results incorporate expectations regarding future ROE(s) determined by regulators.[26] Thus, an "Expected Earnings" model cannot be risk-comparable unless it is circular, and cannot avoid circularity without neglecting comparability.

[26] Expected regulatory actions also affect the inputs to the DCF approach, but in partly offsetting ways: expectations of earnings-increasing regulatory action increase both forecast earnings (increasing the growth input) and current market prices (decreasing the dividend yield). In contrast, the "Expected Earnings" method is based solely on accounting measures and fails to take account of the change in market prices in the denominator.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

I declare under penalty of perjury that the contents of the foregoing Statement are true and correct to the best of my knowledge, information and belief.

BRADFORD CORNELL, PH.D.

Executed in La Canada, California on June 25, 2019.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

BRADFORD CORNELL

Financial Economic Consulting
607 Foxwood Rd,
La Canada, CA 91011
bradfordcornell@gmail.com
Tel: (626) 833-9978

EDUCATION

Ph.D., Financial Economics, Stanford University

M.S., Statistics, Stanford University

A.B., (Interdepartmental) Physics, Philosophy, and Psychology, Stanford University

ACADEMIC AND PROFESSIONAL POSITIONS

February 2019 – Present	Independent Financial Economic Consultant
December 2009 – Present	*Emeritus Professor of Finance,* Anderson Graduate School of Management, UCLA
December 2015 – Present	*Senior Adviser*, Rayliant Global Advisors, Hong Kong and Beijing
December 2017 – Present	*Senior Adviser*, Cornell Capital Group and registered Investment Adviser Representative
Previous positions	*Senior Consultant*, Compass Lexecon
	Senior Consultant, CRA
	Professor of Finance and Director of the Bank of America Research Center, Anderson Graduate School of Management, UCLA
	Visiting Professor of Finance, California Institute of Technology
	President, FinEcon: Financial Economic Consulting
	Vice-President and Director of the Securities Litigation Group, Economic Analysis Corporation
	Assistant and Associate Professor of Finance, UCLA
	Assistant Professor of Finance, University of Southern California
	Assistant Professor of Finance, University of Arizona

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

TEACHING

Designed a new course on **Energy and Finance** to be offered at the Anderson School of Management in 2020

Applied Corporate Finance and Investing

The Law and Finance of Corporate Acquisitions

Corporate Finance

Investments

Options, Futures and Other Derivatives

PUBLICATIONS

Books and book chapters

- *Conceptual Foundations of Investing*, With Andrew Cornell and Shaun Cornell, John Wiley and Sons, New York, NY, 2018.
- "Stock Repurchases: Tradeoffs and Trends," *Dividends and Dividend Policy*, H. Kent Baker, ed., Blackwell Publishing, New York, 2009.
- "Securities Fraud Damages," With J. Hirshleifer and J. Haut. *Developments in Litigation Economics*, Vol. 87, P. Gaughan and R. Thornton, eds., Elsevier, Ltd., Oxford, UK, 2005.
- *The Equity Risk Premium and the Long-Run Future of the Stock Market*. John Wiley and Sons, New York, NY, 1999.
- "Corporate Valuation," *Handbook of Modern Finance*, 3rd edition, Dennis Logue, ed., Warren Gorham Lamont, Boston, MA, 1994.
- *Corporate Valuation: Tools for Effective Appraisal and Decision Making*. McGraw-Hill, New York, NY, 1993.

Academic articles

- "How Efficient is Sufficient?" With John Haut, *The Business Lawyer*, 2019, Vol. 74, 2, pp. 417–434.
- "Can Private Equity Firms Pay Fair Value for Acquisitions?" With Richard Gerger, *Journal of Private Equity,* 2018, Vol. 21, 4, pp. 69–74.
- "What is the Alternative to the Efficient Market Hypothesis?" *Journal of Portfolio Management*, 2018, Vol. 44, 7, pp. 3–6.
- "Yes, It's a Bubble. So What?" With Rob Arnott and Shane Sheppard, *Research Affiliates Publication on Fundamental Investing*, April 2018.
- "Do Valuation Multiples Reflect a Size Effect," With Rajiv Gokhale, *Journal of Business Valuation and Economic Loss Analysis*, 2018, Vol. 13, 1, pp. 2–14.

- "Estimating the Terminal Value with Inflation: The Inputs Matter – It is not a Formulaic Exercise," With Richard Gerger, *Business Valuation Review*, 2017, Vol. 36, 4, pp. 117–123.
- "A Note on Estimating Constant Growth Terminal Values with Inflation," With Richard Gerger, *Business Valuation Review*, 2017, Vol. 36, 3, pp. 102–105.
- "Passive Investing and Market Efficiency**,"** *Journal of Investing*, 2017, Vol. 26, 3, pp. 7–9.
- "Does Past Performance Matter in Investment Manager Selection," With Jason Hsu and David Nanigian, *Journal of Portfolio Management*, 2017, Vol. 43, 3, 33–43. Winner Bernstein/Fabozzi Award for 2017. Commentary in 20th Anniversary Volume of Bernstein/Fabozzi winners.
- "Information Flow and Expected Inflation: An Empirical Analysis," *Journal of Investing*, 2017, Vol. 26, 4, pp. 8–15.
- "Accounting Information, Investor Sentiment and Market Pricing," With Wayne R. Landsman and Steven R. Stubben, *Journal of Law, Finance and Accounting*, 2017, Vol. 2, 2, pp. 325–345.
- "Presidential Politics and Stock Returns," With Rob Arnott and Vitali Kalesnik, *Research Affiliates Publication on Fundamental Investing*, June 2017.
- "An 'Enhanced' Corporate Valuation Model: Theory and Empirical Tests," With Rajiv Gokhale, *Business Valuation Review*, 2016, Vol. 35, 2, pp. 52–61.
- "The Tesla Run-up: Follow-up with Investment Implications," *Journal of Portfolio Management*, Fall 2016, Vol. 43, 1, pp. 1–4.
- "The Self-Fulfilling Prophecy of Popular Asset Pricing Models," With Jason Hsu, *Journal of Investment Management*, 2016, Vol. 14, 1, pp. 65–74.
- "Information and the Oil Price Collapse," *Journal of Portfolio Management Invited Article*, 2015, Vol. 42, 1, pp. 1–4.
- "Capital Budgeting: A General Equilibrium Analysis," *Journal of Financial Perspectives*, 2015, Vol. 3, 1, pp. 1–8.
- "Using Dividend Discount Models to Estimate Expected Returns, *Journal of Investing*, 2015, Vol. 23, 1, pp. 18–22.
- "How Efficient is Sufficient: Securities Litigation Post-*Halliburton*," *Bank and Corporate Governance Law Reporter*, 2014, Vol. 53, No. 4, pp. 26–33; December 2014 *Securities Fraud Litigation Reporter*, Vol. 38, No. 3, p. 327: 38 SRALR 327; January 2015 *RICO and Securities Fraud Law Reporter*, Vol. 61, No. 1, p. 13: 61 RSFLR 13.
- "Competition in Portfolio Management: Theory and Experiment," With Elena Asparouhova, Peter Bossaerts, Jernej Copic, Jaksa Cvitanic and Deborah. Meloso, *Management Science*, 2014, Vol. 61, 8, pp. 1868–1888.
- "Tesla: The Anatomy of a Run-up," With Aswath Damodaran, *Journal of Portfolio Management*, 2014, Vol. 41, 1, pp. 139–151. Winner Bernstein/Fabozzi Award for 2015. Commentary in 20th Anniversary Volume of Bernstein/Fabozzi winners.
- "Guideline Public Company Valuation and Control Premiums: An Economic Analysis," *Journal of Business Valuation and Economic Loss Analysis*, 2013, Vol. 8, 1, pp. 53–70.

- "Dividend Price Ratios and Stock Returns: International Evidence," *Journal of Portfolio Management*, 2013, Vol. 40, 2, pp. 122–127.
- "What Moves Stock Prices: Another Look," *The Journal of Portfolio Management*, 2013, Vol. 39, 3, pp. 32–38.
- "Discounted Cash Flow and Residual Earnings Valuation: A Comparison in the Context of Valuation Disputes, *Business Valuation Review*, 2013, Vol. 31, 4, pp. 10–20.
- "Dividend-Price Ratios and Stock Returns: Another Look at the History," *Journal of Investing*, 2013, Vol. 22, 2, pp. 15–22.
- "Demographics, GDP and Future Stock Returns: The Implications of Some Basic Principles," *The Journal of Portfolio Management*, 2012, Vol. 38, 2, pp. 96–99.
- "Market Efficiency and Securities Litigation: Implications of the Appellate Decision in Thane," *Virginia Law and Business Review*, 2011, Vol. 6, 2, pp. 237–255.
- "Investment Strategies and Investment Track Records," invited editorial, *The Journal of Portfolio Management*, 2011, Vol. 37, 4, pp. 3–5.
- "The Intriguing Case of KMP and KMR," *The Journal of Portfolio Management*, 2011, Vol. 37, 3, pp. 121–127.
- "Warren Buffett, Black-Scholes, and the Valuation of Long-Dated Options," *The Journal of Portfolio Management*, Summer 2010, Vol. 36, 4, pp. 107–111.
- "Economic Growth and Equity Investing," *Financial Analysts Journal*, January/February, 2010, Vol. 66, 1, pp. 54–64. Winner Graham and Dodd G&D Scroll Award for 2010.
- "Beliefs Regarding Fundamental Value and Optimal Investing," With J. Cvitanic and L. Goukasian, *Annals of Finance*, January 2010, Vol. 6, 1, pp. 83–105.
- "Collateral Damages and Securities Litigation," With J. Rutten. *Utah Law Review,* Vol. 2009, 3, pp. 717–748.
- "The Fundamental Nature of Recessions: A Contracting and Restructuring Approach," *The Economists Voice*, October 2009, pp. 1–4.
- "The Pricing of Volatility and Skewness," *Journal of Investing*, Vol. 18, Fall 2009, pp. 27–31.
- "Implications of the Financial Crisis for Financial Education," *Journal of Financial Education*, Vol. 35, Spring, pp. 1–6.
- "Investment Research: How Much Is Enough?," *Management Online Review*, Oxford Management Publishing, 2009, http://www.morexpertise.com/download.php?id=135.
- "Luck, Skill, and Investment Performance," *The Journal of Portfolio Management*, Vol. 35, Winter 2009, pp. 85–89. Winner Bernstein/Fabozzi Award for 2009.
- "The Basic Speed Law for Capital Market Returns," *CFA Magazine*, November/December 2008, pp. 10–11. Also published electronically by *Real Capital Markets*, October 24, 2008, http://www.realclearmarkets.com/articles/2008/10/the_basic_speed_law_for_capita_1.html.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

- "The Impact of Analysts' Forecast Errors and Forecast Revisions on Stock Prices," With W. Beaver, W. Landsman, and S. Stubben. *Journal of Business Finance and Accounting*, Vol. 35, No. 5/6, 2008, pp. 709–740.
- "Market Efficiency, Crashes, and Securities Litigation," With J. Rutten. *Tulane Law Review*, Vol. 81, No. 2, 2006.
- "Accounting and Valuation: How Helpful Are Recent Accounting Rule Changes?," With W. Landsman, *Journal of Applied Corporate Finance*, Fall 2006, Vol. 18, No. 4.
- "Dividends, Stock Repurchases, and Valuation," *Journal of Applied Finance*, Vol. 15, No. 2, 2005, pp. 13–24.
- "How Do Analysts' Recommendations Respond to Major News?," With J. Conrad, W. Landsman, and B. Roundtree. *Journal of Financial and Quantitative Analysis*, Vol. 41, No. 1, 2006, pp. 39–68.
- "A Delegated Agent Asset Pricing Model," With R. Roll. *Financial Analysts Journal*, Vol. 61, No. 1, 2005, pp. 57–69. Winner Graham and Dodd G&D Scroll Award for 2006.
- "Co-movement as an Investment Tool," *The Journal of Portfolio Management*, Vol. 30, Spring 2004, pp. 1–5.
- "Compensation and Recruiting: Private Universities vs. Private Corporations," *Journal of Corporate Finance*, Vol. 10, No. 1, 2004, pp. 37–52.
- "Accounting and Valuation: Is the Quality of Earnings an Issue?," With W. Landsman. *Financial Analysts Journal*, Vol. 59, No. 6, 2003, pp. 20–28.
- "The Information that Boards Really Need," *Sloan Management Review*, Vol. 44, Spring 2003, pp. 71–76.
- "When is Bad News Really Bad News?," With J. Conrad and W. Landsman. *The Journal of Finance,* Vol. 57, December 2002, pp. 2507–2532.
- "The Parent Company Puzzle: When is the Whole Worth Less than the Sum of the Parts?," With Q. Liu. *Journal of Corporate Finance*, Vol. 4, December 2001, pp. 341–366.
- "Is the Response of Analysts to Information Consistent with Fundamental Valuation? The Case of Intel," *Financial Management*, Vol. 30, Spring 2001, pp. 113–136.
- "Equity Duration, Growth Options, and Asset Pricing," *The Journal of Portfolio Management*, Fall 2000, pp. 171–180.
- "Risk, Duration, and Capital Budgeting: New Evidence on Some Old Questions," *Journal of Business,* Vol. 2, April 1999, pp. 183–200.
- "The Term Structure, the CAPM, and the Market Risk Premium: An Interesting Puzzle," *Journal of Fixed Income,* Vol. 4, December 1998, pp. 85–89.
- "Cash Settlement when the Underlying Securities are Thinly Traded: A Case Study," *Journal of Futures Markets*, Vol. 17, No. 8, 1997, pp. 855–871.
- "Estimating the Cost of Equity Capital," With J. Hirshleifer and E. James. *Contemporary Finance Digest*, Vol. 1, Fall 1997, pp. 5–26.

- "The Valuation of Complex Derivatives by Major Investment Firms: Empirical Evidence," With A. Bernardo. *The Journal of Finance*, Vol. 52, June 1996, pp. 785–798.
- "Culture, Information, and Screening Discrimination," With I. Welch. *Journal of Political Economy*, Vol. 104, June 1996, pp. 542–571.
- "Throwing Good Money after Bad? Cash Infusions and Distressed Real Estate," With F. Longstaff and E. Schwartz. *Journal of the American Real Estate and Urban Economics Association*, Vol. 24, 1996, pp. 23–41.
- "An Hypothesis Regarding the Origins of Ethnic Discrimination," *Rationality and Society*, Vol. 7, January 1995, pp. 4–29.
- "Change Reinforces Use of DCF Method," *Natural Gas,* Vol. 11, October 1994, pp. 5–15.
- "Adverse Selection, Squeezes, and the Bid-Ask Spread on Treasury Securities," *Journal of Fixed Income*, Vol. 3, June 1993, pp. 39–47.
- "The Reaction of Investors and Stock Prices to Insider Trading," With E. Sirri. *The Journal of Finance, Vol.* 47, July 1992, pp. 1031–1059.
- "Liquidity and the Pricing of Low-grade Bonds," *Financial Analysts Journal*, Vol. 48, January/February 1992, pp. 63–68.
- "Measuring the Investment Performance of Low-grade Bond Funds," With K. Green. *The Journal of Finance*, Vol. 66, March 1991, pp. 29–48.
- "Using Finance Theory to Measure Damages in Fraud on the Market Cases," With G. Morgan. *UCLA Law Review*, Vol. 37, No. 2, 1990, pp. 883–924.
- "The Incentive to Sue: An Option Pricing Approach," *Journal of Legal Studies*, Vol. 17, No. 1, 1990, pp. 173–188.
- "Volume and R^2," *Journal of Financial Research*, Vol. 13, No. 13, 1990, pp. 1–7.
- "Measuring the Term Premium: An Empirical Note," *Journal of Economics and Business*, Vol. 42, No. 1, 1990, pp. 89–93.
- "Cross Sectional Regularities in the Reaction of Stock Prices to Bond Rating Changes," With W. Landsman and A. Shapiro. *Journal of Accounting, Auditing, and Finance*, Vol. 4, No. 4, 1989, pp. 460–479.
- "The Mispricing of US Treasury Bonds: A Case Study," With A. Shapiro. *The Review of Financial Studies*, Vol. 2, No. 3, 1989, pp. 297–310.
- "The Impact of Data Errors on Measurement of the Foreign Exchange Risk Premium," *Journal of International Money and Finance*, Vol. 8, 1989, pp. 147–157.
- "Security Price Response to Quarterly Earnings Announcements and Analyst Forecast Revisions," With W. Landsman. *The Accounting Review*, Vol. 64, October 1989, pp. 680–692.
- "Financing Corporate Growth," With A. Shapiro. *Journal of Applied Corporate Finance*, Vol. 1, summer 1988, pp. 6–22.
- "Measuring the Cost of Corporate Litigation: Five Case Studies," With K. Engelmann. *Journal of Legal Studies*, Vol. 17, June 1988, pp. 135–162.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

- "Corporate Stakeholders and Corporate Finance," With A. Shapiro. *Financial Management*, Vol. 16, Spring 1987, pp. 5–14.
- "The Impact on Bank Stock Prices of Regulatory Responses to the International Debt Crisis," With A. Shapiro and W. Landsman. *Journal of Banking and Finance*, Vol. 3, 1987, pp. 161–178.
- "Pricing Interest Rate Swaps: Theory and Empirical Evidence," *Proceeding of Conference on Swaps and Hedges*, Salomon Brothers Center, New York University, 1987.
- "Forecasting the Eleventh District Cost of Funds," *Housing Finance Review*, Vol. 6, Summer 1987, pp. 123–135.
- "Commodity Own Rates, Real Interest Rates, and Money Supply Announcements," With K. French. *Journal of Monetary Economics*, Vol. 18, July 1986, pp. 3–20.
- "The Reaction of Bank Stock Prices to the International Debt Crisis," With A. Shapiro. *Journal of Banking and Finance*, Vol. 10, 1986, pp. 55–73.
- "Inflation Measurement, Inflation Risk, and the Pricing of Treasury Bills," *Journal of Financial Research*, Vol. 9, Fall 1985, pp. 193–202.
- "Interest Rates and Exchange Rates: Some New Empirical Evidence," With A. Shapiro. *Journal of International Money and Finance*, Vol. 4, 1985, pp. 431–442.
- "The Weekly Pattern in Stock Returns: Cash versus Futures," *The Journal of Finance*, Vol. 40, June 1985, pp. 583–588.
- "The Income Approach to Valuation," *Proceedings of the Wichita State University Conference on the Appraisal of Railroads and Public Utilities*, 1985.
- "The Value of Rate Base Options in the Eurocredit Market," With O. Sand. *Journal of Bank Research*, Vol. 16, Spring 1985, pp. 22–28.
- "The Money Supply Announcements Puzzle: Review and Interpretation," *American Economic Review*, Vol. 73, September 1983, pp. 644–658.
- "The Money Supply Announcements Puzzle: Reply," *American Economic Review*, Vol. 75, June 1985, pp. 565–566.
- "Taxes and the Pricing of Stock Index Futures," With K. French. *The Journal of Finance*, Vol. 38, June 1983, pp. 675–695; reprinted in *Proceedings of the Seminar for the Analysis of Securities Prices*, University of Chicago Press, 1983.
- "Money Supply Announcements and Interest Rates: Another View," *Journal of Business*, Vol. 56, January 1983, pp. 1–25; reprinted in *Proceedings of the Seminar for the Analysis of Securities Prices*, University of Chicago Press, 1983.
- "Monetary Policy and the Daily Behavior of Interest Rates," *Journal of Business and Economics*, Vol. 35, 1983, pp. 189–203.
- "Managing Exchange Risk," With A. Shapiro. *Midland Corporate Financial Journal*, Vol. 1, Fall 1983, pp. 16–31; reprinted in *New Developments in International Finance*, J. Stern and D. Chew, eds., Basil Blackwell, New York, 1988.

- "The Pricing of Stock Index Futures," With K. French. *Journal of Futures Markets*, Vol. 3, Fall 1983, pp. 1–14; reprinted in *Readings in Futures Markets,* Vol. 5 and in *Selected Writings on Futures Markets: Explorations in Financial Futures*; both published by the Chicago Board of Trade, 1984.
- "Money Supply Announcements, Interest Rates, and Foreign Exchange," *Journal of International Money and Finance*, Vol. 1, 1982, pp. 201–208.
- "Forward versus Futures Prices: Evidence from the Foreign Exchange Markets," With M. Reinganum. *The Journal of Finance*, Vol. 36, December 1981, pp. 1035–1046.
- "Taxation and the Pricing of Treasury Bill Futures," *The Journal of Finance*, Vol. 36, December 1981, pp. 1169–1176.
- "The Relationship between Volume and Price Variability in Futures Markets," *Journal of Futures Markets*, Vol. 1, Fall 1981, pp. 303–316.
- "Relative vs. Absolute Price Changes: An Empirical Study," *Economic Inquiry*, Vol. 16, April 1981, pp. 302–309.
- "The Consumption Based Asset Pricing Model: A Note on Potential Tests and Applications," *Journal of Financial Economics*, Vol. 9, March 1981, pp. 103–110.
- "Strategies for Pairwise Competitions in Markets and Organizations," With R. Roll. *Bell Journal of Economics*, Vol. 12, Spring 1981, pp. 201–216.
- "What is the Future for Floating Rate Bonds?," *Chase Financial Quarterly*, Vol. 1, Fall 1981, pp. 27–38.
- "The Denomination of Foreign Trade Contracts Once Again," *Journal of Financial and Quantitative Analysis*, Vol. 5, November 1980, pp. 933–945.
- "Inflation, Relative Price Changes, and Exchange Risk," *Financial Management*, Vol. 9, Spring 1980, pp. 30–35.
- "Asymmetric Information and Investment Performance Measurement," *Journal of Financial Economics*, Vol. 7, December 1979, pp. 381–390.
- "Treasury Bill Pricing in the Spot and Futures Markets," With D. Capozza. *Review of Economics and Statistics*, Vol. 61, November 1979, pp. 513–520; reprinted in *Interest Rate Futures: Concepts and Issues*, Robert Dame International, 1981.
- "A Variance Forecasting Test of the Option Pricing Model," With D. Capozza. *Financial Review*, Vol. 7, 1979, pp. 381–390.
- "Relative Price Changes and Deviations from Purchasing Power Parity," *Journal of Banking and Finance*, Vol. 3, 1979, pp. 263–279.
- "A Note on Capital Asset Pricing and the Theory of Indexed Bonds," *Southern Journal of Economics*, Vol. 45, 1979, pp. 1239–1247.
- "Do Money Supply Announcements Affect Short-term Interest Rates?," *Journal of Money, Credit, and Banking*, Vol. 11, February 1979, pp. 80–86.
- "Risk, Currency Substitution, and the Exchange Rate," *Proceedings of the Fall 1978 Conference*, Federal Reserve Bank of San Francisco, 1978.

- "Determinants of the Bid-Ask Spread on Forward Foreign Exchange Contracts Under Floating Exchange Rates," *Journal of International Business Studies*, Vol. 9, Fall 1978, pp. 33–41.
- "Using the Option Pricing Model to Measure the Uncertainty Producing Effect of Major Announcements," *Financial Management*, Vol. 7, Spring 1978, pp. 54–59.
- "Price as a Signal of Quality: Some Additional Experimental Results," *Economic Inquiry*, Vol. 16, April 1978, pp. 302–309.
- "Mean Absolute Deviation versus Least-Square Regression Estimation of Beta Coefficients," With J. Dietrich. *Journal of Financial and Quantitative Analysis*, Vol. 13, March 1978, pp. 123–131.
- "Monetary Policy, Inflation Forecasting, and the Term Structure of Interest Rates," *The Journal of Finance*, Vol. 33, March 1978, pp. 117–127.
- "The Efficiency of the Market for Foreign Exchange Under Floating Exchange Rates," With J. Dietrich. *Review of Economics and Statistics*, Vol. 60, February 1978, pp. 111–120.
- "Option Pricing in Bear and Bull Markets," *The Journal of Portfolio Management*, Vol. 4, Summer 1978, pp. 30–32.
- "Spot Rates, Forward Rates, and Exchange Market Efficiency," *Journal of Financial Economics*, Vol. 5, August 1977, pp. 55–65; reprinted in *Frontiers in International Financial Management*, D. Lessard and J. Wiley, Eds., 1979, and in *International Finance: Concepts and Issues*, R. Kalb and G. Gay, Eds., Robert F. Dame, 1982.
- "Measuring the Informational Content of Consumer Price Announcements," *Nebraska Journal of Economics and Business*, Vol. 16, Summer 1977, pp. 57–64.
- "Which Inflation Rate Affects Interest Rates?," *Business Economics*, Vol. 12, May 1977, pp. 22–25. Reprinted in *Certified Financial Analysts Digest*, 1977.
- "Are Deep Discount Convertibles Underpriced?," *The Journal of Portfolio Management*, Vol. 3, Spring 1977, pp. 55–57.
- "Using the Goldsmith-Nagan Survey to Estimate the Liquidity Premium," *Journal of Economics and Business*, Vol. 2, February 1977, pp. 148–151.
- "Managing Money in a Competitive Securities Market," *Arizona Review*, Vol. 25, September 1976, pp. 1–5.
- "Asset Pricing Under Uncertain Inflation: A Note on the Work of Long and Roll," *Intermountain Economic Review*, Vol. 7, Spring 1976, pp. 85–91.
- "The Arizona Retirement System 1956–1975: An Investment Analysis," *Arizona Review*, Vol. 25, March 1976, pp. 1–9.

Working Papers

- "Energy and Investing," *https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3343583* and https://cornell-capital.com/blog/2019/02/energy-and-investing-a-cornell-capital-report-on-renewable-energy.html.

Book reviews and discussion comments

- "Statistical Analysis of Price and Basis Behavior: October 12–6, 1987," *The Stock Market: Bubbles, Volatility, and Chaos*, E. Dwyer and R. Hafer, eds., Kluwer Academic Publishers, 1990.
- Review of *Futures Markets*, *Journal of Monetary Economics*, M. Streit, ed., Vol. 16, July 1985, pp. 133–135.
- Review of "Exchange Rates and International Macroeconomics," *Journal of International Money and Finance*, J. Frenkel, ed., Vol. 4, 1985, pp. 212–214.
- Review of "Exchange Rate Policy," by Ray A. Batchelor and Geoffrey Wood, *Journal of Economic Literature*, Vol. 21, 1983, pp. 1027–1029.

AWARDS AND HONORS

- Bernstein Fabozzi/Jacobs Levy Award for outstanding research from *The Journal of Portfolio Management*, 2017
- Bernstein Fabozzi/Jacobs Levy Award for outstanding research from *The Journal of Portfolio Management*, 2015
- Graham and Dodd G&D Scroll Award for research on securities analysis and valuation, 2011
- Bernstein Fabozzi/Jacobs Levy Award for outstanding research from *The Journal of Portfolio Management*, 2010
- Graham and Dodd G&D Scroll Award for research on securities analysis and valuation (with Richard Roll), 2006
- I/B/E/S award for research in empirical finance (with W. Landsman and J. Conrad), 1999
- Cited as one of the 10 most prolific research authors in the field of finance in "Most Frequent Contributors to the Finance Literature" by Jean Louis Heck and Phillip L. Cooley, *Financial Management*, Autumn 1988
- Financial Management Association Prize for Applied Research
- Institute for Quantitative Research in Finance, Research Grant Center for the Study of Futures Markets, Research Grant
- Center for the Study of Futures Markets, Research Grant Chicago Mercantile Exchange, Research Grant
- Phi Beta Kappa, Stanford University

MEMBERSHIPS IN PROFESSIONAL SOCIETIES

American Finance Association

Member of Board of Directors	1982–1985
Vice-President	1987

American Economic Association

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

American Statistical Association

Western Finance Association

SELECTED BOARD AND COMMITTEE MEMBERSHIPS

Board of Advisors, Research Affiliates LLC 2013–Present

Chairman, Mayor Riordan's Blue Ribbon Commission on Los Angeles Municipal Investments

Pension Policy Board, The Aerospace Corporation

Board of Directors, Forms Engineering Corporation

Trustee, Kellow Trust

SPECIAL EDUCATION PROGRAMS

Developed a joint course with Michael Milken on the Impact of the High-Yield Debt Market on Corporate Finance and Corporate Transactions, Fall term 1992, Anderson Graduate School of Management

The U.S. Business School in Prague – Special Finance Program

The Nissan Program for Historically Black Colleges, Director

The Lead Program for Business Education of Minority High School Students

RECENT PRESENTATIONS

The Impact of Inflation on Constant Growth Measures of Value, ASA Business Valuation Conference Keynote, Chicago, IL

Conceptual Foundations of Investing, Rady Innovations in Finance Lecture Series, Rady School of Management, University of California, San Diego, April 10, 2019

Conceptual Foundations of Investing, Keynote Address at Claremont Colleges, Claremont, CA, February 15, 2019

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

APPENDIX B

BRADFORD CORNELL
DEPOSITION, TRIAL & ARBITRATION TESTIMONY
IN PAST FOUR YEARS

Case Name	Date(s)	Testimony Type
Oaktree Principal Fund V, LP., et al. v. Warburg Pincus LLC, et al.	January 2019	Deposition Testimony
In re: Dow Silicone Corporation (formerly known as Dow Corning Corporation)	September 2018	Deposition Testimony
In re: MPM Silicones, LLC	August 2018	Trial Testimony
In re: MPM Silicones, LLC	July 2018	Deposition Testimony
Ventas, Inc. v. Ernst & Young LLP	April 2018	Arbitration Testimony
In re: General Motors LLC Ignition Switch Litigation	April 2018	Deposition Testimony
BNSF Railway Company and Norfolk Southern Railway Company v. FirstEnergy Generation, LLC, f/k/a FirstEnergy Generation Corporation	February 2018	Deposition Testimony
Ventas, Inc. v. Ernst & Young, LLP	February 2018	Deposition Testimony
In re: Lehman Brothers Holdings Inc., et al.	January 2018	Trial Testimony
In re: ExamWorks Group, Inc. Stockholder Appraisal Litigation	January 2018	Deposition Testimony
In re: Lehman Brothers Holdings Inc., et al.	October 2017	Deposition Testimony
JCM Innovation Corp. and JCM American Corporation v. FL Acquisition Holdings, Inc. and American Capital, Ltd.	September 2017	Deposition Testimony
Building Materials Corporation of America v. Paramount Petroleum Corporation	August 2017	Deposition Testimony
In re: Appraisal of Solera Holdings, Inc.	June 2017	Trial Testimony
The People of the State of California, acting by and through Orange County District Attorney Tony Rackauckas v. General Motors LLC	June 2017	Deposition Testimony

APPENDIX B

Case Name	Date(s)	Testimony Type
Behindthechair.com, Inc. v. Dean Christal, Olaplex LLC, a California limited liability company; LiQWD, Inc., a California corporation; and DOES 1-10, inclusive	June 2017	Deposition Testimony
In re: Appraisal of Solera Holdings, Inc.	May 2017	Deposition Testimony
The People of the State of California, acting by and through Orange County District Attorney Tony Rackauckas v. General Motors LLC	April 2017	Deposition Testimony
In re: Appraisal of AOL, Inc.	March 2017	Trial Testimony
Babak Hatamian, et al. v. Advanced Micro Devices, Inc., et al.	February 2017	Deposition Testimony
In re: Appraisal of AOL, Inc.	February 2017	Deposition Testimony
Tesoro Refining & Marketing Company LLC, a Delaware limited liability company, Claimant v. Demenno-Kerdoon, Inc., a California corporation, and DOES 1 through 10, inclusive, Respondents., Demenno-Kerdoon, Inc., a California corporation, and Ribost Terminal, LLC, a California limited liability company, Counterclaimants, v. Tesoro Refining & Marketing Company LLC, a Delaware limited liability company, Counter-Respondent.	January 2017	Deposition Testimony
Tesoro Refining & Marketing Company LLC, a Delaware limited liability company, Claimant v. Demenno-Kerdoon, Inc., a California corporation, and DOES 1 through 10, inclusive, Respondents., Demenno-Kerdoon, Inc., a California corporation, and Ribost Terminal, LLC, a California limited liability company, Counterclaimants, v. Tesoro Refining & Marketing Company LLC, a Delaware limited liability company, Counter-Respondent.	November 2016	Deposition Testimony
ITW Global Investments Inc. v. American Industrial Partners Capital Fund IV, L.P., American Industrial Partners Capital Fund IV (Parallel), L.P., and AIPCF IV, LLC	November 2016	Deposition Testimony

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

APPENDIX B

Case Name	Date(s)	Testimony Type
ACP Master, Ltd., Aurelius Capital Master, Ltd., and Aurelius Opportunities Fund II, LLC v. Sprint Corporation, Sprint Communications, Inc., Erik Prusch, John W. Stanton, William R. Blessing, Bruce A. Chatterley, Mufit Cinali, Jose A. Collazo, Hossein Eslambolchi, Dennis S. Hersch, Brian P. McAndrews, Kathleen H. Rae, Theodore H. Schell, Jennifer L. Vogel, Slade Gorton, Starburst I, Inc. and Softbank Corp. (ACP Master, Ltd., et al. v. Clearwire Corporation)	October 2016	Trial Testimony
Tiffany and Co. v. Costco Wholesale Corp.	September 2016	Trial Testimony
Spin Master Ltd. v. Bureau Veritas Consumer Products Services, Inc. and Eurofins Product Safety Labs	September 2016	Deposition Testimony
Kraft Foods Group Brands LLC v. TC Heartland, LLC, et al.	June 2016	Deposition Testimony
Iheartcommunications, Inc., f/k/a Clear Channel Communications, Inc. v. Benefit Street Partners LLC, Providence TMT Debt Opportunity Fund II LP, Providence Debt Fund III Master (Non-US) L.P., Providence Debt Fund II, L.P., Benefit Street Partners Capital Opportunity Fund LP, PECM Strategic Funding LP, Benefit Street Credit Alpha Fund LTD, US High Yield Bond Fund, SEI Institutional Investments Trusts - High Yield Bond Fund, SEI Global Master Fund PLC - The SEI High Yield Fixed Income Fund, Schroder Gaia Canyon Capital Advisors, LLC, D.E. Shaw Galvanic Portfolios, LLC, M.H. Davidson & Co., Davidson Kempner Partners, Davidson Kempner International, Ltd., Davidson Kempner Institutional Partners, L.P., Islington Partners, L.P., Bluejay Securities LLC, Franklin Mutual Advisers, LLC, Franklin Advisers, Inc., et al.	May 2016	Trial Testimony
Iheartcommunications, Inc., f/k/a Clear Channel Communications, Inc. v. Benefit Street Partners LLC, Providence TMT Debt Opportunity Fund II LP, Providence Debt Fund III Master (Non-US) L.P., Providence Debt Fund II, L.P., Benefit Street Partners Capital Opportunity Fund LP, PECM Strategic Funding LP, Benefit Street Credit Alpha Fund LTD, US High Yield Bond Fund, SEI Institutional Investments Trusts - High Yield Bond Fund, SEI Global Master Fund PLC - The SEI High Yield Fixed	May 2016	Deposition Testimony

APPENDIX B

Case Name	Date(s)	Testimony Type
Income Fund, Schroder Gaia Canyon Capital Advisors, LLC, D.E. Shaw Galvanic Portfolios, LLC, M.H. Davidson & Co., Davidson Kempner Partners, Davidson Kempner International, Ltd., Davidson Kempner Institutional Partners, L.P., Islington Partners, L.P., Bluejay Securities LLC, Franklin Mutual Advisers, LLC, Franklin Advisers, Inc., et al.		
Iheartcommunications, Inc., f/k/a Clear Channel Communications, Inc. v. Benefit Street Partners LLC, Providence TMT Debt Opportunity Fund II LP, Providence Debt Fund III Master (Non-US) L.P., Providence Debt Fund II, L.P., Benefit Street Partners Capital Opportunity Fund LP, PECM Strategic Funding LP, Benefit Street Credit Alpha Fund LTD, US High Yield Bond Fund, SEI Institutional Investments Trusts - High Yield Bond Fund, SEI Global Master Fund PLC - The SEI High Yield Fixed Income Fund, Schroder Gaia Canyon Capital Advisors, LLC, D.E. Shaw Galvanic Portfolios, LLC, M.H. Davidson & Co., Davidson Kempner Partners, Davidson Kempner International, Ltd., Davidson Kempner Institutional Partners, L.P., Islington Partners, L.P., Bluejay Securities LLC, Franklin Mutual Advisers, LLC, Franklin Advisers, Inc., et al.	April 2016	Trial Testimony
Iheartcommunications, Inc., f/k/a Clear Channel Communications, Inc. v. Benefit Street Partners LLC, Providence TMT Debt Opportunity Fund II LP, Providence Debt Fund III Master (Non-US) L.P., Providence Debt Fund II, L.P., Benefit Street Partners Capital Opportunity Fund LP, PECM Strategic Funding LP, Benefit Street Credit Alpha Fund LTD, US High Yield Bond Fund, SEI Institutional Investments Trusts - High Yield Bond Fund, SEI Global Master Fund PLC - The SEI High Yield Fixed Income Fund, Schroder Gaia Canyon Capital Advisors, LLC, D.E. Shaw Galvanic Portfolios, LLC, M.H. Davidson & Co., Davidson Kempner Partners, Davidson Kempner International, Ltd., Davidson Kempner Institutional Partners, L.P., Islington Partners, L.P., Bluejay Securities LLC, Franklin Mutual Advisers, LLC, Franklin Advisers, Inc., et al.	March 2016	Deposition Testimony
Sequoia Pacific Solar I, LLC v. United States	March 2016	Deposition Testimony

APPENDIX B

Case Name	Date(s)	Testimony Type
Lawrence E. Jaffe Pension Plan, On Behalf of Itself and All Others Similarly Situated v. Household International, Inc., et al.	March 2016	Deposition Testimony
Tinicum Capital Partners II, L.P., and Tinicum Capital Partners II Parallel Fund, L.P. v. Liberman Broadcasting, Inc., Lenard Liberman, Jose Liberman, Winter Horton, Rockard J. Delgadillo, and Peter Connoy	February 2016	Deposition Testimony
Move, Inc., RealSelect, Inc., Top Producer Systems Company, National Association of Realtors, Realtors Information Network, Inc. v. Zillow, Inc., Errol Samuelson, Curt Beardsley, and DOES 1-20	February 2016	Deposition Testimony
ACP Master, Ltd., Aurelius Capital Master, Ltd., and Aurelius Opportunities Fund II, LLC v. Sprint Corporation, Sprint Communications, Inc., Erik Prusch, John W. Stanton, William R. Blessing, Bruce A. Chatterley, Mufit Cinali, Jose A. Collazo, Hossein Eslambolchi, Dennis S. Hersch, Brian P. McAndrews, Kathleen H. Rae, Theodore H. Schell, Jennifer L. Vogel, Slade Gorton, Starburst I, Inc. and Softbank Corp. (ACP Master, Ltd., et al. v. Clearwire Corporation)	November 2015	Deposition Testimony
In re: The Boeing Company and Boeing Commercial Space Company v. KB Yuzhnoye; PO Yuzhnoye; Mashinostroitelny Zavod; S.P. Korolev Rocket and Space Corporation; Energia D/B/A Rocket and Space Corporation Energia After S.P. Korolev; Energia Overseas LLC; and Energia Logistics Ltd.	November 2015	Trial Testimony
In re: Caesars Entertainment Operating Company, Inc., Debtor	October 2015	Trial Testimony
In re: Appraisal of Dell, Inc.	October 2015	Trial Testimony
In re: the Marriage of: Kenneth C. Griffin and Anne Dias Griffin	October 2015	Deposition Testimony
In re: Caesars Entertainment Operating Company, Inc., Debtor	September 2015	Deposition Testimony
Building Materials Corporation of America v. Paramount Petroleum Corporation	September 2015	Deposition Testimony

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

APPENDIX B

Case Name	Date(s)	Testimony Type
The Nutro Company v. Paragon Pet Products USA, Inc., et al.	August 2015	Deposition Testimony
In re: Appraisal of Dell, Inc.	August 2015	Deposition Testimony
In re: Surface Transportation Board Docket No. EP 722 & EP 664 (Sub-No. 2)	July 2015	Hearing Testimony
Magnetar Global Event Driven Master Fund Ltd., et al. v. CEC Entertainment, Inc.	June 2015	Deposition Testimony
In re: The Boeing Company and Boeing Commercial Space Company v. KB Yuzhnoye; PO Yuzhnoye; Mashinostroitelny Zavod; S.P. Korolev Rocket and Space Corporation; Energia D/B/A Rocket and Space Corporation Energia After S.P. Korolev; Energia Overseas LLC; and Energia Logistics Ltd.	May 2015	Deposition Testimony
In re: the Marriage of: Kenneth C. Griffin and Anne Dias Griffin	April 2015	Deposition Testimony
Georgia-Pacific Consumer Products LP, et al. v. NCR Corporation, et al.	March 2015	Deposition Testimony

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

ASSOCIATIONS EXHIBIT NO. A-2

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Exhibit No. A-2

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Inquiry Regarding the Commission's Policy for Determining Return on Equity	))	Docket No. PL19-4-000

Affidavit of Michael P. Gorman

On behalf of the Associations:
Aluminum Association,
American Chemistry Council,
American Forest and Paper Association,
American Public Power Association,
Electricity Consumers Resource Council,
Industrial Energy Consumers of America,
National Rural Electric Cooperative Association, and
Transmission Access Policy Study Group

June 26, 2019

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Table of Contents to the Affidavit of Michael P. Gorman

Page

Performance of the DCF Model 2
C1. 3
C2. 11
C3. 13
C3.a. 14
C3.b. 14
Proxy Groups 15
D1 16
D1.b. 18
D2.a. 19
D4. 20
D4.a. 23
D4.b. 23
D6. 24
D7. 25
D9. 25
D10. 26
D10.a. 34
D10.b. 35
Financial Model Choice 35
E1. 35
E2. 36
E2.a. 36
E3. 37
E4. 38
E5. 38
E6. 39
E7. 39
E8. 40
E8.a. 40
E9. 40
E9.a. 41
E9.b. 42
E10. 42
E11. 43
First Prong of ROE Determination 44
G4. 44
G4.a. 45
Model Mechanics and Implementation 46

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

General Issues/Issues that Affect Multiple Models 46
H.1.1. 46
H.1.1.a. 50
H.1.1.b. 51
H1.1.c. 51
H.1.2. 52
H.1.3. 52
H.1.4. 54
H.1.4.a. 54
H.1.5. 55
H.1.6. 55
DCF 56
H.2.a.2. 56
H.2.a.3. 57
H.2.a.4 58
H.2.a.5. 58
H.2.a.6. 59
CAPM 59
H.2.b.4. 59
Expected Earnings 60
H.2.c.2. 60
Risk Premium 64
H.2.d.1. 64
H.2.d.2. 65
H.2.d.3. 66
H.2.d.3.i. 67
Qualifications of Michael P. Gorman ..... Appendix A

Acronyms and Abbreviations ..... Appendix B

Exhibit No. A-3 through Exhibit No. A-6

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Affidavit of Michael P. Gorman

Q PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A Michael P. Gorman. My business address is 16690 Swingley Ridge Road, Suite 140, Chesterfield, MO 63017.

Q WHAT IS YOUR OCCUPATION?

A I am a consultant in the field of public utility regulation and a Managing Principal of Brubaker & Associates, Inc., energy, economic and regulatory consultants.

Q PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND EXPERIENCE.

A This information is included in Appendix A to this Affidavit.

Q ON WHOSE BEHALF ARE YOU APPEARING IN THIS PROCEEDING?

A This testimony is presented on behalf of the Aluminum Association, American Chemistry Council, American Forest and Paper Association, American Public Power Association, Electricity Consumers Resource Council, Industrial Energy Consumers of America, National Rural Electric Cooperative Association, and Transmission Access Policy Study Group (collectively, "Associations").

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Q WHAT IS THE PURPOSE OF YOUR AFFIDAVIT?

A I will respond to specific questions included in the Federal Energy Regulatory Commission ("FERC" or "Commission") Notice of Inquiry ("NOI") regarding the Commission's policy for determining a return on equity ("ROE").

Performance of the DCF Model

Q DOES THE COMMISSION LIST THE INFORMATION IT SEEKS ON PERFORMANCE OF THE DCF MODEL?

A Yes. The Commission is seeking several comments concerning the results of a Discounted Cash Flow ("DCF") model over time under different investment conditions, including the following:

1. C1. The DCF model assumes stock prices are equal to the present value of future cash flows. Is there evidence of situations when these assumptions are inaccurate?

2. C2. Have current and projected proxy group earnings over the last 10 to 20 years increased in a manner that would justify any increase in their stock price over the same period, consistent with DCF model assumptions?

3. C3. Does the DCF methodology perform over a wide range of interest rate conditions?

4. C3.a. What specific assumptions of the DCF model, if any, do not work well in low or high interest rate environments?

5. C3.b. Is there evidence that the volatility of price-to-earnings ("P/E") ratios over the last 10 to 20 years, assumed to be consistent with DCF methodology, has been driven by wide swings in interest rates over this period? If so, would the constant P/E assumption impact the award of reasonable ROE?

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

C1.

Q THE DCF MODEL ASSUMES STOCK PRICES ARE EQUAL TO THE PRESENT VALUE OF PROJECTED FUTURE CASH FLOWS. IS THERE EVIDENCE OF SITUATIONS WHEN THESE ASSUMPTIONS ARE INACCURATE?

A No, the DCF model is reliable in all markets. Because stock market prices efficiently incorporate relevant available information, they recognize that utilities' cash flows can vary over time, and also recognize that growth outlooks can change based on market, industry and company factors. Observable stock prices do reflect the expected present value of future cash flows, in all markets. This is not surprising, as rights to expected future cash flows are what investors acquire by paying present market prices for a stock.

Again, the DCF model is reliable and accurately tracks securities valuation across various market conditions. The DCF model is particularly appropriate for utility companies because dividends are a primary driver of annual returns and volatility of returns. A significant component of total expected annual investor return for making investments in utility stocks is derived from annual dividends, with the remainder of the expected return made up of expected growth – growth in earnings, dividends and stock price. Equity analysts' assessment of utility stock investments include considerable detail on a company's ability to pay dividends and ability to grow earnings and dividends over time. Indeed, in large part, utility executives' periodic earnings call meetings with security analysts focus significantly on rate base growth,

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

ability to pay and grow dividends, and the stability and predictability of cash flows needed to meet the utility's obligations, including dividend payments.[1]

Market participants view utility stocks as a hybrid investment that offers investors both periodic cash returns (dividends) and stock price appreciation. These periodic cash returns tend to align with market interest rates, and growth outlooks largely track factors that drive earnings growth. For the operating utility subsidiaries of publicly-traded "utility" stocks, these earnings growth factors prominently include rate base or capital investment growth. The valuations and P/E ratios of the parent stocks are affected by growth in earnings, changes in market interest rates, and other factors.[2] Anticipated dividend payments are a primary factor used by market participants to assess risks and expected return for investments in utility stocks.

The DCF model values utility stock based on anticipated dividend payments, market interest rates and growth outlooks, or, when solved in the other direction for regulatory purposes, solves for the discount rate that aligns anticipated dividend payments with current stock market prices. Thus, the DCF model provides a straightforward way of evaluating an economically logical valuation or expected return for utility stocks.

[1] *S&P Global Ratings Industry Top Trends 2019*: "North America Regulated Utilities," November 8, 2018, provided as Exhibit No. A-3, pages 1-6.
[2] *Id*.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Q PLEASE EXPLAIN WHY A DCF MODEL IS PARTICULARLY APPROPRIATE FOR UTILITY STOCKS.

A Again, the valuation and expected return outlooks for utility investments are derived based on dividend payments. The significance of a dividend portion of a return for a utility company versus that of the overall market illustrates this point very clearly.

This is illustrated in Table 1 below. Based on the Edison Electric Institute Utility Index ("EEI Index"),[3] I show the annual return experienced by this electric utility index over the last five years in comparison to the S&P 500. The total annual return is based on the two factors: (1) change in stock price from end of year to beginning of year; and (2) dividend income. As shown below in Table 1, return on the EEI Index over this 11-year period has actually exceeded the total return on the S&P 500. But more important, the annual return on utility stocks is far more stable than that of general market investments, as proxied by the S&P 500.

[3]The EEI Index is composed of 32 electric utility companies that are publicly traded, and are largely holding companies for electric utilities. Developing the index above relied on all utility companies that had data available over the period 2008-2018 and consistently paid dividends during this time period.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

TABLE 1

Total Investment Return

Edison Electric Index (EEI)			S&P 500		
	Total	Dividend		Total	Dividend
Year	Return	Yield	Year	Return	Yield
2018	5.99%	3.33%	2018	-4.38%	1.98%
2017	18.00%	3.60%	2017	21.83%	2.02%
2016	21.30%	3.97%	2016	11.96%	2.21%
2015	-4.88%	3.44%	2015	1.38%	2.13%
2014	39.22%	4.40%	2014	13.69%	2.06%
2013	7.69%	4.39%	2013	32.39%	2.15%
2012	17.64%	4.90%	2012	16.00%	2.29%
2011	8.32%	4.79%	2011	2.11%	2.11%
2010	14.30%	5.02%	2010	15.06%	2.02%
2009	-27.31%	3.37%	2009	26.46%	2.44%
2008	9.31%	3.53%	2008	-37.00%	2.42%
Average	10.0%	4.1%	**Average**	9.05%	2.17%
Std. Dev.	16.6%	0.7%	**Std. Dev.**	18.80%	0.16%

Source: Exhibit No. A-4

Utility stock dividends stabilize the total annual returns on utility stocks. This variability reduction is evident by the lower standard deviation of annual returns. Hence, the investment risk of an electric utility is lower than the overall market, as proxied by the S&P 500, because the returns are more stable.

More specifically, for utility stocks, over 40% of the total annual return is produced through dividend payments. In contrast, for the S&P 500, dividend payments represent approximately 20% of annual returns. Further, because annual investment

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

returns on utility stocks are largely tied to the dividends, the variability of the stock price annual return is also reduced. This reduction results because compensation to utility investors is largely produced through more stable and predictable dividend payments compared to the market in general. In contrast, investors in the broader stock market expect much lower compensation from dividend payments and are more focused on growth in stock price, which is driven by future earnings and market factors rather than more heavily weighted toward far more stable annual dividend returns.

Q WHY DOES THIS ILLUSTRATION OF ANNUAL RETURNS DEMONSTRATE THAT THE DCF MODEL IS PARTICULARLY APPROPRIATE FOR REGULATED UTILITY STOCK INVESTMENTS?

A A valuation model, like the DCF, that focuses predominantly on dividend cash flows is the key valuation factor for assessing a utility stock investment. Moreover, in applying the DCF model, the aspect that requires inferences about what investors expect concerns future growth — not present dividend yields, which are visible. When making comparisons across stocks, the greater the share of investors' total expected near-term return that derives from dividends rather than capital appreciation, the smaller the relative effect of any error in inferring future growth. Consequently, the DCF model is especially reliable for stocks with relatively high dividend yields, which utility stocks generally have.

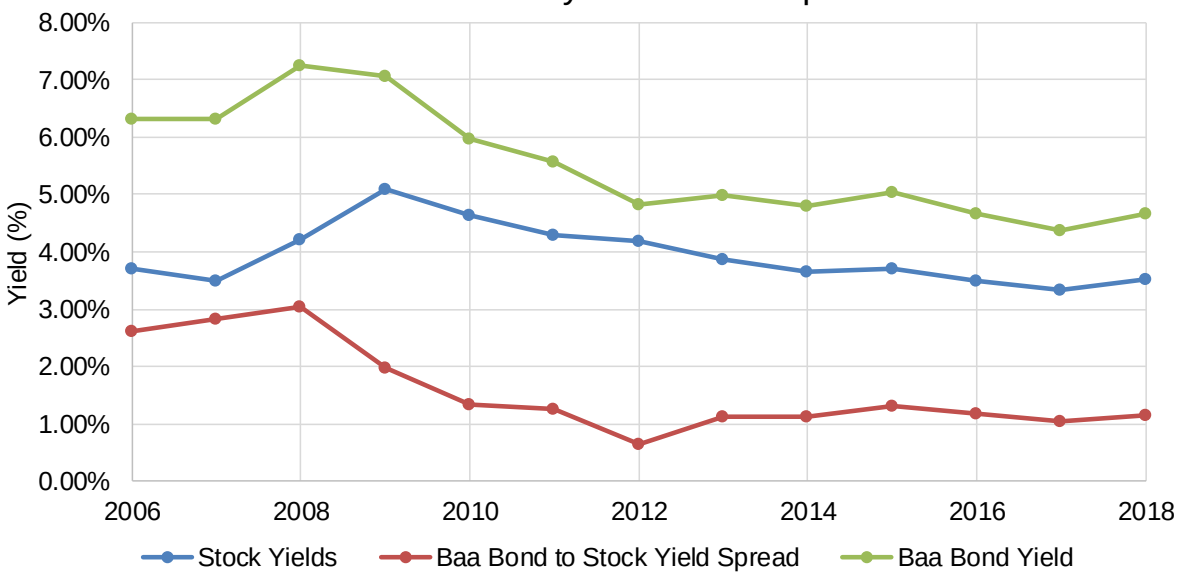
20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Q PLEASE EXPLAIN WHY YOU BELIEVE UTILITY STOCK YIELDS MOVE IN RELATIONSHIP TO CHANGES IN MARKET INTEREST RATES AND THUS SUPPORT THE ACCURACY AND RELIABILITY OF THE DCF MODEL.

A There is a consistent and reliable spread between utility stock yields and utility bond yields that support this conclusion. Utility stocks and bonds are two competing investments that provide annual income return to investors. Because bond yields track changes in market interest rates, and utility stock yields track changes in utility bond yields, this is clear evidence that utility stock valuations are impacted by interest rate changes.

This relationship is illustrated in Figure 1 below.

Figure 1



Source: Exhibit No. A-5

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

As shown in Figure 1, since 2010, the yield spreads between utility stocks and utility bonds have averaged 1.13% and have held rather steady near that level. The graph shows some volatility during earlier periods of market distress, such as 2007-2008. Excluding these periods of market distress, however, shows that the variation in yield spread between utility bonds and utility stock dividend yields has been tight, in the range of 0.63%–1.29%. The annual nominal and real spread of utility stocks and utility bonds is shown on my Exhibit No. A-5, page 1.

This is evidence that utility stock values do respond to changes in market interest rates. From a DCF perspective, a dividend yield on a utility stock does change with changes in market interest rates. Hence, a DCF model is a reasonable model in both high and low interest rate environments, because the utility stock value will change in order to adjust the yield to correspond with prevailing interest rate market levels. This conclusion is economically logical, because utility stocks are hybrid investments that produce both annual returns, similar to a fixed investment vehicle such as a bond, but they also provide growth similar to a stock investment.

Q WHY DO YOU BELIEVE THAT THE DCF MODEL IS APPROPRIATE BUT MAY NEED TO REFLECT CHANGES IN RELATIONSHIPS BETWEEN DIVIDEND GROWTH, STOCK PRICE, AND EARNINGS?

A The DCF model can accommodate both constant growth outlooks and non-constant multi-growth outlooks. Under a constant growth model, the DCF model assumes that

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

dividends grow at the same rate indefinitely.[4] However, under non-constant growth periods, the model can be constructed to reflect dividends growing over an intermediate period at a rate that could not be sustained long-term, followed by a return to steady-state or constant growth at some point in the future. When this occurs, the DCF model can accommodate changing market and valuation factors, such as changing P/E ratios, variation in interest rates, and changing growth outlooks.

Under a constant growth DCF model, the investor-required return is measured based on the following:

$$K = (D_1 \div P) + G \qquad \text{Equation 1}$$

Where:

K = Required Return
D_1 = Dividend After Investment
P = Price of Stock
G = Growth

Equation 1 above can produce different results over time based on changes to the dividend and dividend growth. Under the constant growth model, D_1 is expected to reflect a constant payout ratio of earnings such that D is equal to earnings times 1 minus earnings retention ratio. If, however, a utility is retaining more earnings in order to fund abnormal rate base growth, or is paying out a larger percentage of earnings, because the earnings are not needed in the utility, the utility's dividend payout ratio can change over time. This changing dividend payout ratio can cause a period of non-constant growth for the utility or, conversely, a period of above-average growth.

[4]Exhibit No. A-3, pages 9-10.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

From a valuation perspective, the DCF model is stated as follows:

$$P_0 = D_1 \div (K - G) \qquad \text{Equation 2}$$

Where:
P = Stock Price
D = Dividend After Investment
K = Required Return
G = Growth

As shown in the equation above, if the growth increases, then stock price, P, will increase, because the denominator of the equation will increase, and vice versa, all else equal. Therefore, changing growth outlooks can change the valuation of a utility stock and impact valuation metrics, such as P/E ratios.

C2.

Q HAVE CURRENT AND PROJECTED PROXY COMPANY EARNINGS OVER THE LAST 10 TO 20 YEARS INCREASED IN A MANNER THAT WOULD JUSTIFY ANY INCREASES IN THEIR STOCK PRICES OVER THE SAME PERIOD, CONSISTENT WITH DCF MODEL ASSUMPTIONS?

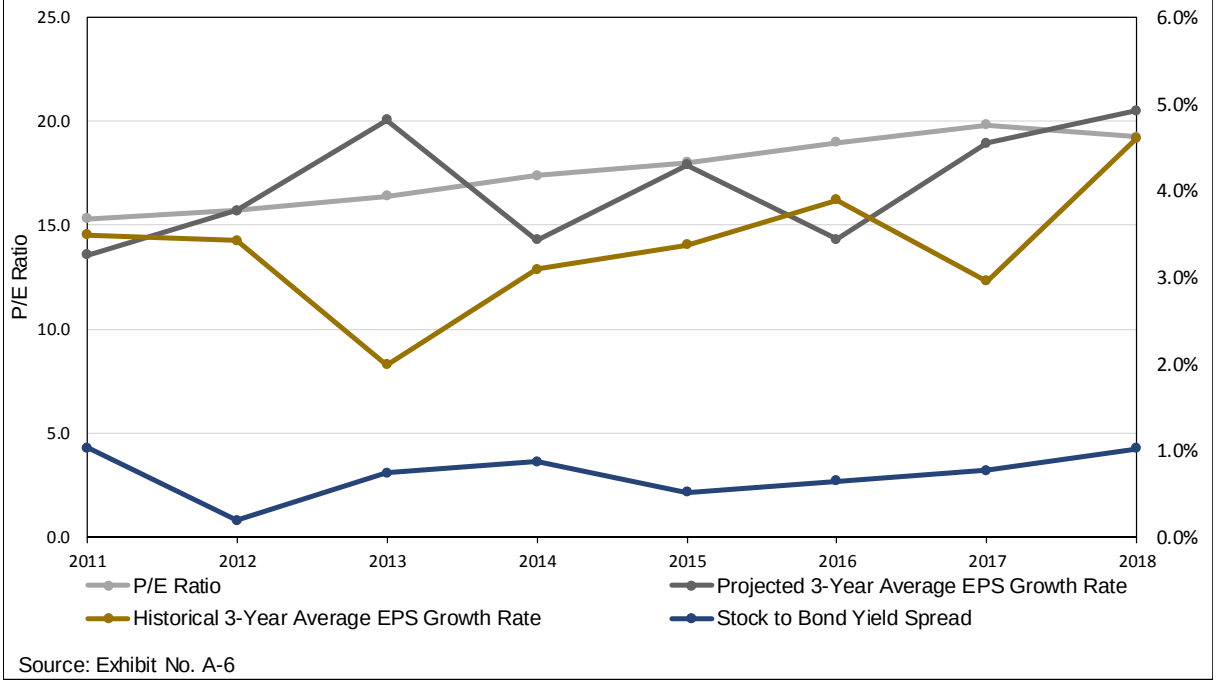
A Yes. Changes in stock price have followed changes in interest rates and changes in utility stock growth outlooks. Therefore, utility proxy groups made up of the utility industry proxy companies do track those companies' earnings. This is illustrated in Figure 2 below. On this figure, I track P/E ratios for the Electric Utility Index in comparison to a three-year average historical earnings growth rate and a three-year projected earnings growth rate for the same companies. As shown on this graph below, the historical and projected earnings increase as the P/E ratio increases. This is

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

a clear indication that, as utility companies modify their dividend payout ratios and the earnings growth outlooks change, the stock price accommodates this changing growth outlook and the P/E ratio adjusts.

Figure 2

P/E Ratio, EPS Growth Rate (Historical and Projected), and Utility Stock to Bond Yield Spread



Source: Exhibit No. A-6

Figure 2 above also illustrates that earnings outlooks for utility companies based on historical and projected growth rates change regularly over time, with a corresponding change in the stock P/E ratio. As the graph shows, earnings outlooks are not constant over time, but change based on changes in market, industry, and company-specific factors. As a result, the changing outlook for earnings growth and historical earnings growth over time illustrates the importance of critically reviewing whether or not a constant growth or a multi-growth stage DCF model will produce a

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

more accurate estimate of the current market ROE. The graph also shows the influence changing interest rates have on P/E ratios, as the yield spread between utility stock and bond yields generally aligns with changes in P/E ratios and somewhat offsets the uncertainty about future earnings outlooks.

C3.

Q HOW DOES THE DCF METHODOLOGY PERFORM OVER A WIDE RANGE OF INTEREST RATE CONDITIONS?

A Utility stock valuations are impacted by changes in market interest rates. Hence, the DCF model accurately tracks changes in utility valuation and required return based on changes to market interest rates, as well as changes in growth.

Utility stock yield spreads to utility bond yields typically track within a relatively narrow range, except during periods of distressed markets, as shown above in Figure 1. The utility stock/bond yield spread is predictable, and it has a strong correlation to market interest rates. Because the DCF model is primarily driven by dividends, and the utility stock yield tracks market interest rates, it is economically logical to conclude that the DCF model produces reliable results over ranges in market interest rates, *i.e.*, in both high and low interest rate environments, for utility companies.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

C3.a.

Q WHAT SPECIFIC ASSUMPTIONS OF THE DCF MODEL, IF ANY, DO NOT WORK WELL IN LOW OR HIGH INTEREST RATE ENVIRONMENTS?

A The DCF model produces economically logical results in both high and low interest rate markets. However, a specific form of the DCF model that relies on constant growth will not work well if the constant growth rate is taken directly from near-term projections of per-share earnings growth that are not intended as long-term projections or are not sustainable as long-term dividend growth rates.

C3.b.

Q IS THERE EVIDENCE THAT THE VOLATILITY OF PRICE-TO-EARNINGS RATIOS OVER THE LAST 10 TO 20 YEARS, ASSUMED TO BE CONSTANT IN THE DCF METHODOLOGY, HAS BEEN DRIVEN BY THE WIDE SWINGS IN INTEREST RATES OVER THIS PERIOD? IF SO, WOULD THE CONSTANT P/E ASSUMPTION IMPACT THE AWARD OF REASONABLE ROEs?

A Yes, utility stock prices do react to changes in interest rates and changes in growth outlooks. When the DCF model is applied, it is based on the current valuation of stock based on current market conditions which reflect which reflect both current and expected interest rate outlooks, as well as the utility's growth outlook. The DCF model can accurately capture these market outlooks and will reliably estimate the investor required return implied by the market's valuation of the investment.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

However, the assumption of constant or non-constant growth needs to be captured in properly modeling the current market outlook in order to develop a DCF model which accurately estimates valuation and/or return requirements. The changes in valuation in past periods are irrelevant for establishing the current valuation and market required return that are built into observable utility stock price. Therefore, the DCF model must be based on current relevant market-, industry-, and company-specific factors.

Market conditions do change, as do utility stock valuations and investors' required returns. These are not constant over time as implied by the question. Rather, as capital market conditions change, the market's appetite for risky investments is impacted by general market conditions, and the market's valuation of stocks based on investment risk differentials will impact the valuation of all market securities, including utility stocks.

Proxy Groups

Q PLEASE DESCRIBE THIS SECTION OF YOUR AFFIDAVIT.

A I will respond to the following questions included in the Commission's NOI:

1. D1. Should proxy groups for electric utilities, as well as natural gas and oil pipelines, consist only of companies with corresponding regulated businesses?

2. D1.b. Are the corresponding proxy groups sufficiently large given the continued consolidation in the industries?

3. D2.a. Should the Commission approach to proxy group selection change depending on which financial models it considers when determining a just and reasonable ROE, and if so, how?

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

D1

Q SHOULD PROXY GROUPS FOR ELECTRIC UTILITIES, AS WELL AS NATURAL GAS AND OIL PIPELINES, CONSIST ONLY OF COMPANIES WITH CORRESPONDING REGULATED BUSINESSES?

A Yes. The proxy group should be an accurate proxy to the subject company's/companies' comparable investment risk, and the market return derived from the proxy group should represent fair compensation for the subject utility company's market required return. The proxy companies should be limited to companies that operate in (and are viewed by investors as operating in) the same industry. This is critical, because observable risk parameters may not appropriately describe differences in investment characteristics for securities that reflect different industry groups.

This is evidenced by several factors, including the following:

1. Two securities can have the same bond rating, but observable risk and required market returns by market participants can be very different.

2. Regulated utility companies generally have investment return outlooks for investors that are more stable and predictable for non-regulated companies, even if they have the same bond rating.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Q PLEASE EXPLAIN THE MARKET EVIDENCE THAT SHOWS THAT TWO SECURITIES CAN HAVE THE SAME BOND RATING, BUT THEIR INVESTMENT RISK AND MARKET-REQUIRED RETURNS CAN BE VERY DIFFERENT.

A This is shown in Exhibit No. A-5, page 2. There, a U.S. Treasury security with a bond rating of AAA can be compared to a AAA-rated corporate bond. As shown on this exhibit, while both securities have the same bond rating, the yield on a 30-year Treasury bond has been 84 basis points lower than the yield on a AAA-rated corporate bond. (Column 8, line 41).

Spreads between utility and corporate Baa bond yields also vary over time, largely tracking the market's appetite for more risky or less risky investments. Specifically, as shown under Column 10, the Baa yield spread over a four-year period is relatively neutral; however, the spread has ranged between 10 to 20 basis points since 2008, a period of the last recession followed by a period where the market generally paid a premium for more stable, less risky investments. During this time period, Baa-rated utility bond yields were sold in the market at a lower yield than Baa corporate bond yields. Again, this is observable market evidence that, while risk factors may suggest risk comparability, the market valuation of the security suggests that utilities fall into a grouping of low-risk stable investments and are priced differently than general corporate securities.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Q PLEASE EXPLAIN WHY THE RETURN OUTLOOKS FOR REGULATED COMPANIES CAN BE VERY DIFFERENT FROM A DEREGULATED COMPANY, EVEN IF THEY HAVE THE SAME BOND RATING.

A This was illustrated above in my Table 1. As shown in that table, utility stock total annual returns are materially impacted by the payment of annual dividends, which reduce both annual return volatility and utility annual return relative to the total returns on the general market. Indeed, dividend payments represent 40% to 50% of the annual return on utility stocks which is much more significant than the dividend component of the annual return for general stock investments – approximately average 20% of the annual return over time.

D1.b.

Q ARE THE CORRESPONDING PROXY GROUPS SUFFICIENTLY LARGE GIVEN THE CONTINUED CONSOLIDATION IN THE INDUSTRIES?

A Yes. While the number of independent companies in the industry for regulated electric and gas industry have been contracting, the number of *The Value Line Investment Survey* ("*Value Line*") universe regulated utility companies available to select a comparable risk proxy group is still adequate to produce a reliable estimate of the current market cost of equity for regulated utility companies.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

D2.a.

Q SHOULD THE COMMISSION'S APPROACH TO PROXY GROUP SELECTION CHANGE DEPENDING ON WHICH FINANCIAL MODELS IT CONSIDERS WHEN DETERMINING THE JUST AND REASONABLE ROE AND, IF SO, HOW?

A Not if the financial models used are market-based. The selection of a proxy group should be an effort to identify publically traded companies that have similar investment risk to that of the subject company. The market-based model used to estimate the required return from the proxy group should not be a factor in establishing parameters which are used to develop the proxy group selection. However, both market factors used to identify proxy group companies of comparable risk and data input and models used to estimate an ROE from those proxy groups should all be based on economically logical factors that will support the development of an ROE that reasonably captures investors' return requirements.

I do not recommend use of the non-market-based "Expected Earnings" model based on forecast Earnings/Book ("E/B") ratios. If that model were to be used, however, it would need to be limited to proxies with market/book ratios resembling those of operating utilities, i.e., ratios near unity. Otherwise, the utilized E/B ratios will not be comparable to the expected E/B ratios of operating utilities.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

D4.

Q IS IT NECESSARY EXCLUDE OUTLIER PROXY RESULTS?

A Given a large proxy group, outlier tests are needed if decisional significance is placed on the range (as distinguished from distribution) of proxy results. In that event, the *Coakley* Briefing Order identified for consideration possible low and high outlier tests. However, if the proxy group is large and the only effect of including a low (or high) outlier is to shift the identified median to the next lowest (or highest) value in the central portion of the distribution of proxy results, I would question whether any outliers should be excluded, because in that case no significance is being placed on the outlier's specific value; its use is as if the outlier value were adjusted to be set equal to the nearest proxy result that is found to be logical and retained.

Q ASSUMING OUTLIER TESTS ARE NEEDED, WHAT, IF ANY, ARE APPROPRIATE LOW-END OUTLIER TESTS?

A. For approximately a decade, in numerous cases, the Commission has employed a low-end outlier test equal to the applicable utility bond yield plus 100 basis points. In its Opinion No. 531 at P 122, the Commission explained that:

> The purpose of the low-end outlier test is to exclude from the proxy group those companies whose ROE estimates are below the average bond yield or are above the average bond yield but are sufficiently low that an investor would consider the stock to yield essentially the same return as debt.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Requiring a 100 basis point margin over prevailing bond yields is a reasonable way to identify proxy group companies whose stock returns are distinguishable from utility bond returns.

Q PLEASE EXPLAIN.

A No matter the market condition, a 100 basis point difference is significant to investors and sufficiently large to distinguish the return on a proxy's equity from a bond yield. In any event, yield spreads for utility stock dividends over utility bond yields are relatively stable during most markets. The only notable exception would be during distressed markets where the market demands abnormal risk premiums to invest in securities of greater risk.

Q DOES OBSERVABLE MARKET EVIDENCE DEMONSTRATE THAT RISK PREMIUMS DO NOT VARY WIDELY ACROSS CHANGES IN INTEREST RATE LEVELS OVER TIME?

A Yes. Valuation changes for bonds and stock securities across various market conditions and changes in interest rate levels can be observed by comparing the yield spread of utility stock dividend yields versus utility bond yields. In most market conditions, these Baa bond yield spreads versus utility stock yield are relatively stable. This is an important and observable distinction in risk premiums. Specifically, bond yield spreads change as bond prices are revalued based on investment risk and income requirements. As such, the market's response to changing interest rates is reflected in

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

bond yields. Investors' responses to market changes involving investment risk characteristics, such as changes in interest rates, also impact stock valuation. As utility stock value increases or decreases, the yield adjusts with the change in stock price, because dividend payments are relatively stable. As such, risk premium changes from Baa bond yields versus utility stock yields can be observed by simply tracking the spread between Baa bond yields and utility stock dividend yields.

This spread is shown above in Figure 1. Importantly, only during times of significant market distress does it widen substantially. In most market conditions, this Baa bond vs. stock dividend spread generally hovers around 100 basis points, which equals the Commission's minimum risk premium for utility stock versus utility bonds. This is illustrated above in Figure 1.

As illustrated in Figure 1 above, a minimum DCF return spread over a Baa bond yield of 100 basis points implies that the DCF return needs at least a 200-basis point growth component, if the yield spread for Baa bonds to stock is 100 basis points. This implied minimum growth component is approximately equal to the long-term inflation projections made by the target for the Federal Reserve.[5] For these reasons, the Commission's threshold test of a 100-basis point risk premium for utility stock return versus Baa utility bond yield is economically logical.

Generally, using a constant spread over an "A" bond yield would also produce a meaningful low-end estimate to describe the difference between an economically logical stock expected return versus a bond expected return. In either instance, the

[5]Federal Reserve Board Press Release: "Federal Reserve issues FOMC statement of longer-run goals and policy strategy," January 25, 2012, provided as Exhibit No. A-3, pages 17-18.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

yield spreads are relatively stable, at least in terms of measuring the low-end point, where the return on the stock is no longer distinguishable from the return on the bond.

D4.a.

Q THROUGH APPLICATION OF A LOW-END OUTLIER TEST THE COMMISSION CURRENTLY EXCLUDES FROM THE PROXY GROUP COMPANIES WHOSE ROE FAILS TO EXCEED THE AVERAGE 10-YEAR BOND YIELD BY APPROXIMATELY 100 BASIS POINTS. SHOULD THE LOW-END OUTLIER TEST CONTINUE TO BE BASED ON A FIXED VALUE RELATIVE TO THE COSTS OF DEBT OR (A) SHOULD IT BE BASED ON ITS VALUE RELATIVE TO THE MEDIAN (I.E., LESS THAN 50 PERCENT OF THE MEDIAN); OR (B) STILL REFLECT THE COST OF DEBT BUT VARY BASED ON INTEREST RATES?

A For the reasons outlined above, a 100 basis point spread is reasonable and should not be widened under current market conditions.

D4.b.

Q HOW, IF AT ALL, SHOULD THE COMMISSION'S APPROACH TO OUTLIERS VARY AMONG DIFFERENT FINANCIAL MODELS?

A The approach used for testing outliers should not vary across financial models. Assuming an outlier test is used (but see discussion above), outliers should be

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

removed, if they produce economically illogical estimates of an investor required return and therefore should not be referenced in determining a relied-upon range.

D6.

Q WHAT WOULD BE THE IMPACT OF THE COMMISSION MODIFYING THE CREDIT RATING SCREEN TO INCLUDE ALL INVESTMENT GRADE UTILITIES IN THE PROXY GROUP?

A The effect would be to produce less risk-comparable proxy groups, and therefore to produces less-accurate estimates of the subject utility's cost of equity. Under current circumstances and for the great majority of FERC-regulated electric utilities, continuing to apply the Commission's established "one notch" credit rating screen (in conjunction with other standard screens[6]) will produce a robust proxy group from which to accurately estimate a utility's current market cost of equity.

[6] Companies that clearly are out of line with the industry range of norms, or are in the midst of specific company factors which may distort their market data should be excluded from these broad industry proxy group ranges. Hence, the Commission should continue to exclude companies that are involved in mergers and acquisitions, exclude companies that have suspended or reduced dividend payments over the last two years, or exclude companies that have entered into a period of abnormal activity such that their market factors will be impacted and market-based models will be distorted based on these events that are unrelated to the provision of providing utility service.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

D7.

Q TO WHAT EXTENT DO CREDIT RATINGS CORRESPOND TO THE ROE REQUIRED BY INVESTORS?

A Credit ratings are a reasonable means of estimating proxy group investment risk and can accurately be the primary factor that identifies proxy companies that are similar in investment risk to a subject company.

A credit rating reflects the predictability and stability of the utility's cash flows in order to support its debt service obligations – both principal and interest payments. The same cash flows that are used to assess credit risk are also the cash flows available to the utility needed to meet its stock investors' return requirements (*i.e.*, dividend payments and earnings/dividends growth). Stock investors are paid after bond holders, so equity investors have more risk than bond holders, due to this priority claim to cash flows. Nonetheless, the stability and predictability of utilities' cash flows impact both bond holders' and equity holders' investment risk in a similar manner.

D9.

Q WHAT CIRCUMSTANCES OR FACTORS, IF ANY, WARRANT AN ADJUSTMENT FROM THE MIDPOINT/MEDIAN TO OTHER POINTS WITHIN THE ZONE OF REASONABLENESS (*E.G.*, LOWER OR UPPER MIDPOINT/MEDIAN)?

A Because the present NOI concerns base ROEs (with incentives, including ROE adders, being addressed separately in Docket No. PL19-3), I will answer in terms of the

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

circumstances under which the base ROE should be placed elsewhere than at the median of the proxy group distribution. Such placement should be rare. It should occur only when it is not possible to identify a reasonably risk-representative proxy group of adequate size, in which case the base ROE should be placed at a different percentile of the proxy group distribution — a percentile lower than 50 when the subject utility or service is markedly less risky than the proxy group, or conversely a percentile higher than 50 when the subject utility or service is markedly more risky than the proxy group.

D10.

Q THE COMMISSION CURRENTLY USES MIDPOINTS TO DETERMINE THE CENTRAL TENDENCY OF THE ZONE OF REASONABLENESS WHEN DETERMINING RTO-WIDE ROEs. SHOULD THE COMMISSION ADOPT A POLICY OF USING MEDIANS FOR THIS PURPOSE?

A Yes. The median more accurately describes the central tendency of the proxy group results, and the midpoint does not. Given the large, nationwide proxy groups that the Commission now uses, midpoints are erratic and prone to distortion, as I will explain below. For this reason, the midpoint should never be used.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Q HAS THE COMMISSION PROVIDED DIRECTION ON WHEN IT BELIEVES THE USE OF A PROXY GROUP MIDPOINT IS APPROPRIATE?

A Yes. In a 2004 opinion, the Commission used the midpoint of proxy group consisting of a subset of the parents of the subject TOs themselves, and explained:

> Given that the ROE will apply across-the-board to all members of the Midwest ISO, rather than to a single company of average risk, we must consider their full range of risks and business profiles. To that end, the proxy group used to define the range of reasonableness in this case consists of a subset of the Midwest ISO TOs to which the ROE will actually apply. This is a departure from prior ROE cases, in which the selected proxy group is deemed to be comparable to the risks faced by a single gas pipeline or electric utility. Here, we are dealing with a group of utilities with differing risks and business rankings. In our view, the differing ROEs in this group fairly brackets the range of reasonableness for all Midwest ISO TOs.[7]

In other words, the Commission viewed the lowest and highest DCF results as equivalent to the costs of equity for, respectively, the single least risky and single most risky Midcontinent Independent System Operator, Inc. ("MISO") transmission owner ("TO"), and the Commission was more concerned in that case with minimizing the extent to which the uniform allowed base ROE was unsuitable for those unusual MISO TOs than it was with identifying a base ROE that was reasonably apt for most of the MISO TOs.

[7] Docket No. ER02-485-003, *Midwest Independent Transmission System Operator, Inc.*, Order on Remand, 106 FERC ¶ 61,302, P 9 (2004).

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Q DOES THAT REASONING CONTINUE TO SUPPORT USE OF THE PROXY GROUP MIDPOINT?

A No, for two reasons. First, the Commission relied, in part, on the fact that the ROE being determined in that docket was to be applied to "a group of utilities with differing risks and business rankings." As noted in the cited paragraph above, the proxy group in that docket was comprised of a subset of MISO TOs. More recently, the Commission has relied on a national proxy group based on a credit rating screen of plus/minus one notch of the *Value Line* universe of electric utilities. With that expanded proxy group screening, and with the increased geographic dispersion of the investments of today's publicly-traded utility stocks, there is no basis to view the lowest and highest proxy results as equivalent to the costs of equity for, respectively, the single least risky and single most risky TOs in a given RTO.

Second, the midpoint is not a statistically reliable measure. Following the application of reasonable criteria to identify publicly-traded companies that are risk comparable and should be included in the proxy group, the utilized central tendency measure should represent the weight of the proxy group results, in order to provide a representative distillation of the proxy group results into a reasonable estimate of the current market cost of equity for the proxy group.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Q PLEASE EXPLAIN.

A The median of the distribution of retained proxy group results is the middlemost number of that distribution when it is sorted in ascending order.[8] The median is also known as the 50th percentile of the distribution of results. The median estimate is determined by rank ordering all the proxy group results in order to find this median point estimate of proxy group results.

In contrast, the midpoint is simply the average of the highest and lowest single point estimates within the proxy group results. In contrast to the median, the midpoint is calculated using only two point estimates within the proxy group results – the high and the low estimates. The midpoint estimate may bear no relationship to all the remaining proxy group results because they simply are not used in calculating the midpoint of the proxy group range. As such, the median is based on all the companies' proxy group results, whereas the midpoint is based on only two point estimates within the proxy group results. Therefore, the median more accurately describes the results of the proxy group than does the midpoint.

Q WHY IS THE MEDIAN MORE ACCURATE THAN THE MIDPOINT IN DESCRIBING THE PROXY GROUP CENTRAL TENDENCY?

A While the median is often used to measure of central tendency, the midpoint, however, is not.[9] The midpoint evenly weights the highest and lowest proxy group results, while discarding the rest. These most-disparate results are the ones *least*

[8] If there are an even number such results, the median is the average of the middle two.
[9] Exhibit No. A-3, pages 19-20.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

representative of the weight of proxy group results, and the ones *most* likely to have been distorted by measurement error or input noise. The midpoint methodology lends itself to being influenced and biased by outlier results which are atypical of the results for the overwhelming majority of the proxy group determined to be risk-comparable to the RTO utilities to which ROE is going to apply. Accordingly, the midpoint is less accurate than the median approach.

The Commission has previously rationalized the use of the midpoint methodology for RTO-wide ROEs as a way of accounting for various and diverse risk profiles of the utilities within the RTO.[10] Considering that the Commission relies on a proxy group that includes companies with credit ratings of +/- one notch of the utilities within the RTO, the proxy group's DCF and Capital Asset Planning Model ("CAPM") results will have already accounted for the various and diverse risk profiles of the utilities within the RTO. Absent any concrete evidence that an adjustment needs to be made within the range of proxy group results, the median, or 50th percentile, should be utilized as it is the very definition of the measure of the central tendencies of the results. And even if such an adjustment is supported, it should be tied to a percentile of the entire proxy group distribution, not to highest and lowest results that form the proxy group range.

[10]Docket No. ER02-485-003, *Midwest Independent Transmission System Operator, Inc.*, Order on Remand, 106 FERC ¶ 61,302, P 9 (2004).

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Q PLEASE EXPLAIN WHY THE MEDIAN IS THE MORE ACCURATE MEASUREMENT OF CENTRAL TENDENCY.

A As mentioned previously, the median is the middlemost value of the entire distribution of results. In other words, there are an equal number of results above and below the median, making it a preferred measure of central tendency. As such, the median also mitigates the impacts of single outliers, whether high or low. For example, consider the following data set that includes nine observations that range from 0 to 20.

0	3	4	5	**6**	7	8	9	20

Based on the dataset above, the median is 6, as it is the middlemost value of all the results when lined up in ascending order. As I mentioned earlier, the median mitigates the bias or skew of outlier results. Had the highest value been 100 instead of 20, it would not change the median observation. Similarly, had the 0 been -100, the median would still be 6. The mean, which gives equal weight to each observation, is 6.9. The mean of 6.9 is relatively close to the median, however it is easy to see that the highest outlier value of 20 has biased the mean upward. By comparison, the midpoint of the dataset above, which is the average of the bookend observations of 0 and 20, is 10. Also of note, the midpoint methodology completely ignores the seven observations between the highest and lowest values. This impact is exacerbated when looking at the results of a well-defined and very large proxy group of 30 or more companies. Importantly, the midpoint value of 10 is higher than every observation except the highest single outlier (*i.e.*, 20).

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

A more pragmatic example would be to look at something like home values in the United States. A house in Los Angeles named, "The One," is listed for $500 million. For sake of argument and for illustration purposes, I will use $0 as the cheapest house in the United States. The *midpoint* of these two home values is $250 million. There are likely less than 10 homes in the United States that have a value of $250 million and in no way represent the central tendency of U.S. home values. As reported by Zillow.com, the *median* home value is approximately $227 thousand. In other words, the midpoint is approximately 1100x greater than the median.

In a scenario where an analyst has correctly developed a proxy group that is deemed risk-comparable to that of the utility, or group of utilities, to which the awarded ROE would be applicable, a true measure of central tendency is desired. Given the proxy group companies are located throughout the United States, and likely have credit ratings both above and below the ratings of the RTO members, a wide range of diverse and unique risks will be accounted for to the extent that the median is used as the measure of central tendency when determining ROE.

Q HAS THE COMMISSION OPINED ON WHAT THE PRINCIPAL CONSIDERATION SHOULD BE IN DETERMINING THE ROE BEING SET FOR THE UTILITY OR UTILITIES?

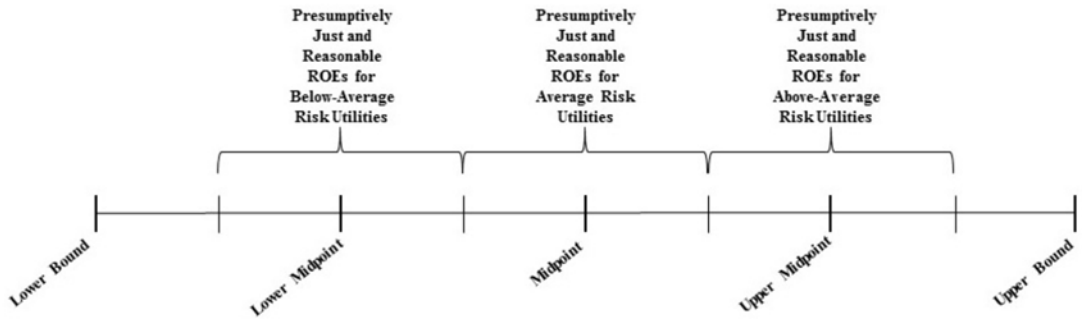
A Yes. In paragraph 26 of the *Coakley* Briefing Order, the Commission states:

> [T]he principal consideration for determining whether an existing ROE within the overall zone of reasonableness has become unjust and unreasonable is the risk profile of the utility or utilities for which the Commission is setting the ROE. This is consistent with the

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

> Commission's well-established policy on relative risk analysis, in which the presumptively just and reasonable ROE for an average-risk utility is the relevant measure of central tendency for the entire zone of reasonableness while the presumptively just and reasonable ROE for an above- or below-average risk utility is the relevant measure of central tendency for either the upper or lower half of the zone of reasonableness, respectively.

In establishing the zone of reasonableness for a diverse group of average risk utilities, the Commission has proposed in the Briefing Orders that the range of potentially lawful ROEs constitutes one quarter of the zone of reasonableness, centered on the midpoint.



Paragraph 28 of the *Coakley* Briefing Order places a lot of emphasis on the central tendency. As explained in detail above, the midpoint is heavily influenced by outlier results and the measurement errors they likely embody. It is not an accurate, reliable, or stable measure of central tendency. The median, in contrast, is an accurate, reliable, and stable measure of central tendency.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

D10.a.

Q WOULD THE USE OF MULTIPLE ROE METHODOLOGIES, AS PROPOSED IN THE COAKLEY BRIEFING ORDER, UNDERCUT THE COMMISSION'S CURRENT RATIONALE FOR USING THE MIDPOINT IN RTO-WIDE BASE ROE?

A Regardless of the ROE methodology used to estimate the current market cost of equity from a proxy group, the statistical tool that most accurately describes the proxy group's central tendency results is the median. As compared to the midpoint, the median produces a more representative distillation of the proxy group results and a more reliably representative indication of the subject utility's cost of equity. That should be the dispositive consideration. Moreover, the use of non-DCF methodologies in the manner proposed in the *Coakley* Briefing Order does further undercut the rationale stated in *MISO*, 106 FERC ¶ 61, 302 (2004). For example, the range of "Expected Earnings" results will tend to be driven by the range of proxy company M/B ratios. This can be seen, for example, in MISO Briefing Order P 55, where the top of the Expected Earnings range would be set by Vectren Corp., and is associated with an M/B ratio of approximately 2.24.[11] There is no basis to believe that the M/B range of the respondent operating companies whose transmission ROEs are at issue in that case extends that high.

[11] See the March 2015 Value Line for Vectren Corp., which is available to the Commission in the record of Docket No. EL14-12 as Exhibit No. S-3, at 95.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

D10.b.

Q SHOULD THE SIZE OF THE PROXY GROUP BE CONSIDERED IN THIS DECISION?

A A larger proxy group only makes the problems associated with midpoints worse. A larger proxy group may well have a wider range of proxy group results (it cannot be narrower), and there is no reason to believe the midpoint of that same or wider range will more accurately represent the full distribution of proxy group results. Consider again the home price distribution I discussed earlier. On any one block, the median, midpoint, and average home prices are all likely to be fairly close. But if we expand the distribution to encompass the millions of U.S. homes, it will encompass the $500 million parcel, and the midpoint of the associated range will be wildly unrepresentative. That said, there is no statistically valid basis to reference the midpoint of even a smaller proxy group.

Financial Model Choice

E1.

Q WHAT MODELS DO INVESTORS USE TO EVALUATE UTILITY EQUITIES?

A There is little disagreement in regulatory proceedings that the methods generally relied on by investment practitioners, the investment community, and academic circles include DCF and CAPM models. I am not aware of any evidence that "risk premium" methods based on the outcomes of regulatory proceedings are widely used by

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

investors. However, different variants of the risk premium model are commonly used in regulatory proceedings. In general, these three models – DCF, CAPM, and Risk Premium – and only these three models, have gained wide acceptance in modern regulatory proceedings.

E2.

Q WHAT ROLE DO CURRENT CAPITAL MARKET CONDITIONS PLAY IN THE CHOICE OF MODEL USED BY INVESTORS TO EVALUATE UTILITY EQUITIES?

A Investors' model choices do not vary depending on capital market conditions such that the selection of the models that should be used to quantify investors' required rate of return on equity should vary depending on capital market conditions. Rather, in all foreseeable capital market conditions, investors' required rate of return on equity as of any given period can be modeled with reasonable accuracy by applying well-designed market-based models to that period's capital market data.

E2.a.

Q IF CAPITAL MARKET CONDITIONS FACTOR INTO THE CHOICE OF MODEL, HOW DO INVESTORS DETERMINE AND EVALUATE THOSE CONDITIONS?

A Not applicable.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

E3.

Q ARE ANY MODELS THOUGHT TO BE SUPERIOR OR INFERIOR TO OTHERS? IF SO, WHY?

A The DCF model most accurately reflects the unique return outlooks for a utility stock investment. A well-constructed CAPM will also provide meaningful results. A risk premium model relies on the premise that past regulatory decisions accurately found the cost of equity as of the time giving rise to the bond yield to which that allowed ROE is compared. As such, when applied using valid inputs, the risk premium method produces results that, while not entirely devoid of value, are less direct than re-measuring the cost of equity using a current DCF and/or CAPM model. Like taking a photograph of a photograph of a photograph, each successive recycling of past results through the use of a risk premium method can take the outcome further and further away from accurately identifying the current cost of equity. The "Expected Earnings" method, based on forecast earnings-to-book ratios, is not related to the market cost of equity that is required to attract capital for investment in utility assets. As such, it is worse than "inferior"; it is entirely unsuitable for use in determining utilities' cost of equity. Dr. Cornell provides additional discussion of this method and its deficiencies.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

E4.

Q HOW ARE ALTERNATIVE MODELS REDUNDANT OR COMPLEMENTARY WITH EACH OTHER AND/OR THE DCF MODEL?

A Multiple reliable market-based models, when applied appropriately, can produce more reliable and stable information from which to accurately estimate the current market cost of equity. Accordingly, well-developed CAPM model and/or risk premium models can complement the DCF model in applying market information to accurately estimate the current market cost of equity.

E5.

Q TO WHAT EXTENT DO ALTERNATIVE MODELS AVOID ANY DEFICIENCIES OF THE DCF MODEL AND/OR OPERATE BETTER IN DIVERSE CAPITAL MARKET CONDITIONS?

A As I discussed earlier (see responses to Question C3 and its subparts), the DCF model operates well in diverse capital market conditions. Nonetheless, it can usefully be supplemented with select other methods *if* they are market-based and well designed.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

E6.

Q TO THE EXTENT THAT INVESTORS USE MULTIPLE MODELS, SHOULD THE COMMISSION COMBINE THEM IN ITS ANALYSIS OR USE THE "BEST" ONE THAT WOULD APPLY IN ALL MARKET CONDITIONS?

A There are too many investors and investor-utilized models for the Commission to adopt a standard of using every model utilized by some investor. The Commission should use no more than three models, all of them market-based, and all designed well to operate robustly across a wide-range of market conditions, including present conditions. Having selected that small set of one to three approved market-based models, the Commission should trust the model results.

E7.

Q IF THE COMMISSION WERE TO CONSIDER MULTIPLE MODELS, HOW SHOULD IT WEIGH THEM?

A In future proceedings,[12] it would be reasonable to weight equally each of the one to three approved market-based models.

[12] In ongoing case-specific proceedings that were filed and litigated through trial-type evidentiary hearings under the understanding that the DCF method was the Commission's primary or exclusive tool, it would be reasonable to give extra weight to the DCF model.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

E8.

Q TO WHAT EXTENT IS IT REASONABLE FOR THE COMMISSION TO USE A SIMPLIFIED VERSION OF A MODEL THAT DOES NOT REFLECT ALL THE VARIABLES THAT INVESTORS CONSIDER?

A A simplified version of the DCF model may not accurately reflect the multiple market factors which are needed to accurately measure the current market cost of equity. The Commission should continue to maintain reliable data inputs and to reflect dividend growth outlooks in producing an accurate ROE estimate.

E8.a.

Q IS THE USE OF A SIMPLIFIED MODEL JUSTIFIED FOR EASE OF ADMINISTRATION AND PREDICTABILITY OF RESULT?

A No. See E8.

E9.

Q HOW, IF AT ALL, SHOULD THE COMMISSION CONSIDER STATE ROEs?

A State-allowed ROEs should be considered relevant by FERC, because for typical vertically-integrated utilities a much larger share of revenues comes through state-regulated than FERC-regulated cost-based rates. State-allowed ROEs therefore give some indication of ROEs that have been embraced by the market participants as constructive, able to support strong investment grade bond ratings, to attract an abundant amount of capital to support large capital programs, and to support strong

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

stock prices. Accordingly, the Commission should consider state ROEs in order to get some observable market evidence where ROEs have supported utilities' ability to develop strong credit standing, access to capital and maintain large capital programs. Moreover, risk premium analysis can usefully reference state commission rather than FERC outcomes, because there are more of the former, and because a large share of the relatively few FERC transmission ROE outcomes represent continued application of past ROE approvals rather than fresh determinations of the cost of equity. Alternatively or in addition, because state-allowed ROEs exhibit considerable regulatory lag and "gradualism" (falling and rising later and slower than does the cost of equity itself), referencing recent state ROE allowances would tend to stabilize ROEs over time, while still taking eventual account of changing equity market conditions.

E9.a.

Q HOW AND WHY DO STATE ROEs VARY BY STATE?

A State-allowed ROEs vary for numerous reasons, prominently including ROE incentive deducts and adders and the fact that in their calculations of the weighted average cost of capital ("WACC"), some state regulators include low-cost short-term debt or limit the equity ratio for ratemaking to less than its actual level. When taken out of context, certain state-allowed ROEs may appear to be out of line with industry norms, even though the resulting pre-incentive WACC is in line with industry norms. Such variations make the *range* of state-allowed ROEs uninformative in identifying either

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

the cost of equity or a reasonable ROE stabilization method. However, that problem can be avoided through an approach that combines a large number of recent state-allowed ROEs, by utilizing them for risk premium analysis or by referencing their median or mean.

E9.b.

Q HOW ARE CERTAIN STATE ROEs MORE OR LESS COMPARABLE TO COMMISSION ROEs?

A See response to Question E9.a.

E10.

Q IF THE COMMISSION CONSIDERS STATE ROEs, HOW SHOULD IT COMPARE FERC-JURISDICTIONAL TRANSMISSION ROEs WITH STATE ROEs THAT APPLY TO UTILITIES THAT ARE (A) DISTRIBUTION AND TRANSMISSION COMPANIES; OR (B) DISTRIBUTION, GENERATION, AND TRANSMISSION COMPANIES?

A Both credit rating agencies and investors view (and are right in viewing) FERC-regulated transmission service as financially less risky than generation service, and similar in risk to distribution service, absent commodity cost recovery risk. For example, variations in emissions regulations, in the cost of natural gas, or in tax policies applicable to wind generation can drastically change the market competitiveness of a given generator, while having no effect on transmission owners'

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

ability to recover their allowed revenue requirement, which if they so choose and file can be calculated through automatically adjusting, comprehensive formula rates. Accordingly, in setting electric transmission ROEs, the Commission should look to the ROEs allowed by state commissions to generation-divested utilities.

E11.

Q TO WHAT EXTENT, IF ANY, SHOULD THE COMMISSION EXERCISE JUDGMENT IN USING FINANCIAL MODELS TO SET ROEs UNDER VARIOUS CAPITAL MARKET CONDITIONS?

A The Commission should exercise careful judgment to identify market-based financial models that will reliability indicate the cost of equity under a wide range of capital market conditions. It should then rely on the results of those models, as applied by credible expert witnesses through record evidence, and should not substitute its intuition for that systematic estimate.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

First Prong of ROE Determination

G4.

Q IN SINGLE UTILITY RATE CASES, THE COMMISSION DETERMINES THE CENTRAL TENDENCY OF THE ZONE OF REASONABLENESS BASED ON THE MEDIAN OF THE PROXY GROUP ROEs. IS THE APPROACH OUTLINED IN THE COAKLEY AND MISO BRIEFING ORDERS APPROPRIATE IN SINGLE UTILITY RATE CASES GIVEN THAT THE PROXY COMPANY ROEs TEND TO CLUSTER NEAR THE CENTER OF THE ZONE OF REASONABLENESS, MAKING THE MIDDLE QUARTILE RELATIVELY NARROW?

A The fact that most proxy results cluster near each other is not a problem; it is an empirical indication that the true result indicated by that model resides within that cluster. As a statistically superior measure of central tendency, the median recognizes that statistical fact. Midpoints and other range-based measures (including range "quartiles" as diagrammed in the referenced orders) do not. The midpoint produces a statistically inferior estimate of the central tendency of proxy group results and does not produce an economically logical assessment of the information provided by the proxy group regarding the current market cost of equity for the subject utilities or utility. In interpreting proxy group results, therefore, the Commission should look to medians, not midpoints.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

G4.a.

Q WOULD IT BE REASONABLE TO DETERMINE THE CENTRAL TENDENCIES OF THE UPPER AND LOWER HALVES OF THE ZONE OF REASONABLENESS FOR SINGLE UTILITIES BASED ON A MIDPOINT ANALYSIS, SO AS TO PRODUCE APPROXIMATELY EQUAL RANGES OF PRESUMPTIVELY JUST AND REASONABLE ROEs FOR BELOW AVERAGE, AVERAGE, AND ABOVE AVERAGE RISK UTILITIES?

A No. The midpoint of the analysis simply does not accurately measure the central tendency of the proxy group results. It discards most of the information contained in the proxy results distribution, and is too highly influenced by outlier estimates that are the ones most likely to embody unrepresentative inputs or other distortions. For these reasons, the central tendency of the proxy group results should be identified by looking to the proxy group distribution's median. To the extent it is necessary to identify a point value other than the median (whether because the proxy group cannot be made risk-representative, or for the dubious purpose of quantifying a rebuttable presumption that above-center ROEs remain just and reasonable), the Commission should look to another percentile of the distribution rather than to a range, such as the $25^{th,}$, 37.5^{th}, 62.5^{th}, or 75^{th} percentile.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Model Mechanics and Implementation

General Issues/Issues that Affect Multiple Models

H.1.1.

Q ARE IBES DATA A GOOD PROXY FOR "INVESTOR CONSENSUS?"

A IBES provides the consensus growth rate estimates of its participating analysts. Compared to a single analyst's growth rate, a consensus formed by averaging multiple analysts' estimates is more likely to accurately summarize the various growth rates that informed study period stock price formation.

There have been many academic studies conducted on which growth rate estimates more accurately reflect the consensus market outlook. These studies were summarized in *New Regulatory Finance*, a book by Dr. Morin, in which he identifies the following academic studies:

> Important papers include Brown and Rozeff (1978), Cragg and Malkiel (1968, 1982), Harris (1986), Vander Weide and Carleton (1988), Lys and Sohn (1990), and Easterwood and Nutt (1999).[13]

According to Dr. Morin, these reports state that analysts' projected growth rates more accurately reflect market expectations than do growth rates derived from historical data.

Dr. Morin goes on to cite consensus analysts' growth rate estimates and indicates a preference for more than one analyst growth rate estimate in capturing market expectations:

[13] *New Regulatory Finance*, Roger A. Morin, PhD, Public Utilities Reports, Inc., at 299 and 302 (2006), provided as Exhibit No. A-3, pages 12 and 15.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

> These firms include most large institutional investors, such as pension funds, banks, and insurance companies. Representative of industry practices, the Zacks Investment Research Web site is a central location whereby investors are able to research the different analyst estimates for any given stock without necessarily searching for each individual analyst.
>
> * * *
>
> The forecast 5-year growth rates are normalized in order to remove short-term distortions. Forecasts are updated when analysts formally change their stated predictions.
>
> * * *
>
> Exclusive reliance on a single analyst's growth forecast runs the risk of being unrepresentative of investors' consensus forecast.[14]

As outlined above, it is generally accepted that consensus analysts' growth rate estimates, which are not skewed by single growth rate estimates, may more accurately capture market expectations and reflect the growth rates built into observable stock prices.

Q HAS THE COMMISSION COMMENTED ON ITS PREFERENCE FOR USING CONSENSUS ANALYSTS' GROWTH RATE ESTIMATES RELATIVE TO A SINGLE ANALYST'S GROWTH RATE ESTIMATES SUCH AS *THE VALUE LINE INVESTMENT SURVEY*?

A Yes. The Commission has already considered and rejected the use of *Value Line* short-term growth rates, in lieu of, or in supplementing, the IBES growth rates as a short-term growth rate stage in the two-stage DCF model. Specifically, in Opinion No. 551, the Commission stated as follows:

[14] *Id*., pages 301 and 302, provided as Exhibit No. A-3, pages 14 and 15.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

> We reject MISO TOs' request for clarification that the growth projections published by Value Line constitute an acceptable and comparable source of short-term earnings growth estimates that may be considered for use in the two-step DCF analysis. In Opinion No. 531, the Commission held that "in future public utility cases, the Commission will adopt the same two-step DCF methodology it uses in natural gas and oil pipeline cases." [footnote omitted] While the Commission has refrained from mandating the exclusive use of IBES data in its natural gas and oil pipeline rate of return cases, the Commission has stated that "IBES data is the preferred data source for computing the short-term growth rate." [footnote omitted] The Commission has explained that the "IBES data is a compilation of projected growth rates from various knowledgeable financial advisors within the investment community." [footnote omitted] As such, the IBES short-term growth estimates generally represent consensus growth rate estimates by a number of analysts. By contrast, the Commission has rejected the use of Value Line growth estimates in gas pipeline ROE cases, because they are the estimates of a single analyst and thus do not constitute such consensus estimates. [footnote omitted][15]

Q DO YOU BELIEVE THAT THE IBES GROWTH RATE IS A MORE RELIABLE ESTIMATE OF INVESTOR OUTLOOKS THAN IS *VALUE LINE*?

A Yes. As outlined by Dr. Morin's book concerning academic empirical studies and findings by the Commission, a consensus analysts' growth rate projection which reflects the views of many analysts' advice to investors is more likely to reflect investor outlooks than a growth rate produced by a single analyst, or from historical data. *Value Line* is a single analyst source and does not provide a consensus of what security analysts' advice is to the investing public.

[15]Assn. of Bus. Advocating Tariff Equity, et al., v. Midcontinent Indep. Sys. Operator, Inc., et al., Opinion No. 551, 156 FERC ¶ 61,234 at P 62 (2016) ("Opinion No. 551").

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Further, *Value Line*'s growth rate represents a growth from its historical base to the three- to five-year forecast period. *Value Line* describes its growth rate as follows:

> Example: To calculate the compound annual sales growth from 2001-2003 to 2007-2009, we take sales per share for each of the years 2001, 2002, and 2003 and average them. Then we take the sales per share for the years 2007-2009, as shown in the far right column of the large statistical section of our report.[16]

Value Line uses a normalized historical base over a three-year period to project growth from the average of the three-year period out to a three- to five-year projection beyond the end of the latest year. This growth rate cannot accurately be used to grow earnings or dividends in the most recent quarter (annualized). It is simply not designed to produce an earnings growth rate from this starting point. The starting point for the Commission's two-step DCF analysis is the most recent quarterly dividend (annualized). Moreover, where IBES-participating analysts remove non-recurring losses or gains from GAAP-style baseline earnings in order to produce a more representative growth rate, *Value Line* tends to rely instead on a coarser, mechanical averaging of three past years. *Value Line*'s growth rate methodology simply is not the best information to reflect the growth outlook for future dividends, as required by the Commission DCF model. Importantly, if the growth of dividends is misstated, then the DCF model will be misstated, and the DCF return estimate will not be reliable or accurate. Therefore, *Value Line* growth rates should not be used with IBES growth rates.

[16] *Value Line Selection & Opinion,* August 6, 2004, page 2186), provided as Exhibit No. A-3, page 24.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

H.1.1.a.

Q IF NOT, ARE THERE BETTER ALTERNATIVES, SUCH AS BLOOMBERG, ZACKS, S&P CAPITAL, MORNINGSTAR, AND VALUE LINE?

A The five sources listed in Question H.1.1.a are of two distinct types. Bloomberg and Zacks aggregate multiple analysts and report consensus growth rates. So does reuters.com, which publishes IBES growth rates and (unlike Yahoo Finance) discloses the number of contributing analysts. As such, all of these sources are comparable and can reasonably be referenced, although the Commission should be alert to the risk that parties or witnesses will opportunistically vary their growth rate sourcing in order to shop for supportive data. To mitigate that risk and in order to best capture the growth outlook reflected in market prices, to the extent multiple sources of analyst consensus growth rates are used, they should be combined to produce one composite five-year growth rate per proxy company, rather than generating a separate DCF distribution for each growth rate source.

In contrast, the growth rates published by S&P Capital, Morningstar, and *Value Line* are those of a single analyst. The Commission's previous finding that a consensus analyst growth projection is preferred to a single analyst's growth rate estimate is still based on sound academic empirical evidence. Accordingly, these singe-analyst estimates should not be used as the source of DCF model inputs.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

H.1.1.b.

Q SHOULD THE COMMISSION COMBINE DATA FROM MULTIPLE SOURCES?

A The Commission should seek to use the data source(s) that most accurately reflects market outlooks, such as using analysts' consensus to source estimates of five-year earnings growth. To the extent the Commission chooses to use more than one source of consensus analysts' growth rate data, they should be combined into a single composite consensus, as discussed in response to Question H.1.1.a.

H1.1.c.

Q WHAT WEIGHT, IF ANY, SHOULD BE GIVEN TO AN ESTIMATE IF THE NUMBER AND IDENTITY OF ANALYSTS CONTRIBUTING TO THE ESTIMATE IS NOT AVAILABLE?

A As I stated in response to Question H.1.1.a, consensus estimates for a particular proxy company's growth rate that are known to combine the estimates of numerous analysts should receive more weight. For example, suppose that for a given proxy company two growth rates are available in the record. The first is 5% from IBES via reuters.com and known to be sourced from three analysts, and the second is 6% from Bloomberg and known to be sourced from three analysts. In that case, the DCF model should use a composite five-year[17] growth rate of [(5% x 2) + (6% x 3)]/5 = 5.6%.

[17] This would be the short-term growth rate, prior to being combined with or transitioning to a long-term, GDP-based growth rate.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

H.1.2.

Q TO WHAT EXTENT DOES MODEL RISK AFFECT ALL ROE METHODOLOGIES?

A While no model is perfect, not all models are equal. The DCF model has been used by FERC and other regulators for many years, and the fact that it has produced allowed ROEs adequate to attract capital is demonstrated by the fact that utility stock prices are high and utilities have ample capital to invest in new assets. To the extent analysts are proposing deviations from standard methodologies, the Commission should require verifiable and complete evidence supporting the change in methodology or the ROE adder. The "Expected Earnings" method does not even attempt to measure the cost of equity, so model "risk" may not be the best term to describe its deficiency. Model "irrelevance" may be a better term.

H.1.3.

Q THE DCF MODEL INCORPORATES DATA AT THE PARENT/HOLDING COMPANY LEVEL (E.G., STOCK PRICE). THE COMMISSION ADJUDICATES CASES AT THE OPERATING COMPANY LEVEL, FOR WHICH THERE IS NO PUBLIC DATA LIKE STOCK PRICES, GROWTH RATES, AND BETAS. WHAT IMPACT DOES THIS DISPARITY HAVE ON THE RESULTS OF THE DCF AND OTHER MODELS?

A To measure the current market cost of equity, a proxy group of publicly traded companies is necessary in order to gain information that could produce an accurate

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

and reliable estimate of the current market cost of equity. Practically speaking, publicly traded parent company holding company data will predominantly make up these proxy group estimates. There has been no evidence that the parent company data is not producing reliable and accurate estimates of rates of return that can be applied to operating utility subsidiaries of the holding companies. Therefore, the Commission should continue to rely on observable evidence and sound financial models to estimate current market returns of proxy groups of regulated utility companies, in order to measure a rate of return that is consistent with the *Hope* and *Bluefield*[18] standards.

As I noted in response to Question D10.a., the difference between parent/holding companies and operating electric utilities does undermine the representativeness of "Expected Earnings" results. Proxy company M/B ratios are quite different from those of operating utilities, when the market prices of the latter are revealed by acquisition-type transactions. Consequently, the projected E/B ratios of publicly-traded proxy companies are not a reliable guide to the projected E/B ratios that would apply to operating utilities.

[18]Bluefield Water Works & Improvement Co. v. Pub. Serv. Comm'n of W. Va., 262 U.S. 679 (1923) and Fed. Power Comm'n v. Hope Natural Gas Co., 320 U.S. 591 (1944).

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

H.1.4.

Q SHOULD THE COMMISSION CONTINUE TO RELY ON THE EFFICIENT MARKET HYPOTHESIS, WHICH UNDERLIES THE DCF AND CAPM MODELS? WHY OR WHY NOT?

A Yes. The *Hope* and *Bluefield* standards clearly suggest that the market models can be used to produce an accurate estimate of the current investor required return. The efficient market hypothesis states that investors will rely on all relevant information in order to form/make investment decisions. All relevant information is available to investors to form economically logical outlooks for growth in dividends, risk spreads between utility stock yields and utility bond yields, and utility bond yields and Treasury yields. All of this information can be used to opine on the reasonableness of the rate of return estimates made from DCF, CAPM, and risk premium studies.

H.1.4.a.

Q IF YES, SHOULD THE COMMISSION CONTINUE TO EMPLOY OUTLIER SCREENS, M&A SCREENS, ETC., FOR THE DCF AND CAPM MODELS SINCE THESE MODELS NEED TO INCORPORATE ALL RELEVANT INFORMATION?

A The established fact that stock market prices efficiently incorporate all relevant public information does not imply that all stocks' prices provide a representative and reliable basis for inferring the cost of equity for a given utility. I have discussed screening criteria in response to Questions D4, D6, and D7.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

H.1.5.

Q SHOULD GROWTH RATES BE BASED ON VALUE LINE, IBES, OR ALTERNATIVE ESTIMATES?

A As I discussed in response to Question H.1.1 and its subparts, consensus analysts' growth rate estimates are the most reliable source of the near-term portion of the dividend growth expectation embedded in market prices and therefore suitable for use in the DCF model. Therefore, a consensus growth rate estimate published by IBES or other consensus analysts' growth rate estimates produce a better and more reliable estimate than does a growth rate estimate published by *Value Line*.

H.1.6.

Q SHOULD THE SAME GROWTH RATE SOURCES BE USED ACROSS MODELS, IF MORE THAN ONE MODEL IS USED TO DETERMINE THE ROE?

A Yes. Consistent use of growth rate estimates that accurately gauge the market's outlook should be the primary focus in both measuring short-term growth and long-term growth. In principle, these growth rate estimates should not vary across different models. However, there is a practicality limit to that principle in the event the equity risk premium used in CAPM model is based on a DCF analysis of the approximately 400 dividend-paying member of the S&P 500, as referenced in the *Coakley* and MISO briefing orders. Although there would be a significant subscription cost and calculation burden involved in using multiple sources of analyst consensus

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

growth rates for a proxy group of electric utility parent companies, that task is manageable as there are now fewer than 40 such companies. Extending that approach to a CAPM-component DCF study of approximately 400 companies makes the task an order of magnitude more burdensome, and should not be required.

DCF

H.2.a.2.

Q COULD TERMINAL STOCK VALUE BE USED IN PLACE OF LONG-TERM GROWTH PROJECTIONS? IF SO, HOW SHOULD TERMINAL STOCK VALUE BE DETERMINED?

A A terminal value DCF methodology would not produce a more reliable estimate than the Commission's current two-stage growth DCF study. Indeed, the two methodologies are mathematically very similar, if done consistently. However, the ability to arrive at a terminal stock price introduces far more uncertainty into the methodology, which can minimize the Commission's ability to accurately estimate the DCF return estimate.

Specifically, the Commission's current two-step DCF methodology uses a composite growth rate within a constant growth rate methodology that gives way to a short-term growth outlook and a long-term sustainable growth outlook. In contrast, a terminal value stock DCF methodology could project cash flows based on a shorter term cash flow window which encapsulates short-term dividend growth and a stock price at the end of a holding period. However, the stock at the end of the holding

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

period would need to be estimated from the flow of cash flows that would reflect a short-term growth rate, and a contraction to long-term steady-state growth. As such, the terminal stock price should reflect the value of the stock based on the long-term sustainable growth rate estimate. The DCF study would then reflect a period of short-term growth and at the end of the holding period the terminal stock price would reflect the value based on long-term sustainable growth.

H.2.a.3.

Q DO INVESTMENT ANALYSTS PROJECT EARNINGS/DIVIDENDS GROWTH BEYOND FIVE YEARS, AND IF NOT, WHY NOT, AND IS GROSS DOMESTIC PRODUCT ("GDP") AN APPROPRIATE PROXY FOR LONG-TERM GROWTH?

A No, investment analysts only project earnings and dividends out over the next five years. Longer-term growth projections for an individual stock are highly uncertain and can be significantly impacted by changes in market conditions, company conditions, and other factors. Indeed, long-term growth reflects a part of the risk of investing in a utility equity security, because the ability to project that far out is so uncertain. However, analysts' three- to five-year growth rate outlooks are relevant in establishing the current value, and efficient market hypothesis tells us that these longer term outlooks are based on macroeconomic factors available to market participants in order to make informed investment decisions.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

H.2.a.4

Q HOW SHOULD THE COMMISSION WEIGHT SHORT-TERM AND LONG-TERM EARNINGS/DIVIDEND GROWTH PROJECTIONS?

A The current FERC methodology of weighting the short-term and long-term growth rate estimates is reasonable. However, alternatively, the Commission could use a multi-growth stage DCF model in order to give varying weights to various stages of growth. Such a multi-stage growth model, in which three-to-five-year growth projections would be used as the growth rate for no longer than five years, is consistent with the intent of the authoring analysts. Thereafter, they would transition in stages to a long-term growth rate no higher than the long-term forecast rate of nominal GDP growth.

H.2.a.5.

Q THE COMMISSION USES A CONSTANT GROWTH DCF MODEL. SHOULD THE COMMISSION CONSIDER USING A MULTI-STAGE DCF MODEL? IF SO, HOW WOULD THE COMMISSION DETERMINE THE LENGTH OF EACH STAGE OF A PROXY COMPANY'S GROWTH?

A Yes. See my response above to Question H.2.a.4.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

H.2.a.6.

Q ARE SIX MONTHS OF AVERAGE HIGH/LOW HISTORICAL MONTHLY STOCK PRICES AN APPROPRIATE MEASURE FOR THE CURRENT STOCK PRICE "P"?

A In measuring the current market cost of equity, the Commission should strive to minimize the risk of skewing the estimate based on aberrant price and market data. The period studied should be long enough to eliminate aberrant market data but should not be so long that it does not currently reflect current market conditions. The Commission's practice of using six-month dividend yields and six-month bond yields is a reasonable approach.

CAPM

H.2.b.4.

Q. SHOULD THE COMMISSION EMPLOY MORE SOPHISTICATED VERSIONS OF THE CAPM MODEL THAT CONSIDER MORE VARIABLES INSTEAD OF ONLY BETA, SUCH AS THE FAMA-FRENCH MODEL?

A Dr. Cornell is providing the Associations' principal statement on this issue. I agree with him that the right answer is "no." But I will supplement his statement with two additional points. As I recently showed in the Docket Nos. EL14-12 and EL15-45 paper hearings,[19] the "size premium" adjustment to the standard CAPM model that has been applied by transmission owner witnesses in several recent proceedings was based

[19] See Exhibit No. JC-100 at 16-26, provided as Exhibit No. A-3, pages 30-40.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

on a mismatch, in which the size adjustment is quantified using Duff & Phelps data and designed for application to Duff & Phelps betas, but is then applied to Value Line betas. The two sources' betas are not comparable, as only the latter incorporates a "Blume" adjustment—meaning it is moved towards 1.0, which in the case of utility betas almost always means it is raised.[20] Curing this mismatch removes most of the effect of the "size adjustment."[21] Furthermore, Duff & Phelps does not recommend or utilize that adjustment in isolation; it also makes a sector-based ("industry") adjustment, which in the case of the utility sector points in the opposite direction, and indeed more than offsets the "size adjustment."[22]

Expected Earnings

H.2.c.2.

Q. WHAT, IF ANY, CONCERNS REGARDING CIRCULARITY ARE THERE WITH USING THE EXPECTED EARNINGS ANALYSIS TO DETERMINE THE BASE ROE, AS OPPOSED TO USING THE ANALYSIS FOR CORROBORATIVE PURPOSES?

A Dr. Cornell is providing the Associations' principal statement on this issue and other Expected Earnings issues. I agree with him that the Expected Earnings method should not be used. But I will supplement his statement with evidence that the E/B and M/B

[20] *See id*. at 17-24, provided as Exhibit No. A-3, pages 31-38.
[21] *See id.*, Table 1, provided as Exhibit No. A-3, page 36.
[22] *See id*. at 24-25, provided as Exhibit No. A-3, pages 38-39.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

ratios of parent-level holding companies are not representative of the E/B and M/B ratios operating utilities.

In recent study periods, FirstEnergy Corp. has commonly provided transmission owner witnesses' highest E/B result. It does so because Value Line's fifth-year E/B projection for that company jumped from 12.5% as of February 16, 2018[23] to 15.5% as of May 18, 2018.[24] Between those two consecutive quarterly Value Line reports, FE's projected share count and projected dividends did not change, and its projected earnings and earnings/share actually declined. The change that drove the increase in FE's projected E/B ratio was a 25% decrease in projected book value per share, from $24 to $18, apparently due to accounting changes associated with the bankruptcy filing of FE's nonregulated subsidiaries. While that drastic decrease in the denominator of FE's E/B ratio had an outsized effect on the highest E/B ratio to be found among electric utility stocks, there is no basis to infer a corresponding change to such stocks' *representative* E/B ratio, much less the ratio representative of operating utility companies.

Consider also NextEra's recent acquisition (from Southern Company) of Gulf Power Company. NextEra paid approximately Gulf Power Company's net book value: On January 1, 2019, it paid "approximately $4.47 billion in cash consideration" and assumed "approximately $1.3 billion of Gulf Power debt,"[25] thus committing approximately $5.77 billion. In exchange, it acquired an operating utility with a year-

[23] See Exhibit No. A-3, page 41.
[24] See Exhibit No. A-3, page 42.
[25] NextEra, Inc., SEC Form 10-K for 2018 at 98 (Feb. 15, 2019), provided as Exhibit No. A-3, pages 44-45.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

end 2018 regulatory book value of $5.32 billion.[26] Thus, this transaction indicates a utility-level M/B ratio of approximately 1.08, much closer to unity than the contemporaneous M/B ratios of NextEra (approximately 2.54[27]) or Southern (approximately 1.80[28]).

An even lower M/B ratio for an operating utility is indicated by the April 2013 acquisition of Atlantic Path 15 by Duke-American Transmission Company. The seller received "a total sale price of approximately $56 million,"[29] in exchange for an entity whose book value equity ("Total Proprietary Capital") exceeded $60 million.[30] Thus, the M/B ratio indicated[31] by that transaction is below unity.

Circa 2007, Alliant subsidiary Interstate Power and Light Company ("IPL") sold its transmission system to the nascent ITC Midwest—not only selling the associated transmission assets, but doing so as a going concern with its transmission

[26] Gulf Power Co. FERC Form 1 for 2018 at 111, line 85 ("Total Assets" of $5,320,620,672), provided as Exhibit No. A-3, page 47.
[27] Yahoo Finance identifies NEE's year-end 2018 market price as $173.82 (provided as Exhibit No. A-3, page 48). See https://finance.yahoo.com/quote/NEE/history?p=NEE&.tsrc=fin-srch. The February 15, 2019 Value Line (provided as Exhibit No. A-3, page 49) for NEE estimates a year-end 2018 book value per share of $68.30. Applying those amounts' ratio, NEE's year-end 2018 M/B was approximately 2.54.
[28] Yahoo Finance identifies SO's year-end 2018 market price as $43.92, provided as Exhibit No. A-3, page 50. See https://finance.yahoo.com/quote/SO/history?p=SO. The February 15, 2019 Value Line for SO (provided as Exhibit No. A-3, page 51) estimates a year-end 2018 book value per share of $24.35. Applying those amounts' ratio, SO's year-end 2018 M/B was approximately 1.80.
[29] Atlantic Power Corporation SEC Form 10-Q for the Quarter Ended March 31, 2013, at 12 (available at https://www.sec.gov/Archives/edgar/data/1419242/000104746913005749/a2214227z10-q.htm and provided as Exhibit No. A-3, page 53).
[30] Atlantic Path 15, LLC, FERC Form 3-Q for the Quarter Ended March 31, 2013, at 112 line 16 (FERC eLibrary No. 20130430-8004 and provided as Exhibit No. A-3, page 55). The transaction also included assumption of debt, which is excluded from both sides of the foregoing comparison.
[31] The SEC Form 10-Q also states (at 12), provided as Exhibit No. A-3, page 53, that Atlantic Power "recorded a gain on sale of approximately $7.0 million," which would suggest an M/B ratio slightly more than unity rather than slightly less than unity.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

personnel transferred to ITC Midwest. *See generally ITC Holdings Corp.* 121 FERC ¶ 61,229 (2007). IPL expected to receive approximately $165.7 million in "Net Proceeds Above Net Book Value of Assets," which were estimated to be $423.2 million at the anticipated time of closing.[32] Thus, this transaction indicates a utility-level M/B ratio of approximately 1.39,[33] a significant portion of which presumably reflected the market value of ITC Holdings' substantial non-cost incentive ROE adders and ability to profit through double-leveraging. At the exchange-traded parent level, as of year-end 2007, ITC Holdings' M/B ratio was approximately 4.3.[34]

[32] Exhibit CAH-1, Schedule K [~Spiegel R:08904.002 IA, MN, WI COALITION/As organized before 7.24.07/Alliant Filing Documents (SPU 07-11)/Compiled Searchable.pdf at 257 of 541], provided as Exhibit No. A-3, page 57.
[33] That is, in $ millions, (165.7 + 423.2)/423.2=1.39.
[34] According to the September 16, 2016 Value Line for ITC Holdings (provided as Exhibit No. A-3, page 58), its split-adjusted, year-end 2007 book value per share was $4.37, and its contemporaneous market price was between $12.6 and $19.5; https://www.historicalstockprice.com specifies $18.81. The ratio $18.81/$4.37 exceeds 4.3.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Similarly, when FE subsidiary Monongahela Power Company ("Mon Power") sold its Ohio operations to Columbus Southern (a subsidiary of AEP) at year-end 2005, it did so for a utility-level M/B ratio of approximately 1.17[35]—much closer to unity than the M/B ratios of either FE (1.64[36]) or AEP (1.58[37]).

Risk Premium

H.2.d.1.

Q SHOULD THE ANALYSIS BE HISTORICAL OR FORWARD-LOOKING?

A The risk premium analysis should be "forward-looking," but that is best achieved by referencing actual bond yields, which at any given historical time reflect bond investors' forward-looking expectations of future interest rate offerings. It should not combine equity risk premiums found by comparing allowed ROEs to past actual bond yields with a projection of future bond yields. In particular, it would not be rational to derive a risk premium based on actual past utility bond yields, and then add that risk premium to current forecasts of future utility bond yields. Moreover, if regulator-

[35] See Letter from Allegheny Energy Senior Attorney Randall B. Palmer to FERC Secretary Magalie Roman Salas, Docket No. ER05-1312 (Apr. 11, 2006), eLib. 20060411-5026. Mon Power sold assets and associated accounts with a net book value of $44,589,133 for cash or accounts payable valued at $52,369,133, i.e., at a M/B ratio of 1.17. This calculation is conservatively high in that it does not include Mon Power's sale of power at below market prices. Further context for this transaction is provided in Mon Power's FERC Form 1 for 2005, eLib. 20060419-8007, at Page 109.1 (provided as Exhibit No. A-3, page 60), and a contemporaneous AEP press release, https://www.aepohio.com/info/news/viewRelease.aspx?releaseID=217.

[36] See February 20, 2015 Value Line for FE (provided as Exhibit No. A-3, page 61), showing 2005 market price per share range of $37.7 to $53.4 and 2005 year-end book value per share of $27.86; averaging the first two amounts and dividing by the third produces an M/B ratio of 1.63).

[37] See March 20, 2015 Value Line for AEP (provided as Exhibit No. A-3, page 62), showing 2005 market price per share range of $32.3 to $40.8 and 2005 year-end book value per share of $23.08; averaging the first two amounts and dividing by the third produces an M/B ratio of 1.58).

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

allowed ROEs are utilized in identifying the equity risk premium, the data set of past ROE allowances should be limited to decisions that reflect contemporary findings by the Commission of the current market cost of equity, relative to the contemporaneous actual bond yield. Significant timing lags can distort the observed past relationship between the cost of equity and bond yields and thereby distort the output of a risk premium model.

H.2.d.2.

Q IS A RISK PREMIUM ANALYSIS COMPATIBLE WITH A FINDING OF ANOMALOUS CAPITAL MARKET CONDITIONS? WHY OR WHY NOT?

A The particular application of the risk premium method referenced in the *Coakley* and MISO briefing orders (as further referenced in the NOI) assumes a linear relationship between bond yields and the cost of equity, and assumes that equity risk premiums vary *only* with changes in bond yields. This is an oversimplistic and invalid assumption. The fact is that other factors also affect equity risk premiums. Indeed, market literature makes it clear that risk premiums are driven by changes and differences in investment risk. However, if that assumption is followed, and if (as was asserted in Opinion No. 531) "anomalous" market conditions produce an unreliable relationship between bond yields and the cost of equity, then such conditions make such risk premium analysis unreliable.

However, this issue is not unique to the risk premium method. If "anomalous" capital market conditions is used in the same way as Opinions Nos. 531 and 551—

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

meaning conditions under which proven models can no longer be trusted to estimate the cost of equity from visible financial market data—then *no* empirically-grounded estimate of the cost of equity is compatible with anomalous capital market conditions. If the Commission finds market conditions to be anomalous in that sense, it should refrain from attempting to reach its own estimate of what equity costs, and instead should simply rely on the recent average of state commission allowed ROEs for similar services. However, the Commission has identified no basis to conclude that market conditions are anomalous in that sense. For example, just because interest rates move, that is not an indication that market prices of bonds and equities do not adjust to reflect prevailing interest rates or outlooks for future changes in interest rates.

H.2.d.3.

Q UNLIKE THE FINANCIAL MODELS DISCUSSED ABOVE, THE RISK PREMIUM ANALYSIS PRODUCES A SINGLE ROE RATHER THAN A ZONE OF REASONABLENESS. DOES THIS CHARACTERISTIC REQUIRE THE COMMISSION TO USE THE RISK PREMIUM MODEL DIFFERENTLY THAN THE OTHER MODELS?

A To the extent the various models are applied independently (rather than being combined at the individual-proxy level), each should be used to identify a single point value estimate of the cost of equity, as I have discussed in response to Question D10 and its subparts. Accordingly, all of the adopted market-based models can and should be used in the same way; for example, there is no good reason to reference risk the

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

premium method for purposes of setting a replacement ROE while ignoring it for purposes of evaluating whether an existing ROE remains reasonable.

In any case, a risk premium analysis can be used to develop a range or distribution, just like the proxy-based DCF and CAPM methods. It is simply inaccurate to state that the risk premium method can only create a point estimate. For example, past regulatory determinations can be compared to and then added to the yields on more than one class of bonds, thereby generating a range.

H.2.d.3.i.

Q IS THERE A METHOD BY WHICH THE RISK PREMIUM ROE COULD BE ADJUSTED UPWARD FOR AN ABOVE AVERAGE RISK UTILITY OR DOWNWARD FOR A BELOW AVERAGE RISK UTILITY? IF NOT, IS IT REASONABLE TO CONSIDER THE RESULTS OF A RISK PREMIUM ANALYSIS WHEN DETERMINING THE ROE OF AN ABOVE OR BELOW AVERAGE RISK UTILITY?

A Equity risk premiums are typically measured over a standard bond yield, and the risk premium method is commonly applied using past regulatory decisions to stand in for the past cost of equity, without differentiating among decisions involving utilities of other than average risk. As these common practices are not inherent features of risk premium analysis, it is possible to apply the risk premium method differently so as to account for the atypical risk of a particular subject utility. For example, where properly supported, the analysis could exclude past cases in which the past-case utility

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

had a credit rating more than one "notch" different from that of the utility presently at issue, and/or could apply the identified equity risk premium to the bond yield applicable to the subject utility's own credit rating.

Q DOES THIS CONCLUDE YOUR AFFIDAVIT?

A Yes.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Qualifications of Michael P. Gorman

Q PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A Michael P. Gorman. My business address is 16690 Swingley Ridge Road, Suite 140, Chesterfield, MO 63017.

Q PLEASE STATE YOUR OCCUPATION.

A I am a consultant in the field of public utility regulation and a Managing Principal with the firm of Brubaker & Associates, Inc. ("BAI"), energy, economic and regulatory consultants.

Q PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND WORK EXPERIENCE.

A In 1983 I received a Bachelor of Science Degree in Electrical Engineering from Southern Illinois University, and in 1986, I received a Master's Degree in Business Administration with a concentration in Finance from the University of Illinois at Springfield. I have also completed several graduate level economics courses.

In August of 1983, I accepted an analyst position with the Illinois Commerce Commission ("ICC"). In this position, I performed a variety of analyses for both formal and informal investigations before the ICC, including: marginal cost of energy, central dispatch, avoided cost of energy, annual system production costs, and working capital. In October of 1986, I was promoted to the position of Senior

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Analyst. In this position, I assumed the additional responsibilities of technical leader on projects, and my areas of responsibility were expanded to include utility financial modeling and financial analyses.

In 1987, I was promoted to Director of the Financial Analysis Department. In this position, I was responsible for all financial analyses conducted by the Staff. Among other things, I conducted analyses and sponsored testimony before the ICC on rate of return, financial integrity, financial modeling and related issues. I also supervised the development of all Staff analyses and testimony on these same issues. In addition, I supervised the Staff's review and recommendations to the Commission concerning utility plans to issue debt and equity securities.

In August of 1989, I accepted a position with Merrill-Lynch as a financial consultant. After receiving all required securities licenses, I worked with individual investors and small businesses in evaluating and selecting investments suitable to their requirements.

In September of 1990, I accepted a position with Drazen-Brubaker & Associates, Inc. ("DBA"). In April 1995, the firm of Brubaker & Associates, Inc. was formed. It includes most of the former DBA principals and Staff. Since 1990, I have performed various analyses and sponsored testimony on cost of capital, cost/benefits of utility mergers and acquisitions, utility reorganizations, level of operating expenses and rate base, cost of service studies, and analyses relating to industrial jobs and economic development. I also participated in a study used to revise the financial policy for the municipal utility in Kansas City, Kansas.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

At BAI, I also have extensive experience working with large energy users to distribute and critically evaluate responses to requests for proposals ("RFPs") for electric, steam, and gas energy supply from competitive energy suppliers. These analyses include the evaluation of gas supply and delivery charges, cogeneration and/or combined cycle unit feasibility studies, and the evaluation of third-party asset/supply management agreements. I have participated in rate cases on rate design and class cost of service for electric, natural gas, water and wastewater utilities. I have also analyzed commodity pricing indices and forward pricing methods for third party supply agreements and have also conducted regional electric market price forecasts.

In addition to our main office in St. Louis, the firm also has branch offices in Phoenix, Arizona and Corpus Christi, Texas.

Q HAVE YOU EVER TESTIFIED BEFORE A REGULATORY BODY?

A Yes. I have sponsored testimony on cost of capital, revenue requirements, cost of service and other issues before the Federal Energy Regulatory Commission and numerous state regulatory commissions including: Arkansas, Arizona, California, Colorado, Delaware, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Louisiana, Michigan, Mississippi, Missouri, Montana, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Oregon, South Carolina, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, Wyoming, and before the provincial regulatory boards in Alberta and Nova Scotia, Canada. I have also sponsored testimony before the Board of Public Utilities in Kansas City, Kansas;

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

presented rate setting position reports to the regulatory board of the municipal utility in Austin, Texas, and Salt River Project, Arizona, on behalf of industrial customers; and negotiated rate disputes for industrial customers of the Municipal Electric Authority of Georgia in the LaGrange, Georgia district.

Q PLEASE DESCRIBE ANY PROFESSIONAL REGISTRATIONS OR ORGANIZATIONS TO WHICH YOU BELONG.

A I earned the designation of Chartered Financial Analyst ("CFA") from the CFA Institute. The CFA charter was awarded after successfully completing three examinations which covered the subject areas of financial accounting, economics, fixed income and equity valuation and professional and ethical conduct. I am a member of the CFA Institute's Financial Analyst Society.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Acronyms and Abbreviations

Associations	Aluminum Association, American Chemistry Council, American Forest and Paper Association, American Public Power Association, Electricity Consumers Resource Council, Industrial Energy Consumers of America, National Rural Electric Cooperative Association, and Transmission Access Policy Study Group
BAI	Brubaker & Associates, Inc.
CAPM	Capital Asset Pricing Model
CFA	Chartered Financial Analyst
Commission	Federal Energy Regulatory Commission
DBA	Drazen-Brubaker & Associates, Inc.
DCF	Discounted Cash Flow
E/B	Earnings/Book
EEI	Edison Electric Institute
FERC	Federal Energy Regulatory Commission
GDP	Gross Domestic Product
Hope and *Bluefield*	*Bluefield Water Works & Improvement Co. v. Pub. Serv. Comm'n of W. Va.*, 262 U.S. 679 (1923) and *Fed. Power Comm'n v. Hope Natural Gas Co.*, 320 U.S. 591 (1944)
IBES	Institutional Brokers' Estimate System
IPL	Interstate Power and Light Company
ICC	Illinois Commerce Commission
MISO TO	Midcontinent Independent System Operator, Inc.
NOI	Notice of Inquiry
P/E	Price-to-Earnings
RFP	Request for Proposals
ROE	Return on Equity
TO	Transmission Owner
Value Line	*The Value Line Investment Survey*
WACC	Weighted Average Cost of Capital

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

ASSOCIATIONS EXHIBIT NO. A-3

S&P Global
Ratings

Industry Top Trends 2019

North America Regulated Utilities

November 8, 2018

Authors

Gabe Grosberg
New York
+1 212 438 6043
gabe.grosberg
@spglobal.com

Kyle Loughlin
New York
+1 212 438 7804
kyle.loughlin
@spglobal.com

Gerrit Jepsen
New York
+1 212 438 2529
gerrit.jepsen
@spglobal.com

Obie Ugboaja
New York
+1 212 438 7406
obioma.ugboaja
@spglobal.com

Key Takeaways

- **Ratings Outlook:** Rating trends across regulated electric, gas, and water utilities in North America remain mostly stable, reflecting generally supportive regulatory oversight. However, the industry's financial measures weakened in 2018 as a result of U.S. tax reform, robust capital spending, and flat to slightly negative load growth. In general, those utilities most affected by these developments were those who strategically operate with a minimal financial cushion at their current rating.
- **Forecasts:** We expect only modest financial improvement in 2019, reflecting somewhat improving margins partially offset by rising debt. Margin improvement will reflect productivity improvements from technological investments, favorable fuel cost trends, and higher revenues from robust capital investments and acquisitions.
- **Assumptions:** We expect overall capital spending to remain elevated through 2020, primarily due to rising infrastructure spending needs. Sales growth will generally remain flat to slightly negative, reflecting customer growth offset by conservation.
- **Risks and Opportunities:** To grow, utilities are merging and acquiring higher-risk businesses outside of the industry. The transformation of fossil generation to renewables provides utilities with an opportunity to grow while reducing their environmental risks. Also, increasing electric vehicles sales will lead to higher load growth, partially offsetting the negative effects of conservation.
- **Industry Trends:** The North America utility industry is mostly stable with some downside ratings exposure. Weaker credit measures from tax reform will likely persist in 2019, reflecting tax-related rate reductions carryovers. However, we expect that some utilities will offset this reduced revenue with further equity infusions or asset sales. Other developing trends include rising interest rates, inflation, technology, climate change, and regulatory lag, which could further stress the industry's credit quality.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Ratings trends and outlook

North America Regulated Utilities

Chart 1

Ratings distribution

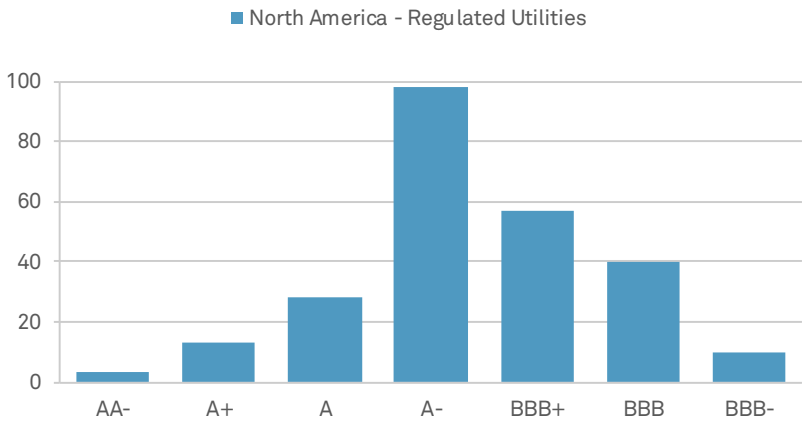


Chart 2

Ratings outlooks

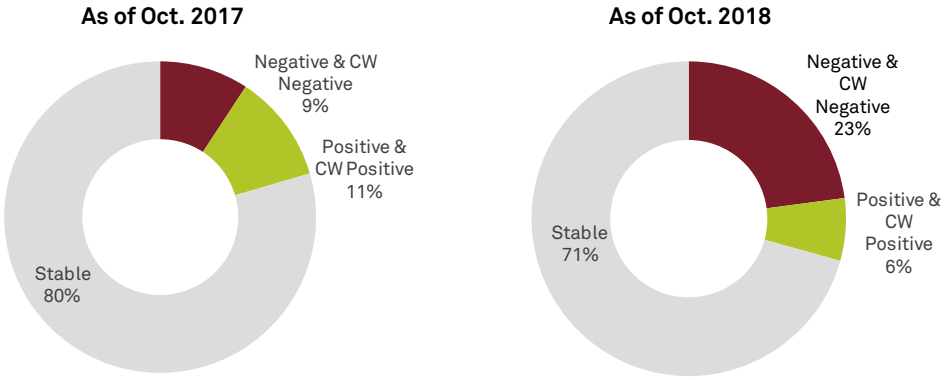
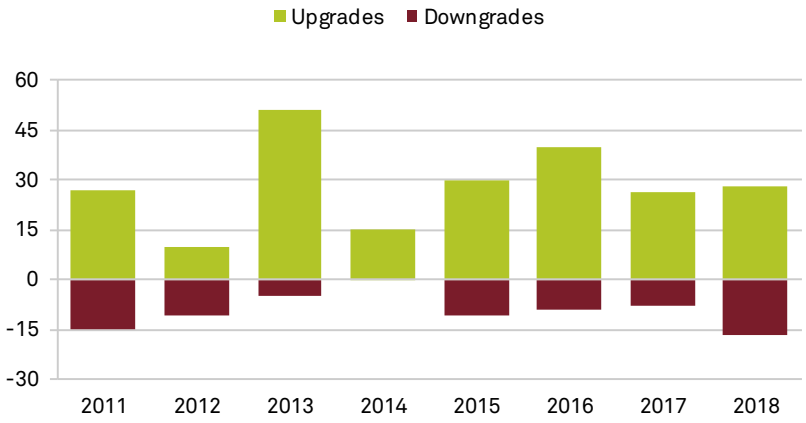


Chart 3

Ratings upgrades and downgrades



Source: S&P Global Ratings. Ratings data as of October 15, 2018

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Industry credit metrics

North America Regulated Utilities

Chart 4

Debt / EBITDA (median, adjusted)

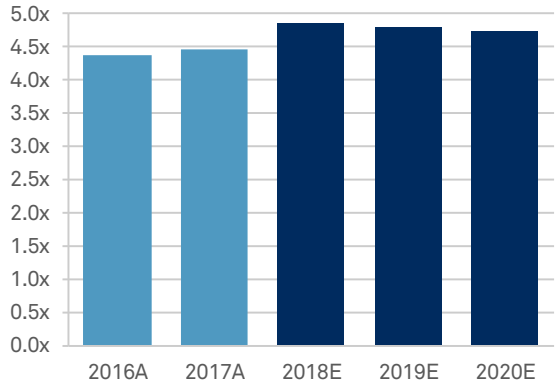


Chart 5

FFO / Debt (median, adjusted)

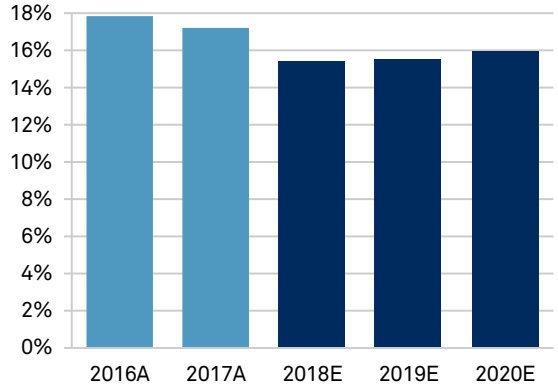


Chart 6

Cash flow and primary uses

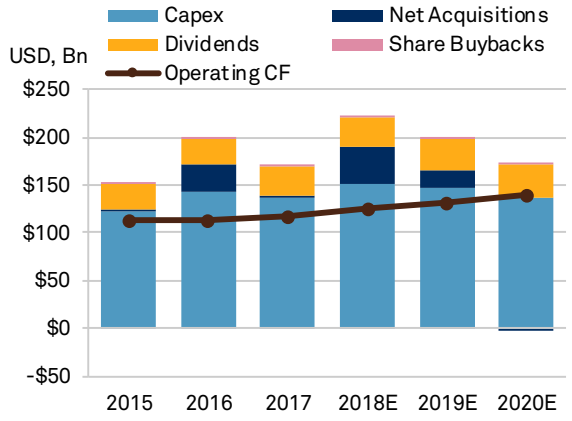


Chart 7

Equity Issuance

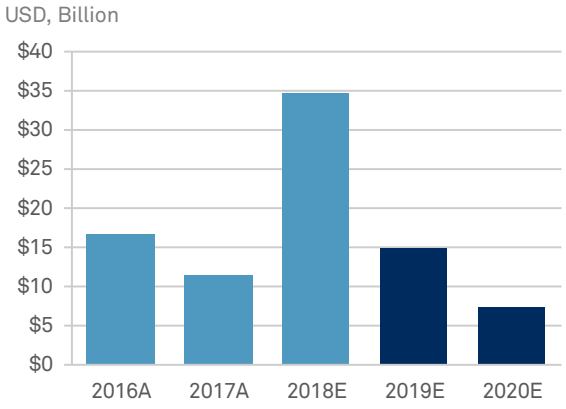
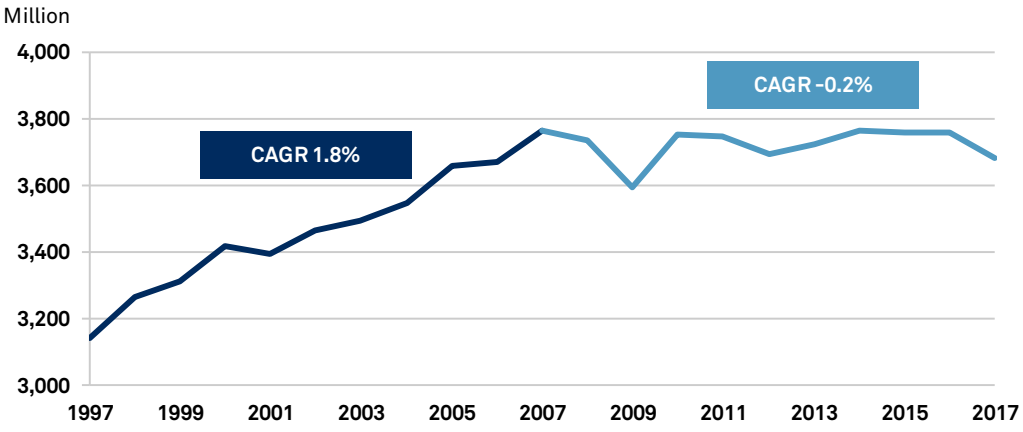


Chart 8

Total U.S. megawatt hours sold

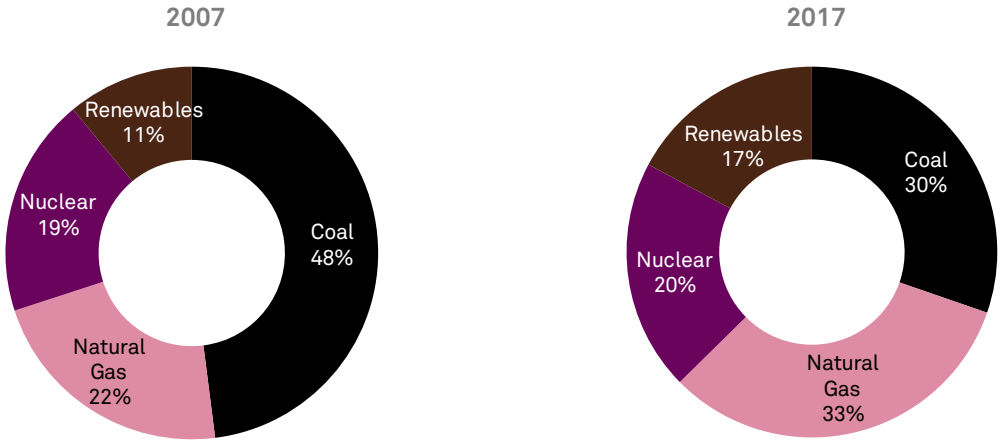


Source: S&P Global Ratings, S&P Global Market Intelligence, EIA U.S. sales growth 1990-2016. FFO--Funds from operations.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Chart 9

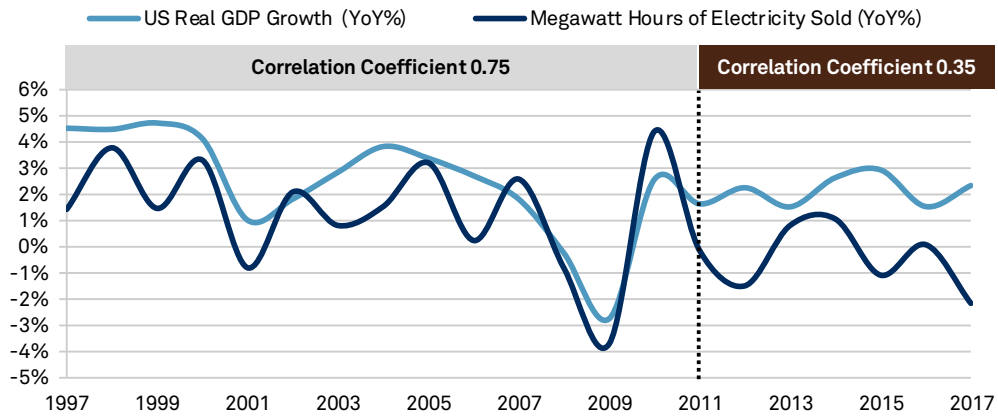
Generation Mix By Energy Source



Source: S&P Global Ratings, S&P Global Market Intelligence

Chart 10

Correlation Of U.S. GDP and Electricity Sales



Source: S&P Global Ratings

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Industry outlook

Key assumptions

1. Conservation has reduced demand tied to economic growth

Historically, a strong correlation existed between economic growth and the demand for electricity. Since 2011, conservation has significantly curtailed sales growth, leading to a very weak correlation between utility sales and economic growth. Our base case incorporates flat to slightly negative sales growth over the next three years, reflecting new customer growth offset by conservation. To achieve growth, we expect that utilities will pursue mergers with other utilities as well as acquisitions of slightly higher-risk businesses outside of the direct utility industry.

2. Regulation and public policy support earnings and cash flow

We expect that regulators will continue to provide utilities with constructive frameworks that support credit quality. For most regulators, the requirement that utilities provide safe, reliable, and affordable utility services remains a priority. This regulatory perspective is balanced against an increasing awareness that the utility infrastructure in North America is aging, and that utilities may have to invest necessary capital to maintain and improve the infrastructure apparatus for electric, gas, and water systems. Such regulated infrastructure capital spending most often translates to low-risk rate base growth. In addition, regulatory support ensuring timely recovery of costs generally remains favorable for utilities' credit quality. Numerous cost recovery riders, trackers, and forward mechanisms provide more timely recovery of utility costs and reduce the regulatory lag. As such, we expect low-risk rate base growth to drive utilities' earnings and cash flows despite flat to slightly negative sales growth. From a public policy perspective, we also expect utilities will be given sufficient time to adapt to various public policy initiatives, including those relating to renewable energy, grid resilience, reduced emissions, improved technology, and higher safety standards.

3. Elevated capital spending to meet infrastructure needs

We assume that capital spending for North America's regulated electric, gas and water utilities will remain robust for 2019 and 2020 at about $140 billion annually. In general, we expect that the industry will invest in smaller scale infrastructure projects that improve safety and reliability and boost productivity. Capital spending can provide margin growth when sales are diminished by recovering investments made on a growing rate base and by reducing cost through technology investments. Furthermore, capital spending is often welcomed by policymakers that appreciate the economic stimulus and the benefits of a safer and more reliable service. The speed with which the regulatory process turns the new spending into higher rates to begin to pay for the capital investment is an important factor in our assumptions and forecast. Any extended lag between spending and recovery can exacerbate the negative effect on credit metrics and therefore ratings. Investments in new generation with reduced emissions will drive higher capital spending. These types of investments would focus on renewable and natural gas-fired generation. Other areas of investment would include smart grids, electric vehicle charging stations, batteries, mergers within the industry, and acquisitions outside of the utility industry.

4. Generally flat operating and maintenance expense

We expect utilities to continue to lower operating and maintenance expenses through productivity initiatives and technological improvements. Because utilities earn on their capital investments, each dollar saved in operating expense provides headroom in the

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

customer bill for increased capital investments, boosting a utility's financial performance without excessively increasing the customer bill. The deployment of technology such as digital meters can increase efficiency of operations while also securing the integrity of a utility's operations. Furthermore, investing in solar generation not only reduces operating and environmental risks, compared to fossil fuel generation, but also lowers a utility's operating and maintenance expenses. A solar generation installation requires very few people to operate, which reduces maintenance expenses, and it does not require any fossil fuel to generate electricity. As a comparison, coal generation burns fossil fuel to generate electricity and a nuclear generating facility could require thousands of employees to safely operate and maintain the facility.

5. Equity, hybrids, and asset sales to support credit quality

In2018, North America regulated utilities took steps to preserve credit quality, by issuing common equity and hybrid securities, and by selling assets to support their financial measures. In particular, the industry utilities issued about $35 billion of common equity in 2018, compared to about $10 billion in 2017 and about $15 billion in 2016. Driving this trend were weaker financial measures because of U.S. tax reform, robust capital spending, and M&A. For 2019, we expect equity issuance to temper to about $15 billion. Credit quality remains important to the utility industry and the large 2018 equity issuances demonstrates that utilities will take the necessary steps to protect credit quality when facing financial challenges.

Key risks and opportunities

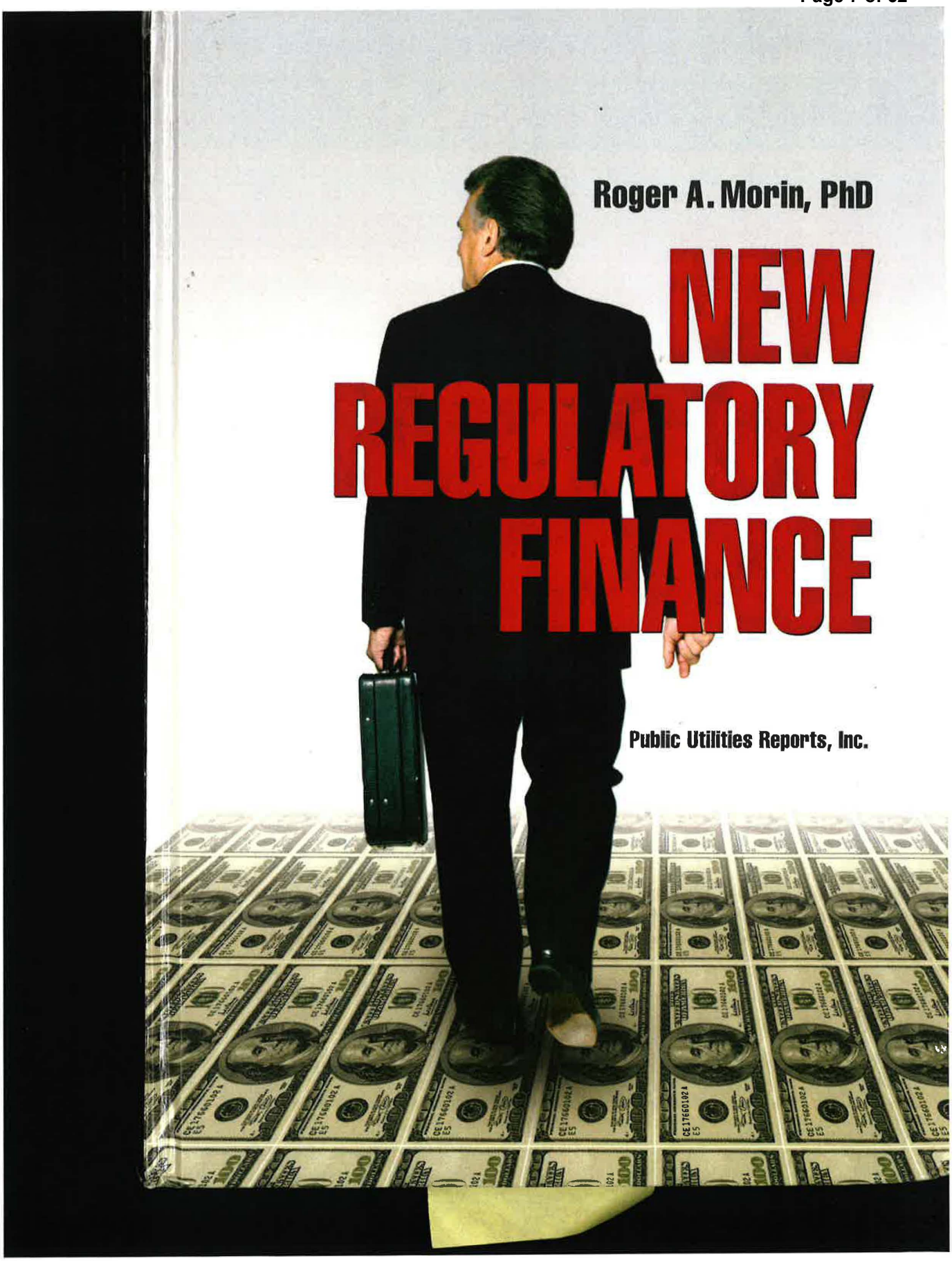
1. Mergers and acquisitions

In order to respond to sector challenges and disruption, we expect continued M&A activity despite rising interest rates. Due to conservation and sluggish load growth, two primary M&A strategies have developed within the industry. The first is to grow the absolute size of the utility business across multiple states and regulatory jurisdictions. This strategy attempts to reduce costs by identifying synergies and implements best practices across utilities. Canadian and U.S. utilities have also been focusing on growing by diversifying their utility portfolio (gas utilities buying electric utilities and vice versa, and even an electric/gas utility holding company acquiring water utilities) or cross-border combinations (mostly Canadian holding companies acquiring U.S. utilities). The second strategy is to grow through the acquisition of slightly higher-risk businesses (contracted assets) outside of the utility industry. Low interest rates by historical standards, strong stock prices, and plentiful leverage have justified paying large multiples of late. We've also seen holding companies once again thinking about rationalizing their portfolios with selective sales and purchases of smaller, less strategic utilities to gain scale within a jurisdiction or exit if scale is not feasible. Cost of capital has been slowly rising but is still well below the historical average. As a result, 2019 could bring more transactions before higher interest rates start to dissuade purchasers.

2. Generation transformation and disruption

Regulated electric utilities have been modifying their generation fleets to reduce emissions from power plants, electing to close aging coal plants and build low or zero emissions generation. Utilities have been shifting away from building bigger baseload generating stations, particularly coal and nuclear, to more modular construction that can be scaled up at an existing site on an as-needed basis. Improved economics associated with renewable generation support this trend, and utilities are able to benefit from efficiencies of scale.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM



20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

EXAMPLE 8-1

We have the following market data for Utility X:

current dividend per share = $1.62
current stock price = $25.00
expected dividend growth = 4%

From Equation 8-8, the standard DCF model produces a cost of equity of:

$$K = D_1 / P_0 + g$$
$$= D_0(1+g) / P_0 + g$$
$$= \$1.62\ (1.04) / \$25 + .04$$
$$= 6.7\% + 4.0\% = 10.7\%$$

Note that next year's expected dividend is the current spot dividend increased by the expected growth rate in dividends. In general, implementation of the approach requires finding D_0 and P_0 from readily available sources of market data; the growth rate, g, can be estimated using several techniques. One way is to rely on analysts' long-term growth forecasts. Chapter 9 will discuss the application of the DCF formulation in detail.

Standard DCF Model Assumptions

The assumptions underlying the standard DCF model have been the source of controversy, confusion, and misunderstanding in rate hearings. This section clarifies these assumptions.

Theories are simplifications of reality and the models articulated from theories are necessarily abstractions from and simplifications of the existing world so as to facilitate understanding and explanation of the real world. The DCF model is no exception to the rule. The assumptions of the standard DCF model are as follows:

Assumption #1. The four assumptions discussed earlier in conjunction with the general classical theory of security valuation still remain in force.

Assumption #2. The discount rate, K, must exceed the growth rate, g. In other words, the standard DCF model does not apply to growth stocks. In Equation 8-7, it is clear that as g approaches K, the denominator gets progressively smaller, and the price of the stock infinitely large. If g exceeds K, the price becomes negative, an implausible situation. In the derivation of the standard

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

DCF equation (8-7) from the general stock valuation equation (8-5), it was necessary to assume g is less than K in order for the series of terms to converge toward a finite number. With this assumption, the present value of steadily growing dividends becomes smaller as the discounting effect of K in the denominator more than offsets the effect of such growth in the numerator.

This assumption is realistic for most public utilities. Investors require a return commensurate with the amount of risk assumed, and this return likely exceeds the expected growth rate in dividends for most public utilities. Although it is possible that a firm could sustain very high growth rates for a few years, no firm could double or triple its earnings and dividends indefinitely.

Assumption #3. The dividend growth rate is constant in every year to infinity. This assumption is not as problematic as it appears. It is not necessary that g be constant year after year to make the model valid. The growth rate may vary randomly around some average expected value. Random variations around trend are perfectly acceptable, as long as the mean expected growth is constant. The growth rate must be ''expectationally constant,'' to use formal statistical jargon. This assumption greatly simplifies the model without detracting from its usefulness.

If investors expect growth patterns to prevail in the future other than constant infinite growth, more complex DCF models are available. For example, investors may expect dividends to grow at a relatively modest pace for the first 5 years and to resume a higher normal steady-state course thereafter, or conversely. The general valuation framework of Equation 8-5 can handle such situations. The ''non-constant growth'' model presented later in the chapter is a popular version of the DCF model.

It should be pointed out that the standard DCF model does not require infinite holding periods to remain valid. It simply assumes that the stock will be yielding the same rate of return at the time of sale as it is currently yielding. Example 8-2 illustrates this point.

Another way of stating this assumption is that the DCF model assumes that market price grows at the same rate as dividends. Although g has been specified in the model to be the expected rate of growth in dividends, it is also implicitly the expected rate of increase in stock price (expected capital gain) as well as the expected growth rate in earnings per share. This can be seen from Equation 8-7, which in period 1 would give:

$$P_1 = D_2 / (K - g)$$

But $D_2 = D_1(1 + g)$ and $P_0 = D_1 / (K - g)$

so that $P_1 = D_1(1 + g)/(K - g) = P_0(1 + g)$

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

EXAMPLE 8-2

We have the following market data for Utility X:

current dividend per share = $1.62
current stock price = $13.00
expected dividend growth = 4%

Consider a 3-year holding period. If both price and dividend grow at the 4% expected rate, dividends for each of the next 3 years are $1.68, $1.75, and $1.82, respectively, and the price at the end of the third year is $13 $(1 + .04)^3 = \$14.62$. If the investor sells the stock at the end of the third year, the return expected by the investor is still 17%, because the present value of the dividend stream and the stock price at resale is exactly equal to the current purchase price:

$$P_0 = \frac{1.68}{1.17} + \frac{1.75}{1.17^2} + \frac{1.82}{1.17^3} + \frac{14.62}{1.17^3}$$

$$= \$13.00$$

The same result obtains for any value of "n," that is, for any length of holding period. The main result of the DCF model does not depend on the value of n. In other words, the DCF model is independent of the investor holding period.

Hence, g is the expected growth in stock price. Similarly, if a fixed fraction of earnings are distributed in dividends, then:

$$D_1 = aE_1 \quad \text{and} \quad D_2 = aE_2$$

where a is the constant payout ratio and E the earnings per share. Since $D_2 = D_1(1 + g)$, we also have $E_2 = E_1(1 + g)$ and, hence, g is the expected growth in earnings per share.

Yet another way to express the idea that the validity of the standard DCF model does not depend on the value of the investor's holding period is to say that investors expect the ratio of market price to dividends (or earnings) in year n, P_n/D_n, to be the same as the current price/dividend ratio, P_0/D_0. This must be true if the infinite growth assumption is made. Investors will only expect $(P/E)_n$ to differ from $(P/E)_0$ if they believe that the growth following year n will differ from the growth expected before year n, since the price in year n is the present value of all subsequent dividends from {n + 1} to infinity.

The constancy of the price/earnings (P/E) assumption is not prohibitive to DCF usage. If there is reason to believe that stock price will grow at a different

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

rate than dividends (for example, if the stock price is expected to converge to book value), a slightly more complex model is warranted. Such a model is presented in section 8.6.

Assumption #4. Investors require the same return K every year. The assumption of a flat yield curve was alluded to earlier, but requires elaboration. A firm's cost of capital, K, varies directly with the risk of the firm. By assuming the constancy of K, the model abstracts from the effects of a change in risk on the value of the firm. If K is to remain constant, the firm's capital structure policy and dividend payout policy must be assumed to remain stable so as to neutralize any effect of capital structure changes or dividend policy changes on K.

The assumption of a constant dividend payout policy not only simplifies the mathematics but also insulates the model from any effects of dividend policy on risk, if any, and hence on K. Besides, this assumption was indirectly stated earlier; a constant dividend policy implies that dividends and earnings grow at the same rate. The assumption of a constant dividend payout is realistic. Most firms, including utilities, tend to maintain a fixed payout rate when it is averaged over several years.

The simplification of a constant capital structure may be acceptable if the utility exhibits a near constant debt-equity ratio over time and is expected to do so in the future.

Assumption #5. The standard DCF model assumes no external financing. All financing is assumed to be conducted by the retention of earnings. No new equity issues are used or, if they are, they are neutral in effect with respect to existing shareholders. Without this assumption, the per share dividends could be watered down by a new stock issue, violating the constant growth assumption. A more comprehensive model allowing for external stock financing is presented in a later section.

8.4 The Determinants of Dividend Growth

It is instructive to describe the factors that cause growth in dividends to occur and to disaggregate the growth term in the standard DCF model into its contributory elements.

The "retention ratio" is defined as the percentage of earnings retained by the firm for reinvestment. The fraction of earnings not ploughed back into the firm's asset base is paid out as dividends, and is referred to as the "dividend payout ratio." Under the DCF assumption of no external financing, if a firm is expected to retain a fraction b of its earnings and expected to earn a book return of r on common equity investments, then its earnings, dividends, book

Year	Eq Ba
1	$10
2	$10
3	$11
4	$11
5	$12
—	-
—	-
—	-
etc.	et
g =	5

value, and mar
a firm's sustain
times its retent
the reinvestme

The relationshi
payout ratio, b
by reference to

Table 8-1 shov
capital base of
earnings in divi
on an initial c
dividends, and
$100. An equit
the cycle in th
is paid out in d
base to $110.25
in each subseq
arbitrarily assu
with the DCF
book return o
dividends per
and stock price

In summary:

But:

so that:

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

includes many *ad hoc* forecasts from statistical models, ranging from the naive methods of simple averages, moving averages, etc. to the sophisticated time-series techniques such as the Box-Jenkins modeling techniques. The literature suggests that analysts' earnings forecasts incorporate all the public information available to the analysts and the public at the time the forecasts are released. This finding implies that analysts have already factored historical growth trends into their forecast growth rates, making reliance on historical growth rates somewhat redundant and, at worst, potentially double counting growth rates which are irrelevant to future expectations. Furthermore, these forecasts are statistically more accurate than forecasts based solely on historical earnings, dividends, book value equity, and the like.

Summary of Empirical Research

Important papers include Brown and Rozeff (1978), Cragg and Malkiel (1968, 1982), Harris (1986), Vander Weide and Carleton (1988), Lys and Sohn (1990), and Easterwood and Nutt (1999).

The study by Brown and Rozeff (1978) shows that analysts, as proxied by Value Line analysts, make better forecasts than could be obtained using only historical data, because analysts have available not only past data but also a knowledge of such crucial factors as rate case decisions, construction programs, new products, cost data, and so on. Brown and Rozeff test the accuracy of analysts' forecasts versus forecasts based on past data only, and conclude that their evidence of superior analyses means that analysts' forecasts should be used in studies of cost of capital. Their evidence supports the hypothesis that Value Line analysts consistently make better predictions than historical time-series models.

Using the IBES consensus earnings forecasts as proxies for investor expectation, Harris (1986) estimates the cost of equity using expected rather than historical earnings growth rates. In his review of the literature on financial analysts' forecasts, Harris concludes that a growing body of knowledge shows that analysts' earnings forecasts are indeed reflected in stock prices. Elton, Gruber, and Gultekin (1981) show that stock prices react more to changes in analysts' forecasts of earnings than they do to changes in earnings themselves, suggesting the usefulness of analysts' forecasts as surrogates for market expectations. In an extensive National Bureau of Economic Research study using analysts' earnings forecasts, Cragg and Malkiel (1982) present detailed empirical evidence that the average analyst's expectation is more similar to expectations being reflected in the marketplace than historical growth rates, and that it is the best possible source of DCF growth rates. The authors show that historical growth rates do not contain any information that is not already impounded in analysts' growth forecasts. They conclude that the expectations formed by Wall Street professionals get quickly and thoroughly impounded

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

into the prices of securities and that the company valuations made by analysts are reflected in security prices.

Vander Weide and Carleton (1988) update the Cragg and Malkiel study and find overwhelming evidence that the consensus analysts' forecasts of future growth is superior to historically oriented growth measures in predicting the firm's stock price. Their results also are consistent with the hypothesis that investors use analysts' forecasts, rather than historically oriented growth calculations, in making stock buy-and-sell decisions. A study by Timme and Eiseman (1989) produced similar results.

Using virtually all publicly available analyst earnings forecasts for a large sample of companies (over 23,000 individual forecasts by 100 analyst firms), Lys and Sohn (1990) show that stock returns respond to individual analyst earnings forecasts, even when they are closely preceded by earnings forecasts made by other analysts or by corporate accounting disclosures. Using actual and IBES data from 1982–1995, Easterwood and Nutt (1999) regress the analysts' forecast errors against either historical earnings changes or analysts' forecasting errors in the prior years. Results show that analysts tend to underreact to negative earnings information, but overreact to positive earnings information.

The more recent studies provide evidence that analysts make biased forecasts and misinterpret the impact of new information.[11] For example, several studies in the early 1990s suggest that analysts either systematically underreact or overreact to new information. Easterwood and Nutt (1999) discriminate between these different reactions and reported that analysts underreact to negative information, but overreact to positive information. The recent studies do not necessarily contradict the earlier literature. The earlier research focused on whether analysts' earnings forecasts are better at forecasting future earnings than historical averages, whereas the recent literature investigates whether the analysts' earnings forecasts are unbiased estimates of future earnings. It is possible that even if the analysts' forecasts are biased, they are still closer to future earnings than the historical averages, although this hypothesis has not been tested in the recent studies. One way to assess the concern that analysts' forecasts may be biased upward is to incorporate into the analysis the growth forecasts of independent research firms, such as Value Line, in addition to the analyst consensus forecast. Unlike investment banking firms and stock brokerage firms, independent research firms such as Value Line have no incentive to distort earnings growth estimates in order to bolster interest in common stocks.

[11] Other relevant papers corroborating the superiority of analysts' forecasts as predictors of future returns versus historical growth rates include: Fried and Givoly (1982), Moyer, Chatfield and Kelley (1985), and Gordon, Gordon and Gould (1989).

Some argue
those actuall
The magnit
stable segm
severity of t
exists at all
companies
understating
by analysts
and may in
be circumv
long-term e
or third stag

Empirical st
primarily o
houses and
Thus, both
primarily o
rates alone.

Ideally, one
then confin
reliable data
with poor t
poor foreca
poor future
typically ha
recommend
the availabl
produce the

Growth rate
Value Line
tem), Zacks
Multex We
reporting o
growth fore
and other f
These firms
banks, and
Zacks Inve

[12] Examples
Touche R

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Some argue that analysts tend to forecast earnings growth rates that exceed those actually achieved and that this optimism biases the DCF results upward. The magnitude of the optimism bias for large rate-regulated companies in stable segments of an industry is likely to be very small. Empirically, the severity of the optimism problem is unclear for regulated utilities, if a problem exists at all. It is interesting to note that Value Line forecasts for utility companies made by independent analysts with no incentive for over- or understating growth forecasts are not materially different from those published by analysts in security firms with incentives not based on forecast accuracy, and may in fact be more robust. If the optimism problem exists at all, it can be circumvented by relying on multiple-stage DCF models that substitute long-term economic growth for analysts' growth forecasts in the second and/or third stages of the model.

Empirical studies have also been conducted showing that investors who rely primarily on data obtained from several large reputable investment research houses and security dealers obtain better results than those who do not.[12] Thus, both empirical research and common sense indicate that investors rely primarily on analysts' growth rate forecasts rather than on historical growth rates alone.

Ideally, one could decide which analysts make the most reliable forecasts and then confine the analysis to those forecasts. This would be impractical since reliable data on past forecasts are generally not available. Moreover, analysts with poor track records are replaced by more competent analysts, so that a poor forecasting record by a particular firm is not necessarily indicative of poor future forecasts. In any event, analysts working for large brokerage firms typically have a following, and investors who heed a particular analyst's recommendations do exert an influence on the market. So, an average of all the available forecasts from large reputable investment houses is likely to produce the best DCF growth rate.

Growth rate forecasts are available online from several sources. For example, Value Line Investment Analyzer, IBES (Institutional Brokers' Estimate System), Zacks Investment Research, Reuters, First Call, Yahoo Finance, and Multex Web sites provide analysts' earnings forecasts on a regular basis by reporting on the results of periodic (usually monthly) surveys of the earnings growth forecasts of a large number of investment advisors, brokerage houses, and other firms that engage in fundamental research on U.S. corporations. These firms include most large institutional investors, such as pension funds, banks, and insurance companies. Representative of industry practices, the Zacks Investment Research Web site is a central location whereby investors

[12] Examples of these studies include Stanley, Lewellen and Schlarbaum (1981) and Touche Ross Co. (1982).

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

are able to research the different analyst estimates for any given stock without necessarily searching for each individual analyst. Zacks gathers and compiles the different estimates made by stock analysts on the future earnings for the majority of U.S. publicly traded companies. Estimates of earnings per share for the upcoming 2 fiscal years, and a projected 5-year growth rate in such earnings per share are available at monthly intervals. The forecast 5-year growth rates are normalized in order to remove short-term distortions. Forecasts are updated when analysts formally change their stated predictions.

Exclusive reliance on a single analyst's growth forecast runs the risk of being unrepresentative of investors' consensus forecast. One would expect that averages of analysts' growth forecasts, such as those contained in IBES or Zacks, are more reliable estimates of investors' consensus expectations likely to be impounded in stock prices.[13] Averages of analysts' growth forecasts rather than a single analyst's growth forecasts are more reliable estimates of investors' consensus expectations.

One problem with the use of published analysts' forecasts is that some forecasts cover only the next one or two years. If these are abnormal years, they may not be indicative of longer-run average growth expectations. Another problem is that forecasts may not be available in sufficient quantities or may not be available at all for certain utilities, for example water utilities, in which case alternate methods of growth estimation must be employed.

Some financial economists are uncomfortable with the assumption that the DCF growth rates are perpetual growth rates, and argue that above average growth can be expected to prevail for a fixed number of years and then the growth rate will settle down to a steady-state, long-run level, consistent with that of the economy. The converse also can be true whereby below-average growth can be expected to prevail for a fixed number of years and then the growth rate will resume a higher steady-state, long-run level. Extended DCF models are available to accommodate such assumptions, and were discussed in Chapter 8.

Earnings versus Dividend Forecasts

Casual inspection of the Zacks Investment Research, First Call Thompson, and Multex Web sites reveals that earnings per share forecasts dominate the information provided. There are few, if any, dividend growth forecasts. Only Value Line provides comprehensive long-term dividend growth forecasts. The wide availability of earnings forecasts is not surprising. There is an abundance of evidence attesting to the importance of earnings in assessing investors'

[13] The earnings growth rates published by Zacks, First Call, Reuters, Value Line, and IBES contain significant overlap since all rely on virtually the same population of institutional analysts who provide such forecasts.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

expectations. The sheer volume of earnings forecasts available from the investment community relative to the scarcity of dividend forecasts attests to their importance. The fact that these investment information providers focus on growth in earnings rather than growth in dividends indicates that the investment community regards earnings growth as a superior indicator of future long-term growth. Surveys of analytical techniques actually used by analysts reveal the dominance of earnings and conclude that earnings are considered far more important than dividends. Finally, Value Line's principal investment rating assigned to individual stocks, Timeliness Rank, is based primarily on earnings, accounting for 65% of the ranking.

Historical Growth Rates Versus Analysts' Forecasts

Obviously, historical growth rates as well as analysts' forecasts provide relevant information to the investor with regard to growth expectations. Each proxy for expected growth brings information to the judgment process from a different light. Neither proxy is without blemish; each has advantages and shortcomings. Historical growth rates are available and easily verifiable, but may no longer be applicable if structural shifts have occurred. Analysts' growth forecasts may be more relevant since they encompass both history and current changes, but are nevertheless imperfect proxies.

9.5 Growth Estimates: Sustainable Growth Method

The third method of estimating the growth component in the DCF model, alternately referred to as the ''sustainable growth'' or ''retention ratio'' method, can be used by investment analysts to predict future growth in earnings and dividends. In this method, the fraction of earnings expected to be retained by the company, b, is multiplied by the expected return on book equity, r, to produce the growth forecast. That is,

$$g = b \times r$$

The conceptual premise of the method, enunciated in Chapter 8, Section 8.4, is that future growth in dividends for existing equity can only occur if a portion of the overall return to investors is reinvested into the firm instead of being distributed as dividends.

For example, if a company earns 12% on equity, and pays all the earnings out in dividends, the retention factor, b, is zero and earnings per share will not grow for the simple reason that there are no increments to the asset base (rate base). Conversely, if the company retains all its earnings and pays no dividends, it would grow at an annual rate of 12%. Or again, if the company earns 12% on equity and pays out 60% of the earnings in dividends, the

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Press Release

January 25, 2012

Federal Reserve issues FOMC statement of longer-run goals and policy strategy

For release at 2:00 p.m. EST

Share

Following careful deliberations at its recent meetings, the Federal Open Market Committee (FOMC) has reached broad agreement on the following principles regarding its longer-run goals and monetary policy strategy. The Committee intends to reaffirm these principles and to make adjustments as appropriate at its annual organizational meeting each January.

The FOMC is firmly committed to fulfilling its statutory mandate from the Congress of promoting maximum employment, stable prices, and moderate long-term interest rates. The Committee seeks to explain its monetary policy decisions to the public as clearly as possible. Such clarity facilitates well-informed decisionmaking by households and businesses, reduces economic and financial uncertainty, increases the effectiveness of monetary policy, and enhances transparency and accountability, which are essential in a democratic society.

Inflation, employment, and long-term interest rates fluctuate over time in response to economic and financial disturbances. Moreover, monetary policy actions tend to influence economic activity and prices with a lag. Therefore, the Committee's policy decisions reflect its longer-run goals, its medium-term outlook, and its assessments of the balance of risks, including risks to the financial system that could impede the attainment of the Committee's goals.

The inflation rate over the longer run is primarily determined by monetary policy, and hence the Committee has the ability to specify a longer-run goal for inflation. The Committee judges that inflation at the rate of 2 percent, as measured by the annual change in the price index for personal consumption expenditures, is most consistent over the longer run with the Federal Reserve's statutory mandate. Communicating this inflation goal clearly to the public helps keep longer-term inflation expectations firmly anchored, thereby fostering price stability and moderate long-term interest rates and enhancing the Committee's ability to promote maximum employment in the face of significant economic disturbances.

The maximum level of employment is largely determined by nonmonetary factors that affect the structure and dynamics of the labor market. These factors may change over time and may not be directly measurable. Consequently, it would not be appropriate to specify a fixed goal for employment; rather, the Committee's policy decisions must be informed by assessments of the maximum level of employment, recognizing that such assessments are necessarily uncertain and subject to revision. The Committee considers a wide range of indicators in making these assessments. Information about Committee participants' estimates of the longer-run normal rates of output growth and unemployment is published four times per year in the FOMC's Summary of Economic Projections. For example, in the most recent projections, FOMC participants' estimates of the longer-run normal rate of unemployment had a central tendency of 5.2 percent to 6.0 percent, roughly unchanged from last January but substantially higher than the corresponding interval several years earlier.

In setting monetary policy, the Committee seeks to mitigate deviations of inflation from its longer-run goal and deviations of employment from the Committee's assessments of its maximum level. These objectives are generally complementary. However, under circumstances in which the Committee judges that the objectives are not complementary, it follows a balanced approach in promoting them, taking into account the magnitude of the deviations and the potentially different time horizons over which employment and inflation are projected to return to levels judged consistent with its mandate.

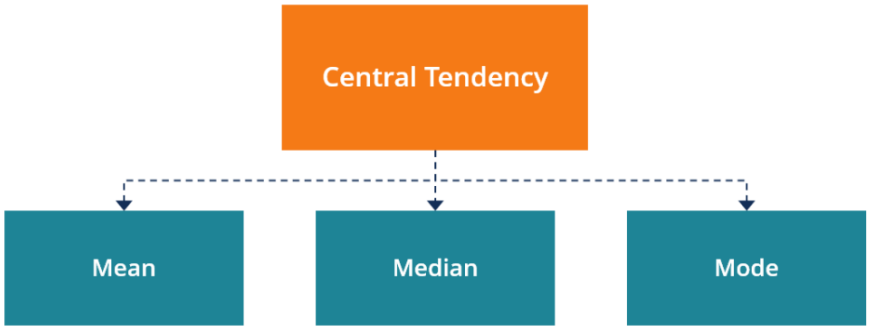
20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Last Update: January 25, 2012

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Central tendency is a descriptive summary of a dataset through a single value that reflects the center of the data distribution. Along with the variability (dispersion) of a dataset, central tendency is a branch of descriptive statistics.

The central tendency is one of the most quintessential concepts in statistics. Although it does not provide information regarding the individual values in the dataset, it delivers a comprehensive summary of the whole dataset.



Measures of Central Tendency

Generally, the central tendency of a dataset can be described using the following measures:

- **Mean (Average):** Represents the sum of all values in a dataset divided by the total number of the values.
- **Median:** The middle value in a dataset that is arranged in ascending order (from the smallest value to the largest value). If a dataset contains an even number of values, the median of the dataset is the mean of the two middle values.
- **Mode:** Defines the most frequently occurring value in a dataset. In some cases, a dataset may contain multiple modes while some datasets may not have any mode at all.

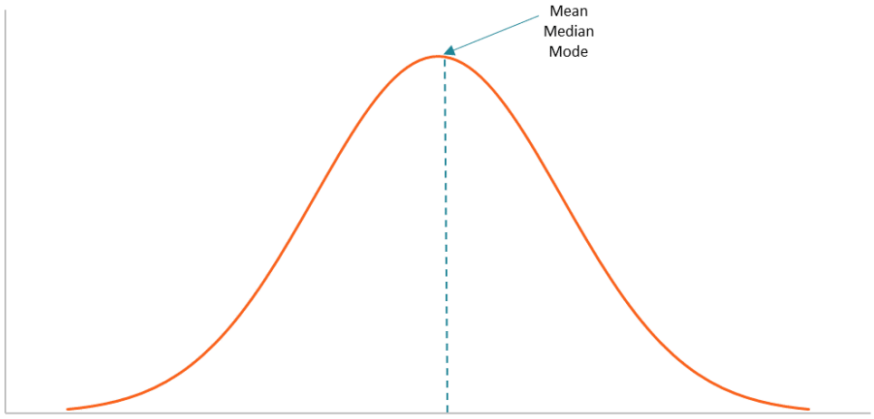
20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

including, but not limited to, geometric mean, harmonic mean, midrange, and geometric median.

The selection of central tendency as a measure depends on the properties of a dataset. For instance, mode is the only central tendency measure of categorical data while a median works best with ordinal data.

Although mean is regarded as the best measure of central tendency for quantitative data, it is not always the case. For example, mean may not work well with quantitative datasets that contain extremely large or extremely small values. The extreme values may distort the mean. Thus, you may consider other options of central tendency.

The measures of central tendency can be found using a formula or definition. Also, they can be identified using a frequency distribution graph. Note that for the datasets that follow a normal distribution, the mean, median, and mode are located on the same spot on the graph.



Related Readings

CFI is the official provider of the global Financial Modeling & Valuation Analyst (FMVA)™ certification program, designed to help anyone become a world-class financial analyst. To keep advancing your career, the additional resources below will be useful:

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

THE VALUE LINE Investment Survey®

PAGES 2183-2190

File in page order in the *Selection & Opinion* binder.

PART 2 — *Selection & Opinion* — AUGUST 6, 2004

The Value Line View

In This Issue

The Value Line View	2183
Model Portfolios: Recent Developments	2184
Understanding The Value Line Page: Annual Rates	2186
Selected Yields	2187
Federal Reserve Data	2187
Tracking the Economy	2188
Major Insider Transactions	2188
Market Monitor	2189
Value Line Asset Allocation Model	2189
Industry Price Performance	2189
Changes in Financial Strength Ratings	2189
Stock Market Averages	2190

The *Selection & Opinion* Index appears on page 2286 (June 4, 2004).

In Three Parts: Part 1 is the Summary & Index. This is Part 2, Selection & Opinion. Part 3 is Ratings & Reports. Volume LIX, Number 49.

Published weekly by VALUE LINE PUBLISHING, INC.
220 East 42nd Street, New York, NY 10017-5891.

© 2004, Value Line Publishing, Inc. All rights reserved. Factual material is obtained from sources believed to be reliable and is provided without warranties of any kind. THE PUBLISHER IS NOT RESPONSIBLE FOR ANY ERRORS OR OMISSIONS HEREIN. This publication is strictly for each subscriber's own, non-commercial, internal use. No part of this publication may be reproduced, resold, stored or transmitted in any printed, electronic or other form, or used for generating or marketing any printed or electronic publication, service or product. Officers, directors or employees of Value Line, Inc. or Value Line Publishing, Inc., as well as certain investment companies or investment advisory accounts for which Value Line, Inc. acts as investment advisor, may own stocks that are reviewed or recommended in this publication. Nothing herein should be construed as an offer to buy or sell securities or to give individual investment advice.

ECONOMIC AND STOCK MARKET COMMENTARY

The economic picture is mixed as we near the midpoint of the third quarter. Recent reports, for example, show a modest easing in retail sales, housing starts, industrial production, and factory use. Other data, though, indicate that existing home sales are increasing; that there are fewer mass layoff announcements than earlier in 2004; and that consumer confidence remains strong. These crosscurrents held the nation's gross domestic product to a rather modest 3.0% rate of increase in the second quarter. Slower growth in consumer spending and increasing strength in capital goods demand were the main factors in the recent GDP performance.

There are reasons for the U.S. economy's slowing rate of growth. One reason is the continuing rise in energy prices. Higher oil prices, and the resultant rise in heating bills, air conditioning costs, and the tab for filling up a gasoline tank act as tax increases by taking funds out of the hands of consumers. The earlier rise in certain interest rates (notably home mortgages) and the recent decline in stock prices are also putting some pressure on the business expansion.

There are also bright spots. For openers, the housing market remains strong, both in terms of demand and prices. In fact, the further rise in real estate values is helping to partially offset the negative wealth effect of falling equity prices. The recent drop in mortgage rates, meantime, is likely to give housing a boost in the second half. Finally, second-quarter earnings were generally positive and favorable comparisons should continue in the second half.

We expect the economic ship to continue sailing forward. True, the recent move by the Federal Reserve to nudge up short-term interest rates and some possible further rate hikes going forward may limit GDP growth to a certain extent. Nevertheless, the economic uptrend is likely to remain securely in place. In fact, we think there is sufficient momentum around for GDP growth to average 3%, or better, in the second half of 2004.

Investors are uneasy. We think some concern is realistic given the recent slowing in growth, the risks of higher inflation, and the tenuous global outlook. That said, we think the recent drop in stock prices has taken some of these risks into account. As such, equity valuations now appear to be quite reasonable.

Conclusion: We continue to think the market's risks and potential rewards are fairly well balanced. Please refer to the inside back cover of *Selection & Opinion* for our Asset Allocation Model's current reading.

CLOSING STOCK MARKET AVERAGES AS OF PRESS TIME

	7/22/2004	7/29/2004	%Change 1 week	%Change 12 months
Dow Jones Industrial Average	10050.33	10129.24	+0.8%	+10.0%
Standard & Poor's 500	1096.84	1100.43	+0.3%	+11.2%
N.Y. Stock Exchange Composite	6390.63	6394.07	+0.1%	+14.8%
NASDAQ Composite	1889.06	1881.06	-0.4%	+8.6%
NASDAQ 100	1408.51	1398.55	-0.7%	+9.7%
American Stock Exchange Index	1244.31	1229.60	-1.2%	+29.6%
Value Line (Geometric)	352.25	352.83	+0.2%	+13.7%
Value Line (Arithmetic)	1529.94	1534.77	+0.3%	+20.2%
London (FT-SE 100)	4306.3	4418.7	+2.6%	+6.8%
Tokyo (Nikkei)	11285.04	11116.84	-1.5%	+13.0%
Russell 2000	546.52	549.83	+0.6%	+16.1%

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Model Portfolios: Recent Developments

PORTFOLIO I

We are purchasing *Getty Images* stock for Portfolio I this week. The company sells and licenses still and moving images and associated products and services to advertisers and design agencies. The images are marketed and distributed via its Internet site. Since going public in early 1998, *Getty's* top line has expanded nicely, reflecting internal growth supplemented by a handful of acquisitions. The company moved into profitability in 2002, and it looks like 2004 will be a strong year in this regard. Indeed, its second-quarter financial report made for excellent reading, with revenues and earnings rising sharply. And, based on *Getty's* view of its business environment, the company raised its forecast for its likely financial performance for the second half of the year. As such, the stock, though not trading at a bargain-basement price, should be a good addition to our group. To make room for *GYI* shares, we are selling Omnicare stock, whose Timeliness rank fell to 3 (Average) in the wake of an earnings shortfall.

PORTFOLIO II

The latest earnings season ended on an upbeat note for Portfolio II. In particular, our insurance-related holdings all picked up additional support from investors after posting strong results that exceeded our expectations. *Chubb* led the way, with strong premium growth, favorable loss experience, and successful expense-control initiatives driving a nearly 30% gain in operating earnings during the June quarter. Insurance-broker *A.J. Gallagher* fell just short of this level, as share net rose 26%. *Marsh & McLennan's* performance was more subdued, though the company still managed to deliver 11% profit growth, despite continued weakness in its investment-management subsidiary. Meanwhile, chemical-makers *DuPont* and *Eastman Chemical* also saw their share prices advance after releasing generally favorable second-quarter results. Investors, however, were less impressed with tool-manufacturer *Stanley Works*, which gave up some ground in the market despite exceeding its previous earnings guidance.

PORTFOLIO III

More than 25% of the stocks in Portfolio III are well-known consumer products companies. Our holdings include *Coca-Cola*, *Hormel Foods*, *W.M. Wrigley, Jr.*, *Pepsico*, and *Anheuser Busch*. Traditionally, these companies have held up fairly well during market downturns, thereby providing some downside protection for investors. Unfortunately, that has not been the case thus far in the September quarter, as these stocks have all experienced substantial declines in price since the beginning of July. Some of the weakness is attributable to near-term profit concerns (e.g., *Coca-Cola* and *Pepsi*), but the majority of the selloff seems to stem from a rotation by investors out of the consumer-products sector. Our long-term view for all of these companies remains unchanged; hence we plan on maintaining our positions for the time being, with the possibility of increasing our holdings in these stocks if prices continue to decline. As such, we are once again not making any changes to Portfolio III this week.

PORTFOLIO I: STOCKS WITH ABOVE-AVERAGE YEAR-AHEAD PRICE POTENTIAL

(primarily suitable for more aggressive investors)

Ratings & Reports Page	Ticker	Company	Recent Price	Time-liness	Safety	P/E	Yield%	Beta	Financial Strength	Industry Name
785	ACDO	Accredo Health	33.92	2	3	19.7	Nil	1.00	B+	Pharmacy Services
1585	BFAM	Bright Horizons Family	52.25	2	3	27.9	Nil	0.80	B+	Educational Services
786	CVS	CVS Corp.	41.88	1	3	18.6	0.6	0.80	A+	Pharmacy Services
1253	CELG	Celgene Corp.	51.37	1	3	NMF	Nil	1.30	B+	Drug
658	CERN	Cerner Corp.	44.62	2	3	26.9	Nil	1.00	B+	Healthcare Information
1724	CHS	Chico's FAS	41.22	2	3	26.6	Nil	1.35	B+	Retail (Special Lines)
945	CHD	Church & Dwight	44.66	2	2	19.8	0.7	0.50	A	Household Products
2185	CTSH	Cognizant Technology	27.11	2	3	41.7	Nil	1.00	B+	Computer Software/Svcs
1256	CVD	Covance Inc.	35.26	1	3	24.3	Nil	0.95	B+	Drug
1387	FO	Fortune Brands	71.37	2	2	16.0	1.8	0.85	A	Diversified Co.
388	GYI	Getty Images	54.25	1	3	33.9	Nil	1.70	B+	Information Services
822	HELE	Helen of Troy Ltd.	31.18	2	3	12.6	Nil	0.90	B+	Toiletries/Cosmetics
450	POG	Patina Oil & Gas	29.36	1	3	14.3	0.7	0.90	B+	Natural Gas (Div.)
224	PDCO	Patterson Cos.	73.64	2	2	28.4	Nil	0.55	A	Medical Supplies
1753	PETM	PETsMART Inc.	29.88	1	3	24.9	0.4	1.05	B+	Retail (Special Lines)
1278	PFE	Pfizer, Inc.	31.62	1	1	14.9	2.3	0.85	A++	Drug
226	RMD	ResMed Inc.	47.38	1	3	24.9	Nil	1.00	B+	Medical Supplies
1595	STRA	Strayer Education	99.15	2	3	37.4	0.3	0.65	B++	Educational Services
232	SYK	Stryker Corp.	46.88	1	2	33.5	0.2	0.70	A	Medical Supplies
2222	SYMC	Symantec Corp.	44.96	1	3	31.4	Nil	1.05	B++	Computer Software/Svcs

To qualify for purchase in the above portfolio, a stock must have a Timeliness rank of 1 and a Financial Strength Rating of at least B+. If a stock's Timeliness rank falls below 2, it will be automatically removed. Stocks in the above portfolio are selected and monitored by Charles Clark, Assistant Research Director.

© 2004, Value Line Publishing, Inc. All rights reserved. Factual material is obtained from sources believed to be reliable and is provided without warranties of any kind. THE PUBLISHER IS NOT RESPONSIBLE FOR ANY ERRORS OR OMISSIONS HEREIN. This publication is strictly for subscriber's own, non-commercial, internal use. No part of it may be reproduced, resold, stored or transmitted in any printed, electronic or other form, or used for generating or marketing any printed or electronic publication, service or product.

To subscribe call 1-800-833-0046.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

PORTFOLIO II: STOCKS FOR INCOME AND POTENTIAL PRICE APPRECIATION

(primarily suitable for more conservative investors)

Ratings & Reports Page	Ticker	Company	Recent Price	Time-liness	Safety	P/E	Yield%	Beta	Financial Strength	Industry Name
592	CB	Chubb Corp.	68.39	3	2	11.0	2.3	1.10	A	Insurance (Prop/Cas.)
947	CL	Colgate-Palmolive	53.45	3	1	19.8	1.8	0.70	A++	Household Products
1238	DD	Du Pont	42.25	2	1	18.0	3.3	1.00	A++	Chemical (Basic)
1969	EMN	Eastman Chemical	44.12	1	3	19.2	4.0	0.95	B+	Chemical (Diversified)
1387	FO	Fortune Brands	71.37	2	2	16.0	1.8	0.85	A	Diversified Co.
2152	AJG	Gallagher (Arthur J.)	30.99	2	1	15.5	3.2	0.90	A+	Financial Svcs. (Div.)
1014	GE	Gen'l Electric	33.29	3	1	21.5	2.4	1.30	A++	Electrical Equipment
1492	GIS	Gen'l Mills	45.25	3	2	15.8	2.7	0.55	B++	Food Processing
1494	HNZ	Heinz (H.J.)	36.93	3	1	16.1	3.1	0.55	A+	Food Processing
1393	ITT	ITT Industries	78.40	3	1	18.0	0.9	0.90	A	Diversified Co.
215	JNJ	Johnson & Johnson	55.68	2	1	18.7	2.0	0.70	A++	Medical Supplies
904	LEG	Leggett & Platt	26.27	3	2	19.5	2.1	1.05	A	Furn/Home Furnishings
1887	MBG	Mandalay Resort Group	67.48	NR	3	22.5	1.6	0.95	B+	Hotel/Gaming
2162	MMC	Marsh & McLennan	45.07	2	2	14.5	3.0	1.20	A+	Financial Svcs. (Div.)
919	PCL	Plum Creek Timber	31.19	3	2	23.1	4.5	0.70	B+	Paper/Forest Products
503	SHW	Sherwin-Williams	39.87	3	2	15.3	1.8	1.00	A	Chemical (Specialty)
2123	SOTR	SouthTrust Corp.	38.82	NR	2	17.3	2.6	0.95	B++	Bank
1368	SWK	Stanley Works	41.81	2	3	14.9	2.7	1.00	B++	Machinery
2126	SNV	Synovus Financial	25.41	3	2	17.5	2.7	1.10	B++	Bank
626	USB	U.S. Bancorp	28.29	3	3	13.2	3.6	1.25	B++	Bank (Midwest)

To qualify for purchase in the above portfolio, a stock must have a yield that is in the top half of the Value Line universe, a Timeliness Rank of at least 3 (unranked stocks may be selected occasionally), and a Safety Rank of 3 or better. If a stock's Timeliness Rank falls below 3, that stock will be automatically removed. Stocks are selected and monitored by Robert M. Greene, CFA, Senior Industry Analyst.

PORTFOLIO III: STOCKS WITH LONG-TERM PRICE GROWTH POTENTIAL

(primarily suitable for investors with a 3- to 5-year horizon)

Ratings & Reports Page	Ticker	Company	Recent Price	Time-liness	Safety	P/E	Yield%	Beta	3- to 5-yr Appreciation Potential	Industry Name
1205	AFL	AFLAC Inc.	38.93	2	2	16.9	1.0	0.95	40 - 95%	Insurance (Life)
1537	BUD	Anheuser-Busch	52.33	3	1	18.9	1.9	0.60	55 - 90	Beverage (Alcoholic)
1252	BMY	Bristol-Myers Squibb	23.57	4	3	15.7	4.8	1.05	25 - 110	Drug
1546	KO	Coca-Cola	43.68	2	1	20.6	2.4	0.65	50 - 85	Beverage (Soft Drink)
411	COP	ConocoPhillips	76.66	2	2	9.6	2.3	0.85	10 - 50	Petroleum (Integrated)
1864	DIS	Disney (Walt)	22.84	2	3	22.2	0.9	1.30	75 - 165	Entertainment
616	FITB	Fifth Third Bancorp	49.86	3	1	15.6	2.7	1.00	70 - 100	Bank (Midwest)
1562	FUJIY	Fuji Photo ADR	30.38	3	1	21.0	0.8	0.70	80 - 115	Foreign Electronics
596	HCC	HCC Insurance Hldgs.	30.00	3	3	10.9	1.0	0.95	65 - 150	Insurance (Prop/Cas.)
1496	HRL	Hormel Foods	29.13	3	1	17.8	1.6	0.60	55 - 90	Food Processing
215	JNJ	Johnson & Johnson	55.68	2	1	18.7	2.0	0.70	45 - 80	Medical Supplies
823	EL	Lauder (Estee)	43.91	2	2	24.4	0.7	0.90	60 - 105	Toiletries/Cosmetics
602	PRE	PartnerRe Ltd.	51.12	3	3	6.7	2.7	1.05	45 - 115	Insurance (Prop/Cas.)
1552	PEP	PepsiCo, Inc.	51.19	3	1	22.3	1.8	0.65	35 - 75	Beverage (Soft Drink)
1278	PFE	Pfizer, Inc.	31.62	1	1	14.9	2.3	0.85	90 - 135	Drug
922	RYN	Rayonier Inc. (REIT)	43.89	3	3	20.0	5.1	0.95	15 - 70	Paper/Forest Products
1524	SWY	Safeway Inc.	20.94	3	3	15.5	Nil	0.90	65 - 140	Grocery
1760	TJX	TJX Companies	23.16	3	3	16.5	0.8	1.10	30 - 95	Retail (Special Lines)
782	TMX	Telefonos de Mexico ADR	30.99	3	3	8.2	4.2	0.80	60 - 140	Foreign Telecom.
1515	WWY	Wrigley (Wm.) Jr.	60.25	3	1	26.8	1.6	0.60	25 - 60	Food Processing

To qualify for purchase in the above portfolio, a stock must have worthwhile and longer-term appreciation potential. Among the factors considered for selection are a stock's Timeliness and Safety Rank and its 3- to 5-year appreciation potential. (Occasionally a stock will be unranked (NR), usually because of a short trading history or a major corporate reorganization.) Stocks in the above portfolio are selected and monitored by William R. Pekowitz, Jr., Senior Analyst.

© 2004, Value Line Publishing, Inc. All rights reserved. Factual material is obtained from sources believed to be reliable and is provided without warranties of any kind. THE PUBLISHER IS NOT RESPONSIBLE FOR ANY ERRORS OR OMISSIONS HEREIN. This publication is strictly for subscriber's own, non-commercial, internal use. No part of it may be reproduced, resold, stored or transmitted in any printed, electronic or other form, or used for generating or marketing any printed or electronic publication, service or product.

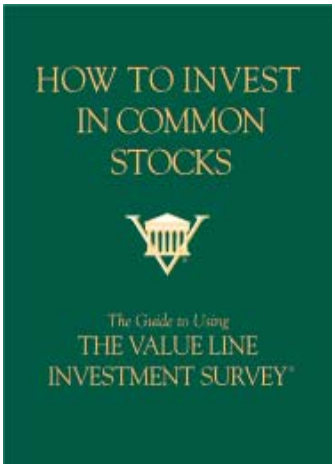
To subscribe call 1-800-833-0046.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Understanding The Value Line Page: Annual Rates

There is a wealth of information included with each company report found in the Ratings & Reports section of *The Investment Survey*. In addition to a stock's Timeliness and Safety rank, the Value Line page is packed with quarterly and annual financial performance figures, important balance sheet statistics, and, of course, our analysts' commentary, estimates, and projections. Indeed, there is much more to the page than we have just mentioned, so it is understandable that those new to *The Survey* may be a bit intimidated, at first. That's why we have a guide on how to use it, namely, *How To Invest In Common Stocks—The Guide to Using The Value Line Investment Survey*.

A picture of the front cover of *The Guide* is found nearby. We hasten to note that it, along with a wide range of useful investment information, can be found on our Web site. To find it, go to www.valueline.com, then click on Education near the top-center of our home page. You should then see a page displayed with a column of buttons along the left side—click on the one labeled How To Invest Guides. Selecting the top link on this new page will get you where you want to be. That is, a copy of *The Guide* should become available for viewing.



With this brief introduction out of the way, we thought we would take this opportunity to answer a question that often comes up about the Annual Rates box, found just to the left of the analysts' comment on the Value Line page. In particular, subscribers often want to know how the annual rates of change for various per-share figures are calculated. To help us here, we decided to take a page out of the above-mentioned investment guide. Using Stryker Corporation as an example, we have largely followed the discussion of the calculation of annual rates of change found on page 14 of *How To Invest In Common Stocks*. Our calculation method is detailed below, along with a reproduction of the annual rates box from our latest report on Stryker Corporation (dated June 4, 2004). We note that this is just a small example of the kind of helpful information that is available on our Web site, and we invite subscribers to check in with us often.

Calculating Annual Rates of Change (Growth Rates)

ANNUAL RATES of change (per sh)	Past 10 Yrs.	Past 5 Yrs.	Est'd '01-'03 to '07-'09
Sales	20.5%	24.5%	*15.5%*
"Cash Flow"	24.5%	28.0%	*19.0%*
Earnings	22.0%	22.5%	*22.0%*
Dividends	26.0%	12.5%	*22.5%*
Book Value	20.5%	20.5%	*16.0%*

In an attempt to eliminate short-term fluctuations that may distort results, Value Line uses a three-year base period and a three-year ending period when calculating growth rates.

Example: To calculate the compound annual sales growth from 2001-2003 to 2007-2009, we take sales per share for each of the years 2001, 2002, and 2003 and average them. Then we take the sales per share for the years 2007-2009, as shown in the far right column of the large statistical section of our report.

In the case of Stryker Corporation, the three-year base period average is $7.76. The three-year ending period average is $18.40. The compound annual growth rate over the six years from 2002 (the middle year) to 2008 (again, the middle year) is 15.5%, rounded.

Investors often try to calculate a growth rate from one starting year to one ending year, and then can't understand why the number they get is not the same as the one published by Value Line. If they used a three-year base period and three-year ending period, they would get the same results we do.

www.valueline.com

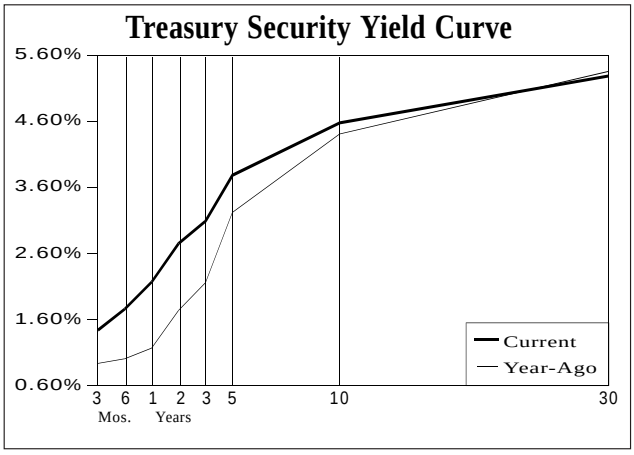
© 2004, Value Line Publishing, Inc. All rights reserved. Factual material is obtained from sources believed to be reliable and is provided without warranties of any kind. THE PUBLISHER IS NOT RESPONSIBLE FOR ANY ERRORS OR OMISSIONS HEREIN. This publication is strictly for subscriber's own, non-commercial, internal use. No part of it may be reproduced, resold, stored or transmitted in any printed, electronic or other form, or used for generating or marketing any printed or electronic publication, service or product.

To subscribe call 1-800-833-0046.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Selected Yields

	Recent (7/29/04)	3 Months Ago (4/29/04)	Year Ago (7/31/03)
TAXABLE			
Market Rates			
Discount Rate	2.25	2.00	2.00
Federal Funds	1.25	1.00	1.00
Prime Rate	4.25	4.00	4.00
30-day CP (A1/P1)	1.38	1.00	1.03
3-month LIBOR	1.69	1.18	1.11
Bank CDs			
6-month	0.93	0.73	0.72
1-year	1.38	0.98	0.80
5-year	3.66	3.12	2.59
U.S. Treasury Securities			
3-month	1.44	0.97	0.94
6-month	1.76	1.13	1.01
1-year	2.17	1.54	1.17
5-year	3.79	3.65	3.22
10-year	4.58	4.54	4.41
30-year	5.29	5.31	5.36
30-year Zero	5.41	5.45	5.57
Mortgage-Backed Securities			
GNMA 6.5%	4.94	4.69	5.14
FHLMC 6.5% (Gold)	4.90	4.80	5.34
FNMA 6.5%	4.89	4.76	5.28
FNMA ARM	2.67	2.80	2.95
Corporate Bonds			
Financial (10-year) A	5.52	5.48	5.60
Industrial (25/30-year) A	6.08	6.14	6.48
Utility (25/30-year) A	6.05	6.06	6.29
Utility (25/30-year) Baa/BBB	6.51	6.44	6.77
Foreign Bonds (10-Year)			
Canada	4.82	4.72	4.84
Germany	4.27	4.20	4.19
Japan	1.83	1.53	0.95
United Kingdom	5.18	5.01	4.52
Preferred Stocks			
Utility A	6.80	6.91	6.74
Financial A	6.23	6.20	6.00
Financial Adjustable A	5.46	5.50	5.19



	Recent (7/29/04)	3 Months Ago (4/29/04)	Year Ago (7/31/03)
TAX-EXEMPT			
Bond Buyer Indexes			
20-Bond Index (GOs)	4.88	4.95	5.07
25-Bond Index (Revs)	5.31	5.28	5.42
General Obligation Bonds (GOs)			
1-year Aaa	1.47	1.25	0.95
1-year A	1.62	1.40	1.21
5-year Aaa	3.03	2.85	2.77
5-year A	3.29	3.16	3.27
10-year Aaa	3.85	3.90	4.04
10-year A	4.20	4.26	4.62
25/30-year Aaa	4.96	4.89	5.07
25/30-year A	5.19	5.12	5.41
Revenue Bonds (Revs) (25/30-Year)			
Education AA	5.17	5.10	5.10
Electric AA	5.07	5.01	5.24
Housing AA	5.25	5.20	5.25
Hospital AA	5.45	5.45	5.40
Toll Road Aaa	5.22	5.13	5.38

Federal Reserve Data

BANK RESERVES

(Two-Week Period; in Millions, Not Seasonally Adjusted)

	Recent Levels			Average Levels Over the Last...		
	7/21/04	7/7/04	Change	12 Wks.	26 Wks.	52 Wks.
Excess Reserves	1375	1945	-570	1664	1531	1670
Borrowed Reserves	242	223	19	156	113	126
Net Free/Borrowed Reserves	1133	1722	-589	1508	1418	1544

MONEY SUPPLY

(One-Week Period; in Billions, Seasonally Adjusted)

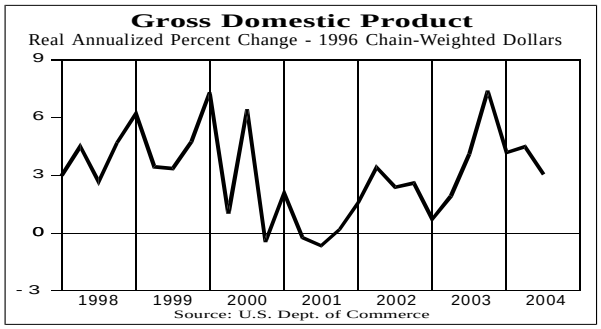
	Recent Levels			Growth Rates Over the Last...		
	7/19/04	7/12/04	Change	3 Mos.	6 Mos.	12 Mos.
M1 (Currency+demand deposits)	1316.4	1310.0	6.4	2.7%	4.3%	3.2%
M2 (M1+savings+small time deposits)	6286.3	6288.0	-1.7	5.5%	7.1%	3.6%
M3 (M2+large time deposits)	9288.1	9267.1	21.0	7.5%	9.2%	5.1%

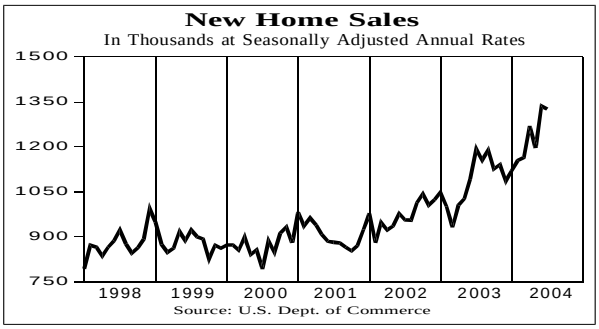
© 2004, Value Line Publishing, Inc. All rights reserved. Factual material is obtained from sources believed to be reliable and is provided without warranties of any kind. THE PUBLISHER IS NOT RESPONSIBLE FOR ANY ERRORS OR OMISSIONS HEREIN. This publication is strictly for subscriber's own, non-commercial, internal use. No part of it may be reproduced, resold, stored or transmitted in any printed, electronic or other form, or used for generating or marketing any printed or electronic publication, service or product.

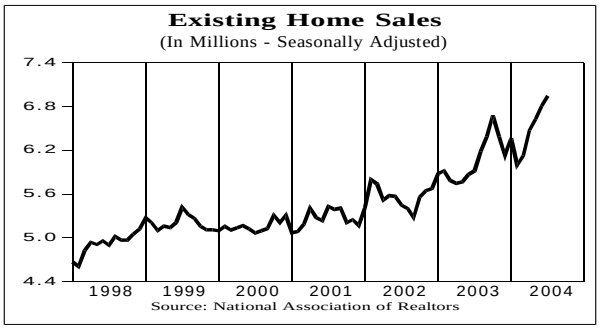
To subscribe call 1-800-833-0046.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Tracking the Economy







Major Insider Transactions†

PURCHASES

Latest Full-Page Report	Timeliness Rank	Company	Insider, Title	Date	Shares Traded	Shares Held(a)	Price Range	Recent Price
746	3	ADTRAN, Inc.	W.L. Marks, Dir.	7/19/04	2,600	3,328	$24.92	25.00
2110	2	Commerce Bancorp NJ	W. Schwartz Jr., Dir.	7/16/04	4,000	38,753	$52.06	49.82
1678	3	Dollar General Corp.	J.L. Clayton, Dir.	7/15/04	52,700	634,252	$18.95-$19.00	19.01
594	3	Everest Re Group Ltd.	J. Weber, Dir.	7/22/04	1,000	4,838	$72.06	73.16
1014	3	Gen'l Electric	C. Gonzalez, Dir.	7/20/04	10,000	101,152	$33.10-$33.11	33.29
2125	4	SunTrust Banks	R.M. Beall II, Dir.	7/21/04	1,000	3,000	$66.19	65.85
2128	3	Wachovia Corp.	L.L. Smith, Dir.	7/16/04	10,000	33,000	$44.56	44.41

SALES

Latest Full-Page Report	Timeliness Rank	Company	Insider, Title	Date	Shares Traded	Shares Held(a)	Price Range	Recent Price
2171	2	Adobe Systems	J.E. Warnock, Co-Chair.	7/15/04	115,261	1,072,688	$43.38	40.43
944	4	Blyth Inc.	R.B. Goergen, Chair.	7/15/04	300,000	10,509,854	$35.00	34.77
1428	3	Goldman Sachs	K.W. Kennedy, Exec. VP	7/21/04	50,000	1,075,728	$89.14	88.71
270	1	Hunt (J.B.)	J.W. Walton, Exec. VP	7/20/04	60,000	143,274	$37.05	37.39
2205	3	Microsoft Corp.	J.S. Raikes, Officer	7/21/04	500,000	8,440,334	$29.46	28.58
2210	3	Oracle Corp.	L. Ellison, CEO	7/21/04	1,000,000	NA	$10.33-$10.76	10.25
1956	4	Rowan Cos.	C. Palmer, Dir.	7/21/04	173,700	359,559	$25.55	24.15

* *Beneficial owner of more than 10% of common stock.*
(a) *Beneficial ownership at end of month in which transaction occurred.*
† *Includes only large transactions in U.S.-traded stocks; excludes shares held in the form of limited partnerships, excludes options & family trusts.*

Major Insider Transactions are obtained from Vickers Stock Research Corporation.

© 2004, Value Line Publishing, Inc. All rights reserved. Factual material is obtained from sources believed to be reliable and is provided without warranties of any kind. THE PUBLISHER IS NOT RESPONSIBLE FOR ANY ERRORS OR OMISSIONS HEREIN. This publication is strictly for subscriber's own, non-commercial, internal use. No part of it may be reproduced, resold, stored or transmitted in any printed, electronic or other form, or used for generating or marketing any printed or electronic publication, service or product.

To subscribe call 1-800-833-0046.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Market Monitor

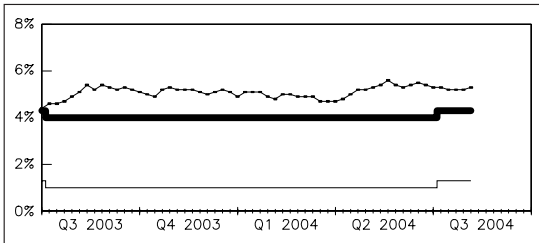
Valuations and Yields	7/29	7/22	13-week range	50-week range	Last market top (4-5-2004)	Last market bottom (10-9-2002)
Median price-earnings ratio of VL stocks	17.5	17.7	17.5 - 18.9	17.5 - 20.1	19.7	14.1
P/E (using 12-mo. est'd EPS) of DJ Industrials	15.8	15.7	15.7 - 17.7	15.7 - 19.5	18.7	15.2
Median dividend yield of VL stocks	1.7%	1.7%	1.6 - 1.8%	1.6 - 1.9%	1.6%	2.4%
Div'd yld. (12-mo. est.) of DJ Industrials	2.2%	2.2%	2.1 - 2.2%	2.0 - 2.3%	2.1%	2.6%
Prime Rate	4.3%	4.3%	4.0 - 4.3%	4.0 - 4.3%	4.0%	4.8%
Federal Funds	1.3%	1.3%	1.0 - 1.3%	1.0 - 1.3%	1.0%	1.8%
91-day T-bill rate	1.4%	1.4%	1.0 - 1.4%	0.9 - 1.4%	0.9%	1.6%
Moody's Aaa Corporate bond yield	5.9%	5.8%	5.8 - 6.2%	5.3 - 6.2%	5.6%	6.1%
30-year Treasury bond yield	5.3%	5.2%	5.2 - 5.6%	4.7 - 5.6%	5.0%	4.7%
Bond yield minus average earnings yield	0.2%	0.2%	0.2 - 0.7%	-0.1 - 0.7%	0.5%	-1.0%

Market Sentiment	Wk. Ending 7/29	Wk. Ending 7/22	10-week average	13-week range	Last market top (4-5-2004)	Last market bottom (10-9-2002)
% of total NYSE short sales by:						
Public	49	52	48	40 - 52	51	53
NYSE specialists	23	21	24	21 - 28	29	37
Other NYSE members	28	27	28	22 - 36	20	10
Total NYSE short sales/total NYSE volume	14.6%	14.4%	14.4%	12.9 - 14.9%	12.9%	12.9%
Short interest/avg. daily volume (5 weeks)	5.4	5.5	5.5	4.8 - 5.8	5.1	5.3
Odd-lot sales/purchases	1.3	1.2	1.0	0.7 - 1.3	1.2	1.1
CBOE put volume/call volume	.73	.74	.86	.73 - 1.12	.72	.96

VALUE LINE ASSET ALLOCATION MODEL

(Based only on economic and financial factors)

	Current (effective 5/21/04)	Previous
Common Stocks	65%-75%	75%-85%
Cash and Treasury Issues	35%-25%	25%-15%



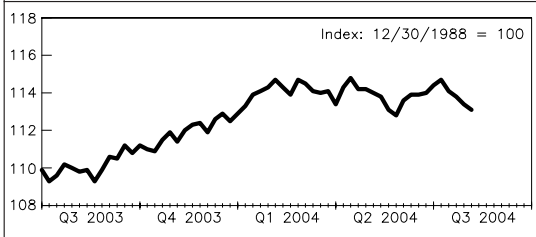
INTEREST RATES

Prime Rate

Federal Funds

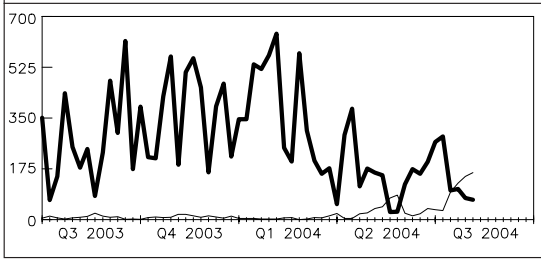
30-Year Treasury Bond

	Recent	Previous Week
Prime Rate	4.3%	4.3%
Federal Funds	1.3%	1.3%
30-Yr. Treasury	5.3%	5.2%



VALUE LINE UNIVERSE

	Recent	Previous Week
Advances	612	519
Declines	1051	1143
Issues Traded	1674	1675
Market Value ($ Trillion)	13.931	13.991



VALUE LINE COMPOSITE

New Highs

New Low

	Recent	Previous Week
New Highs	68	74
New Lows	162	148

INDUSTRY PRICE PERFORMANCE LAST SIX WEEKS ENDING 7/28/2004

7 Best Performing Industries

Steel (Integrated)	+15.8%
Steel (General)	+6.4%
Chemical (Basic)	+5.3%
Trucking	+5.2%
Petroleum (Producing)	+4.6%
Tire & Rubber	+4.5%
Petroleum (Integrated)	+4.3%

7 Worst Performing Industries

Semiconductor Equip	-24.2%
Wireless Networking	-22.0%
Semiconductor	-19.3%
Entertainment Techn.	-14.7%
Telecom. Equipment	-14.7%
Power	-13.9%
Internet	-13.2%

The corresponding change in the Value Line Arithmetic Average is -4.5%

CHANGES IN FINANCIAL STRENGTH RATINGS

Company	Prior Rating	New Rating	Ratings & Reports Page
Amer. Ital. Pasta	B+	B	1482
Winn-Dixie Stores	B	C++	1530

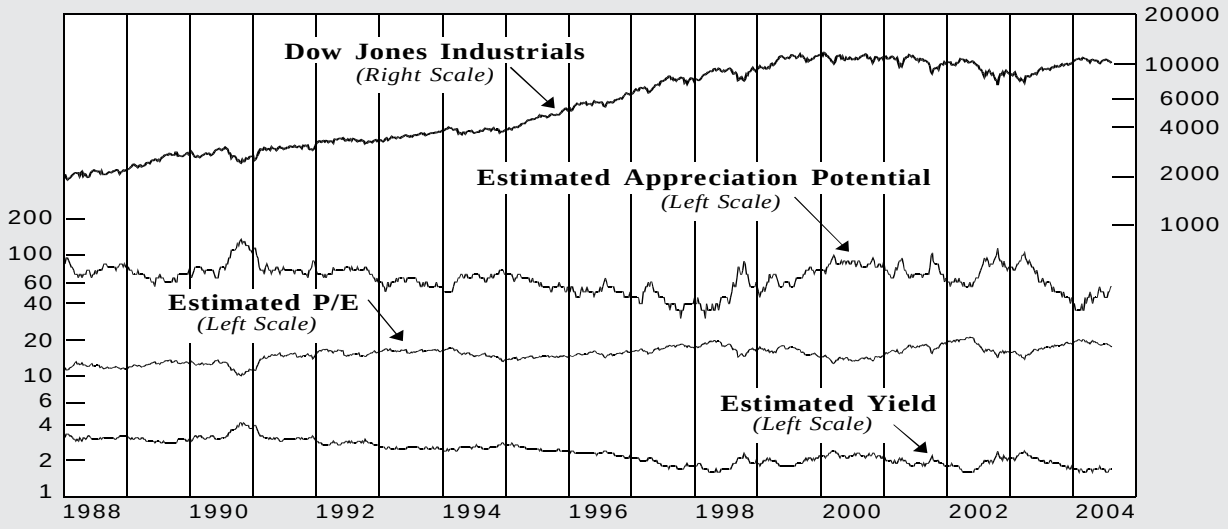
© 2004, Value Line Publishing, Inc. All rights reserved. Factual material is obtained from sources believed to be reliable and is provided without warranties of any kind. THE PUBLISHER IS NOT RESPONSIBLE FOR ANY ERRORS OR OMISSIONS HEREIN. This publication is strictly for subscriber's own, non-commercial, internal use. No part of it may be reproduced, resold, stored or transmitted in any printed, electronic or other form, or used for generating or marketing any printed or electronic publication, service or product.

To subscribe call 1-800-833-0046.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Stock Market Averages

VALUE LINE ESTIMATED P/E, YIELD, APPRECIATION POTENTIAL VERSUS DOW JONES INDUSTRIALS *(JANUARY 1, 1988- JULY 28, 2004)*



THE VALUE LINE GEOMETRIC AVERAGES

	Composite* 1646 stocks	Industrials 1530 stocks	Rails 7 stocks	Utilities 109 stocks
7/23/2004	347.82	296.91	1139.96	223.95
7/26/2004	344.71	294.20	1134.67	222.68
7/27/2004	349.61	298.57	1137.33	223.75
7/28/2004	348.26	297.22	1162.47	224.66
7/29/2004	352.83	301.23	1177.12	226.31
%Change last 4 weeks	-5.0%	-5.4%	+0.9%	-0.1%

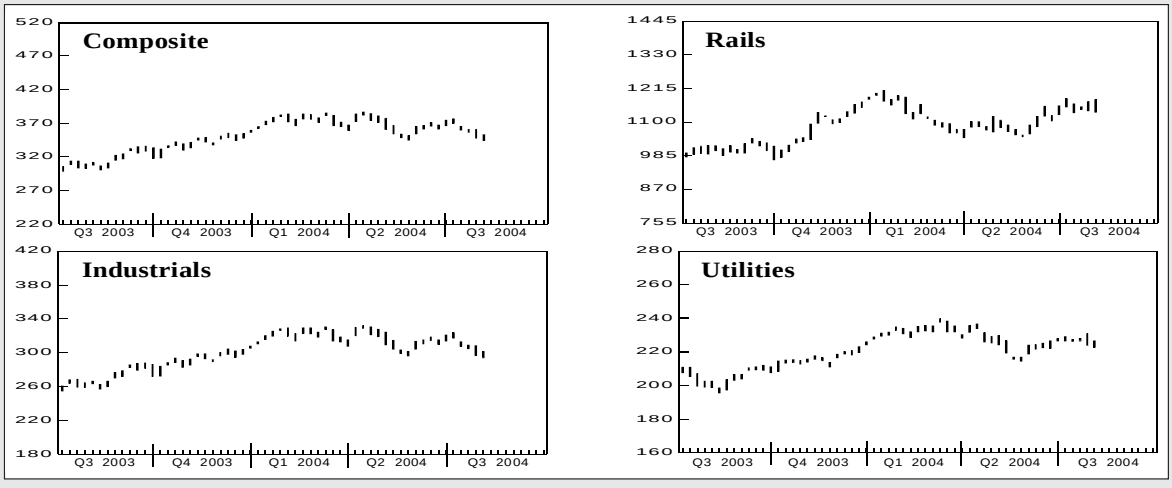
Arithmetic Composite* 1646 stocks
1511.14
1498.02
1519.76
1514.41
1534.77
-4.6%

THE DOW JONES AVERAGES

Composite 65 stocks	Industrials 30 stocks	Transportation 20 stocks	Utilities 15 stocks
2950.86	9962.22	3043.44	276.92
2950.45	9961.92	3048.60	276.01
2974.79	10085.14	3063.60	276.23
2989.62	10117.07	3086.33	278.11
3006.82	10129.24	3129.42	280.05
-1.2%	-2.0%	-1.3%	+1.6%

** Excludes approximately 30 closed-end funds covered in Ratings & Reports in the following industries: Investment Companies (Foreign Funds), Issue 2; Investment Companies, Issue 6.*

WEEKLY VALUE LINE GEOMETRIC AVERAGES *(JULY 1, 2003 - JULY 29, 2004)*



© 2004, Value Line Publishing, Inc. All rights reserved. Factual material is obtained from sources believed to be reliable and is provided without warranties of any kind. THE PUBLISHER IS NOT RESPONSIBLE FOR ANY ERRORS OR OMISSIONS HEREIN. This publication is strictly for subscriber's own, non-commercial, internal use. No part of it may be reproduced, resold, stored or transmitted in any printed, electronic or other form, or used for generating or marketing any printed or electronic publication, service or product.

To subscribe call 1-800-833-0046.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Exhibit No. JC-100

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Association of Businesses Advocating Tariff Equity Coalition of MISO Transmission Customers Illinois Industrial Energy Consumers Indiana Industrial Energy Consumers, Inc. Minnesota Large Industrial Group Wisconsin Industrial Energy Group v. Midcontinent Independent System Operator, Inc., *et al*.	))))))))))	Docket No. EL14-12-003

Affidavit of Michael P. Gorman

On behalf of

Joint Complainants

February 13, 2019

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

VI. SIZE PREMIUM ADJUSTMENT

Q PLEASE SUMMARIZE AGAIN THE POSITIONS MISO TO WITNESS DR. AVERA LISTED FOR SUPPORTING HIS PROPOSAL TO ADD A SIZE PREMIUM ADJUSTMENT TO THE CAPM RETURN ESTIMATE.

A The Commission cited Dr. Avera's testimony in describing the appropriateness of accepting his recommendation for adding a size premium adjustment to his Base CAPM return estimate. The Commission stated as follows:

> According to the CAPM, the expected return on a security should consist of the riskless rate, plus a premium to compensate for the systematic risk of the particular security, which is represented by the beta coefficient. The size adjustment reflects the fact that differences in investors' required rates of return that are related to firm size are not fully captured by beta. Accordingly, [Morningstar, Inc.] developed size premiums that are appropriately added to the theoretical CAPM cost of equity estimates to account for the level of a firm's market capitalization in determining the cost of equity. (Opinion No. 551 at P 263) (emphasis added) (footnote omitted).

Importantly, neither Dr. Avera in his testimony, nor the Commission in its final order, demonstrated that the Morningstar analysis could be applied to the CAPM based on the manner in which Dr. Avera constructed it, or provided support for the basic assertion that required rates of return for regulated utilities are not fully captured by the utility's published *Value Line* beta. These are two critical elements in order to produce a reasonable basis for adjusting the results of a traditional CAPM study.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Q WAS DR. AVERA'S SIZE PREMIUM ADJUSTMENT DEVELOPED IN A MANNER THAT CAN PRODUCE AN ACCURATE CAPM RESULT?

A No. Dr. Avera's CAPM methodology produces a result that is unreliable and flawed. Specifically, his Base CAPM analysis reflects beta factors to measure risk and return which are not compatible with the beta factor used to measure the size premium adjustment. The combination of the two disconnected measures of investment risk and return does not produce an accurate estimate of the risk or required return of a proxy group company. Importantly, which I will show here, correcting this beta deficiency shows that Dr. Avera's Base CAPM methodology without a size premium adjustment is the most reliable CAPM method.

Q PLEASE DESCRIBE WHY DR. AVERA'S BASE CAPM AND SMALL SIZE PREMIUM ADJUSTMENT CANNOT BE COMBINED TO PRODUCE AN ACCURATE CAPM RETURN ESTIMATE.

A Dr. Avera mismatches beta estimates used to produce his Base CAPM return estimate, and the beta estimate used to produce a size premium adjustment to the Base CAPM. The combination of these two very different beta estimates does not produce an accurate or reasonable basis for estimating risk or the required return for a security. Indeed, the source Dr. Avera relies on cautions against using betas measured differently within the same cost of capital analysis.[6] Dr. Avera made this error.

[6]Duff & Phelps, *2015 Valuation Handbook, Guide to Cost of Capital*, at page 5-7, attached as Exhibit No. JC-101, page 5.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Q PLEASE DESCRIBE WHY YOU BELIEVE THE BETAS USED BY DR. AVERA FOR HIS BASE CAPM RETURN ESTIMATE AND HIS SIZE PREMIUM ADJUSTMENT ARE DIFFERENT, AND NOT COMPATIBLE.

A For his Base CAPM study, he used a *Value Line* published beta. However, Dr. Avera relied on a beta that is developed by Morningstar (now Duff & Phelps) to produce his size premium adjustment. These two betas are not measured the same and Dr. Avera's proposal to add the size premium adjustment to his Base CAPM does not produce an accurate measure of risk or required return.

For his Base CAPM return study, Dr. Avera relies on a *Value Line* published beta. *Value Line* measures a "raw" beta based on a regression of the monthly returns of the individual companies, relative to the New York Stock Exchange Index, over a five-year period. *Value Line* then adjusts this "raw" beta for the long-term tendency of betas to converge on the market beta of 1. *Value Line* makes this adjustment by giving the raw beta estimate a weight by two-thirds, and weights the market beta of 1 by one-third, to produce an adjusted beta. *Value Line* publishes its adjusted beta, not its raw beta. *Value Line* asserts that this beta adjustment process takes backward-looking betas and adjusts them to produce forward-looking risk/return characteristics.[7]

In contrast, in measuring the size premium adjustment relied on by Dr. Avera, Duff & Phelps estimates a "raw" beta by regressing the monthly returns on the stock Market Index that are in excess of a 30-day U.S. Treasury yield over the period January 1926 through the most recent period. Unlike the *Value Line* published betas,

[7]Exhibit No. JC-101, pages 6 and 12.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

the Duff & Phelps raw beta is not adjusted for the long-term tendency of betas to converge on the market beta of 1 over time. Therefore, the Duff & Phelps and *Value Line* betas are not measured consistently and are not compatible when combined within a CAPM study and, thus, will not accurately measure the security risk or required return.[8]

Q YOU MENTIONED THAT DUFF & PHELPS WARNS AGAINST USING BETAS MEASURED DIFFERENTLY TO MEASURE A REQUIRED RETURN. PLEASE EXPLAIN.

A Specifically, Duff & Phelps states that:

> Note that significant differences can exist among beta estimates for the same stock published by different financial reporting services. One of the implications of this is that a valuation analyst should try to use betas for guideline companies used in a valuation from the same source.[9]

It continues to say that using betas from the same source can help to avoid an apples-and-oranges mixture of betas calculated using different methodologies.[10]

[8] *Id*.

[9] Duff & Phelps, *2015 Valuation Handbook, Guide to Cost of Capital*, page 5-7, attached as Exhibit No. JC-101, page 5; and Morningstar, *Ibbotson SBBI 2014 Classic Yearbook*, pages 99 and 109, attached as Exhibit No. JC-101, pages 11 and 12.

[10] *Id*.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Q CAN DR. AVERA'S METHODOLOGY BE CORRECTED TO USE THE SAME BETA MEASUREMENT IN BOTH HIS BASE CAPM AND FOR HIS SMALL CAPITALIZATION ADDER?

A Generally it can, but not to the extent necessary to use two betas that are not measured consistently so as to produce a composite beta, Base CAPM return, and the size premium adjustment. I will note, specifically, that when Dr. Avera's CAPM is corrected to consistently use a "raw" beta in both the Base CAPM analysis, and the measure of the size premium adjustment, the resulting CAPM return would align with the Base CAPM estimate using the *Value Line* adjusted beta, but without a size premium adjustment. In other words, this correction of Dr. Avera's CAPM analysis, a Base plus a size premium adjustment, using a "raw" beta in both steps of the CAPM study produces a result that is similar to Dr. Avera's Base CAPM using a *Value Line* adjusted beta.

Q PLEASE CONTINUE.

A As developed on my Exhibit No. JC-102, and summarized in Table 1 below, I modified Dr. Avera's Base CAPM and size premium adjustment to consistently use only a "raw" beta in both steps of the CAPM study.[11] When this is done, the resulting CAPM return using Dr. Avera's Base CAPM and size premium adjustment, produces

[11] *Value Line*'s published betas can be converted to a raw beta estimate by reversing its beta adjustment methodology. *Value Line* produces its adjusted beta by applying one-third weight to a market beta of 1, and two-thirds weight to the raw regression beta. The raw regression beta can be estimated by subtracting one-third from the published beta, and multiplying that product by 1.5.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

a very similar result to Dr. Avera's Base CAPM return based on only *Value Line* adjusted beta, but without a size premium adjustment.

In Table 1 below, under Column 1, I present the results of Dr. Avera's Base CAPM, and the size premium adjustment. Under Column 1, on line 1, Dr. Avera's Base CAPM return range is 7.86% to 10.87%, with a midpoint of 9.37%. On line 2, I show his CAPM after his size premium adjustment is included, and the CAPM range increased to 7.50% to 12.61%, with a midpoint of 10.06%.

Under Column 2, I revised Dr. Avera's Base CAPM analysis to use a "raw" beta in both the Base CAPM and size premium adjustment of the study. Hence, in this scenario, both the Base CAPM and the size premium adjustment are consistently based on the same "raw" beta methodologies. With this adjustment, the Base CAPM return estimate for Dr. Avera's analysis decreases to 6.14% to 10.66%, with a base midpoint of 8.4%, from 7.86% to 10.87%, and a midpoint of 9.37%. Then with the same size premium adjustment proposed by Dr. Avera, the adjusted Base and size premium adjustment CAPM results increases to 5.78% to 12.40%, with a midpoint estimate of 9.09%.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

TABLE 1

CAPM Study

Line	Description	Avera Methodology (1)	Regression Beta Methodology (2)
1	Base CAPM	7.86% to 10.87%	6.14% to 10.66%
	Midpoint	9.37%	8.40%
2	Adjusted CAPM	7.50% to 12.61%	5.78% to 12.40%
	Midpoint	10.06%	9.09%

Source:
Exhibit No. JC-102, pages 1 and 2.

As shown in Table 1 above, when a consistent beta methodology is used to measure both the Base CAPM and the size premium adjustment, the resulting CAPM return midpoint of 9.09% (Column 2, line 2) is reasonably comparable to Dr. Avera's Base CAPM return using a *Value Line* adjusted beta, midpoint of 9.37%, but without a size premium adjustment (Column 1, line 1). This demonstration shows that Dr. Avera's use of betas that are not calculated using the same methodology has the effect of inflating the CAPM return estimate, which distorts the measurement of risk and fair return based on market data.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Q DOES A CAPM ANALYSIS EXCLUDING A SIZE PREMIUM ADJUSTMENT PRODUCE A FAIR RISK-ADJUSTED RETURN THAT WILL ALSO PASS TESTS OF ECONOMIC LOGIC?

A Yes. *Value Line*'s adjustment to the raw regression beta is done in order to increase a CAPM return estimate for companies with betas smaller than 1 and decrease a CAPM return estimate for companies with betas greater than 1. In effect, it results in a flattening of the security market line, an increase to the intercept point, and produces a forward-looking CAPM return estimate because of the belief that all companies' risk and required return will converge on the market risk and required return over time.[12]

As noted by Dr. Avera, adding the size premium adjustment to his Base CAPM is done because it is expected that the Base CAPM understates forward-looking expected risk and return for companies without due consideration of market capitalization risk.

The effect of a CAPM return for utility companies using either of the two methodologies is similar. Specifically, using an adjusted *Value Line* beta produces a higher CAPM estimate for a utility company because these companies have betas lower than 1, reflecting their below market investment risk. Similarly, a majority of the utilities receive a size premium adjustment larger than 1, which increases their CAPM return toward the market expected return by adding a size premium adjustment to the CAPM return. Hence, both the use of an adjusted *Value Line* beta, and adding a

[12]Additionally, using the long-term yield as the risk-free rate instead of the short-term yield has the effect of raising the intercept and flattening the security market line.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

size premium adjustment, increases the CAPM return estimate for electric utility companies.

Q DO THE DUFF & PHELPS BOOKS WHICH DR. AVERA RELIES ON FOR THE SIZE PREMIUM ADJUSTMENT ALSO MAKE NOTE OF OTHER IMPORTANT RISK CHARACTERISTICS IN ACCURATELY MEASURING A UTILITY'S INVESTMENT RISK AND REQUIRED RETURN?

A Yes. The Duff & Phelps books, in addition to a market size premium adjustment, also note that the industry risk is also an important factor in measuring a required return. This is important because regulated utility companies' industry risk is lower than companies in other industries.

For example, utility companies typically have investment grade bond ratings, franchised or monopolistic service territories and limited competition, have access to significant amounts of capital under terms and prices, and are typically managed by competent executives that are good at managing capital and utility infrastructure assets. In contrast, non-regulated small companies may not have an investment grade bond rating, may have limited access to capital for maintenance of existing or asset growth, and may not have effective management. It is simply not legitimate to arbitrarily assume that a utility company has similar risk to a non-regulated small company based on market capitalization alone.

In addition to its size premium adjustment, Duff & Phelps also recommends consideration of industry-specific risk. This broader assessment of investment risk

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

and more accurate gauging of risk and return are based on the premise that because historical raw betas do not accurately measure investment risk and required returns that a buildup method may produce a more accurate return estimate. In Duff & Phelps' buildup method, a required return on a security is based on the following formula:

$$R = RF + MRP + SPA + IRA$$[13]

The formula includes components for the required return (R), the risk-free rate (RF), a market risk premium (MRP), a size premium adjustment (SPA), and an industry premium adjustment (IRA). The size premium adjustment is the same as that used by Dr. Avera in his analyses.

For regulated utility companies, Duff & Phelps estimates the industry risk adjustment to be a negative risk premium of 4.24%. This industry risk premium and the size premium adjustment were both measured using the Duff & Phelps' beta methodology. Hence, they can be applied producing consistent results. These two risk adjustments with a Duff & Phelps derived market risk premium of 7%, and Dr. Avera's risk-free rates, as shown on my Exhibit No. JC-102, page 3, produce a CAPM return in the range of 5.10% to 7.20% with a midpoint of 6.15%. Again, using a consistent beta methodology employed by Duff & Phelps, produces a CAPM return estimate that is lower than the CAPM return estimate using a traditional CAPM return, and a *Value* Line adjusted beta.

[13]Exhibit No. JC-101 at page 7.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

For these reasons, a size premium adjustment for a regulated utility company should only be considered along with recognizing the low-risk nature of the regulated utility industry. This recognition of size premium adjustment as well as industry risk more fully measures the investment risk of a regulated utility company and produces a CAPM return estimate that more accurately measures risk and return compared to the inconsistent model used by Dr. Avera.

VII. PROPOSED CAPM METHODOLOGY

Q BASED ON YOUR COMMENTS ABOVE, PLEASE DESCRIBE THE CAPM METHODOLOGY YOU RECOMMEND THE COMMISSION USE TO DEVELOP THE COMPOSITE ZOR.

A For the reasons outlined below, I recommend the Commission use the methodology outlined here to help form its composite ZOR. This methodology includes the following:

1. A market risk premium estimate should be based on a forward-looking expected return on the market. Using the DCF return on the market should reflect a two-step DCF methodology, using the dividend-paying companies' growth rates as a short-term stage, and the long-term Gross Domestic Product ("GDP") growth rate as the long-term stage. Two-thirds weight should be given to the short-term stage growth, and one-third weight to the long-term stage.

2. *Value Line* adjusted betas should be used as the forward-looking measure of investment risk for the companies in the proxy group.

3. Six-month average U.S. Treasury bond yields should be used as the risk-free rate proxy. The six-month period should be the same time period as used to produce the DCF study in the proceeding.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

FIRSTENERGY NYSE-FE

RECENT PRICE **30.89** | P/E RATIO **12.6** (Trailing: 13.5, Median: 16.0) | RELATIVE P/E RATIO **0.66** | DIV'D YLD **4.7%** | **VALUE LINE**

TIMELINESS 3 Raised 8/11/17
SAFETY 3 Lowered 2/22/13
TECHNICAL 3 Lowered 2/9/18
BETA .70 (1.00 = Market)

2021-23 PROJECTIONS

	Price	Gain	Ann'l Total Return
High	50	(+60%)	*16%*
Low	30	(-5%)	*4%*

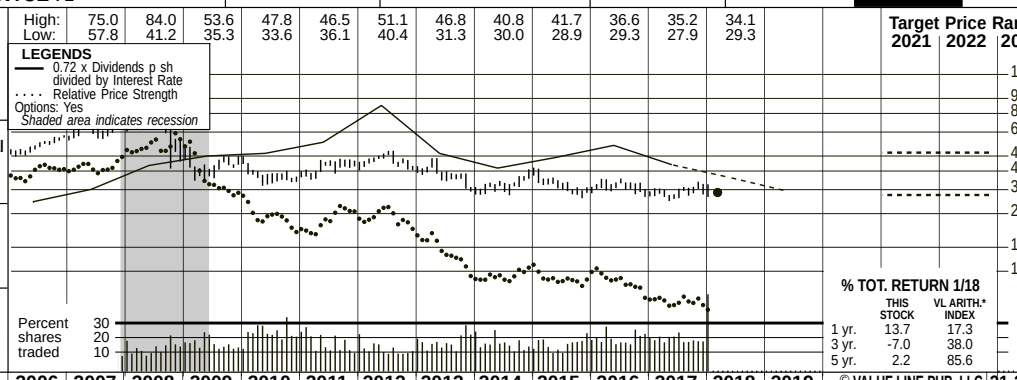
Insider Decisions

	A	M	J	J	A	S	O	N	D
to Buy	0	0	0	0	0	1	0	0	0
Options	0	3	0	0	4	0	0	3	0
to Sell	0	0	0	0	0	0	0	0	0

Institutional Decisions

	1Q2017	2Q2017	3Q2017
to Buy	274	269	258
to Sell	222	228	229
Hld's(000)	382370	388940	401521

High:	75.0	84.0	53.6	47.8	46.5	51.1	46.8	40.8	41.7	36.6	35.2	34.1						
Low:	57.8	41.2	35.3	33.6	36.1	40.4	31.3	30.0	28.9	29.3	27.9	29.3						



Target Price Range

2021	2022	2023
128	96	80
64	48	40
32	24	16
12		

% TOT. RETURN 1/18

	THIS STOCK	VL ARITH.* INDEX
1 yr.	13.7	17.3
3 yr.	-7.0	38.0
5 yr.	2.2	85.6

2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	© VALUE LINE PUB. LLC	21-23
40.83	37.31	37.76	36.35	36.03	42.00	44.70	41.70	43.76	38.87	36.57	35.60	35.74	35.48	32.92	*31.45*	*29.80*	*27.30*	Revenues per sh	*29.75*
6.45	4.79	7.60	7.55	7.22	8.34	9.04	8.80	8.50	5.75	6.05	6.30	4.55	6.33	6.53	*6.40*	*6.20*	*5.90*	"Cash Flow" per sh	*6.75*
2.54	1.47	2.77	2.84	3.82	4.22	4.38	3.32	3.25	1.88	2.13	2.97	.85	2.00	2.10	*2.60*	*2.40*	*2.60*	Earnings per sh [A]	*3.00*
1.50	1.50	1.91	1.71	1.85	2.05	2.20	2.20	2.20	2.20	2.20	1.65	1.44	1.44	1.44	1.44	*1.44*	*1.44*	Div'd Decl'd per sh [B] ■	*1.60*
3.35	2.60	2.57	3.66	4.12	5.36	9.47	7.23	6.44	5.45	7.09	6.90	8.42	6.83	6.93	*6.60*	*5.85*	*4.65*	Cap'l Spending per sh	*5.00*
23.92	25.13	26.04	27.86	28.30	29.45	27.17	28.08	28.03	31.75	31.29	30.32	29.49	29.33	14.11	*15.40*	*17.45*	*19.80*	Book Value per sh [C]	*24.00*
297.64	329.84	329.84	329.84	319.21	304.84	304.84	304.84	304.84	418.22	418.22	418.63	421.10	423.56	442.34	*445.00*	*478.00*	*540.00*	Common Shs Outst'g [D]	*548.00*
13.0	22.5	14.1	16.1	14.2	15.6	15.6	13.0	11.7	22.4	21.1	13.1	39.8	17.0	15.9	*12.0*			Avg Ann'l P/E Ratio	*13.5*
.71	1.28	.74	.86	.77	.83	.94	.87	.74	1.41	1.34	.74	2.10	.86	.83	*.60*			Relative P/E Ratio	*.75*
4.6%	4.5%	4.9%	3.7%	3.4%	3.1%	3.2%	5.1%	5.8%	5.2%	4.9%	4.3%	4.3%	4.2%	4.3%	4.6%			Avg Ann'l Div'd Yield	*4.0%*
13627	12712	13339	16258	15294	14903	15049	15029	14562	*14000*	*14250*	*14750*	Revenues ($mill)	*16250*
1342.0	1015.0	991.0	752.0	891.0	1245.0	356.0	844.0	892.0	*1155*	*1290*	*1395*	Net Profit ($mill)	*1660*
36.7%	19.6%	38.6%	41.3%	41.1%	36.1%	5.6%	35.7%	37.8%	*38.0%*	*25.0%*	*25.0%*	Income Tax Rate	*25.0%*
3.9%	12.8%	16.6%	9.3%	8.1%	6.0%	33.1%	13.9%	11.5%	*7.0%*	*6.0%*	*5.0%*	AFUDC % to Net Profit	*4.0%*
52.4%	58.2%	59.5%	54.2%	53.7%	55.5%	60.7%	60.7%	74.5%	*75.5%*	*66.5%*	*65.5%*	Long-Term Debt Ratio	*63.0%*
47.7%	41.8%	40.5%	45.8%	46.3%	44.5%	39.3%	39.3%	25.5%	*24.5%*	*28.0%*	*34.5%*	Common Equity Ratio	*37.0%*
17383	20467	21124	28996	28263	28523	31596	31613	24433	*27750*	*29900*	*31175*	Total Capital ($mill)	*35600*
17723	19164	19788	30337	32903	33252	35783	37214	29387	*30675*	*31750*	*32475*	Net Plant ($mill)	*34700*
9.7%	6.9%	6.3%	4.0%	4.9%	6.0%	2.7%	4.3%	5.7%	*6.0%*	*6.0%*	*6.0%*	Return on Total Cap'l	*6.0%*
16.2%	11.9%	11.6%	5.7%	6.8%	9.8%	2.9%	6.8%	14.3%	*17.0%*	*13.0%*	*13.0%*	Return on Shr. Equity	*12.5%*
16.2%	11.9%	11.6%	5.7%	6.8%	9.8%	2.9%	6.8%	14.3%	*17.0%*	*14.5%*	*12.5%*	Return on Com Equity [E]	*12.5%*
8.1%	4.0%	3.8%	NMF	NMF	2.6%	NMF	1.9%	4.5%	*7.5%*	*6.5%*	*6.0%*	Retained to Com Eq	*6.0%*
50%	66%	68%	117%	103%	74%	NMF	72%	68%	*55%*	*58%*	*56%*	All Div'ds to Net Prof	*53%*

Bold figures are Value Line estimates

CAPITAL STRUCTURE as of 9/30/17
Total Debt $22665 mill. **Due in 5 Yrs** $8216 mill.
LT Debt $21089 mill. **LT Interest** $995 mill.
Incl. $75 mill. capitalized leases.
(LT interest earned: 2.3x)
Leases, Uncapitalized Annual rentals $125 mill.

Pension Assets-12/16 $6213 mill.
Oblig $9246 mill.
Pfd Stock None

Common Stock 444,858,003 shs.

MARKET CAP: $14 billion (Large Cap)

ELECTRIC OPERATING STATISTICS

	2014	2015	2016
% Change Retail Sales (KWH)	+1.1	-.8	+.3
Avg. Indust. Use (MWH)	NMF	NMF	NMF
Avg. Indust. Revs. per KWH (¢)	NA	NA	NA
Capacity at Peak (Mw)	NA	NA	NA
Peak Load, Summer (Mw)	NA	NA	NA
Annual Load Factor (%)	NA	NA	NA
% Change Customers (yr-end)	+.3	+.3	+.5
Fixed Charge Cov. (%)	118	206	208

ANNUAL RATES of change (per sh)

	Past 10 Yrs.	Past 5 Yrs.	Est'd '14-'16 to '21-'23
Revenues	-.5%	-3.5%	*-2.0%*
"Cash Flow"	-2.5%	-5.5%	*2.0%*
Earnings	-6.0%	-10.0%	*9.0%*
Dividends	-2.5%	-8.0%	*1.5%*
Book Value	-1.0%	-3.5%	*Nil*

QUARTERLY REVENUES ($ mill.)

Calendar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2015	3897	3468	4123	3541	15029
2016	3869	3401	3917	3375	14562
2017	3547	3309	3714	*3430*	*14000*
2018	*3650*	*3450*	*3700*	*3450*	*14250*
2019	*3750*	*3550*	*3900*	*3550*	*14750*

EARNINGS PER SHARE [A]

Calendar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2015	.53	.46	.95	.06	2.00
2016	.77	.34	.89	.10	2.10
2017	.69	.58	.92	*.41*	*2.60*
2018	*.70*	*.50*	*.85*	*.35*	*2.40*
2019	*.75*	*.55*	*.90*	*.40*	*2.60*

QUARTERLY DIVIDENDS PAID [B] ■

Calendar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2014	.36	.36	.36	.36	1.44
2015	.36	.36	.36	.36	1.44
2016	.36	.36	.36	.36	1.44
2017	.36	.36	.36	.36	1.44
2018					

BUSINESS: FirstEnergy Corp. is a holding company for Ohio Edison, Pennsylvania Power, Cleveland Electric, Toledo Edison, Metropolitan Edison, Penelec, Jersey Central Power & Light, West Penn Power, Potomac Edison, & Mon Power. Provides electric service to 6.1 million customers in OH, PA, NJ, WV, MD, & NY. Acq'd Allegheny Energy 2/11. Electric revenue breakdown by customer class not available. Generating sources: coal, 44%; nuclear, 26%; purchased, 30%. Fuel costs: 38% of revenues. '16 reported deprec. rate: 2.5%. Has 15,700 employees. Chairman: George M. Smart. President & CEO: Charles E. Jones. Incorporated: Ohio. Address: 76 South Main Street, Akron, Ohio 44308-1890. Telephone: 800-736-3402. Internet: www.firstenergycorp.com.

FirstEnergy made some substantial financing moves. The company issued $850 million of common stock and $1.62 billion of preferred stock that is mandatorily convertible after 18 months. FirstEnergy is using the proceeds to retire debt and fund its pension plan. This will strengthen the company's balance sheet and lower its pension expense beginning this year. FirstEnergy affirmed its expectation to maintain the common dividend at the current level. Wall Street had a favorable reaction to the announcement, sending the stock price surging more than 10% on the day of the announcement.

FirstEnergy aims to become an entirely regulated company. It established a restructuring working group to make recommendations to management. Last year, FirstEnergy stated its hope to achieve this goal by mid-2018, but this now appears ambitious. The company strategy arose from the struggles of its nonregulated businesses in recent years, which have been hurt by unfavorable conditions in the power markets. In fact, FirstEnergy's main nonregulated subsidiary might not be able to retire the $515 million of debt that is due from April through yearend. (The parent company and utilities would not be part of a bankruptcy filing.) FirstEnergy has written down and sold some nonutility assets, and will likely sell or close additional facilities. The company had a setback when federal regulators rejected its proposal to transfer a nonregulated coal-fired plant to its utilities in West Virginia. In all, earnings are even more unpredictable than usual.

The regulated operations are faring well. FirstEnergy's utilities in Pennsylvania and New Jersey received rate relief last year. The company's utilities in Ohio asked the state commission to approve a three-year, $450 million electric system modernization plan. It is asking for a ruling by May. FirstEnergy plans to spend $800 million-$1.2 billion on transmission annually through 2021, and some 90% of this will be recovered through a forward-looking federal regulatory mechanism.

This stock's dividend yield is about a percentage point above the utility average. However, dividend growth prospects are ill-defined.

Paul E. Debbas, CFA *February 16, 2018*

(A) Diluted EPS. Excl. nonrec. gain (losses): '10, (68¢); '11, 33¢; '12, (29¢); '13, ($2.07); '14, (17¢); '15, (63¢); '16, ($16.59); '17, (42¢); gain from disc. ops.: '14, 20¢. Next earnings report due late Feb. **(B)** Div'ds paid early Mar., June, Sep. & Dec. 5 div'ds declared in '04, 3 in '13. ■ Div'd reinvestment plan avail. **(C)** Incl. intang.: In '16: $14.99/sh. **(D)** In mill. **(E)** Rate base: Depr. orig. cost. Rates all'd on com. eq.: 9.75%-11.9%; earned on avg. com. eq., '16: 7.0%. Regulatory Climate: OH Above Avg.; PA, NJ Avg.; MD, WV Below Avg.

Company's Financial Strength	B+
Stock's Price Stability	85
Price Growth Persistence	10
Earnings Predictability	40

© 2018 Value Line, Inc. All rights reserved. Factual material is obtained from sources believed to be reliable and is provided without warranties of any kind. THE PUBLISHER IS NOT RESPONSIBLE FOR ANY ERRORS OR OMISSIONS HEREIN. This publication is strictly for subscriber's own, non-commercial, internal use. No part of it may be reproduced, resold, stored or transmitted in any printed, electronic or other form, or used for generating or marketing any printed or electronic publication, service or product.

To subscribe call 1-800-VALUELINE

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

FIRSTENERGY NYSE-FE

RECENT PRICE **33.24** | P/E RATIO **33.2** (Trailing: 16.1, Median: 15.0) | RELATIVE P/E RATIO **1.87** | DIV'D YLD **4.3%** | **VALUE LINE**

TIMELINESS 4 Lowered 5/4/18
SAFETY 3 Lowered 2/22/13
TECHNICAL 2 Raised 5/18/18
BETA .65 (1.00 = Market)

2021-23 PROJECTIONS

	Price	Gain	Ann'l Total Return
High	50	(+50%)	*14%*
Low	30	(-10%)	*3%*

Insider Decisions

	J	A	S	O	N	D	J	F	M
to Buy	0	0	1	0	0	0	0	0	0
Options	0	4	0	0	3	0	0	3	12
to Sell	0	0	0	0	0	0	0	0	0

Institutional Decisions

	2Q2017	3Q2017	4Q2017
to Buy	269	258	245
to Sell	228	229	200
Hld's(000)	388940	401521	375942

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	© VALUE LINE PUB. LLC	21-23
High:	75.0	84.0	53.6	47.8	46.5	51.1	46.8	40.8	41.7	36.6	35.2	35.6								
Low:	57.8	41.2	35.3	33.6	36.1	40.4	31.3	30.0	28.9	29.3	27.9	29.3								
	40.83	37.31	37.76	36.35	36.03	42.00	44.70	41.70	43.76	38.87	36.57	35.60	35.74	35.48	32.92	31.49	*24.25*	*22.30*	Revenues per sh	*24.25*
	6.45	4.79	7.60	7.55	7.22	8.34	9.04	8.80	8.50	5.75	6.05	6.30	4.55	6.33	6.53	6.54	*3.45*	*4.30*	"Cash Flow" per sh	*5.25*
	2.54	1.47	2.77	2.84	3.82	4.22	4.38	3.32	3.25	1.88	2.13	2.97	.85	2.00	2.10	2.73	*1.00*	*2.15*	Earnings per sh [A]	*2.75*
	1.50	1.50	1.91	1.71	1.85	2.05	2.20	2.20	2.20	2.20	2.20	1.65	1.44	1.44	1.44	1.44	*1.44*	*1.44*	Div'd Decl'd per sh [B] ■	*1.60*
	3.35	2.60	2.57	3.66	4.12	5.36	9.47	7.23	6.44	5.45	7.09	6.90	8.42	6.83	6.93	6.38	*5.85*	*4.65*	Cap'l Spending per sh	*5.00*
	23.92	25.13	26.04	27.86	28.30	29.45	27.17	28.08	28.03	31.75	31.29	30.32	29.49	29.33	14.11	8.81	*12.30*	*14.80*	Book Value per sh [C]	*18.00*
	297.64	329.84	329.84	329.84	319.21	304.84	304.84	304.84	304.84	418.22	418.22	418.63	421.10	423.56	442.34	445.33	*478.00*	*540.00*	Common Shs Outst'g [D]	*548.00*
	13.0	22.5	14.1	16.1	14.2	15.6	15.6	13.0	11.7	22.4	21.1	13.1	NMF	17.0	15.9	11.4	*Bold figures are Value Line estimates*		Avg Ann'l P/E Ratio	*14.5*
	.71	1.28	.74	.86	.77	.83	.94	.87	.74	1.41	1.34	.74	NMF	.86	.83	.57			Relative P/E Ratio	*.80*
	4.6%	4.5%	4.9%	3.7%	3.4%	3.1%	3.2%	5.1%	5.8%	5.2%	4.9%	4.3%	4.3%	4.2%	4.3%	4.6%			Avg Ann'l Div'd Yield	*4.0%*
	13627	12712	13339	16258	15294	14903	15049	15029	14562	14022	*11600*	*12000*	Revenues ($mill)	*13300*
	1342.0	1015.0	991.0	752.0	891.0	1245.0	356.0	844.0	892.0	1213.0	*865*	*1155*	Net Profit ($mill)	*1520*
	36.7%	19.6%	38.6%	41.3%	41.1%	36.1%	5.6%	35.7%	37.8%	37.2%	*28.0%*	*28.0%*	Income Tax Rate	*28.0%*
	3.9%	12.8%	16.6%	9.3%	8.1%	6.0%	33.1%	13.9%	11.5%	6.5%	*9.0%*	*6.0%*	AFUDC % to Net Profit	*5.0%*
	52.4%	58.2%	59.5%	54.2%	53.7%	55.5%	60.7%	60.7%	74.5%	84.3%	*70.5%*	*69.5%*	Long-Term Debt Ratio	*67.0%*
	47.7%	41.8%	40.5%	45.8%	46.3%	44.5%	39.3%	39.3%	25.5%	15.7%	*23.0%*	*30.5%*	Common Equity Ratio	*33.0%*
	17383	20467	21124	28996	28263	28523	31596	31613	24433	25040	*25375*	*26400*	Total Capital ($mill)	*30300*
	17723	19164	19788	30337	32903	33252	35783	37214	29387	28879	*29875*	*31225*	Net Plant ($mill)	*35600*
	9.7%	6.9%	6.3%	4.0%	4.9%	6.0%	2.7%	4.3%	5.7%	7.0%	*5.0%*	*6.0%*	Return on Total Cap'l	*6.5%*
	16.2%	11.9%	11.6%	5.7%	6.8%	9.8%	2.9%	6.8%	14.3%	30.9%	*8.0%*	*14.0%*	Return on Shr. Equity	*15.5%*
	16.2%	11.9%	11.6%	5.7%	6.8%	9.8%	2.9%	6.8%	14.3%	30.9%	*8.0%*	*14.0%*	Return on Com Equity [E]	*15.5%*
	8.1%	4.0%	3.8%	NMF	NMF	2.6%	NMF	1.9%	4.5%	14.6%	*NMF*	*5.0%*	Retained to Com Eq	*6.5%*
	50%	66%	68%	117%	103%	74%	NMF	72%	68%	53%	*NMF*	*67%*	All Div'ds to Net Prof	*58%*

CAPITAL STRUCTURE as of 3/31/18
Total Debt $19097 mill. **Due in 5 Yrs** $8359 mill.
LT Debt $16740 mill. **LT Interest** $787 mill.
Incl. $91 mill. capitalized leases.
(LT interest earned: 2.4x)
Leases, Uncapitalized Annual rentals $146 mill.

Pension Assets-12/17 $6704 mill.
Oblig $10167 mill.
Pfd Stock None

Common Stock 476,909,318 shs.

MARKET CAP: $16 billion (Large Cap)

ELECTRIC OPERATING STATISTICS

	2015	2016	2017
% Change Retail Sales (KWH)	-.8	+.3	-2.1
Avg. Indust. Use (MWH)	NMF	NMF	NMF
Avg. Indust. Revs. per KWH (¢)	NA	NA	NA
Capacity at Peak (Mw)	NA	NA	NA
Peak Load, Summer (Mw)	NA	NA	NA
Annual Load Factor (%)	NA	NA	NA
% Change Customers (yr-end)	+.3	+.5	+.5
Fixed Charge Cov. (%)	206	208	249

ANNUAL RATES of change (per sh)

	Past 10 Yrs.	Past 5 Yrs.	Est'd '15-'17 to '21-'23
Revenues	-1.5%	-3.5%	*-5.0%*
"Cash Flow"	-1.5%	-1.0%	*-3.5%*
Earnings	-4.5%	-1.0%	*3.0%*
Dividends	-2.5%	-8.0%	*2.0%*
Book Value	-5.0%	-10.5%	*.5%*

QUARTERLY REVENUES ($ mill.)

Calendar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2015	3897	3468	4123	3541	15029
2016	3869	3401	3917	3375	14562
2017	3557	3309	3714	3442	14022
2018	2976	*2724*	*3100*	*2800*	*11600*
2019	*3100*	*2800*	*3200*	*2900*	*12000*

EARNINGS PER SHARE [A]

Calendar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2015	.53	.46	.95	.06	2.00
2016	.77	.34	.89	.10	2.10
2017	.71	.59	.95	.49	2.73
2018	.04	*d.04*	*.55*	*.45*	*1.00*
2019	*.60*	*.45*	*.70*	*.40*	*2.15*

QUARTERLY DIVIDENDS PAID [B] ■

Calendar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2014	.36	.36	.36	.36	1.44
2015	.36	.36	.36	.36	1.44
2016	.36	.36	.36	.36	1.44
2017	.36	.36	.36	.36	1.44
2018	.36				

BUSINESS: FirstEnergy Corp. is a holding company for Ohio Edison, Pennsylvania Power, Cleveland Electric, Toledo Edison, Metropolitan Edison, Penelec, Jersey Central Power & Light, West Penn Power, Potomac Edison, & Mon Power. Provides electric service to 6.1 million customers in OH, PA, NJ, WV, MD, & NY. Acq'd Allegheny Energy 2/11. Electric revenue breakdown by customer class not available. Generating sources: coal, 44%; nuclear, 26%; purchased, 30%. Fuel costs: 33% of revenues. '17 reported deprec. rate: 2.4%. Has 15,700 employees. Chairman: George M. Smart. President & CEO: Charles E. Jones. Incorporated: Ohio. Address: 76 South Main Street, Akron, Ohio 44308-1890. Telephone: 800-736-3402. Internet: www.firstenergycorp.com.

FirstEnergy has deconsolidated almost all of its nonregulated operations. These filed for Chapter 11 bankruptcy protection, and are now separate from FirstEnergy. Thus, its financial statements now reflect an almost entirely regulated company. The move resulted in a gain of $2.50 a share from discontinued operations in the first quarter of 2018.

The stock has been the top performer among electric utility issues so far in 2018. The price is up 9% in what has been a poor year for most equities in this industry. The market reacted favorably to the financing moves the company made in January, when it issued $850 million of common stock and $1.62 billion of preferred that is mandatorily convertible in 2019. The proceeds were used to reduce debt and contribute to the pension plan.

Our 2018 earnings estimate requires an explanation. The preferred stock that FirstEnergy issued in early 2018 was sold at a discount, and the difference is being amortized until the shares become convertible. This is why earnings were negligible in the first quarter, and might well fall into the red in the June period. Management's guidance for "operating" earnings this year is $2.25-$2.55 a share. Although earnings from continuing operations will almost certainly fall short of the dividend this year, the payout is not at risk of a cut.

The regulated businesses have some opportunities, but also a possible risk. The utilities in Ohio should soon receive a ruling from the state commission regarding a proposed three-year, $450 million electric system modernization plan. The company plans to spend $800 million-$1.2 billion on transmission annually through 2021. However, the company incurred $355 million of storm-related costs in the March quarter, $230 million of which were expenses. Of that, $220 million was deferred for future recovery. However, Jersey Central Power & Light was criticized in New Jersey for its performance following the storms, so the possibility of a write-off of some storm costs cannot be ruled out.

The yield of this untimely stock is above the utility average. However, the board hasn't raised the payout since that was cut in 2014, and dividend growth prospects are not well defined.

Paul E. Debbas, CFA *May 18, 2018*

(A) Diluted EPS. Excl. nonrec. gain (losses): '11, 33¢; '12, (29¢); '13, ($2.07); '14, (17¢); '15, (63¢); '16, ($16.59); '17, ($6.61); gains from disc. ops.: '14, 20¢; '18, $2.50. '17 EPS don't sum due to rounding. Next egs. report due late July. **(B)** Div'ds paid early Mar., June, Sep. & Dec. 5 div'ds decl. in '04, 3 in '13. ■ Div'd reinv. plan avail. **(C)** Incl. intang. In '17: $12.71/sh. **(D)** In mill. **(E)** Rate base: Depr. orig. cost. Rates all'd on com. eq.: 9.75%-11.9%; earned on avg. com. eq., '17: 18.5%. Regul. Clim.: OH Above Avg.; PA, NJ Avg.; MD, WV Below Avg.

Company's Financial Strength	B+
Stock's Price Stability	85
Price Growth Persistence	10
Earnings Predictability	40

© 2018 Value Line, Inc. All rights reserved. Factual material is obtained from sources believed to be reliable and is provided without warranties of any kind. THE PUBLISHER IS NOT RESPONSIBLE FOR ANY ERRORS OR OMISSIONS HEREIN. This publication is strictly for subscriber's own, non-commercial, internal use. No part of it may be reproduced, resold, stored or transmitted in any printed, electronic or other form, or used for generating or marketing any printed or electronic publication, service or product.

To subscribe call 1-800-VALUELINE

Section 1: 10-K (10-K)

Table of Contents

UNITED STATES SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d)
OF THE SECURITIES EXCHANGE ACT OF 1934

For the fiscal year ended **December 31, 2018**

Commission File Number	Exact name of registrants as specified in their charters, address of principal executive offices and registrants' telephone number	IRS Employer Identification Number
1-8841	**NEXTERA ENERGY, INC.**	59-2449419
2-27612	**FLORIDA POWER & LIGHT COMPANY**	59-0247775

700 Universe Boulevard
Juno Beach, Florida 33408
(561) 694-4000

State or other jurisdiction of incorporation or organization: Florida

		Name of exchange on which registered
Securities registered pursuant to Section 12(b) of the Act:		
NextEra Energy, Inc.:	Common Stock, $0.01 Par Value	New York Stock Exchange
	6.123% Corporate Units	New York Stock Exchange
Florida Power & Light Company: None		

Indicate by check mark if the registrants are well-known seasoned issuers, as defined in Rule 405 of the Securities Act of 1933.

NextEra Energy, Inc. Yes þ No o Florida Power & Light Company Yes þ No o

Indicate by check mark if the registrants are not required to file reports pursuant to Section 13 or Section 15(d) of the Securities Exchange Act of 1934.

NextEra Energy, Inc. Yes o No þ Florida Power & Light Company Yes o No þ

Indicate by check mark whether the registrants (1) have filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months, and (2) have been subject to such filing requirements for the past 90 days.

NextEra Energy, Inc. Yes þ No o Florida Power & Light Company Yes þ No o

Indicate by check mark whether the registrants have submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T during the preceding 12 months.

NextEra Energy, Inc. Yes þ No o Florida Power & Light Company Yes þ No o

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of registrants' knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. þ

Indicate by check mark whether the registrants are a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company.

NextEra Energy, Inc.	Large Accelerated Filer þ	Accelerated Filer o	Non-Accelerated Filer o	Smaller Reporting Company o	Emerging Growth Company o
Florida Power & Light Company	Large Accelerated Filer o	Accelerated Filer o	Non-Accelerated Filer þ	Smaller Reporting Company o	Emerging Growth Company o

If an emerging growth company, indicate by check mark if the registrants have elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Securities Exchange Act of 1934. ¨

Indicate by check mark whether the registrants are shell companies (as defined in Rule 12b-2 of the Securities Exchange Act of 1934). Yes ¨ No þ

Aggregate market value of the voting and non-voting common equity of NextEra Energy, Inc. held by non-affiliates at June 29, 2018 (based on the closing market price on the Composite Tape on June 29, 2018) was $78,550,110,752.

There was no voting or non-voting common equity of Florida Power & Light Company held by non-affiliates at June 29, 2018.

Number of shares of NextEra Energy, Inc. common stock, $0.01 par value, outstanding at January 31, 2019: 478,167,505

(a) Prior period amounts have been retrospectively adjusted as discussed in Note 14.

The components of NEE's deferred tax assets relating to net operating loss carryforwards and tax credit carryforwards at December 31, 2018 are as follows:

	Amount	Expiration Dates
	(millions)	
Net operating loss carryforwards:		
State	269	2019-2038
Foreign	81 [(a)]	2019-2038
Net operating loss carryforwards	$ 350	
Tax credit carryforwards:		
Federal	$ 2,915	2028-2038
State	344 [(b)]	2019-2044
Tax credit carryforwards	$ 3,259	

(a) Includes $60 million of net operating loss carryforwards with an indefinite expiration period.
(b) Includes $188 million of ITC carryforwards with an indefinite expiration period.

Table of Contents

7. Jointly-Owned Electric Plants

Certain NEE subsidiaries own undivided interests in the jointly-owned facilities described below, and are entitled to a proportionate share of the output from those facilities. The subsidiaries are responsible for their share of the operating costs, as well as providing their own financing. Accordingly, each subsidiary's proportionate share of the facilities and related revenues and expenses is included in the appropriate balance sheet and statement of income captions. NEE's and FPL's respective shares of direct expenses for these facilities are included in fuel, purchased power and interchange expense, O&M expenses, depreciation and amortization expense and taxes other than income taxes and other - net in NEE's and FPL's consolidated statements of income.

NEE's and FPL's proportionate ownership interest in jointly-owned facilities is as follows:

	December 31, 2018			
	Ownership Interest	Gross Investment[(a)]	Accumulated Depreciation[(a)]	Construction Work in Progress
		(millions)		
FPL:				
St. Lucie Unit No. 2	85%	$ 2,227	$ 912	$ 51
Scherer Unit No. 4	76%	$ 1,222	$ 445	$ 21
NEER:				
Duane Arnold	70%	$ 70	$ 9	$ 13
Seabrook	88.23%	$ 1,205	$ 337	$ 85
Wyman Station Unit No. 4	87.49%	$ 28	$ 6	$ —
Stanton	65%	$ 135	$ —	$ —
Corporate and Other:				
Transmission substation assets located in Seabrook, New Hampshire	88.23%	$ 81	$ 13	$ 11

(a) Excludes nuclear fuel.

8. Acquisitions

Gulf Power Company - On January 1, 2019, NEE acquired the outstanding common shares of Gulf Power Company (Gulf Power), a rate-regulated electric utility under the jurisdiction of the FPSC. Gulf Power serves more than 460,000 customers in eight counties throughout northwest Florida and has approximately 9,400 miles of transmission and distribution lines and 2,300 MW of electric generating capacity. The aggregate purchase price included approximately $4.47 billion in cash consideration, excluding post-closing working capital adjustments, and

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

the assumption of approximately $1.3 billion of Gulf Power debt. The cash purchase price was funded through $4.5 billion of borrowings by NEECH in December 2018 under certain short-term bi-lateral term loan agreements which mature in June 2019; the proceeds of which borrowings were restricted and included in noncurrent other assets on NEE's consolidated balance sheet at December 31, 2018. NEE incurred approximately $26 million in acquisition-related costs during the year ended December 31, 2018, which are reflected in merger-related expenses in NEE's consolidated statements of income. NEE is in the process of evaluating the purchase accounting considerations, including the initial purchase price allocation.

Other - In July 2018, NEE acquired the outstanding common shares of the entity that owns Florida City Gas (FCG), which serves approximately 110,000 residential and commercial natural gas customers in Florida's Miami-Dade, Brevard, St. Lucie and Indian River counties with 3,700 miles of natural gas pipeline, for approximately $530 million in cash subject to certain adjustments. Upon closing, NEE transferred FCG to FPL.

In December 2018, NEE acquired a 100% interest in an entity that indirectly owns Oleander Power Project, an approximately 791 MW natural gas-fired, simple-cycle combustion turbine electric generation facility located near Cocoa, Florida, and a 100% interest in an entity that owns a 65% interest in Stanton Energy Center Unit A, an approximately 660 MW combined-cycle electric generation facility located near Orlando, Florida for approximately $200 million in cash, subject to certain adjustments.

Trans Bay Cable, LLC - In November 2018, a wholly owned subsidiary of NextEra Energy Transmission, LLC (NEET) entered into an agreement to acquire the outstanding membership interests of Trans Bay Cable, LLC (Trans Bay) for approximately $1.05 billion, including the assumption of debt, pending, among other things, approval of the California Public Utilities Commission and the FERC. Trans Bay owns and operates a 53-mile, high-voltage direct current underwater transmission cable system in California extending from Pittsburg to San Francisco, with utility rates set by the FERC and revenues paid by the California Independent System Operator. The acquisition is expected to close in late 2019. NEECH guarantees the payment obligation under the agreement.

Table of Contents

NEXTERA ENERGY, INC. AND FLORIDA POWER & LIGHT COMPANY
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (Continued)

9. Variable Interest Entities (VIEs)

At December 31, 2018, NEE had 31 VIEs which it consolidated and had interests in certain other VIEs which it did not consolidate.

FPL - FPL is considered the primary beneficiary of, and therefore consolidates, a VIE that is a wholly owned bankruptcy remote special purpose subsidiary that it formed in 2007 for the sole purpose of issuing storm-recovery bonds pursuant to the securitization provisions of the Florida Statutes and a financing order of the FPSC. FPL is considered the primary beneficiary because FPL has the power to direct the significant activities of the VIE, and its equity investment, which is subordinate to the bondholder's interest in the VIE, is at risk. Storm restoration costs incurred by FPL during 2005 and 2004 exceeded the amount in FPL's funded storm and property insurance reserve, resulting in a storm reserve deficiency. In 2007, the VIE issued $652 million aggregate principal amount of senior secured bonds (storm-recovery bonds), primarily for the after-tax equivalent of the total of FPL's unrecovered balance of the 2004 storm restoration costs, the 2005 storm restoration costs and to reestablish FPL's storm and property insurance reserve. In connection with this financing, net proceeds, after debt issuance costs, to the VIE (approximately $644 million) were used to acquire the storm-recovery property, which includes the right to impose, collect and receive a storm-recovery charge from all customers receiving electric transmission or distribution service from FPL under rate schedules approved by the FPSC or under special contracts, certain other rights and interests that arise under the financing order issued by the FPSC and certain other collateral pledged by the VIE that issued the bonds. The storm-recovery bonds are payable only from and are secured by the storm-recovery property. The bondholders have no recourse to the general credit of FPL. The assets of the VIE were approximately $77 million and $148 million at December 31, 2018 and 2017, respectively, and consisted primarily of storm-recovery property, which are included in both current and noncurrent regulatory assets on NEE's and FPL's consolidated balance sheets. The liabilities of the VIE were approximately $76 million and $147 million at December 31, 2018 and 2017, respectively, and consisted primarily of storm-recovery bonds, which are included in current portion of long-term debt and long-term debt on NEE's and FPL's consolidated balance sheets.

NEER - NEE consolidates 30 NEER VIEs. NEER is considered the primary beneficiary of these VIEs since NEER controls the most significant activities of these VIEs, including operations and maintenance, and has the obligation to absorb expected losses of these VIEs.

Prior to January 1, 2018, a subsidiary of NEER was the primary beneficiary of, and therefore consolidated, NEP, which consolidated NEP OpCo because of NEP's controlling interest as the general partner of NEP OpCo. At December 31, 2017, NEE owned a controlling non-economic general partner interest in NEP and a limited partner interest in NEP OpCo, and presented limited partner interests in NEP and NEP OpCo as a noncontrolling interest in NEE's consolidated financial statements. At December 31, 2017, NEE owned common units of NEP OpCo representing a noncontrolling interest in NEP's operating projects of approximately 65.1%. The assets and liabilities of NEP were approximately $8.4 billion and $6.2 billion, respectively, at December 31, 2017, and primarily consisted of property, plant and equipment and long-term debt. During the third quarter of 2017, changes to NEP's governance structure were made that, among other things, enhanced NEP unitholder governance rights. The new governance structure established a NEP board of directors, which elected board members commenced service in January 2018. As a result of these governance changes, NEP is no longer a VIE and NEP was deconsolidated from NEE in January 2018 (see Note 1 - NextEra Energy Partners, LP) resulting in NEE no longer indirectly consolidating NEP OpCo. NEP OpCo continues to be a VIE and NEE records its noncontrolling interest in NEP OpCo as an equity method investment (See Other below).

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

20190418-8005 FERC PDF (Unofficial) 04/17/2019

THIS FILING IS

Item 1: [X] An Initial (Original) Submission OR [ ] Resubmission No. ____

Form 1 Approved
OMB No.1902-0021
(Expires 12/31/2019)
Form 1-F Approved
OMB No.1902-0029
(Expires 12/31/2019)
Form 3-Q Approved
OMB No.1902-0205
(Expires 12/31/2019)

FERC FINANCIAL REPORT
FERC FORM No. 1: Annual Report of Major Electric Utilities, Licensees and Others and Supplemental Form 3-Q: Quarterly Financial Report

These reports are mandatory under the Federal Power Act, Sections 3, 4(a), 304 and 309, and 18 CFR 141.1 and 141.400. Failure to report may result in criminal fines, civil penalties and other sanctions as provided by law. The Federal Energy Regulatory Commission does not consider these reports to be of confidential nature

Exact Legal Name of Respondent (Company)	Year/Period of Report
Gulf Power Company	End of 2018/Q4

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Name of Respondent: Gulf Power Company	This Report Is: (1) [X] An Original (2) [ ] A Resubmission	Date of Report *(Mo, Da, Yr)* 04/17/2019	Year/Period of Report End of 2018/Q4

20190418-8005 FERC PDF (Unofficial) 04/17/2019

COMPARATIVE BALANCE SHEET (ASSETS AND OTHER DEBITS) (Continued)

Line No.	Title of Account (a)	Ref. Page No. (b)	Current Year End of Quarter/Year Balance (c)	Prior Year End Balance 12/31 (d)
53	(Less) Noncurrent Portion of Allowances		0	0
54	Stores Expense Undistributed (163)	227	0	0
55	Gas Stored Underground - Current (164.1)		0	0
56	Liquefied Natural Gas Stored and Held for Processing (164.2-164.3)		0	0
57	Prepayments (165)		18,671,764	19,544,973
58	Advances for Gas (166-167)		0	0
59	Interest and Dividends Receivable (171)		0	374,003
60	Rents Receivable (172)		670,100	674,775
61	Accrued Utility Revenues (173)		56,649,754	66,526,476
62	Miscellaneous Current and Accrued Assets (174)		0	0
63	Derivative Instrument Assets (175)		79,177	22,315
64	(Less) Long-Term Portion of Derivative Instrument Assets (175)		0	0
65	Derivative Instrument Assets - Hedges (176)		23,045	8,155
66	(Less) Long-Term Portion of Derivative Instrument Assets - Hedges (176		0	0
67	Total Current and Accrued Assets (Lines 34 through 66)		292,570,672	305,687,901
68	**DEFERRED DEBITS**			
69	Unamortized Debt Expenses (181)		9,095,551	9,289,183
70	Extraordinary Property Losses (182.1)	230a	0	0
71	Unrecovered Plant and Regulatory Study Costs (182.2)	230b	57,137,861	62,026,032
72	Other Regulatory Assets (182.3)	232	747,042,131	551,240,344
73	Prelim. Survey and Investigation Charges (Electric) (183)		6,549,910	4,625,820
74	Preliminary Natural Gas Survey and Investigation Charges 183.1)		0	0
75	Other Preliminary Survey and Investigation Charges (183.2)		0	0
76	Clearing Accounts (184)		-328,581	230,724
77	Temporary Facilities (185)		0	0
78	Miscellaneous Deferred Debits (186)	233	2,292,167	4,297,116
79	Def. Losses from Disposition of Utility Plt. (187)		0	0
80	Research, Devel. and Demonstration Expend. (188)	352-353	431,320	0
81	Unamortized Loss on Reaquired Debt (189)		15,146,148	16,327,494
82	Accumulated Deferred Income Taxes (190)	234	183,704,668	197,098,781
83	Unrecovered Purchased Gas Costs (191)		0	0
84	Total Deferred Debits (lines 69 through 83)		1,021,071,175	845,135,494
85	TOTAL ASSETS (lines 14-16, 32, 67, and 84)		5,320,620,672	4,941,569,904

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

NextEra Energy, Inc. (NEE)

NYSE - Nasdaq Real Time Price. Currency in USD

Add to watchlist | Visitors trend 2W ↑ 10W ↑ 9M ↑ | Quote Lookup

207.97 -0.23 (-0.11%)

As of 11:01AM EDT. Market open.

Time Period: Dec 15, 2018 - Jan 15, 2019 Show: Historical Prices

Frequency: Daily Apply

Currency in USD Download Data

Date	Open	High	Low	Close*	Adj Close**	Volume
Jan 15, 2019	171.39	175.81	170.75	174.72	172.47	2,315,300
Jan 14, 2019	174.62	174.62	169.35	171.23	169.02	3,838,900
Jan 11, 2019	175.14	176.14	173.65	175.71	173.45	2,215,000
Jan 10, 2019	173.30	175.62	172.55	175.39	173.13	2,846,200
Jan 09, 2019	173.56	174.00	172.05	172.79	170.56	1,761,900
Jan 08, 2019	172.15	173.79	171.57	173.54	171.30	2,649,900
Jan 07, 2019	171.65	172.94	170.50	172.28	170.06	2,369,500
Jan 04, 2019	169.15	172.59	168.66	172.53	170.31	2,712,200
Jan 03, 2019	169.91	171.16	168.67	169.41	167.23	2,315,200
Jan 02, 2019	172.68	173.30	169.01	169.83	167.64	2,637,400
Dec 31, 2018	173.01	174.03	171.28	173.82	171.58	1,604,400
Dec 28, 2018	172.60	174.37	171.62	172.72	170.49	1,731,000
Dec 27, 2018	170.54	172.16	167.95	172.16	169.94	2,490,400
Dec 26, 2018	168.07	170.37	164.78	170.34	168.15	2,098,400
Dec 24, 2018	174.45	175.38	166.92	168.08	165.91	1,657,500
Dec 21, 2018	174.40	178.56	173.24	174.11	171.87	6,037,100
Dec 20, 2018	174.50	176.55	172.39	174.91	172.66	3,278,100
Dec 19, 2018	176.50	177.18	173.64	174.52	172.27	3,359,400
Dec 18, 2018	176.25	177.82	175.42	176.00	173.73	2,941,000
Dec 17, 2018	182.36	182.36	174.87	175.65	173.39	3,286,900

*Close price adjusted for splits. **Adjusted close price adjusted for both dividends and splits.

YAHOO! FINANCE Premium
It's your money. Trade up.
Try it free

People Also Watch

Symbol	Last Price	Change	% Change
D Dominion Energy, Inc.	79.13	-0.10	-0.12%
SO Southern Company (The)	56.28	+0.01	+0.01%
AEP American Electric Power Company	90.87	-0.03	-0.03%
PPL PPL Corporation	31.60	+0.02	+0.06%
WEC WEC Energy Group, Inc.	85.06	-0.20	-0.23%

Yahoo Small Business

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

NEXTERA ENERGY NYSE-NEE

RECENT PRICE **178.17** | P/E RATIO **23.8** (Trailing: 26.2, Median: 16.0) | RELATIVE P/E RATIO **1.41** | DIV'D YLD **2.8%** | **VALUE LINE**

TIMELINESS 3 Lowered 3/9/18
SAFETY 1 Raised 2/16/18
TECHNICAL 2 Raised 1/25/19
BETA .60 (1.00 = Market)

2022-24 PROJECTIONS

	Price	Gain	Ann'l Total Return
High	210	(+20%)	7%
Low	170	(-5%)	2%

Insider Decisions

	A	M	J	J	A	S	O	N	D
to Buy	0	0	0	0	0	0	0	0	0
Options	0	1	0	0	1	2	2	1	1
to Sell	0	2	2	0	2	3	2	2	2

Institutional Decisions

	1Q2018	2Q2018	3Q2018
to Buy	577	607	612
to Sell	645	586	560
Hld's(000)	359118	358698	365576

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	© VALUE LINE PUB. LLC	22-24
High:	73.8	60.6	56.3	61.2	72.2	89.8	110.8	112.6	132.0	159.4	184.2	180.9								
Low:	33.8	41.5	45.3	49.0	58.6	69.8	84.0	93.7	102.2	117.3	145.1	168.7								
	26.13	28.27	30.00	38.75	37.47	40.13	37.82	36.39	36.88	33.62	34.80	38.42	37.93	34.52	36.51	***33.45***	***36.80***	***39.70***	Revenues per sh	***46.75***
	5.36	5.60	6.18	6.77	6.85	8.03	8.75	9.62	9.29	8.69	10.54	12.10	12.92	12.97	12.11	***14.65***	***15.90***	***17.40***	"Cash Flow" per sh	***20.75***
	2.45	2.46	2.32	3.23	3.27	4.07	3.97	4.74	4.82	4.56	4.83	5.60	6.06	5.78	6.50	6.68	***8.25***	***9.00***	Earnings per sh A	***11.00***
	1.20	1.30	1.42	1.50	1.64	1.78	1.89	2.00	2.20	2.40	2.64	2.90	3.08	3.48	3.93	4.44	***5.00***	***5.65***	Div'd Decl'd per sh B ■ †	***7.00***
	3.75	3.75	4.09	9.22	12.32	12.80	14.52	13.89	15.93	22.31	15.36	15.84	18.17	20.59	22.80	***26.00***	***18.70***	***18.70***	Cap'l Spending per sh	***18.75***
	18.91	20.25	21.52	24.49	26.35	28.57	31.35	34.36	35.92	37.90	41.47	44.96	48.97	52.01	59.89	***68.30***	***69.85***	***73.30***	Book Value per sh C	***85.00***
	368.53	372.24	394.85	405.40	407.35	408.92	413.62	420.86	416.00	424.00	435.00	443.00	461.00	468.00	471.00	***500.00***	***535.00***	***535.00***	Common Shs Outst'g D	***535.00***
	12.6	13.6	17.9	13.7	18.9	14.5	13.4	10.8	11.5	14.4	16.6	17.3	16.9	20.7	21.6	24.8	*Bold figures are Value Line estimates*		Avg Ann'l P/E Ratio	***17.0***
	.72	.72	.95	.74	1.00	.87	.89	.69	.72	.92	.93	.91	.85	1.09	1.09	1.34			Relative P/E Ratio	***.95***
	3.9%	3.9%	3.4%	3.4%	2.7%	3.0%	3.5%	3.9%	4.0%	3.6%	3.3%	3.0%	3.0%	2.9%	2.8%	2.7%			Avg Ann'l Div'd Yield	***3.7%***
	15643	15317	15341	14256	15136	17021	17486	16155	17195	16727	***19700***	***21250***	Revenues ($mill)	***25000***
	1615.0	1957.0	2021.0	1911.0	2062.0	2465.0	2752.0	2693.0	3074.0	3186.0	***4400***	***4960***	Net Profit ($mill)	***6100***
	16.8%	21.4%	22.4%	26.6%	26.9%	32.3%	30.8%	29.3%	24.4%	***29.0%***	***24.5%***	***24.5%***	Income Tax Rate	***24.5%***
	7.9%	4.4%	4.4%	10.8%	7.0%	6.7%	6.9%	8.2%	6.7%	***10.0%***	***5.0%***	***5.0%***	AFUDC % to Net Profit	***4.0%***
	55.7%	55.5%	58.2%	59.1%	57.1%	55.0%	54.2%	53.3%	52.7%	***44.0%***	***45.5%***	***45.5%***	Long-Term Debt Ratio	***46.0%***
	44.3%	44.5%	41.8%	40.9%	42.9%	45.0%	45.8%	46.7%	47.3%	***56.0%***	***54.5%***	***54.5%***	Common Equity Ratio	***54.0%***
	29267	32474	35753	39245	42009	44283	49255	52159	59671	***60925***	***68550***	***71975***	Total Capital ($mill)	***84200***
	36078	39075	42490	49413	52720	55705	61386	66912	72416	70334	***80800***	***86350***	Net Plant ($mill)	***101700***
	6.9%	7.4%	7.0%	6.2%	6.2%	7.0%	6.8%	6.3%	6.3%	***6.5%***	***7.5%***	***8.0%***	Return on Total Cap'l	***8.0%***
	12.5%	13.5%	13.5%	11.9%	11.4%	12.4%	12.2%	11.1%	10.9%	***9.5%***	***12.0%***	***12.5%***	Return on Shr. Equity	***13.5%***
	12.5%	13.5%	13.5%	11.9%	11.4%	12.4%	12.2%	11.1%	10.9%	***9.5%***	***12.0%***	***12.5%***	Return on Com Equity E	***13.5%***
	6.5%	7.8%	7.4%	5.6%	5.2%	6.0%	6.1%	4.4%	4.4%	***3.0%***	***4.5%***	***4.5%***	Retained to Com Eq	***5.0%***
	47%	42%	46%	53%	54%	51%	50%	60%	60%	***66%***	***59%***	***61%***	All Div'ds to Net Prof	***61%***

CAPITAL STRUCTURE as of 9/30/18
Total Debt $32587 mill. **Due in 5 Yrs** $14147 mill.
LT Debt $27048 mill. **LT Interest** $1136 mill.

(LT interest earned: 4.0x)

Pension Assets-12/17 $4020 mill.
Oblig $2593 mill.

Pfd Stock None

Common Stock 477,945,257 shs.

MARKET CAP: $85 billion (Large Cap)

ELECTRIC OPERATING STATISTICS

	2015	2016	2017
% Change Retail Sales (KWH)	+5.6	-.8	-.9
Avg. Indust. Use (MWH)	277	255	NA
Avg. Indust. Revs. per KWH (¢)	6.69	6.11	NA
Capacity at Peak (Mw)	26073	NA	NA
Peak Load, Summer (Mw)	22717	NA	NA
Annual Load Factor (%)	NA	NA	NA
% Change Customers (yr-end)	+1.4	+1.3	NA
Fixed Charge Cov. (%)	348	339	278

ANNUAL RATES of change (per sh)

	Past 10 Yrs.	Past 5 Yrs.	Est'd '15-'17 to '22-'24
Revenues	.5%	.5%	*3.5%*
"Cash Flow"	6.5%	6.5%	*7.5%*
Earnings	7.5%	5.5%	*9.0%*
Dividends	8.5%	9.5%	*10.5%*
Book Value	8.5%	8.5%	*7.0%*

QUARTERLY REVENUES ($ mill.)

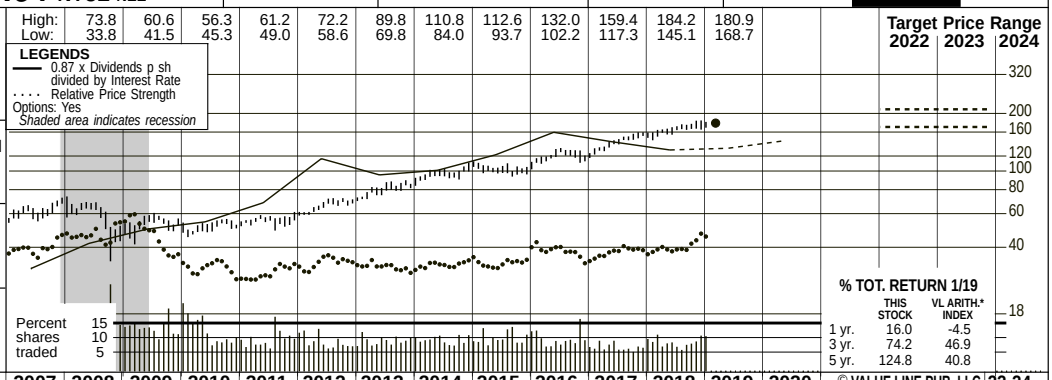
Calendar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2016	3835	3817	4805	3698	16155
2017	3972	4404	4808	4011	17195
2018	3850	4069	4418	4390	16727
2019	***4600***	***4900***	***5600***	***4600***	***19700***
2020	***4950***	***5300***	***6050***	***4950***	***21250***

EARNINGS PER SHARE A

Calendar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2016	1.41	.93	1.62	1.82	5.78
2017	1.90	1.68	1.79	1.13	6.50
2018	2.06	1.64	2.10	.88	6.68
2019	***2.15***	***2.20***	***2.25***	***1.65***	***8.25***
2020	***2.35***	***2.35***	***2.45***	***1.85***	***9.00***

QUARTERLY DIVIDENDS PAID B ■ †

Calendar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2015	.77	.77	.77	.77	3.08
2016	.87	.87	.87	.87	3.48
2017	.9825	.9825	.9825	.9825	3.93
2018	1.11	1.11	1.11	1.11	4.44
2019					



BUSINESS: NextEra Energy, Inc. (formerly FPL Group, Inc.) is a holding company for Florida Power & Light Company (FPL) and Gulf Power, which provide electricity to 5.5 million customers in eastern, southern, & northwestern Florida. NextEra Energy Resources is a nonregulated power generator with nuclear, gas, & renewable ownership. Has 79.9% stake in NextEra Energy Partners. Rev. breakdown: residential, 55%; commercial, 35%; industrial & other, 10%. Generating sources: gas, 71%; nuclear, 23%; coal, 4%; purchased, 2%. Fuel costs: 24% of revs. '17 reported depr. rate (util.): 3.7%. Has 13,900 employees. Chairman, Pres. and CEO: James L. Robo. Inc.: FL. Address: 700 Universe Blvd., Juno Beach, FL 33408. Tel.: 561-694-4000. Internet: www.nexteraenergy.com.

NextEra Energy completed the acquisition of assets from Southern Company at the start of 2019. The last asset was Gulf Power, an electric company serving the Florida panhandle. Earlier, NextEra added Florida City Gas (a gas utility) and two nonregulated gas-fired generating assets in the Sunshine State. NextEra paid $5.1 billion and assumed $1.4 billion of Gulf Power debt. It financed the deal with $4.5 billion of debt. Management estimates that the transaction will boost share net by $0.15 in 2020 and $0.20 in 2021.

NextEra's operations are performing well. The company's main utility subsidiary, Florida Power & Light, is benefiting from rate increases and the healthy economy in its service area. FPL will get additional rate relief when a 1,750-megawatt gas-fired plant is completed in mid-2019. The company is also adding utility-owned solar capacity, which is recovered through a regulatory mechanism. NextEra Energy Resources is expanding its portfolio of wind and solar projects. This subsidiary had a backlog of 8,900 mw at year-end 2018. And the lower federal tax rate boosted profits by $0.45 a share last year. All told, we think earnings will wind up within the company's targeted ranges of $8.00-$8.50 a share this year and $8.70-$9.20 next year. However . . .

There are a couple of causes for concern. Renewable-energy projects affected by the bankruptcy of Pacific G&E contribute $0.13-$0.15 a share to annual earnings. What will happen here remains to be seen. Separately, a 31%-owned gas pipeline project has had delays and cost overruns.

We expect a hefty dividend increase soon. NextEra has stated its expectation for 12%-14% annual dividend growth through at least 2020, and we estimate the directors will raise the annual disbursement by $0.56 a share (12.6%).

NextEra's solid performance has not gone unnoticed on Wall Street. The stock was one of the top performers in 2017, and posted a total return of over 14% in 2018. At its current valuation, this issue doesn't stand out among utilities for either its dividend yield or its 3- to 5-year total return potential.

Paul E. Debbas, CFA *February 15, 2019*

(A) Diluted EPS. Excl. nonrecur. gains (losses): '03, 5¢; '11, (24¢); '13, (80¢); '16, 47¢; '17, 91¢; '18, $7.19; gain on disc. ops.: '13, 44¢. '15 EPS don't sum due to rounding. Next earnings report due late April. **(B)** Div'ds historically paid in mid-Mar., mid-June, mid-Sept., & mid-Dec. ■ Div'd reinvestment plan avail. † Shareholder investment plan avail. **(C)** Incl. def'd charges. In '17: $8.27/sh. **(D)** In mill., adj. for stock split. **(E)** Rate allowed on com. eq. in '17: 9.6%-11.6%; earned on avg. com. eq., '17: 11.7%. Regulatory Climate: Average.

Company's Financial Strength	A+
Stock's Price Stability	100
Price Growth Persistence	80
Earnings Predictability	70

© 2019 Value Line, Inc. All rights reserved. Factual material is obtained from sources believed to be reliable and is provided without warranties of any kind. THE PUBLISHER IS NOT RESPONSIBLE FOR ANY ERRORS OR OMISSIONS HEREIN. This publication is strictly for subscriber's own, non-commercial, internal use. No part of it may be reproduced, resold, stored or transmitted in any printed, electronic or other form, or used for generating or marketing any printed or electronic publication, service or product.

To subscribe call 1-800-VALUELINE

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

The Southern Company (SO)
NYSE - Nasdaq Real Time Price. Currency in USD

Add to watchlist | Visitors trend 2W ↑ 10W ↑ 9M ↑ | Quote Lookup

56.28 -0.00 (-0.01%)
As of 11:02AM EDT. Market open.

Summary | Company Outlook NEW | Chart | Conversations | Statistics | Historical Data | Profile | Financials | Analysis | Options | Holders | Sustainability

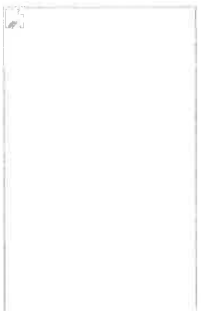
Time Period: Dec 15, 2018 - Jan 15, 2019 Show: Historical Prices
Frequency: Daily Apply

Currency in USD Download Data

Date	Open	High	Low	Close*	Adj Close**	Volume
Jan 15, 2019	46.08	47.09	46.07	46.79	45.69	5,433,100
Jan 14, 2019	46.19	46.46	45.55	46.16	45.07	6,328,900
Jan 11, 2019	46.22	46.79	45.82	46.61	45.51	6,137,000
Jan 10, 2019	45.60	46.42	45.38	46.34	45.25	4,634,900
Jan 09, 2019	45.80	46.04	45.32	45.49	44.42	6,687,600
Jan 08, 2019	44.61	45.97	44.50	45.88	44.80	7,246,200
Jan 07, 2019	44.51	44.76	44.18	44.61	43.56	5,397,800
Jan 04, 2019	44.12	44.73	44.04	44.71	43.66	5,680,700
Jan 03, 2019	43.76	44.69	43.76	44.34	43.30	9,405,500
Jan 02, 2019	43.89	43.95	43.26	43.72	42.69	5,756,100
Dec 31, 2018	43.96	44.15	43.43	43.92	42.89	4,394,000
Dec 28, 2018	44.01	44.38	43.76	43.95	42.92	4,722,700
Dec 27, 2018	43.60	43.95	42.93	43.95	42.92	7,048,100
Dec 26, 2018	43.14	43.66	42.50	43.64	42.61	5,686,400
Dec 24, 2018	44.94	45.26	42.93	43.02	42.01	5,339,800
Dec 21, 2018	44.94	46.24	44.82	45.09	44.03	12,739,700
Dec 20, 2018	45.28	45.69	44.48	45.09	44.03	8,836,400
Dec 19, 2018	45.74	46.04	45.08	45.28	44.21	8,112,000
Dec 18, 2018	46.20	46.58	45.41	45.53	44.46	6,184,700
Dec 17, 2018	47.40	47.68	45.88	46.00	44.92	6,726,300

People Also Watch

Symbol	Last Price	Change	% Change
DUK Duke Energy Corporation (Holdin	90.52	+0.61	+0.68%
D Dominion Energy, Inc.	79.14	-0.08	-0.10%
AEP American Electric Power Company	90.90	0.00	0.00%
ED Consolidated Edison, Inc.	89.73	+0.08	+0.09%
EXC Exelon Corporation	49.54	-0.62	-1.24%



SOUTHERN COMPANY NYSE-SO

RECENT PRICE **48.73** | P/E RATIO **17.0** (Trailing: 14.5 Median: 16.0) | RELATIVE P/E RATIO **1.01** | DIV'D YLD **5.1%** | **VALUE LINE**

TIMELINESS 3 Raised 3/2/18
SAFETY 2 Lowered 2/21/14
TECHNICAL 4 Lowered 2/15/19
BETA .50 (1.00 = Market)

2022-24 PROJECTIONS

	Price	Gain	Ann'l Total Return
High	65	(+35%)	*11%*
Low	50	(+5%)	*6%*

Insider Decisions

	A	M	J	J	A	S	O	N	D
to Buy	0	0	0	0	0	0	0	0	0
Options	0	0	0	1	0	0	0	0	1
to Sell	0	0	0	0	1	0	0	0	3

Institutional Decisions

	1Q2018	2Q2018	3Q2018
to Buy	523	509	501
to Sell	595	530	556
Hld's(000)	577028	582212	583272

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	© VALUE LINE PUB. LLC	22-24
High:	40.6	37.6	38.6	46.7	48.6	48.7	51.3	53.2	54.6	53.5	49.4	48.8								
Low:	29.8	26.5	30.8	35.7	41.8	40.0	40.3	41.4	46.0	46.7	42.4	43.3								
	15.31	16.05	18.28	19.24	20.12	22.04	19.21	20.70	20.41	19.06	19.26	20.34	19.18	20.09	22.86	*23.10*	*24.00*	*25.00*	Revenues per sh	*28.00*
	3.53	3.65	4.03	4.01	4.22	4.43	4.43	4.51	4.91	5.18	5.27	5.28	5.47	5.69	6.64	*6.40*	*6.70*	*7.00*	"Cash Flow" per sh	*7.75*
	1.97	2.06	2.13	2.10	2.28	2.25	2.32	2.36	2.55	2.67	2.70	2.77	2.84	2.83	3.21	*2.90*	*3.05*	*3.25*	Earnings per sh A	*3.75*
	1.39	1.42	1.48	1.54	1.60	1.66	1.73	1.80	1.87	1.94	2.01	2.08	2.15	2.22	2.30	2.38	*2.46*	*2.54*	Div'd Decl'd per sh B ■	*2.78*
	2.72	2.85	3.20	4.01	4.65	5.10	5.70	4.85	5.23	5.54	6.16	6.58	6.22	7.38	7.37	*8.35*	*7.15*	*6.40*	Cap'l Spending per sh	*5.25*
	13.13	13.86	14.42	15.24	16.23	17.08	18.15	19.21	20.32	21.09	21.43	21.98	22.59	25.00	23.98	*24.35*	*25.20*	*26.15*	Book Value per sh C	*29.50*
	734.83	741.50	741.45	746.27	763.10	777.19	819.65	843.34	865.13	867.77	887.09	907.78	911.72	990.39	1007.6	*1040.0*	*1050.0*	*1060.0*	Common Shs Outst'g D	*1090.0*
	14.8	14.7	15.9	16.2	16.0	16.1	13.5	14.9	15.8	17.0	16.2	16.0	15.8	17.8	15.5	*15.6*	*Bold figures are Value Line estimates*		Avg Ann'l P/E Ratio	*15.0*
	.84	.78	.85	.87	.85	.97	.90	.95	.99	1.08	.91	.84	.80	.93	.78	*.85*			Relative P/E Ratio	*.85*
	4.7%	4.7%	4.4%	4.5%	4.4%	4.6%	5.5%	5.1%	4.6%	4.3%	4.6%	4.7%	4.8%	4.4%	4.6%	5.3%			Avg Ann'l Div'd Yield	*4.9%*
	15743	17456	17657	16537	17087	18467	17489	19896	23031	*24000*	*25200*	*26500*	Revenues ($mill)	*30650*
	1910.0	2040.0	2268.0	2415.0	2439.0	2567.0	2647.0	2757.0	3269.0	*3075*	*3305*	*3530*	Net Profit ($mill)	*4180*
	31.9%	33.5%	35.0%	35.6%	34.8%	33.8%	33.4%	28.5%	25.2%	*20.0%*	*20.0%*	*20.0%*	Income Tax Rate	*20.0%*
	14.9%	13.7%	10.2%	9.4%	11.6%	13.9%	13.2%	11.9%	7.6%	*7.0%*	*6.0%*	*6.0%*	AFUDC % to Net Profit	*4.0%*
	53.2%	51.2%	50.0%	49.9%	51.5%	49.5%	52.8%	61.5%	64.5%	*63.0%*	*62.0%*	*61.5%*	Long-Term Debt Ratio	*59.5%*
	43.6%	45.7%	47.1%	47.3%	45.8%	47.3%	44.0%	35.7%	35.0%	*36.5%*	*37.5%*	*38.0%*	Common Equity Ratio	*40.0%*
	34091	35438	37307	38653	41483	42142	46788	69359	68953	*69100*	*70150*	*72850*	Total Capital ($mill)	*79700*
	39230	42002	45010	48390	51208	54868	61114	78446	79872	*80400*	*84100*	*86925*	Net Plant ($mill)	*91900*
	6.9%	7.0%	7.2%	7.3%	6.8%	7.1%	6.6%	4.9%	5.9%	*5.5%*	*5.5%*	*6.0%*	Return on Total Cap'l	*6.5%*
	12.0%	11.8%	12.2%	12.5%	12.1%	12.1%	12.0%	10.3%	13.3%	*12.0%*	*12.0%*	*12.5%*	Return on Shr. Equity	*13.0%*
	12.4%	12.2%	12.5%	12.8%	12.5%	12.5%	12.6%	11.0%	13.4%	*12.0%*	*12.0%*	*12.5%*	Return on Com Equity E	*13.0%*
	3.2%	3.0%	3.4%	3.6%	3.2%	3.2%	3.1%	2.5%	3.9%	*2.0%*	*2.5%*	*2.5%*	Retained to Com Eq	*3.5%*
	75%	77%	73%	73%	75%	75%	76%	78%	72%	*80%*	*78%*	*76%*	All Div'ds to Net Prof	*73%*

LEGENDS
0.62 x Dividends p sh divided by Interest Rate
Relative Price Strength
Options: Yes
Shaded area indicates recession

Target Price Range 2022 | 2023 | 2024

128 96 80 64 48 40 32 24 16 12

Percent shares traded 18 12 6

% TOT. RETURN 1/19

	THIS STOCK	VL ARITH.* INDEX
1 yr.	13.5	-4.5
3 yr.	14.7	46.9
5 yr.	47.8	40.8

CAPITAL STRUCTURE as of 9/30/18
Total Debt $47002 mill. **Due in 5 Yrs** $18156 mill.
LT Debt $41425 mill. **LT Interest** $1450 mill.
(LT interest earned: 3.2x)

Leases, Uncapitalized Annual rentals $149 mill.
Pension Assets-12/17 $12992 mill.
Oblig $13808 mill.
Pfd Stock $324 mill. **Pfd Div'd** $17 mill.
Incl. 10 mill. shs. 5% cum. pfd. ($25 stated value); 334,210 shs. 4.4%-5.25% cum. pfd. ($100 par).

Common Stock 1,028,888,684 shs.
MARKET CAP: $50 billion (Large Cap)

ELECTRIC OPERATING STATISTICS

	2015	2016	2017
% Change Retail Sales (KWH)	-.7	+.2	-2.6
Avg. Indust. Use (MWH)	3371	3105	3016
Avg. Indust. Revs. per KWH (¢)	5.88	6.01	6.18
Capacity at Yearend (Mw)	44223	46291	46936
Peak Load, Summer (Mw) F	36794	35781	34874
Annual Load Factor (%)	59.9	61.5	61.4
% Change Customers (yr-end)	+.9	+1.0	+1.0
Fixed Charge Cov. (%)	433	330	318

ANNUAL RATES of change (per sh)

	Past 10 Yrs.	Past 5 Yrs.	Est'd '15-'17 to '22-'24
Revenues	1.0%	.5%	*4.5%*
"Cash Flow"	4.0%	4.0%	*4.0%*
Earnings	3.0%	3.0%	*3.5%*
Dividends	4.0%	3.5%	*3.0%*
Book Value	4.5%	3.5%	*3.0%*

QUARTERLY REVENUES (mill.)

Calendar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2016	3992	4459	6264	5181	19896
2017	5771	5430	6201	5629	23031
2018	6372	5627	6159	***5842***	***24000***
2019	***6500***	***6000***	***6600***	***6100***	***25200***
2020	***6850***	***6300***	***6950***	***6400***	***26500***

EARNINGS PER SHARE A

Calendar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2016	.57	.71	1.22	.33	2.83
2017	.73	.73	1.08	.67	3.21
2018	.93	.63	1.13	***.21***	***2.90***
2019	***.85***	***.70***	***1.10***	***.40***	***3.05***
2020	***.90***	***.75***	***1.15***	***.45***	***3.25***

QUARTERLY DIVIDENDS PAID B ■

Calendar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2015	.525	.5425	.5425	.5425	2.15
2016	.5425	.56	.56	.56	2.22
2017	.56	.58	.58	.58	2.30
2018	.58	.60	.60	.60	2.38
2019					

BUSINESS: The Southern Company, through its subs., supplies electricity to 4.6 million customers in GA, AL, FL, and MS. Also has a competitive generation business. Acq'd AGL Resources (renamed Southern Company Gas, 4.5 mill. customers in GA, FL, NJ, IL, VA, & TN) 7/16. Electric rev. breakdown: residential, 37%; commercial, 31%; industrial, 18%; other, 14%. Retail revs. by state: GA, 49%; AL, 35%; FL, 9%; MS, 7%. Generating sources: gas & oil, 42%; coal, 27%; nuclear, 15%; other, 7%; purchased, 9%. Fuel costs: 32% of revs. '17 reported depr. rate (utility): 2.9%. Has 31,300 employees. Chairman, President and CEO: Thomas A. Fanning. Inc.: DE. Address: 30 Ivan Allen Jr. Blvd., N.W., Atlanta, GA 30308. Tel.: 404-506-0747. Internet: www.southerncompany.com.

Southern Company completed a series of asset sales at the start of 2019. The company sold electric and gas utilities in Florida, plus two gas-fired generating assets there, for more than $5 billion. It plans to use the proceeds to reduce debt and offset part of its equity needs.

Construction of two units at the Vogtle nuclear station continues. This project has had significant delays and cost overruns, and is now expected to be completed in 2020 and 2021. Last year, the company took a $0.78-a-share writedown of construction costs that will not be recovered from Georgia Power's customers. If future cost overruns exceed $800 million, the utility will be responsible for a disproportionate amount of these overruns. Thus, Georgia Power still faces construction risk.

Earnings should improve this year and next. In 2019, the year-to-year comparisons in the second and fourth quarters should be easy. The utilities should benefit from rate relief and customer growth. Beginning in 2020, the aforementioned asset sales will increase profits by an estimated $0.04-$0.05 a share annually. Southern Company was scheduled to report fourth-quarter earnings in late February.

The share count has increased significantly in recent years. Besides the cost overruns for Georgia Power's nuclear project, Mississippi Power had similar problems with a coal-gasification project. This led to significant writedowns from 2013 through 2017. Thus, Southern Company wound up issuing stock to help finance the cost overruns and support the common-equity ratio.

Nicor Gas filed a general rate case. The utility is seeking a $230 million increase, based on a 10.6% return on equity. An order is expected by October.

This stock has one of the highest dividend yields of any electric utility issue. This is due to the problems with the two major projects and the remaining construction risk with Vogtle. Despite these difficulties, Southern Company has provided steady dividend growth, which we project will continue through 2022-2024. The stock has appeal for income-seeking investors willing to assume the risks regarding Vogtle construction.

Paul E. Debbas, CFA *February 15, 2019*

Company's Financial Strength	A
Stock's Price Stability	100
Price Growth Persistence	20
Earnings Predictability	95

(A) Diluted EPS. Excl. nonrec. gain (losses): '03, 6¢; '09, (25¢); '13, (83¢); '14, (59¢); '15, (25¢); '16, (28¢); '17, ($2.37); '18, (78¢). '15 EPS don't sum due to rounding. Next earnings report due late Feb. **(B)** Div'ds paid in early Mar., June, Sept., and Dec. ■ Div'd reinvest. plan avail. **(C)** Incl. def'd chgs. In '17: $16.36/sh. **(D)** In mill. **(E)** Rate base: AL, MS, fair value; FL, GA, orig. cost. All'd return on com. eq. (blended): 12.5%; earn. on avg. com. eq., '17: 12.5%. Regul. Climate: GA, AL Above Avg.; MS, FL Avg. **(F)** Winter peak in '15.

© 2019 Value Line, Inc. All rights reserved. Factual material is obtained from sources believed to be reliable and is provided without warranties of any kind. THE PUBLISHER IS NOT RESPONSIBLE FOR ANY ERRORS OR OMISSIONS HEREIN. This publication is strictly for subscriber's own, non-commercial, internal use. No part of it may be reproduced, resold, stored or transmitted in any printed, electronic or other form, or used for generating or marketing any printed or electronic publication, service or product.

To subscribe call 1-800-VALUELINE

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Section 1: 10-Q (10-Q)

Use these links to rapidly review the document
TABLE OF CONTENTS

Table of Contents

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

FORM 10-Q

ý **QUARTERLY REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the quarterly period ended March 31, 2013

OR

o **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the transition period from to

COMMISSION FILE NUMBER 001-34691

ATLANTIC POWER CORPORATION
(Exact name of registrant as specified in its charter)

British Columbia, Canada	**55-0886410**
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)
One Federal Street, 30th Floor Boston, MA	**02110**
(Address of principal executive offices)	(Zip code)

(617) 977-2400
(Registrant's telephone number, including area code)

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ý No o

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

facility for the project, which included a $290 million construction loan and a $20 million 5-year letter of credit facility. In July 2012 we funded approximately $190 million of our equity contribution (net of financing costs). In December 2012, the project received tax equity investments in aggregate of $225 million from a consortium of four institutional tax equity investors along with an approximately $44 million tax equity investment of our own. On May 2, 2013, we sold our tax equity ownership in Canadian Hills to an institutional investor and received net cash proceeds of $42.1 million. The cash proceeds will be held for general corporate purposes and to invest in future accretive growth opportunities. The project's outstanding construction loan was repaid by the proceeds from these tax equity investors, decreasing the project's short-term debt by $265 million as of December 31, 2012. Canadian Hills has no debt at March 31, 2013.

The acquisition of Canadian Hills was accounted for as an asset purchase and is consolidated in our consolidated balance sheets at March 31, 2013 and December 31, 2012. We own 99% of the project and consolidate it in our consolidated financial statements. Income attributable to the tax equity investors is classified as noncontrolling interests and is allocated utilizing the hypothetical liquidation book value method ("HLBV").

Table of Contents

ATLANTIC POWER CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (Continued)

(Unaudited)

2. Acquisitions and divestments (Continued)

2013 Divestments

(a) Gregory

On April 2, 2013 we and the other owners of Gregory, entered into a purchase and sale agreement with an affiliate of NRG Energy, Inc. to sell the project for approximately $272.8 million including working capital adjustments. We expect to receive net cash proceeds for our ownership interest of approximately $33.7 million in the aggregate, after repayment of project-level debt and transaction expenses. We intend to use the net proceeds from the sale for general corporate purposes and to invest in future accretive growth opportunities. We expect the sale of Gregory to close in the third quarter of 2013.

(b) Auburndale, Lake and Pasco

On January 30, 2013, we entered into a purchase and sale agreement for the sale of our Florida Projects for approximately $140 million, with working capital adjustments. The sale closed on April 12, 2013 and we received net cash proceeds of approximately $117 million in the aggregate, after repayment of project-level debt at Auburndale and settlement of all outstanding natural gas swap agreements at Lake and Auburndale. This includes approximately $92 million received at closing and cash distributions from the Florida Projects of approximately $25 million received since January 1, 2013. We used a portion of the net proceeds from the sale to fully repay our senior credit facility, which had an outstanding balance of approximately $64.1 million on the closing date. The Florida Projects are accounted for as assets held for sale in the consolidated balance sheets at March 31, 2013 and December 31, 2012 and as a component of discontinued operations in the consolidated statements of operations for the three months ended March 31, 2013 and 2012. See Note 10, *Assets held for sale*, for further information.

(c) Path 15

On March 11, 2013 we entered into a purchase and sale agreement with Duke-American Transmission Company, a joint venture between Duke Energy Corporation and American Transmission Co., to sell our interests in Path 15. The sale closed on April 30, 2013 and we received net cash proceeds from the sale, including working capital adjustments, of approximately $52 million, plus a management agreement termination fee of $4.0 million, for a total sale price of approximately $56 million. The cash proceeds will be held for general corporate purposes and to invest in future accretive growth opportunities. In April 2013, we recorded a gain on sale of approximately $7.0 million. All project level debt issued by Path 15, totaling $137.2 million as of March 31, 2013, transferred with the sale. Path 15 is accounted for as an asset held for sale in the consolidated balance sheets at March 31, 2013 and December 31, 2012 and as a component of discontinued operations in the consolidated statements of operations for the three months ended March 31, 2013 and 2012. See Note 10, *Assets held for sale*, for further information.

2012 Divestments

(d) Primary Energy Recycling Corporation

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

THIS FILING IS	
Item 1: ☒ An Initial (Original) Submission	OR ☐ Resubmission No. ____

Form 1 Approved
OMB No.1902-0021
(Expires 12/31/2014)
Form 1-F Approved
OMB No.1902-0029
(Expires 12/31/2014)
Form 3-Q Approved
OMB No.1902-0205
(Expires 05/31/2014)

FERC FINANCIAL REPORT
FERC FORM No. 1: Annual Report of Major Electric Utilities, Licensees and Others and Supplemental Form 3-Q: Quarterly Financial Report

These reports are mandatory under the Federal Power Act, Sections 3, 4(a), 304 and 309, and 18 CFR 141.1 and 141.400. Failure to report may result in criminal fines, civil penalties and other sanctions as provided by law. The Federal Energy Regulatory Commission does not consider these reports to be of confidential nature

Exact Legal Name of Respondent (Company)	**Year/Period of Report**
Atlantic Path 15, LLC	**End of** 2013/Q1

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Name of Respondent	This Report is:	Date of Report *(mo, da, yr)*	Year/Period of Report
Atlantic Path 15, LLC	(1) [x] An Original (2) [ ] A Resubmission	03/31/2013	end of 2013/Q1

COMPARATIVE BALANCE SHEET (LIABILITIES AND OTHER CREDITS)

Line No.	Title of Account (a)	Ref. Page No. (b)	Current Year End of Quarter/Year Balance (c)	Prior Year End Balance 12/31 (d)
1	PROPRIETARY CAPITAL			
2	Common Stock Issued (201)	250-251	0	0
3	Preferred Stock Issued (204)	250-251	0	0
4	Capital Stock Subscribed (202, 205)		0	0
5	Stock Liability for Conversion (203, 206)		0	0
6	Premium on Capital Stock (207)		0	0
7	Other Paid-In Capital (208-211)	253	94,452,404	94,452,404
8	Installments Received on Capital Stock (212)	252	0	0
9	(Less) Discount on Capital Stock (213)	254	0	0
10	(Less) Capital Stock Expense (214)	254b	0	0
11	Retained Earnings (215, 215.1, 216)	118-119	-33,949,244	-36,941,614
12	Unappropriated Undistributed Subsidiary Earnings (216.1)	118-119	0	0
13	(Less) Reaquired Capital Stock (217)	250-251	0	0
14	Noncorporate Proprietorship (Non-major only) (218)		0	0
15	Accumulated Other Comprehensive Income (219)	122(a)(b)	0	0
16	Total Proprietary Capital (lines 2 through 15)		60,503,160	57,510,790
17	LONG-TERM DEBT			
18	Bonds (221)	256-257	62,541,471	62,541,471
19	(Less) Reaquired Bonds (222)	256-257	0	0
20	Advances from Associated Companies (223)	256-257	0	0
21	Other Long-Term Debt (224)	256-257	0	0
22	Unamortized Premium on Long-Term Debt (225)		0	0
23	(Less) Unamortized Discount on Long-Term Debt-Debit (226)		0	0
24	Total Long-Term Debt (lines 18 through 23)		62,541,471	62,541,471
25	OTHER NONCURRENT LIABILITIES			
26	Obligations Under Capital Leases - Noncurrent (227)		0	0
27	Accumulated Provision for Property Insurance (228.1)		0	0
28	Accumulated Provision for Injuries and Damages (228.2)		0	0
29	Accumulated Provision for Pensions and Benefits (228.3)		0	0
30	Accumulated Miscellaneous Operating Provisions (228.4)		0	0
31	Accumulated Provision for Rate Refunds (229)		0	0
32	Long-Term Portion of Derivative Instrument Liabilities		0	0
33	Long-Term Portion of Derivative Instrument Liabilities - Hedges		0	0
34	Asset Retirement Obligations (230)		0	0
35	Total Other Noncurrent Liabilities (lines 26 through 34)		0	0
36	CURRENT AND ACCRUED LIABILITIES			
37	Notes Payable (231)		0	0
38	Accounts Payable (232)		65,006	754,963
39	Notes Payable to Associated Companies (233)		0	0
40	Accounts Payable to Associated Companies (234)		25,891	408,760
41	Customer Deposits (235)		0	0
42	Taxes Accrued (236)	262-263	0	0
43	Interest Accrued (237)		1,476,394	238,926
44	Dividends Declared (238)		0	0
45	Matured Long-Term Debt (239)		0	0

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

VOL 2 Larsen Direct

STATE OF IOWA

BEFORE THE IOWA UTILITIES BOARD

RECORDS CENTER
ORIGINAL
DO NOT REMOVE

IN RE:	DOCKET NO. SPU-07- SPU-07-11
INTERSTATE POWER AND LIGHT COMPANY AND ITC MIDWEST LLC	

FILED WITH
Executive Secretary
MAR 30 2007
IOWA UTILITIES BOARD

DIRECT TESTIMONY OF JOHN O. LARSEN

Q. Please state your name and business address.

A. My name is John Larsen. My business address is 4902 North Biltmore Lane, Madison, Wisconsin 53718.

Q. By whom are you presently employed and in what capacity?

A. I am employed as the Vice President of Alliant Energy Corporation's ("Alliant Energy") Technical and Integrated Services Business Unit. In this capacity, I am responsible for electric and gas delivery system engineering and planning, transmission services, generation asset engineering and resource planning, R&D, energy trading, market operations, and fuel portfolio strategy. I am testifying on behalf of Interstate Power and Light Company ("IPL," or "Company"), a wholly owned subsidiary of Alliant Energy, in this proceeding.

Q. What is your educational background?

A. I hold a Bachelor of Science degree in Electrical Engineering from the University of North Dakota and have trained at the Kellogg School of Management at Northwestern University in utility finance.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Exhibit___(CAH-1)
Schedule K
Page 1 of 2

INTERSTATE POWER AND LIGHT COMPANY
TRANSMISSION TRANSACTION
ESTIMATION OF NET PROCEEDS ABOVE
NET BOOK VALUE OF ASSETS SOLD*
AS OF DECEMBER 31, 2007
IN MILLIONS

Line No.	Description		
1	Sales Price	$	750.0
2	Net Book Value of the Transmission Assets		(423.2)
3	Amount of CWIP covered by sales price		(19.1)
4	Transmission Materials and Supplies		(0.8)
	Transaction Costs:		
5	Outside Accounting Fees		(2.0)
6	Employee Grants		(2.6)
7	Investment Banker		(1.3)
8	Outside Legal Fees		(0.9)
9	Real Estate Contractors		(0.6)
10	Other Costs		(0.8)
11	Closing Transaction Adjustments, if any		-
12	Book Income Tax Expense on Gain (page 2)		(133.0)
13	Net Proceeds Above Net Book Value of Assets	$	165.7
14	Amount of Net Proceeds to be Accounted for as Regulatory Liability	$	60.0

*All amounts shown above are estimated except for the sales price.

File Name: Net Proceeds Calculation.xls
Sheet Name: Exhibit-P1

3/21/2007

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

ITC HOLDINGS CORP. NYSE-ITC

RECENT PRICE **46.22** | P/E RATIO **23.9** (Trailing: 30.0, Median: 22.0) | RELATIVE P/E RATIO **1.26** | DIV'D YLD **1.9%** | **VALUE LINE**

TIMELINESS — Suspended 2/19/16
SAFETY **2** Raised 6/24/11
TECHNICAL — Suspended 2/19/16
BETA .70 (1.00 = Market)

2019-21 PROJECTIONS

	Price	Gain	Ann'l Total Return
High	65	(+40%)	*11%*
Low	50	(+10%)	*5%*

Insider Decisions

	N	D	J	F	M	A	M	J	J
to Buy	0	0	0	0	1	0	1	0	0
Options	0	0	8	0	0	8	6	1	8
to Sell	0	0	0	0	0	0	3	1	0

Institutional Decisions

	4Q2015	1Q2016	2Q2016
to Buy	203	145	129
to Sell	163	230	190
Hld's(000)	134973	129567	129827

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	© VALUE LINE PUB. LLC	19-21
High:					10.1	13.7	19.5	20.0	17.6	21.3	27.3	26.6	35.6	42.0	44.0	47.5				
Low:					8.7	8.2	12.6	10.8	10.8	8.2	20.6	22.1	25.5	31.2	30.3	36.5				
Revenues per sh	--	--	--	--	1.37	2.06	1.76	3.31	4.15	4.13	4.58	4.92	5.30	5.98	6.59	6.84	*7.80*	*8.85*		*11.75*
"Cash Flow" per sh	--	--	--	--	.35	.68	.58	1.10	1.37	1.44	1.53	1.73	1.88	2.24	2.40	2.54	*2.95*	*3.35*		*4.50*
Earnings per sh A	--	--	--	--	.03	.35	.31	.56	.73	.86	.95	1.10	1.20	1.47	1.54	1.56	*1.85*	*2.15*		*2.75*
Div'd Decl'd per sh B ■ †	--	--	--	--	--	.18	.36	.38	.40	.42	.44	.46	.49	.54	.61	.70	*.81*	*.93*		*1.30*
Cap'l Spending per sh	--	--	--	--	.83	1.19	1.32	2.23	2.70	2.69	2.55	3.62	5.12	5.22	4.73	4.48	*6.50*	*6.70*		*6.75*
Book Value per sh C	--	--	--	--	2.14	2.64	4.18	4.37	6.24	6.73	7.34	8.18	9.03	10.25	10.76	11.19	*12.25*	*13.55*		*18.00*
Common Shs Outst'g D	--	--	--	--	92.04	99.69	127.19	128.75	148.96	150.25	152.15	153.97	156.75	157.50	155.14	152.70	*154.00*	*155.00*		*158.00*
Avg Ann'l P/E Ratio	--	--	--	--	--	26.3	33.0	27.6	23.2	17.1	20.0	21.4	20.7	20.4	23.8	22.8	*Bold figures are Value Line estimates*			*20.5*
Relative P/E Ratio	--	--	--	--	--	1.40	1.78	1.47	1.40	1.14	1.27	1.34	1.32	1.15	1.25	1.15				*1.30*
Avg Ann'l Div'd Yield	--	--	--	--	--	1.9%	3.5%	2.4%	2.3%	2.8%	2.3%	1.9%	2.0%	1.8%	1.7%	2.0%				*2.3%*
Revenues ($mill)					223.6	426.2	617.9	621.0	696.8	757.4	830.5	941.3	1023.0	1044.8	*1200*	*1370*				*1875*
Net Profit ($mill)					33.2	73.3	109.2	130.9	145.7	171.7	187.9	233.5	244.1	242.4	*290*	*335*				*460*
Income Tax Rate					29.2%	33.3%	38.1%	37.2%	36.1%	35.6%	36.6%	33.7%	38.1%	36.9%	*38.0%*	*38.0%*				*38.0%*
AFUDC % to Net Profit					15.0%	14.7%	13.8%	13.1%	11.9%	12.5%	16.0%	16.3%	10.6%	14.4%	*14.0%*	*12.0%*				*9.0%*
Long-Term Debt Ratio					70.3%	72.4%	70.8%	70.6%	69.1%	67.8%	63.8%	67.9%	70.2%	70.4%	*69.5%*	*67.0%*				*64.5%*
Common Equity Ratio					29.7%	27.6%	29.2%	29.4%	30.9%	32.2%	36.2%	32.1%	29.8%	29.6%	*30.5%*	*33.0%*				*35.5%*
Total Capital ($mill)					1794.5	2041.5	3177.3	3445.9	3614.3	3903.9	3910.2	5025.8	5598.1	5770.0	*6200*	*6395*				*8050*
Net Plant ($mill)					1197.9	1960.4	2304.4	2542.1	2872.3	3415.8	4134.6	4846.5	5496.9	6109.6	*6945*	*7805*				*10175*
Return on Total Cap'l					3.0%	5.7%	5.4%	5.7%	6.1%	6.3%	6.7%	6.2%	6.0%	5.9%	*6.0%*	*7.0%*				*7.0%*
Return on Shr. Equity					6.2%	13.0%	11.8%	12.9%	13.0%	13.6%	13.3%	14.5%	14.6%	14.2%	*15.5%*	*16.0%*				*16.0%*
Return on Com Equity E					6.2%	13.0%	11.8%	12.9%	13.0%	13.6%	13.3%	14.5%	14.6%	14.2%	*15.5%*	*16.0%*				*16.0%*
Retained to Com Eq					NMF	4.5%	5.4%	6.8%	7.1%	8.0%	8.0%	9.3%	8.9%	7.8%	*9.0%*	*9.0%*				*9.0%*
All Div'ds to Net Prof					115%	66%	54%	48%	45%	41%	40%	36%	39%	45%	*43%*	*43%*				*45%*

Target Price Range 2019 | 2020 | 2021

% TOT. RETURN 8/16

	THIS STOCK	VL ARITH.* INDEX
1 yr.	41.0	10.9
3 yr.	61.2	29.8
5 yr.	96.8	84.5

CAPITAL STRUCTURE as of 6/30/16
Total Debt $4598.1 mill. **Due in 5 Yrs** $1725.2 mill.
LT Debt $4146.9 mill. **LT Interest** $185.0 mill.
(LT interest earned: 2.6x)

Pension Assets-12/15 $58.1 mill.
Oblig $97.2 mill.

Pfd Stock None

Common Stock 153,372,055 shs.
as of 7/22/16

MARKET CAP: $7.1 billion (Large Cap)

CURRENT POSITION ($MILL.)	2014	2015	6/30/16
Cash Assets	27.7	13.8	6.1
Receivables	101.0	104.3	147.9
Inventory (FIFO)	30.9	25.8	27.8
Other	27.2	25.3	179.3
Current Assets	186.8	169.2	361.1
Accts Payable	108.0	124.3	146.9
Debt Due	175.0	395.3	451.2
Other	180.0	199.6	186.8
Current Liab.	463.0	719.2	785.0
Fix Chg. Cov.	309%	266%	262%

ANNUAL RATES of change (per sh)	Past 10 Yrs.	Past 5 Yrs.	Est'd '13-'15 to '19-'21
Revenues	14.0%	8.5%	*10.5%*
"Cash Flow"	16.5%	10.5%	*11.0%*
Earnings	23.0%	12.5%	*10.5%*
Dividends	21.5%	8.0%	*13.0%*
Book Value	16.0%	9.5%	*9.0%*

Calendar	QUARTERLY REVENUES ($ mill.) Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2013	217.3	229.8	238.8	255.4	941.3
2014	258.6	263.2	270.1	231.1	1023.0
2015	272.5	275.1	273.2	224.0	1044.8
2016	280.1	298.0	***306.9***	***315***	***1200***
2017	***335***	***340***	***345***	***350***	***1370***

Calendar	EARNINGS PER SHARE A Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2013	.32	.30	.37	.48	1.47
2014	.43	.34	.47	.30	1.54
2015	.43	.46	.42	.24	1.56
2016	.42	.46	***.48***	***.49***	***1.85***
2017	***.50***	***.55***	***.55***	***.55***	***2.15***

Calendar	QUARTERLY DIVIDENDS PAID B ■ † Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2012	.1175	.1175	.126	.126	.49
2013	.126	.126	.1425	.1425	.54
2014	.1425	.1425	.1625	.1625	.61
2015	.1625	.1625	.1875	.1875	.70
2016	.1875	.1875	.2155		

BUSINESS: ITC Holdings Corp. engages in the transmission of electricity in the United States. The company operates primarily as a conduit, moving power from generators to local distribution systems either through its own system or in conjunction with neighboring transmission systems. Acquired Michigan Electric Transmission Company 10/06; Interstate Power & Light's transmission assets 12/07. Has assets in Michigan, Iowa, Minnesota, Illinois, Missouri, and Kansas. Operations are regulated by the Federal Energy Regulatory Commission (FERC). '15 reported depreciation rate: 2.1%. Has about 600 employees. Chairman, President & CEO: Joseph L. Welch. Inc.: Michigan. Address: 27175 Energy Way, Novi, Michigan 48377. Tel.: 248-946-3000. Internet: www.itctransco.com.

The acquisition of ITC Holdings is progressing. Fortis, a Canadian company with utilities in the U.S., would pay US$22.57 in cash plus .752 of a Fortis share for each ITC share. The Fortis shares trade on a Canadian exchange, so the value of the deal will fluctuate based not only on the price of Fortis stock, but on the exchange rate between the U.S. and Canadian dollars. The transaction is now valued at almost $47.00 a share. Each company's stockholders have approved the combination, as have the regulators in Oklahoma and Illinois. The Federal Energy Regulatory Commission (FERC) and the commissions in three other states must still rule on the deal. The companies expect it to be completed by yearend.

We advise ITC holders to sell their shares on the open market. The recent price is just 2% below the value of the buyout, so there isn't much upside potential for ITC holders. There is downside risk if the deal fails to win regulatory approval, however. The Timeliness rank of ITC stock is suspended due to the pending acquisition.

ITC is taking charges associated with the Fortis deal and for the possible refund of previously collected revenues. Merger-related costs reduced earnings by $0.14 a share in the first half of 2016. More significantly, over the past several quarters, the company has been taking reserves for the probable refund of previously collected revenues. This lowered profits by $0.11 a share in the first two quarters of 2016. Transmission users have filed two complaints with FERC against transmission owners in the Midwest, contending that allowed returns on equity are too high and should be reduced. An administrative law judge has recommended cuts in the allowed ROEs, but FERC has yet to rule on either complaint. Each percentage point reduction in ITC's allowed ROE would reduce the company's earning power by $30 million after taxes.

The board of directors has raised the dividend. The increase was $0.11 a share (14.9%) annually. However, unlike most utilities, ITC's dividend yield is still below the market median. Of course, ITC is not like other utilities, being the sole publicly traded transmission-only company.

Paul E. Debbas, CFA *September 16, 2016*

(A) Diluted earnings. '15 earnings don't add to full-year total due to rounding. Next earnings report due late Oct. **(B)** Dividends historically paid in early March, June, Sept., and Dec. ■ Dividend reinvestment plan available. † Shareholder investment plan available. **(C)** Incl. intangibles. In '15: $1.26 billion, $8.24/sh. **(D)** In millions, adjusted for stock split. **(E)** Rates allowed on common equity: 12.16%-13.88%. Earned on avg. com. eq., '15: 14.2%. Regulatory Climate: Above Average.

Company's Financial Strength	B++
Stock's Price Stability	95
Price Growth Persistence	90
Earnings Predictability	90

© 2016 Value Line, Inc. All rights reserved. Factual material is obtained from sources believed to be reliable and is provided without warranties of any kind. THE PUBLISHER IS NOT RESPONSIBLE FOR ANY ERRORS OR OMISSIONS HEREIN. This publication is strictly for subscriber's own, non-commercial, internal use. No part of it may be reproduced, resold, stored or transmitted in any printed, electronic or other form, or used for generating or marketing any printed or electronic publication, service or product.

To subscribe call 1-800-VALUELINE

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

THIS FILING IS	
Item 1: ☒ An Initial (Original) Submission	OR ☐ Resubmission No. ____

Form 1 Approved
OMB No. 1902-0021
(Expires 7/31/2008)
Form 1-F Approved
OMB No. 1902-0029
(Expires 6/30/2007)
Form 3-Q Approved
OMB No. 1902-0205
(Expires 6/30/2007)

FERC FINANCIAL REPORT
FERC FORM No. 1: Annual Report of Major Electric Utilities, Licensees and Others and Supplemental Form 3-Q: Quarterly Financial Report

These reports are mandatory under the Federal Power Act, Sections 3, 4(a), 304 and 309, and 18 CFR 141.1 and 141.400. Failure to report may result in criminal fines, civil penalties and other sanctions as provided by law. The Federal Energy Regulatory Commission does not consider these reports to be of confidential nature

Exact Legal Name of Respondent (Company)	**Year/Period of Report**
MONONGAHELA POWER COMPANY	**End of** 2005/Q4

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Name of Respondent	This Report is:	Date of Report (Mo, Da, Yr)	Year/Period of Report
MONONGAHELA POWER COMPANY	(1) X An Original (2) __ A Resubmission	04/17/2006	2005/Q4

IMPORTANT CHANGES DURING THE QUARTER/YEAR (Continued)

1. See item 3 below.

2. None

3.

On December 31, 2005, Monongahela completed the sale of its Ohio electric T&D assets to Columbus Southern for net cash proceeds of $51.8 million. The purchase price for the assets was the net book value at the time of closing, plus $10.0 million, less certain property taxes. The sale included a power sales agreement under which Monongahela will provide power to Columbus Southern for the Ohio retail customer base from the time of closing through May 31, 2007 at $45 per megawatt-hour, which is projected to be less than the projected market price for power. During 2005, Monongahela recorded a loss on the sale of $29.3 million based on the estimated value, at December 31, 2005, of Monongahela's power sales agreement with Columbus Southern to provide power at below-market prices from December 31, 2005 through May 31, 2007, partially offset by approximately $8.0 million, representing the purchase price less net book value of the assets at December 31, 2005 and approximately $2.0 million in expenses associated with the sale.

On September 30, 2005, Monongahela completed the sale of its natural gas operations in West Virginia to Mountaineer Gas Holdings Limited Partnership, a partnership composed of IGS Utilities LLC, IGS Holdings LLC and affiliates of ArcLight Capital Partners, LLC, for approximately $161.0 million in cash and the assumption of approximately $87.0 million of long-term debt. The assets sold included all of the issued and outstanding capital stock of Mountaineer Gas and certain other assets related to the West Virginia natural gas operations, subject to certain post closing adjustments

4. None

5. See note 3 above.

Here are the Commission orders pertaining to the sale of the Gas Operations.

Securities and Exchange Commission
Case No. 70-10270
Order Authorizing Sale of Gas Utility Company
September 21, 2005

Public Service Commission of West Virginia
Case No. 04-1596-G-PC
Order approving Sale of Gas Operations
August 24, 2005

Federal Energy Regulatory Commission
Transaction Identification No. 20050048
Early Termination of waiting period for the sale of Gas Operations Granted
October 27, 2004

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

FIRSTENERGY NYSE-FE

RECENT PRICE **38.62** | P/E RATIO **14.3** (Trailing: 15.4, Median: 15.0) | RELATIVE P/E RATIO **0.78** | DIV'D YLD **3.7%** | **VALUE LINE**

TIMELINESS 4 Lowered 12/12/14
SAFETY 3 Lowered 2/22/13
TECHNICAL 4 Lowered 2/6/15
BETA .70 (1.00 = Market)

2018-20 PROJECTIONS

	Price	Gain	Ann'l Total Return
High	45	(+15%)	7%
Low	30	(-20%)	-2%

Insider Decisions

	M	A	M	J	J	A	S	O	N
to Buy	0	0	0	0	0	0	0	0	0
Options	1	0	0	0	0	0	0	0	0
to Sell	1	0	2	0	0	1	0	1	0

Institutional Decisions

	1Q2014	2Q2014	3Q2014
to Buy	211	208	178
to Sell	238	210	219
Hld's(000)	303716	300665	311569

	2013	2014	2015	2016
High:	46.8	40.8	41.7	
Low:	31.3	30.0	37.8	

LEGENDS
0.80 x Dividends p sh divided by Interest Rate
Relative Price Strength
Options: Yes
Shaded area indicates recession

Target Price Range 2018 | 2019 | 2020

128 96 80 64 48 40 32 24 16 12

Percent shares traded 15 10 5

% TOT. RETURN 1/15

	THIS STOCK	VL ARITH.* INDEX
1 yr.	33.8	6.9
3 yr.	10.6	57.1
5 yr.	17.9	107.2

1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	© VALUE LINE PUB. LLC	18-20
27.19	31.31	26.88	40.83	37.31	37.76	36.35	36.03	42.00	44.70	41.70	43.76	38.87	36.57	35.60	*36.10*	*36.60*	*37.55*	Revenues per sh	*40.25*
6.89	7.28	5.48	6.45	4.79	7.60	7.55	7.22	8.34	9.04	8.80	8.50	5.75	6.05	6.30	*5.55*	*6.25*	*6.40*	"Cash Flow" per sh	*7.00*
2.50	2.69	2.84	2.54	1.47	2.77	2.84	3.82	4.22	4.38	3.32	3.25	1.88	2.13	2.97	*2.10*	*2.75*	*2.80*	Earnings per sh A	*3.00*
1.50	1.50	1.50	1.50	1.50	1.91	1.71	1.85	2.05	2.20	2.20	2.20	2.20	2.20	1.65	1.44	*1.44*	*1.48*	Div'd Decl'd per sh B ■	*1.60*
2.69	2.74	2.86	3.35	2.60	2.57	3.66	4.12	5.36	9.47	7.23	6.44	5.45	7.09	6.90	*8.60*	*6.95*	*6.80*	Cap'l Spending per sh	*7.50*
19.63	20.72	24.86	23.92	25.13	26.04	27.86	28.30	29.45	27.17	28.08	28.03	31.75	31.29	30.32	*31.05*	*32.35*	*33.70*	Book Value per sh C	*37.75*
232.45	224.53	297.64	297.64	329.84	329.84	329.84	319.21	304.84	304.84	304.84	304.84	418.22	418.22	418.63	*421.00*	*423.50*	*426.00*	Common Shs Outst'g D	*433.50*
11.3	9.2	10.9	13.0	22.5	14.1	16.1	14.2	15.6	15.6	13.0	11.7	22.4	21.1	13.1	*16.1*	*Bold figures are Value Line estimates*		Avg Ann'l P/E Ratio	*12.5*
.64	.60	.56	.71	1.28	.74	.86	.77	.83	.94	.87	.74	1.41	1.34	.74	*.85*			Relative P/E Ratio	*.80*
5.3%	6.1%	4.8%	4.6%	4.5%	4.9%	3.7%	3.4%	3.1%	3.2%	5.1%	5.8%	5.2%	4.9%	4.3%	4.3%			Avg Ann'l Div'd Yield	*4.3%*
11989	11501	12802	13627	12712	13339	16258	15294	14903	*15200*	*15500*	*16000*							Revenues ($mill)	*17500*
951.0	1265.0	1309.0	1342.0	1015.0	991.0	752.0	891.0	1245.0	*895*	*1165*	*1190*							Net Profit ($mill)	*1340*
42.1%	38.6%	40.3%	36.7%	19.6%	38.6%	41.3%	41.1%	36.1%	*30.5%*	*37.0%*	*37.0%*							Income Tax Rate	*37.0%*
2.0%	2.1%	2.4%	3.9%	12.8%	16.6%	9.3%	8.1%	6.0%	*12.0%*	*6.0%*	*6.0%*							AFUDC % to Net Profit	*6.0%*
46.5%	48.6%	49.7%	52.4%	58.2%	59.5%	54.2%	53.7%	55.5%	*56.0%*	*55.5%*	*55.5%*							Long-Term Debt Ratio	*55.0%*
52.4%	51.4%	50.3%	47.7%	41.8%	40.5%	45.8%	46.3%	44.5%	*44.0%*	*44.5%*	*44.5%*							Common Equity Ratio	*45.0%*
17527	17570	17846	17383	20467	21124	28996	28263	28523	*29600*	*30850*	*32125*							Total Capital ($mill)	*36400*
13998	14667	15383	17723	19164	19788	30337	32903	33252	*35500*	*37025*	*38450*							Net Plant ($mill)	*43000*
7.1%	9.0%	9.0%	9.7%	6.9%	6.3%	4.0%	4.9%	6.0%	*4.5%*	*5.5%*	*5.0%*							Return on Total Cap'l	*5.0%*
10.1%	14.0%	14.6%	16.2%	11.9%	11.6%	5.7%	6.8%	9.8%	*7.0%*	*8.5%*	*8.5%*							Return on Shr. Equity	*8.0%*
10.2%	13.9%	14.6%	16.2%	11.9%	11.6%	5.7%	6.8%	9.8%	*7.0%*	*8.5%*	*8.5%*							Return on Com Equity E	*8.0%*
4.2%	7.4%	7.7%	8.1%	4.0%	3.8%	NMF	NMF	2.6%	*2.0%*	*4.0%*	*4.0%*							Retained to Com Eq	*4.0%*
59%	47%	47%	50%	66%	68%	117%	103%	74%	*68%*	*52%*	*53%*							All Div'ds to Net Prof	*52%*

CAPITAL STRUCTURE as of 9/30/14
Total Debt $21538 mill. **Due in 5 Yrs** $8875 mill.
LT Debt $18531 mill. **LT Interest** $965 mill.
Incl. $154 mill. capitalized leases.
(LT interest earned: 2.4x)

Leases, Uncapitalized Annual rentals $202 mill.
Pension Assets-12/13 $6171 mill.
Oblig. $8263 mill.
Pfd Stock None

Common Stock 420,792,515 shs.
as of 10/31/14
MARKET CAP: $16 billion (Large Cap)

ELECTRIC OPERATING STATISTICS

	2011	2012	2013
% Change Retail Sales (KWH)	+.1	+3.5	+.9
Avg. Indust. Use (MWH)	NMF	NMF	NMF
Avg. Indust. Revs. per KWH (¢)	NA	NA	NA
Capacity at Peak (Mw)	NA	NA	NA
Peak Load, Summer (Mw)	NA	NA	NA
Annual Load Factor (%)	NA	NA	NA
% Change Customers (yr-end)	NA	NA	NA
Fixed Charge Cov. (%)	206	236	294

ANNUAL RATES of change (per sh)

	Past 10 Yrs.	Past 5 Yrs.	Est'd '11-'13 to '18-'20
Revenues	.5%	-2.0%	*1.0%*
"Cash Flow"	1.0%	-6.0%	*2.0%*
Earnings	- -	-11.0%	*3.5%*
Dividends	3.0%	- -	*-3.5%*
Book Value	2.5%	2.0%	*3.0%*

QUARTERLY REVENUES ($ mill.)

Calendar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2012	3986	3757	4051	3500	15294
2013	3724	3512	4020	3647	14903
2014	4189	3496	3888	***3627***	***15200***
2015	***4050***	***3750***	***4000***	***3700***	***15500***
2016	***4200***	***3850***	***4150***	***3800***	***16000***

EARNINGS PER SHARE A

Calendar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2012	.78	.52	1.05	d.23	2.13
2013	.51	.47	.88	1.11	2.97
2014	.34	.27	.79	***.70***	***2.10***
2015	***.65***	***.50***	***.85***	***.75***	***2.75***
2016	***.65***	***.50***	***.90***	***.75***	***2.80***

QUARTERLY DIVIDENDS PAID B ■

Calendar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2011	.55	.55	.55	.55	2.20
2012	.55	.55	.55	.55	2.20
2013	.55	.55	.55	.55	2.20
2014	.36	.36	.36	.36	1.44
2015	.36				

BUSINESS: FirstEnergy Corp. is a holding company for Ohio Edison, Pennsylvania Power, Cleveland Electric, Toledo Edison, Metropolitan Edison, Penelec, Jersey Central Power & Light, West Penn Power, Potomac Edison, & Mon Power. Provides electric service to over 6 million customers in OH, PA, NJ, WV, MD, & NY. Acq'd Allegheny Energy 2/11. Electric revenue breakdown by customer class not available. Generating sources: coal, 44%; nuclear, 26%; purchased, 30%. Fuel costs: 43% of revenues. '13 reported deprec. rate: 2.6%. Has 15,800 employees. Chairman: Anthony J. Alexander. President & CEO: Charles E. Jones. Inc.: Ohio. Address: 76 South Main Street, Akron, Ohio 44308-1890. Tel.: 800-736-3402. Internet: www.firstenergycorp.com.

FirstEnergy has made progress in some of its regulatory matters. The Federal Energy Regulatory Commission granted the company's request for forward-looking tariff regulation, effective at the start of 2015. (The utility's allowed return on equity in this business is now 12.38%, but this might be lowered.) The West Virginia commission approved a settlement calling for a total rate increase of $63 million for FirstEnergy's two utilities in the state, effective February 25th. The company's four utilities in Pennsylvania reached a settlement calling for rate hikes totaling $293 million. A ruling is expected by May 19th. This settlement, and the order in West Virginia, were "black box" agreements in which an allowed ROE was not specified.

Other regulatory matters are pending. FirstEnergy is asking the Ohio commission to approve a three-year extension of its Electric Security Plan. This would include 15-year agreements through which the company's utilities in the state would purchase the output of some generating assets, including the Davis-Besse nuclear unit and the Sammis coal-fired plant. Jersey Central Power & Light filed for a tariff hike of $9.1 million, based on an 11% ROE. However, an administrative law judge recommended a cut of $107.5 million. Each of these matters will probably be resolved within the next several weeks.

A dividend increase is possible next year—if not sooner. FirstEnergy is waiting for its regulatory matters to be resolved so that it can gauge the earning power of its utility operations. We estimate a dividend hike in 2016. However, we think the disbursement won't approach its previous $2.20-a-share level, even over the 3- to 5-year period.

Earnings should return to a more normal level this year, followed by a modest increase in 2016. Last year, some unusual (but not nonrecurring) charges reduced profits. FirstEnergy's earnings growth will probably be driven by its regulated utility operations.

The dividend yield of this untimely stock is a bit above the utility average. With the recent price above the midpoint of our 2018-2020 Target Price Range, total return potential is unimpressive.

Paul E. Debbas, CFA *February 20, 2015*

(A) Dil. EPS. Excl. nonrec. gain (losses): '05, (28¢); '09, (3¢); '10, (68¢); '11, 33¢; '12, (29¢); '13, ($2.07); '14, (17¢); gains from disc. ops.: '05, 5¢; '13, 4¢; '14, 20¢. '12 EPS don't add due to rounding. Next earnings report due early May. **(B)** Div'ds paid early Mar., June, Sep. & Dec. 5 div'ds decl. in '04, 3 in '13. ■ Div'd reinv. avail. **(C)** Incl. intang.: In '13: $19.76/sh. **(D)** In mill. **(E)** Rate base: Depr. orig. cost. Rates all'd on com. eq.: 9.75%-12.9%; earned on avg. com. eq., '13: 9.3%. Reg. Climate: OH Above Avg.; PA, NJ Avg.; MD, WV Below Avg.

Company's Financial Strength	B+
Stock's Price Stability	90
Price Growth Persistence	25
Earnings Predictability	65

© 2015 Value Line Publishing LLC. All rights reserved. Factual material is obtained from sources believed to be reliable and is provided without warranties of any kind. THE PUBLISHER IS NOT RESPONSIBLE FOR ANY ERRORS OR OMISSIONS HEREIN. This publication is strictly for subscriber's own, non-commercial, internal use. No part of it may be reproduced, resold, stored or transmitted in any printed, electronic or other form, or used for generating or marketing any printed or electronic publication, service or product.

To subscribe call 1-800-VALUELINE

AMERICAN ELEC. PWR. NYSE-AEP

RECENT PRICE **55.26** | P/E RATIO **16.5** (Trailing: 16.1, Median: 13.0) | RELATIVE P/E RATIO **0.90** | DIV'D YLD **3.9%** | **VALUE LINE**

TIMELINESS **3** Raised 3/6/15
SAFETY **2** Raised 9/19/14
TECHNICAL **3** Raised 3/20/15
BETA .70 (1.00 = Market)

2018-20 PROJECTIONS

	Price	Gain	Ann'l Total Return
High	70	(+25%)	*10%*
Low	45	(-20%)	*Nil*

Insider Decisions

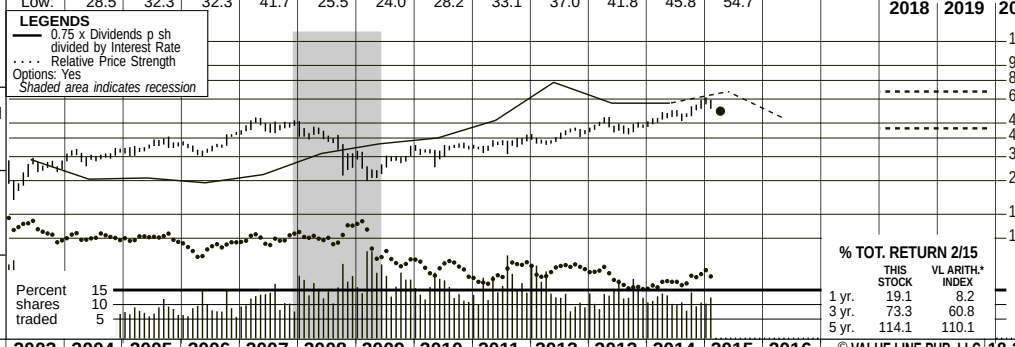
	A	M	J	J	A	S	O	N	D
to Buy	0	0	0	0	0	0	0	0	0
Options	0	12	0	0	0	0	0	0	0
to Sell	0	6	0	0	2	0	0	0	0

Institutional Decisions

	2Q2014	3Q2014	4Q2014
to Buy	338	325	361
to Sell	267	301	308
Hld's(000)	323714	326207	326985

	High:	35.5	40.8	43.1	51.2	49.1	36.5	37.9	41.7	45.4	51.6	63.2	65.4
	Low:	28.5	32.3	32.3	41.7	25.5	24.0	28.2	33.1	37.0	41.8	45.8	54.7

LEGENDS
0.75 x Dividends p sh divided by Interest Rate
Relative Price Strength
Options: Yes
Shaded area indicates recession



% TOT. RETURN 2/15

	THIS STOCK	VL ARITH.* INDEX
1 yr.	19.1	8.2
3 yr.	73.3	60.8
5 yr.	114.1	110.1

1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	© VALUE LINE PUB. LLC	18-20
35.63	42.53	190.10	42.96	36.82	35.51	30.76	31.82	33.41	35.56	28.22	30.01	31.27	30.77	31.48	***34.75***	***34.55***	***35.85***	Revenues per sh	***41.00***
6.36	5.11	7.65	6.99	5.76	5.89	5.96	6.67	6.80	6.84	6.32	6.29	6.83	6.64	6.75	***7.25***	***7.50***	***7.85***	"Cash Flow" per sh	***9.25***
2.69	1.04	3.27	2.86	2.53	2.61	2.64	2.86	2.86	2.99	2.97	2.60	3.13	2.98	3.18	3.34	***3.50***	***3.65***	Earnings per sh [A]	***4.50***
2.40	2.40	2.40	2.40	1.65	1.40	1.42	1.50	1.58	1.64	1.64	1.71	1.85	1.88	1.95	2.03	***2.15***	***2.27***	Div'd Decl'd per sh [B] ■	***2.65***
4.47	5.51	5.69	5.08	3.44	4.28	6.11	8.89	8.88	9.83	6.19	5.07	5.74	6.45	7.75	***8.65***	***9.30***	***8.05***	Cap'l Spending per sh	***8.50***
25.79	25.01	25.54	20.85	19.93	21.32	23.08	23.73	25.17	26.33	27.49	28.33	30.33	31.37	32.98	***34.35***	***35.75***	***37.25***	Book Value per sh [C]	***42.25***
194.10	322.02	322.24	338.84	395.02	395.86	393.72	396.67	400.43	406.07	478.05	480.81	483.42	485.67	487.78	***490.00***	***492.00***	***494.00***	Common Shs Outst'g [D]	***500.00***
14.3	34.3	13.9	12.7	10.7	12.4	13.7	12.9	16.3	13.1	10.0	13.4	11.9	13.8	14.5	15.9	*Bold figures are Value Line estimates*		Avg Ann'l P/E Ratio	***13.0***
.82	2.23	.71	.69	.61	.66	.73	.70	.87	.79	.67	.85	.75	.88	.81	.84			Relative P/E Ratio	***.80***
6.2%	6.7%	5.3%	6.6%	6.1%	4.3%	3.9%	4.1%	3.4%	4.2%	5.5%	4.9%	5.0%	4.6%	4.2%	3.8%			Avg Ann'l Div'd Yield	***4.5%***
12111	12622	13380	14440	13489	14427	15116	14945	15357	17020	***17000***	***17700***							Revenues ($mill)	***20450***
1036.0	1131.0	1147.0	1208.0	1365.0	1248.0	1513.0	1443.0	1549.0	1634.0	***1675***	***1755***							Net Profit ($mill)	***2185***
29.3%	33.0%	31.1%	31.3%	29.7%	34.8%	31.7%	33.9%	36.2%	37.8%	***36.0%***	***36.0%***							Income Tax Rate	***36.0%***
5.4%	9.9%	9.8%	9.9%	10.9%	10.4%	10.6%	11.2%	7.3%	***9.0%***	***10.0%***	***7.0%***							AFUDC % to Net Profit	***7.0%***
54.8%	56.7%	58.3%	59.1%	54.4%	53.1%	50.7%	50.6%	51.1%	***49.0%***	***50.0%***	***49.0%***							Long-Term Debt Ratio	***48.5%***
44.9%	43.0%	41.4%	40.7%	45.4%	46.7%	49.3%	49.4%	48.9%	***51.0%***	***50.0%***	***51.0%***							Common Equity Ratio	***51.5%***
20222	21902	24342	26290	28958	29184	29747	30823	32913	***34050***	***35300***	***36050***							Total Capital ($mill)	***41100***
24284	26781	29870	32987	34344	35674	36971	38763	40997	44117	***46750***	***48650***							Net Plant ($mill)	***54300***
6.6%	6.7%	6.3%	6.2%	6.2%	5.7%	6.6%	6.1%	6.0%	***6.0%***	***6.0%***	***6.0%***							Return on Total Cap'l	***6.5%***
11.3%	11.9%	11.3%	11.2%	10.3%	9.1%	10.3%	9.5%	9.6%	***9.5%***	***9.5%***	***9.5%***							Return on Shr. Equity	***10.5%***
11.3%	12.0%	11.4%	11.3%	10.4%	9.1%	10.3%	9.5%	9.6%	***9.5%***	***10.0%***	***10.0%***							Return on Com Equity [E]	***10.5%***
5.2%	5.7%	5.1%	5.1%	4.6%	3.1%	4.2%	3.5%	3.7%	***4.0%***	***4.0%***	***4.0%***							Retained to Com Eq	***4.5%***
54%	53%	55%	55%	56%	66%	60%	63%	62%	***64%***	***63%***	***64%***							All Div'ds to Net Prof	***61%***

CAPITAL STRUCTURE as of 9/30/14
Total Debt $19340 mill. **Due in 5 Yrs** $9356 mill.
LT Debt $15677 mill. **LT Interest** $713 mill.
Incl. $2230 mill. securitized bonds.
(LT interest earned: 3.7x)

Leases, Uncapitalized Annual rentals $288 mill.
Pension Assets-12/13 $4711 mill.
Oblig. $4841 mill.
Pfd Stock None

Common Stock 489,240,481 shs.
as of 10/23/14
MARKET CAP: $27 billion (Large Cap)

ELECTRIC OPERATING STATISTICS

	2011	2012	2013
% Change Retail Sales (KWH)	+1.2	-2.1	-1.5
Avg. Indust. Use (MWH)	NA	NA	NA
Avg. Indust. Revs. per KWH (¢)	4.95	4.69	NA
Capacity at Peak (Mw)	NA	NA	NA
Peak Load (Mw)	NA	NA	NA
Annual Load Factor (%)	NA	NA	NA
% Change Customers (yr-end)	NA	NA	NA
Fixed Charge Cov. (%)	286	280	326

ANNUAL RATES of change (per sh)

	Past 10 Yrs.	Past 5 Yrs.	Est'd '11-'13 to '18-'20
Revenues	-10.0%	-1.5%	*4.0%*
"Cash Flow"	- -	- -	*4.5%*
Earnings	.5%	1.5%	*5.5%*
Dividends	-1.5%	4.0%	*5.0%*
Book Value	3.5%	4.5%	*4.5%*

QUARTERLY REVENUES ($ mill.)

Calendar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2012	3625	3551	4156	3613	14945
2013	3826	3582	4176	3773	15357
2014	4648	4044	4302	4026	17020
2015	***4350***	***4100***	***4500***	***4050***	***17000***
2016	***4550***	***4250***	***4700***	***4200***	***17700***

EARNINGS PER SHARE [A]

Calendar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2012	.80	.75	1.00	.43	2.98
2013	.75	.73	1.10	.60	3.18
2014	1.15	.80	1.01	.39	3.34
2015	***1.00***	***.80***	***1.15***	***.55***	***3.50***
2016	***1.05***	***.85***	***1.20***	***.55***	***3.65***

QUARTERLY DIVIDENDS PAID [B] ■

Calendar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2011	.46	.46	.46	.47	1.85
2012	.47	.47	.47	.47	1.88
2013	.47	.49	.49	.50	1.95
2014	.50	.50	.50	.53	2.03
2015	.53				

BUSINESS: American Electric Power Company, Inc. (AEP), through 10 operating utilities, serves 5.3 mill. customers in Arkansas, Kentucky, Indiana, Louisiana, Michigan, Ohio, Oklahoma, Tennessee, Texas, Virginia, and West Virginia. Electric revenue breakdown: residential, 40%; commercial, 23%; industrial, 19%; wholesale, 15%; other, 3%. Sold 50% stake in Yorkshire Holdings (British utility) '01; sold SEEBOARD (British utility) '02; sold Houston Pipeline '05. Generating sources not available. Fuel costs: 36% of revenues. '13 reported deprec. rates (utility): 1.1%-7.9%. Has 18,500 employees. Chairman, President & CEO: Nicholas K. Akins. Inc.: New York. Address: 1 Riverside Plaza, Columbus, Ohio 43215-2373. Tel.: 614-716-1000. Internet: www.aep.com.

What will American Electric Power do with its nonregulated generating assets in Ohio? The company had proposed a purchased-power agreement with four plants, which was intended to provide these assets with a stable source of income. The state commission rejected AEP's proposal, but did not prohibit purchased-power contracts. Now, the company must decide whether to put forth a revised proposal, or sell the assets. In fact, AEP has hired an investment-banking firm to evaluate a sale. Another company with nonregulated generating units in Ohio, Duke Energy, reached an agreement to sell these plants last year. Duke fared better than it had originally expected, although the units were still sold at a loss. In any case, AEP has been striving to make itself a more regulated company in recent years. We don't know when management will announce its plans.

We estimate mid-single-digit earnings growth this year and next. We are basing our estimates on retention of AEP's nonregulated generating assets. Due to conditions in the power markets, the income from these assets will probably decline in 2015 and 2016. Even so, rising profits from the regulated operations should outweigh this falloff. Some of AEP's utilities are asking for rate increases, and the company's electric transmission operations are increasing their contribution as more capital is invested in this area. Over the next three years, AEP has budgeted more than $4.8 billion for transmission capital expenditures. Our earnings estimates for 2015 and 2016 are at the midpoint of management's targeted ranges of $3.40-$3.60 a share and $3.45-$3.85 a share, respectively.

Rate cases are pending in West Virginia and Kentucky. In West Virginia, Appalachian Power is seeking a rate hike of $226 million, based on a 10.62% return on equity. An order is due on May 26th. Kentucky Power filed for a rate increase of $70 million, based on the same 10.62% ROE. New tariffs should take effect in mid-2015.

This stock has a dividend yield and 3- to 5-year total return potential that are about average, by utility standards.

Paul E. Debbas, CFA *March 20, 2015*

(A) Diluted EPS. Excl. nonrec. gains (losses): '02, ($3.86); '03, ($1.92); '04, 24¢; '05, (62¢); '06, (20¢); '07, (20¢); '08, 40¢; '10, (7¢); '11, 89¢; '12, (38¢); '13, (14¢); discont. ops.: '02, (57¢); '03, (32¢); '04, 15¢; '05, 7¢; '06, 2¢; '08, 3¢. '11 EPS don't add due to rounding. Next egs. report due late Apr. **(B)** Div'ds historically paid early Mar., June, Sept., & Dec. ■ Div'd reinvest. plan avail. **(C)** Incl. intang. In '13: $18.20/sh. **(D)** In mill. **(E)** Rate base: various. Rates all'd on com. eq.: 9.65%-10.9%; earned on avg. com. eq., '13: 9.9%. Regul. Clim.: Avg.

Company's Financial Strength	A
Stock's Price Stability	100
Price Growth Persistence	60
Earnings Predictability	90

© 2015 Value Line Publishing LLC. All rights reserved. Factual material is obtained from sources believed to be reliable and is provided without warranties of any kind. THE PUBLISHER IS NOT RESPONSIBLE FOR ANY ERRORS OR OMISSIONS HEREIN. This publication is strictly for subscriber's own, non-commercial, internal use. No part of it may be reproduced, resold, stored or transmitted in any printed, electronic or other form, or used for generating or marketing any printed or electronic publication, service or product.

To subscribe call 1-800-VALUELINE

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

ASSOCIATIONS EXHIBIT NO. A-4

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Federal Energy Regulatory Commission

Total Investment Return

Edison Electric Index (EEI)			S&P 500		
Year	Total Return	Dividend Yield	Year	Total Return	Dividend Yield
2018	6.0%	3.33%	2018	-4.38%	1.98%
2017	18.0%	3.60%	2017	21.83%	2.02%
2016	21.3%	3.97%	2016	11.96%	2.21%
2015	-4.9%	3.44%	2015	1.38%	2.13%
2014	39.2%	4.40%	2014	13.69%	2.06%
2013	7.7%	4.39%	2013	32.39%	2.15%
2012	17.6%	4.90%	2012	16.00%	2.29%
2011	8.3%	4.79%	2011	2.11%	2.11%
2010	14.3%	5.02%	2010	15.06%	2.02%
2009	-27.3%	3.37%	2009	26.46%	2.44%
2008	9.3%	3.53%	2008	-37.00%	2.42%
Average	10.0%	4.1%	**Average**	9.05%	2.17%
Std. Dev.	16.6%	0.7%	**Std. Dev.**	18.80%	0.16%

Notes

Some EEI utilities were excluded from the data set due to data limitations or concerns including:

Mergers & Acquisitions: Scana Corp and Vectren Corp.

Avangrid and Evergy Inc lacked sufficient historical data.

PG&E is in bankruptcy and has suspended dividends.

Insufficient historical dividend information for MDU Resource Group Inc, Unitil Corp, and NiSource Inc.

Insufficient historical stock price data for El Paso Electric Co.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Federal Energy Regulatory Commission

Edison Electric Index

Year	Price	Dividend	Price Change	Total Return	Annual Growth	Dividend Yield
2018	$66.50	$2.15	$1.73	5.99%	2.67%	3.33%
2017	$64.77	$2.04	$8.15	18.00%	14.40%	3.60%
2016	$56.62	$1.92	$8.36	21.30%	17.33%	3.97%
2015	$48.25	$1.81	-$4.38	-4.88%	-8.32%	3.44%
2014	$52.64	$1.72	$13.59	39.22%	34.81%	4.40%
2013	$39.04	$1.66	$1.25	7.69%	3.30%	4.39%
2012	$37.79	$1.64	$4.27	17.64%	12.74%	4.90%
2011	$33.52	$1.55	$1.14	8.32%	3.53%	4.79%
2010	$32.38	$1.49	$2.75	14.30%	9.28%	5.02%
2009	$29.63	$1.44	-$13.12	-27.31%	-30.68%	3.37%
2008	$42.75	$1.42	$2.34	9.31%	5.78%	3.53%
2007	$40.41	$1.36	N/A	N/A	N/A	N/A

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Federal Energy Regulatory Commission

	Large-Capitalization Stocks				
Year	Total Return	Capital Appreciation	Tot. Return Growth	Cap. App. Growth	Dividend Yield
2018	$7,030	$196	-4.38%	-6.24%	1.98%
2017	$7,353	$210	21.83%	19.42%	2.02%
2016	$6,035	$175	11.96%	9.53%	2.21%
2015	$5,390	$160	1.38%	-0.73%	2.13%
2014	$5,317	$161	13.69%	11.39%	2.06%
2013	$4,677	$145	32.39%	29.60%	2.15%
2012	$3,533	$112	16.00%	13.41%	2.29%
2011	$3,045	$99	2.11%	0.00%	2.11%
2010	$2,982	$99	15.06%	12.78%	2.02%
2009	$2,592	$87	26.46%	23.45%	2.44%
2008	$2,049	$71	-37.00%	-38.49%	2.42%
2007	$3,253	$115	N/A	N/A	N/A

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

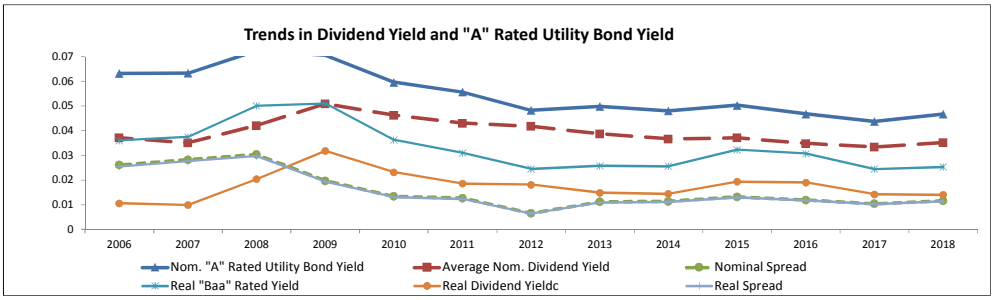
ASSOCIATIONS EXHIBIT NO. A-5

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Federal Energy Regulatory Commission

Electric Utilities
(Valuation Metrics)

Line	Company	Dividend Yield[1] 13-Year Average (1)	2018 [2a] (2)	2017 (3)	2016 (4)	2015 (5)	2014 (6)	2013 (7)	2012 (8)	2011 (9)	2010 (10)	2009 (11)	2008 (12)	2007 (13)	2006 (14)
1	ALLETE	4.03%	3.00%	2.97%	3.56%	3.97%	3.92%	3.89%	4.49%	4.58%	5.03%	5.79%	4.37%	3.60%	3.16%
2	Alliant Energy	3.82%	3.21%	3.07%	3.21%	3.60%	3.53%	3.74%	4.07%	4.28%	4.61%	5.73%	4.10%	3.13%	3.32%
3	Ameren Corp.	4.63%	3.01%	3.12%	3.50%	3.96%	4.02%	4.61%	4.97%	5.28%	5.76%	5.98%	6.21%	4.88%	4.93%
4	American Electric Power	4.15%	3.52%	3.42%	3.54%	3.80%	3.83%	4.23%	4.58%	4.96%	4.90%	5.50%	4.20%	3.40%	4.06%
5	Avangrid, Inc.	3.85%	3.49%	3.79%	4.26%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6	Avista Corp.	3.77%	3.14%	3.14%	3.39%	3.97%	3.99%	4.51%	4.55%	4.54%	4.76%	4.49%	3.39%	2.68%	2.52%
7	Black Hills	3.83%	3.25%	2.75%	2.87%	3.55%	2.84%	3.19%	4.39%	4.64%	4.79%	6.17%	4.21%	3.40%	3.79%
8	CenterPoint Energy	4.57%	4.12%	4.79%	4.70%	5.06%	3.94%	3.57%	4.04%	4.27%	5.29%	6.37%	4.98%	3.87%	4.39%
9	CMS Energy Corp.	3.32%	3.03%	2.88%	2.99%	3.36%	3.59%	3.76%	4.16%	4.25%	3.98%	3.97%	2.69%	1.16%	N/A
10	Consol. Edison	4.51%	3.67%	3.40%	3.62%	4.12%	4.38%	4.25%	4.07%	4.46%	5.16%	5.99%	5.67%	4.84%	5.04%
11	Dominion Resources	3.98%	4.66%	3.88%	3.82%	3.66%	3.43%	3.78%	4.06%	4.13%	4.41%	5.20%	3.77%	3.32%	3.60%
12	DTE Energy	4.24%	3.33%	3.15%	3.34%	3.53%	3.54%	3.84%	4.19%	4.68%	4.75%	6.29%	5.24%	4.36%	4.86%
13	Duke Energy	4.78%	4.46%	4.15%	4.26%	4.34%	4.26%	4.45%	4.68%	5.21%	5.71%	6.25%	5.16%	4.44%	N/A
14	Edison Int'l	3.05%	4.17%	2.87%	2.81%	2.83%	2.62%	2.85%	2.97%	3.37%	3.66%	3.95%	2.69%	2.21%	2.58%
15	El Paso Electric	2.74%	2.52%	2.49%	2.75%	3.13%	2.97%	2.99%	2.97%	2.11%	N/A	N/A	N/A	N/A	N/A
16	Entergy Corp.	4.13%	4.40%	4.49%	4.55%	4.59%	4.47%	5.07%	4.91%	4.85%	4.20%	3.97%	2.92%	2.39%	2.82%
17	Eversource Energy	3.35%	3.28%	3.14%	3.22%	3.34%	3.40%	3.48%	3.52%	3.23%	3.64%	4.16%	3.25%	2.60%	3.27%
18	Evergy, Inc.	3.11%	3.11%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
19	Exelon Corp.	3.91%	3.33%	3.51%	3.75%	3.88%	3.69%	4.69%	5.73%	4.96%	4.95%	4.26%	2.78%	2.48%	2.83%
20	FirstEnergy Corp.	4.35%	4.16%	4.62%	4.31%	4.23%	4.26%	4.26%	4.90%	5.23%	5.76%	5.09%	3.21%	3.12%	3.40%
21	Fortis Inc.	3.68%	4.03%	3.69%	3.80%	3.76%	3.88%	3.84%	3.64%	3.58%	3.80%	4.21%	3.76%	3.01%	2.79%
22	Great Plains Energy	4.52%	N/A	3.58%	3.64%	3.76%	3.62%	3.84%	4.08%	4.15%	4.49%	5.03%	6.96%	5.49%	5.60%
23	Hawaiian Elec.	4.74%	3.49%	3.65%	3.99%	4.05%	4.76%	4.72%	4.70%	5.04%	5.51%	6.89%	5.00%	5.18%	4.59%
24	IDACORP, Inc.	3.27%	2.64%	2.58%	2.77%	3.06%	3.12%	3.21%	3.28%	3.10%	3.44%	4.46%	3.95%	3.55%	3.39%
25	MGE Energy	3.28%	2.20%	1.95%	2.23%	2.78%	2.78%	2.91%	3.25%	3.63%	3.98%	4.36%	4.24%	4.14%	4.25%
26	NextEra Energy, Inc.	3.22%	2.70%	2.79%	2.91%	3.01%	3.00%	3.30%	3.65%	3.96%	3.90%	3.55%	3.02%	2.65%	3.40%
27	NorthWestern Corp	4.14%	3.80%	3.52%	3.43%	3.61%	3.30%	3.66%	4.17%	4.51%	4.93%	5.75%	5.38%	4.09%	3.65%
28	OGE Energy	3.61%	3.92%	3.61%	3.87%	3.51%	2.63%	2.48%	2.94%	3.06%	3.68%	4.96%	4.52%	3.77%	3.99%
29	Otter Tail Corp.	4.26%	2.95%	3.12%	3.87%	4.33%	4.14%	4.11%	5.21%	5.57%	5.68%	5.38%	3.63%	3.46%	3.92%
30	PG&E Corp.	3.70%	N/A	2.42%	3.22%	3.45%	3.96%	4.20%	4.25%	4.24%	4.08%	4.26%	4.01%	3.07%	3.22%
31	Pinnacle West Capital	4.61%	3.46%	3.16%	3.46%	3.88%	4.09%	3.98%	5.32%	4.81%	5.43%	6.76%	6.17%	4.75%	4.67%
32	PNM Resources	3.31%	2.76%	2.53%	2.69%	2.90%	2.79%	2.99%	2.96%	3.19%	4.09%	4.76%	4.85%	3.36%	3.21%
33	Portland General	3.74%	3.20%	2.92%	3.06%	3.27%	3.34%	3.67%	4.11%	4.37%	5.20%	5.36%	4.28%	3.34%	2.54%
34	PPL Corp.	4.38%	5.67%	4.24%	4.25%	4.55%	4.45%	4.81%	5.07%	5.10%	5.12%	4.51%	3.10%	2.69%	3.41%
35	Public Serv. Enterprise	3.84%	3.50%	3.74%	3.78%	3.81%	3.92%	4.35%	4.55%	4.24%	4.30%	4.30%	3.26%	2.73%	3.47%
36	SCANA Corp.	4.37%		4.03%	3.29%	3.90%	4.05%	4.15%	4.25%	4.78%	4.93%	5.67%	4.92%	4.29%	4.21%
37	Sempra Energy	2.94%	3.14%	2.92%	2.92%	2.71%	2.61%	3.03%	3.71%	3.65%	3.08%	3.23%	2.62%	2.08%	2.47%
38	Southern Co.	4.72%	5.19%	4.63%	4.42%	4.78%	4.69%	4.61%	4.29%	4.63%	5.13%	5.52%	4.58%	4.39%	4.52%
39	Vectren Corp.	4.38%		2.79%	3.31%	3.60%	3.62%	4.15%	4.82%	5.06%	5.53%	5.85%	4.79%	4.53%	4.52%
40	WEC Energy Group	3.06%	3.30%	3.31%	3.35%	3.49%	3.40%	3.49%	3.24%	3.35%	2.97%	3.16%	2.41%	2.14%	2.18%
41	Westar Energy	4.37%	N/A	3.00%	2.90%	3.73%	3.88%	4.27%	4.57%	4.84%	5.32%	6.27%	5.22%	4.16%	4.28%
42	Xcel Energy Inc.	3.99%	3.18%	3.10%	3.33%	3.69%	3.83%	3.86%	3.90%	4.20%	4.54%	5.14%	4.70%	4.05%	4.40%
43	**Average**	**3.94%**	**3.51%**	**3.34%**	**3.49%**	**3.71%**	**3.66%**	**3.87%**	**4.18%**	**4.30%**	**4.63%**	**5.09%**	**4.21%**	**3.51%**	**3.71%**
44	Median	3.92%	3.33%	3.15%	3.43%	3.71%	3.76%	3.85%	4.18%	4.42%	4.76%	5.14%	4.21%	3.40%	3.60%
45	20-Yr Treasury Yields[3]	3.48%	3.02%	2.65%	2.23%	2.55%	3.07%	3.12%	2.54%	3.62%	4.03%	4.11%	4.36%	4.91%	4.99%
46	20-Yr TIPS[3]	1.30%	0.92%	0.75%	0.66%	0.78%	0.87%	0.75%	0.21%	1.19%	1.73%	2.21%	2.19%	2.36%	2.31%
47	Implied Inflation[b]	2.15%	2.08%	1.89%	1.56%	1.75%	2.19%	2.35%	2.33%	2.40%	2.26%	1.85%	2.13%	2.49%	2.62%
48	**Real Dividend Yield[c]**	**1.75%**	**1.40%**	**1.42%**	**1.90%**	**1.93%**	**1.44%**	**1.49%**	**1.81%**	**1.86%**	**2.32%**	**3.18%**	**2.04%**	**0.99%**	**1.06%**
	Utility														
49	**Nominal "Baa" Rated Yield[4]**	**5.53%**	**4.67%**	**4.38%**	**4.67%**	**5.03%**	**4.80%**	**4.98%**	**4.83%**	**5.57%**	**5.96%**	**7.06%**	**7.25%**	**6.33%**	**6.32%**
50	**Real "Baa" Rated Yield**	**3.31%**	**2.53%**	**2.44%**	**3.07%**	**3.22%**	**2.55%**	**2.57%**	**2.44%**	**3.09%**	**3.62%**	**5.11%**	**5.01%**	**3.74%**	**3.60%**
	Spreads (Utility Bond - Stock)														
51	**Nominal Spread[d]**	**1.59%**	**1.16%**	**1.04%**	**1.19%**	**1.31%**	**1.14%**	**1.11%**	**0.65%**	**1.26%**	**1.34%**	**1.96%**	**3.03%**	**2.82%**	**2.61%**
52	**Real Spread[e]**	**1.55%**	**1.13%**	**1.02%**	**1.17%**	**1.29%**	**1.11%**	**1.09%**	**0.63%**	**1.23%**	**1.31%**	**1.93%**	**2.97%**	**2.75%**	**2.54%**
	Spreads (Treasury Bond - Stock)														
53	**Nominal[f]**	**-0.46%**	**-0.49%**	**-0.69%**	**-1.26%**	**-1.17%**	**-0.59%**	**-0.75%**	**-1.64%**	**-0.68%**	**-0.60%**	**-0.98%**	**0.15%**	**1.40%**	**1.28%**
54	**Real[g]**	**-0.45%**	**-0.48%**	**-0.68%**	**-1.24%**	**-1.15%**	**-0.58%**	**-0.73%**	**-1.60%**	**-0.67%**	**-0.58%**	**-0.97%**	**0.15%**	**1.37%**	**1.25%**



Sources:
[1] The Value Line Investment Survey Investment Analyzer Software, downloaded on June 21, 2018.
[2] The Value Line Investment Survey, January 25, February 15, and March 15, 2019.
[3] St. Louis Federal Reserve: Economic Research, http://research.stlouisfed.org.
[4] www.moodys.com, Bond Yields and Key Indicators, through December 31, 2018.

Notes:
[a] Based on the average of the high and low price for 2017 and the projected 2017 Dividends Declared per share, published in the Value Line Investment Survey, January 25, February 15, and March 15, 2019.
[b] Line 47 = (1 + Line 45) / (1 + Line 46) - 1.
[c] Line 48 = (1 + Line 43) / (1 +Line 47) - 1.
[d] The spread being measured here is the nominal A-rated utility bond yield over the average nominal utility dividend yield; (Line 49 - Line 43).
[e] The spread being measured here is the real A-rated utility bond yield over the average real utility dividend yield; Line 50 - Line 48)
[f] The spread being measured here is the nominal 20-Year Treasury yield over the average nominal utility dividend yield; (Line 45 - Line 43).
[g] The spread being measured here is the real 20-Year TIPS yield over the average real utility dividend yield; Line 48 - Line 46)

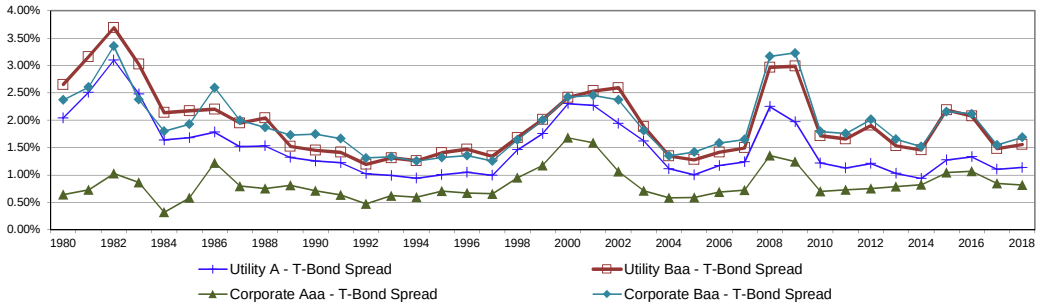
20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

Federal Energy Regulatory Commission

Bond Yield Spreads

			Public Utility Bond				Corporate Bond				Utility to Corporate	
Line	Year	T-Bond Yield[1] (1)	A[2] (2)	Baa[2] (3)	A-T-Bond Spread (4)	Baa-T-Bond Spread (5)	Aaa[3] (6)	Baa[3] (7)	Aaa-T-Bond Spread (8)	Baa-T-Bond Spread (9)	Baa Spread (10)	A-Aaa Spread (11)
1	1980	11.30%	13.34%	13.95%	2.04%	2.65%	11.94%	13.67%	0.64%	2.37%	0.28%	1.40%
2	1981	13.44%	15.95%	16.60%	2.51%	3.16%	14.17%	16.04%	0.73%	2.60%	0.56%	1.78%
3	1982	12.76%	15.86%	16.45%	3.10%	3.69%	13.79%	16.11%	1.03%	3.35%	0.34%	2.07%
4	1983	11.18%	13.66%	14.20%	2.48%	3.02%	12.04%	13.55%	0.86%	2.38%	0.65%	1.62%
5	1984	12.39%	14.03%	14.53%	1.64%	2.14%	12.71%	14.19%	0.32%	1.80%	0.34%	1.32%
6	1985	10.79%	12.47%	12.96%	1.68%	2.17%	11.37%	12.72%	0.58%	1.93%	0.24%	1.10%
7	1986	7.80%	9.58%	10.00%	1.78%	2.20%	9.02%	10.39%	1.22%	2.59%	-0.39%	0.56%
8	1987	8.58%	10.10%	10.53%	1.52%	1.95%	9.38%	10.58%	0.80%	2.00%	-0.05%	0.72%
9	1988	8.96%	10.49%	11.00%	1.53%	2.04%	9.71%	10.83%	0.75%	1.87%	0.17%	0.78%
10	1989	8.45%	9.77%	9.97%	1.32%	1.52%	9.26%	10.18%	0.81%	1.73%	-0.21%	0.51%
11	1990	8.61%	9.86%	10.06%	1.25%	1.45%	9.32%	10.36%	0.71%	1.75%	-0.30%	0.54%
12	1991	8.14%	9.36%	9.55%	1.22%	1.41%	8.77%	9.80%	0.63%	1.67%	-0.25%	0.59%
13	1992	7.67%	8.69%	8.86%	1.02%	1.19%	8.14%	8.98%	0.47%	1.31%	-0.12%	0.55%
14	1993	6.60%	7.59%	7.91%	0.99%	1.31%	7.22%	7.93%	0.62%	1.33%	-0.02%	0.37%
15	1994	7.37%	8.31%	8.63%	0.94%	1.26%	7.96%	8.62%	0.59%	1.25%	0.01%	0.35%
16	1995	6.88%	7.89%	8.29%	1.01%	1.41%	7.59%	8.20%	0.71%	1.32%	0.09%	0.30%
17	1996	6.70%	7.75%	8.17%	1.05%	1.47%	7.37%	8.05%	0.67%	1.35%	0.12%	0.38%
18	1997	6.61%	7.60%	7.95%	0.99%	1.34%	7.26%	7.86%	0.66%	1.26%	0.09%	0.34%
19	1998	5.58%	7.04%	7.26%	1.46%	1.68%	6.53%	7.22%	0.95%	1.64%	0.04%	0.51%
20	1999	5.87%	7.62%	7.88%	1.75%	2.01%	7.04%	7.87%	1.18%	2.01%	0.01%	0.58%
21	2000	5.94%	8.24%	8.36%	2.30%	2.42%	7.62%	8.36%	1.68%	2.42%	-0.01%	0.62%
22	2001	5.49%	7.76%	8.03%	2.27%	2.54%	7.08%	7.95%	1.59%	2.45%	0.08%	0.68%
23	2002	5.43%	7.37%	8.02%	1.94%	2.59%	6.49%	7.80%	1.06%	2.37%	0.22%	0.88%
24	2003	4.96%	6.58%	6.84%	1.62%	1.89%	5.67%	6.77%	0.71%	1.81%	0.08%	0.91%
25	2004	5.05%	6.16%	6.40%	1.11%	1.35%	5.63%	6.39%	0.58%	1.35%	0.00%	0.53%
26	2005	4.65%	5.65%	5.93%	1.00%	1.28%	5.24%	6.06%	0.59%	1.42%	-0.14%	0.41%
27	2006	4.90%	6.07%	6.32%	1.17%	1.42%	5.59%	6.48%	0.69%	1.58%	-0.16%	0.48%
28	2007	4.83%	6.07%	6.33%	1.24%	1.50%	5.56%	6.48%	0.72%	1.65%	-0.15%	0.52%
29	2008	4.28%	6.53%	7.25%	2.25%	2.97%	5.63%	7.45%	1.35%	3.17%	-0.20%	0.90%
30	2009	4.07%	6.04%	7.06%	1.97%	2.99%	5.31%	7.30%	1.24%	3.23%	-0.24%	0.73%
31	2010	4.25%	5.47%	5.96%	1.22%	1.71%	4.95%	6.04%	0.70%	1.79%	-0.08%	0.52%
32	2011	3.91%	5.04%	5.57%	1.13%	1.66%	4.64%	5.67%	0.73%	1.76%	-0.10%	0.40%
33	2012	2.92%	4.13%	4.83%	1.21%	1.90%	3.67%	4.94%	0.75%	2.02%	-0.11%	0.46%
34	2013	3.45%	4.48%	4.98%	1.03%	1.53%	4.24%	5.10%	0.79%	1.65%	-0.12%	0.24%
35	2014	3.34%	4.28%	4.80%	0.94%	1.46%	4.16%	4.86%	0.82%	1.52%	-0.06%	0.12%
36	2015	2.84%	4.12%	5.03%	1.27%	2.19%	3.89%	5.00%	1.05%	2.16%	0.03%	0.23%
37	2016	2.60%	3.93%	4.67%	1.33%	2.08%	3.66%	4.71%	1.07%	2.12%	-0.04%	0.27%
38	2017	2.90%	4.00%	4.38%	1.10%	1.48%	3.74%	4.44%	0.85%	1.55%	-0.06%	0.26%
39	2018	3.11%	4.25%	4.67%	1.14%	1.56%	3.93%	4.80%	0.82%	1.69%	-0.13%	0.32%
40	2019[4]	3.01%	4.25%	4.77%	1.24%	1.76%	3.83%	4.97%	0.82%	1.95%	-0.19%	0.42%
41	**Average**	**6.44%**	**7.93%**	**8.37%**	**1.49%**	**1.93%**	**7.28%**	**8.37%**	**0.84%**	**1.93%**	**0.01%**	**0.66%**

Yield Spreads
Treasury Vs. Corporate & Treasury Vs. Utility



Sources:

[1] St. Louis Federal Reserve: Economic Research, http://research.stlouisfed.org/.

[2] The utility yields for the period 1980-2000 were obtained from Mergent Public Utility Manual, Mergent Weekly News Reports, 2003.
The utility yields for the period 2001-2009 were obtained from the Mergent Bond Record.
The utility yields for the period 2010-2019 were obtained from http://credittrends.moodys.com/.

[3] The corporate yields for the period 1980-2009 were obtained from the St. Louis Federal Reserve: Economic Research, http://research.stlouisfed.org/.
The corporate yields from 2010-2019 were obtained from http://credittrends.moodys.com/.

[4] Data includes January - March, 2019.

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

ASSOCIATIONS EXHIBIT NO. A-6

Federal Energy Regulatory Commission

Electric Utility Industry Average
P/E Ratio, EPS Growth Rate (Historical and Projected), and Utility Stock to Bond Yield Spread

Line	Description	2018	2017	2016	2015	2014	2013	2012	2011
1	Historical 3-Year Average EPS Growth Rate[1]	4.6%	3.0%	3.9%	3.4%	3.1%	2.0%	3.4%	3.5%
2	P/E Ratio[1]	19.2	19.8	19.0	18.0	17.4	16.4	15.7	15.3
3	Projected 3-Year Average EPS Growth Rate[2]	4.9%	4.5%	3.4%	4.3%	3.4%	4.8%	3.8%	3.3%
4	Utility Stock to A Rated Bond Yield Spread[2,3]	1.0%	0.8%	0.6%	0.5%	0.9%	0.7%	0.2%	1.0%

Sources:

[1]The Value Line Investment Analyzer

[2]S&P Capital IQ

[3]https://credittrends.moodys.com/

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

20190626-5146 FERC PDF (Unofficial) 6/26/2019 1:27:01 PM

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Inquiry Regarding the Commission's Policy for Determining Return on Equity	))	Docket No. PL19-4-000

Affidavit of Michael P. Gorman

SAINT LOUIS, MISSOURI ss:

BEFORE ME, the undersigned authority, personally appeared Michael P. Gorman, who after being by me first duly sworn, deposes and says that the facts stated herein are true based on personal knowledge.

I hereby affirm that the foregoing is true and correct to the best of my knowledge and belief. If called to testify in this matter, I would testify as set forth herein.

Further affiant says not.

Michael P. Gorman
Affiant

Subscribed and sworn to before me by Mr. Michael P. Gorman, who is known to me this 25th day of June, 2019.

Notary Public

MARIA E. DECKER
Notary Public - Notary Seal
STATE OF MISSOURI
St. Louis City
My Commission Expires: May 5, 2021
Commission # 13706793

My Commission Expires: May 5, 2021

ATTACHMENT B

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Inquiry Regarding the Commission's Policy for Determining Return on Equity	Docket No. PL19-4-000

REPLY COMMENTS OF THE ALUMINUM ASSOCIATION, THE AMERICAN CHEMISTRY COUNCIL, THE AMERICAN FOREST & PAPER ASSOCIATION, THE AMERICAN PUBLIC POWER ASSOCIATION, THE ELECTRICITY CONSUMERS RESOURCE COUNCIL, THE INDUSTRIAL ENERGY CONSUMERS OF AMERICA, THE NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION, AND THE TRANSMISSION ACCESS POLICY STUDY GROUP

July 26, 2019

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

TABLE OF CONTENTS

I. INTRODUCTION AND SUMMARY 1

II. REPLY COMMENTS 6

A. Role and Objective of the Commission's Base ROE Policy (Questions A1-A4) 6

B. ROEs for Different Commission-regulated Industries (Questions B1 – B4) 8

C. Performance of the DCF Model (Questions C1 – C3) 8

D. Proxy Groups (Questions D1-D11) 11

1. The Commission must retain appropriate proxy group selection criteria. 11

2. Outlier tests are necessary to ensure a reasonable range of proxy group returns. 12

3. The Commission should use the median as the measure of central tendency. 14

E. Financial Model Choice (Questions E1 – E11) 16

F. Mismatch Between Market-Based ROE Determinations and Book-Value Rate Base (Questions F1-F5) 18

G. First Prong of ROE Determination (Questions G1 – G4) 19

H. Model Mechanics and Implementation – General (Questions H.1.1 – H.1.6) 21

I. Model Mechanics and Implementation – DCF (Questions H.2.a.1 – H.2.a.6) 23

J. Model Mechanics and Implementation – CAPM (Questions H.2.b.1 – H.2.b.4) 23

1. The Commission's market risk premium estimate should be consistent with unbiased, published, widely used, market risk premium estimates. 23

2. Financial theory does not support using a single-stage DCF to calculate the market risk premium. 24

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

3. The ECAPM methodology is unsound and should not be adopted. 27

4. Commenters agree that Value Line is an appropriate source of betas. 29

K. Model Mechanics and Implementation – Expected Earnings (Questions H.2.c.1 – H.2.c.4) 30

1. Transmission Owners provide no evidence that investors use the Expected Earnings model to calculate the cost of equity. (E1).....30

2. Accounting-based rates of return are irrelevant—not complementary—to market-based estimates of the cost of equity.....33

L. Model Mechanics and Implementation – Risk Premium (Questions H.2.d.1 – H.2.d.3) 34

1. Mixing historical and projected bond yields will not produce a better estimate of the cost of equity.....34

2. Using projected bond yields to calculate risk premiums is unreliable and unduly speculative. 35

3. The Risk Premium methodology is not compatible with a finding of anomalous market conditions. 36

III. CONCLUSION.....38

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

I. INTRODUCTION AND SUMMARY

The American Chemistry Council, American Forest & Paper Association, American Public Power Association, Electricity Consumers Resource Council, Industrial Energy Consumers of America, National Rural Electric Cooperative Association, and Transmission Access Policy Study Group (collectively, "Associations") hereby provide their reply comments in response to the *Inquiry Regarding the Commission's Policy for Determining Return on Equity*, 166 FERC ¶ 61,207 (2019) (the "NOI").[1] The Associations appreciate the opportunity to provide their collective view[2] on these important return on equity ("ROE") issues.

In our opening comments, the Associations addressed the NOI questions in a detailed and comprehensive fashion, supported by expert statements from Dr. Bradford Cornell and Mr. Michael Gorman. Our reply comments focus primarily on points raised in the opening comments submitted by a number of transmission-owning public utilities, or groups of transmission-owning public utilities, as well as by the Edison Electric Institute ("EEI"). We generally refer to these entities collectively as the "transmission owner commenters" or the "transmission owners."[3]

There are areas of common ground between the Associations and the transmission owner commenters. In general, we agree that the Federal Energy Regulatory Commission's ("FERC" or "Commission") goal should be policies that allow for an accurate determination of the market

---

[1] Abbreviations and defined terms are used as those terms are used in the Notice of Inquiry. We refer to particular stocks by their exchange tickers.

[2] These reply comments respond to comments filed in response to the NOI, and necessarily (like the NOI itself) reference other pending proceedings to which individual members of the various associations are parties. Nothing in these reply comments is intended to modify the position of individual parties in those proceedings.

[3] In addition to EEI, the transmission owner commenters include American Electric Power Company, Inc. ("AEP"), the MISO Transmission Owners ("MISO TOs"), the New England Transmission Owners ("NETOs"), the PJM Transmission Owners ("PJM TOs"), San Diego Gas and Electric Company ("SDG&E") and Southern California Edison Company ("SoCalEd"). To the extent that other commenters raise arguments similar to those addressed by the transmission owners, these reply comments are intended to respond to these other sets of comments, even where they are not specifically cited herein.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

cost of equity for electric transmission companies, *i.e.*, the level of return required by an investor to invest in the common equity of a transmission utility, given its relative risk. There is also general agreement that the Discounted Cash Flow ("DCF") remains an appropriate model for the Commission to use in determining the cost of equity for electric transmission companies. And, while the Associations do not believe there are any deficiencies in the DCF model that *necessitate* consideration of additional models, we do not take issue with the general proposition that other, properly designed and applied ROE estimation models could be used to complement the DCF model in determining the market cost of equity. The Associations and transmission owners likewise concur that the Commission should not move to a "vintage" approach for determining return allowances, nor should it make policy changes to address any perceived "mismatch" between market-based ROE determinations and book-value rate base.

On many other issues raised in the NOI, however, the positions of the Associations and transmission owners diverge significantly. The Associations' opening comments emphasized a number of key points that are essential to protecting consumers from unjust and unreasonable ROEs. We explained, for example, that investors do not use the Expected Earnings methodology to estimate the cost of equity, and use of this model in determining the ROE allowance for an electric transmission company would produce unjust and unreasonable results. The Associations also established that it is improper to use a single-stage DCF to calculate the market risk premium when applying the Capital Asset Pricing Model ("CAPM"). Further, the Associations showed that use of the median (or other appropriate percentile) in determining a uniform Regional Transmission Organization ("RTO") ROE is superior to using the midpoint (or other range-based measures), not least because using the median promotes consistency, stability, and predictability in ROE determinations by reducing the emphasis on extreme values in the proxy

group range and de-escalating disputes over outlier tests that inevitability accompany use of the midpoint. On these and other important issues, the transmission owners promote positions at odds with those of the Associations that, if adopted as Commission policy, would produce unjust and unreasonable rates.

The transmission owners generally purport to endorse the Commission's proposed revised approach to assessing the justness and reasonableness of an existing ROE and establishing a replacement ROE first described in *Coakley v. Bangor Hydro-Electric Company*.[4] As an initial matter, the Commission should dismiss warnings by various transmission owner commenters that the Commission must not "abandon" the *Coakley* method.[5] The Commission cannot abandon a policy it has never adopted, and, at this juncture, the *Coakley* method remains only a proposal that the Commission has yet to address with the benefit of a full record. The Commission initiated this NOI proceeding to "provide all interested stakeholders with the opportunity to comment on the Commission's ROE policy,"[6] and it would be unreasonable bootstrapping to reject necessary changes to the proposed *Coakley* method based on arguments that investors and others have relied on the proposal.

The transmission owner commenters' support for the *Coakley* method, moreover, is highly selective. Their respective comments argue for significant changes to the Commission's proposed new approach, from adopting a single-stage constant growth DCF, to utilizing the midpoint as the measure of central tendency in single-utility proceedings, to eliminating high-end outlier screens, to using the Empirical CAPM ("ECAPM") methodology in lieu of, or in addition to, the standard CAPM methodology. Even if the Commission were to adopt the

---

[4] 165 FERC ¶ 61,030 (2018) ("*Coakley*"); *see also Ass'n of Bus. Advocating Tariff Equity, et al., v. Midcontinent Indep. Sys. Operator, Inc.*, 165 FERC ¶ 61,118 (2018) ("MISO Briefing Order").

[5] *See, e.g.*, AEP Comments at 5; NETOs Comments at 6; *see also* WIRES Comments at 11.

[6] NOI at P 28.

Coakley method, the transmission owners apparently would want the ability to argue for adjustments in particular cases, as they urge the Commission not to apply the proposed new approach in a "mechanistic" fashion.[7] Adoption of these changes to the *Coakley* proposal would increase uncertainty and controversy regarding the Commission's transmission ROE determinations. The Commission should reject the transmission owners' attempts to seize on the *Coakley* method as a proper change in policy while simultaneously offering significant changes to that methodology.

The Associations respond at greater length below to some of the inappropriate changes to the *Coakley* method proposed by the transmission owners. We also address transmission owner commenters' arguments that purport to defend aspects of the *Coakley* method that must be revised to ensure just and reasonable transmission ROEs. Our reply comments on a number of these important issues are supported by supplemental expert statements from Dr. Cornell and Mr. Gorman. Among the key points discussed in these reply comments are as follows:

- Nothing in the opening comments supports a conclusion that the Commission should not rely on the DCF model to determine the cost of equity, either as the sole estimation approach, or in combination with other well-designed models.
- The Commission should not generically loosen the proxy group criteria in response to ill-defined "concerns" that the proxy group may be too small in individual cases.
- Particularly if the Commission insists on using the midpoint as the measure of central tendency to determine allowed ROE, it is important that the Commission preserve some form of outlier screen for both high- and low-end results. A 100-basis point premium over utility bond yields remains reasonable as a low-end outlier screen, and statistical screening for high-end outliers (*e.g.*, two standard deviations) is appropriate.

[7] *See* EEI Comments at 3-4, 6.

- The median is a better measure of central tendency for setting an RTO-wide ROE and for single utility ROE determinations, even if one assumes that that the Commission's screening criteria should produce a risk-appropriate proxy group.

- Certain transmission owner proposals would erect improper obstacles to the exercise of parties' rights under section 206 of the Federal Power Act ("FPA") to challenge the existing ROE of a public utility or group of public utilities during the pendency of a prior complaint.

- The Commission should reject transmission owner recommendations to broaden the range of the proxy group results by using, but not integrating, multiple growth projections.

- The market risk premium estimate used in the CAPM model should be consistent with unbiased, published, widely used, market risk premium estimates.

- It would be unreasonable to calculate the CAPM market risk premium using a single-stage DCF analysis on the dividend-paying companies in the Standard & Poor's 500 ("S&P 500"). Such an approach incorrectly presumes that investors believe dividends for companies in the S&P 500 will grow forever at a rate equal to short-term earnings growth estimates.

- The ECAPM method is theoretically unsound, unsupported by evidence that investors rely on it to calculate the cost of equity, reliant on unstated assumptions that have not been adequately analyzed, and duplicative of the adjustment that the Value Line Investment Survey ("Value Line") makes to its beta figures.

- The transmission owners provide no evidence that investors use the Expected Earnings model to calculate the cost of equity, and the Commission should not include this model in any revised approach to determining allowed equity returns.

- Accounting-based rates of return, such as that produced by the Expected Earnings model, are irrelevant—not complementary—to the market cost of equity.

- Risk premium studies should compare the cost of equity for historical study periods to the actual, contemporaneous bond yields for the study period, not to projected bond yields for future periods.

II. REPLY COMMENTS

The Associations have organized these reply comments according to the eight topics listed in the NOI, while adding several subheadings for organizational clarity. Given the variety of ways that parties organized their opening comments, however, the Associations have not attempted to reply to the opening comments on a question-by-question basis.

A. Role and Objective of the Commission's Base ROE Policy (Questions A1-A4)

The Associations and the transmission owner commenters agree, in broad terms, on the role and objective of the Commission's base ROE policy. There appears to be no dispute that the Commission should implement policies aimed at estimating the market cost of equity for electric transmission companies, as it changes from time to time,[8] while accounting for the relative risk of the utility(ies) at issue, through methodologies that improve predictability of results and promote regulatory certainty.

Where the Associations differ from the transmission owner commenters is in how to achieve these objectives. The transmission owners endorse aspects of the Commission's proposed new approach that, as the Associations explained in our opening comments, would produce ROE estimates that are inconsistent with the market cost of equity. And where the transmission owner commenters object to the proposed new approach, they propose significant changes that would produce cost of equity estimates even more unrepresentative of investor requirements, while diminishing predictability and certainty in establishing allowed ROEs.

[8] There is also agreement that the Commission should not adopt a "vintage approach" to setting the base ROE. *Compare, e.g.*, Associations Comments at 11-14 *with* EEI Comments at 23-25; NETOs Comments at 13-15; PJM TOs Comments at 41-42; AEP Comments at 7; SoCalEd Comments at 9-10.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

The Associations advocate that a well-designed methodology "should achieve reasonably consistent and predictable results across cases and over time."[9] The transmission owners claim to agree on that principle, emphasizing the importance of predictable ROE determinations that would improve stability, reduce litigation expense, and ease administrative burden.[10] Yet the transmission owners support methodologies that would *reduce* predictability of ROE determinations.

Two transmission owner proposals, in particular, conflict with their stated goal of increased predictability. First, several transmission owners advocate for reverting to using the midpoint—rather than the median—of the proxy group distribution to set ROEs for individual utilities.[11] The Commission's recent cases involving transmission owners in the ISO New England and Midcontinent Independent System Operator ("MISO") footprints have demonstrated that midpoints (or any other measure based on the range of proxy results, such as the upper midpoint, the 5/8th point, or the top of the zone) can vary widely from case-to-case even when there is little or no change in the underlying capital markets.[12] Thus, it is much more difficult to predict the litigated outcome of an ROE proceeding that uses range-based measures instead of using the median (or other appropriate percentile), which leads to fewer settlements and more litigation. Moreover, the midpoint (and other range-based measures) can fluctuate

[9] Associations Comments at 7.

[10] EEI Comments at 6 ("predictability and stability of transmission ROEs is vitally important."); NETOs Comments at 3 (seeking "greater predictability and certainty."); PJM TOs Comments at 13 (urging that the Commission's policy "should be to foster administrative efficiency and ensure predictability and stability for transmission owner ROEs."); MISO TOs Comments at 6-7 (stating that increased predictability of ROEs "should reduce litigation costs for utilities and potential complainants and intervenors alike, while also easing the administrative burden on the Commission.").

[11] AEP Comments at 14-18; EEI Comments at 22; SoCalEd Comments at 6-7; PPL Comments at 14; PJM TOs Comments at 41-44.

[12] *See* Associations Comments at 26-28 (comparing the results of Opinion No. 551 and the Initial Decision in Docket No. EL14-86, which had virtually identical proxy groups and study periods, yet had very different midpoint results).

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

significantly depending on how outlier tests are implemented,[13] which leads to more protracted litigation about whether one company or another is appropriately included in the proxy group.

Transmission owners also contradict their desire for predictability when they urge the Commission to "retain the flexibility to consider new proxy groups and rely on record-specific case-by-case analysis."[14] The Associations discuss the substantive flaws with the transmission owners' proxy group proposals in Section II.D, below, but we note here that the Commission can achieve both predictability and flexibility by establishing clear screening criteria and identifying the limited circumstances in which those criteria can be relaxed.[15]

B. ROEs for Different Commission-regulated Industries (Questions B1 – B4)

As with the Associations' opening comments, we are not specifically addressing questions relating to whether the Commission should apply a single ROE policy across electric, interstate natural gas and oil pipeline industries. On certain issues, however, the Associations address the comments submitted by representatives of other Commission-regulated industries, including the Interstate Natural Gas Association of America ("INGAA") and the Association of Oil Pipe Lines ("AOPL").

C. Performance of the DCF Model (Questions C1 – C3)

In our opening comments, the Associations showed that the DCF model is accepted by academicians and industry alike and has performed well in estimating the cost of equity for electric utilities in a variety of stock-market and interest-rate conditions. The Associations

---

[13] *Id.* at 31 (explaining that by relying on applicable percentiles rather than range-based measures, "the significance of whether low and high outlier results are retained would be greatly diminished.").

[14] NETOs Comments at 32; *see also* EEI Comments at 4 (the Commission should adopt proxy group selection methods that "provide flexibility to the Commission to be responsive to market conditions."); PJM TOs Comments at 47 (urging "a more flexible approach to the exclusion from the proxy group of companies with merger activity").

[15] *See* Associations Comments at 23-24 (recommending that the Commission establish bright-line screening criteria and only loosen those criteria when the resulting proxy group has fewer than four members).

supported these conclusions with the expert statements by Professor Cornell and Mr. Gorman.[16] Accordingly, while it may be reasonable to utilize other well-designed models to determine the market cost of equity in conjunction with the DCF, reliance on such additional models is certainly not necessitated by any weaknesses in the DCF model itself.

The opening comments of transmission owner commenters support retaining the DCF model to determine the cost of equity, while at the same time purporting to identify flaws with the model.[17] These comments break no new ground and offer no new evidence in assessing the DCF model's performance. According to EEI, the DCF model's "fundamental limitation is its underlying assumption that current growth rates, dividend payout ratios, and stock price valuation levels will persist in perpetuity," which "poses challenges to the accuracy of its results in high or low interest rate environments."[18] EEI, however, simply cites a whitepaper that makes theoretical criticisms directed at the general constant-growth DCF model. The Commission's proposed two-step DCF model tempers the "perpetuity" assumption by incorporating short- and long-term dividend-growth estimates. EEI asserts that a two-step DCF model "likely increases the inaccuracy of the model," but EEI does not provide reasons or evidence that this is so. The whitepaper on which EEI relies, in turn, relied on the unsupported assumption that U.S. Gross Domestic Product ("GDP") growth will return to the explosive rate of the 1870-1970 "American Century," when growth in population, electrification, urbanization, mechanized transportation, sanitation, and telecommunication converged in a historically unique, one-time transition to a modern economy.[19]

---

[16] Associations Comments at 15-20.

[17] *See* EEI Comments at 15; NETOs Comments at 22; MISO TOs Comments at 3, 38-40; PJM TOs Comments at 16-26; AEP Comments at 7.

[18] EEI Comments at 15-16.

[19] *See A Customer Coalition Response to the Edison Electric Institute's Whitepaper on the Federal Energy*

Referring to question C.1, EEI states that "when there is a divergence in stock prices relative to the present value of projected future cash flows, the efficacy of the [DCF] model breaks down."[20] But, EEI provides no evidence that such divergence is so common that it poses a significant problem in determining the cost of equity. That individual investors make short-term buy or sell decisions based on many factors, including expected stock prices and dividend yields,[21] is hardly news, but as the Associations' comments and its expert statements showed, such investor behavior does not undermine the efficient-market hypothesis or the overall efficacy of the DCF model to determine the cost of equity.

The comments of various transmission-owning public utilities really do not engage with the Commission's inquiries in Questions C.1 to C. 3.b. The MISO TOs' comments do not address these questions at all. The NETOs' response to Question C.1 is simply to defend the use of multiple models.[22] They call Question C.2 a "distraction" and deem Questions C.3.a. and C.3.b. unnecessary and irrelevant.[23] Responding to Question C.3, the PJM TOs argue that any concerns about the DCF model are allayed by using multiple financial models.[24] AEP's comments are similar.[25] In short, nothing in the opening comments should dissuade the Commission from continuing to rely on the DCF model to determine the cost of equity, either as the sole estimation approach, or in combination with other well-designed models.

Regulatory Commission's Two-Step DCF Methodology for Calculating Allowed Returns on Equity at 11 (June 2018) (citing Robert J. Gordon, *The Rise and Fall of American Growth* (2016)), *available at* https://www.publicpower.org/system/files/documents/Final%20Customer%20Coalition%20Whitepaper%20Response.pdf.

[20] EEI Comments at 15-16.

[21] *See id*. at 16.

[22] NETOs Comments at 15-22.

[23] *Id*. at 22-25.

[24] PJM TOs Comments at 16-19.

[25] AEP Comments at 7-8.

D. Proxy Groups (Questions D1-D11)

1. The Commission must retain appropriate proxy group selection criteria.

Several transmission owner commenters proceed from the flawed premise that "[t]he lack of a large, representative comparison group has become an increasing concern in recent years."[26] Leaving aside the question of who exactly holds this "concern," the transmission owner commenters do not identify the number of proxy companies that they would consider insufficient. In gas pipeline ROE cases, the Commission has indicated that a proxy group with as few as four members is adequate to determine an allowed ROE using the DCF model.[27] As the Associations explained in their opening comments, even after applying reasonable screening criteria, there currently are enough regulated utility stocks from which to select a robust comparable risk proxy group to set a base ROE for an electric transmission company.[28] The Commission, therefore, should not generically loosen the proxy group criteria in response to ill-defined "concerns" that the proxy group they produce may sometimes be too small.[29] Nor should the Commission relax proxy group screening criteria to admit less risk-appropriate stocks

[26] EEI Comments at 25; *see also* AEP Comments at 9; PJM TOs Comments at 46; SoCalEd Comments at 13.

[27] *See* Associations Comments at 23, n.58.

[28] *See id*. at 23-26, Exh. A-2 at 18:14-18. The Associations' position appears to be confirmed by information in SoCalEd's Comments showing numerous potential proxy companies at all but the highest and lowest credit rating rungs. *See* SoCalEd Comments at 16, Table 3.

[29] Pointing to a whitepaper prepared for EEI by ScottMadden, EEI suggests that the Commission could loosen or discard the credit rating screen to expand the proxy group in particular cases. *See* EEI Comments at 27. The Associations addressed this issue in their opening comments, including the suggestion that credit ratings are only relevant to debt costs. *See* Associations Comments at 34, n.97; *see also id.*, Exh. A-2 at 25:13-14 (explaining that "the stability and predictability of utilities' cash flows impact both bond holders' and equity holders' investment risk in a similar manner."). The NETOs specifically endorse the use of credit ratings in identifying comparable risk proxy companies, noting that they are "an objective measure of risk because credit ratings are the result of comprehensive analyses by independent third parties that are widely referenced by investors." NETOs Comments at 28. Further, it appears to be common ground that application of the credit rating screen will not incentivize public utilities to behave in ways that might impact their credit ratings. *See* Associations Comments at 35; NETOs Comments at 39-41.

in a particular case, unless the standard screening criteria result in fewer than a pre-specified minimum proxy group size (*e.g.*, four companies).[30]

2. Outlier tests are necessary to ensure a reasonable range of proxy group returns.

The transmission owner commenters generally attack the outlier tests (both high and low) that the Commission proposed in the *Coakley* Order, urging the Commission to adopt policies that likely would result in higher low- and high-end results in the proxy group range(s) of returns.[31] As the Associations explained in their opening comments, the Commission could largely avoid such disputes by using the median (or other distribution-based measure) as the measure of central tendency for identifying the just and reasonable ROE from within the proxy group range of returns.[32] The significance of outlier tests is driven by reliance on the midpoint as the appropriate measure of central tendency for a proxy group range of returns, and the attention devoted to these screens in the transmission owners' opening comments largely can be explained by their support for use of the midpoint.

If, contrary to the Associations' arguments, the Commission uses the midpoint as the measure of central tendency to determine allowed ROEs, it is essential that the Commission preserve some form of outlier screen for both high- and low-end results.[33] The transmission owners generally agree, conceptually, with a screen for low-end outliers tied to bond yields, but they contend that a 100 basis point risk premium is too narrow and/or that a "dynamic threshold"

---

[30] *See* Associations Comments at 21-26. This framework adequately addresses the "asymmetric risk" arguments raised by SDG&E and SoCalEd relating to wildfire risk. *See* SoCalEd Comments at 10-12, 14-15, 19; SDG&E Comments at 2-7. The Associations also note that recently passed California legislation, Assembly Bill 1054 (approved July 12, 2019), contains provisions related to addressing wildfires caused by utility infrastructure, including the establishment of a wildfire fund to pay eligible claims arising from covered wildfires.

[31] *See, e.g.*, EEI Comments at 29-32; NETOs Comments at 33-38; MISO TOs Comments at 9-14; SoCalEd Comments at 18-19.

[32] Associations Comments at 26-33; *see also* INGAA Comments at 67 (explaining that "[w]hen an ROE is set at the median of a range of proxy group returns, an outlier-test is unnecessary.").

[33] *See* Associations Comments at 32-34.

reflecting changes in interest rates should be used.[34] SoCalEd goes so far as to suggest that "the low-end threshold should be estimated by using a risk premium formula based on the CAPM model."[35] Contrary to these arguments, Mr. Gorman showed that 100 basis points above the utility bond yield remains an appropriate low-end outlier screen.[36] He demonstrated, in particular, that there is no need to adjust the risk premium threshold to account for interest rate changes because risk premiums do not vary widely across changes in interest rate levels over time.[37]

Although it is important to retain outlier screens if the Commission continues to rely on the midpoint as the measure of central tendency, the Associations have expressed some concerns with the Commission's existing high-end outlier test (150 percent above the median) and its "natural break" standard.[38] Instead of using a 150 percent multiplier to screen for high-end results, the Commission should utilize accepted and objective statistical tests for outliers, of which there are several.[39] Associations continue to recommend using two standard deviations as the high-end outlier threshold.[40] Similarly, a more objective quantification of the "natural break" test is required, and the Commission could adopt one of the approaches from the record evidence cited in the Associations' initial comments.[41]

The transmission owner commenters, for their part, take issue with the concept of applying any high-end outlier test. AEP's comments include a paper by William Avera and John

---

[34] *See, e.g.*, EEI Comments at 29-31; NETOs Comments at 33-34; MISO TOs Comments at 9-10; PJM TOs Comments at 37-38; AEP Comments at 11.

[35] SoCalEd Comments at 18.

[36] Associations Comments, Exh. A-2 at 20-23.

[37] *See id.* at 21-23.

[38] *See* Associations Comments at 32-34.

[39] *See id.* at 33.

[40] *Id.*

[41] *Id.* at 34, n.95.

Thompson suggesting that statistical high-end outlier tests, including use of standard deviation screens, are inappropriate within the framework the Commission uses to determine the allowed ROE. They argue that, because the proxy companies and ROE results are already subject to a number of screens intended to ensure an appropriate zone of reasonableness, there is no basis to screen out high-end results using statistical measures.[42] This argument assumes its own conclusion, however, insofar as it is presumes that the Commission's other screening criteria will produce only "reasonable and reliable" high end results so that further statistical screening is not required.[43] In truth, the other criteria applied by the Commission in selecting proxy companies and screening unreasonable results are not guaranteed to produce reliable high-end observations, and statistical screening for high-end outliers remains appropriate, particularly if the Commission persists in relying on the midpoint as the measure of central tendency in certain circumstances.

Similar reasoning applies to arguments that the Commission should dispense with the high-end outlier screen for the results of the two-stage DCF.[44] MISO TOs contend in this regard that "use of a long-term growth rate component already moderates the DCF model's estimated cost of equity, rendering a high-end outlier test unnecessary."[45] Here again, this argument presupposes that one component of the DCF formula – long-term growth – will address any and all variables that might cause an ROE result to be a high-end outlier.

3. The Commission should use the median as the measure of central tendency.

The Associations' opening comments explained in detail why the Commission should use the median rather than the midpoint as the measure of central tendency of the zone of

[42] *See* AEP Comments, Att. A at 2-7.
[43] *Id.* at 7.
[44] *See* MISO TOs Comments at 14.
[45] *Id.* at 11; *see also id.* at 14.

reasonableness for determining an RTO-wide ROE.[46] The transmission owners, in contrast, generally support use of the midpoint, with some commenters urging the Commission to employ the midpoint in making single-utility ROE determinations.[47] The Commission should reject the transmission owner commenter positions.

The PJM TOs argue that "[t]here is no valid basis for distinguishing between the just and reasonable ROEs of transmission owners in neighboring RTOs based on the fact that in one RTO, the same ROE applies to all transmission owners, while in the other, individual ROEs are set."[48] The Associations agree with the general proposition that there is no reason to use different measures of central tendency in RTO-wide and single-utility cases, but, contrary to the PJM TOs' position, this proposition supports use of the median, not the midpoint.[49] The Associations have explained in this regard that "[g]iven the Commission's correct and judicially-affirmed finding that the median best represents investor requirements in single-utility cases, it follows that the median should be applied in all cases."[50]

In their paper attached to AEP's comments, Avera and Thompson contend that "the Commission should use midpoints to determine central tendency of the zone of reasonableness for RTO-wide ROEs and individual electric utilities given current capital market conditions."[51] Their main argument is that, while the median may be a better measure of central tendency in a

---

[46] *See* Associations Comments at 37-43, Exh. A-2 at 26-35.

[47] *See, e.g.*, AEP Comments at 14-18, Att. A; PJM TOs Comments at 42-45; SDG&E Comments at 8-9. The PJM TOs argue that the Commission should at least utilize the midpoint when setting the ROE for any electric utility participating in an RTO, regardless of whether the proceeding involves a single, RTO-wide ROE. *See* PJM TOs Comments at 43-44.

[48] PJM TOs Comments at 44.

[49] *See* Associations Comments at 38.

[50] *Id.* If the Commission were to rely on the median rather than the midpoint as the measure of central tendency, the Associations agree that it might be appropriate to adopt some sort of materiality threshold in applying the Commission's merger activity screen. *See id.* at 35-36; *see also, e.g.*, EEI Comments at 25-26; PJM TOs Comments at 47-48; AEP Comments at 10.

[51] AEP Comments, Att. A at 2-3.

skewed distribution,[52] "the electric utility proxy groups created for groups of electric utilities using FERC policies are unlikely to have extreme outliers and therefore any skewness does not cause a distortion."[53] They also argue that, where the highest and lowest values in the range are reliable, "[i]gnoring the highest and lowest values of this reasonable range, as the utilization of median would do, would be to throw away useful data."[54]

First, the median is not a superior measure of central tendency *only* when the applicable distribution of results meets some standard measure of skewness. Mr. Gorman explained that the median is a better measure of central tendency, even recognizing that the Commission's screening criteria should produce a risk-appropriate proxy group.[55] *Second*, it is simply incorrect to suggest that using the median "ignores" the highest and lowest and values in the range.[56] Drs. Avera and Johnson themselves state in their paper, that "both measures of central tendency consider all of the observations but extract different information about central tendency."[57] The use of the midpoint to set the ROE for a group of utilities is the exception to the Commission's general rule that the median is a superior measure of central tendency – and this exception is no longer supportable.[58]

E. Financial Model Choice (Questions E1 – E11)

There appears to be little dispute that, if the Commission utilizes multiple models to determine the cost of equity, the choice of model(s) should not change based on shifts in capital market conditions. The Associations observed in their initial comments that "there is no

---

[52] *Id.* at 9.
[53] *Id.* at 15.
[54] *Id.* at 13.
[55] *See* Associations Comments, Exh. A-2 at 26-35.
[56] AEP Comments, Att. A at 13.
[57] *Id.* at 16.
[58] *See* Associations Comments at 37-43.

evidence that actual investors in electric utility stocks . . . peg their choice of financial models (as distinguished from model inputs) to particular points on the business cycle,"[59] and the transmission owners appear generally to concur with this sentiment.[60] Similarly, there is a consensus that alternative models are complementary of the DCF and one another.[61] This is not to say, however, that the Associations and the transmission owner commenters agree on the models that might be used to determine an authorized ROE. As discussed in section II.K below, the transmission owners' support for the Expected Earnings model is wholly unjustified, and any reasonable approach for determining the market cost of equity cannot incorporate expected earnings.

The Associations and the transmission owners generally concur that state ROEs can serve as a reference point in considering a proposed transmission ROE in Commission proceedings.[62] As the Associations and others have pointed out, however, it can be difficult, if not impossible, to draw direct apples-to-apples comparisons between FERC-authorized ROEs and state-authorized ROEs, given the multitude of factors that can influence the allowed ROEs across the various states.[63] Thus, the Commission should not adopt any bright-line rules with respect to using state ROEs as a point of reference, including EEI's blanket suggestion that, "[i]n determining the reasonableness of the ROE calculated using the four models, transmission ROEs should be higher than state ROEs absent extraordinary circumstances."[64]

---

[59] *Id.* at 45.

[60] *See, e.g.*, AEP Comments at 19 (arguing that "the Commission should not attempt to identify a 'best' model . . . or identify particular conditions in which some models are better than others . . . ."); NETOs Comments at 47 (observing that "investors do not completely reject certain models and adopt entirely new models in their analyses based on shifting capital market conditions.").

[61] *See, e.g.*, Associations Comments at 48-53; EEI Comments at 10-13; NETOs Comments at 50-51.

[62] *See* Associations Comments at 56-58, Exh. A-2 at 40-43; EEI Comments at 14; NETOs Comments at 52-54; MISO TOs Comments at 21; AEP Comments at 19.

[63] *See* Associations Comments at 56-58; Eastern Massachusetts Consumer-Owned Systems Comments at 50-52.

[64] EEI Comments at 14; *see also* NETOs Comments at 54 (arguing that "if vertically integrated utility state ROEs

F. Mismatch Between Market-Based ROE Determinations and Book-Value Rate Base (Questions F1-F5)

The Associations' opening comments explained why there is no "mismatch" when market-based allowed returns on equity are applied to book-value rate base. The Associations showed that the allowed cost of equity should be based on financial market values; that parent- and operating-company market-to-book ratios are unimportant for purposes of determining the market-based cost of equity; and that no adjustments to ROE determinations should be made because of any such "mismatch."[65]

The good news from the other opening comments submitted in this proceeding is that other commenters agree: There is no "mismatch" between market-based ROE determinations and book-value rate base, and the Commission should not alter its ROE policies to address this non-issue. Thus, EEI deems the mismatch issue "inconsequential."[66] Similarly, the NETOs "do not agree that there is a 'mismatch' between market-based ROE determinations and book-value rate base" and argue that the Commission "should not revise its use of the models to account for any deviation in the market-to-book ratio from one, or any perceived 'mismatch' that is inherent to public utility cost-of-service regulation …."[67] As the MISO TOs state, "There is no sound rationale for adjusting ROEs based on market-to-book ratios."[68]

If earnings/book ratios were utilized (as in the "Expected Earnings" method), they would need to be adjusted using market/book ratios in order to translate those earnings/book ratios into

---

are higher than the ROE resulting from application of the Coakley Methodology, the resulting transmission ROE may be inadequate to satisfy *Hope* and *Bluefield*.").

[65] Associations Comments at 58-71.

[66] EEI Comments at 12.

[67] NETOs Comments at 55, 62.

[68] MISO TOs Comments at 22.

an indication of the cost of equity.[69] But the better approach is to apply neither earnings/book ratios nor a market/book ratio adjustment thereto.

G. First Prong of ROE Determination (Questions G1 – G4)

The transmission owner commenters generally endorse the quartile screening approach proposed in the Commission's *Coakley* Order to evaluate whether an existing authorized ROE is unjust and unreasonable.[70] The Associations' opening comments, in contrast, explained that "an existing base ROE is no longer just and reasonable if it is found to exceed the cost of equity, as measured by the best available empirical tool(s), applied to an appropriate study period."[71] The Commission's proposed quartile screening approach, the Associations explained, is untenable insofar as it would insulate from challenge a portion of the range in excess of the cost of equity identified by such empirical tools.[72] The problems with the Commission's proposal would only be magnified by the PJM TOs' recommended approach, under which the composite range would be divided into three equal parts.[73] The PJM TOs' method has the virtue of demonstrating the arbitrariness of dividing the composite range into four, rather than some other number of, segments. But its end result would be to insulate an even larger portion of the range above the cost of equity from challenge than the already-unreasonable quartile approach.[74]

---

[69] *See* Associations Comments at 64-68, 72-73.

[70] *See* EEI Comments at 7-9; NETOs Comments at 63-65; MISO TOs Comments at 23-24.

[71] Associations Comments at 75.

[72] *See id.* at 75-85.

[73] *See* PJM TOs Comments at 8-13.

[74] If the Commission does adopt the quartile approach, it would be inappropriate to impose a "clear and convincing" evidentiary standard to rebut the presumption of reasonableness that the Commission would apply to ROE results falling within the corresponding risk quartile, as proposed by a number of the transmission owners. *See, e.g.*, NETOs Comments at 68; PJM TOs Comments at 2, 15-16. In general, the preponderance of the evidence standard applies in Commission proceedings. *See e.g.*, *Louisiana Pub. Serv. Comm'n v. Entergy Corp.*, Opinion No. 521, 139 FERC ¶ 61,240 at PP 35, 106 n.217 (2012), *order on reh'g*, 155 FERC ¶ 61,064 (2016); *see also Sea Island Broad. Corp. v. FCC*, 627 F.2d 240, 243 (D.C. Cir. 1980) (explaining that "use of the 'preponderance of evidence' standard is the traditional standard in civil and administrative proceedings. It is the one contemplated by the [Administrative Procedure Act].").

The Commission should also reject efforts by the transmission owners to erect unreasonable and extra-statutory barriers to FPA section 206 complaints challenging public utility ROEs. The Associations explained in their opening comments that complainants challenging an existing base ROE should be required to make a *prima facie* showing that it exceeds the cost of equity, regardless of whether a prior complaint remains pending.[75] Such a *prima facie* showing may be made by presenting equity cost studies based on methods adopted by the Commission and comparing the resulting current equity cost to the subject utility's allowed base ROE.[76]

The additional hurdles the transmission owners seek to impose on the exercise of FPA section 206 rights under successive complaints are improper. As the transmission owners generally concede, the Commission has correctly rejected their argument that successive complaints are precluded under the 15-month limit on refunds in FPA section 206(b).[77] The Commission has allowed successive complaints upon a showing that the current cost of equity is lower than the respondent utility's (or utilities') allowed ROE, and has recognized the importance of allowing successive complaints 'given that what is at issue is return on equity,' which, 'in contrast to other cost of service issues…can be particularly volatile.'"[78] Transmission owner proposals that complainants demonstrate, for example, "*sustained* changes in market conditions since the existing rate was established,"[79] and/or "that a reasonable amount of time has passed since the existing ROE was established"[80] could erect a *de facto* prohibition on

---

[75] *See* Associations Comments at 85-88.

[76] *Id.* at 85.

[77] *See* NETOs Comments at 71; MISO TOs Comments at 27; *see also, e.g., Golden Spread Elec. Coop., Inc. v. Sw. Pub. Serv. Co.*, 151 FERC ¶ 61,126 at P 21 (2015) ("*Golden Spread*").

[78] *Golden Spread* at P 21.

[79] EEI Comments at 8 (emphasis added).

[80] *Id.* at 8-9; *see also* PJM TOs Comments at 16.

successive complaints as a substitute for the *de jure* prohibition that the Commission has concluded is not supported under FPA section 206(b). Such threshold hurdles on complaints, moreover, would accord asymmetrical treatment to filers under FPA sections 205 and 206, contrary to the aims of the Regulatory Fairness Act.[81]

H. Model Mechanics and Implementation – General (Questions H.1.1 – H.1.6)

In our opening comments, the Associations supported the Commission's use of Institutional Brokers' Estimate System ("IBES") data as a good proxy for investor consensus on growth rates. Specifically, the Associations recommended the Commission use a source-weighted combination of IBES data (as posted on reuters.com, which shows the number of contributed analysts) with a comparable aggregator of analyst growth estimates, such as Bloomberg or First Call.[82] The Associations did not recommend using Value Line for this purpose, since it does not represent a consensus estimate of analysts.[83]

The comments by various transmission owners generally argue that, because investors are using other sources alongside IBES estimates, the Commission should continue using IBES growth rates, while also considering comparable alternatives when supported by the record in particular cases.[84]

The MISO TOs also argue that the Commission should not consider the number of analysts supporting a growth rate estimate in weighing the credibility of that estimate and, thus, should consider growth estimates from Value Line.[85] The Associations' opening comments, however, argued that there are better alternatives to Value Line, such as Bloomberg and First

---

[81] *See generally* Associations Comments at 86-88.

[82] *See id*. at 90-93 (describing specific proposal for DCF studies of electric utility parent stocks).

[83] *See id.* at 91.

[84] *See* EEI Comments at 19-20; NETOs Comments at 73-77; MISO TOs Comments at 34-36; PJM TOs Comments at 23; AEP Comments at 23-24.

[85] MISO TOs Comments at 36-37.

Call, which are used by investors and are more transparent and reliable sources of growth estimates, because they are based on consensus aggregations of multiple, independent analysts.[86] Given this limitation on Value Line's estimates, the Associations also recommend the Commission not use Value Line for the growth estimates in the DCF study of the equity market used in the CAPM.[87]

Another issue is how the Commission uses multiple growth estimates. EEI argues that the Commission should not average multiple growth projections, "because this would distort the full range of investor expectations."[88] The objective of this recommendation, as made clear in the whitepaper EEI cites, is to obtain multiple DCF results for each company in the proxy group and, thus, increase the odds that an especially high result will raise the top of the DCF range—thereby distorting and destabilizing the proxy group midpoint, which EEI seeks to apply in all cases as the measure of central tendency.[89] The PJM TOs pursue the same gambit.[90] But that approach wrongly maximizes the weight given to whatever near-term growth estimate is least representative of the multiple estimates that investors see for a particular utility stock and for the proxy group. This problem is avoided by the Associations' recommended approach: use the median of the proxy group results as the measure of central tendency, and for each member of the proxy group, determine a single first-step growth estimate by averaging the growth estimates of IBES and another comparable source, weighted by the number of contributing analysts.[91] If the Commission continues its present policy of using the midpoint of the range of proxy group results in setting the allowed return for a group of public utilities, however, the Commission

[86] *See* Associations Comments at 91-93.
[87] *See id.* at 93-94.
[88] EEI Comments at 20.
[89] *See id.* at 21-22.
[90] *See* PJM TOs Comments at 25, 42-45.
[91] *See* Associations Comments at 93.

should reject EEI's and PJM TOs' recommendations to broaden the range of the proxy group results which further complicate and reduce the predictability and stability of the results of the Commission's ROE methodologies.

I. Model Mechanics and Implementation – DCF (Questions H.2.a.1 – H.2.a.6)

A number of transmission owners urge the Commission to fundamentally modify the DCF method proposed in the *Coakley* Order by adopting a single-stage constant growth DCF that would eschew consideration of a long-term growth rate.[92] The primary argument advanced for this approach is that "there is no reason to believe investors base their dividend growth expectation on long-term economic projections."[93] The Associations' initial comments explained at length why this argument does not support using a single-stage constant growth DCF model.[94] Notably, AOPL specifically agreed that it is reasonable to use a two-stage DCF with long-term growth based on projected GDP growth.[95]

J. Model Mechanics and Implementation – CAPM (Questions H.2.b.1 – H.2.b.4)

1. The Commission's market risk premium estimate should be consistent with unbiased, published, widely used, market risk premium estimates.

Accurately estimating the market risk premium is a critical element of applying the CAPM model. Investors, advisory services, and academics have developed a variety of tools to estimate the market risk premium, and several organizations publish market risk premium estimates that are widely used by investors. For example, Duff & Phelps publishes forward looking estimates in its annual Valuation Handbook, including a "long-horizon expected equity

---

[92] *See, e.g.*, NETOs Comments at 88-89; MISO TOs Comments at 38-40; PJM TOs Comments at 19-22.

[93] PJM TOs Comments at 20; *see also* NETOs Comments at 88.

[94] *See* Associations Comments at 97-98, 99-107.

[95] *See* AOPL Comments at 22 (explaining that "since it is not possible to predict with any accuracy which companies will exceed GDP growth and which will not, the use of GDP for all companies as one element in the overall growth forecast is reasonable as a policy matter."); *see also id.* at 40.

risk premium (supply-side)" and a "Duff & Phelps recommended equity risk premium (conditional)."[96] Both are relied on by investors, and the former has frequently been adopted by the Delaware Court of Chancery for use in the CAPM in appraisal actions.[97] Professor Aswath Damodaran also publishes a forward-looking market risk premium estimate.[98]

The Commission could adopt one of these unbiased publications as a source for the market risk premium to be used in the CAPM analyses in regulatory proceedings. But if the Commission were to instead accept market risk premium estimates produced for the sole purpose of litigation, it should at least compare those litigation estimates to the unbiased, published estimates used by investors. Where the results are significantly different, the Commission should try to understand why that is the case.

2. Financial theory does not support using a single-stage DCF to calculate the market risk premium.

The transmission owners advocate for estimating the market risk premium by performing a single-stage DCF analysis on the dividend-paying companies in the S&P 500.[99] The Associations explained in detail why such an approach is not supported by financial theory or investor expectations.[100] In short, that approach depends on the false premise that investors believe dividends for companies in the S&P 500 will grow forever at a rate equal to the IBES 3-5 year earnings growth estimates.

One of the transmission owners' rationales for assuming that high, short-term growth rates can be sustained forever is that the growth rates are applied to the S&P 500 index, which is

[96] Associations Reply Comments, Exh. A-7 at n.13.
[97] *Id.*
[98] *Id.* at n.11.
[99] *See, e.g.*, MISO TOs Comments at 40-41; NETOs Comments at 90-92; PJM TOs Comments at 31-32.
[100] Associations Comments at 99-106.

regularly updated to contain companies with high market capitalization.[101] That argument is incorrect because: (1) the short-term growth rates are applied to individual companies in the S&P index, not to the index itself; (2) the dividend-paying companies of the S&P 500 are used as a proxy for the entire equity market, which cannot, as a whole, grow faster than the economy forever; (3) when S&P updates its index to include a new company that has a higher market capitalization, it also adjusts the divisor of the index so that the index value is held constant; and (4) unbiased, published estimates of S&P 500 growth rates are much lower than the rates implied by a single-stage DCF.[102]

A second rationale is that the two-step DCF model that the Commission applies to utility stocks is not relevant to companies in the general economy.[103] As Professor Cornell explained in his initial affidavit, outside of the regulatory context, it is standard practice to use multi-stage DCF models to calculate the cost of equity.[104] The specific two-step DCF approach that the Commission has adopted for utilities (*i.e.*, weighting short-term and long-term growth projections to construct an implied constant growth rate) can achieve a similar result, though it is not as robust as using a truly multi-stage DCF model that separately models short-term and long-term growth estimates.[105] But the fact remains that multi-stage DCF studies are used by investors and academics in the general economy as well as the utility industry. Importantly, Professor Damodaran, one of the leading proponents of using a market-wide DCF to calculate a

[101] MISO TOs Comments at 40-41 (citing Opinion No. 531-B at P 113; Opinion No. 551 at P 170).
[102] *See* Associations Comments at 104-5 (discussing these four flaws in greater detail).
[103] New England TO Comments at 91-92.
[104] Associations Comments, Exh. A-1 at 22-28.
[105] *Id.*

forward-looking market risk premium, uses a two-stage DCF model and specifically warns against exclusive reliance on short-term growth rates.[106]

The final rationale offered for using a single-stage DCF to calculate the market risk premium is that investors supposedly do not base their forecast growth expectations of the S&P 500 on long-term GDP growth forecasts.[107] First, that is factually incorrect: investors are well aware that long-run economy-wide growth limits the growth potential of an economy-wide stock portfolio. Accordingly, Professor Cornell recommends "using long-run nominal growth rates for [GDP] forecast by the Federal Reserve and leading private forecasting firms" as the long-run growth rate used to calculate the market risk premium.[108] Professor Damodaran uses an even lower estimate for his long-run growth rate: basing it on 10-year Treasury bond yields rather than on the GDP forecast.[109]

Whether investors use GDP estimates, 10-year Treasury bond yields, or some other long-term estimate, the fact is that no rational investor believes that the long-term sustainable growth rate on the S&P 500 is equal to the short-term estimates. GDP estimates are a reasonable proxy for investor expectations of the long-term sustainable growth rate. In fact, historical records show that there is a correlation between GDP growth rates and S&P 500 growth rates: nominal GDP growth over the past ninety years was 6.1%; S&P 500 growth was 5.8% over roughly the same period.[110] Mr. Gorman concludes that "over long periods of time, it is reasonable to expect that the growth rate in the S&P 500 will continue to track the growth rate of the nominal GDP because these markets are interrelated, and can only grow over long periods of time at growth

---

[106] Associations Reply Comments, Exh. A-7 at 7-8.

[107] PJM TOs Comments at 28; New England TOs Comments at 80.

[108] Associations Reply Comments, Exh. A-7, at 7, n.11.

[109] *Id.*

[110] Associations Reply Comments, Exh. A-8 at Table 3.

rates that are reasonably comparable to one another."[111] Similarly, a survey of forward-looking estimates confirms that independent advisory firms expect S&P 500 growth rates to be comparable to GDP growth over the long-term.[112]

Ultimately, the proof is in the pudding: a single-stage DCF of the S&P 500 companies produces a market risk premium in excess of 8%, while most published estimates are in the 4-6% range. The transmission owners provide no valid justification for using a method that produces results that are inconsistent with every unbiased, published estimate.

3. The ECAPM methodology is unsound and should not be adopted.

Several commenters advocate that the Commission should consider an Empirical CAPM (ECAPM) methodology in lieu of, or in addition to, the standard CAPM methodology.[113] Consistent with the Commission's previous holdings, the Commission should not give any weight to the ECAPM methodologies when determining just and reasonable ROEs.

First, the ECAPM method is theoretically unsound, and there is no evidence that investors rely on the ECAPM to calculate the cost of equity. Professor Cornell explains that the ECAPM "is not based on economic theory" and "has not received support in the academic literature in decades."[114] The NETOs assert that the ECAPM model is used by some state commissions and is described in *New Regulatory Finance*, but they do not present any evidence that this model is used outside the regulatory context. The standard CAPM model, while not perfect (no model is), is widely used by investors, academics, and regulators. If the Commission were to adopt any modification to the standard CAPM, it should adopt a modification that has

---

[111] *Id.* at 18:14-15 – 19:1-2.

[112] *Id.* 15-16 (showing long-term estimates of nominal GDP growth is around 4.2% and that the median projection of long-term S&P 500 growth is 3%-5%); *see also id.* at Table 2.

[113] *See, e.g.,* NETOs Comments at 94-95; PJM TOs Comments at 27-28.

[114] Associations Comments, Exh. A-7 at 5.

been adequately studied and gained wide acceptance.[115] The ECAPM does not meet that standard.

Second, the ECAPM relies on several unstated assumptions that have not been adequately analyzed. Because the ECAPM is premised on an empirical regression, there are important and unresolved questions about the time period over which the regression is conducted: should the regression be recalculated in every case, or should the Commission accept factors that were calculated over a decade ago by Dr. Morin? If the empirical regression is recalculated in each case, how many time periods should be included in the regression? What should be the interval of those time periods?[116] And, even if those timing questions could be resolved, other assumptions must be made about how systemic risk is modelled in the regression analysis and which companies are included in the regression.[117] Without widespread consensus on how those questions should be answered, the ECAPM devolves into an adjustment to an otherwise widely-used and accepted model.

Third, the ECAPM adjustment to the standard CAPM model is duplicative of the adjustment that Value Line makes to its betas.[118] If the ECAPM is used with Value Line adjusted betas, it would double count the impact of low betas on the CAPM result. Mr. Gorman analyzes the impact to the standard CAPM model of applying the ECAPM and of using Value Line adjusted betas, and he concludes that making both adjustments "significantly distorts the

---

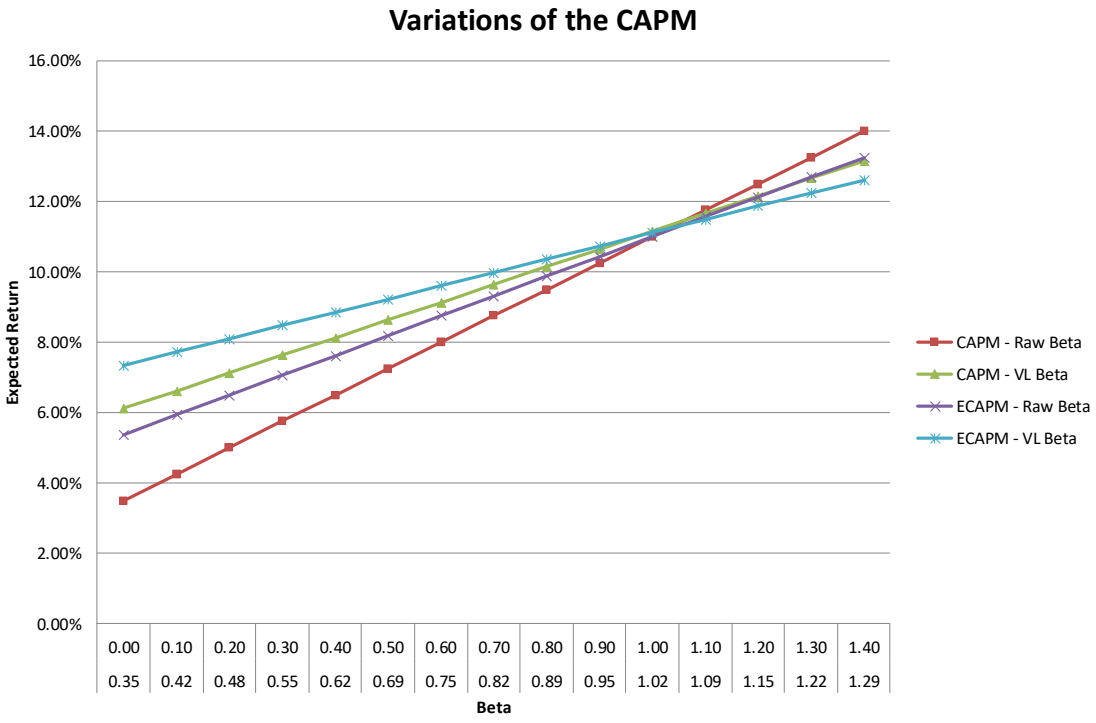
[115] The Fama-French factor model has been studied extensively, and yet even that model is insufficiently proven to justify using it in regulatory proceedings. Professor Cornell notes that the Fama-French model and other factor models "remain highly controversial," are "cumbersome to implement and require complex and still unproven statistical techniques." Associations Comments, Exh. A-1 at 31; *accord* NETOs Comments at 94.

[116] *See* Associations Reply Comments, Exh. A-7 at 5-7 (describing the implicit assumptions in the ECAPM).

[117] *Id.*

[118] *See generally* Associations Reply Comments, Exh. A-8 at 12-13.

security market line by further increasing the intercept point and nearly flattening the slope."[119] The chart below graphically demonstrates how the security market line is distorted by making both adjustments.[120] It shows that the ECAPM using raw betas (purple line) and the standard CAPM using Value Line betas (green line) have very similar impacts compared to using the standard CAPM using raw betas (red line).



4. Commenters agree that Value Line is an appropriate source of betas.

In our opening comments, in response to Question H.2.b.2, the Associations noted that there is no evidence that the absolute risk of utility stocks or the broader stock market has increased, or that relative risk of utility stocks to the broader stock market has changed. In any

[119] *Id.* at 12:16-18.

[120] *Id.* at Figure 1.

event, CAPM studies do not depend on constant absolute or relative risks.[121] The opening comments of the various transmission-owning public utilities do not dispute these matters.

In response to Question H.2.b.3, the Associations' opening comments noted that the conventional source of beta values for CAPM studies and Value Line, uses assumptions and calculation methods that produce betas erring on the high side. Nonetheless, the Associations believe these beta values can be reasonable to use, albeit with some caution, and without further, *ad hoc* adjustments, which may increase measurement errors.[122] The comments of various transmission-owning public utilities support using Value Line as an appropriate data source for the CAPM beta value.[123]

K. Model Mechanics and Implementation – Expected Earnings (Questions H.2.c.1 – H.2.c.4)

1. Transmission Owners provide no evidence that investors use the Expected Earnings model to calculate the cost of equity. (E1)

Several transmission owners make vague claims about investors relying on the Expected Earnings model, but closer scrutiny reveals that there is no evidence for such claims. EEI, for example, states that "[v]arious forms of [the DCF, CAPM, Expected Earnings, and Risk Premium] models are widely used by investment analysts in determining the cost of equity."[124] But EEI provides no citation for that bald assertion. In fact, a paper that EEI attaches to its comments implicitly contradicts EEI's claim: the ScottMadden, Inc. ("ScottMadden") paper cites multiple academic and industry sources to show that investors "use...the CAPM to compute the cost of equity,"[125] and it cites the CFA Level I Program Curriculum to support the claim that

[121] *See* Associations Comments at 107-9.

[122] *See id*. at 110.

[123] *See* NETOs Comments at 93-94; MISO TOs Comments at 41-42; PJM TOs Comments at 30.

[124] EEI Comments at 10.

[125] *Id*., Att. A at 34, nn.86-87.

"the [Risk Premium] model reflects valuation techniques relied on in practice,"[126] but it provides no similar citation for investor reliance on Expected Earnings models.[127] The implication of that conspicuous silence is clear: EEI's expert, ScottMadden, could find no evidence that investors rely on Expected Earnings models.

Similarly, the NETOs provide no independent verification of their claim that investors rely on Expected Earnings models to calculate the cost of equity. Their witness, Mr. Quackenbush, asserts, "based on [his] experience in investment community" that he "observe[s] that equity investors use...evaluations of Expected Earnings" to "evaluate utility equities."[128] But his subsequent description of his experience suggest that he has not actually observed any investors using the ratio of expected earnings per share to book value per share (*i.e.*, the ratio that makes up the Commission's proposed Expected Earnings model).[129] And even if his observation were true, Mr. Quackenbush does not assert that investors use Expected Earnings to *estimate utilities' cost of equity.*

In fact, Mr. Quackenbush goes on to explain the critical difference between the valuation of utility equities and estimating the cost of equity.[130] He states that "the cost of capital estimation process is...but an intermediate step" to equity valuation, which is "the end goal of investors."[131] Even if he were correct that some investors consider Expected Earnings in making

---

[126] *Id.* at 32, n.81.

[127] *Id.* at 34-35 (not even claiming that investors rely on Expected Earnings, let alone providing citations).

[128] NETOs Comments, Attachment B at 17.

[129] Mr. Quackenbush details how, at UBS, he spent hours calculating earnings per share and book value per share estimates. *Id.* at 24-26. He resorts to much vaguer language, however, when discussing whether investors calculate the ratio of those two values: "Some investors will undoubtedly make this expected earnings-to-book value calculation while others will not." *Id.* at 29. In that passage, he does not indicate the purpose for which an investor might calculate the expected earnings-to-book ratio.

[130] *Id.* at 18.

[131] *Id.*

some investment decisions, it provides no evidence for the relevant inquiry for this Commission: whether investors use the Expected Earnings methodology to estimate utilities' cost of equity.

They do not. Professor Cornell explains in detail that the academic literature affirmatively disavows the use of Expected Earnings on the book value of a firm's equity (*i.e.*, the Expected Earnings methodology) to estimate the cost of equity capital.[132] Even Dr. Vilbert, who endorses the use of Expected Earnings, admits that "the Expected Earnings method has no theoretical basis as a means of estimating the market cost of capital."[133] Instead, he says, it "represents additional information available to investors for their consideration *when making investment decisions*."[134] The same could be said for astrology, but that does not mean that using that information to estimate the cost of equity would be a rational Commission practice.[135] Moreover, neither Mr. Quackenbush nor Dr. Vilbert asserts, much less shows, that investors use earnings/book ratios in isolation from market/book ratios. Investors who use those factors together are, in effect, applying earnings/price ratios. Investors' reference to earnings/price ratios is neither surprising nor supportive of using an Expected Earnings model.

In short, no witness has put forward any credible evidence that investors consider Expected Earnings to estimate utilities' cost of capital, or any credible evidence that the output of an Expected Earnings model indicates their cost of capital.

---

[132] Associations Comments, Ex. A-1 at 6, 10, 15, 31-32; Associations Reply Comments, Exh. A-7 at 2-4.

[133] INGAA Comments, Att. A at 47.

[134] *Id* (emphasis added).

[135] *See* Associations Comments at 44 & n.118 (providing evidence of an investment fund that gleans insights from the movements of celestial bodies) (*citing* Simon van Zuylen-Wood, *Is the Key to Beating the Market Written in the Stars?*, Business Week (July 27, 2018), https://www.bloomberg.com/news/features/2018-07-27/is-the-key-to-beating-the-market-written-in-the-stars).

2. Accounting-based rates of return are irrelevant—not complementary—to market-based estimates of the cost of equity.

Even the commenters and experts witnesses who advocate for using the Expected Earnings methodology admit that "it is an accounting rate of return, not a market-based estimate."[136] They try to spin that fact as a positive, claiming that Expected Earnings is "consequently the most complementary to the other models."[137] But being the most different from the other models does not make it most complementary. The DCF and CAPM are complementary because they use different methods to achieve the same objective (*i.e.*, estimating the cost of equity). In contrast, the Expected Earnings method has a different objective from the DCF and CAPM methods. Thus, the Expected Earnings method is not complementary to the DCF and the CAPM; rather, it is irrelevant to the DCF's and CAPM's objective of estimating the cost of equity.

EEI similarly attempts to treat the Expected Earnings' shortcomings as a strength, arguing that—unlike the market-based methodologies—the Expected Earnings is "independent from swings in market data."[138] That is actually a reason *not* to consider the Expected Earnings methodology. A methodology that does not change when market data changes fails to reflect the principles of *Bluefield*, which requires that the just and reasonable ROE vary with "changes affecting opportunities for investment, the money market and business conditions generally."[139]

---

[136] INGAA Comments, Att. A at 47; *see also* NETOs Comments, Att. B at 23; AOPL Comments, App. A at P 51.

[137] NETOs Comments at 50.

[138] EEI Comments, Att. A at 35.

[139] *Bluefield Waterworks and Improvement Co. v. Pub. Serv. Comm'n of West Virginia*, 262 U.S. 679, 693 (1923) ("*Bluefield*").

L. Model Mechanics and Implementation – Risk Premium (Questions H.2.d.1 – H.2.d.3)

1. Mixing historical and projected bond yields will not produce a better estimate of the cost of equity.

In our opening comments, the Associations noted that even the best Risk Premium studies are inherently less accurate than well-constructed DCF or CAPM studies. Thus, when equity costs are declining, Risk Premium studies reflect regulatory lag and tend to produce results exceeding the current cost of equity. Nonetheless, Risk Premium studies are commonly used, and they directly reflect current financial (*i.e.*, bond) market conditions. While the Associations do not favor using the Risk Premium method to determine the cost of equity for electric utilities, we acquiesce in its use as a general method.[140]

That said, the Associations caution that Risk Premium studies must be properly constructed and performed. In response to Question H.2.d.1, the Associations stress that Risk Premium studies should be internally consistent in their use of bond-yield data, as explained in Mr. Gorman's expert statement. Thus, Risk Premium studies should compare the cost of equity for historical study periods to the actual, contemporaneous bond yields for the study period—and not to projected bond yields for future periods. In any event, because projected bond yields do not reflect the actual, current cost of capital, and are unreliable indicators of the future cost of capital, projected bond yields should not be used in Risk Premium studies to estimate the current market cost of equity.[141]

The NETOs argue that the Risk Premium method can properly use, and mix, both historical and projected bond yields, and that the Commission should continue to consider both

[140] *See* Associations Comments at 126.

[141] *Id.* at 127-129.

types of bond yields.[142] They endorse averaging Risk Premium study results using historical and projected bond yields.[143] The MISO TOs and PJM TOs also support this averaging the result of two separate Risk Premium studies, one using historical bond yields and one using projected bond yields.[144]

The Associations do not support this mixing of actual and projected bond yields, or the use of projected bond yields at all. It is unclear how averaging actual bond-yield results with unreliable projected bond-yield results produces a better estimate of the cost of equity. The issue is not that risk premiums change over time, or are inversely proportional to interest rate levels; it is that projected bond yields are unreliable indicators of the current cost of equity.[145]

2. Using projected bond yields to calculate risk premiums is unreliable and unduly speculative.

The transmission owners support using projected bond yields to calculate risk premiums.[146] This is not a question of using a "historic" versus "forward-looking" Risk Premium model because the Risk Premium model always uses historic data to calculate a spread between bond yields and regulatory outcomes, and then applies that spread prospectively using the current bond yields. The question is whether the risk premium spread should be calculated using actual or projected bond yields.

The transmission owners' main argument for using projected, rather than actual, bond yields is that projected bond yields are "more reflective of investors' forward-looking expectations"[147] and that investors believed that "bond yields would change from the then-

[142] *See* NETOs Comments at 97-98.
[143] *See id.* at 98.
[144] *See* MISO TOs Comments at 43; PJM TOs Comments at 36.
[145] *See* Associations Comments at 127-129.
[146] MISO TOs Comments at 43-44; NETOs Comments at 97-98; PJM TOs Comments at 36.
[147] MISO TOs Comments at 44.

current historical bond yields."[148] Although it is axiomatic that investors believe bond yields will change, that is not sufficient reason to calculate a risk premium based on projected bond yields. Investors also believe that stock prices will change, but the DCF is performed using current stock prices not predictions of future stock prices. Current stock prices and current bond yields are the best reflection of actual investor expectations, and are the most reliable inputs to use for cost of capital studies. Unlike mere forecasts of future bond yields, actual bond yields embody investment decisions backed by actual financial commitments.

Furthermore, projected bond yields do *not* represent investor expectations. Mr. Gorman presents a study that shows, over the last 18 years, analysts have consistently projected increases in bond yields that never materialized.[149] Investors are aware that projected interest rates are "highly unreliable, and seldom accurately match the market's actual cost of capital demands."[150] The Commission was, therefore, correct in finding that "projected yields used in risk premium analyses are speculative and less reliable than historical yields."[151]

3. The Risk Premium methodology is not compatible with a finding of anomalous market conditions.

In response to Question H.2.d.2, the Associations' opening comments explained why the Risk Premium method's underlying assumptions are incompatible with a finding that bond yields or other financial-market conditions, are "anomalous." The Risk Premium method directly reflects bond yields, assumes these yields have linear relationship to equity costs, and assumes

[148] NETOs Comments at 98.

[149] Associations Reply Comments, Exh. A-8 at 4.

[150] *Id.*

[151] *Ass'n of Bus. Advocating Tariff Equity v. Midcontinent Indep. Sys. Operator, Inc.*, Opinion No. 551, 156 FERC ¶ 61,234, 62,161 (2016) ("Opinion 551").

the subject utility presents risks comparable to those of utilities in past rate cases. A finding of "anomalous" market conditions logically precludes use of the Risk Premium method.[152]

The NETOs deem this question irrelevant if the Risk Premium method is not used by itself, but in conjunction with the other three proposed methods.[153] The NETOs argue that a finding of anomalous market conditions does not preclude the use of the Risk Premium method if it is used alongside the other methods.[154] But they do not attempt to delve into the contradictions inherent between such a finding and the Risk Premium method's underlying assumptions. Finally, the NETOs argue that the particular Risk Premium studies they have presented in the pending New England rate cases obviate any concerns over anomalous market conditions by using an annual averaging approach.[155] But the only anomalous market conditions that annual-average calculations might mitigate are very short-term disruptions of less than a year. Moreover, the time series of NETO Risk Premium studies shows clearly that their Risk Premium results are distorted upward by an idiosyncratic and error-based aspect of the ROE-bond yield spreads that NETOs impute to the 2006-09 period. Specifically, "NETOs' inferred risk premium/interest rate relationship is bizarre during 2006-09, reflecting the fact that bond yields were rising sharply while allowed base ROEs as reflected in the data set were not, which in turn reflects the fact that so many of those data set cases did not actually involve the determination of new base ROEs using updated financial information."[156] This anomaly is larger and more solidly demonstrated than any supposed "anomaly" affecting utility-proxy DCF results, and it is not cured by clumping the risk premium data set into annual sub-sets.

---

[152] *See* Associations Comments at 129-130.

[153] *See* NETOs Comments at 98.

[154] *See id.* at 99.

[155] *See id.*

[156] *See Coakley v. Bangor Hydro-Elec. Co.*, CAPS' Paper Hearing Principal Reply Brief, Reply Affidavit of Dr. J. Randall Woolridge, Exh. No. CAP-600 at 26, Docket Nos. EL11-66-001, *et al.*, (filed Mar. 8, 2019).

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

III. CONCLUSION

The Associations appreciate the opportunity to provide these reply comments on the Commission's NOI. As explained above and in our opening comments, the *Coakley* method for evaluating ROE complaints and determining just and reasonable equity returns, as proposed by the Commission, is contrary to the FPA and the standards of reasoned decision-making. Nothing included in the opening comments of the transmission owners rebuts the Associations' identified objections to the proposed new approach, and, as explained above the numerous changes to the *Coakley* method proposed by the transmission owner commenters would seriously exacerbate the problems with the proposed method. Accordingly, if the Commission intends to pursue changes to its policies for determining just and reasonable ROEs, it should adopt the revisions to its proposed new approach described by the Associations.

Respectfully submitted,

/s/ John E. McCaffrey
Delia Patterson
Senior Vice President, Advocacy & Communications and General Counsel
John E. McCaffrey
Regulatory Counsel
THE AMERICAN PUBLIC POWER ASSOCIATION
2451 Crystal Drive
Suite 1000
Arlington, VA 22202
(202) 467-2900
dpatterson@publicpower.org
jmccaffrey@publicpower.org

The American Public Power Association

/s/ David E. Pomper
David E. Pomper
Cynthia S. Bogorad
Latif M. Nurani
SPIEGEL & MCDIARMID LLP
1875 Eye Street, NW
Suite 700
Washington, DC 20006
(202) 879-4000

Attorneys for the Transmission Access Policy Study Group

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

/s/ Robert A. Weishaar, Jr.
Robert A. Weishaar, Jr.
McNees Wallace & Nurick LLC
1200 G Street, NW
Suite 800
Washington, DC 20005
(202) 898-5700
bweishaar@mcneeslaw.com

Vasiliki Karandrikas
McNees Wallace & Nurick LLC
100 Pine Street
Harrisburg, PA 17101
(717) 237-5274
vkarandrikas@mcneeslaw.com

Counsel to the American Forest and Paper Association and on behalf of The Aluminum Association, The American Chemistry Council, The Industrial Energy Consumers of America, and The Electricity Consumers Resource Council

/s/ Randolph Elliott
Randolph Elliott
Senior Director, Regulatory Counsel
The National Rural Electric Cooperative Association
4301 Wilson Boulevard
11th Floor
Arlington, VA 22203
(703) 907-6818
randolph.elliott@nreca.coop

The National Rural Electric Cooperative Association

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

CERTIFICATE OF SERVICE

I hereby certify that I have this day served, via first-class mail, electronic transmission, or hand-delivery the foregoing upon each person designated on the official service list compiled by the Secretary in this proceeding.

Dated at Washington, DC this 26th day of July, 2019.

/s/ *Robert A. Weishaar, Jr.*

Robert A. Weishaar, Jr.
McNees Wallace & Nurick LLC
1200 G Street, NW
Suite 800
Washington, DC 20005
Phone: (202) 898-5700
bweishaar@mcneeslaw.com

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

SUPPLEMENTAL STATEMENT OF BRADFORD CORNELL, PH.D.

I, Bradford Cornell, Ph.D., hereby state:

I provided a statement dated June 25, 2019 in support of the comments submitted by the Aluminum Association, American Chemistry Council, American Forest and Paper Association, American Public Power Association, Electricity Consumers Resource Council, Industrial Energy Consumers of America, National Rural Electric Cooperative Association, and Transmission Access Policy Study Group (collectively, "Associations") to *Inquiry Regarding the Commission's Policy for Determining Return on Equity*, 166 FERC ¶ 61,207 (2019) (the "NOI").

I make this supplemental statement in support of supplemental comments submitted by the Associations and to address certain issues raised in the submissions of other entities. I have personal knowledge of the matters stated herein.

My background and qualifications are summarized in my initial statement and described more fully in my curriculum vitae, which is attached as Appendix A thereto. A list of testimony I have given in deposition or at trial over the past four years may be found in Appendix B to my initial statement.

Specifically, I have been asked to respond to:

- Statements made by experts for the Interstate Natural Gas Association of America (the "INGAA), the New England Transmission Owners (the "NETOs"), and the Environmental Defense Fund (the "EDF") regarding investors' use of expected earnings and the Commission's inclusion of an Expected Earnings model (as defined below) to estimate the cost of capital;
- Statements made by Mr. McKenzie, an expert for the NETOs, regarding the use of the Empirical Capital Asset Pricing Model ("ECAPM"); and
- Statements made by the NETOs regarding the use of long-term expected growth rates and a multi-stage Discounted Cash Flow ("DCF") model to estimate the market risk premium when applying the Capital Asset Pricing Model ("CAPM").

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

THE EXPECTED EARNINGS APPROACH DOES NOT PROVIDE A RELIABLE ESTIMATE OF A FIRM'S COST OF EQUITY

In my initial statement dated June 25, 2019, I emphasized that the academic literature does not endorse the use of expected earnings and the book value of a firm's equity (the "Expected Earnings" model) as a procedure for estimating the cost of equity capital, because it is based on accounting measures rather than economic measures. Several of the Transmission Owners' experts appear to agree with this point.

To begin, Dr. Vilbert, an expert for the INGAA, acknowledges "that the Expected Earnings method has no theoretical basis as a means of estimating the market cost of capital."[1]

Next, Mr. Quackenbush, an expert for the NETOs, does not state that investors use the Expected Earnings model to estimate the cost of equity. Rather, he claims that investors may use evaluations of expected earnings to make investment decisions.[2] While this may be true, it does not mean that investors use the Expected Earnings model to estimate the cost of equity capital. The central problem with that model is its use of book value equity in the *divisor* of proxy firms' Earnings-to-Book ("E/B") ratios. That problem is not solved by assertions that investors consider the projected earnings that form the *numerator* of that ratio.

Finally, Mr. Murchie, an expert for the EDF, succinctly states why the academic literature does not endorse use of the Expected Earnings model to estimate the cost of equity:

> ... the cost of capital for a particular company or group of companies and the return those companies earn on that capital (which I will refer to as the

---

[1] *See* Prepared Affidavit of Dr. Michael J. Vilbert on behalf of INGAA, dated June 26, 2019 ("Vilbert Affidavit"), page 47, paragraph 121.

[2] *See* Affidavit of John D. Quackenbush, dated June 26, 2019 ("Quackenbush Affidavit"), page 17.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

> Accounting ROE and is simply reported earnings divided by book value) are two entirely different concepts.[3]

Mr. Murchie is correct, the ratio of a firm's reported earnings to a firm's book value does not provide a reliable measure of the firm's cost of equity because the calculation is based on an entirely different concept, *i.e.*, an accounting return on equity, not a market-based cost of equity. Furthermore, replacing reported earnings with expected earnings does not solve the problem. Both approaches erroneously divide returns by book value rather than market-priced equity; neither approach provides a reliable measure of the firm's cost of equity.

The academically accepted methods of measuring the cost of equity all rely on market-based measures, not accounting-based measures. Dr. Vilbert and Mr. Quackenbush appear to agree with this statement as well. Dr. Vilbert emphasizes that the Expected Earnings model provides an accounting rate of return, not a market-based estimate of the cost of equity. [4] Similarly, Mr. Quackenbush states:

> … 3) because the end goal of utility regulation is to determine the ROE based on the cost of equity, it is sometimes easy to conjecture that the cost of equity estimates are an end goal of investors when they are not… and 7) by combining cost of equity models that investors are known to use with data that investors are known to access along with observed market values, it is possible to back into cost of capital estimates that investors may be using in the aggregate.[5]

These experts' statements highlight two important points.

First, the Expected Earnings model fails to provide an estimate of a firm's cost of equity because it does not use observed market values, it uses book values. Second, Mr. Quackenbush

---

[3] *See* Affidavit of James J. Murchie, dated June 25, 2019, page 3.

[4] *See* Vilbert Affidavit, page 47, paragraph 121.

[5] *See* Quackenbush Affidavit, page 18.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

is correct: the end goal of investors likely differs from the end goal of utility regulation. Utility regulation uses estimates of the cost of equity to determine a reasonable return on equity ("ROE"). The necessary input is a market-based estimate of the cost of equity. On the other hand, investors typically analyze companies to make buy or sell decisions, e.g., they are looking for undervalued or overvalued companies. Investors use lots of data other than estimates of the cost of equity to reach those decisions, including forecasts of dollar or per-share earnings, cash flow forecasts, price-earnings ("P/E") multiples, earnings before interest, tax, depreciation, and amortization ("EBITDA") multiples, market to book ratios, *etc*. In fact, they may not estimate a cost of equity to reach an investment decision. Because investors are highly heterogeneous, it is difficult, if not impossible, to identify which inputs different investors use and how those investors affect investment decisions. However, if the Federal Energy Regulatory Commission's ("FERC" or "Commission") goal is to set allowed ROEs at a reasonable economic rate of return on equity, then reliable measures of the cost of equity based on market-data should be used, not accounting rates of return relative to book value equity.

USE OF THE EMPIRICAL CAPITAL ASSET PRICING MODEL

With respect to his discussion of the CAPM, Mr. McKenzie, an expert for the NETOs, offers what, in my view, are contradictory opinions. At the outset of his affidavit, he says, and I agree, that, in contrast to factor pricing models, the CAPM is widely referenced by investors, financial practitioners, and regulators. Moreover, because of its ubiquity, continued use of the

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

CAPM over multiple-factor approaches supports the goal of providing clarity and transparency in the Commission's determinations, consistent with the Coakley Methodology.[6]

But then his opinion goes off the tracks with the suggestion that the standard CAPM be replaced by the ECAPM.[7] This makes little sense. Rather than replace the CAPM by a widely studied factor model like those proposed by Fama and French, Mr. McKenzie advocates the use of a model that has not received support in the academic literature in decades. Furthermore, the ECAPM is not based on an economic theory; rather, it is based on an empirical regression comparing returns predicted by the CAPM to historical observed returns. Furthermore, making this comparison requires selecting inputs that are based on several debatable assumptions and the result of this comparison and the model itself are dependent on the specific data included in the analysis as well as the date the analysis is performed. Several of these issues are identified below.

First, the date on which the ECAPM regression is calculated, and the time interval over which observations are to be recorded, must be determined. Second, the number of time periods to include in the regression must be selected. Third, the ECAPM regression requires an estimate of systematic risks, which are unobservable; however, Beta can be used to fill this input. But, doing so requires an estimate of Beta. Furthermore, Beta must be estimated for not only the subject company, but also hundreds of other companies in order to conduct the ECAPM regression. Moreover, if Betas or the risk-free rate are not measured consistently for both the CAPM predicted return and the ECAPM regression, the ECAPM regression is subject to double

---

[6] *See* Affidavit of Adrien M. McKenzie, CFA, dated June 26, 2019, pages 33–34.

[7] *Id.* at pages 34-36.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

counting. For example, Value Line already adjusts Betas for low-Beta companies upward and high-Beta companies downward which increases the CAPM predicted returns for low-Beta companies and descreases the CAPM predicted returns for high-Beta companies versus CAPM returns based on unadjusted Betas. Furthermore, Dr. Morin concedes that "the use of a long-term risk-free rate rather than a short-term risk-free rate already incorporates some of the desired effect of using the ECAPM."[8] Finally, the companies included in the regression would need to be placed into portfolios to reduce estimation error when calculating the ECAPM regression. The methodology used to create these portfolios would need to be determined. Because of its complexity, cumbersome implementation, and lack of a theoretical basis, the ECAPM disappeared from the academic literature more than two decades ago.

If an ECAPM regression were to be used, the Commission would have to decide how to estimate the inputs for the regression, and it would have to develop an ECAPM regression which corresponds to the date on which it is setting an ROE; otherwise, since it is based on raw empirical data, the ECAPM regression will be stale. For instance, the Morin book cited by Mr. McKenzie in support of the ECAPM was published in 2006, and its basis for the ECAPM model applied by Mr. McKenzie relied on a data period ending in 1984.[9] If data from that book were used to estimate the ECAPM regression as of today, the results would be many decades out of date.

Conversely, the CAPM's formula does not become stale and the model does not have to be re-estimated at each decision point, because it is based on fundamental economic analysis. In

---

[8] *See* Morin, *New Regulatory Finance* (2006), page 190.

[9] *Id.*, page 190 n.12.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

my opinion, the Commission should not become involved in arcane debates about the proper estimation process for the ECAPM regression. It should also not have the burden of having re-estimate the ECAPM every time it faces a decision regarding the proper return on equity. Instead, the Commission should use the standard CAPM until a clearly superior model has been accepted by the financial community.

ESTIMATING THE MAREKT RISK PREMIUIM FOR THE CAPM

When it comes to estimating the market risk premium to include in the CAPM, the goal should be to estimate it as accurately as possible. The NETOs argue that:

> The Commission's two-stage methodology for electric utilities is not an appropriate methodology with which to analyze the market risk premium. The market risk premium requires an analysis of investors' 'required return on the overall market,' not an analysis of a proxy group of electric utilities.[10]

In presenting this argument, they are making a conceptual error. To estimate the market risk premium, a multi-stage DCF model should be applied to the S&P 500 portfolio. This is precisely what Professor Aswath Damodaran (my former student, and now Professor of Finance at New York University's Stern School of Business) has been doing for a decade. In the 2019 update to his widely read posts on the equity risk premium, Prof. Damodaran explains how a two-stage model can be used to estimate the market risk premium.[11] His approach is not redundant of the

---

[10] *See* Initial Comments of New England Transmission Owners, pages 91-92.

[11] Damodaran, Aswath, 2019, Equity Risk Premiums (ERP): Determinants, Estimation and Implications – The 2019 Edition, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3378246. I note Prof. Damodaran uses a lower long-run growth rate based on 10-year Treasury bond yields than I would recommend. I recommend using long-run nominal growth rates for Gross Domestic Product ("GDP") forecast by the Federal Reserve and leading private forecasting firms.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Commission's two-stage DCF methodology for electric utilities, because it does not rely solely on electric utility stocks, but all of the stocks in the S&P 500.

In addition, Prof. Damodaran specifically warns against using short-term growth rates that cannot be sustained in the long run. As I stressed in my initial affidavit, equating analyst projections of short-term growth rates to the constant growth rate required for a single stage DCF model is likely to overstate the cost of equity for single companies and the implied market risk premium derived from a broad market index.

In general, a two-stage (or three-stage) model should be used when applying the DCF model because it gives more accurate results. Failing to properly incorporate appropriate long-run growth rates will produce unnecessary error. These observations apply to the DCF approach whether applied to a single company or a broad market index.

The NETOs also cite Judge Coffman to suggest that the use of an estimate of the equity risk premium based on a two-step DCF approach in the CAPM is duplicative of an estimate of the cost of equity for utilities based on a two-step DCF approach - "[w]ere the methodologies identical in all respects, the CAPM would simply duplicate the results of the two-step DCF."[12] But, Judge Coffman's statement is a tautology, and the two methodologies, even if both are based on a two-step DCF approach, are not identical in all respects.

For the CAPM, the two-step DCF is applied to a portfolio of 500 stocks, not individual utilities. This is an important difference because the average growth rate of payouts to stockholders for a portfolio of 500 stocks can be estimated more accurately than the growth rate

[12] *See* Initial Comments of New England Transmission Owners, page 91.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

in payouts to stockholders for an individual stock because the measurement errors across multiple companies tend to cancel each other. Furthermore, once the market risk premium is estimated, it is multiplied by the company's Beta to obtain a cost of equity for each individual company. Beta does not enter when the DCF model is applied to individual companies directly. As noted above, a multi-stage procedure for estimating the market risk premium is required because at various points in time expected short-term growth rates diverge from sustainable long-term growth rates. Under such circumstances, failing to use the proper multi-stage model will lead to a biased estimate of the cost of equity. If the DCF model applied to individual companies and the CAPM applied to the same companies give similar answers for the cost of equity, that is a good thing, not a bad thing. It indicates that two different approaches arrive at the same final result, which should give the Commission added confidence in that result.[13]

Finally, although the expected growth rate in payouts to stockholders for an individual company may exceed the expected long-term growth rate of GDP for a substantial period of time, it cannot do so forever. Likewise, although the expected growth rate in payouts to stockholders for a broad index of companies may exceed the expected long-term growth rate of GDP for a period of time, it cannot do so forever, nor for as long as a high performing individual

[13] I also note that forward-looking estimates of the equity risk premium are routinely calculated using methodologies other than a DCF model. For example, in its annual Valuation Handbook, Duff & Phelps publishes a "long-horizon expected equity risk premium (supply-side)" and a "Duff & Phelps recommended equity risk premium (conditional)." (For example, *see* Duff & Phelps. (2017). *2017 Valuation Handbook: U.S. Guide to Cost of Capital.* Hoboken, N.J.: John Wiley. Chapter 3.) The long-horizon expected equity risk premium (supply side) has frequently been adopted by the Delaware Court of Chancery for use in the CAPM in appraisal actions. Again, if the Commission's equity risk premium based on a multi-stage DCF model results in an estimate similar to the long-horizon expected equity risk premium (supply-side) or the Duff & Phelps recommended equity risk premium (conditional) that is a good thing, not a bad thing. If the estimates are not similar, the Commission should understand why the approaches result in substantially different estimates.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

company may. Accordingly, for the DCF model to produce a reasonable estimate of the cost of equity or the equity risk premium, it is necessary to cap the expected long-term growth rate at the expected long-term growth rate of GDP at some point in time. This is true for both an individual company and a broad index of companies.

I declare under penalty of perjury that the contents of the foregoing Statement are true and correct to the best of my knowledge, information and belief.

BRADFORD CORNELL, PH.D.

Executed in La Canada, California on July 26, 2019.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

ASSOCIATIONS EXHIBIT NO. A-8

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Exhibit No. A-8

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Inquiry Regarding the Commission's Policy for Determining Return on Equity	))	Docket No. PL19-4-000

Reply Affidavit of Michael P. Gorman

On behalf of the Associations:
Aluminum Association,
American Chemistry Council,
American Forest and Paper Association,
American Public Power Association,
Electricity Consumers Resource Council,
Industrial Energy Consumers of America,
National Rural Electric Cooperative Association, and
Transmission Access Policy Study Group

July 26, 2019

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Table of Contents to the Reply Affidavit of Michael P. Gorman

Page

I. Risk Premium and Projected Interest Rates....2

II. Earnings/Book Ratios....7

III. Empirical CAPM....8

IV. CAPM Market Risk Premium....13

Acronyms and Abbreviations....Appendix A

Exhibit No. A-9: Accuracy of Interest Rate Forecasts

Exhibit No. A-10: Workpapers

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Reply Affidavit of Michael P. Gorman

Q PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A Michael P. Gorman. My business address is 16690 Swingley Ridge Road, Suite 140, Chesterfield, MO 63017.

Q ARE YOU THE SAME MICHAEL P. GORMAN WHO PREVIOUSLY FILED AN AFFIDAVIT IN THIS PROCEEDING?

A Yes. On June 26, 2019 I filed an Affidavit on behalf of the Aluminum Association, American Chemistry Council, American Forest and Paper Association, American Public Power Association, Electricity Consumers Resource Council, Industrial Energy Consumers of America, National Rural Electric Cooperative Association, and Transmission Access Policy Study Group (collectively, "Associations").

Q WHAT IS THE PURPOSE OF YOUR REPLY AFFIDAVIT?

A I will respond to four specific issues raised by Transmission Owners ("TOs") in their comments to the Federal Energy Regulatory Commission ("FERC" or "Commission"). Those are: (1) the use of projected interest rates within a risk premium study; (2) the use of Earnings/Book ratios, also known as "Expected Earnings"; (3) the application of an Empirical Capital Asset Pricing Model ("ECAPM") as proposed by the some TOs; and (4) the appropriate development of a market risk premium for a CAPM model, specifically, the validity estimating the long-

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

term return on a broad equity portfolio by applying a two-step Discounted Cash Flow ("DCF") model that assumes perpetual growth rates forecast for the near term.

As outlined later in this Affidavit, the TOs' proposed methodologies do not reflect economic logic in measuring a return on equity ("ROE") that meets the *Hope* and *Bluefield* standards. These specific issues will be addressed in detail below.

I. Risk Premium and Projected Interest Rates

Q DID THE MIDCONTINENT INDEPENDENT SYSTEM OPERATOR, INC. ("MISO") TOs MAKE COMMENTS CONCERNING PROJECTED INTEREST RATES WITHIN A RISK PREMIUM ANALYSIS?

A Yes. At page 44 of their Comments, the MISO TOs state the following:

> In the *Coakley* Briefing Order, the Commission presented the approach of averaging the results of risk premium analyses using historical and projected bond yields.[footnote omitted] Such a blended approach makes sense, as Mr. McKenzie has explained in the MISO Transmission Owners' ROE proceedings.[footnote omitted] The historical bond yield analysis reflects yields at the time the proxy group ROEs were established, and the projected bond yields provide a risk premium estimate more reflective of investors' forward-looking expectations.

Q IS IT APPROPRIATE TO USE FORECASTED INTEREST RATES IN A RISK PREMIUM STUDY?

A The use of projected yields in the risk premium methodology, as proposed by TOs, is not reasonable and produces a flawed risk premium estimate for several reasons including the following:

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

1. FERC rejected the use of projected bond yields because they are unreliable estimates of market cost of capital. This finding is valid.

2. The MISO TOs' risk premium methodology is internally inconsistent and develops a risk premium that is not accurately calibrated to apply to projected bond yields. Rather, the risk premium is calibrated to current observable equity costs and bond yields, and therefore the proposed application produces a mismatch in the measurement of a risk premium estimate.

3. Projected bond yields are rarely reasonable estimates of actual investor-required returns on capital investments. Therefore, the resulting risk premium estimate simply does not provide an accurate estimate of the market participant required ROE.

Q PLEASE DESCRIBE THE FERC'S FINDING ON USE OF PROJECTED BOND YIELDS IN A RISK PREMIUM STUDY.

A This issue was explored by the Administrative Law Judge ("ALJ") in Docket No. EL14-12, where the MISO TOs proposed historical risk premium analyses in combination with projected bond yields. However, the resulting study was rejected as speculative based on the following:

> Dr. Avera also produces a risk premium analysis using bond yields projected for 2016-20. This Initial Decision rejects those studies. Projected yields are speculative, and, therefore, a less reliable basis for a study than historical yields.[1]

The Commission went on to confirm the ALJ's findings in that same docket by stating as follows:

> The Presiding Judge held that projected yields used in risk premium analyses are speculative and less reliable than historical yields, and

[1] *Ass'n of Bus. Advocating Tariff Equity v. Midcontinent Indep. Sys. Operator, Inc.*, 153 FERC ¶ 63,027, P 257 (2015) ("*MISO I ID*") (footnote omitted), *aff'd*, Op. No. 551, 156 FERC ¶ 61,234 (2016).

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

> rejected Dr. Avera's use of projected Baa-rated bond yields. . . . [W]e agree with the Presiding Judge. . . .[2]

Q IS THERE EVIDENCE THAT PROJECTED BOND YIELDS ARE UNRELIABLE AS FOUND PREVIOUSLY BY THE FERC?

A Yes. This is illustrated on my Exhibit No. A-9. On that exhibit, I compare projected changes in Treasury bond yields out over a two-year period to the actual prevailing bond yield that was realized at the time the projection represented. As shown on this exhibit, over the last 18 years, economists have consistently been projecting increases in interest rates relative to current prevailing interest rates but those projections have been wrong. Indeed, interest rates have not increased as economists have consistently projected, and in many cases remained flat or even declined.

This exhibit clearly illustrates that projected interest rates are highly unreliable, and seldom accurately match the market's actual cost of capital demands. Hence, projected interest rates simply are not reliable by themselves in forming a risk premium study.

[2] Op. No. 551, P 194. *See also Potomac-Appalachian Transmission Highline, L.L.C.*, 122 FERC ¶ 61,188, P 102 (rejecting "speculative forecasting of th[e] indexed cost of debt" as a basis to raise the low-end test used to filter proxies' DCF results).

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Q PLEASE EXPLAIN WHY THE TOs' PROPOSED MODEL WOULD BE INTERNALLY INCONSISTENT IF PROJECTED BOND YIELDS WERE INCLUDED.

A Risk premiums are derived by a comparison of Commission authorized ROEs relative to prevailing utility bond yields. Hence, the resulting equity risk premium represents a relationship between ROEs measured from current market data relative to observable bond yield market data. This produces a risk premium related to observable market data for a specific period of time. This equity risk premium then can be applied to observable market bond yields to measure the current market cost of equity.

However, the MISO TOs are proposing to use a historically derived equity risk premium, in combination with projected bond yields. This methodology mismatches the time period where the equity risk premium is derived relative to the time period the bond yield is "expected" to prevail. The combination of an inconsistent time period for measuring the (1) equity risk premiums, and applying that to a (2) projected bond yield produces an internally inconsistent, and unreliable, estimate of the market cost of equity.

Using internally consistent data is necessary to produce a valid estimate of the market cost of equity. Dr. Morin explains in the textbook cited throughout the Briefing Orders, "[o]ne must be careful that the debt instrument used to calculate the risk premium matches the debt instrument used to calculate the interest rate component of the risk premium approach."[3]

[3] Roger A. Morin, *New Regulatory Finance* at 113 (2006), provided as Exhibit No. A-10, page 2.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

While it would be internally consistent to use projected bond yields to derive the projected risk premium, and then apply that to a current projected bond yield, such a methodology would not calculate the current cost of equity. Additionally, using projected bond yields to calculate both the historical risk premium and the current bond yield would amplify the problem of projected bond yields systematically exceeding actual bond yields over time, as evidenced by the actual versus projected yield comparisons in the six docket-specific *Coakley* and MISO ROE proceedings.

Q WHY DO YOU BELIEVE THAT ECONOMISTS' PROJECTED BOND YIELDS RARELY ACCURATELY REFLECT THE MARKET REQUIRED RETURN ON INVESTMENTS?

A This is illustrated by failure of economists to accurately project changes in future interest rates. I refer you once again to my Exhibit No. A-9, that shows that consensus economists' projections of changes in Treasury bond yields rarely turn out be accurate, and predominantly overstate the market required return on Treasury bonds that prevail at the point in time where the forecasts have been made. That is, economists consistently overestimate what the market cost of capital will be for Treasury bonds in their forecasts. As such, economists' projections simply are not reliable estimates of current or future capital costs required by market participants.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

II. Earnings/Book Ratios

Q MR. MCKENZIE RECOMMENDS RELIANCE ON "EXPECTED EARNINGS," BY WHICH HE MEANS PROJECTED EARNINGS DIVIDED BY EQUITY BOOK VALUE. PLEASE EXPLAIN HIS RATIONALE.

A Mr. McKenzie states that "the Expected Earnings approach provides a direct guide to ensure that the allowed ROE is similar to the returns that investors expect other utilities of comparable risk will earn on invested capital."[4]

Q DO YOU HAVE A RESPONSE?

A Yes. Dr. Cornell provides Associations' main testimonial response to transmission owners' support for the use of "Expected Earnings," and I agree with him that this method does not indicate the cost of equity and should not be used. However, I am supplementing his evidence by responding to the statement by Mr. McKenzie quoted above. Mr. McKenzie refers to the returns that *utilities* are expected to earn, as distinguished from the returns that *investors* expect to earn. This is a crucial distinction, and it goes to the heart of why the Expected Earnings method should not be used. The cost to the utility of attracting investment capital is the return that *investors* can earn on alternative investments of comparable risk, *not* the return that the utility itself can earn. As investment capital is just one of many inputs that utilities need to assemble the assets and used to provide service, a useful analogy in this regard is the cost of electrical conduit used in providing transmission service. An open-

[4] eLibrary No. 20190626-5323, Attachment A to Initial Comments of the New England Transmission Owners, at 25.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

market conduit vendor will charge a price that reflects what alternative purchasers would pay, i.e., a market price. The rate of return that the utility will earn after the conduit becomes a rate base asset is a *result* of regulators' regulatory determinations, not an *input* to that market price. Similarly, the cost to the utility of investors' equity is tied to alternative, comparable-risk investments that are actually available to current investors. As investors have no opportunity to purchase utility stocks at book values that diverge from market prices, the ratio of utilities' earnings to their equity book values is *not* a direct guide, or even a meaningful guide, to the returns that investors expect to receive from their market-priced investments in utility stocks.

III. Empirical CAPM

Q MR. MCKENZIE RECOMMENDS THE USE OF AN ECAPM ANALYSIS AS A COMPONENT OF A CAPM. PLEASE EXPLAIN HIS RATIONALE.

A Mr. McKenzie outlines that an ECAPM analysis can help correct for the deficiencies in the CAPM analysis by adjusting the intercept line of the security market line, and reducing the slope. He asserts that this modification in the intercept and slope of the security market line has the effect of producing a more reliable estimate of the expected return relative to risk for securities, because a standard CAPM analysis will understate the required return for companies with betas less than 1, and overstate the required return for companies with betas greater than 1.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Q IS IT APPROPRIATE TO APPLY THE ECAPM ANALYSIS THE WAY THAT MR. MCKENZIE HAS PROPOSED?

A No. As Dr. Cornell explains, the ECAPM is theoretically unsound, and is based on an empirical regression for which estimation methodologies and the estimation period are unspecified. Even if the Commission were to adopt this ad-hoc modification to the established CAPM, Mr. McKenzie's proposed application of the ECAPM is flawed. Specifically, he applies the ECAPM adjustments in combination with *The Value Line Investment Survey* ("*Value Line*") adjusted betas. The use of a standard CAPM analysis with *Value Line* adjusted betas and the ECAPM analysis double counts the change to the security market line that is theorized as needed to produce a more accurate return versus risk estimate. That is, both the ECAPM with "regression" or "raw" betas, and a CAPM using *Value Line* adjusted betas will raise the intercept point relative to the standard CAPM estimate, and reduce the slope of the security market line. Both of these methods have the effect of increasing return estimates for companies with betas less than 1, and reducing return estimates for companies with betas greater than 1.

Indeed, the mathematical modification to the security market line, the intercept and the slope, are nearly identical when a standard CAPM with a *Value Line* adjusted beta is employed, compared to an ECAPM analysis using a non-adjusted beta. The mathematical derivation of this is shown below in Table 1.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

TABLE 1

Security Market Line

Line	Description		Intercept	+	Risk Premium
1	Standard CAPM	=	R_f	+	100% Raw β x MRP
2	CAPM with VL Beta	=	R_f + 35% MRP	+	67% x Raw β x MRP
3	ECAPM	=	R_f + 25% MRP	+	75% x Raw β x MRP
4	ECAPM with VL Beta	=	R_f + 51% MRP	+	50% x Raw β x MRP

As shown above under lines 1 and 2, the security market line is adjusted by use of *Value Line* adjusted betas to increase the intercept point and flatten the slope of the security market line. Similarly, the ECAPM applied with non-adjusted betas (regression or raw betas) similarly increases the intercept point and flattens the slope of the security market line. Both of these methodologies adjust the intercept point via combination of the risk-free rate plus a factor of the market risk premium, and reduce the slope line from 100% of the raw beta estimate relative to the market risk premium, to a fraction, approximately 3/4 to 2/3 of the beta adjusted risk premium estimate.

For example, using *Value Line* betas within a standard CAPM analysis (Line 2) increases the intercept from the risk-free rate up to the risk-free rate plus 35% of the market risk premium. From there, the slope of the line decreases from a raw beta estimate multiplied by the market-risk free premium to only 67% of the raw beta estimate by the market risk premium. Thus, using the *Value Line* beta adjustment in the standard CAPM model increases the intercept point and reduces the slope of the security market line.

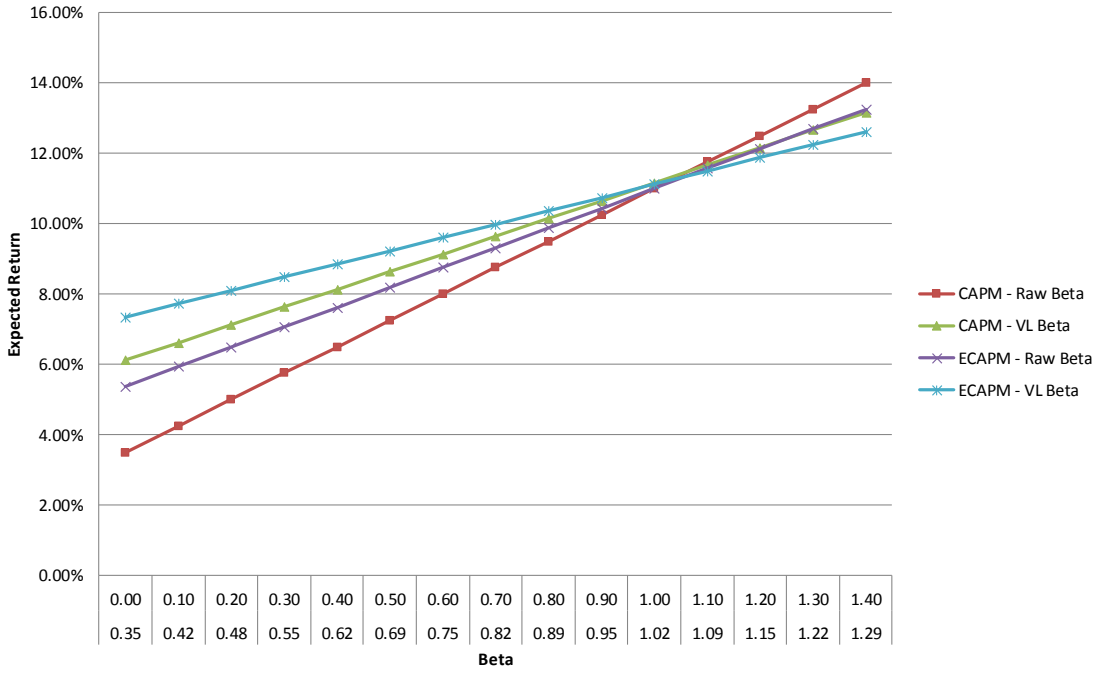
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Using an ECAPM with a raw beta estimate accomplishes nearly the same thing. Specifically, the ECAPM with a raw beta will increase the intercept point to the risk-free rate plus 25% of the market risk premium, and change the slope of the line from the raw beta multiplied by the market risk premium to 75% of the raw beta multiplied by the market risk premium. The impact on the intercept point and the slope of the security market line are very comparable using a standard CAPM with a *Value Line* adjusted beta, or an ECAPM using a raw beta estimate.

These relationships, along with the mathematical equations outlined in Table 1 above, are shown graphically in Figure 1 below.

FIGURE 1

Variations of the CAPM



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

As shown above, the ECAPM using *Value Line* betas intersects the zero beta X axis at a very high level, and then increases more slowly as the beta increases from zero up to above 1. Please note that at a beta of 1, all versions of the CAPM study produce the same market return estimate. Therefore, the adjustments to the standard CAPM produced by either a *Value Line* adjusted beta or ECAPM analysis had the effect of increasing CAPM return estimates for companies with betas less than 1, and decreasing CAPM return estimates for companies with betas greater than 1. The significant deficiency in the ECAPM employed with use of *Value Line* betas is it has a substantially greater impact on the CAPM return estimate for companies with betas less than 1, and a substantially reduced CAPM return estimate for companies with betas greater than 1.

Q WHY DO YOU STATE THAT USE OF A *VALUE LINE* ADJUSTED BETA WITHIN AN ECAPM ANALYSIS DOUBLE COUNTS THE ADJUSTMENT TO THE SECURITY MARKET LINE AS SUPPORTED BY ACADEMIC LITERATURE?

A Use of *Value Line* adjusted betas within an ECAPM analysis significantly distorts the security market line by further increasing the intercept point and nearly flattening the slope line. This is illustrated in Table 1 above on line 4. As shown in the table above, *Value Line* adjusted betas within an ECAPM analysis suggests that the required rate of return for a riskless security would be equal to the risk-free rate plus one-half of the market risk premium. Additional return for assuming securities of greater amounts of

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

risk would only be adjusted by less than one-half of the expected market premium adjustment by the beta estimate. More specifically, the adjustment to the intercept point produces a doubling of the addition to the risk-free rate by the market risk premium, and reduces the slope by about a third of the market risk premium based on a reduction of the weight of 75% down to 50%.

For these reasons, an ECAPM analysis should not be employed in combination with *Value Line* adjusted betas. The application of an ECAPM with *Value Line* adjusted betas does not produce an economically logical return estimate for a given level of investment risk. For these reasons, the ECAPM should not be employed in combination with *Value Line* adjusted betas, or any type of adjusted beta, because it simply produces an economically illogical estimate of the current market cost of equity.

IV. CAPM Market Risk Premium

Q IN DERIVING A CAPM RETURN ESTIMATE, HAS THE COMMISSION OFFERED DIRECTIONS ON HOW TO MEASURE THE MARKET RISK PREMIUM?

A Yes. The Commission states that the market risk premium should reflect a forward-looking estimate of the return on the market relative to the prevailing risk-free rate. The Commission opines that a forward-looking return on the market is best estimated from a DCF analysis.[5]

[5]Opinion No. 531 at 14.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Q IN ORDER TO PRODUCE AN ECONOMICALLY LOGICAL CAPM RETURN ESTIMATE, SHOULD THE COMMISSION TAKE CARE TO ENSURE THAT THE ESTIMATED FORWARD-LOOKING RETURN ON THE MARKET REFLECTS ECONOMICALLY LOGICAL RESULTS, AND LIKELY THEREFORE REFLECTS EXPECTATIONS OF INVESTORS?

A Yes. It is generally regarded that most investors act rationally, that rational investors will take advantage of any mis-pricing by any irrational investors, and that stock market prices therefore rationally and efficiently incorporate all relevant public information. To accord with the reality of efficient stock market pricing, any projection of long-term returns on a broad stock market portfolio should reflect an economically and rational outlook for expected returns on the market. Relevant pieces of information available to the investment community to make rational outlooks for expected returns on the market include the following:

1. Historically returns on the market have generally tracked growth of the economy in which the market sells its goods and services. More specifically, compound growth of the S&P 500 has reasonably tracked the compound growth of the U.S. Gross Domestic Product ("GDP").

2. Market participants' outlooks for expected return on the market generally support the historical relationship between the growth in the stock market, and the growth in the U.S. GDP, or economy in which the stock market companies operate.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Q PLEASE OUTLINE THE INFORMATION YOU HAVE THAT SUPPORTS YOUR BELIEF THAT MARKET PARTICIPANTS' PROJECTIONS FOR THE RETURN ON THE MARKET GENERALLY ALIGN WITH STOCK MARKET RETURNS THAT CORRELATE WITH U.S. GDP RETURNS.

A The current consensus outlook for both intermediate-term and long-term nominal GDP growth is around 4.2%, which includes the Federal Reserve's long-term inflation outlook of around 2%.

As shown in Table 2 below, the projections of independent advisory firms for long-term returns on the U.S. equity market bracket this outlook for future U.S. GDP growth. At the high end, BlackRock Investment Institute is projecting nominal 25-year returns for U.S. large cap equities to be around 7.1%. This is the highest of the surveyed independent market participants' projections for large-cap equity returns in the U.S. marketplace. At the low end, Research Affiliates is projecting nominal 10-year returns for U.S. large cap equities to be around 2.6%. The median surveyed projection of expected return on large-cap US equity is Vanguard's 3%-5%, comparable to the consensus projection of 4.2% nominal growth in GDP.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

TABLE 2

Projected Return on the Market

Source	Term	Expected Return: Large Cap Equities	Expected Return: Nominal US GDP
BlackRock Capital Management[1]	25 Years	7.1%	N/A
JP Morgan Chase[2]	10 - 15 Years	5.25%	3.75%
Vanguard[3]	10 Years	3% - 5%	N/A
Research Affiliates[4]	10 Years	2.60%	3.51%
Morningstar[5]	10 Years	2.70%	N/A

Sources:

[1]BlackRock Investment Institute, April 2019 report, downloaded 7/23/2019.

[2]JP Morgan Chase, Long-Term Capital Market Assumptions, 2019 Report, provided as Exhibit No. A-10, pages 3-114.

[3]Vanguard Economic and Market Outlook for 2019: Down but not out, December 2018, provided as Exhibit No. A-10, pages 115-158.

[4]Research Affiliates, Asset Allocation Interactive, downloaded 7/24/2019.

[5]Morningstar Markets Observer Q2 2019 at 12, provided as Exhibit No. A-10, pages 159-210.

Q DID ANY COMMENTERS HAVE COMMENTS CONCERNING THE FERC'S USE OF A TWO-STAGE DCF IN MEASURING A MARKET RISK PREMIUM WITHIN A CAPM?

A Yes. Several transmission owners argued that the Commission should reject measuring the market risk premium using a two-stage DCF return on the market. The

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

New England TOs comments are generally reflective of the arguments made by all the transmission owners. The New England TOs assert that the Commission's rationale for including a long-term growth rate in a DCF analysis is because it is often unrealistic and unsustainable for high, short-term growth rates to continue into perpetuity. The New England TOs believe this rationale does not apply to a DCF return on the market index. The primary argument in support of this notion is that the market index as measured by the S&P 500 will always reflect higher performing companies. Therefore, since the S&P will rotate in high-performing companies in developing its index, the New England TOs assert that a short-term growth rate is higher than rational expectations for long-term sustainable growth is appropriate for measuring a DCF return on the market.

Q IS THE NEW ENGLAND TOs' REJECTION OF THE TWO-STAGE DCF MODEL TO MEASURE THE CURRENT MARKET RETURN ON THE S&P 500 ECONOMICALLY LOGICAL?

A No. There is simply no credible evidence that suggests that it is rational and an economically logical outlook for an investor to believe that the long-term sustainable growth rate on the S&P 500 can reflect growth outlooks that substantially exceed growth rates achieved in the past, or growth rates that reflect the economy in which the stock market as a whole will sell its goods and services into the future.

Specifically, historically, the S&P 500 has grown at a rate that reasonably tracks the actual nominal growth of the U.S. GDP. As such, there is verifiable

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

evidence that it is rational to believe that the market will track the growth rate of the economy in which the companies that make up the market, sell their goods and services. Further, it is rational to expect that the growth of the market for the companies that serve the market, will grow in line with the market demand for services. That is, the companies that sell goods and services to the market can experience growth in line with the market growth in demand for those goods and services. Indeed, this expectation is corroborated by a review of historical evidence. As shown in Table 3 below, the historical growth of the market has tracked the historical growth of the U.S. GDP.

TABLE 3

Historical Growth: S&P 500 vs GDP

Description	Percent
Nominal GDP (1929-2018)[1]	6.1%
S&P 500 Capital Growth (1926 - 2018)[2]	5.8%

Sources:
[1]Bureau of Economic Analysis, downloaded 7/15/19.
[2]Duff & Phelps 2019 SBBI Yearbook at 6-17, provided as Exhibit No. A-10, pages 211-212..

As outlined above, the historical nominal growth and geometric growth of the U.S. stock market has been approximately 6.1%, whereas the historical growth of the U.S. GDP has been 5.8%. (As discussed above, U.S. GDP growth is widely expected to be considerably lower going forward. This expectation reflects slower growth in population, slower growth in productivity, and lower inflation, in each case as between

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

the future and the historical period that began in the 1920s.) Clearly, there is an interrelationship between the growth rate of the consumer market for goods and services and the growth rate for publicly traded companies that operate to supply the goods and services demanded by the consumer market. As such, over long periods of time, it is reasonable to expect that the growth rate in the S&P 500 will continue to track the growth rate of the nominal GDP because these markets are interrelated, and can only grow over long periods of time at growth rates that are reasonably comparable to one another.

Q IS THERE MERIT TO THE NEW ENGLAND TOS' ARGUMENT THAT HIGH GROWTH COMPANIES WILL CONTINUE TO BE SWAPPED IN AND OUT OF THE S&P 500 INDEX, AND THEREFORE THE EXPECTED RETURN ON THE MARKET SHOULD TRACK NEAR-TERM PROJECTIONS OF THE EARNINGS GROWTH OF DIVIDEND-PAYING COMPANIES INCLUDED IN THE INDEX?

A No. While companies are periodically added to or removed from the S&P 500 index, this is always done such that the change of index composition leaves the index value unchanged, by in effect "selling" from the index portfolio a relatively large number of index shares in order to purchase relatively few shares in the added company. These transitions do not, in the aggregate, systematically increase the earnings associated with a portfolio that tracks the index. More important, CAPM theory calls for the equity market return to represent the entire stock market, not simply the high growth

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

companies included in any particular market index. The S&P 500 index is used only as a proxy for the entire stock market. Accordingly, expected return on the stock index should reflect the growth of the overall market. New England TOs' are not factually accurate in asserting that index composition changes can make the S&P 500 sustainably grow faster than the entire stock market and underlying economy, but if they were, that would be a reason to disregard the S&P 500 as a basis for estimating the CAPM equity risk premium, not a reason to substitute near-term S&P 500 growth for sustainable market returns in estimating the CAPM equity risk premium.

In any case, proponents of such substitution do not actually propose to conduct a DCF analysis of the S&P 500 index itself as its composition changes over time. Rather, they rely on a large and unchanging subset of the companies that are included in the index at a particular point in time. Any arguments about how the index will grow are irrelevant to the expected long-term growth of the individual companies in the index.

Q DOES THIS CONCLUDE YOUR REPLY AFFIDAVIT?

A Yes.

\\consultbai.local\documents\ProlawDocs\SDW\10809\Affidavit\372266.docx

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Acronyms and Abbreviations

Associations	Aluminum Association, American Chemistry Council, American Forest and Paper Association, American Public Power Association, Electricity Consumers Resource Council, Industrial Energy Consumers of America, National Rural Electric Cooperative Association, and Transmission Access Policy Study Group
ALJ	Administrative Law Judge
CAPM	Capital Asset Pricing Model
Commission	Federal Energy Regulatory Commission
DCF	Discounted Cash Flow
ECAPM	Empirical Capital Asset Pricing Model
FERC	Federal Energy Regulatory Commission
GDP	Gross Domestic Product
Hope and *Bluefield*	*Bluefield Water Works & Improvement Co. v. Pub. Serv. Comm'n of W. Va.*, 262 U.S. 679 (1923) and *Fed. Power Comm'n v. Hope Natural Gas Co.*, 320 U.S. 591 (1944)
MISO	Midcontinent Independent System Operator, Inc.
NOI	Notice of Inquiry
ROE	Return on Equity
TO	Transmission Owner
Value Line	*The Value Line Investment Survey*

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

ASSOCIATIONS EXHIBIT NO. A-9

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

FERC NOI

Accuracy of Interest Rate Forecasts
(Long-Term Treasury Bond Yields - Projected Vs. Actual)

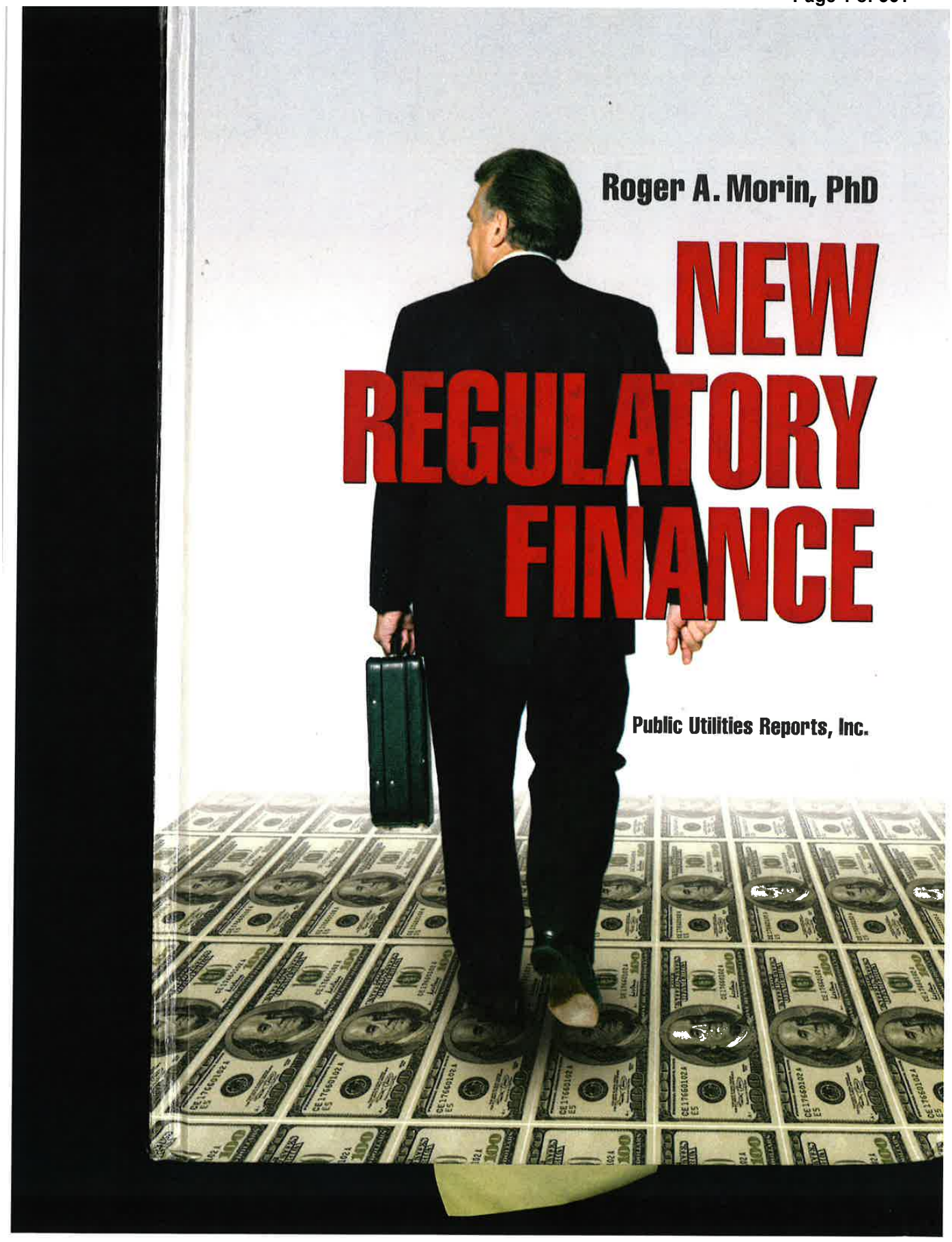
Line	Date	Publication Data: Prior Quarter Actual Yield (1)	Publication Data: Projected Yield (2)	Publication Data: Projected Quarter (3)	Actual Yield in Projected Quarter (4)	Projected Yield Higher (Lower) Than Actual Yield* (5)
1	Dec-00	5.8%	5.8%	1Q, 02	5.6%	0.2%
2	Mar-01	5.7%	5.6%	2Q, 02	5.8%	-0.2%
3	Jun-01	5.4%	5.8%	3Q, 02	5.2%	0.6%
4	Sep-01	5.7%	5.9%	4Q, 02	5.1%	0.8%
5	Dec-01	5.5%	5.7%	1Q, 03	5.0%	0.7%
6	Mar-02	5.3%	5.9%	2Q, 03	4.7%	1.2%
7	Jun-02	5.6%	6.2%	3Q, 03	5.2%	1.0%
8	Sep-02	5.8%	5.9%	4Q, 03	5.2%	0.7%
9	Dec-02	5.2%	5.7%	1Q, 04	4.9%	0.8%
10	Mar-03	5.1%	5.7%	2Q, 04	5.4%	0.3%
11	Jun-03	5.0%	5.4%	3Q, 04	5.1%	0.3%
12	Sep-03	4.7%	5.8%	4Q, 04	4.9%	0.9%
13	Dec-03	5.2%	5.9%	1Q, 05	4.8%	1.1%
14	Mar-04	5.2%	5.9%	2Q, 05	4.6%	1.4%
15	Jun-04	4.9%	6.2%	3Q, 05	4.5%	1.7%
16	Sep-04	5.4%	6.0%	4Q, 05	4.8%	1.2%
17	Dec-04	5.1%	5.8%	1Q, 06	4.6%	1.2%
18	Mar-05	4.9%	5.6%	2Q, 06	5.1%	0.5%
19	Jun-05	4.8%	5.5%	3Q, 06	5.0%	0.5%
20	Sep-05	4.6%	5.2%	4Q, 06	4.7%	0.5%
21	Dec-05	4.5%	5.3%	1Q, 07	4.8%	0.5%
22	Mar-06	4.8%	5.1%	2Q, 07	5.0%	0.1%
23	Jun-06	4.6%	5.3%	3Q, 07	4.9%	0.4%
24	Sep-06	5.1%	5.2%	4Q, 07	4.6%	0.6%
25	Dec-06	5.0%	5.0%	1Q, 08	4.4%	0.6%
26	Mar-07	4.7%	5.1%	2Q, 08	4.6%	0.5%
27	Jun-07	4.8%	5.1%	3Q, 08	4.5%	0.7%
28	Sep-07	5.0%	5.2%	4Q, 08	3.7%	1.5%
29	Dec-07	4.9%	4.8%	1Q, 09	3.5%	1.4%
30	Mar-08	4.6%	4.8%	2Q, 09	4.0%	0.8%
31	Jun-08	4.4%	4.9%	3Q, 09	4.3%	0.6%
32	Sep-08	4.6%	5.1%	4Q, 09	4.3%	0.8%
33	Dec-08	4.5%	4.6%	1Q, 10	4.6%	0.0%
34	Mar-09	3.7%	4.1%	2Q, 10	4.4%	-0.3%
35	Jun-09	3.5%	4.6%	3Q, 10	3.9%	0.8%
36	Sep-09	4.0%	5.0%	4Q, 10	4.2%	0.8%
37	Dec-09	4.3%	5.0%	1Q, 11	4.6%	0.4%
38	Mar-10	4.3%	5.2%	2Q, 11	4.3%	0.9%
39	Jun-10	4.6%	5.2%	3Q, 11	3.7%	1.5%
40	Sep-10	4.4%	4.7%	4Q, 11	3.0%	1.7%
41	Dec-10	3.9%	4.6%	1Q, 12	3.1%	1.5%
42	Mar-11	4.2%	5.1%	2Q, 12	2.9%	2.2%
43	Jun-11	4.6%	5.2%	3Q, 12	2.8%	2.5%
44	Sep-11	4.3%	4.2%	4Q, 12	2.9%	1.3%
45	Dec-11	3.7%	3.8%	1Q, 13	3.1%	0.7%
46	Mar-12	3.0%	3.8%	2Q, 13	3.2%	0.7%
47	Jun-12	3.1%	3.7%	3Q, 13	3.7%	0.0%
48	Sep-12	2.9%	3.4%	4Q, 13	3.8%	-0.4%
49	Dec-12	2.8%	3.4%	1Q, 14	3.7%	-0.3%
50	Mar-13	2.9%	3.6%	2Q, 14	3.4%	0.2%
51	Jun-13	3.1%	3.7%	3Q, 14	3.3%	0.4%
52	Sep-13	3.2%	4.2%	4Q, 14	3.0%	1.2%
53	Dec-13	3.7%	4.2%	1Q, 15	2.6%	1.7%
54	Mar-14	3.8%	4.4%	2Q 15	2.9%	1.5%
55	Jun-14	3.7%	4.3%	3Q 15	2.8%	1.5%
56	Sep-14	3.4%	4.3%	4Q 15	3.0%	1.3%
57	Dec-14	3.3%	4.0%	1Q 16	2.7%	1.3%
58	Mar-15	3.0%	3.7%	2Q 16	2.6%	1.1%
59	Jun-15	2.6%	3.7%	3Q 16	2.3%	1.4%
60	Sep-15	2.9%	3.8%	4Q 16	2.8%	1.0%
61	Dec-15	2.8%	3.7%	1Q 17	3.0%	0.7%
62	Mar-16	3.0%	3.5%	2Q 17	2.9%	0.6%
63	Jun-16	2.7%	3.4%	3Q 17	2.8%	0.6%
64	Sep-16	2.6%	3.1%	4Q 17	2.8%	0.3%
65	Dec-16	2.3%	3.4%	1Q 18	3.0%	0.4%
66	Mar-17	2.8%	3.7%	2Q 18	3.1%	0.6%
67	Jun-17	3.0%	3.7%	3Q 18	3.1%	0.6%
68	Sep-17	2.9%	3.6%	4Q 18	3.3%	0.3%
69	Dec-17	2.8%	3.6%	1Q 19	3.0%	0.6%
70	Mar-18	2.8%	3.7%	2Q 19		
71	Apr-18	3.0%	3.8%	3Q 19		
72	May-18	3.0%	3.8%	3Q 19		
73	Jun-18	3.0%	3.8%	3Q 19		
74	Jul-18	3.1%	3.8%	4Q 19		
75	Aug-18	3.1%	3.7%	4Q 19		
76	Sep-18	3.1%	3.7%	4Q 19		
77	Oct-18	3.1%	3.6%	1Q 20		
78	Nov-18	3.1%	3.7%	1Q 20		
79	Dec-18	3.1%	3.7%	1Q 20		
80	Jan-19	3.3%	3.6%	2Q 20		
81	Feb-19	3.3%	3.5%	2Q 20		
82	Mar-19	3.3%	3.4%	2Q 20		
83	Apr-19	3.0%	3.2%	3Q 20		
84	May-19	3.0%	3.2%	3Q 20		
85	Jun-19	3.0%	3.1%	3Q 20		
86	Jul-19	2.8%	2.8%	4Q 20		

Source:
Blue Chip Financial Forecasts, Various Dates.
* Col. 2 - Col. 4.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

ASSOCIATIONS EXHIBIT NO. A-10

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

investments. Therefore, the yield on intermediate-term Treasury notes is an inappropriate proxy for the risk-free rate.

Some analysts prefer to use the yield on utility bonds rather than the yield on Treasury bonds when implementing the Risk Premium methodology. Because a utility's cost of capital is determined by its business and financial risks, it is reasonable to surmise that its cost of equity will track its cost of debt more closely than it will track the government bond yield. Trends in utility cost of capital are directly reflected in their cost of debt and are not directly captured by a risk premium estimate tied to government bond yields. To guard against this possibility, the risk premium analysis should be performed using both the government bond yield and the utility bond yield, and both sets of results weighted in arriving at a final estimate of the utility's cost of equity.

One must be careful that the debt instrument used to estimate the risk premium matches the debt instrument used to calculate the interest rate component of the risk premium approach. To illustrate, if the equity risk premium is calculated by comparing stock returns with A-rated utility bond yields, consistency requires that the yield on A-rated utility bonds be used to estimate the interest rate component of the risk premium approach.

Time Period

Realized risk premium results are highly dependent on the choice of time period over which the security return data are compiled. Both the length of the period and the choice of end points can make a substantial difference in the final results obtained. For example, Table 4-1 reports the realized returns on stocks and bonds obtained by Ibbotson Associates (2005) for the last 10,

TABLE 4-1
INSTABILITY OF RISK PREMIUMS COMPUTED FROM REALIZED RETURNS

Period	Stock Returns	Bond Returns	Risk Premium
1995 - 2004	12.1	9.8	2.3
1985 - 2004	13.2	10.8	2.4
1975 - 2004	13.7	9.5	4.2
1965 - 2004	10.5	7.7	2.8
1993 - 2002	9.3	9.7	−0.4
1983 - 2002	12.7	10.6	2.1
1973 - 2002	10.7	9.3	1.4
1963 - 2002	10.5	7.5	3.0

Source: Ibbotson Associates (2005)

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

FOR INSTITUTIONAL/WHOLESALE/PROFESSIONAL CLIENTS AND QUALIFIED INVESTORS ONLY – NOT FOR RETAIL USE OR DISTRIBUTION

PORTFOLIO INSIGHTS

2019 | 23rd ANNUAL EDITION

LONG-TERM CAPITAL MARKET ASSUMPTIONS

Time-tested projections to build stronger portfolios

J.P.Morgan
Asset Management

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

2019 LONG-TERM CAPITAL MARKET ASSUMPTIONS
TABLE OF CONTENTS

4 FOREWORD

5 EXECUTIVE SUMMARY
2019 Long-Term Capital Market Assumptions

14 MACROECONOMIC ASSUMPTIONS
Stable forecasts of moderate growth and inflation

I. THEMATIC ARTICLES

20 THE TAMING OF THE BUSINESS CYCLE
Fewer recessions but weaker recoveries

28 WILL DEBT BE A DRAG?
Dealing with the upward drift in government debt

34 THE EVOLUTION OF MARKET STRUCTURE
Managing illiquidity risk across public and private markets

45 SURVIVING THE SHORT TERM TO THRIVE IN THE LONG TERM
Building investor resilience in a downturn

II. ASSUMPTIONS

54 FIXED INCOME ASSUMPTIONS
G4 government bonds: Flatter curves, lower yields

61 EQUITY MARKET ASSUMPTIONS
Turning a corner: Returns hold steady

68 ALTERNATIVE STRATEGY ASSUMPTIONS
A generally stable, relatively attractive outlook for alternatives

85 CURRENCY EXCHANGE RATE ASSUMPTIONS
U.S. dollar strength: A cyclical pause, not a new long-term trend

90 VOLATILITY AND CORRELATION ASSUMPTIONS
Stable volatility outlook, but tail risk management critical in late cycle

III. ASSUMPTIONS MATRICES

100 U.S. DOLLAR

102 EURO

104 STERLING

IV. APPENDIX

108 GLOSSARY

110 ACKNOWLEDGMENTS

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

FOREWORD

CHRIS WILLCOX

MIKE O'BRIEN

ROB O'RAHILLY

"YOU CAN NEVER PLAN THE FUTURE BY THE PAST," wrote Edmund Burke, the 18th century British political theorist and politician. When investors study the past to assess the prospects for capital markets, they must think how its lessons will, and won't, apply in the years ahead.

Amid today's challenging investing environment, we present the 2019 edition of J.P. Morgan Asset Management's Long-Term Capital Market Assumptions (LTCMAs). In our 23rd year of producing capital market estimates, we incorporate more than 50 asset and strategy classes; our return assumptions are available in 14 base currencies. Over the years, many investors and advisors have come to depend on our assumptions to inform their strategic asset allocation, build stronger portfolios and establish reasonable expectations for risks and returns over a 10- to 15-year time frame.

We formulate our LTCMAs as part of a deeply researched proprietary process that draws on quantitative and qualitative inputs as well as insights from experts across J.P. Morgan Asset Management — a collaborative effort that has evolved over the past two decades. Our own multi-asset investment approach relies heavily on our LTCMAs. The assumptions form a critical foundation of our framework for designing, building and analyzing solutions aligned with our clients' specific investment needs.

This edition of our assumptions explores the challenges of late-cycle investing in a long-term context. Over our investment horizon we see still-modest returns in many asset markets. Navigating late cycle demands that investors think and manage outside the mean. It may also require new portfolio construction tools that account for the wider spectrum of risks that investors will need to assume to drive future returns.

Whatever approach investors take, a considered, long-term strategic perspective is essential. So too is careful manager selection and attentiveness to the power of active asset allocation.

We look forward to working with you to make the best use of our assumptions in setting your own strategic perspective and pursuing your investment goals.

On behalf of J.P. Morgan Asset Management, thank you for your continued trust and confidence. As always, we welcome your feedback.

Chris Willcox
Chief Executive Officer,
Asset Management

Mike O'Brien
Co-Chief Executive Officer,
Asset Management Solutions

Rob O'Rahilly
Co-Chief Executive Officer,
Asset Management Solutions

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

EXECUTIVE SUMMARY

2019 Long-Term Capital Market Assumptions

John Bilton, CFA, *Head of Global Multi-Asset Strategy, Multi-Asset Solutions*

IN BRIEF

This executive summary gives readers a broad overview of our 2019 Long-Term Capital Market Assumptions (LTCMAs) and provides a context for how some of the structural factors affecting economies today are likely to drive asset returns over a 10- to 15-year investment horizon. The key takeaways from this year's LTCMAs:

- Our 2019 estimate for real global GDP growth of 2.5% is unchanged from last year, and despite a few country-level adjustments, the secular growth outlook is stable and risks are balanced. Asset returns at equilibrium look reasonable by historical standards, but cyclical headwinds constrain our return forecasts today and still present a challenge.
- Cyclical risks are building, many economies are operating above trend with little slack, and asset valuations are elevated. While long-term investors should consider returns over the whole cycle, the starting point matters greatly to the long-term outlook. Traditional investment frameworks reflect market risk quite well but may not capture factors like illiquidity risk, which can profoundly affect asset returns late in the cycle.
- Bond return forecasts improve this year, notably in the U.S., where policy normalization has created a favorable entry point. Global equity returns are unchanged, but there is some regional divergence, which may offer opportunities for investors. Alternatives are a relative bright spot, as fee reduction and improved alpha trends lend support.
- Expected returns for a U.S. 60/40 portfolio are slightly better, and the stock-bond frontier rotated further in a clockwise direction due to higher expected bond returns. In other regions, the frontier is little changed. This reflects both the late-cycle environment in the U.S. and the regional divergence in economic cycles. Ex-ante Sharpe ratios for U.S. Treasuries now meaningfully exceed those of U.S. stocks for the first time in a decade.
- Our message this year is to manage outside the mean. This implies looking for insight beyond our traditional mean-variance tools to help us navigate the end of this cycle. In the longer term, it suggests that while mean-reversion is a powerful force, it isn't infallible and we must be mindful which of today's dislocations may be tomorrow's new equilibria.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

INTRODUCTION

For investors, 2019 could prove to be a symbolic, possibly even seminal year. Should the U.S. expansion persist to the middle of 2019, it will set a new record for the length of a U.S. cycle. Still well short of Australia's 27-year (and counting) expansion, but a notable record nonetheless. That is true especially when we consider some of the paradoxes that characterize this cycle. Developed market (DM) policy rates are rising yet remain below prior cycle troughs, just as G7 unemployment rates are at 40-year lows. This S&P 500 bull market is the longest on record, with trough-to-peak gains almost twice the bull market average of the last 50 years; but at the same time, global equities have delivered gains about 6% shy of prior bull market averages. And just as technology is eroding geographic boundaries and functional barriers, trade protectionism may be forcing globalization into retreat, at least in the short term.

Of course, the simple chronological age of this expansion has triggered intense speculation about when the current cycle may end. Most of us will not succeed in perfectly timing the end of the cycle, and arguably the effort to do so may be something of a fool's errand. Nevertheless, understanding the complexion of late cycle and preparing for a bear market phase, whenever that may arise, is a vital exercise. Longer-term investors might be forgiven for thinking that the vagaries of the cycle are less relevant to them – but for all our focus on structural themes and equilibrium returns, we must all enter and exit the market at prevailing prices, and those will profoundly affect performance even over the longest horizons (**Exhibit 1**).

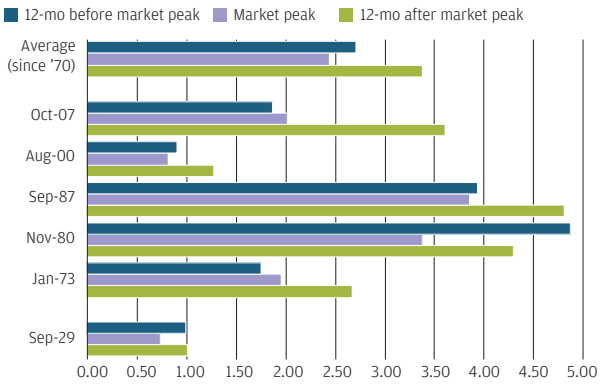
In making economic decisions, we instinctively weigh the possibilities to form a central case that is essentially an average, or mean, of possible future outcomes. But considering the end of the cycle implicitly means anticipating a discontinuity and an environment that will, for a time at least, be far away from any mean outcome. Much of our financial tool kit is anchored in average outcomes and mean-reversion, and therefore might not tell us the whole story at key turning points in cycles.

This isn't to say we should discard these trusted tools or abandon any instance of mean-reversion, and indeed our Long-Term Capital Market Assumptions work is grounded in such techniques. Instead, to gain better insight throughout the cycle we should complement those frameworks and better scrutinize assumptions of mean-reversion. After all, as this cycle has shown, economies and markets can stay far away from equilibrium for a long time, and those equilibria themselves are far from static.

Navigating late cycle demands that investors think and manage outside the mean, and evaluate how turning points in the cycle might lead to non-linear outcomes in even diversified portfolios. Scrutiny of when mean-reversion holds, and when it does not, also resonates with the broader thematic work we've undertaken. Exploring some of the apparent disequilibria we face – and recognizing where they might signal structural shifts in the fabric of our economies – is a thread that runs through all four of our thematic papers this year.

Entry point affects performance even over long time horizons

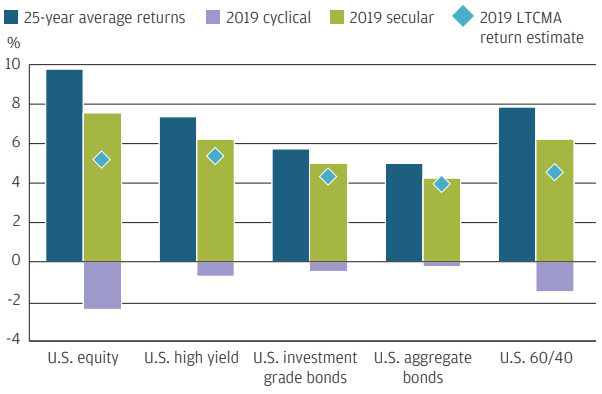
EXHIBIT 1: VALUE OF $1 INVESTED IN S&P 500 AFTER 10 YEARS GIVEN ENTRY POINT



Source: Bloomberg, J.P. Morgan Asset Management; data as of September 30, 2018.

We remain secular optimists despite increased cyclical headwinds; returns for a U.S. 60/40 stock-bond portfolio rise slightly due to better bond returns

EXHIBIT 2: HISTORICAL 25-YEAR AVERAGE RETURNS FOR KEY ASSETS AND THIS YEAR'S ESTIMATES, SPLIT INTO THEIR SECULAR (EQUILIBRIUM) AND CYCLICAL COMPONENTS



Source: Bloomberg, Datastream, J.P. Morgan Asset Management Multi-Asset Solutions; data as of September 30, 2018.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Last year, we described ourselves as secular optimists but cyclical realists. Our secular optimism is undiminished even as cyclical headwinds have increased this year — leading us to contemplate how to manage our portfolios as the storm clouds gather (**Exhibit 2**). We also note that some of the factors that might hasten the end of this cycle could also have gradual but profound effects on the economic and investment landscape over the long term. Indeed, the very nature of the cycle itself may well be changing, and with it the causes of — and remedies for — recessions. Debt levels and the size of central bank balance sheets create new challenges for policy and could ultimately compromise central bank independence; at the same time, the structure of the capital markets is evolving, generating new sources of return, and risk, for investors.

Overall, our long-term forecasts of economic growth and equilibrium interest rates change only modestly from last year. We see little upside pressure on price inflation and expect that over future cycles inflation will frequently fall short of central bank targets. This leads to a modest cut in our U.S. inflation expectations. Returns for a simple U.S. 60/40 stock-bond portfolio have risen slightly from 5.25% to 5.50% but, as a further sign that we are late in the cycle, this is entirely driven by higher returns from bonds. Most notably, our estimated Sharpe ratio for U.S. Treasuries is now meaningfully higher than that for U.S. stocks for the first time in a decade. As we will explore, Sharpe ratios don't tell the whole story, especially for assets with a left-tail risk[1] and especially when the cycle is mature, but they are a telling feature of today's investing environment.

MACROECONOMIC THEMES - MANAGING OUTSIDE THE MEAN

Our 10- to 15-year forecast for developed market real GDP growth is unchanged from last year at 1.50%, and we trim our emerging market (EM) estimate from 4.50% to 4.25% — although forecasts for the major EM economies[2] are unchanged. Overall, our global real GDP forecast of 2.50% is unchanged year-over-year and the relative levels of growth across countries and regions are similarly little changed (**Exhibit 3**). As was the case last year, our secular outlook is quite stable, with risks broadly balanced between the well-understood drag from demographics and the potential upside from a technology-led pickup in productivity. However, the cyclical risks have increased over the last 12 months — and not only from the simple aging of this cycle.

[1] We define left-tail risk as being the risk of more severe downside price action than upside price action; such assets can suffer more severe repricing during periods of stress than may be implied by a simple normal distribution.

[2] China, India and Brazil real GDP forecasts are unchanged this year; Russia real GDP growth forecasts are cut by 25 basis points.

Our 2019 global growth assumptions are subdued but mostly stable

EXHIBIT 3: MACROECONOMIC ASSUMPTIONS (%)

	2019 assumptions		2018 assumptions		Change (percentage points)	
	Real GDP	Core inflation	Real GDP	Core inflation	Real GDP	Core inflation
DEVELOPED MARKETS	**1.50**	**1.75**	**1.50**	**1.75**	**0.00**	**0.00**
U.S.	1.75	2.00	1.75	2.25	0.00	-0.25
Eurozone	1.50	1.50	1.50	1.50	0.00	0.00
UK	1.25	2.00	1.25	2.00	0.00	0.00
Japan	0.50	1.00	0.50	1.00	0.00	0.00
Australia	2.00	2.50	2.00	2.25	0.00	0.25
Canada	1.50	1.75	1.50	1.75	0.00	0.00
Sweden	1.75	1.75	1.75	1.75	0.00	0.00
Switzerland	1.25	0.50	1.25	0.75	0.00	-0.25
EMERGING MARKETS*	**4.25**	**3.50**	**4.50**	**3.50**	**-0.25**	**0.00**
China	5.00	2.75	5.00	2.75	0.00	0.00
India	7.00	5.00	7.00	5.00	0.00	0.00
Brazil	3.00	4.75	3.00	5.00	0.00	-0.25
Russia	1.25	5.50	1.50	5.50	-0.25	0.00
GLOBAL	**2.50**	**2.25**	**2.50**	**2.50**	**0.00**	**-0.25**

Source: J.P. Morgan Asset Management; estimates as of September 30, 2017 and September 30, 2018.

* Emerging markets aggregate derived from nine country sample.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

The U.S.-China[3] trade dispute increasingly appears to be as much about ideology as tariff disparity and could well define the path of globalization far beyond the current cycle. U.S. policy normalization is inexorably tightening global financial conditions and may yet hasten the turn of the cycle, perhaps before other central banks even get going (**Exhibit 4**), risking a semi-permanent divergence in policy across the world economy. Corporate leverage itself might not trigger a downturn but could be an accelerant, and in the longer run high indebtedness across an economy complicates the transmission of monetary policy. But rather like trying to time a downturn, attempting to identify precise catalysts can be a futile exercise. Instead, recognizing where risks reside and considering how they might evolve and affect our secular framework is a key area of focus for our LTCMA thematic papers this year.

Our first paper explores this trend directly. It looks at the anatomy of past recessions and considers what the nature of future recessions — and recoveries — might be. Our LTCMA framework is designed to be "cycle neutral" by virtue of its long horizon, but it is not "cycle agnostic" in any sense. Put another way, we don't seek to time cycles within our framework, but our return forecasts are sensitive to the starting point. Arguably, the global economy today is more stable, which likely means longer and shallower cycles in the future as imbalances take longer to build up.

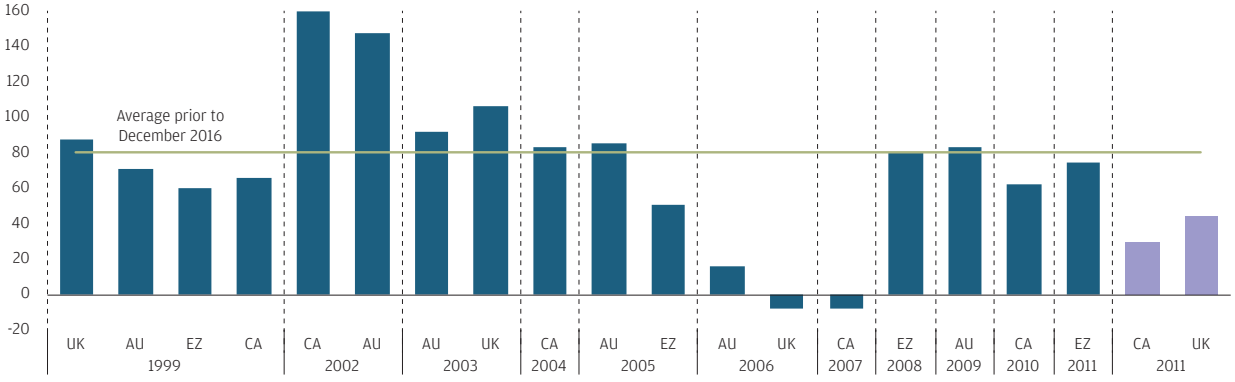
But just as downside risks are muted by a shorter inventory cycle, improved bank capitalization and steadier government spending patterns, the tools to stimulate an ailing economy are also blunted and forces that drove V-shaped recoveries in the past are fading. This likely means shallower recoveries and ever more inventive monetary policy. In short, it is likely that over the next decade policy rates are more often loose, with respect to the neutral rate of interest, than tight. Rates may remain below equilibrium for longer periods than in the past, as protracted periods of loose policy will probably be needed to stabilize future expansions.

Shallower and longer cycles that rely on prolonged stimulus will likely subdue interest rates, and this has major implications for debt dynamics. In our second paper, we explore government indebtedness — what might reduce it and whether governments either need to or want to reduce their debt levels. With rates likely to remain low and frequently below their neutral rate, there may be little incentive for governments to address debt levels over our 10- to 15-year forecast horizon. While this simply postpones the issue, it also means that anchoring our forward expectations to past averages for either sustainable debt levels or policy rates may prove incorrect. Perhaps, more profoundly, it also raises the question of whether the dual forces of rising government debt levels, and the growing exposure of central bank balance sheets to that debt, means we've passed the high water mark of central bank independence.

[3] Other trade disputes — e.g., NAFTA and with the European Union — we expect to be resolved through tariff negotiation, but the dispute with China at the time of writing appears less likely to be readily resolved.

Hiking cycles are often more globally synchronized; the U.S. yield curve is flatter today than the typical levels at which other regions would start their hiking cycles

EXHIBIT 4: U.S. 3-MONTH TO 2-YEAR BOND CURVE AT THE START OF MAJOR CENTRAL BANKS' HIKING CYCLE (BPS)



Source: Bloomberg, J.P. Morgan Asset Management; data as of October 2018.

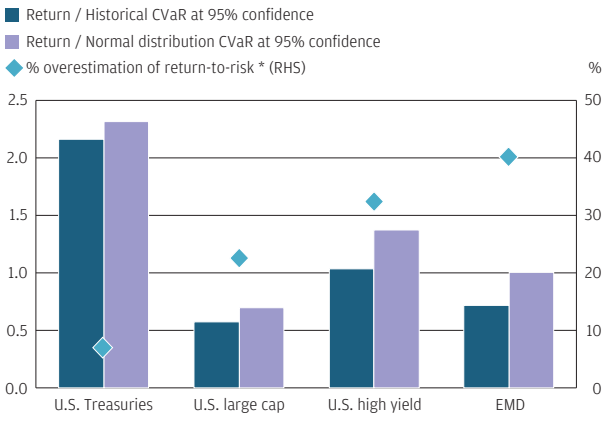
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Our third paper starts by looking at how the secular decline in interest rates has helped to catalyze an evolution of public equity markets from a venue primarily for raising investment capital to a venue used increasingly for cash distribution and balance sheet management. At the same time, private markets have grown in scale and scope to offer development capital to firms of all sizes. Today's large and accessible private asset markets offer potentially superior returns, subject to illiquidity risk and appropriate manager due diligence. Even as private assets have moved into the mainstream for investors, illiquidity risk – in both private and some public assets – can be a secondary consideration for many investors.

Common investment tools like Sharpe ratios take little direct account of liquidity, especially in periods of market stress, but other tools, such as CVaR (conditional value at risk) or Sortino[4] ratios, can be illuminating (**Exhibit 5**). And as late cycle plays out, ensuring proper compensation for illiquidity risk as well as market risk is crucial. Over the long term, public equity returns are likely to be dominated by income – leaving private asset markets to fill a return gap for investors and a funding gap for corporates. Ultimately, this demands new portfolio construction tools that account for the wider spectrum of risks that investors will need to assume to drive returns in the future.

Metrics that account for the distribution of risks as well as the average level of risks are valuable in late cycle

EXHIBIT 5: RETURN-TO-RISK RATIOS FOCUSED ON LEFT-TAIL RISK



Source: J.P. Morgan Asset Management Multi-Asset Solutions; data as of September 2018.

* Percentage difference between return-to-CVaR based on normal assumption and return-to-CVaR based on historical experience. Both CVaR measures are computed at 95% confidence level. See Volatility assumptions section for details.

The practicalities of managing a portfolio over the cycle is the focus of our final paper. Based on historical precedent, and a little humility, it is fair to say that most of us can neither predict the cause nor the timing of a downturn. However, we can make a reasonable assessment of the events that would wreak the greatest havoc in our particular portfolios. A shock caused by an excessive rise in interest rates may well have less impact on a liability-driven portfolio than on a long-only bond mutual fund, while a slump in corporate confidence and earnings might hit U.S. retail investors harder than their European peers, who generally own fewer stocks. If managing outside the mean is central to navigating the end of this cycle and locking in the more compelling secular returns that we anticipate, then identifying the non-linear exposures in specific portfolios is perhaps the best place to begin.

A common theme in our work this year is anticipation of discontinuity in the short term and accommodation of disequilibria in the long term. And yet we remain, at heart, quite optimistic. Our return numbers at equilibrium[5] are a little below the averages of the last 50 years, but after accounting for prevailing cyclical headwinds they are healthy enough. To be sure, investors may need to look for ways to complement existing investment frameworks. Managing outside the mean doesn't imply ignoring average return expectations and normalized risk-return profiles, but builds upon the traditional investing tool kit to better reflect tail risks and factors such as illiquidity. Nor does managing outside the mean suggest that we ignore equilibrium anchors, but it does imply that we should anticipate that some factors can stray from fair value for prolonged periods – especially given the unprecedented patterns of demographics, policy and market structure that look set to define the long-term investing environment.

[4] Conditional Value-at-Risk (CVaR): A risk assessment measure that qualifies the amount of tail risk in a portfolio, with a focus on less profitable outcomes, useful in unlikely scenarios. Sortino ratio improves the Sharpe ratio by isolating downside volatility from total volatility by dividing excess return by downside deviation.

[5] "At equilibrium" return numbers represent our forecasts assuming valuations, margins, credit spreads and interest rates to be at our fair value estimates rather than at prevailing market levels.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Selected LTCMA returns – Cyclical risks are building, weighing on returns and risk premia for equity and riskier credit

EXHIBIT 6: SELECTED LTCMA RETURNS (%)

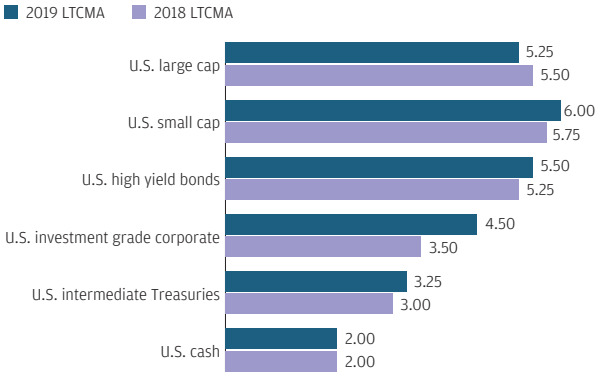
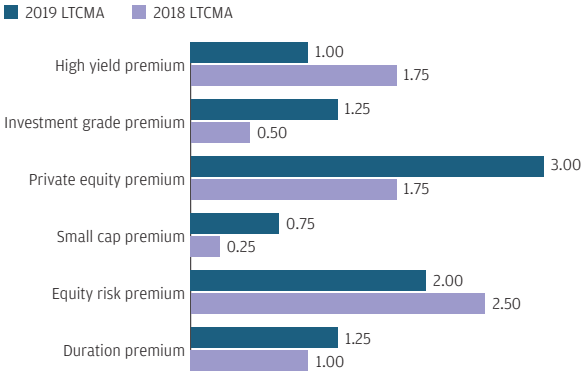


EXHIBIT 7: SELECTED LTCMA RISK PREMIA



Source: J.P. Morgan Asset Management; estimates as of September 30, 2017 and September 30, 2018.

MAJOR ASSET CLASS ASSUMPTIONS

Our stable long-term economic outlook this year translates into a fairly stable outlook for returns at equilibrium, with much of the variation in our asset return forecasts explained by market moves over the course of 2018 (**Exhibits 6** and **7**). At a global aggregate level, equity return expectations are little changed from last year, while our forecast for global government bond returns is slightly higher. There are meaningful regional differentials, mainly reflecting U.S. leadership in equity markets over 2018 and the more advanced state of policy normalization in U.S. rates.

Ex-ante Sharpe ratios for U.S. Treasuries now stand above those for U.S. equities, which is consistent with an economy late in its cycle. What is perhaps an important nuance is that the U.S. Treasury Sharpe ratio is boosted more by low interest rate volatility than by elevated returns. This may be an overhang of the loose monetary policy we have experienced over this cycle. In most other regions, however, equity Sharpe ratios are still higher than those for bonds, largely because policy normalization has yet to begin in many economies. The puzzle that investors face in judging the long-term global outlook in 2019 may be in deciding the extent to which patterns in the U.S. market will dominate risk appetite around the world – and in turn how much the U.S. will set the tempo for the entire global economic cycle.

FIXED INCOME – Flatter curves, lower yields

U.S. policy normalization has continued at a slow and steady pace. At the time of writing, U.S. cash rates and 10-year yields are close to our estimates of long-term equilibrium. We expect cash rates to rise further in this cycle but see less upside risk to long-end yields, likely leading to a flat or inverted yield curve at the end of this cycle, albeit at low absolute levels of rates. We see lower rates and flatter curves as a secular condition over the next 10 to 15-years, a view that reflects our dovish inflation outlook and anticipation of extended periods of stimulus as future business cycles elongate.

With U.S. rate normalization well advanced while other regions have yet to begin, there is a risk that this economic cycle might end before the hiking cycle outside the U.S. gets underway – raising the prospect of structural divergence in policy around the globe that transcends the current cycle. Cuts to equilibrium rate assumptions plus normalization[6] in some regions mean that our return expectations for global government bonds are slightly higher than last year. Credit and EM debt still offer the best return possibilities across fixed income over our forecast horizon. However, we would caution that their optically strong Sharpe ratios and contained volatility estimates probably do not capture the illiquidity risk that can manifest itself in stressed markets.

[6] Policy normalization in the U.S. has resulted in a more favorable starting point for U.S. bonds; for regions yet to begin normalizing rates (e.g., Europe), there is still a meaningful normalization penalty weighing on bond returns.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

EQUITY – Turning a corner, returns hold steady

Our equity return forecasts for 2019 are largely a reflection of the variation in regional fortunes over the last year. Our forecast for U.S. equities, which led the pack in 2018, is down 25 basis points (bps) to 5.25%, and the U.S. equity risk premium (ERP) is now below long-term averages. By contrast, our forecast for EM equities, 2018's laggard, is up 50bps to 8.50%. This modestly widens the wedge between DM and EM equity return forecasts to 2.75% in USD terms and 3.00% in local FX. The underlying return drivers for DM and EM equities diverge further still in our 2019 forecasts, with as much as four-fifths of forecast returns in DM equity coming from dividends and buybacks, compared with less than one-third in EM equity.

One factor that unites both DM and EM equity is that stock markets in general are a lightning rod for de-risking when the economic cycle turns. So while investors must judge both how much risk to carry in late cycle and how far the cycle could run, we would reiterate that the equilibrium return assumptions for global equities are stable and reasonably attractive. Crucially, the cyclical elements that constrain returns today in some markets result in very different optimized portfolio allocations at prevailing return forecasts and at our expected equilibrium returns (**Exhibit 8**). What count for cyclical headwinds today – high valuations and wide margins – will become cyclical tailwinds after this cycle has troughed. A crucial consideration for any long-term investor in 2019 will be the trade-off between how much to continue to attempt to extract returns from risk assets in this cycle and how much "dry powder" to try and keep for the next one.

ALTERNATIVE ASSETS – Alpha gets you halfway

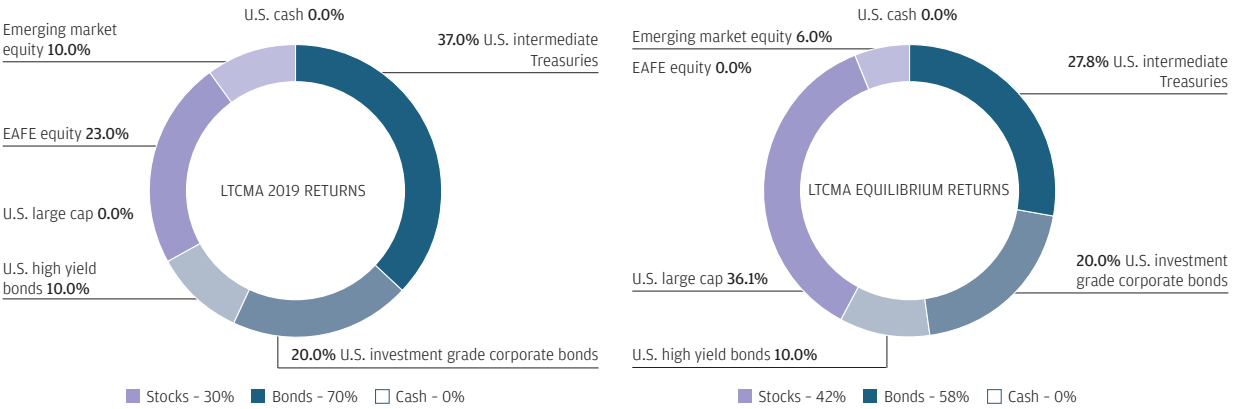
Alternative assets are a relative, and in some cases an absolute, bright spot in our 2019 assumptions. Improving alpha expectations in private equity result in an upgrade to our outlook this year. Elsewhere, return expectations across most other alternatives classes are little changed from last year, as the tailwind from lower fees roughly balances the headwind from lower public market returns. Given the paucity of returns in traditional asset classes, we expect that capital will continue to flood into alternative assets in search of enhanced returns – but probably pushing up valuations and eventually weighing on future returns. This prompts us to repeat our refrain that manager selection is the primary determinant of return across alternatives. Compensation for illiquidity and a modest boost to our alpha assumptions may get investors part of the way to their return aspirations in alternatives, but there really is no substitute for manager due diligence – especially given where we are in the economic cycle.

FOREIGN EXCHANGE – All roads lead to the dollar

Our forecasts for the major currencies this year are little changed, with our fair value estimate of EURUSD at 1.32 and USDJPY at 92, which illustrates the relative stability in our long-term economic outlook this year. The U.S. dollar remains well above fair value, but as price action over the last 12 months demonstrates, long-term valuation anchors have only limited influence on currencies' short-term trading patterns. Nevertheless, we expect that the dollar will weaken against most major crosses over our forecast horizon, boosting returns from international diversification for USD-based

An optimized liquid asset portfolio using our prevailing 10- to 15-year return assumptions looks very different from an optimized portfolio using equilibrium return estimates

EXHIBIT 8: LIQUID PORTFOLIO (EX-ALTS) WITH 2019 LTCMA RETURNS VS. EQUILIBRIUM RESULTS



Note: Stylized liquid asset portfolio mean-variance optimized for moderate risk tolerance using 1. LTCMA 2019 returns and 2. Equilibrium returns; max allocation constraints of 20% IG, 10% HY, 55% U.S. equity, 35% EAFE equity, 10% emerging market equity.

Source: J.P. Morgan Asset Management Multi-Asset Solutions; estimates as of September 30, 2018.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

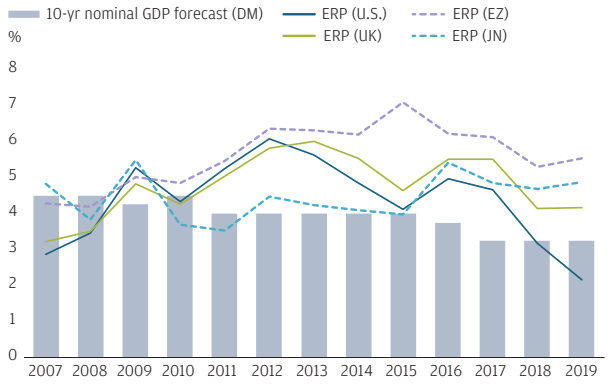
investors but having a rather more nuanced effect for non-dollar based investors. The Chinese renminbi will likely gain greater stature as an international reserve currency over the next decade. But despite concerns over U.S. deficits and debt dynamics that will only increase as time passes, we see little challenge to the dollar as the world's reserve currency over our forecast horizon. As a result, the trajectory of the greenback will continue to set the tone in currency markets.

IMPLICATIONS FOR INVESTORS

A couple of years ago, our secular growth forecasts were still falling but equity risk premia were elevated. Today our growth estimates are stable, but equity risk premia, notably in the U.S., are lower (**Exhibit 9**). The result is a progressive flattening of the U.S. stock-bond frontier, last year driven mostly by lower equity return expectations but this year largely driven by better bond returns. In other regions, where policy normalization has yet to begin, stock-bond frontiers are steeper even though returns for a 60/40 stock-bond portfolio are lower in absolute terms.

Estimates for equity risk premia are falling, especially in the U.S., even though GDP growth forecasts are stable

EXHIBIT 9: LTCMA IMPLIED EQUITY RISK PREMIA (ERP), % PER ANNUM

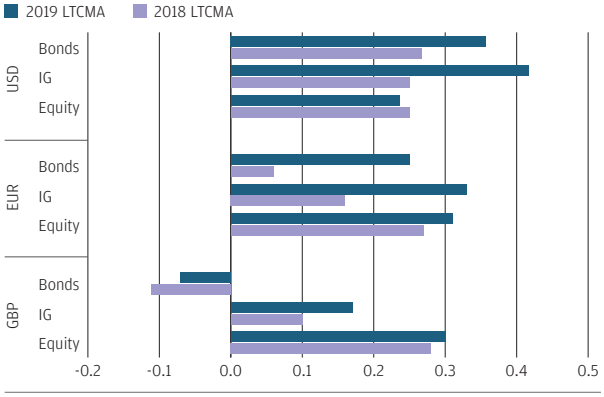


Source: J.P. Morgan Asset Management Multi-Asset Solutions; estimates as of September 2018.

The pattern also holds in regional Sharpe ratios: U.S. bond Sharpe ratios are ahead of those for U.S. stocks, but in Europe the reverse is true (**Exhibit 10**). The relative shape of stock-bond frontiers and rank order of Sharpe ratios in various currencies reflect the regional differences in stages of the business cycle and policy normalization rather well. But they won't tell us when a downturn may hit, where it will start and how it could spread, or what the distribution of returns might be in stressed markets.

For the first time since the crisis, U.S. bond Sharpe ratios are well ahead of those for U.S. stocks, but in Europe the reverse is true

EXHIBIT 10: SELECTED SHARPE RATIOS FOR G3 CURRENCIES



Source: J.P. Morgan Asset Management; estimates as of September 30, 2017 and September 30, 2018.

Looking ahead, a recession is virtually inevitable over the next decade and likely to occur sooner rather than later in our 10- to 15-year horizon. Many investors fixate on the precise catalysts and shape of the next downturn — and specifically on avoiding it. Yet market timing is notoriously tricky. We believe that focusing on staying in the game through a contraction and evaluating the possible contour of the next cycle is the more effective approach over the long run.

For any investor — even those with a longer-term horizon — navigating late cycle means recognizing what a traditional mean-variance-based framework can tell us and what it cannot. A relatively flat U.S. stock-bond frontier (**Exhibits 11A** and **11B**) tells us that de-risking is becoming more attractive, but it doesn't tell us whether policy rates outside the U.S. will normalize before the cycle rolls over. Relatively high Sharpe ratios in U.S. high yield and EM debt tell us that credit is attractive over a whole cycle, but don't tell us whether there will be the liquidity to cut positions in a weak market. And average long-term return forecasts for eurozone stocks that are three-quarters of a point above those for U.S. stocks don't tell us whether the skew of actual returns might be to the left in Europe but to the right in the U.S.

Managing outside the mean late in the cycle entails not only optimizing to market risks evident in our traditional frameworks, but also recognizing the risks they don't capture and, most importantly, ensuring those are compensated.

Turning to the long-term investing environment, we believe that identifying which elements of the current cycle might evolve into structural hallmarks of the next one is an important exercise; in particular, where they may lead apparently cyclical dislocations to become permanent or

cause accepted equilibria to reset. After all, mean-reversion is a powerful force, but it is not infallible. Differentiating among those dislocations that may be persistent, rather than merely stubborn, is critical in understanding the secular economic and investment environment.

We imagine that it is in policy rates where persistent dislocations are most likely to arise, as flatter cycles less sensitive to stimulus hold policy rates below equilibrium for long periods. This could in turn stoke asset prices, driving future rounds of asset inflation without associated price inflation. The new technology trends we wrote about last year[7] only serve to contain price and wage inflation further, even as they boost real growth and productivity. To the extent that such an environment reinforces economic inequality, the temptation for governments to borrow to fund fiscal stimulus is a good reason to think that national debt levels are unlikely to mean-revert anytime soon. In our view, policy rates, government balance sheets, market structure patterns and inflation trends all represent structural shifts in the investing environment that a simple mean-reversion framework is unlikely to capture.

To help meet these challenges, investors will be well served by focusing on more active investment around secular themes such as technology, and the growth in alternative assets, as well as ensuring all elements of risk – not merely market risk – are appropriately rewarded. For larger, more constrained or more risk-averse investors, the ability to de-risk efficiently as expected bond returns rise in some markets helps with staying in the game in late cycle, and in positioning for the next one. And for investors with deeper pockets or limited mark-to-market pressure, attractive Sharpe ratios on some less liquid assets create the potential to enhance returns over the long run, albeit with some nearer-term volatility. In any case, navigating late cycle doesn't mean avoiding risk, but it does mean knowing the risks you're taking.

[7] "The impact of technology on long-term potential economic growth," 2018 *Long-Term Capital Market Assumptions*, J.P. Morgan Asset Management, 2017.

Compared with last year, expected returns on a U.S. 60/40 portfolio are slightly better and improved bond returns have rotated the stock-bond frontier clockwise; by contrast, in Europe returns and frontiers are unchanged, reflecting that Europe has lagged the U.S. in policy normalization

EXHIBIT 11A: USD STOCK-BOND FRONTIERS AND 60/40 PORTFOLIOS BASED ON 2019 VS. 2018 LTCMAS FOR RISK AND RETURN (%)

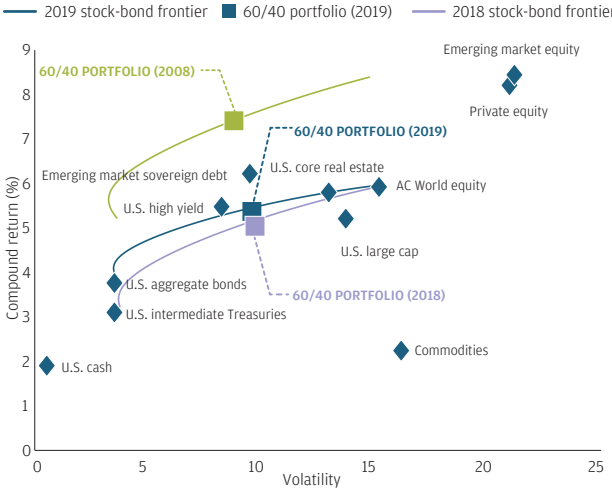
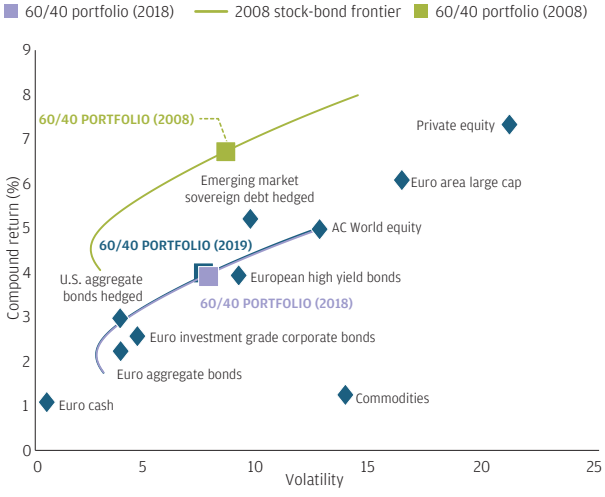


EXHIBIT 11B: EUR STOCK-BOND FRONTIERS AND 60/40 PORTFOLIOS BASED ON 2019 VS. 2018 LTCMAS FOR RISK AND RETURN (%)



Source: J.P. Morgan Asset Management Multi-Asset Solutions; estimates as of September 30, 2017 and September 30, 2018.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Stable forecasts of moderate growth and inflation

Michael Hood, *Global Strategist, Multi-Asset Solutions*
Dr. David Kelly, CFA, *Chief Global Strategist, Head of Global Market Insights Strategy*
Benjamin Mandel, Ph.D., *Global Strategist, Multi-Asset Solutions*

IN BRIEF

- This year's edition of our Long-Term Capital Market Assumptions (LTCMAs) makes few significant changes to the forecasts for GDP growth and inflation that underlie each asset class outlook.
- Our unchanged developed market (DM) growth projections lie below long-term historical averages, largely because of demographic forces. Among the four major DM economies, we think the U.S. will deliver the fastest pace of economic growth.
- Emerging market (EM) economies will continue to outgrow their DM counterparts, with India and China leading the way. We expect the gradual deceleration in Chinese growth underway during the past five years will persist over our forecast horizon.
- Fairly stable inflation will prevail at the global level. U.S. inflation will likely spend more time below target than above it; we slightly downgrade our U.S. CPI forecast.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

In this 2019 edition of our Long-Term Capital Market Assumptions, we are not significantly changing the macroeconomic forecasts that underlie each asset class outlook. Indeed, our developed market economy growth projections have not moved compared with last year (**Exhibit 1**). For these countries, we continue to expect modest growth by historical standards, mostly because of weaker demographics. In some cases, however, our DM forecasts imply acceleration relative to average performance over the past decade. Continuing a trend that began in 2018, we see more upside risk to our DM projections than was generally the case in earlier years. By contrast, a handful of our emerging market economy growth numbers have fallen. These adjustments bring down the EM growth aggregate by 0.25 percentage points, but we continue to expect EM economies to expand considerably faster than their DM counterparts during the next 15 years, given still-ample space for gradual convergence toward DM income levels. Our 1.50% forecast for DM growth and our 4.25% EM figure combine to imply 2.50% global real GDP growth during our forecast horizon, the same as in 2018.

Our long-term inflation forecasts have shifted a bit more this year, although the aggregate levels are unchanged, with DM inflation averaging about 1.75% and EM inflation at 3.50%. In most cases, over the long run inflation seems likely to run fairly close to central bank targets. We recognize, however, that the distribution of inflation outcomes in many countries has changed during the past decade or so, with more low-side readings and fewer high outcomes. Put another way, inflation has shown a greater tendency to linger at low levels in post-recession environments, without overshooting strongly when the economic cycle is more advanced. While outright deflation remains a rare outcome, the risk to our base case inflation forecasts likely tilts to the downside.

GDP GROWTH: LONG-TERM DRIVERS

In setting our growth projections, we attempt to define a long-term trend or potential rate of expansion for each economy. In doing so, we focus on slow-moving drivers of capacity growth, which fall into three categories:

- **Labor input**, the growth rate of the labor force and the rate of improvement in human capital, along with any expected change in average hours worked.
- **Capital stock growth rate**, a reflection of investment spending.
- **Total factor productivity (TFP)**, which owes primarily to technological change, at least in DM economies.

We take a similar approach for emerging markets, with one nuance: Here, we think about TFP growth as reflecting varying speeds of convergence toward the global technological frontier rather than the movement of that line itself.

Our 2019 assumptions anticipate slow real GDP growth globally; global growth assumptions are little changed from last year at the aggregate level, with most developed-market projections stable

EXHIBIT 1: MACROECONOMIC ASSUMPTIONS (%)

	2019 assumptions		2018 assumptions		Change (percentage points)	
	Real GDP	Inflation	Real GDP	Inflation	Real GDP	Inflation
DEVELOPED MARKETS	**1.50**	**1.75**	**1.50**	**1.75**	**0.00**	**0.00**
U.S.	1.75	2.00	1.75	2.25	0.00	-0.25
Eurozone	1.50	1.50	1.50	1.50	0.00	0.00
UK	1.25	2.00	1.25	2.00	0.00	0.00
Japan	0.50	1.00	0.50	1.00	0.00	0.00
Australia	2.00	2.50	2.00	2.25	0.00	0.25
Canada	1.50	1.75	1.50	1.75	0.00	0.00
Sweden	1.75	1.75	1.75	1.75	0.00	0.00
Switzerland	1.25	0.50	1.25	0.75	0.00	-0.25
EMERGING MARKETS	**4.25**	**3.50**	**4.50**	**3.50**	**-0.25**	**0.00**
China	5.00	2.75	5.00	2.75	0.00	0.00
India	7.00	5.00	7.00	5.00	0.00	0.00
Brazil	3.00	4.75	3.00	5.00	0.00	-0.25
Russia	1.25	5.50	1.50	5.50	-0.25	0.00
GLOBAL	**2.50**	**2.25**	**2.50**	**2.50**	**0.00**	**-0.25**

Source: J.P. Morgan Asset Management; estimates as of September 30, 2018.

* Emerging markets aggregate derived from nine-country sample.

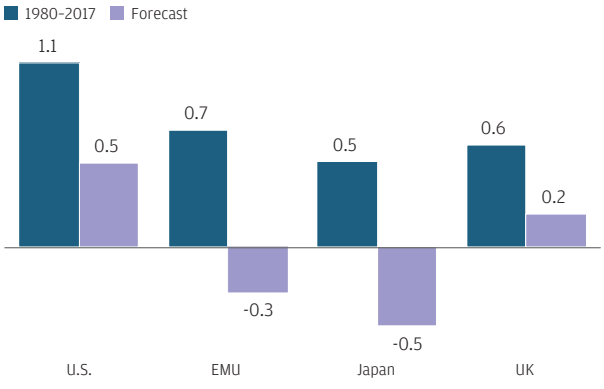
DM GROWTH: LABOR FORCES ACCOUNT FOR DIFFERENCES

Our unchanged DM growth projections lie below long-term historical averages, largely because of demographic forces. With population growth slower than it has been in the past and age structures (the distribution of a population's ages) now tilted toward older people, labor forces are increasing more sluggishly than before (**Exhibit 2**). On the high side, we expect 0.7% annual average labor supply growth in Australia; at the other end of the spectrum, Japan's labor force will likely shrink by 0.5% annually. At a 0.5% rate, the U.S. should benefit from relatively favorable labor supply trends, although even that figure falls well short of the 1.3% annual average labor force growth sustained as recently as the 1990s.

To estimate labor supply growth, we begin with the U.S. Census Bureau population projections for each country and then make assumptions about how participation in the labor force will evolve. Possible swings in immigration flows notwithstanding, there is little uncertainty about the population figures themselves over this time frame. After all, every person who will be of working age during our forecast horizon (the next 15 years) has already been born. More doubt attaches to labor force participation. We run a variety of scenarios for each economy, separating the age 15–64 population from those 65 and older (who are less likely to be involved in the labor force but whose participation has been rising in many countries).

Labor forces are increasing more sluggishly

EXHIBIT 2: DM LABOR FORCE GROWTH HISTORY AND FORECAST (% P.A.)



Source: Haver Analytics, J.P. Morgan Asset Management; data as of September 30, 2018.

Recent trends justify some optimism about participation in both cohorts, and we see modest upside risk to our forecasts. Even the most optimistic scenarios, though, would translate into only about a 0.25 percentage point (ppt) boost to expected GDP growth, relative to our baseline figures.

One question concerns possible effects of the more flexible working arrangements of the "gig economy," which conceivably could boost labor supply by allowing contributions from people who were previously sidelined. For now, we do not adjust our projections for two reasons. First, recent studies have shown that such jobs still represent a small minority of total employment. Second, the part-time nature of much of this work means that a decline in average hours worked could serve as a partial offset to any boost in the number of persons employed. In coming years, though, our forecasts will likely need to grapple further with the effects of these flexible arrangements and what they may mean for labor supply and other aspects of potential growth.

Our forecasts for TFP growth have edged higher this year vs. 2018. To be sure, evidence from the past year or so, especially outside of the U.S., does not yet suggest any acceleration from the generally weak TFP growth experienced since the financial crisis. That said, with seemingly rapid technological advances occurring in many fields, an eventual pickup in measured TFP growth, at least back toward historical norms, seems increasingly plausible. Our forecasts expect TFP to add 0.7ppt to GDP growth in the U.S., which we think of as a vanguard country in this respect; the boost is slightly less in other DM economies.

Combined with our assumptions about capital stock evolution, these labor supply and TFP expectations generate a 1.75% rate of average U.S. real GDP growth, in line with our estimates of the past two years. We continue to see the U.S. leading the way among the four major DM economies, with the euro area in second place at 1.50%. Although it suffers from significantly weaker demographics, the euro area is expected to benefit from three key factors: the ongoing take-up of the spare capacity created, especially in the labor market, by two recessions since 2009; rising workforce participation as labor market reforms pursued in several countries during the past decade take hold; and greater improvement in human capital as educational standards rise in economies such as Italy and Spain. We think UK growth will average 1.25%, with a penalty associated with the country's departure from the European Union and the associated deterioration in its foreign trade arrangements. Admittedly, uncertainty around this forecast remains high, as the exact nature of the UK's exit has not yet become clear. Japan, with its rapidly declining workforce, brings up the rear at 0.50%. The Japanese labor force has surged in the past few years, boosting growth, but with the country's labor force participation already quite high, we do not expect this trend to persist through our forecast horizon.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

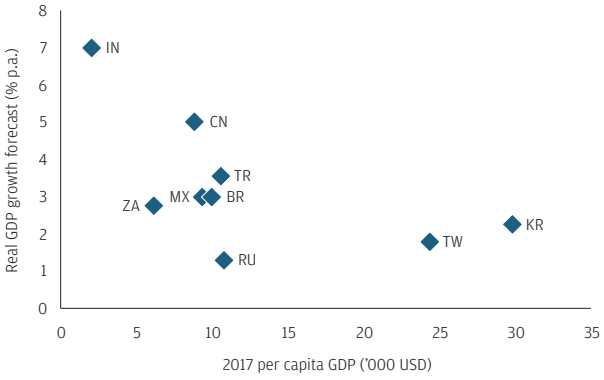
EM GROWTH: CONVERGENCE TO CONTINUE

As in prior years, we expect EM economies to outgrow their DM counterparts during our forecast period, with India and China – where per capita GDP remains fairly low compared with DM levels – leading the way (**Exhibit 3**). In parts of the EM universe, this outperformance reflects more favorable demographics, but population growth has already slowed sharply in other EM countries. Indeed, labor forces are expected to shrink during our forecast horizon in Korea, Taiwan and Russia, and to grow at a pace similar to the U.S. in China, Brazil and Turkey.

Larger EM-DM differences appear in other aspects of growth: in TFP, where EM economies can potentially converge toward the global frontier by adopting existing technology and best practice industrial organization techniques; in human capital, where educational standards are rising more rapidly than in already highly educated DM societies; and in investment, as many EM economies possess capital stock-to-GDP ratios below DM levels.

EM economies will continue to outperform their DM counterparts, although labor force growth is slowing in some countries

EXHIBIT 3: EM PER CAPITA GDP AND GROWTH FORECAST



Source: Haver Analytics, J.P. Morgan Asset Management; data as of September 30, 2018.

Our growth projections have not changed for three of the largest EM economies: China, India and Brazil. We expect the gradual deceleration in Chinese growth underway during the past five years to continue bringing growth to a 5.00% average for our forecast horizon. To be sure, the prime-age Chinese population will shrink over this period, but continued urbanization should provide an offset. Moreover, China has established a favorable track record of convergence via technology adoption and international trade specialization. Current tensions on the trade and technology-transfer fronts thus represent downside risk to our forecast. As has been the case in recent years, India leads the way in our growth forecasts, at 7.00%, helped by favorable demographics, improving human capital and its low starting point in per capita GDP, leaving corresponding room for catch-up. Our Brazil projection remains at 3.00%, supported by a weak cyclical starting point that has generated significant spare capacity but held back by uncertainty about the policy framework likely to prevail in coming years. We have cut our Russia forecast to 1.25%, extending a trend underway in recent years. Not only does Russia face an unfavorable demographic outlook with a declining workforce, but its commodity-centric economic structure, closed political system and vulnerability to international sanctions are likely to restrict TFP growth persistently.

INFLATION: INCREASINGLY ASYMMETRIC AROUND TARGET

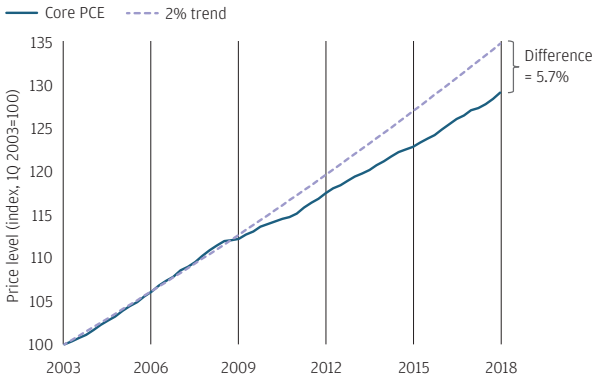
While we maintain a fairly stable outlook for inflation at the global level, we have made some country-level modifications to account for trends in the distribution of inflation outcomes. When making long-term inflation forecasts, we combine a view of the equilibrium rate of inflation – often governed by central bank targets – with specific features of the inflation process at the country level. As such, our projections represent a joint assessment of both the end point and the expected future path of price growth.

Among developed market forecasts, we scrutinize most closely our outlook for U.S. inflation. On the one hand, we believe that the Federal Reserve has maintained credibility in its 2% target for the personal consumption deflator (about 2.25% for CPI growth) and, indeed, the gravitational pull of its target has contributed to core CPI rising through 2% this year. On the other hand, we have just come to the end of a very long period in which inflation undershot its target, accompanied by a fattening of the inflation distribution's left tail. As policymakers' priorities for the coming years become clear, we arrive at the sobering conclusion that U.S. inflation is likely to spend more time below target than above it in the next 10 to 15 years (**Exhibit 4**). Binding constraints for inflation's path include what we perceive to be limited tolerance by policymakers for an inflation overshoot, and the high probability that policy interest rates return to the zero lower bound in the next recession, constraining the ability of monetary policy to boost demand and prices. Both of these constraints imply more undershooting of the target than overshooting over the next cycle. Balancing these considerations, we downgrade the U.S. CPI forecast by 25 basis points (bps), to 2%.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

U.S. inflation will likely undershoot the Fed's target for much of the next cycle

EXHIBIT 4: U.S. CORE INFLATION VS. TREND



Source: Haver Analytics, J.P. Morgan Asset Management; data as of May 31, 2018.

In the other G4 economies, our projections are unchanged relative to last year. In the euro area, low inflation is a headwind insofar as expectations may have drifted downward, but we are comfortable with 1.5% as a reasonable discount to the European Central Bank's 2% inflation ceiling. In the UK, trailing inflation is near the Bank of England's target and the historical distribution is diffuse and roughly symmetric, keeping us at 2%. Finally, recent decades of history are not especially relevant in forecasting inflation in Japan, as they reflect a period when inflation expectations were anchored in negative territory. A gradual upward drift toward the Bank of Japan's 2% target — with a dynamic similar to the improvement observed over the past five years — is consistent with a 1% average realization over our forecast horizon.

Emerging markets present several general differences in the nature of their inflation dynamics relative to developed markets. First, inflation volatility is higher across the board, reflecting a somewhat weaker monetary policy anchoring, as well as the stronger influence of food prices and exchange rate volatility on domestic prices. These observations are related to the fact that EM inflation distributions tend to have fatter right tails, as blowouts in food and FX occasionally push inflation dramatically higher.

We make two kinds of revisions to our EM inflation forecasts. The first addresses the set of economies displaying more classical EM inflation characteristics. Mexico and Turkey, for example, have both been running inflation persistently above target, and currency volatility is adding significant skewness to inflation outcomes. Taking these developments into account, in Mexico's case we increased our forecast by 25bps to 3.5%, while noting that higher inflation drivers will be mitigated to some extent by expected peso appreciation over time. In Turkey, our forecast climbed 50bps to 7.5%, reflecting underlying erosion in central bank credibility. Brazil's estimate fell 25bps in light of an unusually low starting point as well as a likely headwind from currency appreciation and the imminent reduction in the central bank's target.

The second group of revisions relates to economies where inflation dynamics have begun to trend in the direction of their DM counterparts. In China and Korea (where, to be sure, the underlying drivers of inflation are distinct from developed markets'), inflation outcomes have moved lower, as have measures of inflation volatility and skewness. We believe that in addition to their lower starting points, these distributional changes are indicative of inflation dynamics that are becoming more inertial, supporting a downgrade of our Korean inflation projection by 25bps.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

I Thematic articles

FERC Docket No. PL19-4-000
Reply Affidavit of Michael P. Gorman
Exhibit No. A-10
Page 22 of 361

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Fewer recessions but weaker recoveries

Dr. David Kelly, CFA, *Chief Global Strategist, Head of Global Market Insights Strategy*
Michael Albrecht, CFA, *Global Strategist, Multi-Asset Solutions*
John C. Manley, *Global Market Strategist, Global Market Insights Strategy*

IN BRIEF

- The U.S. economy has become more stable over time. Analysis of the components of aggregate demand suggests that this is primarily due to smaller inventory cycles and less disruption from big swings in government spending and housing.
- The U.S. economy has gradually seen slower growth, along with increased stability. However, simulation models suggest that, in predicting the frequency of recession, diminished macro volatility is more important than diminished average growth. This in turn suggests that recessions should occur less frequently than in the past and be milder than the average historical experience. It also, however, implies that future recoveries will be less robust.
- Extending the analysis outside the U.S. generally yields the same prediction – fewer and smaller recessions but weaker recoveries over our forecast horizon.
- It should be noted that this growing stability in the macro economy provides no guarantee that the next financial market downturn will be similarly mild. How investors fare in such a downturn will depend on both its causes and how portfolios are positioned when the downturn begins. We examine this issue in "Building investor resilience in a downturn."

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

INTRODUCTION

Our Long-Term Capital Market Assumptions are deliberately neutral with respect to the timing of business cycles. We recognize that within a 10- to 15-year forecast horizon, most economies will experience one or more recessions and that these recessions will impact the overall average pace of economic growth, inflation, interest rates and asset class returns. However, timing these recessions, particularly over such a long horizon, would be an overly ambitious goal, and in most cases subsequent recoveries will undo many of the impacts of the recessions themselves.

Still, we should not be blind to the changing nature of business cycles. Excluding the very deep global recession that was triggered by the global financial crisis, recessions have generally become milder and less frequent in recent decades, with correspondingly shallower recoveries. In this paper, we examine why this has been the case and what it implies for the cyclical behavior of economies in our forecast. We start with a brief review of the 11 post-World War II recessions in the U.S. This is followed by an examination of the causes of greater GDP stability and a simple model of recession dynamics, from which we derive probable U.S. recession frequency and depth over the next 15 years. We focus chiefly on the U.S., in part because of better historical data but also because U.S. recessions have often precipitated downturns overseas. We conclude with a brief look at some other economies' business cycles to determine common trends. In what has become a slower-growing but more stable global economy, we expect downturns to be less severe and recoveries less robust.

It is also important to recognize that while a milder business cycle could help reduce the size of financial market downturns, it provides no guarantee of this. This makes investor outcomes at least as dependent on portfolio positioning as macro stability. More broadly, outcomes will be driven by the impact of macro events on investors' wider circumstances and the impact of market events on their portfolios.

A BRIEF HISTORY OF U.S. POST-WORLD WAR II RECESSIONS

Massachusetts Institute of Technology economist Rudi Dornbusch famously remarked that postwar expansions "were all murdered by the Fed." That assessment is a bit of an exaggeration. Federal Reserve policy tightening has played a supporting role in triggering a few recessions, but tightening through prior expansions has largely been the appropriate response to accelerating demand, arguably leading to softer landings than would otherwise have occurred in overheating economies.[1]

Instead, the causes of U.S. recessions have been multifaceted and are not perfectly understood, even in hindsight. That said, each of the 11 postwar recessions since 1947 has some evident contributors. The first two, beginning in 1948 and 1953, seem to have been affected by demobilization and peacetime adjustment following, respectively, World War II and the Korean War. For the following nine recessions, a series of other factors all played contributing roles (**Exhibit 1**). The cause of one recession, the downturn that began in 1990, remains less clear.

Postwar recessions have varied causes

EXHIBIT 1: U.S. RECESSION STATISTICS

Recession start date	Duration (months)		Most evident cause
	Expansion	Recession	
August 1957	39	8	Fiscal tightening
April 1960	24	10	Monetary tightening
December 1969	106	11	Fiscal tightening
November 1973	36	16	Oil price shock
January 1980	58	6	Oil price shock
July 1981	12	16	Monetary tightening
July 1990	92	8	Unclear
March 2001	120	8	Equity bubble popped
December 2007	73	18	Financial crisis

Source: U.S. Bureau of Economic Analysis, J.P. Morgan Asset Management; data as of September 30, 2018.

The most recent recessions, beginning in 2001 and 2007, were sparked by financial shocks. While the bursting of the dot-com bubble in 2000–01 led to one of the shallowest postwar downturns, the subprime mortgage crisis of 2007–10 resulted in the deepest since the Great Depression. Factors explaining the different outcomes include differences in the sizes of markets involved; the distribution of ownership of impaired assets, especially by systemically important financial institutions; and the size of directly affected sectors in relation to the real economy.

[1] There are two notable exceptions, when Fed policy focused solely on inflation: the recessions starting in 1960 and 1981. In the more famous instance of 1981, growth collapsed after Paul Volcker's Fed raised the federal funds rate to 17.6% in April 1980 to combat high inflation, throwing the economy into a second recession. This policy move and subsequent recession helped to pave the way for today's lower and more anchored inflationary expectations.

FERC Docket No. PL19-4-000
Reply Affidavit of Michael P. Gorman
Exhibit No. A-10
Page 24 of 361
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

SOURCES OF GREATER STABILITY

U.S. economic growth has become more stable over the past seven decades. Analyzing the variance and covariance of real growth and its subcomponents, we can identify several factors that have contributed to this stability.[2] Moreover, a number of factors that have added to variance — that is, made real GDP growth less stable — also have become apparent.

Our analysis examines the variance of quarterly changes in U.S. real GDP over rolling 10-year periods, with the first ending in the fourth quarter of 1957.[3] We find the subcomponent contributions to the change in volatility by calculating the contribution to quarterly real GDP growth of the 11 major sectors defined by the U.S. Bureau of Economic Analysis.[4]

Smarter and smoother inventory management

Lower inventory volatility has been a significant factor in increased economic stability (**Exhibit 2**). Improved inventory management has enabled corporations to adjust production capabilities more rapidly through just in time management. As a result, we see diminished evidence of inventory booms and busts, which in turn means fewer shocks to the economy.

Predictability in the housing sector

The decline in housing sector cyclicality has also contributed to increased economic stability. This decline reflects both a decreased overall demand for housing and diminished volatility in housing starts. In the past 10 years, housing starts have averaged 904,000 per month; in the five decades prior, average starts were nearly twice as high. This downward trend is likely a side effect of shifting demographics.

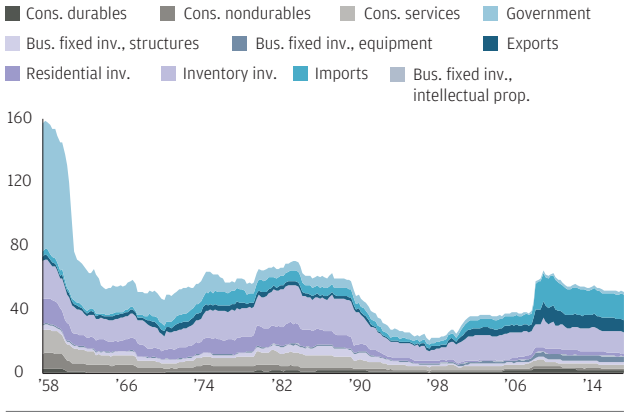
Perhaps more significantly, the standard deviation of housing starts over the last decade has fallen by nearly 25%. A persistently low interest rate environment, coupled with earlier deregulation of interest paid on deposits, has allowed for smoothed demand over time.

Smaller government, bigger economy

In recent decades, a reduced reliance on government spending helped make the economy more stable — in some ways, a counterintuitive finding. In 1957, government spending contributed nearly as much as consumption to GDP; this contribution has since decreased by roughly half, while consumption's contribution has increased by roughly a quarter. At the same time, government spending variance has fallen.

GDP variance has come down over time

EXHIBIT 2: AGGREGATE VARIANCE BY SUBCOMPONENT, 10-YEAR ROLLING PERIOD



Source: U.S. Bureau of Economic Analysis, J.P. Morgan Asset Management; data as of September 30, 2018.

A large component of this decline likely reflects historical trends. Public infrastructure investment, for example, was significantly higher in earlier decades, with the construction of the U.S. interstate highway system in 1956 providing a considerable tailwind to growth. Government expenditures on war were also substantial relative to the size of the U.S. economy. That said, it appears that high historical variance was perhaps more in measured GDP than in a broader assessment of real economic activity: In the early postwar years, government employment saw little volatility.

The implications of diminished covariance

It is worth noting that the covariance of GDP subcomponents has also declined over time (**Exhibit 3**). For example, whereas historically a fall in housing demand could slow consumption, possibly resulting in inventory mismanagement and weakened investment spending, today's economy is more resilient. Individual subcomponents are more insulated; in fact, GDP covariance has largely been negative since the turn of the century.

[2] Variance is broadly defined as how far a set of numbers are spread from their average value. Covariance is broadly defined as the measure of joint variability of two numbers.

[3] As a result, the scope of the analysis covers data beginning in 1947. This encompasses nearly the entirety of the postwar period.

[4] These are consumer durables, consumer nondurables, consumer services, business fixed investment in structures, business fixed investment in equipment, business fixed investment in intellectual property, residential investment, inventory investment, exports, imports and government.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

The trade drag

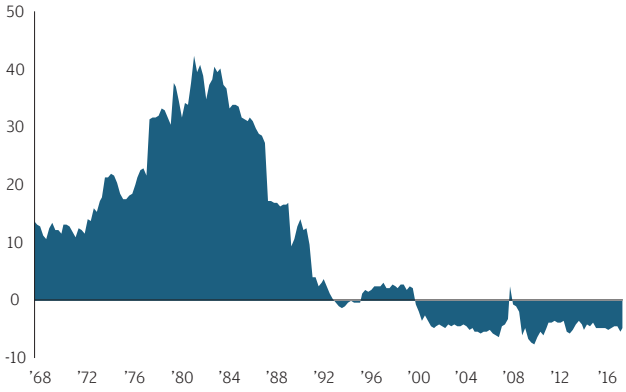
Trade has become an increasingly important part of the U.S. economy. Exports now account for roughly 14% of GDP, while imports are close to 19%.[5]

At the same time, the variance of these subcomponents has increased meaningfully, particularly for imports, which contribute roughly a quarter to overall GDP variance. Most of this increase happened recently, with variance doubling over the last decade. This may be attributable to the shifting nature of demand for overseas goods — consumer electronics are disproportionately produced overseas, for example — and large fluctuations in the U.S. dollar over the past decade, the unsurprising fallout from global economic and political turmoil.

We note, however, that higher import variance may not necessarily be a drag on economic growth, since large contractions in imports, particularly in response to recessions, can help bolster the economy.

GDP covariance has declined in recent decades

EXHIBIT 3: AGGREGATE COVARIANCE OF GDP BY SUBCOMPONENT, 10-YEAR ROLLING PERIOD



Source: U.S. Bureau of Economic Analysis, J.P. Morgan Asset Management; data as of September 30, 2018.

ULTIMATE CAUSES OF STABILITY

Although the average pace and volatility of quarter-to-quarter real GDP growth can be seen as the direct cause of successive negative quarters, thus meeting the unofficial definition of recession, history has often also revealed more ultimate causes, deeper imbalances that build up over many quarters or years. These might be unsustainable levels of demand, often manifesting as runaway price inflation, or rapid expansions of credit. Rapid monetary policy tightening, one evident cause of recessions historically, is often an attempt to correct these imbalances.

[5] Exports at 13.9% as of 2Q 2018; Imports at 18.5% as of 2Q 2018.

Expansions do not die of old age, but neither is recession risk constant, as underlying imbalances become more threatening as the economy progresses through the cycle. And because expansions now last longer than they have historically, there is more time for these threats to take hold. Wages and inflation tend to accelerate only once labor slack has tightened; spending tends to become stretched only once sentiment becomes exuberant. These factors are correlated and interconnected. A tighter job market, for instance, will tend to produce more optimistic households.

Other developments can make the expansion more fragile. As households grow increasingly confident, their saving rates tend to decline. All else equal, a lower saving rate means less buffer against a real income shock — from, say, a jump in the oil price. This could lead to a decline in real consumption. And once the economy has recovered fully and closing the output gap no longer provides a tailwind, the trend rate of growth slows.

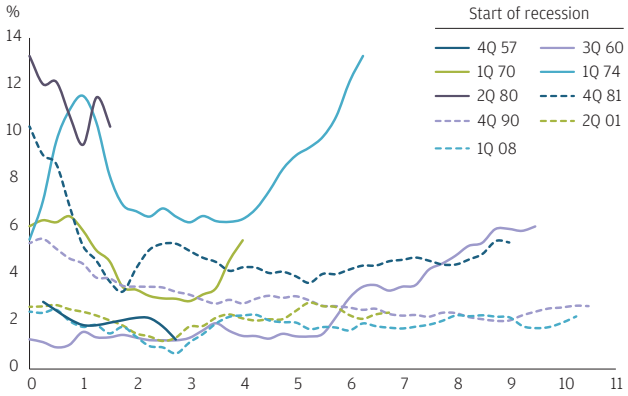
Some of these ultimate contributors to past recessions have faded in their relevance, and it is this change that is most relevant to the potential frequency of future recessions. Specifically:

- Inflation: Today runaway inflation seems unlikely to force a rapid tightening of monetary policy; over the last several decades, U.S. CPI has not only declined in magnitude but also grown less cyclical (**Exhibit 4**). Secular explanations range from the increased credibility of central bank inflation targets to the declining significance of labor unions and the offshoring of jobs. The increased sophistication of monetary policy also means that the Fed is less likely to tighten too aggressively in response to any threat of future inflation acceleration.
- Credit: The role of credit has also changed, but in more nuanced ways. On the one hand, easier access to revolving consumer loans has smoothed household consumption, making it less dependent on current income and savings. On the other hand, the expanding level of credit (**Exhibit 5**) poses its own risks: A credit bubble in the residential housing sector was a key contributor to the last recession. Aggregate private sector credit as a share of GDP is still increasing, and it is becoming notably extended in the nonfinancial corporate sector. Although regulation has made bank balance sheets more resilient, the threat of rapid credit expansions has not disappeared.

Other ultimate contributors to past recessions remain as relevant as ever. The economy will continue to be susceptible to unsustainable booms in investment and consumption, and rising income inequality will likely mean that a greater share of the population is living paycheck to paycheck, with little buffer against an adverse price shock or lost income.

Inflation has grown more quiescent and less cyclical

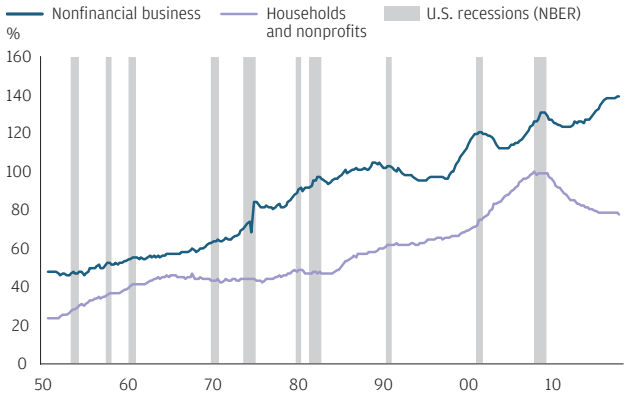
EXHIBIT 4: U.S. CORE CPI BY EXPANSION, % OF GDP Y/Y



Source: U.S. Bureau of Labor Statistics, NBER, J.P. Morgan Asset Management; data as of September 30, 2018.

Recession-inducing bubbles may still lurk

EXHIBIT 5: U.S. PRIVATE NONFINANCIAL SECTOR LIABILITIES AS % OF GDP



Source: U.S. Bureau of Economic Analysis, Federal Reserve, NBER, J.P. Morgan Asset Management; data as of September 30, 2018.

FUTURE U.S. RECESSIONS: LESS FREQUENT AND LESS DEEP, BUT WITH SLOWER RECOVERIES

What might be the frequency and depth of recessions over the next 15 years, given that the economy has become more stable over time? To answer that question, we have constructed a simple model of recession dynamics.

While the National Bureau of Economic Research, the unofficial scorekeeper of the U.S. business cycle, has a more complicated definition,[6] many economists describe a recession as the occurrence of two or more consecutive quarters of negative real GDP growth. Using this formulation, and looking purely at the pattern of real GDP growth over time, the probability of recession becomes a function of three parameters: (1) the average pace of real GDP growth; (2) the volatility of real GDP growth; and (3) any positive or negative correlation between real GDP growth rates over time. Specifically, the probability of recession falls when average growth rates are higher and rises when growth is more volatile. The probability of two consecutive negative quarters also rises when one quarter's growth is positively correlated with next quarter's growth, since this increases the chances of relatively rare negative quarters clustering together.

[6] A "recession is a significant decline in economic activity, spread across the economy, lasting more than a few months, normally visible in real GDP, real income, employment, industrial production, and wholesale-retail sales." "U.S. Business Cycle Expansions and Contractions." National Bureau of Economic Research, April 23, 2012, http://www.nber.org/cycles/cyclesmain.html.

MONTE CARLO SIMULATION

A simple econometric equation explaining quarterly percentage changes in real U.S. GDP, with a constant and a lag of its own value, allows us to calculate the historical value of all three parameters (the average level, variance and serial correlation of real GDP growth). We estimated the model over the post-WWII era (defined as 3Q 1948 to 2Q 2018). Doing so explains a portion of the change in real GDP over that period; the rest is explained by the random shocks that move growth.

If we assume that:

(1) shocks to the pace of real GDP growth are normally distributed,

(2) the average pace of real GDP growth going forward is the same as historically,

(3) shocks to that growth rate going forward have the same variance as historically, and

(4) real GDP growth going forward has the same autocorrelation as historically,

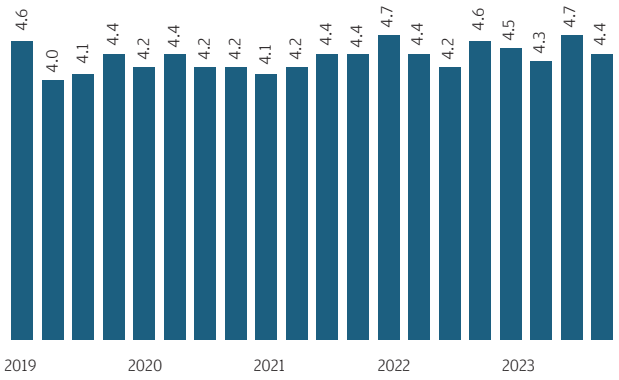
then we can use our estimated parameters and a random number generator to generate shocks in building a Monte Carlo simulation model. Specifically, we ran 10,000 iterations to estimate the probability of a recession starting in any given quarter, defining the start of a recession as two consecutive quarters of negative GDP growth following a positive one.* Over the next 15 years, adding up the number of times a recession starts in a given quarter over 10,000 iterations results in frequency and cumulative distributions of recession starts.

* This model assumes real GDP growth for this quarter is calculated as a function of a constant, real GDP growth in the prior quarter and a randomly generated real GDP shock. This shock is generated randomly and is normally distributed using the same variance as seen historically.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Historical data suggest recession probability of around 4% per quarter

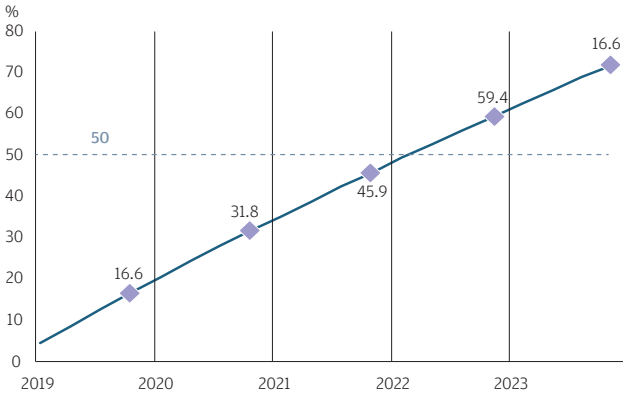
EXHIBIT 6: PROBABILITY PER QUARTER BASED ON 3Q48–2Q98 PARAMETERS



Source: U.S. Bureau of Economic Analysis, J.P. Morgan Asset Management; data as of September 30, 2018.

Historical data suggest 50% recession probability by 1Q 2022

EXHIBIT 7: CUMULATIVE PROBABILITY PER QUARTER BASED ON 3Q48–2Q18 PARAMETERS



Source: U.S. Bureau of Economic Analysis, J.P. Morgan Asset Management; data as of September 30, 2018.

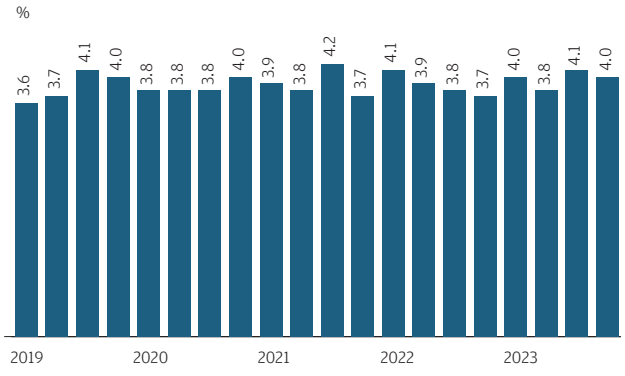
If, going forward, real GDP follows roughly its average behavior between 3Q 1948 and 2Q 1998 (a 50-year period), the chances of a recession starting in any given quarter are about 4.3% (**Exhibit 6**). Assuming that a recession will not begin in the second half of 2018, the simulations show that, on average, the probability of recession starting exceeds 50% 15 quarters from now. (**Exhibit 7**).

However, as we have discussed, the economy has become more stable over time. Estimating these parameters over the past 20 years vs. the 50 years before that should yield a lower probability of recession. This is, in fact, the case. Running the same equation over the past 20 years and using those parameter estimates to run simulations over the next 15 years result in a lower probability of a recession starting in any given quarter, with a 50% chance of the expansion surviving for another 17 quarters (**Exhibit 8** and **Exhibit 9**).[7]

[7] Remaining expansion length is based on an assumption that there is a zero percent probability of a recession occurring in the remaining quarters of 2018.

Recent data suggest recession probability of less than 4% per quarter

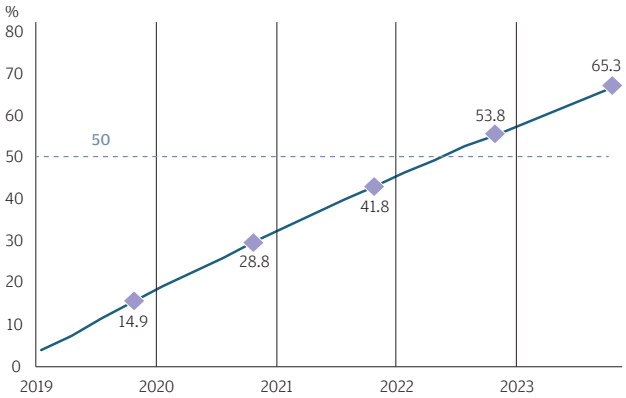
EXHIBIT 8: PROBABILITY PER QUARTER BASED ON 3Q98–2Q18 PARAMETERS



Source: U.S. Bureau of Economic Analysis, J.P. Morgan Asset Management; data as of September 30, 2018.

Recent data suggest 50% recession probability by 3Q 2022

EXHIBIT 9: CUMULATIVE PROBABILITY PER QUARTER BASED ON 3Q98–2Q18 PARAMETERS



Source: U.S. Bureau of Economic Analysis, J.P. Morgan Asset Management; data as of September 30, 2018.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

It should be noted that a period of 17 quarters is not the expected length of future expansions. Rather, it represents the number of quarters any current expansion could be expected to survive, assuming that the future longevity of the expansion is unrelated to its present age (see "**Recession risks, expansion strength and the post-recession bounce**"). If a time traveler had arrived in a random expansion quarter in the postwar era, he or she could have expected to enjoy under four years of expansion before facing an impending recession. Based on the increased stability of the U.S. economy, if the time traveler arrived today, he or she would have a few extra quarters of growth.

RECESSION RISKS, EXPANSION STRENGTH AND THE POST-RECESSION BOUNCE

The probability assumption does not take into consideration the current position within the cycle. It therefore does not account for stronger early-expansion growth, which would diminish the probability of re-entering a recession within a year of the expansion start. Moreover, it underweights the probability of falling into a recession after the initial growth spurt, since growth tends to be lower – and therefore more susceptible to shocks – in any expansion quarter after the first year.

The same simulation model can tell us two other interesting things about future recessions. First, they should be less deep. The average recession from 1948 to 2018 involved a 1.9% decline in real GDP. However, based on GDP behavior over the last 20 years, a hypothetical future recession could involve just a 1.4% decline from peak to trough.

Second, recoveries are getting weaker. On average, in the three years following the 11 postwar recessions, the economy grew by 13.9%. However, based on the last 20 years of GDP volatility, a hypothetical future recovery could involve just 7.0% growth in the first three years.[8]

THE IMPLICATIONS OF GROWING GDP STABILITY OUTSIDE THE U.S.

Economies outside the U.S. have also become more stable over time. Looking at the variance of quarterly GDP growth throughout history, a similar trend to that of the U.S. is evident in major developed economies around the world.[9] Some economies have become more stable than others: Canada, the UK and Australia, for example, have become noticeably more stable throughout history, following a similar trajectory as the U.S. Japan, on the other hand, has seen GDP variance swing wildly. Europe is a more complicated story. Variance declined considerably before the financial crisis only to return, more or less, to prior peak levels; this is unique and likely reflects the second European recession, between 2011 and 2013.

An economy's underlying growth trend and volatility appear to be the key determinants of recession frequency. Australia, aided by the tailwind of a multi-decade commodity super-cycle, is in its 27th year of expansion; Japan, by contrast, where the underlying growth trend is the slowest among developed economies, has technically suffered four recessions within the last decade.

As declining economic variability has largely reduced the probability of recessions in the U.S., it has also done so in other countries. The UK, in particular, has seen probability decrease significantly – by nearly half – alongside similarly large moves in Australia and Japan. Canadian recession probability has declined as well, though by a smaller amount. Interestingly, the probability of a European recession has increased over the last two decades relative to history, again likely reflecting recent economic turbulence. If we ignore recent recessions, the resulting probability diminishes. This global downward trend has occurred alongside a fall in both economic variance and average growth rates (**Exhibit 10**).

[8] For any given economic recovery, it is clear that the first several quarters of an expansion are generally stronger than any subsequent quarters (historically by a multiple of 1.9). Therefore, while our crude model implies a roughly 0.5% quarterly growth rate throughout the first three years of recovery, we have adjusted this forecast to include an additional 0.4% of growth per quarter in the first four quarters of expansion to account for this phenomenon.

[9] Variance analysis is conducted using the same parameters as the analysis of U.S. growth. Time periods vary based on data availability: Japan begins 2Q 1955; Australia begins 3Q 1959; the UK begins 1Q 1960; Canada begins 1Q 1961; and Europe begins 2Q 1961. European data are based on the EU15, a 15-country subset of the European Union as provided by the OECD.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Global growth has become slower but more stable

EXHIBIT 10: GLOBAL ECONOMIC GROWTH STATISTICS

	Australia		Canada		Europe		Japan		UK		U.S.	
	20-yr	Long-term	20-yr	Long-term	20-yr	Long-term	20-yr	Long-term	20-yr	Long-term	20-yr	Long-term
Avg. GDP growth rate (%)	0.8	0.9	0.4	0.6	0.6	0.8	0.2	1.0	0.5	0.7	0.6	0.8
Avg. GDP variance	34.4	106.9	40.0	67.4	30.5	36.9	117.6	150.2	38.1	92.6	36.9	84.3
Quarterly probability of recession (%)	4.7	6.6	4.8	5.3	4.3	3.8	5.3	7.6	4.7	8.6	3.9	4.3

Source: Australia Bureau of Statistics, Bureau of Economic Analysis, ESRI, OECD, ONS, Statistics Canada, J.P. Morgan Asset Management; data as of September 30, 2018.

Note: "Long-term" varies by country due to data availability: for Canada, since 1Q 1961; for Japan, since 2Q 1955; for the UK, since 1Q 1960; for Australia, since 3Q 1959; for the U.S., since 3Q 1948.

CONCLUSION

Our analysis has focused chiefly on the U.S., in part because U.S. recessions have often sparked downturns overseas. Since 1965, each U.S. recession, with the exceptions of shallower ones in 1970 and 2001, has corresponded with recessions in the euro area, the UK and (with the additional exception of 1980–81) Japan. Expanding international financial and trade linkages imply that a large enough shock to one economy is likely to have a domino effect on others; at the same time, shocks to domestic demand in one economy can often be offset by the cushion of international trade.

The trends highlighted in the U.S. appear to be relevant around the world: decreased economic variance and slower overall growth trends have yielded a more stable global economy. All in all, these effects mean that recessions are less likely to occur than in the past, both in the U.S. and abroad, and will likely be milder. When they do occur, recoveries will unfortunately be slower and market cycles could still be as violent as in the past, particularly if a more stable macro environment fosters the growth of asset bubbles. Overall, however, while investors will find trend economic growth slower than in the past, they should be able to take some comfort in a global economy that will likely also be steadier.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Dealing with the upward drift in government debt

Karen Ward, *Chief Market Strategist for EMEA, Global Market Insights Strategy*
Benjamin Mandel, Ph.D., *Global Strategist, Multi-Asset Solutions*

IN BRIEF

- Developed economy governments appear generally reluctant, or simply unwilling, to tackle the large stock of public debt that accumulated during the global financial crisis.
- We examine successful public debt consolidations since the 1950s, separating out the contributions made by financial conditions (interest rates vs. growth) from active fiscal policy (i.e., raising the budget balance).
- Recent case studies underscore that favorable monetary policy and a positive growth backdrop are important for debt consolidation. Government belt-tightening is also a common feature.
- Debt consolidation is not a foregone conclusion. But if it does occur in the coming decades, given fiscal spending constraints, it will be likelier for economies with a more favorable mix of interest rates relative to growth, or a tailwind from currency depreciation.
- We view any debt consolidation over the next 10 to 15 years as a mild downside risk to our interest rate projections. Extreme political pressure on central banks to keep rates low so as to keep debt growth in check could pose a challenge to central bank independence.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

WHAT DO SUCCESSFUL DEBT ADJUSTMENTS LOOK LIKE?

The U.S. is currently deploying a significant and unfunded tax cut. Voters in Europe are demonstrating austerity fatigue. And Japan is still kicking the can down the road. Clearly, developed market (DM) governments are generally reluctant, or simply unwilling, to tackle the large stock of public debt accumulated during the global financial crisis (GFC). We document this drift in government priorities and then ask: What would a successful debt consolidation look like?

What are the key characteristics of adjustment paths, in which government debt stabilizes and then falls from high levels in an environment of relatively strong growth? History suggests the following ingredients, which fit into the common framework for thinking about debt sustainability:

1. Loose monetary conditions – a falling and sometimes artificially constrained real interest rate (e.g., the U.S. post-World War II)

2. Targeted fiscal policy, including cuts to entitlements that in some cases promoted labor force participation (e.g., Belgium and Canada in the 1990s)

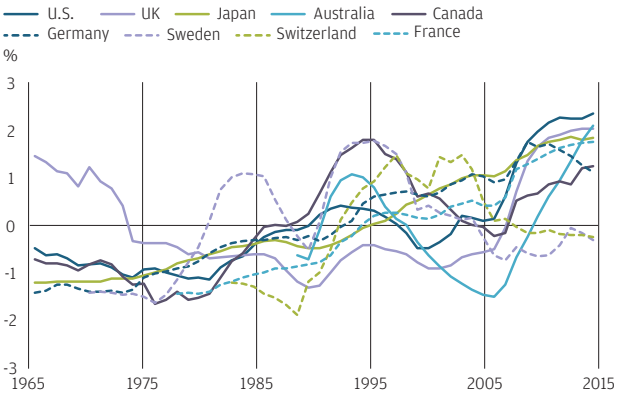
We discuss the likelihood of either of these in the context of our long-term macroeconomic and market expectations. We build a case that much of the burden of debt consolidation in the coming decades will fall on the central banks, in the form of pressure to maintain loose monetary conditions. Economies with a more favorable balance between interest rates and growth, or those experiencing a tailwind from currency depreciation, have the highest odds of successfully consolidating debt. We view this potential future pressure on central banks as a mild downside risk to our rates projections and, in its extreme form, as a possible challenge to central bank independence.

Documenting debt drift

Our empirical starting point is the observation that general government debt, as a share of GDP in developed market economies, has continued a long-term upward trajectory – what we're calling debt drift. The buildup in debt that took place during the global financial crisis has not been unwound (**Exhibit 1**). Below the surface of this trend, debt levels in the U.S., UK, France, Australia and Canada have continued rising in recent years; levels in Japan have remained relatively stable; and in Germany debt has fallen steadily. Sweden and Switzerland did not undertake significant buildups in debt during the financial crisis period, and their debt remains near levels of the mid 2000s.

Debt continues to drift upward in most DM economies

EXHIBIT 1: TRAJECTORY OF DEBT AS % OF GDP, STANDARDIZED



Source: IMF Fiscal Monitor, J.P. Morgan Asset Management; data as of August 2018.

Exhibit 1 also highlights the extent to which higher levels of government debt today are part of a longer-term, secular trend of rising debt. DM country debt levels in the 1960s and 1970s (with the exception of the UK) were roughly one standard deviation below their long-run averages for the 50 years between 1965 and 2015. This is an important qualifier for our results. Sustainable levels of debt may have increased in recent decades, and periods of relatively high debt may persist for some time.

Having documented the rise in debt, it is helpful to disentangle its underlying drivers. To do so, we follow an accounting framework that parses changes in the debt-to-GDP ratio, separating out contributions from the real interest rate, real GDP growth and the government's primary balance (the fiscal balance excluding interest payments) (**Exhibit 2**). The primary balance contains a cyclical component, reflecting how government finances deteriorate during periods of economic contraction and improve during expansions, and a structural component that more reflects the role of policy.

Debt is reduced when the real interest rate is below GDP growth or when policy tightens

EXHIBIT 2: GOVERNMENT DEBT ACCOUNTING FORMULA

Source: J.P. Morgan Asset Management; as of October 2018.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

During the recent years of debt drift, looser fiscal policy played an overwhelming role. We know this because other factors leaned against it. For one, the balance of real interest rates and growth has generally been exerting downward pressure on debt levels. We estimate that from 2010–17 the fact that growth rates were higher than prevailing interest rates subtracted an average of 1.2 percentage points (ppt) annually from debt-to-GDP levels in each country (**Exhibit 3**). The cyclical aspect of the primary surplus added slightly to debt over this period as a whole (0.4ppt), but it has swung to become a force for debt reduction in recent years, particularly in the U.S., Germany, Canada and Sweden. In stark contrast, since 2010 the policy component of the primary balance has added 1.3ppt to debt levels annually, on average, for each country. All in all, monetary, growth and cyclical conditions have been generally favorable for debt consolidation, but both have been overwhelmed by sustained shifts in fiscal policy.

During recent years of debt drift, looser fiscal policy played an overwhelming role

EXHIBIT 3: DRIVERS OF CHANGE IN DEBT-TO-GDP RATIO

Debt/GDP drivers (2000-17)	Impact on debt-to-GDP (avg, annual, per country)
Growth rates higher than interest rates	-1.2ppt
Cyclical component of primary balance	+0.4ppt
Policy component of primary balance	+1.3ppt

Source: IMF Fiscal Monitor, J.P. Morgan Asset Management; data as of August 31, 2018.

Will large amounts of debt today restrain growth in the future?

It seems natural to conclude that government debt will necessarily restrain future growth – that lower taxes today will mean higher taxes in the future to ensure that debt is repaid – so that growth today comes at the expense of growth tomorrow. But history tells us this is not necessarily the case. In a number of instances in the past, high debt levels were tackled without significantly impeding growth.[1]

We use the deconstruction of debt-to-GDP ratios discussed above to characterize these successful consolidations going back to the 1950s. By doing so, we are able to separate the contributions of financial conditions (i.e., rates vs. growth) from those of policy (i.e., primary surplus) in pushing down debt levels (**Exhibit 4**). Notably, of the 14 successful debt consolidations that we identify, 13 occurred during periods of relatively tight fiscal policy (high primary surpluses), suggesting that at least some belt-tightening is necessary. The number of consolidation experiences that took place amid relatively low vs. relatively high rates is evenly split, implying a significant – but not necessary – role for low rates relative to growth. To shed light on the mechanics of consolidation, we describe selected cases from the lower two quadrants in Exhibit 3 (see Addendum, **Exhibit 8** for information on all 14 cases).

[1] The evidence for debt's feedback into future growth is mixed and fraught with difficulties in identifying whether or not the relationship is a causal one. This paper considers the narrower but more cleanly defined episodes of successful consolidation. Given the focus on DM economies, debt crises and their effects on growth and markets are outside the scope of the paper.

Policy tightening or favorable financial conditions are necessary – sometimes both

EXHIBIT 4: SUCCESSFUL CASES OF DEBT CONSOLIDATION AND THEIR ECONOMIC AND POLICY ENVIRONMENTS

	Neutral/high interest rates vs. growth	Low rates vs. growth
Less ↑ Neutral policy		Switzerland (1999-2007)
More ↓ Tight policy	Sweden (1985-90) Belgium (1994-2007) U.S. (1994-2001) Australia (1995-2007) UK (1996-2001) Canada (1997-2007) Japan (2006-07)	U.S. (1955-69) Canada (1962-69) Japan (1988-91) UK (1987-90) Sweden (1997-2008) Germany (2012-17)

Source: IMF Fiscal Monitor, Haver Analytics, J.P. Morgan Asset Management; data as of August 2018.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Tight policy/low interest rates vs. growth: The U.S.

The U.S. experience post-World War II is one of the most dramatic examples of debt consolidation. In 1946, government debt was 120% of GDP and the primary balance was a deficit equal to about 5% of GDP. Then, in the following few years, the primary balance swung dramatically into a surplus of more than 6%. The primary balance remained in surplus throughout much of the 1950s and 1960s; by 1969, government debt was down to 46% of GDP. Over this postwar period, monetary conditions were kept artificially loose, with Washington propping up government bond prices, continuing a policy put in place during the war. This prevented the Federal Reserve (Fed) from raising interest rates. Instead, the Fed attempted to curb excess credit growth through lending constraints. This had only limited success, and inflation spiked as economic recovery took hold. While it lasted, though, robust nominal activity combined with low interest payments contributed to the substantial fall in government debt.

Tight policy/neutral or high interest rates vs. growth: Belgium

Belgium experienced an expansion in government debt, to more than 100% of GDP, in the 1980s. In the years that followed, the Belgian government embarked on a tough deficit reduction plan that focused on reducing government spending. Public employment was scaled back, as was the generosity of the welfare state. Unemployment benefits were reduced, the retirement age was increased and, eventually, the cuts stretched to pension and health care costs. These efforts saw the primary balance swing by more than 11ppt into a primary surplus, where it remained for much of the next two decades. Despite the significant fiscal tightening, the debt-to-GDP ratio remained elevated as the economy struggled to cope with the combination of fiscal contraction and very tight monetary policy. It was only when monetary conditions eased in the mid 1990s that the fiscal efforts paid off and debt began falling.

By the mid-1990s, many other developed market nations were also focused on reducing the government debt accumulated during the early 1990s global recession. But for many, the debt problem was relatively short-lived. By the turn of the millennium, many countries – including Canada, the UK, Australia and Sweden – had managed to successfully change course and debt-to-GDP was falling.

This often involved a concerted fiscal effort, as in Belgium. The Canadian government directed its efforts to reducing public spending in difficult areas such as unemployment insurance, pensions and provincial government payments. This helped a primary deficit swing back into surplus. Other G7 countries, including the UK and Italy, saw similar improvements in their fiscal position, again after some tough political choices that reduced entitlements.

What all these fiscal consolidations had in common was a marked reduction in government spending on interest payments, reflecting the secular trend of falling bond yields. The shift toward independent central banks – mandated to deliver low inflation – coincided with a steady fall in bond yields through the 1990s, and both go a long way toward explaining the global growth performance and subsequent fiscal consolidation over that decade. We also note the possibility that falling bond yields likely increased the level of debt that economies could sustainably carry during the period that we examined.

Considering these case studies, it appears possible for a government's debt burden to come down in a manner not detrimental to growth. The U.S. success relied on a good dose of unexpected inflation, but the other examples of debt consolidation have two things in common. First, governments made difficult political choices to reduce entitlements and bring down their spending. In many instances, because these changes increased workforce participation, they improved the supply side of the economy. Second, and perhaps more importantly, tight fiscal policy was accompanied by relatively low rates, which promoted demand to compensate for the reduction in public spending.

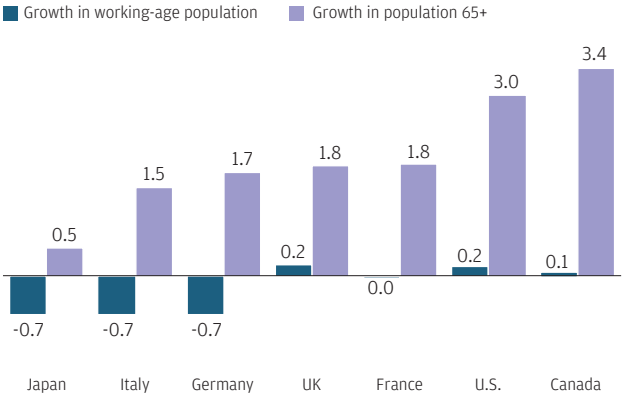
What are the chances of successful DM debt consolidation in the coming decades?

We conclude with a rough assessment of DM economies' ability to replicate the successful consolidation experiences of the past and, where it is likely that they can, what conditions would be necessary. To begin, the ability of the governments in the developed world to improve their primary balance position looks challenging on a number of fronts. The most acute challenge is the demographic shift set to take place in the coming decades. While the severity of the problem differs by country, all countries in the developed world are seeing a slowing rate of growth of their working-age populations and a rapid expansion of those of pensionable age (**Exhibit 5**).

FERC Docket No. PL19-4-000
Reply Affidavit of Michael P. Gorman
Exhibit No. A-10
Page 34 of 361
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

A ubiquitous, though uneven, rotation in entitlement spending

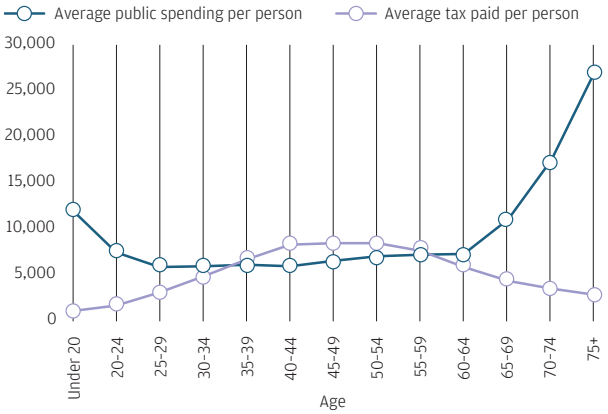
EXHIBIT 5: DEMOGRAPHIC TRANSITION IN DEVELOPED MARKETS (%, AVERAGE ANNUALIZED GROWTH, 2018-28)



Source: United Nations Department of Economic and Social Affairs, J.P. Morgan Asset Management; data as of July 31, 2018.

Government spending ramps up dramatically over the life cycle

EXHIBIT 6: DEMOGRAPHIC DRIVERS OF GOVERNMENT SPENDING AND TAXES IN THE UK (GBP)



Source: Office for Budget Responsibility, Her Majesty's Revenue and Customs (HMRC), J.P. Morgan Asset Management; data as of July 31, 2018.

This demographic shift will have a material impact on public finances. Exhibit 6 shows how tax payment and public spending vary by age in the UK. Tax contributions peak at around 50 years of age and then slow dramatically from the mid 60s, at which point many people no longer pay income tax (note that governments also receive taxes to fund spending from other sources, including corporations). By contrast, government spending per person increases substantially from age 70 as the provision of health and social care ramps up. Given that around half of those eligible to vote in the developed world are older than 50, governments are likely to find reducing pension and health care benefits politically challenging.

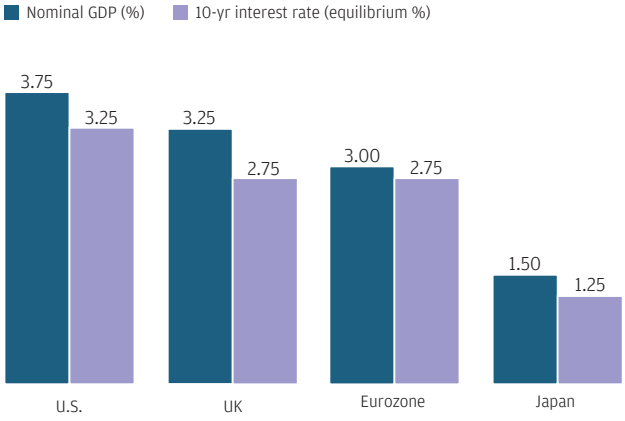
Further reducing benefits currently granted to the working population seems similarly challenging. Income growth for middle and lower income households has been very meager in this recovery in much of the developed world. This has contributed to the recent spate of populist pressures and the backlash against migration and globalization. If anything, the trend may be for some governments to increase support for low income households through guarantees of a minimum income, as was recently proposed in Italy.

While there are multiple structural downside risks to DM public finances, it is harder to identify upside risks. Perhaps in the near term a recovery in productivity is possible, which would raise GDP and, in turn, government revenues – though productivity has been lacking through much of this recovery and it is difficult to rely on a phenomenon whose drivers are little understood.

Finally, we note that in our 2019 baseline Long-Term Capital Market Assumptions (LTCMAs) macroeconomic assumptions – which link nominal GDP and interest rates as a matter of methodology – we do not anticipate a significant tailwind from financial conditions. In other words, we do not pencil in large imbalances between growth and interest rates (Exhibit 7). Should the next recession cause liquidity-trap dynamics like the post-GFC period's, leading to a sustained period when rates are lower than growth, we see little potential upside from the perspective of public debt consolidation. Such a dynamic would likely be accompanied by either a deep recession (requiring a big fiscal response) or by pressure on fiscal authorities to make up for less-effective monetary policy.

Big imbalances are not in our baseline projections

EXHIBIT 7: LTCMA ASSUMPTIONS FOR NOMINAL 10-YEAR RATES MINUS NOMINAL GDP GROWTH



Source: J.P. Morgan Asset Management; data as of October 2018.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

CONCLUSION

The picture we've painted presents something of a quandary for DM economies, where debt is drifting higher but neither belt-tightening nor outsize contributions from financial conditions would be sufficient to cap it. Achieving the required primary fiscal surplus looks incredibly challenging in the developed world, given an aging electorate that will defend its entitlements at the ballot box. Globalization and automation, and the resulting social challenges, may also make it hard to reduce the generosity of the welfare state. Boosting trend growth using fiscal policy is difficult and has yielded a mixed bag of results in the past.

This leads us to our conclusion that if debt consolidation is going to happen in the coming decades, the bulk of the burden will need to be shouldered by monetary conditions, and we expect this would encompass both implicit and explicit pressure on central banks to provide the solution. In theory, monetary policy should remain independent, focused on the objective of containing inflation (and sustaining employment, in some cases). The reality, however, might prove trickier. Any efforts to rein in primary balances will reduce short-term growth and lead central banks to adopt more accommodative monetary policy stances — and political pressure to keep rates low cannot be ruled out. Currency trends will redistribute demand in a way that creates winners and losers vis-à-vis public debt consolidation.

In our baseline LTCMA macroeconomic assumptions for DM economies, public debt burdens do not feed back unduly into growth or inflation projections, or our expectations for monetary policy outcomes. Indeed, the trend toward higher debt burdens may well be borne for some time. But in time, efforts to consolidate debt are likely to present downside risk to interest rate projections, growth or both.

Addendum

EXHIBIT 8: SUCCESSFUL CONSOLIDATIONS

Debt/GDP drivers (2000-17)	(Debt/GDP) $_{t-1}$	Δ(Debt/GDP)	g	r	r-g	r-g (vs. all t)	PS (cyclical)	PS (structural)	PS (vs. all t)	ΔBroad FX
U.S. (1955-69)	73	-1.8	4.2%	2.2%	-2.0%	-1.3%				
Canada (1962-69)	68	-1.6	5.7%	5.0%	-0.7%	-2.4%				
UK (1987-90)	40	-3.2	3.6%	3.3%	-0.2%	-0.1%	1.7	-1.4	0.6	2.2%
Japan (1988-91)	77	-3.4	5.0%	3.2%	-1.8%	-1.5%				4.7%
Sweden (1985-90)	61	-3.5	2.4%	5.4%	3.1%	2.1%				1.4%
Switzerland (1984-89)	34	-1.1	3.0%	1.9%	-1.1%	0.3%				3.7%
U.S. (1994-2001)	70	-2.1	3.7%	3.5%	-0.2%	0.5%	0.8	0.9	5.0	5.5%
UK (1996-2001)	43	-1.5	3.3%	4.3%	1.1%	1.2%	-0.5	1.8	4.1	4.7%
Australia (1995-2007)	32	-1.7	3.6%	3.6%	-0.1%	0.3%	-0.2	1.3	2.1	1.5%
Canada (1997-2007)	101	-3.1	3.3%	4.6%	1.3%	-0.4%	0.2	3.2	3.1	2.5%
Sweden (1997-2008)	69	-2.7	3.1%	3.0%	-0.1%	-1.1%	1.5	1.0	1.6	-0.2%
Switzerland (1999-2007)	60	-1.4	2.4%	0.4%	-2.0%	-0.6%	0.0	0.5	-0.1	0.7%
Belgium (1994-2007)	134	-3.4	2.5%	3.2%	0.8%	0.7%	-0.1	4.5	2.9	2.8%
Japan (2006-07)	177	-0.7	1.5%	1.0%	-0.5%	-0.3%	0.4	-3.2	2.6	-6.3%
Germany (2012-17)	81	-2.1	1.7%	-0.5%	-2.2%	-3.1%	0.1	1.7	1.3	-0.2%

Source: IMF Fiscal Monitor, Haver Analytics, J.P. Morgan Asset Management; data as of August 2018.
PS: primary surplus; g: real GDP growth; r: real interest rate.

FERC Docket No. PL19-4-000
Reply Affidavit of Michael P. Gorman
Exhibit No. A-10
Page 36 of 361

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Managing illiquidity risk across public and private markets

John Bilton, CFA, *Head of Global Multi-Asset Strategy, Multi-Asset Solutions*
Patrik Schöwitz, CFA, *Global Strategist, Multi-Asset Solutions*
Anthony Werley, *Chief Portfolio Strategist, Endowments and Foundations Group*
David Lebovitz, *Global Market Strategist, Global Market Insights Strategy*
Victoria Helvert, *Associate, Multi-Asset Solutions*
Nandini Srivastava, Ph.D., *Quantitative Analyst, Multi-Asset Solutions*

IN BRIEF

- The structure and role of the capital markets have evolved steadily but profoundly over the last 50 years. Public equity markets, which traditionally funded corporate expansion and investment, are increasingly becoming a mechanism for cash distribution and balance sheet management.
- At the same time, private markets, which traditionally provided vital funding for new ventures, have significantly expanded in their scale and scope; they now offer capital for many areas that had historically been financed by public equity markets.
- Investors in private assets take on illiquidity risk and tacitly assume it is compensated through superior returns. This is in essence correct, although full compensation is only captured by above-median managers. Some public assets may also have embedded illiquidity risk, but it is more cyclical and not always compensated. Identifying compensated and uncompensated illiquidity risk across public and private markets is critical in portfolio construction.
- Optimizing returns from the private part of the portfolio means staying the course and harvesting the illiquidity premium over the cycle. This suggests that any cash calls or redemptions may be disproportionately financed by the sale of public assets. While larger and more sophisticated investors have a greater propensity to take on private market illiquidity risk, there is no economy of scale in dealing with public market illiquidity.
- We introduce a framework to demonstrate how actively planning for illiquidity in public asset markets can help with portfolio construction decisions over the cycle.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

THE EVOLVING ROLE OF PUBLIC AND PRIVATE MARKETS

Over the last half century, we have witnessed a gradual but profound shift in the role and structure of the capital markets. Public equity markets were traditionally where firms sought financing for expansion and investors sought to share in the fruits of that growth, including a dividend when operating cash flows allowed. Today, public equity markets are increasingly a vehicle for cash redistribution where greater regulatory scrutiny, plus regular reporting requirements, can incentivize firms to focus on current operations – possibly to the detriment of investing in future growth (**Exhibit 1**). More and more, public equity markets are playing the role in firms' financial calculus that corporate credit markets typically fulfilled, and in turn are giving investors an ever more bond-like return stream.

As public equity markets morphed from providing growth capital to providing operational capital, private asset markets grew to fill the void. Private markets were once a financial backwater where a small number of investors with deep pockets and even deeper risk tolerance offered capital for innovators and entrepreneurs. Today, the market value of private assets has grown to around one-fifth of the market capitalization of U.S. public equity markets (**Exhibit 2**). Increasingly, private asset markets attract investors of all types and offer the exposure to corporate growth, emerging technology, restructuring, and operational transformation that public equity markets may not – and with that, the prospect of superior returns. The trade-off is assumed to be illiquidity, but this may be a naive conclusion; private assets are indeed illiquid, but generally investors are compensated for it, subject to appropriate manager due diligence (see page 37 for a more detailed discussion). Public market assets can also be illiquid, but investors may not, at times, be fully compensated for it.

Identifying compensated and uncompensated illiquidity across different markets is critical in optimally designing a portfolio with both public and private assets.

In this paper, we explore the shifting structure of the private and public markets, and consider how this may affect portfolio construction. Specifically, we look at the nature of illiquidity[1] in both private and public assets to understand how best to harvest illiquidity premia across the cycle, and how to avoid being trapped with uncompensated illiquidity in public asset markets.

Looking back to the early phase of the modern financial era,[2] between the late 1960s and early 1980s, public equity markets functioned largely in the way described by the classic financial textbooks. Firms raised funds via the stock market, with returns generated from reinvestment of investors' capital (retained earnings) and any excess paid out as dividends. The permanent nature of public equity capital meant that it was traditionally viewed as the main source of funding for the expansion and development of businesses.

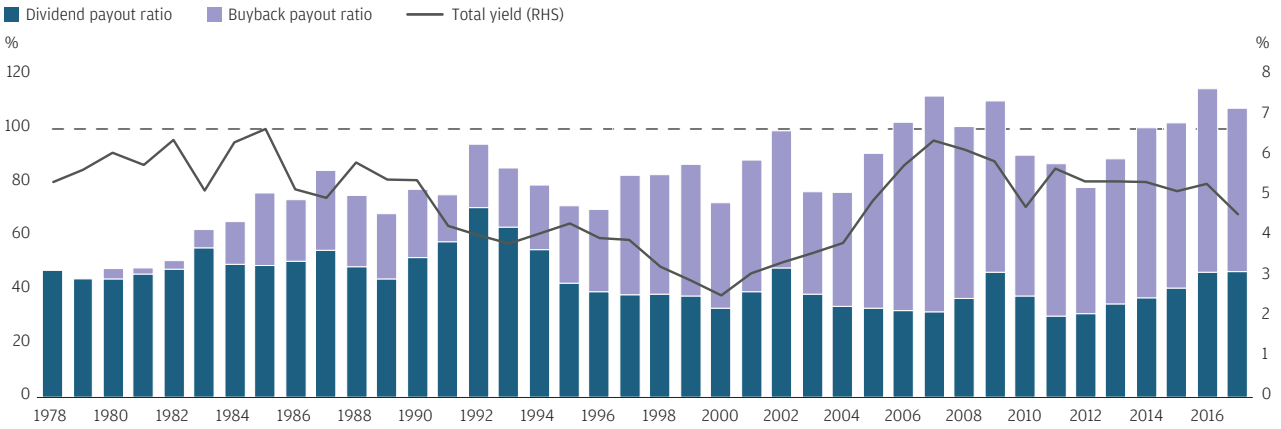
Over the subsequent decades, the role of equity markets changed. The secular decline in interest rates led investors to rely more heavily on equity income and to reward firms with

[1] Illiquidity premium is the additional return demanded by investors for assuming the risk of illiquidity, which typically arises due to the delay in conversion of an asset to cash at prevailing market prices. Illiquidity risk can arise from the size of the position, the nature of the underlying asset, friction in the capital market or a combination of all three. Literature has supported the existence of this phenomenon across asset classes for instance, Keynes (1936), Townsend (1937), Amihud and Mendelson (1986), Constantinides (1986), Luttmer (1996), Liu and Loewenstein (2002), among others.

[2] We assume the modern financial era to run from the late 1960s to the present day, the starting point being loosely defined as around the time when modern portfolio construction techniques (CAPM, efficient frontiers, etc.) gained prominence.

The U.S. equity payout ratio has been rising and has frequently been above 100% of earnings in recent years

EXHIBIT 1: U.S. PAYOUT RATIO, BROKEN DOWN INTO BUYBACKS AND DIVIDENDS

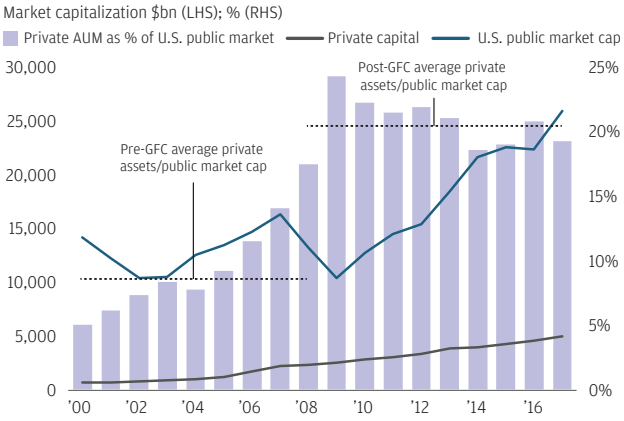


Source: Thomson Reuters Datastream, J.P. Morgan Asset Management; data as of July 31, 2018.

FERC Docket No. PL19-4-000
Reply Affidavit of Michael P. Gorman
Exhibit No. A-10
Page 38 of 361
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Expanding private asset markets offer the exposure to corporate growth, emerging technology and operational transformation that public equity markets may not

EXHIBIT 2: PRIVATE EQUITY ASSETS AS A PERCENTAGE OF THE MSCI U.S. MARKET CAPITALIZATION



Source: Thomson Reuters Datastream, Preqin; data as of December 31, 2017.

more stable dividend streams. The global financial crisis (GFC) only reinforced this trend, as interest rates fell to near zero. The growing dual burden of regular reporting and regulation – notably Sarbanes-Oxley in the U.S. – further favored maximization of returns from current operations rather than investing in expansion (**Exhibit 3A**). Today, the combination of deeper and more liquid public markets, lower interest rates and diminished shareholder willingness to forgo dividend growth means that it often makes more sense to buy growth than to build it organically. Public equity has been transformed from being primarily a source of growth financing to being an income-bearing asset for investors and an acquisition currency for corporations.

This was not a transformation that could happen in isolation, of course. The expansion of private asset markets, as well as the scale and sophistication of M&A and primary markets, accompanied the gradual structural shifts in the role of public equity markets. From vehicles for financing the rebuilding of the industrial base, private asset markets gradually shifted toward the financing of innovation and new ventures. Venture capital and smaller cap private equity (PE) still focus on this today, while larger cap private equity is dedicated mainly to financing operating efficiency and building scale. The preference for private over public markets as financing venues for new enterprises is reflected in the long-term decline in IPOs (**Exhibit 3B**).

The evolution of market structure across public and private asset markets is symbiotic: Public markets have shifted to optimize the distribution of cash to shareholders that in turn provide the equity base to allow firms to raise other forms of capital. At the same time, private markets have expanded to provide funding for growth and operational effectiveness at an industrial scale, bringing to bear not only capital but professional and managerial resources.

The modern structure has developed as a compromise to address the sometimes competing requirements and incentives from the regulatory environment, cost of capital and investor demands. Public markets allow firms to concentrate on existing operations, and make it cheaper and less risky to simply "buy in" growth when needed. Private markets can effectively "hothouse" and optimize growth and expansion more effectively than might be possible within public enterprises and provide the bolt-on opportunities to public firms when they decide it's time to "buy in" growth.[3]

[3] M&A volumes and values tend to be cyclical and have grown in line with underlying market values over the long run. The nature of deals, though, appears to be shifting somewhat from large-scale consolidation to more targeted deals to acquire new capabilities, technology or access to new markets and to integrate these into the acquirers' existing business. See, for example, PitchBook 2Q18 M&A report and BCG 2017 M&A report.

As regulatory burdens increased, companies found public listings less compelling

EXHIBIT 3A: NUMBER OF PAGES OF THE CODE OF FEDERAL REGULATIONS, 1970-2017

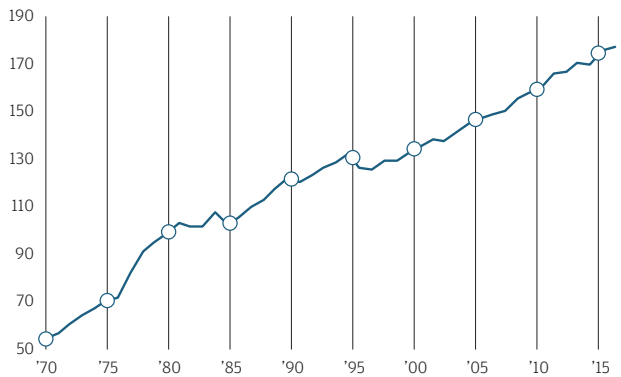
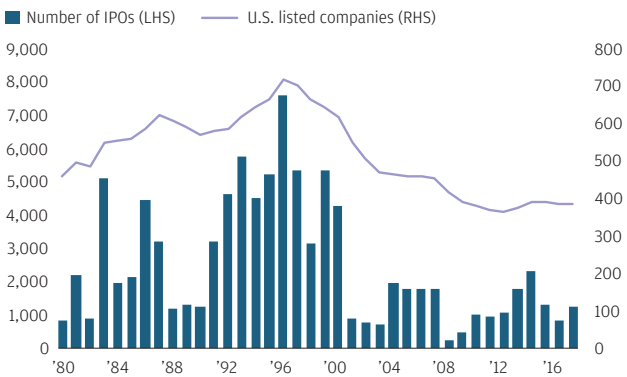


EXHIBIT 3B: NUMBER OF IPOS AND U.S. LISTED COMPANIES



Source: Jay R. Ritter, University of Florida, Warrington College of Business, "Initial Public Offerings: Updated Statistics," May 14, 2018; World Bank, data from 1980 - 2017; Federal Register, data as of December 31, 2017.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

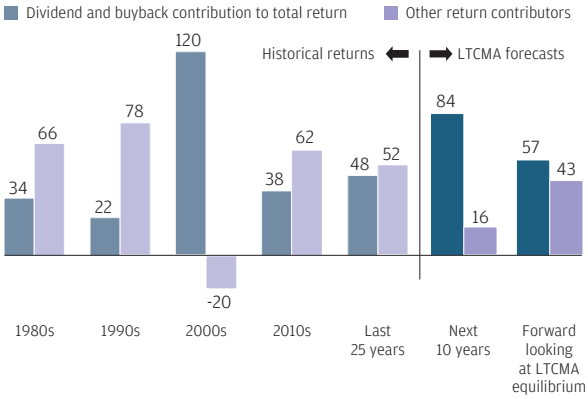
Portfolio construction: The role of private assets and the impact of illiquidity

At this juncture, we shift our perspective to the investor and consider how the evolution of public and private asset markets is affecting portfolio design and strategic allocation decisions across the cycle. We note the increasingly income-dominated return stream in public equity markets and the growth in access to private markets, and begin to consider how investors should factor in the illiquidity risks inherent in private assets.

Looking ahead, we expect over 80% of returns in developed public equity markets over the next 10 years to come from dividends and buybacks, compared with less than half over the last 25 years (**Exhibit 4**). The current return profile reflects the growing importance of income to investors but also implies that public equity markets have a reduced exposure to growth and new ventures. To capture those exposures, investors must increasingly turn to private asset markets, where they can expect a higher return but must also accept the illiquidity risk that comes with it.

Over 80% of the returns in developed public equity markets over the next 10 years could come from dividends and buybacks, vs. less than half over the last 25 years

EXHIBIT 4: PAST AND FUTURE PROPORTION OF EQUITY TOTAL RETURNS FROM CASH FLOWS (DIVIDENDS + BUYBACKS) VS. CAPITAL GROWTH (%)



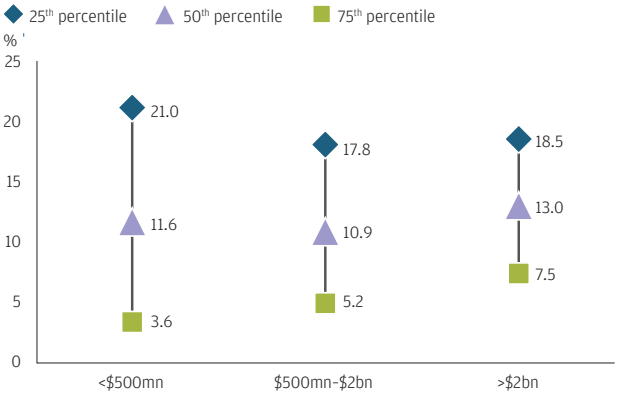
Source: Bloomberg, Citigroup, FactSet; data as of December 31, 2017. LTCMA equilibrium assumes returns at equilibrium margin buyback and valuation levels, as opposed to starting point values.

The benefits of the illiquidity risk premium in private assets are broadly accepted by sophisticated institutional investors. Indeed, illiquidity risk in private asset markets can be thought of as a function of the business model for which investors will be compensated over the cycle. Lack of a daily mark-to-market in private equity certainly helps to dampen traditional measures of market risk and can make private equity an optically outstanding portfolio contributor. But simply taking on illiquidity risk does not guarantee that private equity will deliver superior returns; these have to be generated by skilled managers, which need to be carefully identified and accessed. In an important sense, illiquidity is what enables skilled private equity managers to generate excess returns, through tools such as reorganization, leverage, product repositioning or strategic acquisition. In contrast, public market illiquidity risk is simply a frictional cost that is cyclical and for which investors are not always fully compensated.

In recent years, however, the average private equity manager has not delivered a meaningful premium over the public markets. A very wide dispersion of returns (**Exhibit 5**) suggests it's not illiquidity alone that is compensated but, rather, the strategy and skill of the operator employed. For investors with a sub-optimal selection of available managers and/or an uncertain commitment to the unique long-term aspects of private equity investing, the illiquidity risk they are taking on in private markets may be underestimated.

Wide dispersion of PE returns reflects relative manager skill more than illiquidity compensation

EXHIBIT 5: HISTORICAL PRIVATE EQUITY DISPERSION BY SIZE OF FUND, * IRR OF VINTAGE YEARS 2002-16 (%)



Source: Burgiss, J.P. Morgan Asset Management; data as of March 31, 2018.
*Includes buyout and expansion capital funds.

The optimal level of illiquidity risk needed to at least match required returns varies greatly across institutions. For those with ample access to top-tier managers and proven manager selection skills, illiquidity risk becomes a lower-order consideration. In such cases, liquidity is required only to meet planned distributions, to address dislocations in the normal cash flow modeling of illiquid exposures or to set aside a small contingency allocation. For investors with very long investment horizons, good access to top-tier managers and well-formulated contingency plans for any liquidity event, it is the value of liquidity that can be overestimated.

In the majority of institutional portfolios, a sustainable balance can be found between liquidity requirements and illiquidity risk, and between the potential for excess return

FERC Docket No. PL19-4-000
Reply Affidavit of Michael P. Gorman
Exhibit No. A-10
Page 40 of 361

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

and the certainty of lower but more liquid/tactical and low cost returns. Nevertheless, this balance will vary cyclically with market and economic conditions.

There is also a connection between institutional asset size and the balance between liquid and illiquid allocations, with larger institutions generally more willing to take on illiquidity risk (**Exhibit 6**). However, as we will discuss at greater length, when we account for additional illiquidity risks in public asset markets and factor in the economic cycle, we find that larger institutions will need to be more proactive in managing public market illiquidity risks. Indeed, a higher propensity to hold illiquid private assets in a diversified portfolio only serves to exacerbate that need. An institution's size, though, is just one factor in determining an appropriate balance between liquidity and illiquidity. Other considerations include an institution's access to private investment, tolerance for illiquidity risk and J-curves,[4] and ability to accept 10- to 12-year lockups and identify high performing managers.

Assessing the costs and benefits of illiquidity under different market scenarios

We have thus far explored the evolution of public and private asset markets, and the opportunities and considerations they present to investors over a cycle in stable, equilibrium conditions. We now focus more on cyclicality – in particular for illiquidity risk – and propose a framework for evaluating allocations to both public and private assets in a multi-asset portfolio. The process is critical to successful portfolio construction and hinges on the idea that the illiquidity risk premium is a natural and even desirable feature of private assets, for which investors are generally compensated over the cycle. Meanwhile, in public asset markets illiquidity risk is a manifestation of friction in the secondary market, for which investors may not always be compensated. Thus, an investor with allocations to both public and private assets should look to capture compensated illiquidity risk in private assets but seek to avoid being forced to crystallize losses in less liquid public assets at times when illiquidity risk may be uncompensated.

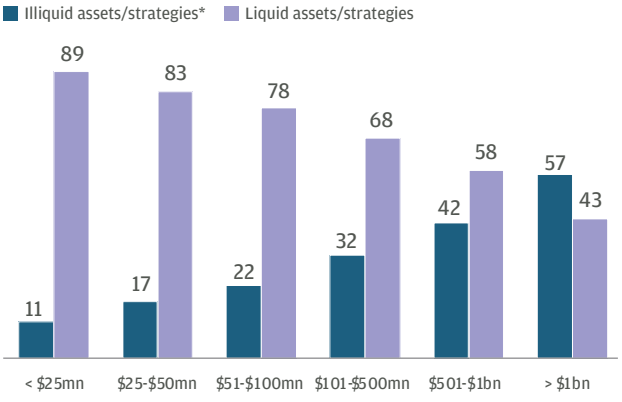
To help understand the interplay between illiquidity risk and market risk through the cycle, we refer to two concepts. The first is based on the way cash flows evolve over the life cycle of a private investment, and the second is based on the probability of experiencing an adverse liquidity event in public markets over a defined time horizon.

Private investments follow a life cycle with three defined phases: an investment phase in which capital is committed up front from investors, further cash calls are possible and cash flow to investors is negative; a breakeven point when cash flow to investors begins to turn positive; and a harvesting phase in which cash is returned to investors (**Exhibit 7**). Should economic conditions deteriorate during the investment phase, it may be that cash calls are brought forward and/or that planned future positive payouts to investors are delayed.

[4] The J-curve represents the pattern of returns an investor can expect to realize from a private equity fund over time, from inception to termination. The J-curve effect refers to the fact that a private equity fund will often show a negative return in its early years, when fees and start-up costs are incurred; investment gains will usually come in the later years as portfolio companies mature, increase in value and are ultimately exited with returns realized.

Larger institutions are generally more willing to take on illiquidity risk

EXHIBIT 6: ASSET ALLOCATION OF ENDOWMENTS BY SIZE FOR FISCAL YEAR 2017, %

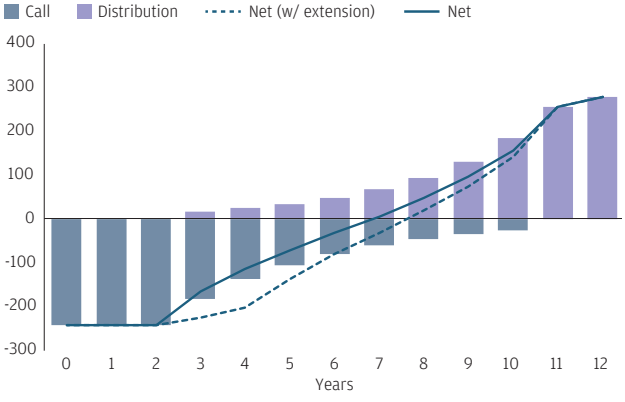


Source: 2017 NACUBO-Commonfund Study of Endowments.

* Includes private equity, hedge funds, venture capital, private real estate, energy, natural resources, commodities, managed futures, distressed debt and others.

To earn the illiquidity risk premium in private markets, investors need to be able to weather any variation in the cash flow profile over the full investment life cycle

EXHIBIT 7: AGGREGATE PRIVATE EQUITY INVESTMENT CASH FLOWS OVER LIFE CYCLE



Source: J.P. Morgan Asset Management. The chart shows a hypothetical stream of capital calls and distributions, and assumes an additional capital call in year three due to an unexpected period of financial market stress. The chart is based on average capital call and distribution data from Preqin back to 2000. By looking at average non-crisis cash flows, and using median net IRR data by vintage back to 2005, we have come up with a maximum drawdown by vintage, which was used to compute the average drawdown in non-crisis periods. We assume that the extension leads to an extra 1.75 years of average calls, which is consistent with the historical data.

In theory, investors are compensated for this through the higher returns available in private assets over the full life cycle of the private investment. In other words, to harvest the illiquidity risk premium in private markets, investors need to be able to stay the course, weathering any variation in the cash flow profile over the full cycle. This means that cash calls would need to be funded from elsewhere in the portfolio.

The ability to accept this type of risk ranges widely across investor types. Those that may be subject to redemptions or fund withdrawals (e.g., mutual fund managers) are less able to bear uncompensated illiquidity risk than those with a long-term pool of capital to deploy (e.g., sovereign wealth investors). Further, during times of market crisis, when investors are already seeking to cut exposure to public markets, threats to liquidity are generally correlated and can compound to become a serious issue for investors. Investors could face liquidity demands arising from redemptions and a prudent desire to hold higher portfolio cash buffers. At the same time, on the private asset side there may be cash calls to finance, calls that are best covered from public assets – and thus, avoiding uncompensated illiquidity traps in public markets becomes a priority. To fully assess the illiquidity risk in a portfolio, all of these factors need to be considered holistically.

Taking high yield (HY) bonds as an example of a potentially illiquid public asset with both market and illiquidity risk, we can ask whether, over a defined time horizon, the probability of being forced to crystallize a loss under adverse liquidity conditions is appropriately compensated (see Addendum, "Modeling the cost of high yield trading under illiquid conditions"). Early in the economic cycle, when credit spreads are wide, the illiquidity premium in an asset such as high yield credit may well offer an additional return compared with a replicating stock-bond portfolio.[5] However, as the cycle matures and credit spreads tighten, there will come a tipping point – some breakeven level of spread – where the return in credit is not sufficient to offset the probability-weighted risk of a loss over a defined time horizon. Effectively, the illiquidity risk has at that point become uncompensated and investors may be better served expressing their desired level of market risk via a replicating stock-bond portfolio.

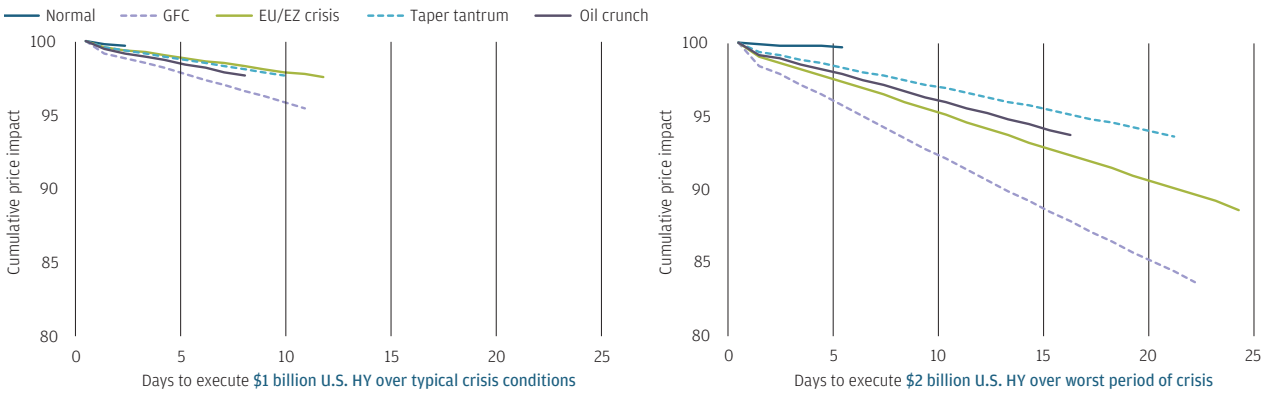
The scale of the potential illiquidity during times of market stress is demonstrated in **Exhibit 8**, again using HY credit as an example. The illiquid credit asset will suffer from wider bid-ask spreads and much reduced transaction volumes; large transactions can take considerable time to execute in markets where prices are dropping sequentially over multiple trading sessions.

Turning to private market assets, as investors have increasingly added private assets to portfolios there is commensurately more focus on the risk that they could be forced to liquidate private investments at an inopportune time to meet an additional capital call. Alternately, redemptions and other portfolio-level cash requirements may force them to exit private investments at an undesirable point. Since such events tend to occur during adverse conditions in public markets and the economy at large, the most relevant question is how bad things might really get.

[5] For the purpose of our analysis, we assume that the market risk of a credit investment can be approximately replicated with a combination of equity and bonds/cash; over the long run, the beta of high yield credit to the S&P 500 is approximately 0.4, so we make a simplifying assumption that a 40/60 stock-bond mix will approximate to high yield over short periods and for the purpose of our modeling exercise.

Large transactions take longer to execute in markets where prices are steadily falling

EXHIBIT 8: PRICE IMPACT AND DAYS TO TRANSACT A SIGNIFICANT SIZE IN U.S. HIGH YIELD CREDIT IN STRESSED CONDITIONS



Source: Financial Industry Regulatory Authority Trade Reporting and Compliance Engine, J.P. Morgan Asset Management; data as of May 31, 2018.

Notes: Based on historical liquidity patterns adjusted for typical third-quarter volumes; assumes ability to trade 10% of market volume in normal markets, with a drop-off of 50% after two days for ongoing sell orders; assumes trade size drops by one-third in stressed markets, with similar drop-off for ongoing sell orders. Bid-ask spreads assumed at 50bps in normal conditions and 300bps in stressed markets. Typical crisis conditions take the average daily price move during the depth of the crisis; worst period extrapolates the worst weekly price action across the full period.

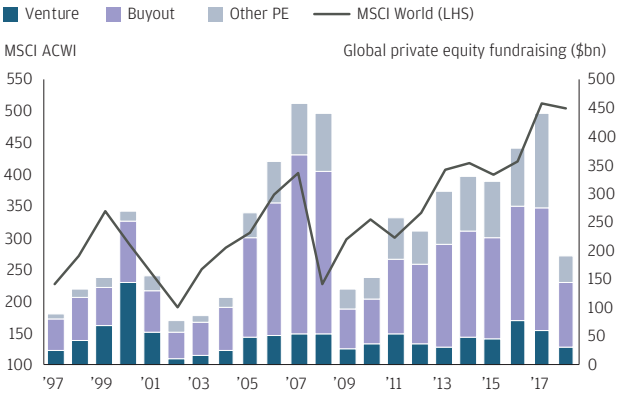
FERC Docket No. PL19-4-000
Reply Affidavit of Michael P. Gorman
Exhibit No. A-10
Page 42 of 361
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

The evolution of the secondary market for private assets allows us to estimate the drawdown investors might be forced to take if they were to instead sell their private assets. Using data on capital calls,[6] capital distributions and secondary market pricing over the past 18 years, it is possible to determine periods of private market stress. Using a composite of secondary market pricing data, we find that private equity assets have sold at an average of 88% of NAV on the secondary market since 2000. As such, we view periods where secondary market pricing was below 88% of NAV and net cash flow was negative (capital calls exceeded capital distributions) as stress periods – as seen in 2000-02 and 2008-09.[7]

As **Exhibit 9** illustrates, there is a tight relationship between private equity fundraising and public equity market performance. This suggests that increased cash demands on an investor correlate with periods of broad market weakness; this is borne out by data showing negative net cash flow from private equity during the 2000-02 and 2008-09 stress periods.

Increased cash demands on investors correlate with periods of broad market weakness

EXHIBIT 9: RELATIONSHIP BETWEEN PRIVATE EQUITY FUNDRAISING AND PUBLIC EQUITY MARKETS



Source: Bloomberg, Thomson One fundraising global private equity and venture capital; data as of June 30, 2018.

The aggregate net cash flow during the two stress periods is negative at around $47 billion per year, and excluding 2008 it is closer to $29 billion per year (**Exhibit 10**). Translating this into terms of the percentage of assets under management (AUM), on average the private equity cash demands during a time of crisis amount to 6.2% of AUM; during the global financial crisis, that percentage was 11.3%.

Private equity cash demands rise in periods of market stress

EXHIBIT 10: AVERAGE NET PRIVATE ASSET CASH FLOWS IN STRESS PERIODS

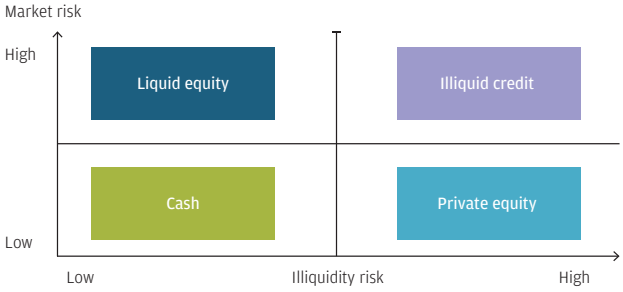
Stress period	Net cash flow ($bn)	Secondary pricing	Amt needed to sell ($bn)
2000	-22	84%	-$27
2001	-23	81%	-$29
2002	-27	85%	-$32
2008	-117	73%	-$161
2009	-43	59%	-$72
Average	-47	76%	-$61
Average ex-2008	-29	77%	-$38

Source: J.P. Morgan Asset Management; data through the end of 2017 and released in an August 2018 report.

Tying these concepts together, we can establish a framework that allows us to simulate the behavior of a portfolio of both private and public assets through the cycle. To this end, we create a stylized portfolio comprising a private asset, a liquid public asset (equity), an illiquid public asset (credit) and cash (**Exhibit 11**).

A stylized portfolio can simulate the behavior of private and public assets through the cycle

EXHIBIT 11: STYLIZED PORTFOLIO MARKET AND ILLIQUIDITY RISK ASSUMPTIONS



Source: J.P. Morgan Asset Management. Notes: The liquid equity, illiquid credit and cash are all public assets. (1) We assume that equity risk can be exited in a single trading session, so there is no ongoing negative price drift; we account for the price impact by taking the average and worst-case equity drawdown days from previous crises. (2) The private asset has market risk only in the event of a forced sale. If we insert the condition that any cash demands hitting the portfolio – from any source – must be funded purely from the portfolio's public assets, we can treat the private asset as having only illiquidity risk.

[6] Defined here as additional calls on investors' cash to support a stressed private equity investment.

[7] The year 2003 is excluded as a stress period despite the below-average secondary market NAV and a negative net cash flow, as both private and public equity markets generated a positive return that year and there were no broader signs of stress in the global economy.

We assume that the market risk of credit can be approximately replicated with some combination of equity and cash so that we compare expected returns and choose whether to accept the additional illiquidity risk associated with credit. We also assume the liquid equity part of the public asset portfolio can be instantaneously exited even in stressed markets with limited additional friction.

Exhibit 12 shows our stylized four-asset portfolio. An unconstrained optimized portfolio tends to heavily allocate to private equity and high yield, given optically good information ratios. However, if we set maximum exposure to each asset at 20%, then in equity beta equivalent terms a 70/30 stock-bond portfolio and a 60/40 stock-bond portfolio can be replicated. The 50/20/20/10 portfolio (P1 in Exhibit 12) is representative of multi-asset portfolios with private asset exposure, so this is the stylized portfolio we test.

Optically, spreads today may appear to offer adequate compensation for illiquidity in both cases, but this assumes both perfect foresight and flawless execution, and makes no allowance for any rise in default rates. We would therefore reasonably expect that most investors would want a bigger cushion built into their breakeven spread assessment.

Our four-asset stylized portfolio can replicate in equity beta equivalent terms a 70/30 and a 60/40 stock-bond portfolio

EXHIBIT 12: SIMULATION PORTFOLIOS (FOUR-ASSET MIX)

	Expected		Equity	Portfolios (inc. HY & PE)		Equivalent (ex. HY & PE)	
Asset	Return	Vol	beta	Weights (P1)	Weights (P2)	Weights (Px1)	Weights (Px2)
U.S. large cap	5.25%	13.75%	1.0	50%	40%	70%	60%
Private equity	8.25%	21.00%	0.7	20%	20%	-	-
U.S. high yield bonds	5.50%	8.25%	0.4	20%	20%	-	-
U.S. cash	2.00%	0.50%	0.0	10%	20%	30%	40%
Excess return				3.58%	3.25%	2.28%	1.95%
Sharpe ratio				0.31	0.31	0.24	0.24

Source: J.P. Morgan Asset Management Multi-Asset Solutions; data as of September 30, 2018.

Our model can estimate how the sale of illiquid public assets will impact portfolio returns

EXHIBIT 13: BREAKEVEN SPREADS FOR ILLIQUID PUBLIC ASSETS (HY) IN PORTFOLIOS OF VARIOUS SIZES AT 15% WITH RECESSION PROBABILITY AVERAGE-CASE STRESS SIMULATION

Total fund	Cash call*	Public assets to sell (base)			Days to	Crisis price	Baseline*	Drawdown	Breakeven
($mn)	Base case	Equity	Cash	HY	transact	impact	spread	impact	HY spread
1,000	87	54	11	22	2	-0.8%	225	11	236
3,000	261	163	33	65	2	-0.8%	225	11	236
5,000	435	272	54	109	2	-0.8%	225	11	236
10,000	869	543	109	217	3	-1.0%	225	15	240
25,000	2,173	1358	272	543	6	-1.8%	225	27	252
50,000	4,345	2,716	543	1,086	12	-3.3%	225	50	275

Source: Financial Industry Regulatory Authority Trade Reporting and Compliance Engine, J.P. Morgan Asset Management; data as of May 31, 2018.
* Baseline spread is the required credit spread to compensate for losses given defaults (3.75% default assumption, 40% recovery rate). Note: Simulation assumes 15% probability of recession, base-case cash call, average crisis price drift.

The extent of the assumed drawdown will determine what spreads are required to hold high yield

EXHIBIT 14: BREAKEVEN SPREADS FOR ILLIQUID PUBLIC ASSETS (HY) IN PORTFOLIOS OF VARIOUS SIZES AT 33% RECESSION PROBABILITY WITH WORST-CASE STRESS SIMULATION

Total fund	Cash call*	Public assets to sell (bear)			Days to	Crisis price	Baseline*	Drawdown	Breakeven
($mn)	90th %ile	Equity	Cash	HY	transact	impact	spread	impact	HY spread
1,000	173	108	22	43	2	-1.4%	225	45	270
3,000	520	325	65	130	2	-1.4%	225	45	270
5,000	867	542	108	217	3	-1.8%	225	59	284
10,000	1,734	1,084	217	433	5	-2.7%	225	89	314
25,000	4,335	2,709	542	1,084	12	-5.9%	225	196	421
50,000	8,669	5,418	1,084	2,167	22	-10.5%	225	345	570

Source: Financial Industry Regulatory Authority Trade Reporting and Compliance Engine, J.P. Morgan Asset Management; data as of May 2018.
* Baseline spread is required credit spread to compensate for losses given defaults (3.75% default assumption, 40% recovery rate). Note: Simulation assumes 33% probability of recession, worst-case cash call, bear-case crisis price drift.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

This would further push up breakeven spread requirements – possibly even to levels some way above prevailing spreads for managers of larger portfolios with meaningful exposure to illiquid public and private assets.

We can now consider how the portfolio copes with the varying cash demands that must be funded from public assets alone. These demands come from three sources that we assume are correlated with periods of market stress: cash calls from private assets, portfolio redemptions and increased portfolio cash buffers (with estimates taken from Girardi, Stahel and Wu, 2017[8]). As the cash calls are funded from public assets alone, we can estimate, for varying portfolio sizes and probabilities of market stress, what amount of illiquid public assets (HY) will need to be sold to meet portfolio cash needs and, in turn, what impact that will have on portfolio returns.[9]

Assuming a 15% probability of market stress over a one-year horizon and setting default and recovery rates at through-cycle averages, we see that it is only in extremely large portfolios, or those with outsize illiquid asset concentrations, in which the ex-ante breakeven spread might come anywhere close to recent trading ranges (**Exhibit 13**).

If we were to raise the probability of stress over the next 12 months to 33% – equivalent to assuming that the cycle may end in the next three years – then the breakeven spread the manager of a $10 billion portfolio should demand to hold high yield increases by 18 basis points (bps) to 258bps for a mild drawdown and by 49bps to 314bps for a severe drawdown (**Exhibit 14**).

Moreover, later on in the economic cycle, as recession risks rise objectively for all investors, even managers of smaller portfolios may begin to find that the ex-ante breakeven spread in illiquid public assets is uncomfortably close to prevailing trading levels.

CONCLUSIONS AND KEY FINDINGS

In this paper, we have explored the shifting nature of public and private asset markets – first from the perspective of firms that are raising capital and then from the perspective of investors that must evaluate the trade-off between returns and illiquidity in their portfolios.

The evolution in market structure that drove the growth in private asset markets and the transition of public equity markets toward more of an income asset is unlikely to reverse, in our view. A larger, and more easily accessible private asset market opens up new potential return streams for investors, particularly those seeking exposure to growth, innovation and corporate restructuring as drivers of returns. Investors are generally quite familiar with the subtleties of return differences between public and private markets. However, the growth in private assets likely demands that greater attention be paid to how illiquidity risk can manifest itself in portfolios – in particular, how it can arise, and interplay, within diversified portfolios.

One significant conclusion from our analysis is that while larger and more sophisticated investors have a greater propensity to take on private market illiquidity risk, the ability to absorb unexpected public market illiquidity episodes decreases as fund size grows. Unlike so many issues in investing and finance, there is no economy of scale for managing public market illiquidity. Indeed, there are *dis*economies of scale that can only be mitigated by proactively managing illiquidity risk in the public asset side of the portfolio so that the more stable and desirable private market illiquidity risk premium can be harvested.

Investment horizon may be a significant mitigating factor. The philosophy behind our modeling of breakeven spreads in high yield credit – to compensate for illiquidity risk as well as default assumptions – is that if we can avoid being forced sellers of an asset and crystallizing losses from any sale transaction greater than accrued returns, then we can manage a portfolio more efficiently. Investors with a long investment horizon, operating funds that are less subject to redemptions at times of market stress, are commensurately more able to assume illiquidity risk in private assets and ride out episodes of uncompensated illiquidity risk in public markets. Nevertheless, recognizing portfolio cash demands across the cycle is essential to prudently planning and managing a portfolio. And understanding that there is a cyclical element to the illiquidity risk premium in public assets is an important subtlety in optimally navigating a sophisticated multi-asset portfolio through the cycle.

[8] Giulio Girardi, Christof Stahel, and Youchang Wu, "Cash management and extreme liquidity demand of mutual funds," U.S. Securities and Exchange Commission, June 2017. The paper uses a data set that estimates the average monthly cash demand on a multi-asset portfolio in periods of stress to be 1.491% of AUM, with a standard deviation of 0.693%. We use this input to calculate our average and 90th percentile monthly stress period cash demands in our model portfolio simulations.

[9] We can also estimate the ex-ante breakeven spread required to include illiquid public assets in the portfolio, given the probability of market stress over the forecast horizon, using the methodology in the Addendum.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

One way to frame this issue is to consider the difference between asset owner and asset manager. An asset owner is not forced, under any circumstances beyond its own preferences or the liquidity demands of its underlying (private) investments, to transact in public markets at a sub-optimal point. By contrast, an asset manager is a fiduciary that must transact not only to meet cash calls from private assets but also to manage redemptions, allocation constraints and associated rebalancing, and planned distributions. Sovereign wealth funds with no immediate distribution demands are probably closer to the asset owner end of the continuum, while mutual funds with daily liquidity commitments and predetermined distributions are likely closest to the asset manager end.

Simply put, the larger the fund and the closer it sits to the asset manager end of the owner/manager continuum, the more sensitive it will be to public market illiquidity risks, and as the cycle matures, there is a rising risk of a liquidity event hitting both public and private markets simultaneously. This may bring forward the point at which larger investors choose to exit more illiquid public asset markets, such as high yield credit, even if the prevailing spreads relative to realized defaults appear attractive. By contrast, smaller funds that are nearer the asset owner end of the spectrum are most insulated and – assuming necessary manager selection skill in, and access to, private asset investments – should be less constrained in harvesting both private and public market illiquidity risk premia over the cycle.

In running simulations of a simple multi-asset portfolio with exposure to both public and private assets, we can draw a few conclusions regarding illiquidity risk and how it might affect different investors:

- Illiquidity is not the same to all actors. If priced appropriately (in PE), it is a significant contributor to returns over the cycle, but in public markets it is more cyclical. The pricing of illiquidity risk should be considered in an overall portfolio context.
- An investor will always want to avoid becoming a forced seller in illiquid markets, public or private. But it will be more desirable to hold illiquid positions (in market weakness) in private markets than in public markets because in private markets illiquidity is a positive driver of returns, whereas in public markets it is a frictional cost that rises in times of market stress.
- Large, sophisticated investors with commitments to liquidity or regular outflows may be more exposed to public market illiquidity risk than their propensity to invest in private market illiquidity risk implies. Mitigating that risk requires a proactive assessment of the compensation for public market illiquidity risk that is being assumed and a disciplined process to reallocate to more liquid public market equivalents at times when public market illiquidity becomes undercompensated.
- Pension investors that have positive cash flow and are fully funded are less likely to face public market illiquidity traps – even given relatively large private asset allocations. But pension funds in negative cash flow or with funding gaps should operate more as asset managers than asset owners in planning for episodes of adverse public market illiquidity. Most importantly, scale is a disadvantage in dealing with public market illiquidity.
- Smaller investors are more nimble but should be mindful of the constraints that public and private market illiquidity place on larger investors and how this might distort market pricing at times of stress. Smaller investors with deep pockets and longer time horizons can even consider that they might, in times of severe market stress, in fact be the ultimate liquidity backstop – in turn profiting from the dislocations that might arise during episodes of illiquidity in public asset markets.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

ADDENDUM: MODELING THE COST OF HIGH YIELD TRADING UNDER ILLIQUID CONDITIONS

In our modeling, we have used high yield credit as the archetypal public market asset subject to large illiquidity risk. Here we describe in more detail how we calibrate the frictional costs of exiting a bloc of high yield credit in times of market stress. The additional frictional cost in small transactions arises mostly from the wider bid-ask spread that can be expected in stressed markets. However, for larger transactions the frictional costs are dominated by the constraint on trading volumes, forcing investors to liquidate over multiple sessions, at sequentially lower prices from one session to the next (**Exhibit A1**).

This allows us to estimate what the ex-ante breakeven spread should be able to compensate us for a given probability of being forced to exit the position over a defined horizon. The table takes a one-year horizon and assumes a 15% probability of being a forced seller of varying trade sizes of high yield credit; this approximates the unconditional probability of recession in any given 12-month period. The volume and price impacts are taken from the average experience of periods of market stress from 2008 to the present,[10] and default and recovery rates are set at through-cycle average levels of 3.75% and 40%, respectively.

For an investor that may need to liquidate $1 billion of high yield and anticipates any crisis to be average in its severity, credit spreads above around 270bps compensate for illiquidity risk. But if the investor's subjective view of the probability of recession over the next year were to increase to 33%, then the breakeven credit spread required to compensate fully for illiquidity risk would jump to 320bps and as high as 398bps in a worst-case drawdown scenario. As portfolio size increases – and the potential illiquid asset trade size grows – the ex-ante breakeven spread required to compensate for illiquidity risk increases. Crucially, there is no economy of scale for illiquidity risks and, indeed, there are very apparent diseconomies of scale.

[10] We have tested four explicit periods of stress: the 2008-09 financial crisis, the 2011-12 U.S. debt ceiling and EU financial crisis period, the 2013 taper tantrum and the 2015-16 oil price and credit sell-off. The price action and trading conditions of these periods for high yield are then taken as potential scenarios, and an average price and trading path under stress is derived from these historical episodes for the purpose of estimating the effect of a future period of market stress on credit market trading conditions.

For larger transactions, investors may be forced to liquidate over multiple sessions, at sequentially lower prices

EXHIBIT A1: IMPACT OF SELLING A POSITION IN HIGH YIELD UNDER AVERAGE AND WORST-CASE SIMULATED MARKET STRESS CONDITIONS; IMPLIED EX-ANTE BREAKEVEN SPREAD TO COMPENSATE FOR ILLIQUIDITY RISK

Sale of HY $mn	Days to transact	Crisis price impact		Baseline* spread	Drawdown impact		Breakeven HY spread	
		Average	Worst case		Average	Worst case	Average	Worst case
500	4	1.2%	2.2%	225	19	34	244	259
1,000	10	2.9%	5.2%	225	43	79	268	304
2,000	20	5.6%	10.1%	225	84	151	309	376
3,000	29	8.0%	13.9%	225	120	209	345	434
4,000	36	10.5%	17.7%	225	157	266	382	491
5,000	43	12.6%	20.7%	225	189	311	414	536

Source: Financial Industry Regulatory Authority Trade Reporting and Compliance Engine, J.P. Morgan Asset Management; data as of May 31, 2018.

* Credit spread required to compensate for default losses; estimates based on 15% recession probability, 3.75% default rate and 40% recovery rate.

FERC Docket No. PL19-4-000
Reply Affidavit of Michael P. Gorman
Exhibit No. A-10
Page 47 of 361
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Building investor resilience in a downturn

Sorca Kelly-Scholte, FIA, *Global Strategist, Global Pension Solutions*
Jason Davis, CFA, *Portfolio Manager, Global Fixed Income, Currency & Commodities*
Vincent Juvyns, *Global Market Strategist, Global Market Insights*
Tim Lintern, *Global Strategist, Multi-Asset Solutions*

IN BRIEF

- Recession experiences have varied in terms of trigger events and associated market responses. In this paper, we consider a plausible range of downturn scenarios and the degrees to which different investor types may be resilient to them.
- The maturity of corporate defined benefit pension funds and their size relative to sponsors' balance sheets have raised concern that pension funds could hamper corporate recoveries. Corporate plans have de-risked investment strategies, but other risks have become more important – notably, cash flow, liquidity and operational risks. Sponsor covenant risk remains critical.
- A "corporate caution" scenario, characterized by severe equity downturns, falling interest rates and high default rates, is the most challenging scenario for defined benefit pension funds, particularly those whose resilience has been weakened by being in a negative cash flow position.
- Other institutional investors, such as sovereign wealth funds, endowments and foundations, and public pension funds, have a greater ability to take a long-term investing view and have thus extended more aggressively into alternatives. While this may help compensate for falling expected public market returns, the spending commitments of endowments and foundations and the negative cash flow position of many public pension funds can undermine this resilience.
- The resilience of individual investors will depend on the interaction of their income growth and their strategic portfolio allocation. Evidence suggests that higher income growth is associated with greater risk-taking.
- Particularly in the U.S., where households have a relatively high allocation to risk assets, there is evidence of an increasing use of balanced funds, including target date funds, within defined contribution holdings. Skillful management of asset allocations in these vehicles can help improve outcomes, resulting in greater individual investor resilience in a downturn.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

FACING INTO THE LATE CYCLE

Our Long-Term Capital Market Assumptions (LTCMAs) are structurally optimistic, but we cannot fail to acknowledge the potential short-term pain that may come with the end of the current cycle. In this paper, we consider which risks different types of investors are bearing today, their capacity for bearing them and how these risks might impact investors through the end of the expansion.

LESSONS FROM RECESSION EXPERIENCE

Our review of recessions confirms a diverse experience across different recessionary periods. A variety of triggers have catalyzed recessions, and the quality and duration of the market response have been different in each case. Recessions are generally expected to spur equity sell-offs, credit defaults and a flight to quality driving Treasury prices up. These responses have not always occurred, however (**Exhibit 1**). Markets can respond violently and then bounce back straightaway, or they can shrug recessions off altogether. Further, the ordering of market responses is not fixed.

We can consider a range of potential downturn scenarios and the resilience of different investors when exposed to each. In "The taming of the business cycle: Fewer recessions but weaker recoveries,"[1] we examine clues about what future recessions might look like and conclude that, notwithstanding the recession associated with the global financial crisis, recessions have generally become milder, less frequent and more synchronized globally. In this context, and with the U.S. economy firmly in its late-cycle phase, we have created a heuristic and non-exhaustive set of four recession scenarios that we deem most likely and contemplate the potential effects of each on markets (**Exhibit 2**).

Against these scenarios, we look at different types of investors, the risks they bear and their ability to weather a recessionary environment. The way in which investors respond to different types of recessions depends not just on the recession itself but also on investors' wider circumstances, capacity to bear risk and investment goals.

[1] "The taming of the business cycle: Fewer recessions but weaker recoveries," 2019 *Long-Term Capital Market Assumptions*, J.P. Morgan Asset Management, 2018.

History confirms that all recessions are not made equal

EXHIBIT 1: REVIEW OF DEVELOPED MARKET RECESSION EXPERIENCES

● Equity market ■ Bond market ◆ Credit

Start date*	Trigger	Duration in quarters		Market reaction*			
				Led	Coincided	Lagged	Uninterrupted
Nov '73	Oil shock	U.S.	5				
		EU	2		●	■	
		JP	5				
Jan '80	Oil shock	U.S.	2				
		EU	10		■	●	
		JP	12				
Jul '81	Monetary tightening	U.S.	5		●	■	
Jul '85	Plaza Accord	JP	6	■			●
Jul '90	Unknown	U.S.	2				
		EU	6		●		■ ◆
		JP	11				
Jul '97	Asian financial crisis	JP	7		■	●	
Mar '01	Equity bubble	U.S.	3				
		JP	5	●		■	◆
Dec '07	Credit crisis	U.S.	6				
		EU	5	◆	● ■		
		JP	4				
Sep '11	Sovereign debt crisis	EU	6	● ■ ◆			

Source: Bank of America Merrill Lynch, Bloomberg, Moody's, NBER, Thomson Reuters Datastream, Trading Economics, J.P. Morgan Asset Management; as of October 2018.
* Market reactions are qualitative assessments. For global recessions, market reactions and start dates refer to U.S. sources. U.S. credit data is available from 4Q 1988. For region-specific recessions, the market reaction refers to the domestic market.

We cannot predict the shape of the next recession, but we can create plausible scenarios

EXHIBIT 2: POSSIBLE DOWNTURN SCENARIOS

● Negative ○ Moderately negative ○ Moderately positive ● Positive

Cause of recession	Possible triggers	Inflation	Curve shape into downturn	U.S. large cap	U.S. 10-year Treasuries	Credit	Emerging market assets	U.S. dollar
Monetary tightening	Inflation	Higher; distribution shifts to right	Flatter; led by a higher short end	○	○	○	●	●
Corporate caution	Change in tax regime	Lower; distribution shifts to left	Flatter	●	●	●	○	○
Trade war	Further tariff measures	Unclear; wider distribution	Flatter; led by long end	○	○	○	●	○
Consumer retreat	Labor market downturn	Lower; distribution shifts to left	Flatter	○	○	○	○	○

Source: J.P. Morgan Asset Management. For illustrative purposes only.

CORPORATE PENSION FUNDS

Defined benefit (DB) pension provision expanded rapidly during the economic boom following World War II, but the insolvencies that followed recessions in the 1960s and 1970s exposed the weak positions of the pension funds left behind by failing companies. The response was regulatory tightening, starting with the introduction in the U.S. in 1974 of the Employee Retirement Income Security Act (Erisa), which slowed the creation of new DB plans. Eventually, the regulatory burden triggered a global trend – closing defined benefit plans and shifting to defined contribution (DC) plans, albeit at different paces in different parts of the world.

Regulatory relief

Nonetheless, by the time the global financial crisis began in 2007, DB plans had become large, both on an absolute basis and relative to the size of their sponsors, through the natural process of maturation and consolidation into larger entities. Coming on the heels of a further round of regulatory tightening, the financial crisis was disastrous for DB plans and their sponsors, with funding levels plummeting. In contrast to previous recessions, the regulatory response was more accommodative, as concerns began to emerge that pension obligations could hamper corporate recoveries or, indeed, trigger sponsor insolvencies.

Squeezing the balloon: Changing risks

While pension funds have taken substantive steps to de-risk their investment strategies by shifting from risk assets to bonds, diversifying their exposure to equities and tapping the pension risk transfer markets, new risks and a different balance of risks are present today. Many plans, particularly those that are closed or frozen, are now in negative cash flow, routinely paying out more in benefits than they are receiving in contributions.[2] Defined benefit liabilities and deficits are concentrated in "old economy" sectors, where sponsors are arguably more vulnerable to a downturn. Pension funds are not only large relative to their sponsors; they are, in general, thinly capitalized despite sizable cash injections. For example, the U.S. industrial sector continues to have an outsize share of U.S. corporate defined benefit deficits (**Exhibit 3**), despite having contributed 9.8% of its operating cash flows over the last 10 years to its pension funds, compared with the market average of just 3.7%.[3]

It is also evident that pension portfolios today are much more complex. While they may carry less investment risk, particularly in the form of equity risk, many are carrying greater:

- cash flow risk arising from their negative cash flow position
- operational risk arising from derivatives-based liability and currency hedging programs
- liquidity risk arising from increased investment in private markets, skill-based strategies and extended credit
- covenant risk, given the concentration of defined benefit liability in "old economy" sectors, and the size of DB plans relative to the size of their sponsors

Surviving the short term to thrive in the long term

Nonetheless, we believe that the long-term outlook for pension funds is relatively benign, with the expectation that the gradual normalization of interest rates and steady returns from risk assets will help to repair funding levels over the time horizon of our assumptions.[4] However, to make it to the

[2] See "Matching cash flows and managing liquidity in maturing pension funds," *2018 Long-Term Capital Market Assumptions*, J.P. Morgan Asset Management, 2017.

[3] HOLT®; data as of July 8, 2018.

[4] "Matching cash flows and managing liquidity in maturing pension funds," *2018 Long-Term Capital Market Assumptions*, J.P. Morgan Asset Management, 2017.

FERC Docket No. PL19-4-000
Reply Affidavit of Michael P. Gorman
Exhibit No. A-10
Page 50 of 361

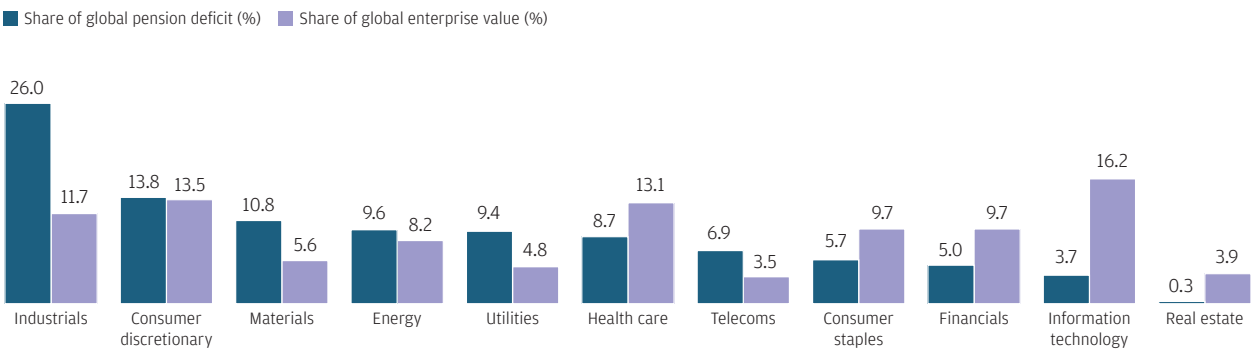
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

long term, pension funds must survive the short term. The principal driver of the demise of pension funds following previous recessions was the demise of the sponsor, and this risk remains most pertinent today. But a key difference today is the concern that pension funds themselves may have the propensity to drag their sponsors under or, at least, materially impact their ability to recover from hard times.

A variety of risk factors can impact the resilience of pension institutions under our different scenarios. **Exhibit 4** shows the potential magnitude of the impact for an illustrative U.S. corporate DB plan, but clearly results will depend on how much an individual plan is exposed to the pension risk factors listed. For example, UK corporate plans tend to make much greater use of derivatives through leveraged liability-driven investment (LDI) and currency hedging programs, and are therefore more likely to experience large operational cash flows that can create or compound liquidity challenges. Many European pension funds have lower allocations to growth assets, so they may be less exposed to equity pullbacks than the sample U.S. plan shown.

"Old economy" sectors retain an outsize share of DB pension deficits

EXHIBIT 3: SHARE OF PENSION DEFICIT COMPARED WITH SHARE OF ENTERPRISE VALUE



Source: HOLT®, J.P. Morgan Asset Management; data as of July 8, 2018. Data refers to pension plans for the Russell 2000, MSCI Europe and FTSE 350.

Different types of downturns will have different implications for pension funds

EXHIBIT 4: IMPACT OF KEY RISK FACTORS ON RESILIENCE IN DIFFERENT RECESSION SCENARIOS – FRAMEWORK FOR ANALYTICAL THINKING

● Negative ○ Moderately negative ■ Neutral

			Potential impact on pension plan			
Pension risk factor	**Description of risk factor**	**Illustrative U.S. pension plan**	**Monetary tightening**	**Corporate caution**	**Trade war**	**Consumer retreat**
Negative cash flow drag	Negative cash flow creates a further drag on funding in low return scenarios.	-2.6% net cash flow	○	●	○	○
Public market illiquidity*	Forced selling in volatile markets amplifies funding level/balance sheet volatility.		○	●	○	○
Low hedging ratio	Flight to quality in volatile markets drives liability valuations upward.	Six years unhedged duration	○	●	○	○
Large growth allocation	Sharp sell-offs can drive funding levels below critical regulatory thresholds, requiring immediate intervention.	60% allocation to growth assets: public and private equity, REITs, hedge funds	○	●	○	○
Large credit exposure	Defaults and downgrades impair credit returns.	40% allocation to U.S. aggregate	○	●	○	○
Large illiquid allocation	Poorly planned liquidity management may result in liquidity squeezes during downturns.	5% allocation to private equity and hedge funds	■	○	■	■
Large foreign currency exposure	Strengthening of domestic currency impairs returns on non-domestic assets .	15% allocation to EAFE equities	○	■	■	■
Heavy derivatives usage	Derivatives can drive large operational cash flows during periods of volatility in rates and currencies.	Modest to little currency hedging; modest levels of interest rate leverage	■	■	■	■
Weak sponsor covenant	Extended pressure on sponsor may elevate insolvency risk.	Moderate to weak	○	●	○	○

Source: J.P. Morgan Asset Management; as of October 2018.
* "The evolution of market structure," *2019 Long-Term Capital Market Assumptions*, J.P. Morgan Asset Management, 2018.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

In general, however, we expect that the corporate caution scenario, with its combination of severe equity downturns, falling interest rates and high default rates, is the most challenging scenario for DB pension funds – particularly those whose resilience has been weakened by being in a negative cash flow position – pointing to a need to be alert to the triggers of such a scenario.

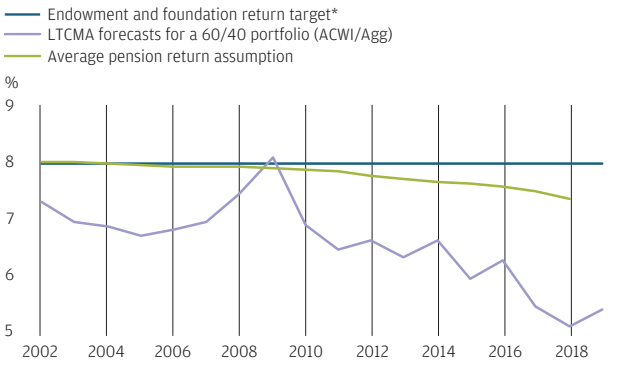
OTHER INSTITUTIONAL INVESTORS

Generally, the corporate caution scenario is also the most troublesome for insurers. Insurers rely heavily on credit in investment portfolios, and low interest rates feed through to mark-to-market liability valuations in Europe and new business book yields in the U.S.

Institutional investors that either have less concrete liabilities (such as sovereign wealth funds [SWFs] and endowments and foundations [E&Fs]), or are free of mark-to-market balance sheet accounting (public pension funds) are arguably more resilient in a downturn and able to take a long-term view. However, there is growing tension between the investment return requirements or expectations of these investors and what is likely to be attainable if our Long-Term Capital Market Assumptions are borne out. Endowments and foundations have the two-fold objective of preserving the purchasing power of their assets and meeting spending requirements, which we estimate implies a return of roughly 8% per annum, gross of fees. U.S. public pension funds have required returns of just under 8%, on average, having only marginally reduced their expectations over the last 10 years. This target looks increasingly difficult to achieve with public assets (**Exhibit 5**).

Investment returns from stocks and bonds are not expected to deliver the required returns of many institutional investors

EXHIBIT 5: EXPECTED RETURN ON A 60/40 PORTFOLIO (%)



Source: Public Plans Data – the Center for Retirement Research at Boston College and the Center for State and Local Government Excellence, J.P. Morgan Asset Management; data as of September 2018.

* The E&F return target is estimated at 8.00%, calculated as follows: 8.00% = spending rule (5%) + inflation (2.00%, per LTCMAs) + management fees (1%).

It is thus not surprising that E&Fs, public pension funds and SWFs have shifted substantially into alternatives, exploiting these institutions' perpetual horizons, less burdensome regulation and, for E&Fs and SWFs, non-contractual liabilities to harvest risk and illiquidity premia.

Nonetheless, the spending commitments of E&Fs and the negative cash flow positions of many public pension funds can undermine this resilience. Sovereign wealth funds, particularly those that are funded by revenues from natural resources and/or whose purpose is to smooth a nation's fiscal experience, may be faced with large and sudden divestment needs in a recessionary scenario. As outlined in our article "The evolution of market structure,"[5] it is essential for all investors to avoid becoming forced sellers in illiquid markets. Again, we find that the degree to which investors have control over the cash flows from their funds is a critical resilience factor.

INDIVIDUAL INVESTORS

We think about resilience for an individual investor in terms of the extent to which he or she will need to tap into household financial assets in a recessionary environment and in turn the declines in investment values that the individual and/or household will be able to tolerate.

Growth in income vs. growth in financial assets

Historically, the U.S. has enjoyed the greatest household net disposable income growth among OECD member nations, but we find that stronger income growth does not necessarily imply greater resilience in all types of recessions.

From 1995 to 2016, household wealth in the U.S. experienced greater variability than in other parts of the world (**Exhibit 6**) despite the fact that the U.S. faced fewer downturns than most OECD members (two in the U.S. vs. three in the euro area and four in Japan). U.S. households may have experienced the greatest growth in income during this period, but not in the value of their financial assets. In fact, we found very low correlations between household net disposable income growth and household financial asset (HFA) growth across OECD countries. This suggests to us that the strategic allocation of household financial assets may be the critical factor influencing HFA growth.

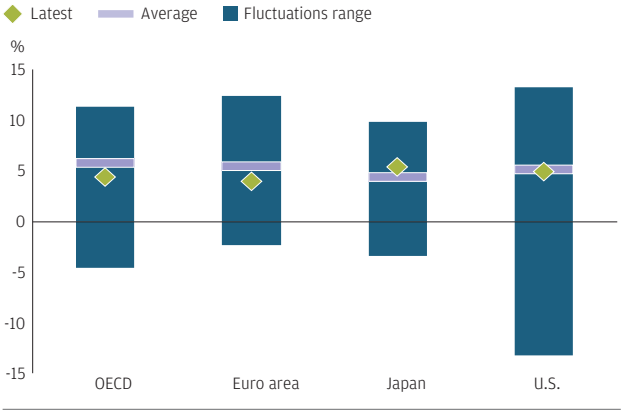
As we will see in the case of the U.S., for example, high income growth tends to be associated with more risk-taking and, over the period analyzed, with an average annual growth rate of HFAs slightly below the OECD average (5.08% for the U.S. vs. 5.71% for the OECD).

[5] "The evolution of market structure," *2019 Long-Term Capital Market Assumptions*, J.P. Morgan Asset Management, 2018.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Household wealth in the U.S. has experienced much wider variation historically vs. other regions … and an average annual growth in HFAs slightly below that of the OECD as a whole

EXHIBIT 6: CHANGE IN PER CAPITA HOUSEHOLD FINANCIAL ASSETS VALUE BY COUNTRY/REGION (%Y/Y, 1995-2016)



Source: OECD household financial assets (indicator). doi: 10.1787/7519b9dc-en; data as of July 2018.

Allocation of household wealth

An examination of the allocation of household wealth across regions (**Exhibit 7**) helps shed additional light on the relationship between strategic asset allocation and HFA growth. U.S. households have a relatively risky allocation, holding the greater part of their financial assets in pension funds (DB and DC) and equity shares. In contrast, for European households the balance shifts toward deposits and insurance-based savings, and in Japan toward cash and insurance-based savings.

This gives us a way to think about the relative resilience of households under different types of downturns. U.S. investors will be sensitive to a corporate caution scenario, for example, given that (a) they still have relatively higher direct exposure to equity shares and (b) a large proportion of their wealth is held in pension funds—either in DB plans or DC plans, which we can observe to have high equity allocations. European and Japanese investors may have a greater degree of resilience under a corporate caution scenario, given higher allocations to deposits and greater reliance on insurance-based savings.

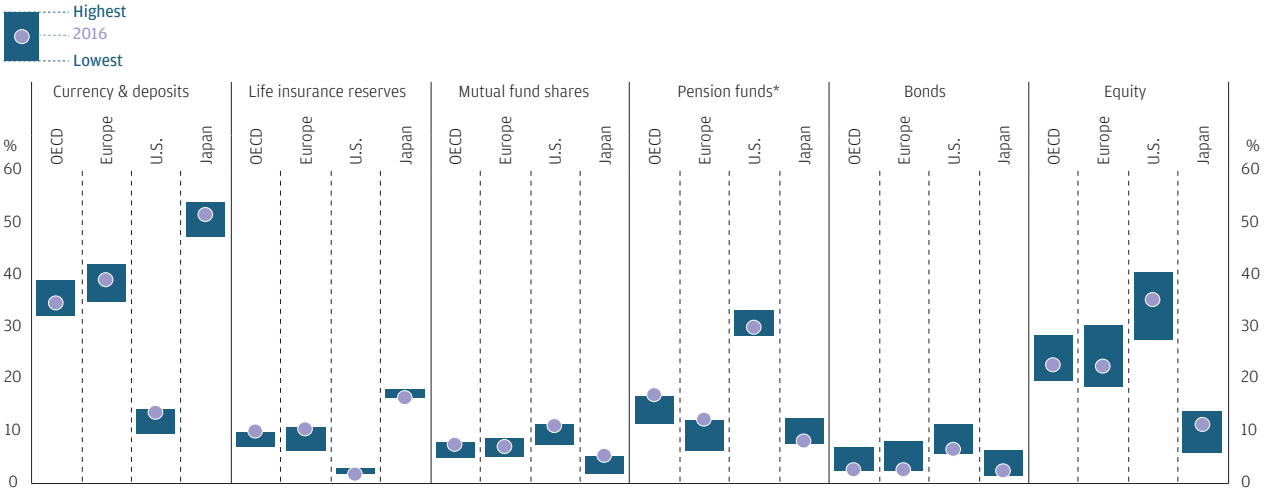
Evolving investor trends

The response of individual investors to recessionary environments is complicated by a gradual shift in market risk and investment decision-making toward the individual. This trend is being driven by insurers offering more market-based savings products with fewer guarantees and by the increasing role of DC plans in employee retirement saving. We see investors responding, in part, by increasing allocations to mutual funds and multi-asset structures, including target date funds (TDFs). This is observable across OECD countries in a move away from direct equity and bond exposure — now at the lower end of their historical ranges — in favor of mutual funds, now at the higher end, as shown in Exhibit 7. The delegation of asset allocation via balanced funds such as TDFs is another manifestation, particularly among U.S. DC plan participants.[6] These strategies can improve resilience through downturns by better aligning

[6] Employee Benefit Research Institute, Issue Brief No. 458, September 2018.

Household wealth allocations vary considerably across regions, with more conservative approaches in Europe and Japan vs. the U.S.

EXHIBIT 7: HOUSEHOLD FINANCIAL ASSET ALLOCATION BY COUNTRY/REGION (HIGH, LOW AND 2016 AVERAGE HFA ALLOCATIONS [%], 1995-2016)



Source: OECD household financial assets (indicator). doi: 10.1787/7519b9dc-en; data as of July 2018.
*Includes DB and DC plan assets.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

asset allocations with investors' changing needs as they approach retirement. Further, dynamic management of these multi-asset structures can help to steer portfolios through a downturn and, where successful, reduce the degree of stress that investors experience. We see these trends as having the potential to help mitigate the strong cyclicality in household investing.

Reasons for concern

In general, though, there are still reasons for concern. Investor age and risk-taking are becoming more aligned, but there's room for improvement. Nearly one in five 401(k) participants in their 60s have equity allocations exceeding 80%, while 7% of those in their 20s have no allocation to equity.[7] J.P. Morgan's recent survey of U.S. corporate DC plan participants finds that less than 40% were highly confident in their ability to make investment decisions.[8] This knowledge gap and the large allocation of account balances to equities in the U.S., on average, (even among some participants near retirement) raise concern regarding the resilience of plan participants given a downturn. What's more, there are divergences among income groups in terms of savings participation: 87% of households with an income above $100,000 have a 401(k) or similar defined contribution plan account vs. only 37% of households with an income of less than $40,000.[9] Those households with both low income and low savings will likely be hardest hit by a recession, no matter what their portfolio allocation.

Meanwhile, outside the U.S., European and Japanese investors have fewer equities and may therefore be more immunized to equity drawdowns. However, they still have exposure to markets via insurance savings products, and hold large allocations of their household wealth in cash and deposits. A downturn that results in prolonged periods of low rates may confirm the validity of the term "reckless conservatism" as applied to these "lower risk" allocations.

In any case, there is apparently much less historic tolerance at the European and Japanese household level for variability in return than there is in the U.S., and the notion of age-appropriate investing is less well developed in these geographies. Consequently, even with lower equity exposure, the willingness to look through adverse equity market scenarios could be limited. In the context of insurers steadily switching business models to more market-based savings products with fewer guarantees, an early setback via a market downturn could inflict lasting damage to a nascent market-based savings culture.

CONCLUSION

While recessions will always be painful, the intensity and nature of that pain can vary greatly. In recessions caused by monetary tightening, emerging market assets will suffer alongside a strong U.S. dollar. Recessions characterized by corporate caution pose particular risks to stocks and credit markets. A recession following a trade war is likely to come with non-linear effects on near-term growth and inflation, with emerging market assets the likely underperformer. In the U.S., with its consumer-driven economy, a weaker demand impulse following a "consumer retreat" is likely to keep inflation contained.

For pension funds, the key risk today is that of dragging sponsors under, especially in a corporate caution scenario with severe equity downturns. Managing pension portfolios through recessionary environments will require monitoring a number of risk factors beyond just asset price performance, such as negative cash flow risks, derivatives usage and illiquid allocations.

Sovereign wealth funds and endowments and foundations are primed to weather recessionary environments well, but only if they can manage their spending commitments and avoid becoming a forced seller in illiquid markets. This is particularly important because these investors have allocated heavily to private assets, given that expected returns from stocks and bonds have moved lower over the cycle.

Individual investors with higher equity allocations, such as those in the U.S., will be hit hardest by a recession but may also have the greatest resilience, depending on their income level and age. Investment vehicles such as target date funds build on age-related resilience and may further improve resilience in the long run by actively managing investors' needs through to retirement. Additionally, multi-asset structures may be able to effectively manage portfolios through a period of market weakness.

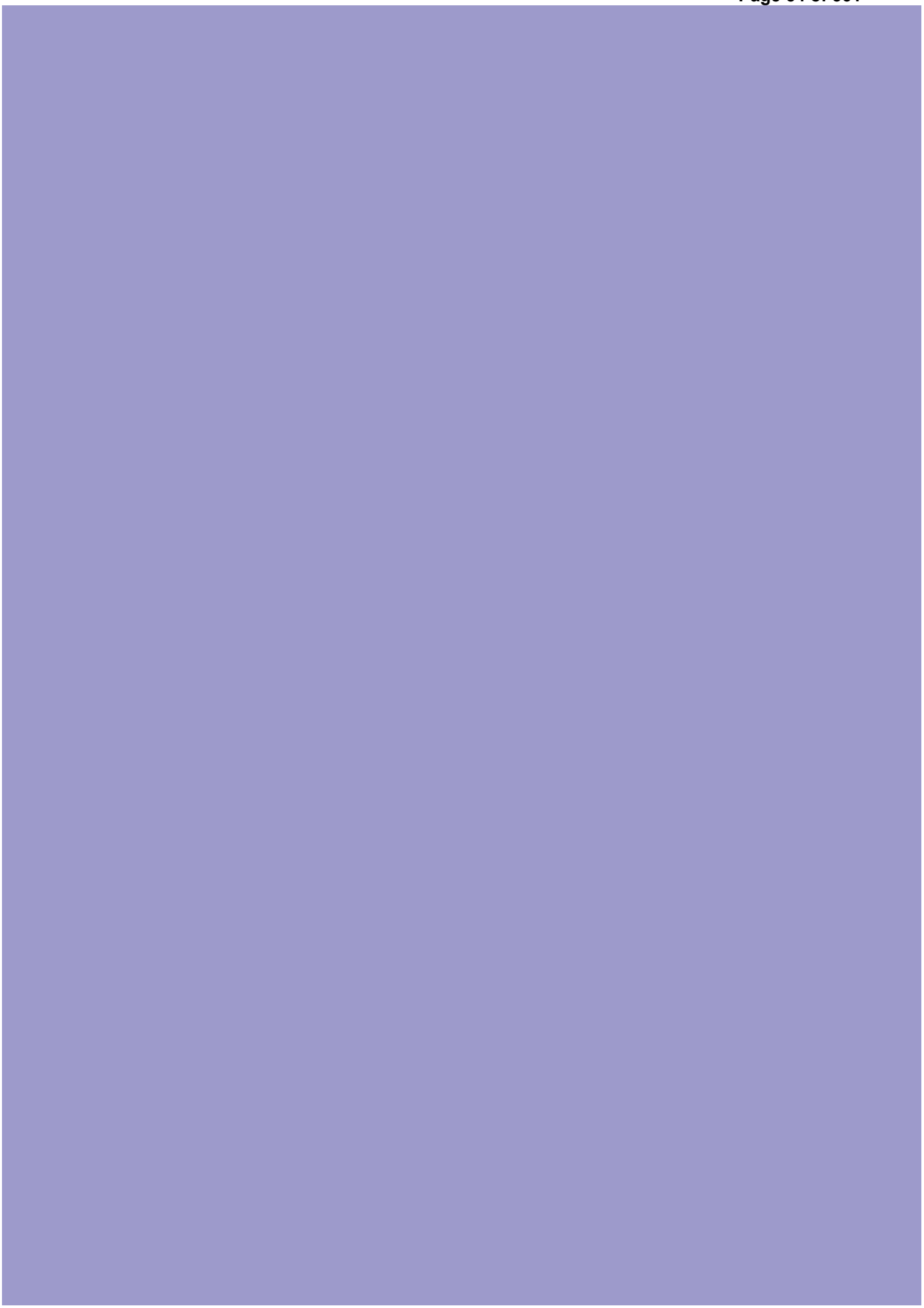
Building resilience in a downturn requires all investors to assess the quality of the recessionary environment and to understand the risks they bear and their capacity to bear them. Such an appraisal is critical in order to survive the short term and thrive in the long term.

[7] Ibid.

[8] *2018 Defined Contribution Plan Participant Survey, Part 1,* J.P. Morgan Asset Management, 2018.

[9] Report on the Economic Well-Being of U.S. Households in 2015, Board of Governors of the Federal Reserve System.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

II Assumptions

FERC Docket No. PL19-4-000
Reply Affidavit of Michael P. Gorman
Exhibit No. A-10
Page 56 of 361

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

G4 government bonds: Flatter curves, lower yields

Thushka Maharaj, DPhil, CFA, *Global Strategist, Multi-Asset Solutions*
Michael Feser, CFA, *Portfolio Manager, Multi-Asset Solutions*
Jason Davis, CFA, *Portfolio Manager, Global Fixed Income, Currency & Commodities*
Jonathon Griggs, *Head of Applied Research, Global Fixed Income, Currency & Commodities*

IN BRIEF

- Anticipating flatter curves and lower yields, we gradually shift our equilibrium interest rates lower across major G4 markets.
- For the first time since the financial crisis, the current U.S. cash rate is modestly above our forecast of equilibrium. Cash rates for the rest of the G4 are still far below our equilibrium assumptions and only expected to converge to the long-term equilibrium very gradually.
- In a much larger corporate bond market, duration has risen significantly and average credit quality has notably declined. But we do not expect these trends to continue over our forecast horizon; expected returns are somewhat improved from last year.
- For emerging market debt, our spread assumptions are unchanged, but more attractive starting valuations mean our return expectations are up significantly. However, the non-normal distribution of returns means the risk of outsize losses is substantially larger than these improved Sharpe ratios suggest.

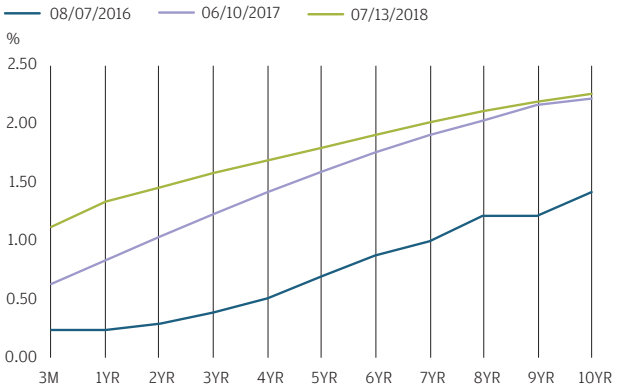
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

OVERVIEW

The defining theme in fixed income markets over the last 12 months was the yield curve flattening associated with policy tightening in the U.S. The average of G4 cash rates rose by 60 basis points (bps) on a GDP-weighted basis – the largest one-year rise since the global financial crisis – a move that reflected 100bps of hikes by the Federal Reserve (Fed) and two rate hikes from the Bank of England (BoE). In contrast, the yield on the G4 10-year government bond yield rose just 20bps over the same time frame, flattening the G4 2s10s yield curve over the year (**Exhibits 1** and **2**).

As U.S. monetary policy has tightened in recent years, G4 yield curves have flattened

EXHIBIT 1: G4 GDP-WEIGHTED FORWARD CURVES FOR 3-MONTH RATES



Source: J.P. Morgan Asset Management; data as of September 30, 2018.

In the past year, the average of G4 cash rates rose by 60bps on a GDP-weighted basis – the largest one-year rise since the global financial crisis

EXHIBIT 2: G4 10-YEAR REAL YIELD (%)

Source: J.P. Morgan Asset Management; data as of September 30, 2018.

In keeping with the last few editions of our Long-Term Capital Market Assumptions (LTCMAs), we gradually shift our equilibrium interest rates lower across major G4 markets. On the one hand, low potential growth and ongoing disappointments on the inflation front argue for gradualism in normalization of monetary policy. On the other hand, zero and negative nominal interest rate policies are not expected to prevail over our forecast horizon. Evaluating these two factors in tandem, we expect that global central banks will gradually shift to a more hawkish position in coming years

OUR FIXED INCOME ASSUMPTIONS METHODOLOGY CONSTRUCTS EQUILIBRIUM YIELDS FROM SIMPLE BUILDING BLOCKS

BUILDING BLOCKS: ANATOMY OF FIXED INCOME YIELDS AND SPREADS

1. **Equilibrium cash rate**
   - The level of cash rates consistent with our long-run growth and inflation forecasts by country
2. **+ Curve (equilibrium long-dated yield)**
   - Additional yield to compensate investor for holding long-term bonds (term premium)
3. **+ Credit spread**
   - Additional credit spread, incorporating rating migration assumptions for *investment grade* (IG) and credit/liquidity risk premia and expected default loss for *high yield* (HY)
4. **Return calculation**
   - Reflects normalization path to equilibrium interest rate, annual roll-down and rebalancing to a constant maturity index, plus coupon accrual and any defaults/losses

In this year's edition of the LTCMAs, we introduced explicit equilibrium assumptions for the two-year and five-year parts of the yield curve.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Non-dollar developed market (DM) cash rates outside the U.S. are expected to converge to long-term equilibrium at a very gradual pace

EXHIBIT 3A: DEVELOPED MARKET CASH YIELD

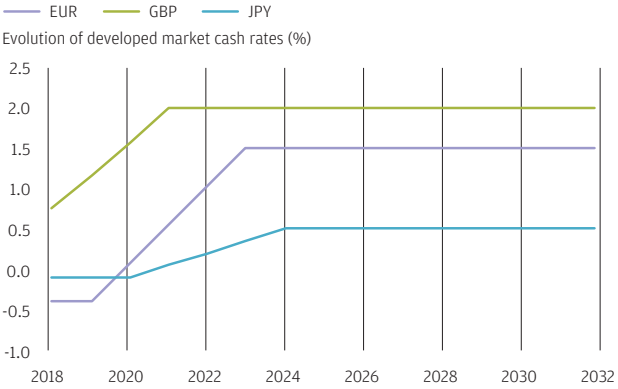
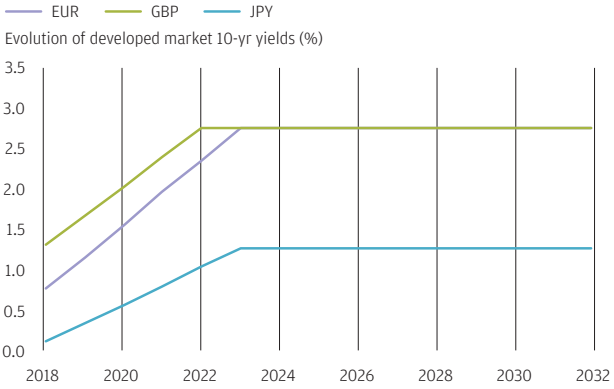


EXHIBIT 3B: 10-YEAR NORMALIZATION WINDOWS



Source: J.P. Morgan Asset Management; data as of September 30, 2018.

while keeping yields depressed below nominal GDP to provide ongoing stimulus. In addition, we acknowledge that the global economic cycle is mature and the likelihood of an economic downturn over our forecast horizon is rising. Experience has shown that central bank responses to a downturn are asymmetric. That is, with rates already close to zero, there is little room to cut rates in a downturn, but central banks can more easily raise rates in response to inflation. We think this asymmetry will persist, especially as we expect the zero lower bound (limited use of negative rates) will be broadly binding in the next recession. This view informs our expectation that real equilibrium yields will remain low, and certainly lower than experienced historically.

In terms of fiscal policy, the fact that we are seeing a large fiscal expansion at the peak of the U.S. cycle suggests we are likely to see structurally higher deficits over our forecast horizon. This limits the ammunition from fiscal policy in the next downturn.

For the G4 economies, we assume real cash rates are close to zero in equilibrium, with a relative ranking across countries dictated by their ranking of real GDP. The U.S. real cash rate is assumed to be the highest, and modestly positive, while Japan has the lowest ranking. For the first time since the financial crisis, the current U.S. cash rate is modestly above our forecast of equilibrium. Cash rates for the rest of the G4 are still far below our equilibrium assumptions and only expected to converge to the long-term equilibrium very gradually, meaning expected returns are forecasted to remain below equilibrium this year (**Exhibits 3A** and **3B**).

The most significant change we make this year is a downgrade to U.S. cash rates, which is a direct consequence of the lowering of our U.S. inflation assumption. The real cash rate for the U.S. is kept at 0.25% and remains the highest across G4 countries.

A key component of our framework for long-end yield assumptions is that quantitative easing (QE) is likely to be a part of the conventional central bank tool kit. Central banks have added QE and forward guidance to their monetary policy tools, and we believe these are here to stay in future downturns. Indeed, we think that QE will probably be used again over our forecast horizon. This is expected to keep term premia depressed, implying that curves remain flatter in equilibrium than experienced during the last 15 years. Along with the global impact of QE, unfavorable demographics, high indebtedness, lower potential growth rates and regulatory demand for fixed income are all weighing on long-end yields. The combination of these factors – primarily the large G4 central bank balance sheets – contributes to the globalization of long-end yields and affects our assumption of long-end yield normalization, particularly for the U.S. (**Exhibit 4**).

Higher starting yields improve bond returns, especially in the U.S. This also implies that the duration premium relative to cash improves modestly this year. We note, however, that the premium is still low relative to its history. On the broader spectrum of fixed income, long-term returns across emerging market (EM) and U.S. high yield are attractive compared with core sovereign bonds (**Exhibits 5A** and **5B**).

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

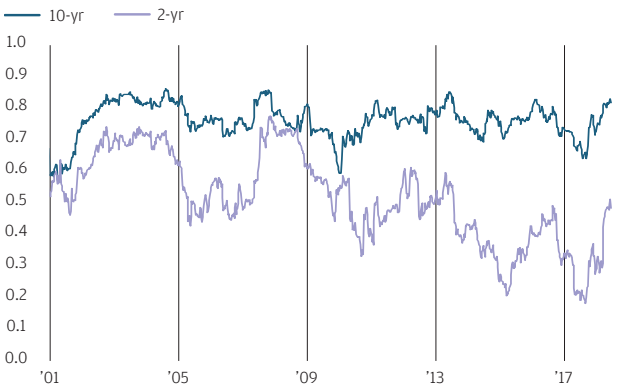
U.S. RATES

This year, we reduce the U.S. cash rate equilibrium assumption, based on our lower inflation estimate. We lower the equilibrium cash rate by 25bps to 2%, the same level as CPI inflation and roughly 25bps above PCE inflation. Our equilibrium assumption for the U.S. is now below the current prevailing cash rate in the U.S. – for the first time since the financial crisis. To be clear, our equilibrium, cycle-neutral assumption should not be confused with a terminal cash rate. Indeed, it is very likely that policy rates will rise above and fall below our equilibrium assumption at various points over the next 15 years.

We maintain our estimates for the cash 10-year yield curve at 125bps, which is around 50bps flatter than the average over the last 30 years. Mechanically, this pushes our 10-year yield assumption down by 25bps to 3.25%, which represents a 50bps discount vs. long-term nominal U.S. GDP growth. We maintain a 25bps yield curve assumption for the slope between 10-year and 30-year yields.

Developed market long-end yields are highly correlated despite differing economic cycles

EXHIBIT 4: 2-YEAR AND 10-YEAR YIELD CORRELATIONS



Source: Bloomberg; data as of September 30, 2018.

EUROZONE RATES

We modestly downgrade our cash real yield assumption in Europe from 0.25% to 0%,[1] as real yields are likely to be lower in Europe than in the U.S. We continue to expect that inflation will undershoot the European Central Bank (ECB) target over the forecast horizon despite the central bank's aggressive efforts to stimulate the economy. This therefore pushes our nominal cash yield assumption to 1.5%, 25bps lower than last year. Quantitative easing is likely to end this year, but the ECB's balance sheet is expected to remain large by historical standards. This keeps the EUR yield curve flatter in equilibrium than recent data would suggest. Our yield curve assumption is unchanged at 125bps (approximately 50bps flatter than the average since the financial crisis), which necessarily reduces our 10-year and 30-year yield assumptions by 25bps each, to 2.75% and 3%, respectively.

We hold the trajectory of normalization for both cash and 10-year yields unchanged, implying that we are one year closer to normalization. Cash rates will start normalizing in 2019 and reach equilibrium four years later, suggesting a significantly negative real return, all else equal, over our assumption horizon. The 10-year only ends normalizing in 2023.

UK RATES

Brexit presents the greatest element of uncertainty in our assumption framework for the UK. Our real growth estimates reflect a penalty relative to other G4 economies, especially the eurozone. In keeping with our ranking of real cash yields cross-sectionally based on real GDP estimates, we reduce our equilibrium cash yield from 2.25% to 2%. The supply side of the economy has weakened, and the UK's growth has lagged its G4 peers over the last year – phenomena undoubtedly linked to the uncertainty surrounding Brexit. On the monetary policy front, the Bank of England has already embarked on a rate hiking path that we assume will proceed at a very gradual pace over the next three years.

We keep our assumption for the cash 10-year yield curve unchanged at approximately 75bps, which is approximately 90bps flatter than the average since the financial crisis. We expect the ultra-long end will be supported by liability-driven investment; hence, our UK assumptions build in the flattest 10s30s curve across the G4. We expect the UK 10s30s curve to be flat in equilibrium, with both 10-year and 30-year bonds yielding 2.75%.

JAPANESE RATES

Over the last year, the Bank of Japan (BoJ) has successfully defended its yield curve control framework and kept 10-year yields within a target range. The introduction of flexibility in the target range injects some volatility into Japanese bond yields but does not change the fact that policy is keeping yields artificially depressed in order to provide stimulus. Low levels of growth and a widespread belief that inflation will persistently undershoot the BoJ's target keep return expectations low for Japanese fixed income. Our estimates are unchanged following our significant cut last year to our

[1] We use eurozone yields based on the French government curve as a benchmark.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Higher starting yields improve bond returns, especially in the U.S., but the duration premium is still low relative to its history

EXHIBIT 5A: G4 10-YEAR RATES, BUILDING BLOCKS

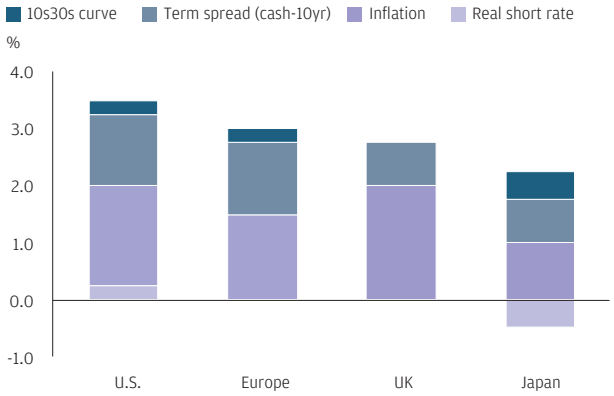
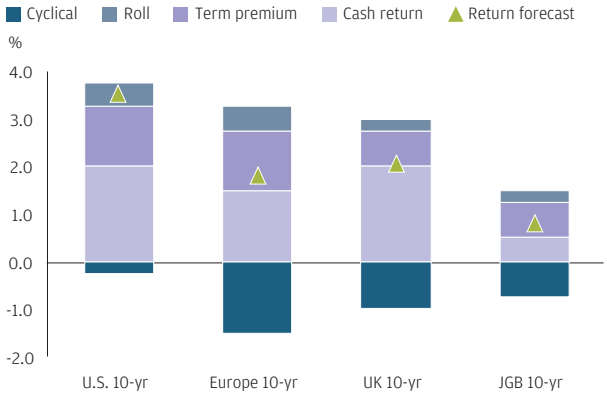


EXHIBIT 5B: 10-YEAR RETURN COMPONENTS



Source: J.P. Morgan Asset Management; data as of September 30, 2018.
Note: U.S. inflation refers to PCE inflation.

equilibrium cash rate expectation (from 1% to 0.5%). We also keep our normalization window unchanged for cash vs. last year, implying that cash rates will only start normalizing in 2021. This is premised on disappointing inflation outcomes over the last 12 months. We expect 10-year yields to reach their equilibrium level of 1.25% after five years of normalization, with the implied yield curve steeper than it has been in recent years. This assumption largely reflects our expectation that the BoJ will need to balance two competing factors: A steeper curve would aid the domestic financial sector, but suppressing long-end yields below GDP would aid debt sustainability.

OTHER DEVELOPED MARKETS

In Australia, our cash rate assumption is kept unchanged at 3.00%. But this masks some changes beneath the surface – our macro assumptions upgrade inflation by 25bps to 2.5%. At the same time, in keeping with our downgrade across major markets, we downgrade our Australia real cash rate from 0.75% to 0.5%. On a cross-sectional basis, Australian real cash rates remain the highest among the developed markets. We reduce the curve slope between cash and the 10-year, acknowledging a higher front-end yield as well as bringing the Australian curve slope closer to other developed markets. This 25bps decrease in curve slope between the three-month and the 10-year pushes our 10-year yield assumption to 4.00%.

In Canada, we keep our cash yield and 10-year yield assumption unchanged at 2.00% and 3.25%, respectively. However, we downgrade our 30-year yield assumption by 25bps to reflect the ongoing lack of long-end issuance and the persistence of the flatter 10s30s curve relative to G10 peers. This brings the Canadian curve more in line with peers and leaves the 10s30s curve slope at 25bps and the 30-year yield at 3.5%.

Finally, in Switzerland our lower inflation assumption leads to a lower short rate assumption. We reduce our equilibrium cash yield assumption to 0.25% vs. 0.5% last year. This filters through to the 10-year, as we keep the yield curve assumption unchanged at 100bps.

GLOBAL CREDIT MARKETS: BIGGER SIZE, HIGHER DURATION, LOWER QUALITY

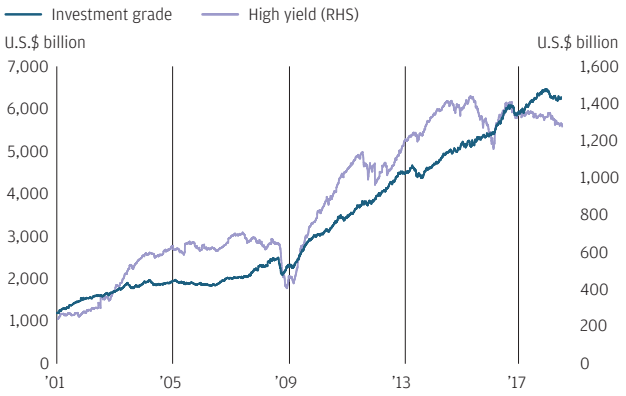
In hindsight, it is clear that the corporate sector benefited most from quantitative easing and the long period of easy monetary policy. Evidence can be found not only in equity index levels above or close to pre-financial crisis highs, but also in the evolution of the size and shape of the corporate bond market.

In the U.S., the market value of outstanding investment grade corporate bonds more than tripled, from about $2 trillion on the eve of the financial crisis to $6.4 trillion by the middle of 2018 – a growth rate almost twice as fast as the pre-crisis average. A similar dynamic has played out in the U.S. high yield market, as well as in the market for EUR-denominated corporate bonds (**Exhibit 6**).

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

The market value of U.S. investment grade and high yield bonds has grown dramatically since the global financial crisis

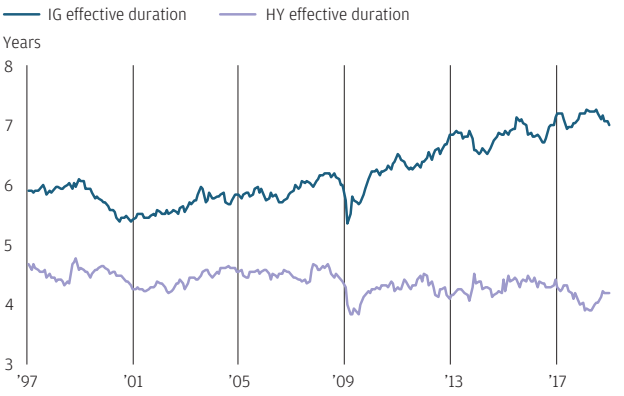
EXHIBIT 6: U.S. INVESTMENT GRADE, HIGH YIELD BONDS, MARKET VALUE, 2001-18



Source: BofA Merrill Lynch Credit Indices; data as of September 30, 2018.

As companies moved to lock in low funding costs, the duration of corporate credit rose steadily post-crisis

EXHIBIT 7: U.S. INVESTMENT GRADE CREDIT EFFECTIVE DURATION, 1997-2017



Source: ICE BofAML Credit Indices; data as of September 30, 2018.

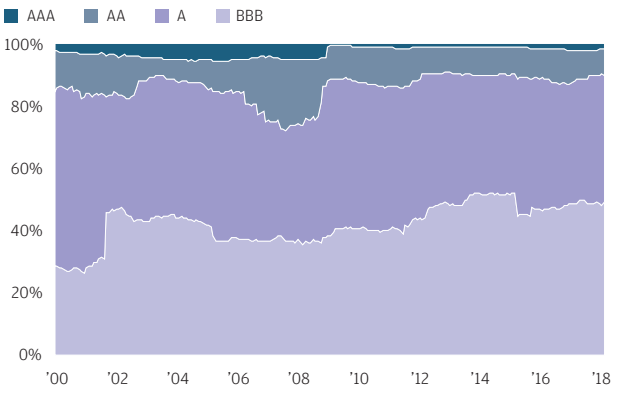
Perhaps even more remarkable than the change in the size of the U.S. corporate bond market has been the change in its composition. As they moved to lock in the extraordinarily low levels of funding costs for as long as possible, issuers across the credit quality spectrum issued bonds with longer maturities than they had in the past. This is particularly evident in the investment grade market, which has extended by 20%-30%, or between one to two years when compared with typical pre-2007 levels (**Exhibit 7**).

In the investment grade corporate bond market, in addition, the average credit quality declined significantly at the same time. While pre-crisis about 40% of investment grade debt had a credit rating of A and about 33% of BBB, today more than 50% has a debt rating of BBB and only about 25% has an A rating. The pace of the credit rating decline over the last five years has been the fastest, outside of a recession, since the mid 1990s. The average credit rating did not decline in the high yield bond market, where the credit spread represents a much larger proportion of the overall bond yield and quantitative easing therefore had a relatively smaller impact on the overall funding cost (**Exhibits 8A** and **8B**).

With policy normalization well underway in the U.S., we do not expect these trends to continue and have thus left our assumptions for the equilibrium spread for the broad U.S. investment grade and high yield market unchanged. Equally, we have not changed our broad UK investment grade assumption. In the euro area, however, we expect the credit market to generally follow themes established in the U.S.

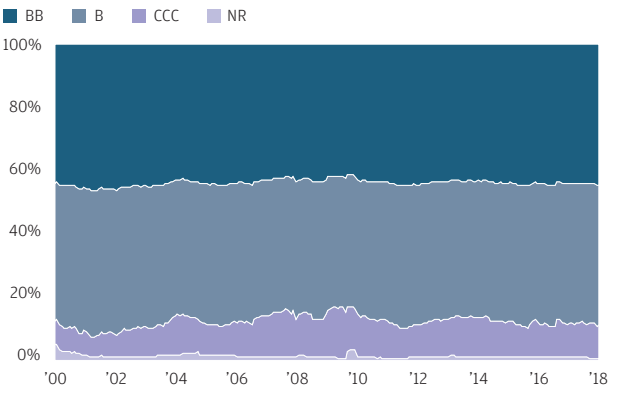
The pace of investment grade credit rating declines over the last five years has been the fastest, outside of a recession, since the mid 1990s; average credit ratings have been fairly stable in the high yield market since 2000

EXHIBIT 8A: RATINGS DISTRIBUTION FOR U.S. INVESTMENT GRADE CREDIT, 2000-18



Source: ICE BofAML Credit Indices; data as of June 30, 2018.

EXHIBIT 8B: RATINGS DISTRIBUTION FOR U.S. HIGH YIELD CREDIT, 2000-18



Source: ICE BofAML Credit Indices; data as of June 30, 2018.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Lower equilibrium yield and return assumptions reflect expectations of very gradual rate normalization, leading to a lower terminal rate

EXHIBIT 9: DEVELOPED MARKET EQUILIBRIUM YIELD AND RETURN ESTIMATES (10- TO 15-YEAR RETURN ASSUMPTIONS, LOCAL CURRENCY, %)

	USD		GBP		EUR		JPY	
	Equilibrium yield (%)	Return	Equilibrium yield (%)	Return	Equilibrium yield (%)	Return	Equilibrium yield (%)	Return
Inflation	2.00		2.00		1.50		1.00	
Cash	2.00	2.00	2.00	1.75	1.50	1.00	0.50	0.25
10-year bond	3.25	3.50	2.75	2.00	2.75	1.75	1.25	0.75
30-year bond	3.50	3.25	2.75	1.25	3.00	0.75	1.75	0.50
Investment grade credit*	4.75	4.50	4.25	3.00	4.00	2.50	1.75	1.00
High yield	7.75	5.50			6.25	4.00		
Emerging market debt**	6.25	6.25						

Source: J.P. Morgan Asset Management; estimates as of September 30, 2018.
* Investment grade corporate bonds. ** Emerging market sovereign debt.

during the QE era – credit quality deterioration and duration extension among them. For this reason, we increase our equilibrium spread assumption by 25bps to 150bps.

Looking across global credit markets broadly, we do not expect that the recent tweaks of rating standards will materially alter either an issuer's loss probability or expected recovery rate for a given credit quality. We do, however, believe that there is considerable uncertainty about the cost associated with a downgrade from an investment grade rating (BBB) to a high yield rating (BB). Given the high proportion of issuers with a BBB rating, it is likely that an unprecedented amount will drop out of the investment grade index during the next recession. This will test investor resilience and market liquidity, as regulatory requirements make owning non-investment grade debt onerous for those investors bound by particularly tight regulatory requirements, as well as for many index investors. And retail investors, in their search for yield, have for the first time this cycle become a more significant presence in credit markets. These concerns notwithstanding, valuations are less stretched than last year due to somewhat wider spreads and higher Treasury yields. We therefore arrive at expected returns that are slightly improved from last year, if unremarkable by historical standards (**Exhibit 9**).

GLOBAL EMERGING MARKET DEBT: MORE ATTRACTIVE STARTING VALUATIONS, CHANGING INDEX COMPOSITION

Our assumptions reflect unchanged expectations for the equilibrium spread for emerging market sovereign and corporate debt of 325bps and 375bps, respectively, as well as an unchanged loss rate of 50bps and 75bps. We believe that the index duration extension trend has ended and that the rating downward migration of the recent past reflects shorter-term cyclical pressures more than structural changes in the issuer composition and preferences.

Despite these unchanged fair value assumptions, our return expectations have improved substantially, from 5.25% for emerging market sovereign debt to 6.25%. This upgrade follows from more attractive starting valuations due to a more normalized rate environment in the U.S., as well as the lagging of the emerging market economic cycle relative to the U.S. and euro area. However, we do note that liquidity risks in emerging market debt dampen these return expectations.

Local emerging market debt return assumptions are up a little from last year, benefiting from slightly higher starting yields and an expectation for some translation gains as the U.S. dollar declines over the assumptions horizon. As a result, emerging market debt (EMD) Sharpe ratios appear very attractive relative to those of other fixed income assets; we therefore like to remind readers that, given the non-normal distribution of EMD returns, the risk of outsize losses is substantially larger than these Sharpe ratios suggest. (Please refer to "**Volatility and correlation assumptions**" for further detail.)

The composition of local EMD indices is likely to change materially in the not too distant future through the inclusion of Chinese debt. While the exact magnitude of the impact varies by index construction and inclusion rules, we expect that this will have an adverse impact on the index return assumptions, given the lower real yields on Chinese debt compared with the current index average.

FERC Docket No. PL19-4-000
Reply Affidavit of Michael P. Gorman
Exhibit No. A-10
Page 63 of 361

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Turning a corner: Returns hold steady

Pete Klingelhofer, CFA, *Portfolio Manager, Multi-Asset Solutions*
Christopher Sediqzad, CFA, *Manager Research, Multi-Asset Solutions*
Michael Albrecht, CFA, *Global Strategist, Multi-Asset Solutions*
Hannah Anderson, *Global Market Strategist, Global Market Insights Strategy*
Stephen Macklow-Smith, *Portfolio Manager, European Equity Group*
Patrik Schöwitz, CFA, *Global Strategist, Multi-Asset Solutions*

IN BRIEF

- After several years of steadily lower expected returns, this year our equity return assumptions generally hold firm, with developed markets unchanged, emerging markets up and the U.S. slightly down. The expected dispersion in returns between emerging and developed equities widens to 3.00% in local FX terms and 2.75% in USD terms.
- In the U.S., our expected return falls modestly, mostly due to this year's cut to our U.S. inflation forecast and the knock-on impact on domestic nominal GDP; in the euro area, UK and Japan, our equity return estimates rise slightly.
- Central to our view on Japanese equities is the expectation that governance-led reforms are likely to drive a sustainable increase in return on equity (ROE), along with greater capital returns to shareholders.
- We project moderately higher emerging market equity returns, supported by lower starting valuations and higher GDP (and thus earnings) growth.
- We still expect the USD to weaken over our forecast horizon, providing a significant tailwind to the attractiveness of international equity markets to U.S. dollar-based investors.
- Return of capital to shareholders in the form of dividends and buybacks is expected to be a crucial component of future returns.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

HOLDING FIRM

In recent years, our expected equity returns have steadily fallen. This year, we break from that trend. Our equity return assumptions generally hold firm, with developed markets unchanged, emerging markets up and the U.S. slightly down.[1]

In 2018, with the exception of the U.S., developed and emerging equity market indices trended sideways to slightly negative, drifting below our estimates of long-term returns. That provides valuation support to our projected returns, but it is tempered by a larger drag from margin normalization.

In local currency terms, our expectation for long-term developed market (DM) equity returns is unchanged at 5.50% while our expectation for emerging market (EM) equity returns has increased to 8.50% from 8.00%. The expected dispersion in returns between emerging and developed equities widens to 300 basis points (bps) in local FX terms and 275bps in USD terms. Within an unchanged DM aggregate return profile, we upgrade the eurozone, Japan and the UK, and modestly lower expected U.S. returns. The adjustments largely reflect the confluence of cyclical, valuation-driven upgrades for DM ex-U.S. markets and reduced U.S. revenue growth that follows a cut to our U.S. inflation forecast and the knock-on impact on domestic nominal GDP.

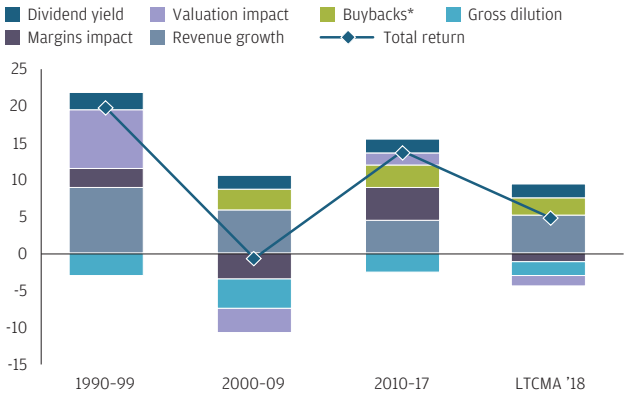
Our forecasts for currency movements are expected to continue to impact unhedged equity market returns. We still expect the USD to weaken relative to non-U.S. developed markets, providing a significant tailwind to the attractiveness to U.S. dollar-based investors. In contrast, our assumptions for the path of the dollar against the gamut of EM currencies in aggregate leaves our EM return assumption unchanged.

Return of capital to shareholders in the form of dividends and buybacks is expected to be a crucial component of future returns (**Exhibit 1**). We remain agnostic on whether return of capital will reflect a dearth of capital investment opportunities, ultra-low interest rates, demographic factors or some combination of the three.

[1] Our rounded estimate for global equity returns is unchanged this year, but unrounded return estimates for MSCI ACWI reveal a slight uplift.

Dividends and buybacks are expected to be key components of future returns

EXHIBIT 1: CONTRIBUTION TO TOTAL RETURNS, % ANNUAL, FOR U.S. LARGE CAP EQUITIES



Source: Citigroup, Thomson Reuters Datastream, U.S. Bureau of Economic Analysis, J.P. Morgan Asset Management; data as of September 2018.

* Buybacks are included in "gross dilution" before 2000 (i.e., as net dilution), due to limited data availability.

BUILDING OUR FORECASTS

We continue to rely on the equity return assumptions methodology we introduced in our 2015 assumptions (see box).

Our equity assumptions methodology breaks equity returns into easy-to-forecast return drivers

BUILDING BLOCKS – ANATOMY OF EQUITY TOTAL RETURNS

1. **Aggregate revenue growth**
2. **× Aggregate earnings growth / revenue growth (margins) = Aggregate earnings growth**
3. **× Earnings per share (EPS) growth / aggregate earnings growth (net dilution) = EPS growth**
4. **× Price return / EPS growth (valuations) = Price return**
5. **+ Dividends (carry) = Total return**

Similar to DuPont analysis, this methodology allows us to decompose total returns structurally into easy-to-forecast ratios as drivers of returns. It enables us to account explicitly for the global composition of corporate revenues – and how fast different regions are growing – as well as the normalization of profit margins and valuations, and the impact of share buybacks and dilution. Perhaps most importantly, it ties together complex interrelationships among these factors to ensure that retained earnings and gross dilution imply a future book value that is consistent with projected return on equity and future earnings. This framework – analogous to Robert

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

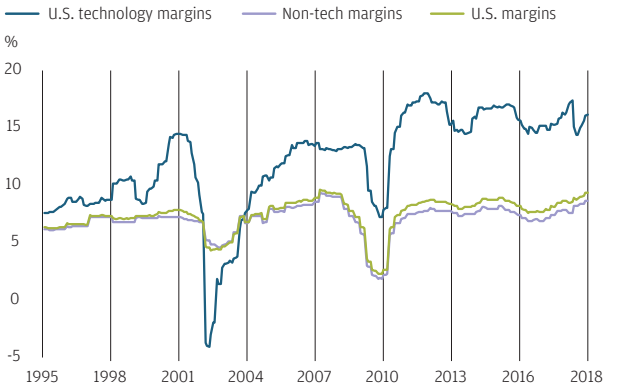
Higgins' sustainable growth rate (SGR) concept – ensures that higher shareholder payouts, for instance, would come at the expense of slower earnings growth, all else the same. Our methodology uses trailing, not forward, earnings, which tend to be more stable.

DEVELOPED MARKETS EQUITY RETURN ASSUMPTIONS

In the U.S., our expected return falls to 5.25% from 5.50%, mostly due to this year's cut to our U.S. inflation forecast and an increased drag from margin normalization. Earnings-based valuations for the U.S. equity market now sit comfortably in line with long-term averages. We have modestly upgraded longer-run equilibrium assumptions for large cap margins; we expect that tax reform-driven profitability increases in the high margin tech sector will persist (**Exhibit 2**).

A high margin technology sector has become increasingly dominant

EXHIBIT 2: U.S. MARGINS – TECHNOLOGY VS. NON-TECHNOLOGY



Source: Thomson Reuters Datastream; data as of August 2018.

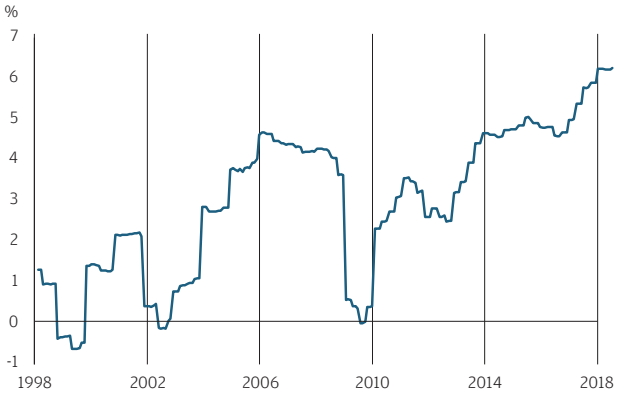
In the euro area, we raise our expectations of future returns by 25bps. The upgrade largely reflects a lower starting valuation level, but we also take into account reduced expectations of return on equity. In the eurozone, financial sector leverage levels fell precipitously over the last year and we think the regulatory environment is likely to lead to lower leverage over our forecast horizon. We see this as a structural change unlikely to be offset by asset turnover or improved margins.

Central to our view on Japanese equities is the expectation that governance-led reforms are likely to drive a sustainable increase in ROE in addition to capital returns to shareholders. Recent evidence suggests the trend is on track, supported by historically high margins and returns on shareholder equity, which have materially exceeded our longer-term view (**Exhibit 3**). Additionally, amendments to the corporate governance codes announced in June reinforce our view of the continuation of structural reforms within the market. Updates to the code include additional guidance on cross-shareholdings, management diversity and corporate strategy transparency, all of which aim to further align the incentives of investors with those of company managements.

The continued momentum in corporate profitability and ROE has led us to stress test whether our reform-driven expectations are too conservative even as they are much higher than historical averages would suggest. In our analysis, we assume that material yen appreciation over our forecast horizon will present a headwind to the export-heavy market; this will further pressure margins, although not enough to erode the benefit of a stronger yen that an unhedged investor would realize over our investment horizon. As a result, we leave unchanged the inputs to our building block model. Finally, we note that starting valuations, which had been a detractor in recent years, now provide a critical boost to forward-looking returns for Japanese equities.

Governance-led reforms are driving an increase in margins for Japanese corporations

EXHIBIT 3: JAPANESE STOCKS, NET MARGINS, 1998-2018



Source: Topix Net Margins, Factset as of September 2018.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

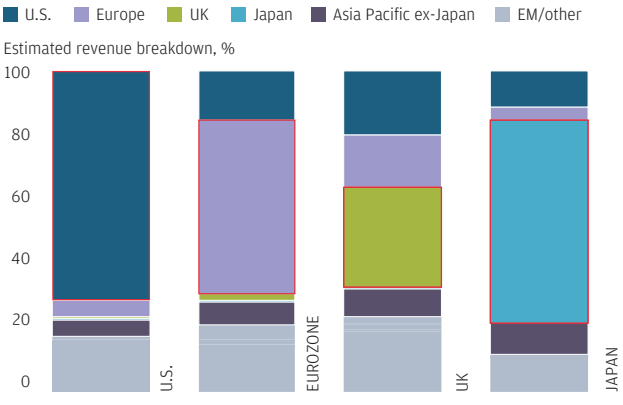
The UK market has moved modestly higher since last year, as earnings have recovered in the resource sectors. As a result, the expected drag from valuations has declined, leading to a modest upgrade in our UK equity return assumptions – a 25bps increase, from 5.50% to 5.75%. Commodity price performance has been somewhat mixed for the resources-dependent UK market, but the oil price has been quite firm amid an improved global supply and demand balance. Stronger performance from the extraction industries has contributed to a recent boost in ROE, but our long-term expectations for ROE are tempered by the decline in leverage across the UK market.

We can't predict how Brexit will affect the UK's future trading relationship with the European Union, but given that a large proportion of the UK stock market is linked to international rather than domestic growth, the impact on overall stock market profitability and direction should be fairly muted.

In terms of revenue, the breakdown of international vs. domestic revenue shares varies widely across major developed markets (**Exhibit 4**).

Foreign revenue shares vary widely across major developed markets

EXHIBIT 4: INTERNATIONAL REVENUE BREAKDOWN FOR G4 MARKETS



Source: Thomson Reuters Datastream, J.P. Morgan Asset Management; data as of August 2018.

EMERGING MARKETS EQUITY RETURN ASSUMPTIONS

After EM equities delivered robust returns in 2017, over the past year a combination of a stronger U.S. dollar and a rising U.S. 10-year Treasury yield has put at least a temporary dampener on investor sentiment, resulting in lower starting valuations for the EM equity universe. Nonetheless, we expect that emerging markets will offer a 300bps (in local terms) return premium relative to developed markets, an increase of 50bps over last year's assumption. Lower starting valuations support the higher expectation, but the wider spread mainly reflects higher revenue (and thus earnings) growth.

From a structural perspective, our views are unchanged. Relative to developed economies, we see higher growth potential for emerging economies from a range of forces: still-high productivity, the potential for the EM technology sector to catch up to its DM counterpart and more favorable demographics (with the exception of China). In the medium term, our expectation that the U.S. dollar will weaken over our forecast period also means that funding pressures for emerging market sovereign borrowers will likely dissipate.

Translating this strong economic growth into returns is a nuanced process in emerging markets, which investors need to consider as they determine their allocations. As we did last year, we note the dispersion among returns in individual emerging markets within the broader complex. Variations in market structure, sectoral composition, corporate governance and external exposure all contribute to the spread between individual EM market returns.

While high growth economies do tend to deliver strong equity returns over a long time horizon, this is not always the case. China reported the highest average annual real GDP growth in our sample, 9.2% over the past 23 years, as well as a dramatic increase in market capitalization. But it also delivered the lowest average annual returns among the individual EM equity markets we cover: 1.0% (**Exhibit 5**).[2] Although the size of the gap between economic growth and returns varies, both as a function of the starting point and of the high volatility inherent in emerging equities, over most periods and most countries returns lag real GDP growth on an average annualized basis.

As highlighted in prior Long-Term Capital Market Assumptions (LTCMAs), earnings per share are more complicated to forecast for emerging markets.[3] As the market capitalization of a relatively nascent stock market grows through new issuance, the number of listed shares grows, diluting the portion of the pie owned by existing shareholders. As a result, faster economic growth does not necessarily result in faster earnings per share growth. Within our assumptions framework, this tends to lead to a higher dilution for emerging markets than for developed ones. A lower USD in aggregate over our forecast horizon will likely ease funding pressures on emerging market sovereign borrowers broadly, even though the individual exchange rates for emerging market currencies vs. the USD are unlikely to move in a uniform manner.

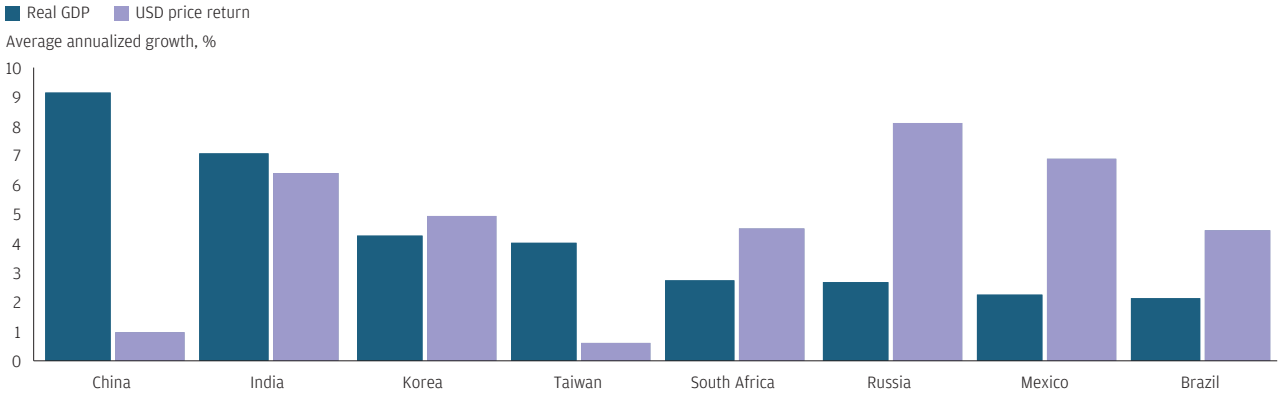
[2] Source: FactSet, MSCI, national statistics agencies, J.P. Morgan Securities LLC, J.P. Morgan Asset Management; data as of July 30, 2018. Data covers the period from December 31, 1994 through December 31, 2017, the longest period for which we could obtain both real GDP growth and equity returns data for all markets. The MSCI index returns shown are U.S. dollar price returns.

[3] Patrik Schöwitz and Michael Albrecht, "Emerging market equities: Then, now and tomorrow," *2016 Long-Term Capital Market Assumptions*, J.P. Morgan Asset Management, 2015.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

High growth typically corresponds with high equity returns, with exceptions

EXHIBIT 5: REAL GDP GROWTH AND EQUITY MARKET RETURNS, AVERAGE ANNUALIZED % GROWTH



Source: FactSet, MSCI, J.P. Morgan Securities LLC, J.P. Morgan Asset Management; data as of July 30, 2018. Data covers the period from December 31, 1994 through December 31, 2017. Data covers the period from December 31, 1994 through December 31, 2017, the longest period for which we could obtain both real GDP growth and equity returns data for all markets. The MSCI index returns shown are U.S. dollar price returns.

This year our equity return assumptions generally hold firm

EXHIBIT 6A: SELECTED DEVELOPED MARKET EQUITY LONG-TERM RETURN ASSUMPTIONS AND BUILDING BLOCKS

Equity assumptions	U.S. large cap	Euro area	UK	Japan
Revenue growth	5.0	4.6	4.5	3.3
+ Margins impact	-0.9	-1.0	-1.2	-1.7
Earnings growth	4.1	3.5	3.3	1.5
+ Gross dilution	-2.0	-2.0	-2.0	-2.0
+ Buybacks	2.4	1.5	1.0	2.2
EPS growth	4.5	3.0	2.3	1.7
+ Valuation impact	-1.4	-0.1	-0.1	0.7
Price return	3.1	2.9	2.1	2.4
+ Dividend yield (DY)	2.0	3.0	3.5	2.5
Total return, local currency	5.25%	6.00%	5.75%	5.00%
Change vs. 2018	-25bps	+25bps	+25bps	+25bps

Source: J.P. Morgan Asset Management; estimates as of September 30, 2017 and September 30, 2018.

EXHIBIT 6B: SELECTED EMERGING MARKET EQUITY LONG-TERM RETURN ASSUMPTIONS AND BUILDING BLOCKS

Equity assumptions	China	Korea	Taiwan	India	South Africa	Brazil
Revenue growth	8.8	5.8	4.8	13.1	9.6	9.4
+ Margins impact	-0.2	-2.3	-1.1	-0.1	-0.4	-3.5
Earnings growth	8.5	3.4	3.7	13.0	9.2	5.5
+ Gross dilution	-3.2	0.1	-0.6	-2.9	-1.8	-2.0
+ Buybacks	0.3	1.3	0.5	0.3	0.5	0.8
EPS growth	5.3	4.8	3.5	10.0	7.8	4.1
+ Valuation impact	0.3	1.9	0.8	-2.7	-2.0	1.0
Price return	5.6	6.9	4.4	7.1	5.6	5.1
+ Dividend yield (DY)	2.8	1.5	3.5	1.5	3.0	3.5
Total return, local currency	8.75%	8.50%	8.00%	8.75%	8.75%	8.75%
Change vs. 2018	+100bps	+75bps	-25bps	–	+25bps	+200bps

Source: J.P. Morgan Asset Management; estimates as of September 30, 2017 and September 30, 2018.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

We derive our aggregate EM equity assumption by applying the same methodology to nine large emerging markets and aggregating by market capitalization weight. The countries we include account for more than 85% of the market capitalization in the MSCI Emerging Markets Index. We once again caution that data history in emerging economies is generally shorter and data quality less robust, so our confidence in the resulting assumptions is by nature somewhat lower than for developed markets. Despite this reservation, and the variety of cyclical and structural cross-currents moving through the emerging market universe, we identify a few common themes.

Export-oriented countries (Brazil, South Africa and Korea) are expected to generate some of the highest returns within emerging markets. Brazil and South Africa, along with China, are each expected to return 8.75%. Korea is expected to return 8.5%. As referenced earlier, higher return expectations reflect lower starting valuations.

In only a few EM countries do we lower return expectations. Taiwan is the most noteworthy example: Modestly reduced expectations of revenue growth lead us to reduce return expectations from 8.25% to 8.0%. For an overview of our equity assumptions, see **Exhibits 6A** and **6B**.

CONVERTIBLE BONDS

Convertible bonds — corporate debt securities that provide the holder with an option to convert into the issuer's stock at a predetermined price — have historically offered investors equity-like returns with lower volatility and downside protection through a fixed income floor. Since Thomson Reuters' Global Hedged Convertible Bond Index started in 1994 through the third quarter of 2018, it has outperformed the MSCI World Index. Convertibles generally provide a more attractive income component than stocks alone while still allowing participation in the stock's price movement; they can improve the risk-adjusted returns of balanced stock-bond portfolios due to their asymmetric return profile and diversification benefits. Adding asymmetry to a portfolio may be especially attractive in times of economic uncertainty, whether investors expect a continued recovery or a recession.

As an equity alternative, convertibles allow investors to remain invested while lowering the risk of large drawdowns. Moreover, convertible valuations benefit from increased volatility, as they are implicitly long volatility via the optionality embedded within them.

As a credit alternative, convertibles offer a route to positive returns even as the environment for duration and credit spreads deteriorates. Convertibles will generally be more positively affected by rising stock values than negatively affected by rising interest rates due to their structurally low duration. However, like high yield bonds, convertibles have been susceptible to liquidity constraints during periods of market stress.

Our methodology for calculating convertible bond returns accounts for convertibles' similarities to and differences from traditional equity and fixed income, as well as the composition of convertible indices. While the geographic composition of the global convertibles universe is similar to that of the MSCI World, it has historically been biased toward smaller companies and cyclical sectors. We incorporate into our convertible bond assumptions our existing LTCMA numbers for equity and fixed income, along with convertibles' equity sensitivity, credit quality, option premium and the underlying stocks' unique characteristics.

This year, our global convertible bond and global credit-sensitive convertible bond assumptions (hedged into USD) are 5.50% and 4.75%, respectively. Credit-sensitive convertibles are securities whose underlying stock trades significantly below the conversion price, causing them to behave more like debt than equity. For context, we forecast 6.00% for MSCI AC (All Country) World and 4.25% for global credit returns (both also hedged into USD).

Compared with last year, our assumptions for convertible bonds (applying our methodology to last year's data) have increased approximately 50bps for both global and credit-sensitive convertibles. This change is consistent with the changes in our equity and fixed income assumptions that also resulted in modestly higher return expectations over the next 10 to 15 years.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

EQUITY FACTOR ASSUMPTIONS

Authors
Joe Staines, *Portfolio Manager and Research Analyst, Quantitative Beta Strategies*
Garrett Norman, *Investment Specialist, Beta Strategies*
Livia Wu, *Research Analyst, Multi-Asset Solutions*

For the first time in our LTCMAs' 23-year history, we are including long-term assumptions across a range of equity factor exposures, aiming to provide insight into a rapidly growing segment of the investment landscape (Exhibit). We define a factor as any characteristic that describes the risk and return of a group of securities or financial instruments. In our portfolios, we focus on factors that are backed by economic rationale and either drive returns in a manner that is unrelated to the market risk premium or deliver a desired outcome. Our assumptions cover five individual factors (value, quality, momentum, minimum volatility and dividend yield) and multi-factor approaches across five geographies (U.S., global developed, international developed, Europe and emerging markets).

At J.P. Morgan, we have been managing dedicated factor-based strategies for nearly a decade and consider factors from a bottom-up perspective. For example, equity value is represented by a grouping of individual stocks that are priced cheaply relative to peers. This notion of equity value may be familiar to investors when they think of the Russell 1000 Value Index (launched in 1987) or a Morningstar Style Box (introduced in 1992). However, factors represent a more diverse set of explicit, targeted exposures.

In this edition of our LTCMAs, we introduce assumptions across a range of equity factor exposures

RETURN ESTIMATES (ASSUMING ROUNDING TO THE NEAREST 25BPS)	
U.S. Multi-factor	5.50%
U.S. Value	6.00%
U.S. Momentum	5.50%
U.S. Quality	5.25%
U.S. Dividend	6.00%
U.S. Min vol	5.50%

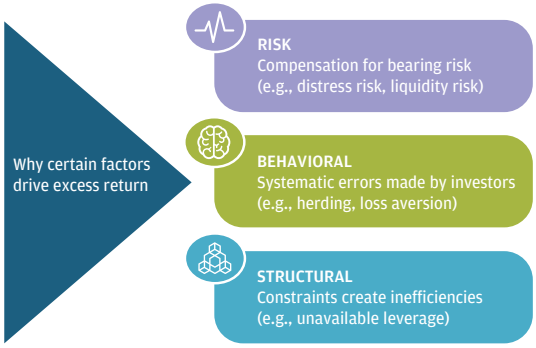
Methodology

We determine our long-term assumptions by examining the properties of two index suites, designed by J.P. Morgan Asset Management and calculated by FTSE Russell. The J.P. Morgan Diversified Factor Suite describes the performance of stocks chosen for their diversified factor characteristics; the J.P. Morgan US Single Factor Suite describes the performance of large U.S. companies chosen to target a single characteristic. Unlike many of the asset classes covered by our Long-Term Capital Market Assumptions, factor indices require a number of design decisions. While there is no unambiguous, natural choice of representative index, we hope that these long-term assumptions will help inform how investors think about asset allocation with respect to factors.

To reach a return assumption, we first make assumptions about the relative performance of the best and worst stocks according to a factor. We calculate the historical return difference between the best and worst quartile of stocks for each factor; significantly, we measure stocks relative to their sector and geographical region peers. Relative returns are adjusted to remove the impact of market beta, allowing for an isolated view of factor performance. The quartile portfolios are rebalanced quarterly and incorporate conservative estimates for the cost of trading. We then apply a haircut to these returns in order to be prudent in our estimation of factor performance and account for potential selection bias effects and market adaptation. These steps form a baseline for our long-term factor return assumptions.

Next, we adjust for the richness/cheapness of factors under the assumption that factor returns are persistent but cyclical. Mechanically, we assume that the forward earnings yield differential between top quartile stocks and bottom quartile stocks will revert to its long-term average, and adjust the return assumption accordingly.

Armed with these assumptions on the performance of each factor, we estimate the exposure of each index in the aforementioned diversified and single factor suites to the market risk premium, as well as the factors, using regression analysis. Multiplying each exposure by the appropriate return assumption gives us our final return assumptions. We base expectations for volatility and correlation on their historical values for the J.P. Morgan Asset Management Index series.



FERC Docket No. PL19-4-000
Reply Affidavit of Michael P. Gorman
Exhibit No. A-10
Page 70 of 361

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

A generally stable, relatively attractive outlook for alternatives

Anthony Werley, *Chief Portfolio Strategist, Endowments & Foundations Group*
Nicolas Aguirre, CFA, *Vice President, Endowments & Foundations Group*
Leon Xin, CFA, *Executive Director, Endowments & Foundations Group*
Patrik Schöwitz, CFA, *Global Strategist, Multi-Asset Solutions*
Sorca Kelly-Scholte, FIA, *Global Strategist, Global Pension Solutions*
Diego Gilsanz, *Global Strategist, Multi-Asset Solutions*

IN BRIEF

- Long-term return assumptions for alternatives are generally consistent with last year's outlook, except for an alpha upgrade within private equity (PE). Expected returns for alternatives remain attractive relative to those for public markets. Our 2019 assumptions, however, reflect methodological changes. Most notably, all assumptions are now available net of fees and, except for commodities, on a levered basis.
- **Private equity:** PE provides the sole meaningful return increment vs. last year's estimates. Increasing alpha opportunities driven by disruptive innovation, geographic expansion and ample exit options are expected to offset a mixed public equity return outlook, high purchase price multiples and sizable asset flows.
- **Direct lending:** Our methodology is enhanced to more accurately reflect how investors access the strategy. After netting out fees, the increase from manager leverage more than offsets the anticipated decline from structural trends in direct lending.
- **Hedge funds:** Return assumptions are unchanged from 2018. A more fundamental, less macro-driven environment, fee reductions and interest rate normalization are expected to counter the headwinds of industry size, competition and absolute fee levels.
- **Real estate:** Core return assumptions (unlevered) are up marginally in the U.S. and down in Europe ex-UK, the UK and Asia, reflecting the stage of the investment cycle and trailing year price performance in each region. For value-added, we introduce an assumption further out on the risk curve and incorporate leverage. **REIT** returns are based on the underlying real asset outlook adjusted by sector, leverage and price-to-NAV differentials.
- **Infrastructure:** The outlook for **infrastructure equity** remains strong, despite a marginal reduction in this year's assumptions due to higher recent valuations and hence a less robust valuation impact. The **infrastructure debt** return estimate is moderately increased while its credit quality is slightly reduced.
- **Commodities:** Return assumptions are reduced to reflect an exuberant energy market over the past year and the introduction of standard industry fees across multiple vehicle types. For gold, we project a 25 basis point premium to broad commodities.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

OVERVIEW

This year, return estimates are available on a net of fees, leveraged basis (**Exhibit 1**). To allow for this enhanced uniformity, we incorporate standard industry leverage assumptions for real estate, standard fee assumptions for commodities and both leverage and fee assumptions for direct lending. These additional leverage and fee assumptions are transparent components of the building block approaches used in generating our long-term return assumptions, as described in the commentary for each alternative strategy class.

Alternative return assumptions are generally stable relative to last year's estimates and remain attractive in comparison with public market return assumptions

EXHIBIT 1: SELECTED ALTERNATIVE STRATEGIES RETURN ASSUMPTIONS (LEVERED,[A] NET OF FEES, %)

	2019	2018
PRIVATE EQUITY (USD)[B]	**8.25**	**7.25**
U.S. private equity—small cap	7.75	6.50
U.S. private equity—mid cap	8.00	6.75
U.S. private equity—large/mega cap	8.50	7.50
PRIVATE DEBT (USD)		
Direct lending[C]	7.25	
HEDGE FUNDS (USD)		
Equity long bias	4.75	4.75
Event-driven	4.75	4.75
Relative value	4.50	4.50
Macro	3.75	3.75
Diversified[D]	4.25	4.25
Conservative[E]	3.75	3.75
REAL ESTATE—DIRECT (LOCAL CURRENCY)[F]		
U.S. core	5.75	
U.S. value-added	7.75	
European ex-UK core	5.50	
European ex-UK value-added	8.00	
UK core	5.00	
UK value-added	7.25	
Asia Pacific core	6.00	
REITS (LOCAL CURRENCY)		
U.S.	6.25	6.25
European	5.75	
European ex-UK	6.00	7.00
UK	5.50	
Asia Pacific	5.75	7.00
Global	6.00	6.50
GLOBAL INFRASTRUCTURE (USD)		
Equity—direct	6.00	6.25
Debt	4.75	4.25
COMMODITIES (USD)[A, G]	**2.25**	
Gold	2.50	

Source: J.P. Morgan Asset Management; estimates as of September 30, 2017 and September 30, 2018.
[A] All 2019 return assumptions incorporate leverage, except for commodities, where it does not apply.
[B] The private equity composite is AUM-weighted: 60% large cap and mega cap, 30% mid cap and 10% small cap. Capitalization size categories refer to the size of the asset pool, which has a direct correlation to the size of companies acquired, except in the case of mega cap.
[C] 2018 results for direct lending (not shown) were gross of fees and did not include leverage. See strategy class discussion for details.
[D] The diversified assumption represents the projected return for multi-strategy hedge funds.
[E] The conservative assumption represents the projected return for multi-strategy hedge funds that seek to achieve consistent returns and low overall portfolio volatility by primarily investing in lower volatility strategies such as equity market neutral and fixed income arbitrage.
[F] The 2018 results for real estate (not shown) did not include leverage. See strategy class discussion for details.
[G] The 2018 results for commodities (not shown) were gross of fees. See strategy class discussion for details.

PRIVATE EQUITY

Our private equity assumptions for 2019 (for small, mid and large/mega cap funds and the cap-weighted composite) are each raised relative to our 2018 assumptions (**Exhibit 2**). The improvement reflects a better operating environment for financial sponsors as the disruption factor in the economy becomes more pervasive, an increasing geographic alpha opportunity set – especially in the key emerging markets of India and China – and ample opportunities for portfolio position exits. The base building blocks of our private equity return assumptions – public equity returns – are mixed in terms of year-over-year performance expectations. However, the relative expected outperformance of non-U.S. equities vs. U.S. equities does provide a small lift to our assumptions. Our alpha projection, while improved, remains below what many investors believe to be fair compensation for the additional risk of illiquidity and below the 15-year historical average of industry alpha (**Exhibit 3**).

PE return assumptions are up as improved alpha opportunities outweigh a mixed public equity return outlook

EXHIBIT 2: PRIVATE EQUITY ASSUMPTIONS AND RETURN FRAMEWORK

	Small PE (<$500mn)	Mid PE ($500mn-$2bn)	Large/mega PE (>$2bn)	Cap-weighted*, **
PUBLIC MARKET EXPOSURES				
U.S. mid cap	✓	✓	✓	
Europe			✓	
Asia ex-Japan			✓	
ASSUMPTIONS (%)				
Public market exposure	5.75	5.75	6.25	6.00
Alpha trend	2.00	2.25	2.25	2.25
2019 LTCMA	**7.75**	**8.00**	**8.50**	**8.25**
2018 LTCMA	6.50	6.75	7.50	7.25

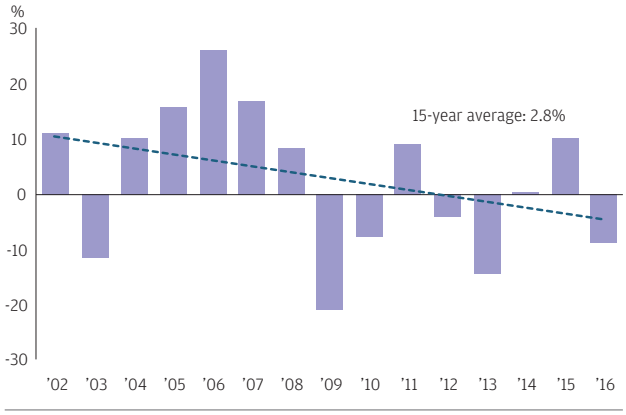
Source: J.P. Morgan Asset Management; estimates as of September 30, 2017 and September 30, 2018.

* The private equity composite is AUM-weighted: 60% large cap and mega cap, 30% mid cap and 10% small cap. Capitalization size categories refer to the size of the asset pool, which has a direct correlation to the size of companies acquired, except in the case of mega cap.

** The regional weights for the capitalization-weighted PE composite are: U.S.: 55%; Europe: 25%; Asia and other: 20%.

Our alpha projection is improved but still below historical averages

EXHIBIT 3: HISTORICAL PREMIUM OF PRIVATE EQUITY TO U.S. MID CAP (2002-16)*, **



Source: Bloomberg, Burgiss Private iQ, J.P. Morgan Asset Management; data as of March 31, 2018.

* Includes buyout and expansion capital funds.

** The historical premium to U.S. mid cap returns (shown here) is not directly comparable to the forward-looking PE cap-weighted composite alpha trend assumption (in Exhibit 2). Our alpha trend assumption reflects a range of public market exposures (across regions and size categories) in addition to U.S. mid cap, the dominant market exposure.

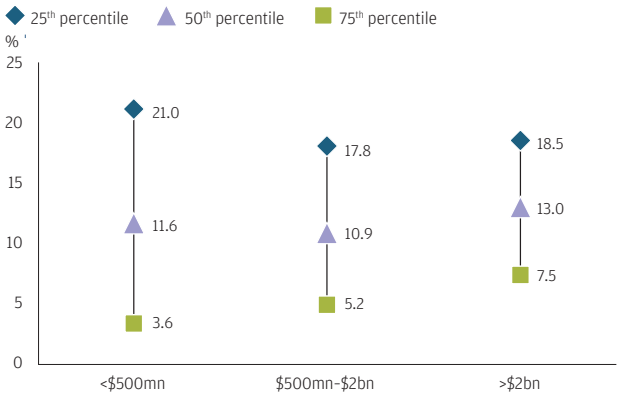
Most of the factors that have been weighing on the outperformance of private vs. public equity markets are still in place. All-time highs in fundraising, post-global financial crisis highs in purchase price multiples and an increasing number of non-traditional competitors continue to suppress excess returns to levels below what many investors anticipate. However, we believe that the balance between new opportunities for creating value and the highly competitive environment for deploying capital tilts slightly in favor of a modest upgrade of the PE illiquidity premium over public markets for the next several years. The illiquidity premium for PE vs. public markets provides one of the few absolute returns across the capital markets that meet the elevated hurdle rates required by many organizations – returns that can't be met by a public-market-only portfolio.

We continue to emphasize the importance of manager selection in the PE space as a key determinant of the value of a private equity allocation. We would expect the dispersion of returns to remain very wide, especially in the small and mid segments of the market (**Exhibit 4**).

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Manager choice is still a critical factor for success in PE investing — especially when investing in smaller funds

EXHIBIT 4: HISTORICAL PRIVATE EQUITY DISPERSION BY SIZE OF FUND,* IRR OF VINTAGE YEARS 2002-16 (%)



Source: Burgiss, J.P. Morgan Asset Management; data as of March 31, 2018.
*Includes buyout and expansion capital funds.

Economic change and the potential for incrementally better returns

As articulated in "The evolution of market structure,"[1] the public markets, which have traditionally funded corporate expansion and investment, are increasingly shifting their orientation toward returning capital and optimizing capital structure — leaving private markets to provide more of the vital funding for growth, in addition to funding for new ventures. In the past, we have expressed concern as to whether the private equity industry can find ample opportunities in the U.S. and European mid cap equity space to absorb fast-growing assets under management (AUM).

More recently, the global economy has been undergoing a number of disruptions that represent enhanced opportunities for new economy-attuned corporate restructurers and investors to potentially add value. As disruption advances, certain themes, such as those associated with e-commerce/supply-chain management, millennial consumer preferences, access-not-ownership, social connectivity, mobile everything and new food preferences, may be a better fit for the operating temperament and skill set of the private equity industry vs. that of a profit-optimizing, traditional risk corporate setting.

Regardless of who handles the new economy and social preferences best, in an environment of restructuring and adaptation, the risk-seeking private equity model has a new pool of niche, higher return opportunities. At the margin, we believe the scale of new economy opportunities may be enough to better absorb and profitably deploy the soaring AUM raised by the industry over the past few years.

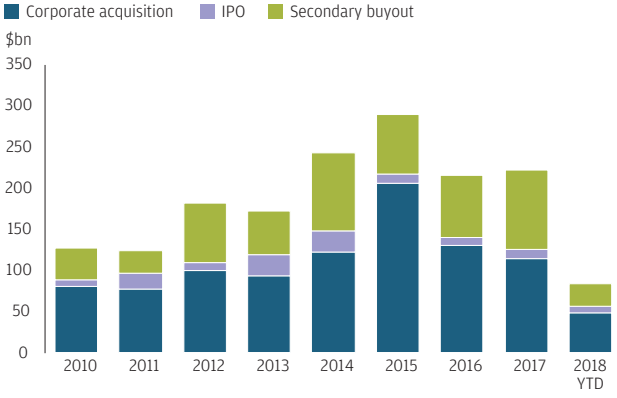
Multiple exits

An uptick in exit opportunities on multiple fronts, including corporate acquisitions, sponsor-to-sponsor transactions and IPOs, could help improve exit multiples.

Public companies' desire to bolster growth through strategic acquisitions appears robust, judging by the extent to which strategic (corporate) buyers have dominated PE-backed exits (**Exhibit 5**). The slowing trend of economic growth and, commensurate with it, the modest level of trend capital expenditures (capex), particularly in the U.S., provide ample rationalization for continued M&A activity. At the same time, sponsor-to-sponsor transactions (i.e., secondary buyouts) are rising, reflecting the need of those organizations without sufficient deal-sourcing capabilities or other corporate strategies to deploy capital raised. While not expected to create an important increment for returns, the recent opening of the IPO window should provide an additional premium to returns for certain product and service niches that are perceived to be most attractive at the time of public offering.

Increasing secondary buyouts, continued M&A activity and an improving IPO outlook could enhance exit opportunities

EXHIBIT 5: U.S. PRIVATE EQUITY-BACKED EXITS BY TYPE AND YEAR



Source: PitchBook 2Q 2018 U.S. Private Equity Breakdown; data as of June 30, 2018.

[1] "The evolution of market structure," *2019 Long-Term Capital Market Assumptions*, J.P. Morgan Asset Management, 2018.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

The outlook for alpha stabilizes

We see the balance among high purchase price multiples (**Exhibit 6A**) and average debt multiples (**Exhibit 6B**), sizable assets to deploy and new non-sponsor competitors vs. new asset deployment opportunities – whether in Asia or in the new economy – as being roughly in equilibrium and poised to generate modest alpha over public markets. Our weighted fund-size composite excess return above the public markets assumption, while up from our 2018 long-term estimate, is slightly below the average performance of the industry over the past 15 years. Additional excess return potential lies in the ability to tap into premium exit avenues. Essentially, the sponsor community's willingness to take on disruption and geographic risk stabilizes returns at a modest increment over public markets, even with the burden of asset size and expensive purchase multiples.

Improved deployment and exit opportunities should offset the impact of high multiples, dry powder and increased competition on PE returns

EXHIBIT 6A: PRIVATE EQUITY PURCHASE PRICE MULTIPLES – ENTERPRISE VALUE/EBITDA (X)

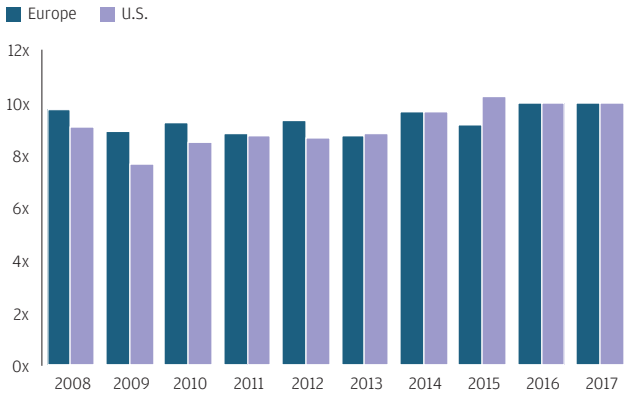
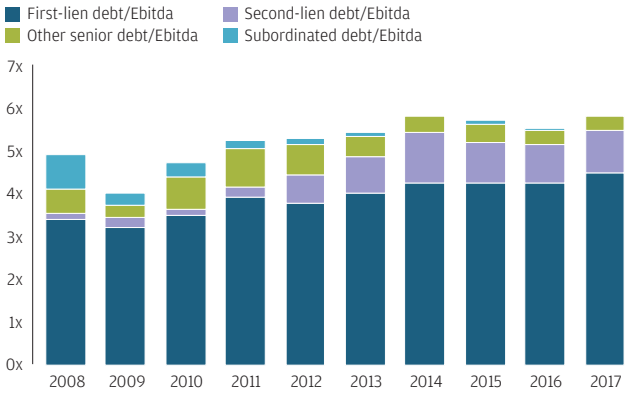


EXHIBIT 6B: AVERAGE DEBT MULTIPLES – DEBT/EBITDA (X)*



Source: S&P Global Inc., J.P. Morgan Asset Management; data as of December 2017.
* Debt multiples for issuers with Ebitda of more than $50 million.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

DIRECT LENDING

Our 2019 long-term return estimate for direct lending is 7.25% (levered, net of fees), up from 2018's 7.00% unlevered, gross of fees estimate. After netting out fees, the increase from manager leverage more than offsets the anticipated decline from structural trends in middle market direct lending. Incorporating leverage is an enhancement in our methodology consistent with the way many investors access the direct lending market.

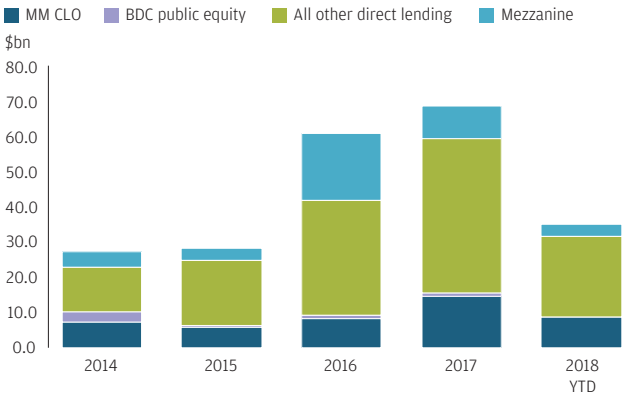
Fundraising growth trends persist, reflecting the historical yield premium delivered to investors, as well as the benefits to borrowers of working with a customized provider, namely speed and certainty of execution, a single counterparty and the flexibility of debt structures (**Exhibit 7**). Direct lending still offers a premium over public market credits of a similar quality. That said, early signs of a relaxed regulatory environment specific to collateralized loan obligation (CLO) risk retention, business development company (BDC) leverage limits and Dodd-Frank interpretation are reinforcing our view that competition for relatively higher yielding, mostly senior secured paper will likely drive both a deterioration in underwriting standards and a reduction in illiquidity premiums for direct lending.

Methodology

Adding to the methodology used in prior editions of our Long-Term Capital Market Assumptions (LTCMAs), which leveraged the Cliffwater Direct Lending Index (CDLI) as the basis for the starting yield assumptions, we have introduced a building block approach that incorporates publicly available loan data for the components of the Credit Suisse Leveraged Loan Index. In an asset class that lacks transparency, this information provides a more robust data set with characteristics close to those of the middle market lending opportunity set. Using our LTCMAs for terminal U.S. cash rates as the basis for Libor and to reflect the floating rate nature of the asset class, along with credit spreads and credit cost assumptions based on public loan information, we arrive at an unlevered yield of 6.75%. The reduction in the unlevered assumption (from 7.00% in 2018) incorporates relatively aggressive underwriting driven by the combination of later-cycle dynamics and our expectation of the continued asset growth in the market. Incorporating relatively conservative assumptions for leverage, financing costs and manager fees, we arrive at a net of fee, levered return assumption of 7.25% (**Exhibit 8**).

Growth in direct lending is likely to be a headwind to forward-looking returns

EXHIBIT 7: MIDDLE MARKET DIRECT LENDING CAPITAL RAISED (USD BILLIONS)



Source: Thomson Reuters LPC; data as of August 3, 2018.

Direct lending is expected to offer a premium vs. public market credits of similar quality, despite competitive pressures

EXHIBIT 8: DIRECT LENDING RETURN ASSUMPTIONS AND BUILDING BLOCKS (USD, %)

	2019 rate/spread (%)	
Libor	2.25	LTCMA for cash rate + 25bps interbank credit spread
Weighted average spread	4.50	Based on post-global financial crisis spreads from Credit Suisse; average of B rated loans (~400bps) and 65/35 mix of 1st/2nd-lien loans (~500bps)
Illiquidity	1.25	Credit Suisse spreads by loan size suggest a historical 150bps illiquidity premium; we adjust downward to reflect increasing market institutionalization
Starting yield	**8.00**	
Credit cost	-1.25	Incorporates LTCMAs for high yield default rates with 70% recovery value for 1st-lien loans and high yield recovery rates for junior debt
Unlevered yield	**6.75**	
Leverage	6.75	50% debt to assets
Cost of financing	-4.75	Assumes 200bps financing spread
Fees	-1.50	Per Cliffwater, asset- and performance-based fees historically have been ~20% of gross yield; we assume a modest reduction to reflect a maturing asset class
Levered return assumption	**7.25**	**2018 unlevered, gross of fees return assumption was 7.00%**

Source: J.P. Morgan Asset Management; estimates as of September 30, 2017 and September 30, 2018.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

HEDGE FUNDS

Our hedge fund return assumptions hold firm relative to 2018 projections, reflecting our public market return assumptions, which, on balance, remain mostly unchanged from last year (**Exhibit 9**).

Hedge fund returns – both absolute and relative to public markets – have turned the corner over the past year. A fundamentally driven investment environment will continue to provide more fertile ground for a long-short investment format than the prior risk on/risk off backdrop shaped by central bank policy. We anticipate headwinds from asset size, increasing competition from liquid "smart beta" providers and the absolute level of fees in a low return world. At the same time, we expect limited partnership returns to be bolstered by a higher contribution from portfolio cash and rebates, and more conciliatory fee structures and levels.

A diversified hedge fund strategy, within the context of modest public market return expectations and rising volatility, should make a positive contribution to a multi-asset mandate by providing compelling and diversifying returns.

A more fundamentally driven market continues to support expected hedge fund returns at 2018 assumption levels

EXHIBIT 9: HEDGE FUND RETURN ASSUMPTIONS (USD, %)

	2019	2018
Equity long bias	4.75	4.75
Event-driven	4.75	4.75
Relative value	4.50	4.50
Macro	3.75	3.75
Diversified*	4.25	4.25
Conservative**	3.75	3.75

Source: J.P. Morgan Asset Management; estimates as of September 30, 2017 and September 30, 2018.

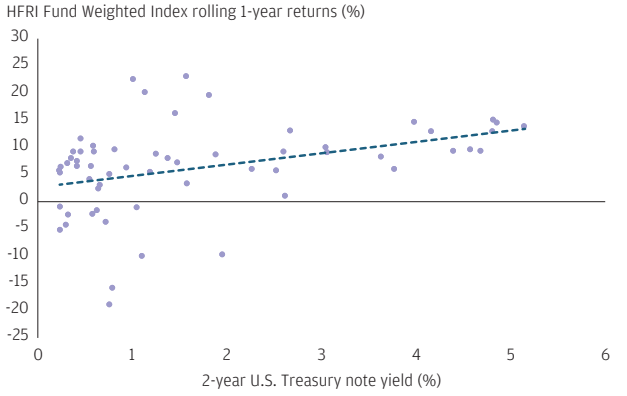
* The diversified assumption represents the projected return for multi-strategy hedge funds. ** The conservative assumption represents the projected return for multi-strategy hedge funds that seek to achieve consistent returns and low overall portfolio volatility by primarily investing in lower volatility strategies such as equity market neutral and fixed income arbitrage.

Post-global financial crisis (GFC) investment conditions

As central bank policies progress toward normalization, the environment for fundamental and, in particular, long-short fundamental investing should become more hospitable. Over the past year, falling intra-sector and stock level correlations, along with rising volatility, have provided conditions more conducive to absolute and relative return generation. Additionally, the normalization of U.S. policy rates, currently at 2.25%, provides a key building block for returns not present during most of the post-GFC environment (**Exhibit 10**). The environment for hedge fund investing has improved with policy normalization, but it is unlikely to reach the heyday of returns prior to the GFC.

Hedge fund returns are generally better in a higher rate environment

EXHIBIT 10: HEDGE FUND RETURNS VS. U.S. 2-YEAR TREASURY NOTE YIELD (3Q 2003–2Q 2018)



Source: Bloomberg, Hedge Fund Research, J.P. Morgan Asset Management; data as of 2Q 2018.

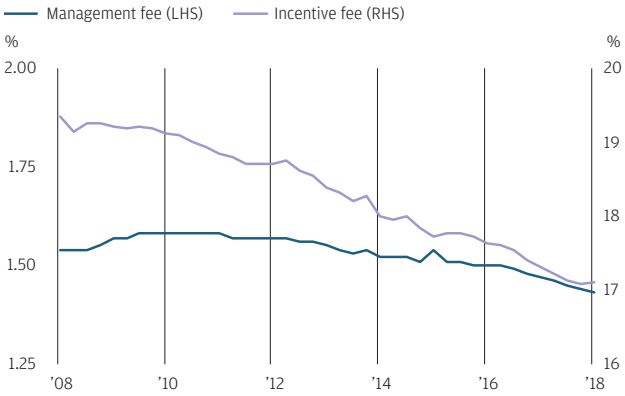
The fee environment

We continue to expect the trajectory for fees generally to be lower (**Exhibit 11**). While management fees have been the focus of reductions thus far, we fully expect performance fees to take the spotlight in the out years of our forecast period. Novel fee arrangements have been launched, such as offering significant principal protection in return for increased performance fees above a high hurdle rate, and increasing lockup periods in exchange for lower fees. Recently, as new fund launches have become more difficult, managers have become more conciliatory on fees.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Hedge fund fees continue to decline

EXHIBIT 11: AVERAGE MANAGEMENT AND INCENTIVE FEES – ALL SINGLE MANAGER STRATEGIES (1Q 2008–1Q 2018)



Source: Hedge Fund Research; data as of 1Q 2018.

The artificial intelligence disruption factor

The use of artificial intelligence (AI) to augment alpha capabilities is not new in the highly competitive hedge fund environment, but it has become the most commonly discussed factor for potentially disrupting hedge fund returns. While simple language processing techniques are already employed at a few of the larger, more quantitatively oriented organizations, we find the impact of advanced AI limited at this time. The limitation lies not so much in the availability of computing horsepower but rather in that of quality, unbiased data. Given its resource-intensive nature, AI may be yet another area in which larger, well-resourced organizations are best positioned – in this case, to tackle the data issues and afford the horsepower necessary to realize AI's true potential in the investment process.

The alpha outlook improves

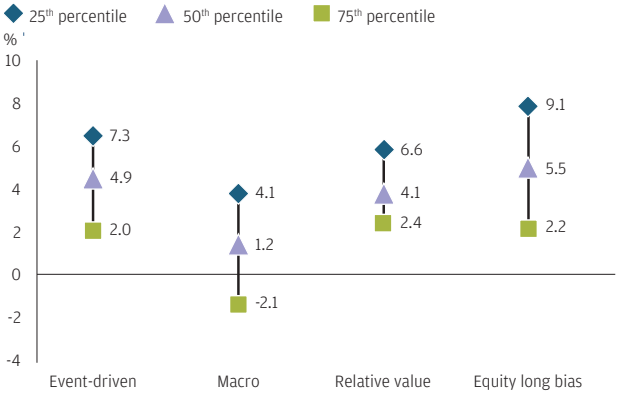
Markets driven more by sector- and security-level fundamentals have lifted the prospects for the industry, as indicated by performance in 2017 and 2018 so far. Our expectations are for alpha to rise closer but not back to the average levels of 15 to 20 years ago, especially for equity long bias and event-driven strategy classes. We see returns further boosted by fee rationalization and a contribution from portfolio cash and rebates.

Manager selection matters

The headwinds of significant industry asset pools and new liquid-format competitors chasing scarce opportunities are formidable. However, to reiterate the case we have made for a number of years, absolute return/hedge funds are investment strategies, not asset classes. The quality of due diligence in manager selection often makes or breaks the investment proposition that hedge funds generally are thought to represent (**Exhibit 12**).

Manager selection is critical in realizing the investment potential of hedge funds

EXHIBIT 12: DISPERSION OF MANAGER RETURNS (%), JULY 2013 TO JUNE 2018*



Source: Hedge Fund Research, J.P. Morgan Asset Management; data as of June 30, 2018.

*Returns adjusted for survivorship bias.

FERC Docket No. PL19-4-000
Reply Affidavit of Michael P. Gorman
Exhibit No. A-10
Page 78 of 361

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

KEY COMPONENTS OF OUR HEDGE FUND RETURN ESTIMATION PROCESS

CORE BETA RETURNS: Approximated as the product of beta exposures (see table below) and our long-term assumptions for traditional asset classes in excess of the risk-free rate, plus the risk-free rate. Core beta returns are the primary component of our hedge fund return assumptions.

- *Our analysis finds beta exposures increasingly rotating toward higher return non-U.S. markets.*
- *We calculate beta by regressing excess returns so as to produce estimates that are independent of interest rate regimes and capture the positive impact of rising interest rates on hedge fund returns.*

ALPHA TRENDS: Based on historical alpha trends, adjusted for forward-looking expectations.

- *We expect the recent negative alpha trend to moderate as fundamentals increasingly drive performance.*

ALPHA POTENTIAL: Further adjustments, based on our interpretation of the impact of industry conditions on the forward-looking alpha potential of each strategy class.

- *We anticipate a fee reduction of 25bps at the average manager level, industry-wide.*

DERIVED EQUITY BETA EXPOSURES (COEFFICIENTS) AND GOODNESS OF FIT (R^2) STATISTICS

	Long bias	Event-driven	Relative value	Macro	Diversified*	Conservative**
Intercept	0.00	0.00	0.00	0.00	0.00	0.00
U.S. large cap	-0.16	-0.12	-0.03	-0.08	0.03	0.02
U.S. mid cap	0.29	0.19				
EAFE	0.14	0.11	0.05	0.07	0.11	0.10
Emerging markets	0.15	0.05	0.05	0.07	0.08	0.05
U.S. high yield		0.16	0.31			
U.S. long duration	-0.14	-0.13	-0.04	0.06	-0.06	-0.07
Adj. R^2	0.93	0.83	0.80	0.16	0.62	0.55

Source: Bloomberg, J.P. Morgan Asset Management. The time frame for regression analysis is November 2005 through April 2018.

* The diversified assumption represents the projected return for multi-strategy hedge funds.**The conservative assumption represents the projected return for multi-strategy hedge funds that seek to achieve consistent returns and low overall portfolio volatility by primarily investing in lower volatility strategies such as equity market neutral and fixed income arbitrage.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

REAL ESTATE

Our 2019 Long-Term Capital Market Assumptions for real estate are expanded this year to include additional regional detail for value-added and REIT return projections. All assumptions are available on a levered, net of fee basis. Core return assumptions (unlevered) are up marginally in the U.S. and down in Europe ex-UK, the UK and Asia. Our value-added assumptions have moved further out on the real estate risk curve and are therefore generally not comparable to last year's assumptions.

Global real estate market trends

Over the past year, real estate markets globally have diverged somewhat, reflecting economic cycle differences across regions. Generally, the U.S. markets marked time while Europe and Asia remained strong and in the recovery stage. Consistent with the progression of the economic cycle around the world, core real estate supply has recently increased and credit is easier to obtain. Relative to past real estate cycles, however, there is no euphoria – particularly in the U.S. and European core markets. Leverage remains muted, loan-to-value is still at the low end of historical ranges, and discipline generally is being maintained relative to past cycles, especially the most recent one.

Globalization of real estate flows remains a theme driving a measure of return harmonization across regions. Global investor trends favor larger/tier one cities, larger assets and more innovative spaces. Lower expected return in the core space is pushing investors out on the risk curve and into the value-added segment. On average, core real estate markets appear attractively priced vs. comparable grade credit fixed income.

Core real estate

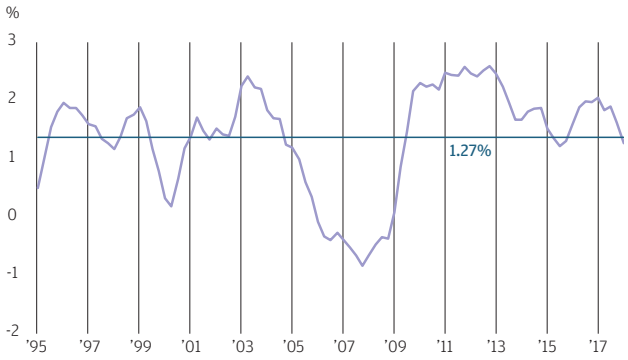
This year's real estate assumptions introduce leveraged returns and a more granular set of building blocks. Specifically, we start with an assumption for net operating income (NOI) before capex, adjust downward for maintenance capex and exit yields, deduct standard industry fees and adjust upward for net cash flow growth. Given this approach, our return assumptions, on a fundamental or apples-to-apples, unlevered basis, are marginally higher in the U.S. and lower in Europe ex-UK, the UK and Asia (**Exhibit 13**).

U.S. markets

Current U.S. core real estate cycle dynamics are in sharp contrast to the excess enthusiasm of the past cycle across a number of indicators. Transaction volumes have been drifting lower for the past few years, and loan-to-value ratios are currently in the low 20% range vs. 65% at the 2007 peak. Appreciation has been muted for the past three years, and ODCE[2] unlevered income yield spreads to BBB corporates, while at the lows for this cycle, are still well above past cycle lows (**Exhibit 14**).

Unlevered income yield spreads have tightened but still exceed historical cycle lows

EXHIBIT 14: CAP RATE (YIELD) SPREAD TO BBB CORPORATE BONDS (%)



Source: Moody's, NCREIF NPI Transaction Cap Rates, J.P. Morgan Asset Management; data as of June 2018.

[2] National Council of Real Estate Investment Fiduciaries (NCREIF) – Open End Diversified Core Equity (ODCE) funds.

Core real estate assumptions diverge regionally, based on the stage of the investment cycle and price performance over the trailing year

EXHIBIT 13: CORE REAL ESTATE ASSUMPTIONS (LOCAL CURRENCY, %)

Core real estate	U.S.	European ex-UK core	UK	Asia Pacific
Starting NOI (before capex) yield	5.00	4.35	4.65	3.50
Maintenance capex	-0.50	-0.20	-0.25	-0.35
Net cash flow growth	2.50	2.25	1.75	3.50
Exit yield adjustment	-0.85	-1.15	-1.05	-0.85
Standard industry fees	-0.70	-0.70	-0.70	-0.75
2019 unlevered return, net of fees	**5.45**	**4.55**	**4.40**	**5.05**
Leverage impact	0.30	0.95	0.60	0.95
2019 levered return, net of fees	**5.75**	**5.50**	**5.00**	**6.00**
2018 unlevered return, net of fees	5.25	4.75	4.75	5.50

Source: J.P. Morgan Asset Management; estimates as of September 30, 2017 and September 30, 2018.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Key thematic points on a U.S. sectoral basis

CENTRAL BUSINESS DISTRICT/OFFICE: Stock growth and tenant space growth are roughly in line. The trend of densification or falling space per worker serves to reduce absorption but raises the ability to pay rent even as wages paid per occupied square foot are rising. Rents and return on investment are rising over the short term.

WAREHOUSE/LOGISTICS: The drive to make the direct-to-consumer economy more efficient continues to push the industrial space-per-inventory ratio higher. The best infill locations see rent surges because the best locations save on other logistics costs. Pricing remains frothy for well-leased industrial assets in low density areas.

RETAIL: Headlines are bleaker than the reality as services are already replacing stores in retail centers. Top malls will continue to perform well, mid grade are well advanced in store-to-service center conversions, and the lowest tier are not likely to survive.

MULTI-FAMILY: A reaccelerating economy and a softer supply are helping rent growth. Luxury rents will continue to firm, but underperformance vs. mid tier will likely persist. Demographics are driving a modest shift back to the suburbs and, on the margin, from owning to renting.

European markets

Solid performance in European ex-UK real estate is being driven by above-trend economic growth in the region, along with global real estate investment flows targeting Europe and, in particular, Germany and France. Credit is readily available due to banks' renewed willingness to lend, as well as increased competition from new debt funds. Despite the strength, risk-taking remains disciplined, which should support values in the next downturn.

Continued demand from investors across the globe for high quality real estate in key European cities has underpinned yield-driven valuation uplifts for the past several years. Rent levels for offices, in most major cities are increasing as economies recover, but the supply of new office stock is failing to keep pace with tenant demand. Retail is undergoing a major structural shift, and yields are beginning to reflect this extra risk. Industrial and logistics have performed most strongly off the back of higher tenant demand, driving strong rental growth and attracting the highest level of investor interest.

Asian markets

Most markets in the region are in mid cycle dynamics. Within each country, however, there are pricing disparities among cities based upon the unique fundamentals of each. Tokyo is expensive for offices, while Osaka remains attractive given the limited supply. Chinese real estate flows are a greater force in New York and London than in Japan or Australia. U.S. and European flows continue into the region.

Value-added real estate

Over the past few years, the value-added sector has received an increasing percentage of real estate flows as investors have looked for yield in a moderate return environment. Consequently, the value-added market has tightened and spreads to core have come down. Given that the market is tight and likely in its late-cycle stage, the underwriting assumptions behind value-added pro formas seem increasingly stretched vs. core.

Our 2019 value-added projections move our assumptions further out on the real estate risk spectrum. Both our return and volatility assumptions are raised to reflect risk-taking between core and opportunistic in terms of leverage employed, targeted returns and degree of restructuring inherent in the investment process (**Exhibit 15**).

This year's assumptions for value-added real estate represent a point on the risk curve between core and opportunistic

EXHIBIT 15: VALUE-ADDED REAL ESTATE ASSUMPTIONS (LOCAL CURRENCY, %)

Value-added real estate	U.S.	European ex-UK	UK
Core real estate unlevered return, gross of fees	6.15	5.25	5.10
Risk premium	3.00	3.00	3.00
Cyclical adjustment	-1.40	-0.75	-0.95
Standard industry fees	-2.50	-2.50	-2.50
2019 unlevered return, net of fees	**5.25**	**5.00**	**4.65**
Leverage impact	2.50	3.00	2.60
2019 levered return, net of fees	**7.75**	**8.00**	**7.25**
2018 unlevered return, net of fees	6.50		

Source: J.P. Morgan Asset Management; estimates as of September 30, 2017, and September 30, 2018.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

We define value-added as having the following characteristics:

- properties with significant leasing, repositioning and redevelopment risks
- properties with medium to low liquidity during the typical three- to five-year holding period
- leverage typically employed at the 50% or higher level
- a risk premium over core of approximately 3%, in an equilibrium valuation and at a similar stage of the cycle
- targeted income returns in the range of 30% to 50% of total return

REAL ESTATE INVESTMENT TRUSTS (REITS)

This year we introduce an assumption for UK REITs. Elsewhere, our REIT projections are flat for the U.S. and down for Europe ex-UK and Asia Pacific due to both market developments and methodological changes. Overall, the expected return for global REITs is reduced by 50 basis points (bps) in local currency terms.

Our regional REITs projections (**Exhibit 16**) utilize unlevered core real estate returns as a starting point, motivated by the belief that REITs are ultimately subject to the fundamentals of the underlying real estate held within the publicly traded vehicles. The regional core returns are then adjusted for:

- industry composition – U.S. REITs projections are adjusted slightly to account for the increased market share of higher growth alternative sectors (e.g., data centers) not captured in our core return figure.
- REIT leverage within each region
- valuation relative to underlying real estate – price to net asset value discount/premium is amortized to its historical average.

For U.S. REITs, the slight upgrade to core real estate was offset by a downgrade to the incremental return expected from higher growth sectors. Outside of the U.S., lower unlevered core real estate assumptions have driven part of the decline, while the benefits from previously assumed valuation discounts have also been adjusted downward. This year, we used a broader set of valuation metrics that showed a larger historical discount for European and Asian REITs, reducing the valuation impact for those markets. Lastly, the net leverage benefit declined for Asian REITs for two reasons. First, the starting assumption of a lower unlevered core return in the region depressed the leverage benefits. Second, a methodological move to incorporate a cycle-neutral, as opposed to contemporaneous, interest rate raised the cost of leverage for markets still early in their credit cycle, such as Japan.

REIT return estimates assume convergence to the value of the underlying real assets and incorporate leverage

EXHIBIT 16: REIT RETURN ASSUMPTIONS AND BUILDING BLOCKS (LEVERED, LOCAL CURRENCY, %)

REITS	U.S.	European	European ex-UK[A]	UK	Asia Pacific	Global
Unlevered return private real estate	5.45	4.50	4.55	4.40	5.05	5.20
Tilt toward higher growth sectors (e.g., data centers)	0.10					0.05
Net leverage benefit	0.45	1.00	1.20	0.85	0.55	0.55
Amortization to historical P/NAV discount	0.25	0.25	0.25	0.25	0.15	0.20
2019 expected return	**6.25**	**5.75**	**6.00**	**5.50**	**5.75**	**6.00**
2018 expected return	6.25		7.00		7.00	6.50

Source: J.P. Morgan Asset Management; estimates as of September 30, 2017, and September 30, 2018.
[A] The 2019 European ex-UK assumption is comparable to the 2018 European assumption (7.00), which did not include the UK.

INFRASTRUCTURE EQUITY

We reduce our 2019 long-term infrastructure equity return assumption marginally to 6.00% from 6.25% in 2018, primarily due to higher recent valuations in the space, leading to a somewhat less robust valuation impact (at 0.50%) going forward (**Exhibit 17**).

The outlook for infrastructure equity remains strong, given its relatively high, stable yields and anticipated demand from underallocated investors

EXHIBIT 17: OECD INFRASTRUCTURE LEVERED EQUITY—RETURN ASSUMPTIONS AND BUILDING BLOCKS (USD, %)

	2019
Starting yield	5.00
Cash flow growth	0.75
Valuation impact	0.50
Leverage impact	1.50
Fees and other expenses	-1.75
Expected return	**6.00**

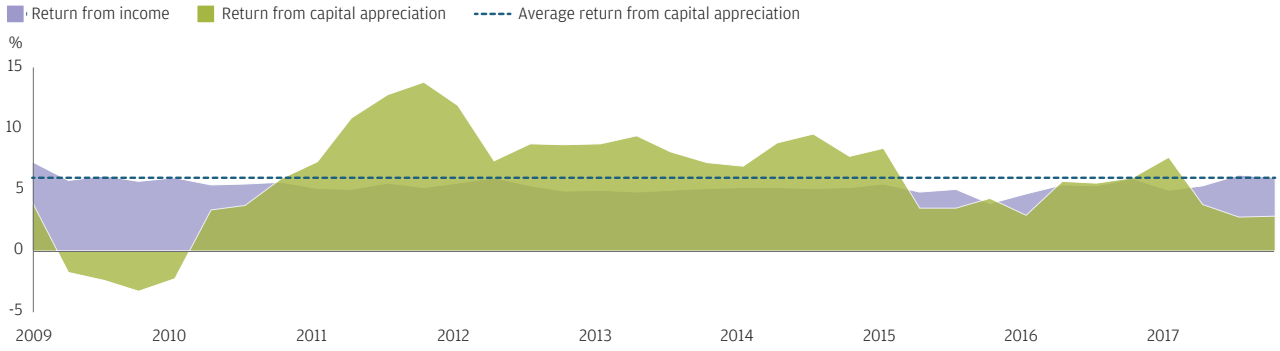
Source: J.P. Morgan Asset Management; estimates as of September 30, 2018.

The outlook remains generally strong as investors continue to value the asset class for its relatively steady, long-term contracted and regulated cash flows, especially in a lower return and more volatile investment environment. Historically stable average yields of approximately 5% (**Exhibit 18**), with some growth based on operational efficiencies and/or contractual inflation mandates, represent an attractive option vs. many similarly risked equity alternatives. In addition to relatively high yields, the asset class benefits from a degree of inflation protection, which manifests in cash flows that grow with inflation over time.

Institutional investors across the board expect to increase their allocation to the asset class, as most have not met their current allocation targets (**Exhibit 19**).

Infrastructure is valued for its historically stable cash flows

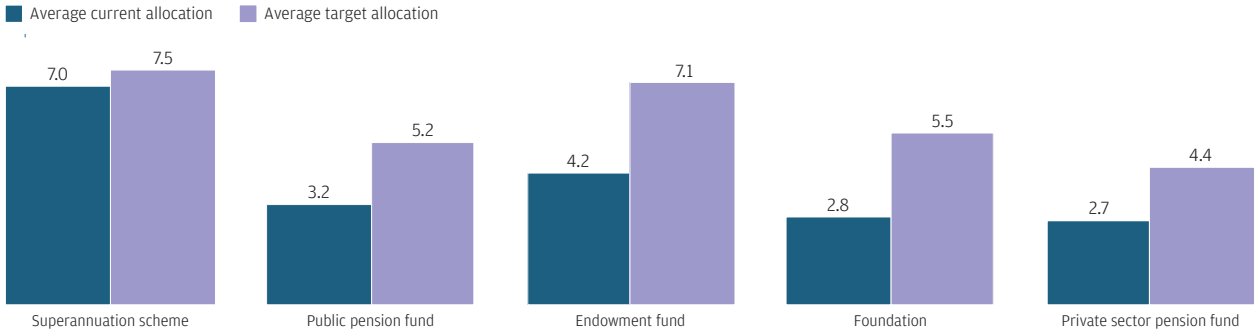
EXHIBIT 18: UNLISTED INFRASTRUCTURE RETURN COMPONENTS: INCOME AND CAPITAL APPRECIATION



Source: MSCI Global Quarterly Infrastructure Asset Index, J.P. Morgan Asset Management; data as of December 2017.
Data show rolling one-year returns from income and represent the index's full available timeline from 1Q 2009 onward.

Rising investor demand should continue to add a valuation premium

EXHIBIT 19: INSTITUTIONAL INVESTORS' CURRENT AND TARGET ALLOCATIONS TO INFRASTRUCTURE (%)



Source: Preqin; data as of December 2017. Based on survey data, subject to self-reporting bias. Percentage allocations shown exclude investors who have no allocation to infrastructure equity.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Utilities

Regulated utilities and distributed power should continue to perform well, as allowed returns have been resilient in the low interest rate environment. Aging systems require capex at the same time government balance sheets are under stress after years of slowing productivity and population growth. Electricity networks have felt the greatest impact from technology over the past few years: Distributed generation and intermittent resources have made grid management more important, while smart meters and demand management have made operators better able to address these changes. Technology is likely to continue to drive change in the industry, as will customers' focus on green energy, safe pipes and a clean water supply.

Transportation

The transportation sector has benefited from the secular trend toward greater trade and travel as the cost of transportation declines and wealth continues to grow. Technological advances and automation are also making transportation assets more efficient, and disruption to transportation business models is likely to continue over the medium term. Quasi-monopolistic market positions with inflation-indexed contracts have further strengthened cash flows. Valuations should move higher for trophy assets.

Contracted power

Power generation investments, particularly for renewable energy, can offer long-term power offtake agreements with sovereign entities, utilities or corporates. The structure of the agreements, including a measure of inflation protection, has tended to produce relatively high and stable yields with higher levels of leverage that consequently have pushed up valuations. Renewable energy costs continue to decline slowly, and there will be additional opportunities to invest in new projects. However, reduced incentives and greater competitiveness will likely reduce the tenor of new contracts in the space. This would make existing investments with longer contracts more valuable, especially in the event of a recession, when interest rates would be expected to fall.

MASTER LIMITED PARTNERSHIPS (MLPS)

In the past, MLPs issued by pipeline operators represented a potentially attractive approach for individual and institutional investors to gain energy infrastructure exposure in the public equity markets, with a steady income component and related tax advantages. Over time, as the industry has matured and reacted to various tax and regulatory changes, many operators have elected to restructure their businesses as traditional C-corporations rather than general partner/limited partnership arrangements. This revised structure has greater appeal for institutional investors like endowments and foundations but introduces greater uncertainty over the medium term around issues such as leverage, distribution growth trajectory and industry composition. Given the impact of this ongoing evolution, we do not feel that the long-term return for MLPs can be reliably estimated at this juncture.

INFRASTRUCTURE DEBT

Our infrastructure debt assumption is based largely on our return projection for global corporate credits of A to BBB quality and 15-year maturity, resulting in a long-term equilibrium return assumption of 4.75%.

FERC Docket No. PL19-4-000
Reply Affidavit of Michael P. Gorman
Exhibit No. A-10
Page 84 of 361

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

COMMODITIES

Our 2019 long-term commodity return assumption is 2.25% net of fees or 3.00% gross of fees – a 75bps decline vs. our 3.75% gross of fees assumption in 2018.

With our U.S. inflation outlook down 25bps to 2.00%, 2019 return expectations imply positive real returns of 25bps net of fees (100bps gross of fees, down 50bps from 2018). Our real return assumption will continue to be tested by the impact of global trade policy, at least in the intermediate term.

Methodology and return assumption building blocks

Our assumptions methodology (basically unchanged, except for net of fee calculations) is detailed in "**Building blocks of commodity returns**."

BUILDING BLOCKS OF COMMODITY RETURNS*

We build our assumption based on the Bloomberg Commodity Total Return Index (a collateralized index of investible futures). We start with a projection of the collateral return for futures-based commodity investing. As this return is generally equivalent to inflation over the long term, we assign a value equivalent to our long-term assumption for U.S. inflation. We then adjust for:

(1) where we are in the current commodity cycle (Pricing theories based on the economics of non-renewable resources in finite supply are not embedded in our estimates.)

(2) a rising emerging market contribution to global per capita commodity consumption

(3) the inverse relationship between commodity returns and the U.S. trade-weighted dollar, with a modest adjustment for the diminishing role of the U.S. dollar in commodity trading

(4) the potential contribution from roll yields. We expect a zero contribution from this source during the 10- to 15-year time frame of our assumptions.

(5) fees – based on U.S commodity ETFs and mutual fund average fees*

* Prior to the 2019 assumptions, commodity return projections were gross of fees and are not comparable to 2019 net of fees return assumptions.

Our approach is a combination of quantitative and qualitative inputs. A comparison of the basic building blocks for 2019 vs. 2018 commodity return assumptions is laid out in **Exhibit 20**.

Relative to 2018, our U.S. inflation assumption (our long-term reference point for commodity returns) is reduced 25bps to 2.00%. Additionally, the "position in current cycle" component, as captured by the Commodity Event Index (see "**Capturing producers' supply constraint sentiment**"), is adjusted from 25bps down to zero, reflecting the impact from the significant surge seen in oil prices and the commensurate increase in U.S. energy capex. The adjustment for the rising role of emerging market (EM) growth and per capita commodity demand is unchanged at 0.25%. The impact of a trade-weighted U.S. dollar decline is reduced to 0.75%. We generally expect a zero contribution from roll yields over the time frame of our long-term projections. The result is a 3.00% commodity return assumption, gross of fees (down 75bps vs. 2018) or a 2.25% return, net of fees.

Our commodity assumption, net of fees, is 25bps in excess of inflation

EXHIBIT 20: COMMODITIES—RETURN ASSUMPTIONS AND BUILDING BLOCKS (USD, %)

	2019	2018
Collateral return*	2.00	2.25
Position in current cycle (premium/discount)	0.00	0.25
EM per capita consumption adjustment	0.25	0.25
Trade-weighted USD decline impact (projected incremental annual decline vs. historical base period)**	0.75	1.00
Impact of roll yield over average life of assumptions	0.00	0.00
Total return, gross of fees	**3.00**	**3.75**
Fees***	-0.75	N/A
Total return, net of fees	**2.25**	**N/A**
Gold return, net of fees	**2.50**	**N/A**

Source: J.P. Morgan Asset Management; estimates as of September 30, 2017 and September 30, 2018.

* The 2019 Long-Term Capital Market Assumption for U.S. inflation.
** The historical relationship of the U.S. dollar to commodities would call for a greater return contribution than the 0.75% shown, but in light of expectations for a reduced role of the U.S. dollar in international trade, we limit this long-term impact.
*** Market-based fees are based on U.S. commodity ETFs and mutual fund average fees. The 2018 assumption did not include fees and is therefore not comparable to the 2019 net of fees assumption.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Current cyclical conditions detract from our long-term commodity return assumption

Trade wars, OPEC/Russia supply constraints and global synchronous growth have produced thus far in 2018 a very volatile but generally negative return across the commodity complex, except for energy prices. The current imbalance in the energy markets is expected to give way to a long-term approximate balance between production and demand, as represented by the International Energy Agency's projection.[3] That outlook is likely to be tested in the intermediate term because underinvestment by the international oil majors, loss of output due to domestic upheavals in countries such as Venezuela and Libya, U.S. sanctions against Iran and, potentially, the new supply discipline of U.S. exploration and production companies have caused an intermediate imbalance that may ripple through the long-term trajectory of energy prices. These conditions, if extended beyond the next few years, should contribute to a commodity index return above the rate of inflation (a rate we view as a reasonable long-term return equilibrium). However, energy prices have likely overshot their long-term equilibrium price, dragging down the average price gain assumption and thus detracting from our 2019 long-term return assumption.

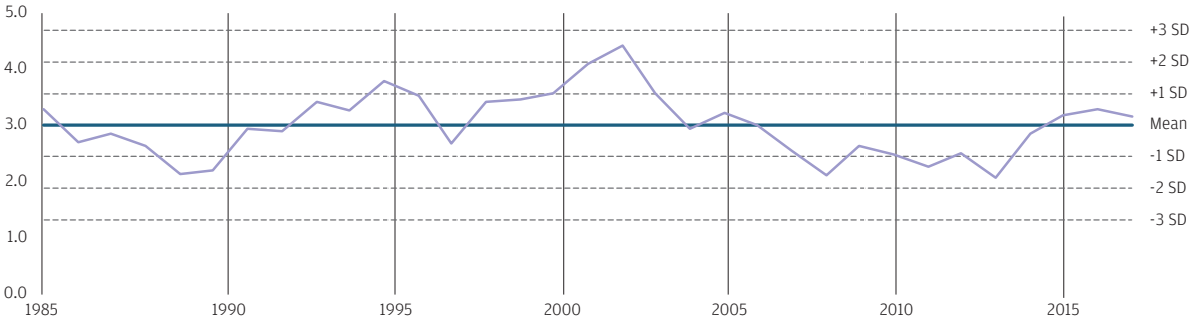
Long-term drivers of return: The U.S. dollar, inflation, emerging markets

More reliably, the projected decline of the U.S. dollar on a trade-weighted basis, in the context of a 2% projected U.S. inflation rate, provides the foundation of the return estimate.

[3] International Energy Agency World Energy Outlook 2017.

CAPTURING PRODUCERS' SUPPLY CONSTRAINT SENTIMENT

The Commodity Event Index



COMMODITY EVENT INDEX COMPONENTS

The Commodity Event Index is designed to capture producer sentiment around the loosening/tightening of production constraints within commodity markets. Higher index values indicate a more constrained environment, supportive of increasing commodity prices.

The event index utilizes a component weight scheme in which four components have 11.1% weightings, while three components that we deem more important receive an 18.5% weighting, as indicated below. Components were added as available (inclusion date in parentheses) for our universe of energy and materials companies, including:

Index component	Component weight %	Observed change to index component	Impact on index value
Credit rating (1985)	11.1	higher	lower
Age of capital stock (1985)	11.1	higher	higher
Financial leverage (1985)	11.1	lower	lower
Volume of bankruptcies, takeovers, debt-for-equity swaps (2004)	11.1	lower	lower
Capital expenditure to sales (1985)	18.5	lower	higher
Oil rig count (1991)	18.5	higher	lower
CEO turnover (2007)	18.5	higher	higher

Source: Baker Hughes, Bloomberg, FactSet, U.S. Bureau of Economic Analysis, J.P. Morgan Asset Management; data as of June 30, 2018.

The increasing role of emerging market consumers, particularly in India and China, two large countries expected to have the fastest-growing economies over the next 10-year-plus time frame, add an increment to the return outlook. When modeling even a modest increase in per capita consumption of commodities, especially in India, which is at the bottom of the middle income economic ladder, the potential for impact is clear (**Exhibit 21**).

Disruption factor

Sustainable energy production, energy efficiency regulation, new modes of transportation-sharing and urbanization trends are growing strongly and may provide a partial offset to the 1% to 2% world energy demand growth experienced in the last few years **(Exhibit 22)**. Certainly, sustainable energy/efficiency growth rates vs. long-term energy demand would indicate a material loss of share by traditional/carbon energy sources. But off a low starting base, the real impact to the commodity demand and pricing picture is likely to be important beyond the 10-year-plus window of our estimation. As a partial offset to developed market energy per capita trends mentioned above, the Chinese One Belt, One Road initiative is likely to keep a positive tone on many commodities over the forecast period.

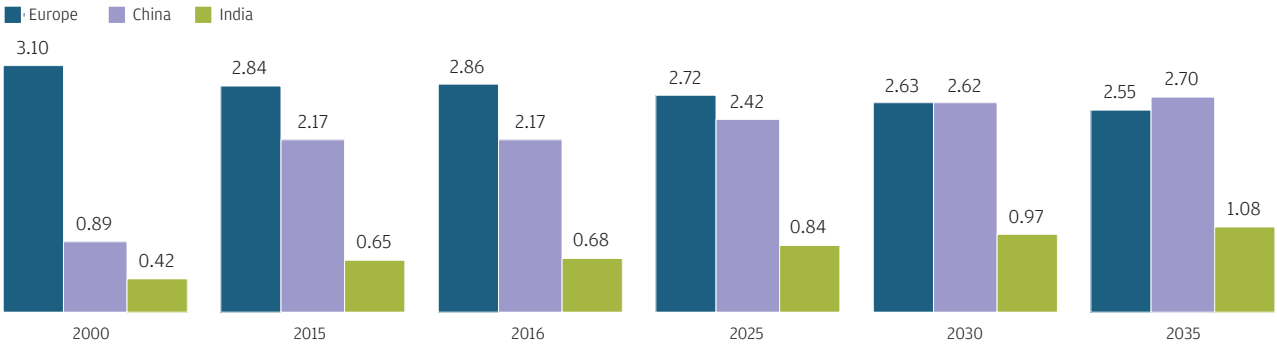
GOLD

The return for gold is driven by many of the same factors as general commodity returns but primarily by U.S. inflation, the direction of the trade-weighted U.S. dollar and a scaling factor that reflects the increasingly important developing economy impact on gold consumption. Consumption per capita can be expected to fall in China and India. However, since the two highest per capita gold consumers (with roughly twice the per capita consumption of developed economies) are also the two fastest-growing economies, we expect the net effect to be an increase in the absolute demand for gold. Another small increment to demand is assumed from an erratic but still long-term accumulation of gold for investment purposes.

Within the last few years, central banks have ceased liquidating their gold reserves and have started accumulating once again. We project a 25bps gold return premium to broad commodities (equivalent to last year's), implying a 2.50% return for gold, net of fees.

Energy demand per capita is decreasing in some developed markets but strengthening in emerging markets

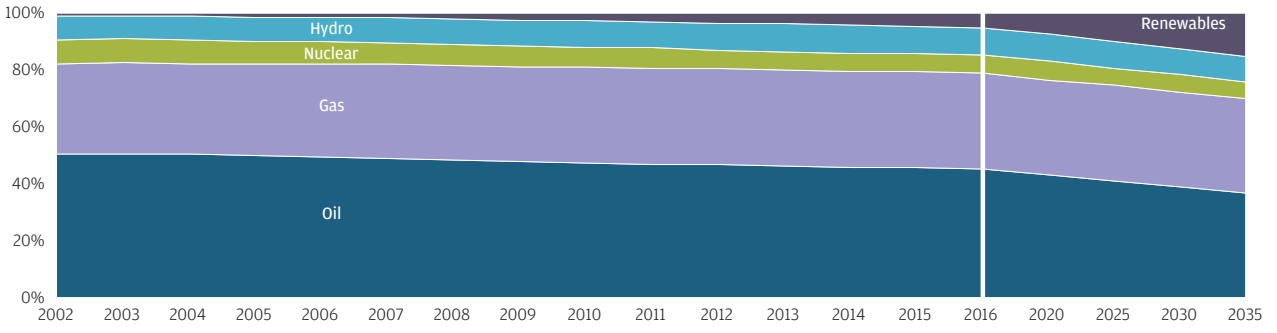
EXHIBIT 21: TOTAL PRIMARY ENERGY DEMAND PER CAPITA (TONS OF OIL EQUIVALENT)



Source: International Energy Agency World Energy Outlook 2017, J.P. Morgan Asset Management.

Renewable energy sources are expected to expand at the expense of fossil fuels

EXHIBIT 22: SHARE OF PRIMARY ENERGY EXCLUDING COAL SINCE THE ACCESSION OF CHINA TO THE WORLD TRADE ORGANIZATION



Source: 2018 BP Energy Outlook.

FERC Docket No. PL19-4-000
Reply Affidavit of Michael P. Gorman
Exhibit No. A-10
Page 87 of 361

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

U.S. dollar strength: A cyclical pause, not a new long-term trend

Michael Feser, CFA, *Portfolio Manager, Multi-Asset Solutions*
Thushka Maharaj, DPhil, CFA, *Global Strategist, Multi-Asset Solutions*
Jonathon Griggs, *Head of Applied Research, Global Fixed Income, Currency & Commodities*

IN BRIEF

- U.S. fiscal stimulus has improved economic activity, corporate earnings and consumer sentiment, producing a divergence between the cyclical position of the U.S. and those of other countries – and abetted the Federal Reserve's policy rate normalization – a dynamic that has halted what had been an aggressive unwinding of the overvalued U.S. dollar.
- For most currency pairs, we expect this U.S. dollar reversal will produce only a transient impact, likely to subside as the effects of the fiscal impulse from the U.S. tax reform begin to wear off toward the end of 2019.
- We assume some recovery of pound sterling over our assumption horizon, although the currency has remained impaired given the political and economic costs of Brexit – though, at the time of writing, it is unclear what form Brexit may take, so the uncertainty around our sterling assumption is high.

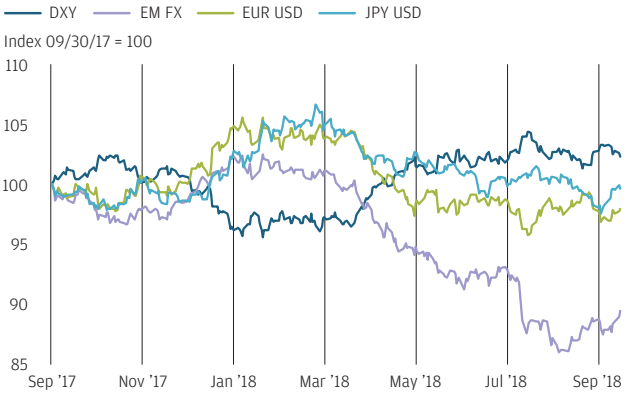
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

CYCLICAL CHANGES AND SECULAR TRENDS

Year over year, the U.S. DXY index has hardly moved since we published the 2018 *Long-Term Capital Market Assumptions* (LTCMAs). But this headline FX market stability is an illusion masking a pretty volatile 12 months in currency markets. That volatility has been a tale in two parts: Between October 2017 and January 2018, a period of synchronized global growth across emerging and developed markets weakened the U.S. dollar. Then a strong fiscal package passed by the U.S. Congress in 4Q 2017 — in an economy already operating close to capacity — disrupted that incipient synchronized uplift in global growth.

Apparent USD stability masks a rather volatile year in currency markets

EXHIBIT 1: USD VS. EURO, YEN AND A BASKET OF EM CURRENCIES (JP MORGAN EM CURRENCY INDEX)



Source: Bloomberg; data as of September 30, 2018.

As the year progressed, trade concerns escalated and major developed market (DM) economies outside the U.S. saw a weak growth patch in Q1. Despite a weaker economic outlook outside the U.S., the Federal Open Market Committee (FOMC) continued resolutely raising interest rates. The confluence of growth and rate differentials boosted the U.S. dollar again, especially vs. emerging market (EM) currencies (**Exhibit 1**). In most cases, these disparities among economies' cyclical growth rates have not materially impacted our expectations for longer-term inflation and growth trends — nor our assessment of the future fair value of currency exchange rates.

What has changed, however, compared with last year's Long-Term Capital Market Assumptions, is that a number of starting valuations have shifted decidedly further away from fair value. Only in a few emerging markets, economic vulnerabilities have become apparent that may also adversely impact their currencies' longer-term fair-value trajectory.

As in prior years, we have determined today's fair value exchange rates for G10[1] currencies through a relative purchasing power parity (PPP) approach, based on the long- term average of each currency's real exchange rate. To calculate the fair value for emerging market currency exchange rates, we take an absolute PPP-based approach that builds on the PPP estimates for actual individual consumption,[2] as calculated by the World Bank and the Organization for Economic Co-operation and Development (OECD) for their international price comparison program.

To arrive at a given exchange rate projection over our assumption horizon, which we also refer to as future fair value, we adjust today's fair value exchange rate using the LTCMAs' underlying macroeconomic assumptions, as follows: For G10 currencies, we reflect the expected change in a country's terms of trade over the assumptions horizon by adjusting today's fair value for the projected inflation rate differential between the two countries. For emerging markets, we make an additional adjustment for the expected differential in GDP per capita growth.

Our assumptions continue to reflect the adverse impact on developed market economies' growth prospects of deteriorating demographics, smaller improvements in total factor productivity (TFP) and lower levels of human capital development.[3] We project that emerging markets, in aggregate, will grow faster than their DM counterparts, given larger increases in the size and quality of their labor forces, although with an increasingly wider dispersion in growth rates. Rather than an increase, some EM countries, such as Russia, Taiwan and Korea, are likely to begin experiencing a shrinking of their labor force in the coming years.

We now believe that the echo of the global financial crisis will continue to impact the effectiveness of developed market central banks' policies over the LTCMA horizon as they struggle to achieve their inflation targets. In particular, we expect that over the assumptions horizon, the G10 economies will experience longer periods of below-target inflation, followed by shorter periods above-target, fluctuating within a narrow band. For emerging market economies, in most cases we expect relatively stable inflation environments, at levels somewhat above their respective central bank targets.

[1] In this context we refer to the G10 as the following currencies: USD, EUR, JPY, GBP, CHF, AUD, CAD, NZD, SEK, NOK.

[2] PPP for actual individual consumption covers all households, consumption expenditure and that part of government final expenditure that covers services it supplies to individual households — for example, housing, health, education and social protection. It does not include government final expenditure on those services it supplies to households collectively, such as defense, police and environmental protection.

[3] Total factor productivity is a residual that in developed economies likely reflects technological change. It encompasses productivity growth not explained by capital stock accumulation or the labor force (increased hours worked), but rather captures the efficiency or intensity with which inputs are utilized.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

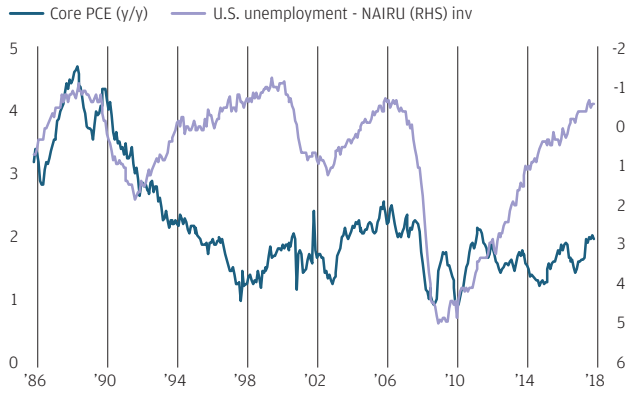
We do, however, acknowledge that populism continues to be on the rise, and in a growing number of countries, increasing the risk that economic trajectories may shift significantly – toward relatively less growth, more inflation and weaker currency exchange rates. Still, political risks to our assumptions for the eurozone remain low, even as Brexit continues to cloud the UK's prospects. Meanwhile, changes in U.S. trade policy are making China's transition from investment-led growth to a more balanced growth model an even more challenging endeavor.

LONG-TERM CURRENCY EXCHANGE RATE ASSUMPTIONS

While global growth has remained robust and continues at or above potential, divergences among the cyclical positions of the U.S. and other developed and emerging market economies have returned since last year's edition. Fiscal stimulus in the U.S., and the subsequent improvements in economic activity, corporate earnings and consumer sentiment, have made it easier for the Federal Reserve (Fed) to move forward with its policy rate normalization at a steady and somewhat faster pace than before.

Despite a tight labor market (unemployment below NAIRU), we are not seeing a meaningful pickup in inflation

EXHIBIT 2: U.S. UNEMPLOYMENT (Y/Y) AND INFLATION (CORE PCE), 1986–2018



Source: OECD, Bloomberg, J.P. Morgan Asset Management; data as of September 30, 2018.

The U.S. economy continues to operate in the flat part of the Phillips curve,[4] with core inflation rising only gradually, despite unemployment levels that for quite some time have been well below the Fed estimate of NAIRU (**Exhibit 2**).[5] In this context, the current Fed interest rate normalization process appears to be well advanced, and further rate hikes later in 2019 are likely to become much more data-dependent.

At the same time, in the euro area, economic activity data has softened, inflation remains well below target and, while the labor market is much improved from the days of the sovereign debt crisis, considerable slack still remains. It has therefore been unsurprising that the European Central Bank has adopted a more dovish tone and signaled that it will not start to raise interest rates for a while.

Abstracting from the volatility of activity data, growth in Japan has been respectably above trend for the last 12 months, mainly led by private consumption and investment spending. But inflation disappointed and remains stubbornly below 1%. In acknowledgment of a delay in the time it will take to reach the inflation target, the Bank of Japan (BoJ) was forced to modify its yield curve control framework. The 10-year yield range was shifted upward, the logic being that by allowing the 10-year yield to move between 0 and 20 basis points, the BoJ will be able to conduct easy monetary policy for longer, and at least until the consumption tax hike in 2019. The irony of the signal from this is not lost on us: The need to push long-term bond yields up, in order to maintain an easy monetary policy stance over a longer horizon, is an example of the quandary central banks are facing and are likely to face again in the coming years. Despite this, the BoJ is not expected to meet its inflation goal over our forecast horizon.

Over the past couple of years, Japan's current account surplus, which previously appeared to be vanishing, has stabilized at a high level, partly thanks to strong income receipts associated with international assets. This highly favorable external position contributes to the view that JPY will appreciate in nominal terms over the long run.

This dynamic has brought the aggressive pace at which the overvalued U.S. dollar had begun to unwind – historically, a seven-year process, on average – to a screeching halt. For DM currency pairs, this reversal of the U.S. dollar is not supported by a change in its long-term fair value, but rather produces a more transient impact likely to subside as the effects of the fiscal impulse from the U.S. tax reform begin to wear off toward the end of 2019.

Sterling has remained impaired as the political and economic costs of a soft Brexit have become more and more apparent, a shift that has also had the effect of elevating the risk that the process overall may unravel and end inadvertently in a hard Brexit.

[4] Low inflation and low unemployment, in this model of the relationship between unemployment and higher wages and consumer prices.

[5] NAIRU (non-accelerating inflation rate of unemployment) is defined as the lowest rate of unemployment at which inflation should begin to increase.

FERC Docket No. PL19-4-000
Reply Affidavit of Michael P. Gorman
Exhibit No. A-10
Page 90 of 361

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Emerging market economies

The path to our equilibrium assumptions for EM FX is not expected to be smooth, and the current market volatility is likely to persist while the Fed tightens policy and U.S. foreign policy focuses on tariffs. Because the U.S. dollar remains the preeminent funding currency for emerging markets, the ripple effects of Fed policy tightening have been clearly visible, even with other central banks still on hold and the absolute level of tightening still fairly benign. A number of emerging market economies, particularly in Latin America but also India and Indonesia, had to tighten their monetary policy in response, to limit exchange rate depreciation and to prevent the inflation rate from spiking. In some countries, this external tightening pressure has been compounded by internal vulnerabilities — either as a result of unfinished reform efforts such as in Argentina or due to profligate fiscal policies as in Turkey, Brazil and South Africa (**Exhibit 3**).

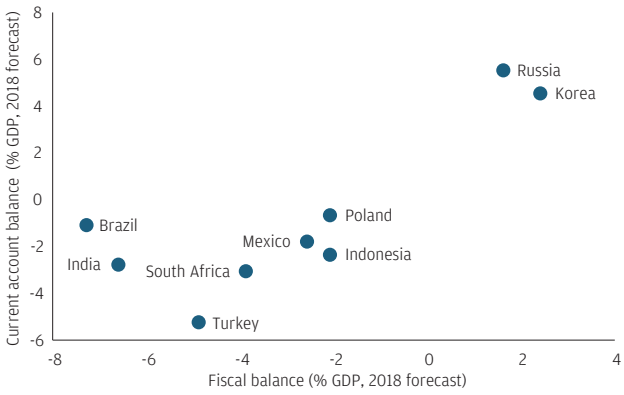
With polarized choices in elections in several emerging markets, political uncertainty and volatility are unusually elevated this year. This makes it hard to derive high conviction views on the economic fundamentals over the longer term. But we acknowledge that the revelation of specific vulnerabilities in parts of emerging markets, and a deterioration in the EM-U.S. inflation differential, adversely impact our longer-term fair value equilibrium assumptions for a number of EM currencies.

For the Chinese RMB, compared with last year's edition, our 2019 assumptions build in a modestly weaker exchange rate vs. the USD. Continued convergence between Chinese economic fundamentals and the global frontier, particularly in terms of growth in export volumes and unit labor costs, has lowered our estimate of fair value. This year, volatility in the RMB increased as headwinds from U.S.-China trade tariffs, and China's domestic deleveraging effort, weighed on growth. As China transitions toward a more balanced growth model, the currency is likely to gain more traction in nontrade international transactions — a welcome development. However, the currency may also have to act as a cushion in smoothly managing that transition.

Exhibit 4 provides an overview of some of our 2019 long-term currency exchange rate assumptions.

Large EM countries exposed to foreign capital flows also have large fiscal deficits

EXHIBIT 3: 2018 EXPECTED CURRENT ACCOUNT BALANCE VS. FISCAL BALANCE



Source: OECD, Institute of International Finance (IIF), Bloomberg, J.P. Morgan Asset Management; data as of September 30, 2018.

After a broad-based U.S. dollar reversal over the last year, our assumptions point toward significant future weakness

EXHIBIT 4: ASSUMPTIONS FOR SELECTED CURRENCY EXCHANGE RATES — NEXT 10–15 YEARS

(According to market convention, CURRENCY A/CURRENCY B means one unit of CURRENCY A is worth the stated number of units of CURRENCY B. EUR/USD = 1.30 means EUR 1.00 is worth USD 1.30.)

		Current levels	2019		2018
Currency		September 30, 2018	Per annum % change from current*	FX rate assumptions	FX rate assumptions
Euro	EUR/USD	1.16	+1.00	1.32	1.34
Japanese yen	USD/JPY	114	+1.75	92	93
Swiss franc	USD/CHF	0.98	+1.50	0.85	0.88
British pound	GBP/USD	1.30	+0.75	1.43	1.47
Canadian dollar	USD/CAD	1.29	+0.75	1.18	1.14
Australian dollar	AUD/USD	0.72	-0.50	0.68	0.71
Chinese renminbi	USD/CNY	6.87	+1.00	6.07	5.87
Brazilian real	USD/BRL	4.02	0.00	4.02	3.59
Mexican peso	USD/MXN	18.72	-0.75	20.56	15.63

Source: Bloomberg, J.P. Morgan Asset Management; estimates as of September 30, 2017 and September 30, 2018.

*For consistency and ease of conversion, we have assumed that the forecast horizon for the per annum change in percentage terms is 12.5 years. Differing from market convention, we have also used a uniform signing convention, such that a positive figure represents a strengthening of the currency vs. the U.S. dollar, and vice versa.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

BUILDING BLOCKS–CURRENCY EXCHANGE RATES

The annualized compound rate of change expresses the difference between two currencies' current exchange rate and our estimate of their fair value exchange rate at the end of our assumptions horizon – for consistency we use 12½ years.

A DEVELOPED MARKETS

- Starting fair value exchange rate based on the theory of purchasing power parity (PPP)
  - + Expected future inflation rate differential between domestic economies
  - + Review qualitatively and adjust currencies selectively to ensure internal consistency and incorporate secular factors and trends other than relative inflation that would otherwise not be captured
  - + The prevailing spot exchange rate level on September 29, 2018

B EMERGING MARKETS

- Starting fair value exchange rate based on the theory of purchasing power parity (PPP)
  - + Expected future inflation rate differentials and GDP per capita growth differentials* between domestic economies
  - + Review qualitatively and adjust currencies selectively to ensure internal consistency and incorporate secular factors and trends other than relative inflation that would otherwise not be captured
  - + The prevailing spot exchange rate level on September 29, 2018

* Academic studies suggest real equilibrium exchange rates in emerging economies are enhanced via the convergence process of higher productivity and trend growth rates. This can be proxied by GDP per capita. See Choudri and Khan (2004), "Real Exchange Rates in Developing Countries: Are Balassa-Samuelson Effects Present?" IMF Working Papers; Kravis and Lipsey (1983), "Toward an Explanation of National Price Levels," Princeton Studies in International Finance.

FERC Docket No. PL19-4-000
Reply Affidavit of Michael P. Gorman
Exhibit No. A-10
Page 92 of 361

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Stable volatility outlook, but tail risk management critical in late cycle

Grace Koo, Ph.D., *Quantitative Analyst and Portfolio Manager, Multi-Asset Solutions*
Xiao Xiao, CFA, *Quantitative Analyst, Multi-Asset Solutions*
Ivan Chan, *Quantitative Analyst, Multi-Asset Solutions*

IN BRIEF

- Our broad volatility forecasts are little changed compared with last year, despite the spike in financial asset volatility at the beginning of 2018.
- With major markets becoming further entrenched in late-cycle dynamics, more frequent volatility spikes are likely – but we see little in the way of structural change to alter our long-term view.
- Late cycle highlights the need to pay attention to the left-tail risks of financial assets. We remind investors that return distributions for financial assets are non-normal, with a higher probability and magnitude of left-tail returns, notably in equities and especially in credit.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

NO MAJOR CHANGE IN FORWARD-LOOKING RISK OUTLOOK, DESPITE CHOPPY, LATE-CYCLE MARKET DYNAMICS

Our broad volatility forecasts are little changed compared with last year. Despite the spike in financial asset volatility at the beginning of 2018, volatility has trended back to near historically low levels. Reviewing the underlying dynamics has generally revalidated our forward-looking risk view. Our Long-Term Capital Market Assumptions (LTCMA) risk forecast is cycle-neutral with full-cycle dynamics embedded. Even as markets have become further entrenched in late-cycle dynamics since last year's report, we see little in the way of structural change to alter our long-term view.

The volatility spike of early 2018 was technical in nature, in our view, likely driven by investors building excessive positions in short-volatility financial products as part of a reach for yield. Their unwinding led to a sudden and sharp rise in volatility. Without an underlying shift in fundamentals to sustain those sizable market moves, calmer markets returned promptly (**Exhibit 1**). As markets remain firmly in late cycle, especially in the U.S., more frequent volatility spikes and corrections are to be expected. However, we do not envision these likely short-lived events altering our long-term risk forecast.

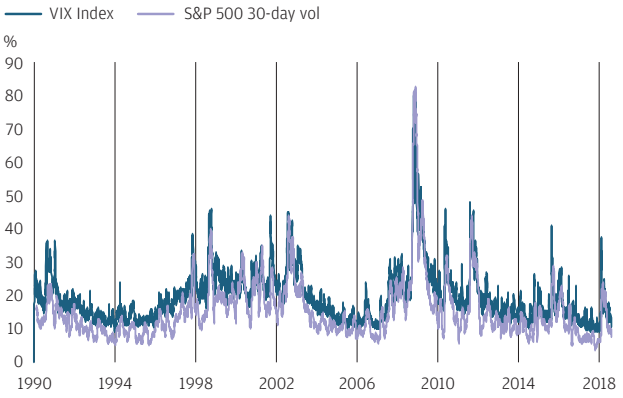
In terms of Sharpe ratio, we see very similar risk-return trade-offs for equities compared to prior years, which is broadly in line with long-run historical experience. What is changing this year is the improvement of risk-adjusted returns for fixed income assets. In prior years, the headwind of rate normalization dampened our rate return forecasts. With U.S. yields resetting to a higher level, returns are normalizing, along with their Sharpe ratios (SR). Fixed income assets in recent decades have delivered very high ex-post risk-adjusted returns (an ex-post SR over 1), given the backdrop of steadily declining yields.

Although we are not necessarily forecasting a return to historical highs, this year's LTCMA forecasts do suggest a reversion to more normal fixed income risk-adjusted return (with SR rising to 0.5 vs. 0.3 last year – the highest thus far in this expansion). Within fixed income, credit instruments are expected to deliver better risk-adjusted return over the cycle, compared with last year's forecast. However, we continue to caution against simply relying on SR, as credit tends to exhibit a higher likelihood of left-tail events.

The Long-Term Capital Market Assumptions' risk forecasts are focused on volatility – which is particularly useful for mean-variance analysis. However, investors should not lose sight of the broader concept of risk, including more extreme experiences – i.e., tail risks.[1] Financial assets tend to exhibit more extreme movements during market downturns and recessions, affecting not only short-term volatility but also the distribution of long-run returns, with a higher likelihood of severe losses (i.e., left tails) than of extreme gains (i.e., right tails). Financial asset returns have historically exhibited what we refer to technically as "fat left tails" – situations in which the probability of a negative return is more frequent and the probability of a decline more sizable than a simple normal distribution would suggest. Although we do not provide forecasts here for these alternative risk measures, we would like to highlight the importance of understanding these dynamics, which become particularly relevant in late cycle.

Despite a spike in early 2018, asset volatility returned to historical lows

EXHIBIT 1: EQUITY MARKET VOLATILITY



Source: Bloomberg, J.P. Morgan Asset Management; data as of July 31, 2018. For illustrative purposes only.

[1] We define tail risk as the risk of a generally unlikely but extreme outcome. See further discussion in the "**Special topic**" section.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Declining quality and lengthening maturity suggest higher risk vs. long-run history

EXHIBIT 2A: MARKET SHARE (%) BY CREDIT RATING FOR U.S. CORPORATE INVESTMENT GRADE BONDS

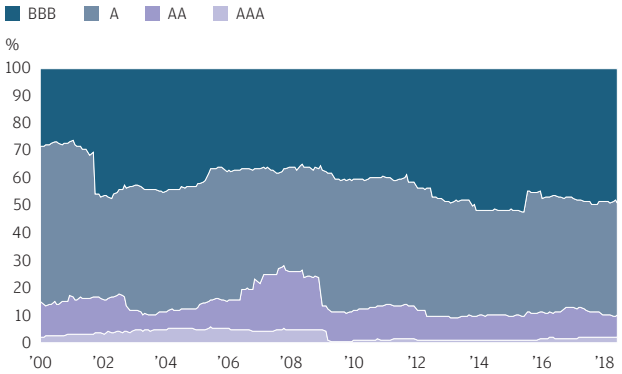
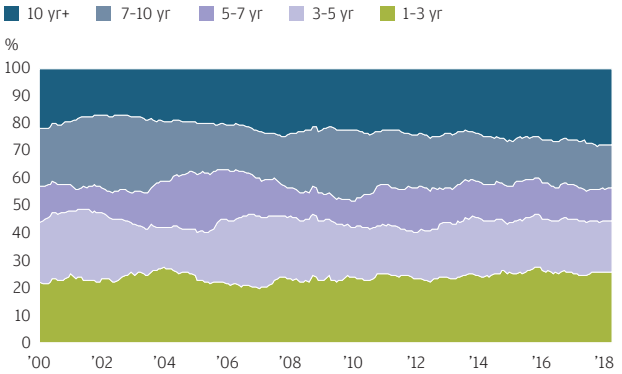


EXHIBIT 2B: MARKET SHARE (%) BY MATURITY FOR U.S. CORPORATE INVESTMENT GRADE BONDS



Source: J.P. Morgan Asset Management Multi-Asset Solutions; data as of June 30, 2018.

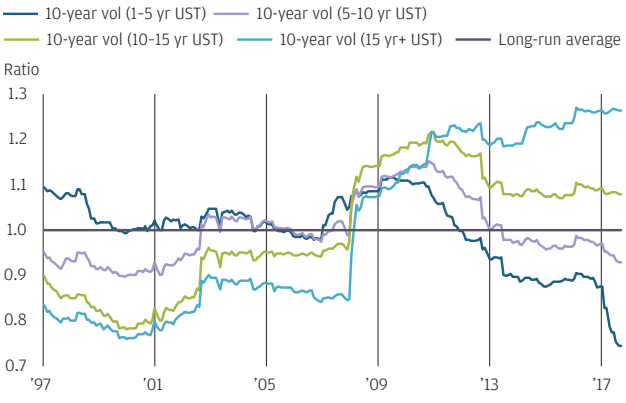
RISKS FOR SELECTED FIXED INCOME MARKETS HIGHER THAN WHAT HISTORY WOULD SUGGEST; EQUITY EXPECTATIONS LITTLE CHANGED

Select credit markets are likely to experience higher volatility over the forecast horizon. The composition of the investment grade corporate bond market has seen a gradual decline in quality over the past decade (**Exhibit 2A**). With cheap financing readily available for a wide spectrum of borrowers, including those with relatively lower quality balance sheets and a poorer ability to pay, companies have had little incentive to pursue elite rating status in recent years. A similar decline in credit quality can be observed in Europe. At the same time, corporates also lengthened the maturity of new debt issuance to lock in low rates (**Exhibit 2B**). Without a further decline in rates, both of these factors contribute to our view that forward-looking risks in investment grade corporate bonds are likely to be higher than long-run history would suggest in the U.S. and euro area.

Volatility will also likely be higher for short-duration instruments as quantitative easing (QE) unwinds over the next few years. The unconventional central bank policies of recent years created an artificial force that dampened fixed income volatility. The result was an unusually low-volatility environment in fixed income markets, especially at the short end of the Treasury yield curve. The results for one- to five-year maturity instruments (**Exhibit 3**) illustrate how this distortion helped volatility break out below its historical range. Our volatility assumptions incorporate the normalization of volatility levels for short-duration instruments to reflect the gradual removal of QE and other central bank stimulus over our forecast horizon.

Volatility is unusually low at the short end of the Treasury curve

EXHIBIT 3: ROLLING 10-YEAR HISTORICAL VOLATILITY, NORMALIZED BY LONG-RUN AVERAGE



Source: J.P. Morgan Asset Management; data as of September 30, 2018

The lines represent the rolling volatility divided by the full sample average of the rolling volatility, by maturity bucket.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Looking across credit markets, all roads don't lead to increased volatility. We expect European high yield (HY), for example, to be less volatile in the future, relative to historical standards, as the quality of the market has improved in recent years and fallen angels are likely to regain their investment grade status over time. We expect equity risks to stay in line with long-run historical levels.

In alternatives, our hedge fund and private equity volatility forecasts are little changed. Since we have revised our LTCMA return assumptions this year for select alternative assets – real estate, infrastructure and direct lending – to incorporate leverage, we are adjusting those volatility estimates accordingly. Our real estate volatility forecast rises from 10.75% to 12.25% for U.S. core to reflect leverage. However, even with this increase our forecast remains lower than the historical average of 14% – driven by an expectation that the peak level of leverage in this cycle will be lower than it was during the credit crisis. Similarly, we forecast lower U.S. REITs volatility over our forecast horizon, compared with recent history. We do not expect U.S. REITs to be as extended in this cycle; thus, in our opinion, recent history overstates likely future volatility.

SPECIAL TOPIC: DON'T FORGET ABOUT TAIL RISK, DESPITE LOW PROBABILITY

Investor interest in tail risk has seen a resurgence since the global financial crisis. We emphasize an important distinction in financial asset risks: Volatility (derived assuming a normal market condition) and tail risk (the behavior of risk at or beyond a typically high level quantile) are two different topics and should be studied separately. In the context of our Long-Term Capital Market Assumptions, volatility is the primary risk measure we forecast and our output has direct applicability in mean-variance frameworks. However, it is essential that investors be acutely aware of financial assets' total return distribution, which encompasses more than what a simple volatility measure can capture.

A tail event and its behavior can be observed from historical return distributions, and in this section we select a few representative asset classes for illustration: U.S. large cap equities, U.S. intermediate Treasuries, U.S. high yield debt and emerging market sovereign debt.[2] We use a sample of monthly data covering the period from February 1990 to June 2018.[3] We then standardize the monthly returns using sample mean and sample standard deviation for each individual asset (i.e., determine the z-score).[4]

First, for each asset we look at the histogram of standardized monthly return distribution vs. standard normal distribution to help visualize and compare the existence and magnitude of tail events (**Exhibit 4**). We calculate the ratio of left-tail events below negative three standard deviations (-3 STD) to the total number of observations in the sample period, and compare it to the cumulative distribution function (cdf) value at -3 STD of a standard normal distribution, which is 0.13%.

During the sample period, we can observe that equity and credit (i.e., high yield and emerging market debt [EMD]) have had both a greater number of and more severe left-tail events than the normal distribution would imply. For equities, the distribution of returns included 0.59% below -3 STD events, compared with the 0.13% that a normal distribution would suggest. It is more extreme for credit assets, where the historical probability was more than 10 times what normal distribution would imply (HY at 1.47%/EMD at 1.36% vs. 0.13%). Although a left-tail event remains unlikely, the historical frequencies clearly exceed the normal probability density curve. The return distribution of U.S. government bonds, on the other hand, is relatively close to normal, with a cdf value of 0.29% and no significant loss below -4 STD.

Interestingly, credit indices (high yield and EMD) experienced many more negative standard deviation events than the equity index, despite having lower volatilities at the total return level.[5] For example, in October 2008, monthly returns of U.S. large cap, high yield and EMD were -16.8%, -16.3% and -16.0%, respectively. Yet when we convert these returns into z-scores, they become -4.3, -7.4 and -5.0 standard deviation events, respectively. This could be driven by major default events in the credit market. EMD's worst drawdown event, a -26.0% monthly return, occurred in August 1998, when the Russian government defaulted on its debt. This is -7.9 standard deviations away from the mean. Statistically, the probability of a -7.9 standard deviation event, assuming normal distribution, would only occur in one in 700 trillion observations.

Given these observations about the probability of left-tail events, we then attempt to measure the magnitude of the risk. The most popular tail risk measures used in banking and insurance are value at risk (VaR) and conditional value at risk (CVaR), also known as expected shortfall. The VaR metric,

[2] Indices used: U.S. large cap: S&P 500 Total Return Index (SPTR Index); U.S. intermediate Treasuries: Bloomberg Barclays U.S. Intermediate Treasury Total Return Index (LT08TRUU Index); U.S. high yield: ICE BofAML U.S. Cash Pay High Yield Index (JOA0 Index); emerging market sovereign debt: J.P. Morgan EMBI Global Diversified Composite Index (JPGCCOMP Index). All these are total return indices.

[3] In all, 341 observations. The exception is emerging market debt data, with a start date of January 1994 and 294 observations.

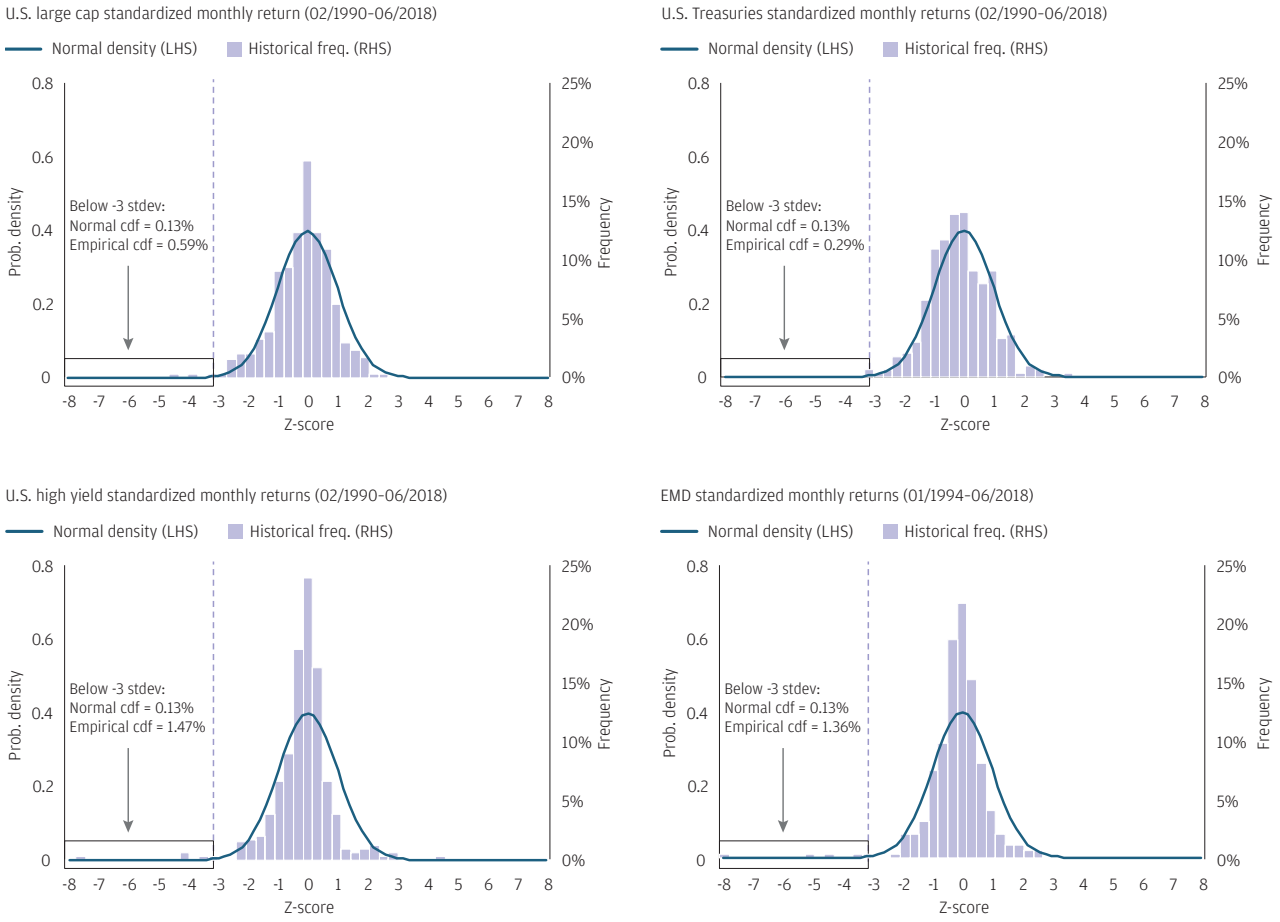
[4] Z-score is a measure of how many standard deviations a data point is above or below the mean.

[5] Sample period annual volatility: U.S. large cap 14.10%; U.S. high yield 7.96%; EMD 11.66%.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Probability of historical large left-tail events for risky financial assets is much higher than normal distribution would suggest

EXHIBIT 4: HISTOGRAM OF STANDARDIZED MONTHLY RETURN DISTRIBUTION VS. STANDARD NORMAL DISTRIBUTION



Source: Bloomberg, J.P. Morgan Asset Management. Monthly return data from February 1990 to June 2018; emerging market debt return data starts in January 1994.

introduced by J.P. Morgan in 1990, measures the maximum potential loss in value of an investment with a given probability, over a pre-set time horizon.[6] However, VaR was criticized as an inaccurate measure of downside exposure due to its inability to capture the true loss in the left tail during periods of significant financial market stress. Researchers therefore proposed CVaR as a more prudent and coherent measure of tail risk, which, by definition, is the average loss given that a loss below a certain probability has occurred.

For our analysis, we use a historical approach, simply based on the monthly return history for the same period, February 1990 to June 2018. In **Exhibit 5**, we look at VaR and CVaR in monthly returns at 95% and 99% confidence levels for each asset, along with their theoretical values, assuming normal distribution (shown in parentheses). Taking U.S. large cap as an example, there is a 5% chance of a loss greater than -6.3% in a month (VaR 95); a normal distribution would suggest a 5% probability of a loss greater than -5.8%. If a 5% left-tail event was to occur, the average loss (CVaR 95) would be -9.2% (vs. -7.5% assuming a normal distribution). VaR and CVaR for risky assets – U.S. large cap, high yield and EMD – are mostly lower than their corresponding normal values at both confidence levels. This indicates that the magnitude of left-tail risk for these assets is higher than their theoretical values. In contrast to risky assets, historical VaR and CVaR numbers for bonds (U.S. intermediate Treasuries) are close to the theoretical value, assuming normal distribution.

[6] "RiskMetrics – Technical Document, Fourth Edition," J.P. Morgan/Reuters, 1996.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

The magnitude of left-tail risk for risk assets is historically higher than their theoretical values, assuming normal distribution

EXHIBIT 5: HISTORICAL VALUE AT RISK (VaR) AND CONDITIONAL VALUE AT RISK (CVaR) VALUES IN MONTHLY RETURNS, WITH THEIR THEORETICAL VALUES, ASSUMING NORMAL DISTRIBUTION (IN PARENTHESES)

	U.S. large cap	U.S. high yield	EMD	U.S. Treasuries
VaR 95	-6.3% (-5.8%)	-2.9% (-3.1%)	-4.2% (-4.8%)	-1.0% (-1.0%)
CVaR 95	-9.2% (-7.5%)	-5.3% (-4.0%)	-8.7% (-6.2%)	-1.5% (-1.4%)
VaR 99	-10.8% (-8.6%)	-7.8% (-4.6%)	-13.5% (-7.1%)	-1.9% (-1.6%)
CVaR 99	-14.0% (-10.0%)	-11.0% (-5.4%)	-21.0% (-8.2%)	-2.2% (-1.9%)

Source: J.P. Morgan Asset Management; historical estimates with monthly return data from February 1990 to June 2018.

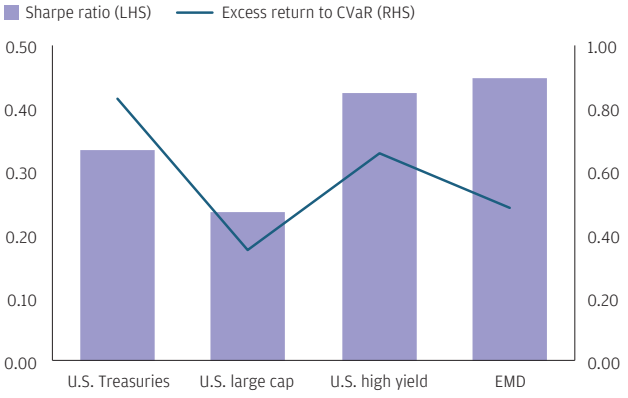
In short, historically both the probability and magnitude of left-tail risks for financial assets, especially risky assets such as equity and credit, are much higher than the normal distribution would suggest. Investors should be wary of the potential large losses associated with tail risks, something very difficult to capture in a single volatility metric in a traditional normal framework.

As **Exhibit 6** shows, the 2019 LTCMA Sharpe ratios of U.S. high yield and EMD are higher than the other two asset classes', suggesting an excellent return to risk. However, a more comprehensive picture using our CVaR analysis suggests otherwise: It finds U.S. Treasuries to be the best-compensated asset per unit of CVaR risk.

These are important considerations for portfolio construction. While a mean-variance framework is essential and useful, its assumptions inherently lead to an underestimation of the risks of holding fat-tail assets. The Sharpe ratio, one of the most referenced measures in the mean-variance framework, is therefore not a robust measure of risk-adjusted return for fat-tail assets or portfolios with large holdings of these assets. Investors can help protect their portfolios from the risk of left-tail events by using tail risk measures on a regular basis to monitor and forecast tail risks for their risky holdings. Investors may also consider expanding their portfolio construction objectives to include downside risk mitigation.

In determining which asset class offers the highest compensation per unit of risk, the winner changes depending on the risk measure used

EXHIBIT 6: 2019 LTCMA SHARPE RATIO VS. EXCESS RETURN TO CVaR RATIO



Source: J.P. Morgan Asset Management, September 30, 2018.

Sharpe ratio: (Total return-cash)/volatility. Excess return to CVaR ratio: (Total return -cash)/CVaR.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

VOLATILITY AND CORRELATION ASSUMPTIONS METHODOLOGY

Long-term asset class volatilities and correlations tend to exhibit stability when measured over multiple cycles. As such, we use the following process in estimating long-term volatility and correlation assumptions for the main asset classes:

1. START WITH MONTHLY HISTORICAL RETURN DATA

- In prior estimates, we used 11 years of historical data as the anchor. This year, we increase the data window from 11 years to 12 years.

2. FILTER DATA OUTLIERS

- Extreme data outliers could bias volatility estimation and are filtered to improve robustness. This is done by winsorizing* historical raw data.
- For extreme data points above (or below) a 99.5% confidence level (or a 0.5% level of significance) for a normal distribution (or beyond 2.58 standard deviations from the mean), we adjust the return data by capping (or flooring) it at the 99.5% confidence level (or 0.5% level of significance).

3. CONSTRUCT ANCHOR MATRIX

- We leverage the historical experience to help anchor our forward-looking expectations, focusing on:
  - Simple historical return series (with each data point equally weighted)
  - Historical return series with each data point weighted by "relevance" (the expected frequency of stress vs. calm periods)**
- Variance-covariance matrix is calculated using the filtered data set.
  - Demean filtered data
    - After filtering the data, we demean each data point by the average of the full sample.
  - Calculate variance-covariance matrix
    - We multiply the weighted demeaned return time series matrix to calculate the covariance matrix.
    - Volatility and correlation are extracted from the covariance matrix. The monthly volatility is then annualized by the industry standard square root of 12 factor.

4. ADJUST FOR KEY THEMES AND STRUCTURAL CHANGES

- Key themes and structural changes that are expected over the forecast interval, such as those highlighted in this article, are reflected in the long-term risk forecast accordingly.

For alternative asset classes, serial correlations can be prevalent in illiquid and hard-to-price securities such as real estate. Because it is difficult to value the underlying assets at regular intervals, an investment manager must estimate fair prices, which are unobservable. This is typically done by updating lagged prices with changes in the economic environment. However, in our view, estimating using previous prices as an input artificially smooths returns, biasing risk estimates downward compared with the true economic risk. We correct for this bias by adjusting the returns from these hard-to-price assets for first-order serial correlation. We estimate the serial correlation coefficient using the same data window as we use for liquid assets, applying them to these illiquid assets' returns before calculating their anchoring volatility and correlations.

There are a few additional things to keep in mind. First, the standard deviation calculation is not subject to sequence risk. Thus, our assigned aggregate weighting of stress periods matters, but not the order of the data points or the continuity of the stress periods. Second, the weights are consistently applied to all the various currency matrices we publish. The forward-looking periods and the treatment of historical data are identical across regions and assets. Third, the volatility estimates capture the likely movement of the return around our central return forecasts. However, it does not incorporate distribution elements, such as the tail risk of the assets and other upper moments. It is particularly important for investors that hold assets known to have fat tails – such as high yield bonds, emerging market debt, convertible bonds, etc. – to account for risk aspects in addition to volatility.

* Winsorization applies a cap and a floor to extreme data values to remove the impact of potentially spurious outlier data on statistical results.

** We define stress periods based on NBER recession periods and assign them a long-run average probability of 15%. We apply these weights on a global basis.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

TAIL-RISK ANALYSIS METHODOLOGY

1. RETURN STANDARDIZATION:

In Exhibit 4, we use standardized monthly returns instead of raw monthly returns. This provides us a comparable scale for tail risk behaviors in all four assets by removing the impact of the sample mean and volatility. For return X at month t for asset i, standardization is done by following

$$Z_{t,i} = \frac{X_{t,i} - \mu_i}{\sigma_i}$$

where μ_i is the sample mean and σ_i is the sample standard deviation of asset i *returns*. Therefore, if we assume X follows a normal distribution $X \sim N(\mu, \sigma^2)$, then Z follows a standard normal distribution $Z \sim N(0,1)$.

2. VALUE AT RISK (VaR) AND CONDITIONAL VALUE AT RISK (CVaR):

In mathematical terms, VaR is a quantile. VaR at confidence level α is defined as the risk level at α quantile (or return level at $1-\alpha$ quantile). The level α here is close to 1 in practice (typically 0.95 or 0.99). CVaR is the average loss of investment given that a loss is occurring at or below the α quantile risk level (or $1-\alpha$ quantile return level).

Historical VaR at α confidence level is the value of $1-\alpha$ percentile of monthly returns in the sample period, and historical CVaR at α confidence level is the average of all returns that are less than or equal to the α VaR—i.e., the average value of returns fall into the $(0, 1-\alpha]$ percentile range.

To calculate the theoretical VaR at α confidence level, one needs to first calculate the z-score (the number of standard deviations from the mean) of a standard normal distribution with a probability $1-\alpha$—i.e., to calculate the inverse cumulative standard normal distribution function value $\Phi^{-1}(1-\alpha)$. For example, a z-score of -1.64 corresponds to a cumulative probability of 5% in a standard normal distribution. One then translates the z-score back into the return form by multiplying the z-score by the standard deviation of the sample return series and adding the mean. Therefore, we have

$$\text{VaR}_\alpha(X) = \mu + \sigma \cdot \Phi^{-1}(1-\alpha)$$

where $\Phi^{-1}(\cdot)$ is the inverse cumulative standard normal distribution function (so $\Phi^{-1}(1-\alpha)$ is the z-score evaluated at $1-\alpha$ probability), σ is the sample standard deviation, and μ is the sample mean.

Theoretical value for CVaR at α confidence level is calculated based on its corresponding VaR value. By definition, CVaR is expressed as

$$\text{CVaR}_\alpha(X) = -E[X | X \le \text{VaR}_\alpha(X)] = \frac{1}{1-\alpha} \int_\alpha^1 \text{VaR}_\chi(X) d\chi.$$

Applying the VaR formula, we could derive a closed-form CVaR for normal distribution

$$\begin{aligned}
\text{CVaR}_\alpha(X) &= \frac{1}{1-\alpha} \int_\alpha^1 (\sigma\phi^{-1}(1-\chi) + \mu) d\chi \\
&= \frac{\sigma}{1-\alpha} \int_\alpha^1 \phi^{-1}(1-\chi) d\chi + \mu \\
&= \frac{\sigma}{1-\alpha} (-\phi^1(\Phi^{-1}(\alpha))) + \mu \\
&= \mu - \frac{\sigma}{1-\alpha} \phi(\Phi^{-1}(\alpha))
\end{aligned}$$

where $\Phi(\cdot)$ is the standard normal density function. Given this, the theoretical value for CVaR at α confidence level could be easily calculated.*

* Jérémie Smaga, "Expected Shortfall Closed-Form for Normal Distribution," *Jérémie Smaga's Personal Blog*, November 6, 2016, http://blog.smaga.ch/expected-shortfall-closed-form-for-normal-distribution/.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

III Assumptions matrices

HOW TO USE THE NUMBERS

Our assumptions can be used to:

- Develop or review a strategic asset allocation
- Understand the risk and return trade-offs across and within asset classes and regions
- Assess the risk characteristics of a strategic asset allocation
- Review relative value allocation decisions

The assumptions are not designed to inform short-term tactical allocation decisions. Our assumptions process is carefully calibrated and constructed to aid investors with strategic asset allocation or policy-level decisions over a 10- to 15-year investment horizon.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

		Compound Return 2018 (%)	Annualized Volatility (%)	Arithmetic Return 2019 (%)	Compound Return 2019 (%)	U.S. Cash	U.S. Intermediate Treasuries	U.S. Long Treasuries	TIPS	U.S. Aggregate Bonds	U.S. Short Duration Government/ Credit	U.S. Long Duration Government/Credit	U.S. Inv Grade Corporate Bonds	U.S. Long Corporate Bonds	U.S. High Yield Bonds	U.S. Leveraged Loans	World Government Bonds hedged	World Government Bonds	World ex-U.S. Government Bonds hedged	World ex-U.S. Government Bonds	Emerging Markets Sovereign Debt	Emerging Markets Local Currency Debt	Emerging Markets Corporate Bonds	U.S. Muni 1-15 Yr Blend	U.S. Muni High Yield	U.S. Large Cap
FIXED INCOME	U.S. Cash	2.00	2.00	0.50	2.00	1.00																				
	U.S. Intermediate Treasuries	3.25	3.31	3.50	3.00	0.22	1.00																			
	U.S. Long Treasuries	3.25	3.83	11.00	2.50	0.04	0.80	1.00																		
	TIPS	3.25	3.38	5.25	2.75	0.07	0.65	0.56	1.00																	
	U.S. Aggregate Bonds	4.00	4.06	3.50	3.25	0.09	0.81	0.82	0.77	1.00																
	U.S. Short Duration Government/Credit	3.25	3.27	2.00	3.50	0.39	0.76	0.45	0.66	0.75	1.00															
	U.S. Long Duration Government/Credit	4.00	4.41	9.25	3.25	-0.01	0.68	0.90	0.65	0.91	0.51	1.00														
	U.S. Inv Grade Corporate Bonds	4.50	4.67	6.00	3.50	-0.05	0.42	0.50	0.64	0.82	0.61	0.79	1.00													
	U.S. Long Corporate Bonds	4.50	4.97	10.00	3.75	-0.07	0.40	0.61	0.57	0.81	0.47	0.88	0.96	1.00												
	U.S. High Yield Bonds	5.50	5.82	8.25	5.25	-0.11	-0.25	-0.23	0.31	0.20	0.15	0.12	0.57	0.46	1.00											
	U.S. Leveraged Loans	5.00	5.27	7.50	5.00	-0.15	-0.50	-0.42	0.05	-0.07	-0.10	-0.10	0.32	0.24	0.79	1.00										
	World Government Bonds hedged	2.75	2.84	3.00	2.50	0.10	0.84	0.86	0.52	0.80	0.58	0.79	0.51	0.55	-0.19	-0.43	1.00									
	World Government Bonds	2.75	3.04	6.25	2.50	0.12	0.64	0.50	0.64	0.68	0.65	0.58	0.56	0.53	0.17	-0.14	0.57	1.00								
	World ex-U.S. Government Bonds hedged	2.50	2.61	2.75	2.25	0.07	0.70	0.75	0.42	0.70	0.49	0.71	0.48	0.52	-0.15	-0.36	0.97	0.50	1.00							
	World ex-U.S. Government Bonds	2.75	2.96	8.00	2.25	0.10	0.53	0.38	0.59	0.59	0.59	0.49	0.53	0.49	0.23	-0.07	0.47	0.99	0.41	1.00						
	Emerging Markets Sovereign Debt	6.25	6.67	9.50	5.25	-0.03	0.23	0.21	0.57	0.60	0.47	0.51	0.77	0.68	0.71	0.39	0.29	0.54	0.28	0.56	1.00					
	Emerging Markets Local Currency Debt	6.75	7.44	12.25	6.25	0.10	0.15	0.06	0.45	0.40	0.39	0.32	0.55	0.48	0.60	0.29	0.14	0.60	0.13	0.65	0.81	1.00				
	Emerging Markets Corporate Bonds	6.00	6.32	8.25	5.25	-0.08	0.10	0.07	0.50	0.52	0.45	0.41	0.78	0.67	0.74	0.53	0.13	0.43	0.14	0.45	0.89	0.72	1.00			
	U.S. Muni 1-15 Yr Blend	3.25	3.29	3.00	2.50	0.03	0.47	0.49	0.53	0.66	0.47	0.57	0.58	0.53	0.26	0.10	0.52	0.40	0.47	0.35	0.51	0.25	0.39	1.00		
	U.S. Muni High Yield	4.50	4.72	6.75	4.50	-0.12	-0.01	0.10	0.32	0.30	0.08	0.26	0.40	0.33	0.43	0.54	0.10	0.08	0.12	0.08	0.42	0.21	0.38	0.58	1.00	
EQUITIES	U.S. Large Cap	5.25	6.03	13.75	5.50	-0.07	-0.31	-0.31	0.05	0.00	-0.05	-0.02	0.27	0.23	0.68	0.55	-0.25	0.14	-0.19	0.21	0.51	0.58	0.54	-0.01	0.19	1.00
	U.S. Mid Cap	5.75	6.79	15.75	5.75	-0.08	-0.33	-0.31	0.07	0.00	-0.05	-0.02	0.29	0.24	0.73	0.58	-0.26	0.11	-0.21	0.18	0.51	0.57	0.55	0.01	0.21	0.96
	U.S. Small Cap	6.00	7.47	18.25	5.75	-0.08	-0.36	-0.34	-0.02	-0.09	-0.11	-0.09	0.18	0.15	0.64	0.50	-0.29	0.03	-0.23	0.10	0.41	0.49	0.44	-0.07	0.09	0.90
	Euro Area Large Cap	7.00	9.03	21.50	6.75	0.02	-0.21	-0.26	0.14	0.08	0.11	0.03	0.36	0.29	0.69	0.49	-0.19	0.32	-0.15	0.39	0.61	0.69	0.60	0.04	0.16	0.85
	Japanese Equity	6.75	7.68	14.50	6.25	-0.09	-0.26	-0.19	0.11	0.07	0.03	0.09	0.38	0.34	0.60	0.46	-0.18	0.18	-0.14	0.24	0.48	0.56	0.54	-0.01	0.13	0.69
	Hong Kong Equity	6.75	8.50	20.00	6.50	0.03	-0.19	-0.20	0.20	0.16	0.16	0.10	0.47	0.39	0.68	0.54	-0.17	0.24	-0.14	0.30	0.64	0.68	0.67	0.14	0.29	0.68
	UK Large Cap	6.50	7.79	16.75	6.25	-0.02	-0.30	-0.32	0.12	0.05	0.04	0.01	0.38	0.31	0.72	0.62	-0.27	0.24	-0.22	0.32	0.59	0.64	0.62	0.04	0.28	0.85
	EAFE Equity hedged	6.50	7.41	13.50	6.25	-0.05	-0.39	-0.32	-0.03	-0.03	-0.08	-0.02	0.31	0.27	0.69	0.60	-0.27	-0.04	-0.19	0.02	0.51	0.52	0.56	-0.01	0.23	0.87
	EAFE Equity	6.75	7.94	16.75	6.25	-0.01	-0.25	-0.26	0.16	0.10	0.10	0.06	0.41	0.35	0.74	0.56	-0.21	0.31	-0.17	0.38	0.64	0.73	0.66	0.04	0.21	0.88
	Emerging Markets Equity	8.50	10.43	21.25	8.00	0.06	-0.19	-0.21	0.24	0.14	0.17	0.09	0.43	0.36	0.72	0.54	-0.17	0.33	-0.15	0.40	0.68	0.80	0.68	0.05	0.25	0.76
	AC Asia ex-Japan Equity	8.50	10.35	20.75	8.25	0.05	-0.18	-0.18	0.23	0.16	0.17	0.12	0.46	0.39	0.71	0.53	-0.14	0.30	-0.11	0.36	0.66	0.75	0.67	0.07	0.25	0.75
	AC World Equity	6.00	7.18	15.25	6.00	-0.02	-0.29	-0.29	0.13	0.06	0.05	0.03	0.37	0.32	0.75	0.58	-0.24	0.25	-0.19	0.33	0.62	0.71	0.64	0.02	0.22	0.95
	U.S. Equity Value Factor	6.00	7.04	15.00	-	-0.10	-0.32	-0.31	0.04	-0.02	-0.05	-0.04	0.26	0.22	0.69	0.54	-0.24	0.11	-0.19	0.18	0.49	0.56	0.52	-0.03	0.17	0.98
	U.S. Equity Momentum Factor	5.50	6.41	14.00	-	-0.06	-0.33	-0.31	0.08	-0.01	-0.06	-0.03	0.27	0.23	0.70	0.58	-0.28	0.11	-0.23	0.18	0.50	0.55	0.53	0.00	0.23	0.97
	U.S. Equity Quality Factor	5.25	5.98	12.50	-	-0.07	-0.28	-0.27	0.07	0.02	-0.03	0.00	0.28	0.24	0.67	0.52	-0.22	0.16	-0.16	0.22	0.52	0.59	0.54	0.01	0.18	0.99
	U.S. Equity Minimum Volatility Factor	5.50	6.07	11.00	-	-0.09	-0.21	-0.15	0.11	0.11	-0.01	0.10	0.34	0.31	0.67	0.51	-0.09	0.19	-0.03	0.25	0.56	0.60	0.53	0.10	0.24	0.93
	U.S. Equity Dividend Yield Factor	6.00	6.87	13.75	-	-0.08	-0.24	-0.19	0.13	0.11	0.01	0.09	0.36	0.32	0.72	0.56	-0.14	0.18	-0.09	0.24	0.57	0.61	0.58	0.11	0.26	0.95
	U.S. Equity Diversified Factor	5.50	6.23	12.50	-	-0.09	-0.29	-0.26	0.09	0.04	-0.03	0.02	0.31	0.27	0.71	0.56	-0.20	0.15	-0.14	0.21	0.54	0.59	0.56	0.05	0.22	0.98
	Global Convertible	5.50	5.92	9.50	5.00	-0.05	-0.32	-0.30	0.13	0.08	0.08	0.04	0.45	0.36	0.81	0.67	-0.23	0.12	-0.17	0.19	0.63	0.60	0.70	0.08	0.30	0.86
	Global Credit Sensitive Convertible	4.75	4.94	6.25	4.25	-0.07	-0.13	-0.20	-0.01	-0.02	-0.04	0.01	0.17	0.17	0.27	0.33	-0.10	0.08	-0.06	0.11	0.17	0.21	0.26	-0.03	0.21	0.36
ALTERNATIVES	Private Equity	8.25	10.20	21.00	7.25	0.06	-0.53	-0.56	0.07	-0.27	-0.18	-0.34	0.19	0.02	0.69	0.66	-0.52	-0.07	-0.46	0.03	0.54	0.56	0.64	-0.08	0.44	0.74
	U.S. Core Real Estate*	5.75	6.45	12.25	5.25	-0.07	-0.41	-0.32	0.06	-0.21	-0.30	-0.21	0.09	0.01	0.54	0.64	-0.38	-0.23	-0.35	-0.19	0.35	0.30	0.46	-0.23	0.57	0.56
	U.S. Value-Added Real Estate*	7.75	9.53	20.00	6.50	-0.07	-0.41	-0.32	0.06	-0.21	-0.30	-0.21	0.09	0.01	0.54	0.64	-0.38	-0.23	-0.35	-0.19	0.35	0.30	0.46	-0.23	0.57	0.56
	European ex-UK Core Real Estate*	6.50	7.74	16.50	5.75	0.03	-0.58	-0.55	0.08	-0.34	-0.26	-0.37	0.12	-0.03	0.64	0.66	-0.58	-0.08	-0.54	0.03	0.43	0.44	0.55	-0.18	0.46	0.61
	Asia Pacific Core Real Estate*	6.00	6.91	14.00	5.50	0.07	-0.38	-0.32	0.31	-0.06	-0.12	-0.12	0.30	0.18	0.72	0.76	-0.38	0.02	-0.35	0.10	0.59	0.47	0.66	0.07	0.71	0.64
	U.S. REITs	6.25	7.35	15.50	6.25	-0.07	0.00	0.06	0.22	0.29	0.10	0.27	0.44	0.42	0.61	0.35	0.11	0.29	0.13	0.31	0.55	0.57	0.46	0.22	0.24	0.72
	Global Infrastructure Equity	6.00	6.64	11.75	6.25	-0.03	-0.20	-0.22	0.32	0.05	0.09	-0.01	0.40	0.26	0.50	0.46	-0.23	0.25	-0.23	0.31	0.51	0.43	0.55	0.12	0.30	0.40
	Global Infrastructure Debt	4.75	4.95	6.50	4.25	-0.06	0.44	0.55	0.67	0.81	0.58	0.78	0.92	0.88	0.47	0.31	0.53	0.48	0.50	0.43	0.66	0.38	0.67	0.62	0.44	0.08
	Diversified Hedge Funds	4.25	4.52	7.50	4.25	0.07	-0.41	-0.36	0.06	-0.10	-0.08	-0.09	0.22	0.17	0.59	0.64	-0.36	-0.04	-0.30	0.03	0.35	0.38	0.42	-0.06	0.36	0.66
	Event Driven Hedge Funds	4.75	5.13	9.00	4.75	-0.02	-0.45	-0.46	0.05	-0.11	-0.06	-0.14	0.27	0.19	0.76	0.76	-0.42	0.02	-0.36	0.10	0.46	0.51	0.57	-0.06	0.37	0.79
	Long Bias Hedge Funds	4.75	5.32	11.00	4.75	-0.01	-0.41	-0.43	0.08	-0.07	-0.02	-0.11	0.30	0.22	0.74	0.66	-0.39	0.11	-0.33	0.19	0.52	0.60	0.60	-0.07	0.28	0.86
	Relative Value Hedge Funds	4.50	4.73	7.00	4.50	-0.03	-0.40	-0.38	0.16	0.02	0.03	-0.04	0.40	0.30	0.83	0.85	-0.35	0.01	-0.30	0.08	0.55	0.52	0.63	0.07	0.49	0.68
	Macro Hedge Funds	3.75	4.06	8.00	3.75	0.16	0.11	0.10	0.26	0.19	0.26	0.19	0.27	0.25	0.17	0.06	0.16	0.31	0.17	0.32	0.23	0.31	0.21	0.10	0.13	0.23
	Direct Lending*	7.25	8.14	14.00	7.00	-0.08	0.29	0.37	0.60	0.74	0.54	0.70	0.97	0.91	0.68	0.47	0.39	0.48	0.38	0.46	0.78	0.56	0.81	0.57	0.45	0.31
	Commodities*	2.25	3.50	16.25	3.75	0.08	-0.11	-0.23	0.27	0.05	0.17	-0.01	0.24	0.17	0.45	0.37	-0.24	0.34	-0.26	0.40	0.37	0.51	0.41	-0.09	0.12	0.44
	Gold*	2.50	4.02	18.00	4.00	0.07	0.37	0.27	0.49	0.41	0.41	0.32	0.37	0.30	0.11	-0.08	0.25	0.53	0.19	0.52	0.36	0.40	0.33	0.25	0.10	-0.02

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

U.S. DOLLAR ASSUMPTIONS

Note: All estimates on this page are in U.S. dollar terms. Given the complex risk-reward trade-offs involved, we advise clients to rely on judgment as well as quantitative optimization approaches in setting strategic allocations to all of these asset classes and strategies. Please note that all information shown is based on qualitative analysis. Exclusive reliance on this information is not advised. This information is not intended as a recommendation to invest in any particular asset class or strategy or as a promise of future performance. Note that these asset class and strategy assumptions are passive only-they do not consider the impact of active management. References to future returns are not promises or even estimates of actual returns a client portfolio may achieve. Assumptions, opinions and estimates are provided for illustrative purposes only. They should not be relied upon as recommendations to buy or sell securities. Forecasts of financial market trends that are based on current market conditions constitute our judgment and are subject to change without notice. We believe the information provided here is reliable, but do not warrant its accuracy or completeness. This material has been prepared for information purposes only and is not intended to provide, and should not be relied on for, accounting, legal or tax advice.

Source: J.P. Morgan Asset Management; as of September 30, 2018. Alternative asset classes (including hedge funds, private equity, real estate, direct lending and infrastructure) are unlike other asset categories shown above in that there is no underlying investible index. The return estimates for these alternative asset classes and strategies are estimates of the industry average, net of manager fees. The dispersion of return among managers of these asset classes and strategies is typically significantly wider than that of traditional asset classes. *Not directly comparable to 2018 assumptions. See strategy class discussion for details. U.S. Long Treasuries reflect the 10 years plus sector of the market instead of the 20 years plus sector in prior years. Return estimates for factor assets are based on the JPMorgan Factor Index Suite, taking into account long-term factor return assumptions, adjustments for factor richness/cheapness, and the underlying market exposure. Correlation figures shown are rounded to two significant figures, which may cause a loss of information. Correlations of value-added and core real estate in their local currencies are identical since value-added local returns are scaled versions of their corresponding core real estate local returns. All returns are nominal. *For reference index information, please visit our website.*

	U.S. Mid Cap	U.S. Small Cap	Euro Area Large Cap	Japanese Equity	Hong Kong Equity	UK Large Cap	EAFE Equity hedged	EAFE Equity	Emerging Markets Equity	AC Asia ex-Japan Equity	AC World Equity	U.S. Equity Value Factor	U.S. Equity Momentum Factor	U.S. Equity Quality Factor	U.S. Equity Minimum Volatility Factor	U.S. Equity Dividend Yield Factor	U.S. Equity Diversified Factor	Global Convertible	Global Credit Sensitive Convertible	Private Equity	U.S. Core Real Estate*	U.S. Value-Added Real Estate*	European ex-UK Core Real Estate*	Asia Pacific Core Real Estate*	U.S. REITs	Global Infrastructure Equity	Global Infrastructure Debt	Diversified Hedge Funds	Event Driven Hedge Funds	Long Bias Hedge Funds	Relative Value Hedge Funds	Macro Hedge Funds	Direct Lending*	Commodities*	Gold*
U.S. Mid Cap	1.00																																		
U.S. Small Cap	0.95	1.00																																	
Euro Area Large Cap	0.82	0.74	1.00																																
Japanese Equity	0.68	0.60	0.71	1.00																															
Hong Kong Equity	0.67	0.56	0.72	0.63	1.00																														
UK Large Cap	0.82	0.72	0.90	0.70	0.76	1.00																													
EAFE Equity hedged	0.85	0.77	0.87	0.79	0.72	0.87	1.00																												
EAFE Equity	0.86	0.76	0.97	0.82	0.79	0.95	0.91	1.00																											
Emerging Markets Equity	0.76	0.66	0.82	0.67	0.87	0.82	0.75	0.87	1.00																										
AC Asia ex-Japan Equity	0.74	0.65	0.80	0.66	0.91	0.79	0.75	0.85	0.98	1.00																									
AC World Equity	0.93	0.84	0.93	0.77	0.80	0.93	0.91	0.97	0.89	0.87	1.00																								
U.S. Equity Value Factor	0.97	0.92	0.82	0.67	0.63	0.81	0.85	0.85	0.72	0.71	0.92	1.00																							
U.S. Equity Momentum Factor	0.97	0.90	0.82	0.67	0.70	0.83	0.86	0.86	0.78	0.77	0.94	0.93	1.00																						
U.S. Equity Quality Factor	0.96	0.91	0.83	0.66	0.67	0.83	0.85	0.86	0.75	0.73	0.94	0.97	0.97	1.00																					
U.S. Equity Minimum Volatility Factor	0.92	0.86	0.77	0.61	0.62	0.77	0.80	0.81	0.69	0.68	0.88	0.93	0.92	0.95	1.00																				
U.S. Equity Dividend Yield Factor	0.95	0.89	0.79	0.64	0.64	0.81	0.83	0.83	0.73	0.70	0.90	0.96	0.92	0.96	0.97	1.00																			
U.S. Equity Diversified Factor	0.98	0.91	0.82	0.67	0.67	0.82	0.85	0.86	0.75	0.73	0.93	0.97	0.97	0.98	0.97	0.97	1.00																		
Global Convertible	0.88	0.78	0.86	0.74	0.79	0.86	0.89	0.89	0.84	0.84	0.91	0.84	0.87	0.84	0.78	0.82	0.85	1.00																	
Global Credit Sensitive Convertible	0.33	0.28	0.38	0.30	0.31	0.43	0.40	0.40	0.29	0.28	0.39	0.31	0.35	0.33	0.29	0.31	0.32	0.38	1.00																
Private Equity	0.76	0.69	0.75	0.53	0.74	0.82	0.71	0.78	0.83	0.79	0.80	0.70	0.76	0.72	0.64	0.67	0.73	0.80	0.28	1.00															
U.S. Core Real Estate*	0.57	0.54	0.39	0.41	0.37	0.52	0.48	0.46	0.44	0.42	0.52	0.57	0.54	0.54	0.59	0.57	0.57	0.42	0.32	0.49	1.00														
U.S. Value-Added Real Estate*	0.57	0.54	0.39	0.41	0.37	0.52	0.48	0.46	0.44	0.42	0.52	0.57	0.54	0.54	0.59	0.57	0.57	0.42	0.32	0.49	1.00	1.00													
European ex-UK Core Real Estate*	0.65	0.56	0.68	0.51	0.55	0.77	0.60	0.71	0.71	0.65	0.70	0.58	0.64	0.60	0.51	0.57	0.61	0.70	0.23	0.86	0.56	0.56	1.00												
Asia Pacific Core Real Estate*	0.67	0.56	0.61	0.45	0.58	0.71	0.57	0.65	0.68	0.64	0.68	0.61	0.67	0.62	0.64	0.68	0.66	0.63	0.36	0.60	0.73	0.73	0.69	1.00											
U.S. REITs	0.76	0.73	0.63	0.51	0.47	0.58	0.62	0.65	0.54	0.54	0.69	0.75	0.70	0.74	0.81	0.81	0.76	0.61	0.17	0.44	0.65	0.65	0.40	0.66	1.00										
Global Infrastructure Equity	0.40	0.27	0.49	0.41	0.57	0.57	0.35	0.53	0.59	0.55	0.51	0.32	0.43	0.36	0.26	0.32	0.36	0.51	0.10	0.59	0.32	0.32	0.61	0.41	0.21	1.00									
Global Infrastructure Debt	0.11	0.00	0.15	0.19	0.32	0.20	0.13	0.21	0.26	0.29	0.17	0.08	0.10	0.10	0.18	0.19	0.14	0.29	0.09	0.27	0.27	0.27	0.26	0.50	0.25	0.38	1.00								
Diversified Hedge Funds	0.68	0.57	0.65	0.60	0.63	0.73	0.73	0.71	0.69	0.66	0.73	0.61	0.73	0.64	0.57	0.59	0.65	0.78	0.41	0.81	0.50	0.50	0.74	0.65	0.32	0.49	0.15	1.00							
Event Driven Hedge Funds	0.82	0.75	0.75	0.65	0.68	0.83	0.80	0.81	0.77	0.74	0.84	0.78	0.81	0.77	0.69	0.75	0.78	0.86	0.50	0.81	0.59	0.59	0.75	0.70	0.50	0.43	0.15	0.87	1.00						
Long Bias Hedge Funds	0.88	0.80	0.83	0.73	0.81	0.87	0.85	0.89	0.88	0.86	0.93	0.83	0.90	0.84	0.75	0.80	0.85	0.92	0.40	0.83	0.48	0.48	0.72	0.65	0.53	0.52	0.13	0.87	0.93	1.00					
Relative Value Hedge Funds	0.71	0.61	0.67	0.62	0.71	0.77	0.74	0.75	0.75	0.72	0.76	0.67	0.71	0.65	0.62	0.67	0.68	0.84	0.42	0.79	0.59	0.59	0.72	0.74	0.43	0.49	0.33	0.84	0.92	0.86	1.00				
Macro Hedge Funds	0.22	0.12	0.29	0.25	0.29	0.32	0.24	0.33	0.38	0.35	0.32	0.17	0.28	0.24	0.22	0.21	0.23	0.32	0.13	0.28	-0.09	-0.09	0.20	0.06	0.14	0.25	0.22	0.56	0.30	0.38	0.30	1.00			
Direct Lending*	0.35	0.24	0.38	0.40	0.52	0.42	0.35	0.45	0.48	0.50	0.42	0.31	0.33	0.32	0.38	0.41	0.36	0.52	0.18	0.38	0.35	0.35	0.33	0.56	0.45	0.45	0.93	0.30	0.37	0.38	0.52	0.25	1.00		
Commodities*	0.46	0.37	0.47	0.35	0.48	0.59	0.34	0.53	0.60	0.52	0.54	0.40	0.48	0.42	0.36	0.42	0.42	0.47	0.27	0.61	0.41	0.41	0.62	0.62	0.24	0.55	0.13	0.53	0.57	0.61	0.54	0.42	0.26	1.00	
Gold*	0.00	-0.05	0.07	-0.01	0.23	0.10	-0.13	0.09	0.24	0.19	0.08	-0.04	0.02	0.01	0.02	0.02	0.00	0.09	0.00	0.09	-0.03	-0.03	0.03	0.21	0.05	0.20	0.37	0.11	0.06	0.14	0.09	0.41	0.34	0.45	1.00

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

		Compound Return 2018 (%)	Annualized Volatility (%)	Arithmetic Return 2019 (%)	Compound Return 2019 (%)	Euro Cash	U.S. Aggregate Bonds hedged	Euro Aggregate Bonds	U.S. Inv Grade Corporate Bonds hedged	Euro Inv Grade Corp Bonds	U.S. High Yield Bonds hedged	European High Yield Bonds	U.S. Leveraged Loans hedged	Euro Government Bonds	Euro Govt Inflation-Linked	World Government Bonds hedged	World Government Bonds	World ex-Euro Government Bonds hedged	World ex-Euro Government Bonds	Emerging Markets Sovereign Debt hedged	Emerging Markets Local Currency Debt	Emerging Markets Corporate Bonds hedged	European Large Cap
FIXED INCOME	Euro Cash	1.00	1.00	0.50	1.25	1.00																	
	U.S. Aggregate Bonds hedged	3.00	3.07	3.75	2.50	0.18	1.00																
	Euro Aggregate Bonds	2.25	2.32	3.75	1.75	0.08	0.64	1.00															
	U.S. Inv Grade Corporate Bonds hedged	3.50	3.67	6.00	2.75	0.07	0.83	0.57	1.00														
	Euro Inv Grade Corp Bonds	2.50	2.60	4.50	2.00	-0.06	0.53	0.71	0.78	1.00													
	U.S. High Yield Bonds hedged	4.50	4.82	8.25	4.50	-0.08	0.19	0.04	0.56	0.57	1.00												
	European High Yield Bonds	4.00	4.39	9.00	3.50	-0.19	0.06	0.11	0.47	0.66	0.87	1.00											
	U.S. Leveraged Loans hedged	4.00	4.32	8.25	4.25	-0.20	-0.06	-0.12	0.32	0.43	0.81	0.88	1.00										
	Euro Government Bonds	2.00	2.08	4.00	1.50	0.09	0.59	0.97	0.45	0.56	-0.10	-0.05	-0.26	1.00									
	Euro Govt Inflation-Linked	2.00	2.11	4.75	1.50	0.08	0.55	0.76	0.58	0.66	0.32	0.29	0.08	0.72	1.00								
	World Government Bonds hedged	1.75	1.85	3.00	1.75	0.19	0.81	0.83	0.52	0.39	-0.19	-0.26	-0.41	0.86	0.58	1.00							
	World Government Bonds	1.75	2.11	7.25	1.50	0.13	0.33	0.46	0.13	0.11	-0.36	-0.29	-0.31	0.47	0.14	0.56	1.00						
	World ex-Euro Government Bonds hedged	1.75	1.73	3.00	1.75	0.24	0.83	0.60	0.49	0.22	-0.24	-0.37	-0.45	0.63	0.39	0.94	0.53	1.00					
	World ex-Euro Government Bonds	1.75	2.26	10.00	1.50	0.11	0.24	0.30	0.05	0.02	-0.36	-0.30	-0.27	0.31	0.01	0.44	0.98	0.44	1.00				
	Emerging Markets Sovereign Debt hedged	5.25	5.67	9.50	4.50	0.07	0.60	0.40	0.77	0.66	0.71	0.56	0.40	0.28	0.55	0.29	-0.19	0.24	-0.26	1.00			
	Emerging Markets Local Currency Debt	5.75	6.13	9.00	5.25	0.09	0.33	0.34	0.46	0.51	0.40	0.37	0.29	0.26	0.39	0.23	0.27	0.15	0.24	0.55	1.00		
	Emerging Markets Corporate Bonds hedged	5.00	5.32	8.25	4.50	0.05	0.51	0.33	0.78	0.72	0.73	0.67	0.53	0.18	0.46	0.14	-0.21	0.09	-0.27	0.89	0.51	1.00	
EQUITIES	European Large Cap	5.75	6.62	14.00	5.50	-0.26	-0.02	0.04	0.31	0.48	0.67	0.74	0.63	-0.06	0.27	-0.25	-0.31	-0.34	-0.32	0.47	0.42	0.52	1.00
	European Small Cap	6.00	7.25	15.75	5.75	-0.26	-0.04	-0.01	0.30	0.45	0.69	0.73	0.61	-0.11	0.24	-0.28	-0.44	-0.35	-0.44	0.48	0.27	0.54	0.89
	U.S. Large Cap	4.25	4.98	13.25	4.50	-0.29	-0.13	0.02	0.10	0.33	0.45	0.52	0.51	-0.06	0.12	-0.23	0.03	-0.32	0.05	0.18	0.45	0.27	0.77
	U.S. Large Cap hedged	4.25	5.04	13.75	4.75	-0.25	-0.01	-0.03	0.26	0.39	0.67	0.61	0.53	-0.11	0.22	-0.25	-0.52	-0.31	-0.54	0.50	0.27	0.53	0.82
	Euro Area Large Cap	6.00	7.19	16.25	5.75	-0.24	-0.02	0.04	0.29	0.44	0.66	0.70	0.56	-0.04	0.30	-0.23	-0.40	-0.32	-0.42	0.49	0.35	0.52	0.97
	Euro area Small Cap	6.25	7.57	17.00	6.00	-0.26	-0.03	0.01	0.30	0.45	0.67	0.73	0.61	-0.08	0.27	-0.27	-0.42	-0.35	-0.43	0.47	0.30	0.54	0.90
	UK Large Cap	5.50	6.42	14.00	5.25	-0.26	-0.05	0.02	0.29	0.47	0.62	0.72	0.66	-0.09	0.18	-0.28	-0.17	-0.37	-0.16	0.38	0.44	0.47	0.93
	UK Large Cap hedged	5.00	5.83	13.25	5.00	-0.19	0.11	0.07	0.38	0.44	0.64	0.58	0.50	-0.02	0.28	-0.12	-0.38	-0.17	-0.41	0.57	0.35	0.57	0.85
	Japanese Equity	5.75	6.62	14.00	5.25	-0.23	-0.06	0.06	0.21	0.35	0.37	0.44	0.41	-0.02	0.16	-0.18	0.12	-0.27	0.13	0.15	0.46	0.26	0.60
	Japanese Equity hedged	5.75	7.16	17.75	5.75	-0.06	-0.17	-0.10	0.12	0.26	0.47	0.49	0.45	-0.15	0.16	-0.35	-0.52	-0.43	-0.54	0.27	0.24	0.35	0.67
	Emerging Markets Equity	7.50	8.75	17.00	7.00	-0.12	0.06	0.04	0.38	0.48	0.67	0.68	0.61	-0.07	0.27	-0.20	-0.24	-0.27	-0.25	0.55	0.62	0.59	0.75
	AC Asia ex-Japan Equity	7.50	8.79	17.25	7.25	-0.13	0.08	0.10	0.40	0.49	0.63	0.65	0.56	-0.01	0.28	-0.14	-0.15	-0.22	-0.17	0.50	0.60	0.56	0.73
	AC World Equity	5.00	5.84	12.50	5.00	-0.27	-0.06	0.04	0.26	0.46	0.62	0.68	0.62	-0.07	0.22	-0.25	-0.11	-0.35	-0.11	0.37	0.53	0.46	0.91
	AC World ex-EMU Equity	5.00	5.76	12.50	5.00	-0.27	-0.07	0.04	0.24	0.44	0.59	0.66	0.62	-0.07	0.20	-0.25	-0.06	-0.35	-0.05	0.34	0.54	0.44	0.87
	Developed World Equity	4.75	5.54	12.50	5.00	-0.29	-0.08	0.03	0.22	0.43	0.59	0.66	0.61	-0.06	0.20	-0.26	-0.09	-0.35	-0.09	0.33	0.49	0.42	0.90
	Global Convertible hedged	4.50	4.93	9.50	4.25	-0.14	0.07	0.05	0.44	0.53	0.81	0.78	0.67	-0.07	0.31	-0.25	-0.50	-0.33	-0.52	0.62	0.34	0.70	0.84
	Global Credit Sensitive Convertible hedged	3.75	3.94	6.25	3.50	-0.30	-0.03	0.09	0.18	0.33	0.27	0.39	0.31	0.01	0.07	-0.11	-0.19	-0.16	-0.21	0.18	0.10	0.27	0.42
ALTERNATIVES	Private Equity	7.25	9.21	21.00	6.25	-0.37	-0.36	-0.32	0.04	0.17	0.59	0.57	0.63	-0.41	-0.07	-0.53	-0.28	-0.53	-0.24	0.38	0.38	0.51	0.68
	U.S. Core Real Estate*	4.75	5.54	13.00	4.25	-0.49	-0.16	-0.19	0.04	0.14	0.42	0.41	0.54	-0.25	-0.05	-0.29	0.04	-0.28	0.08	0.26	0.45	0.36	0.46
	European ex-UK Core Real Estate*	5.50	6.23	12.50	4.75	-0.47	-0.43	-0.38	-0.06	0.03	0.52	0.49	0.63	-0.43	-0.14	-0.58	-0.26	-0.60	-0.22	0.25	0.22	0.39	0.55
	European ex-UK Value-Added Real Estate*	8.00	9.78	20.00	6.50	-0.47	-0.43	-0.38	-0.06	0.03	0.52	0.49	0.63	-0.43	-0.14	-0.58	-0.26	-0.60	-0.22	0.25	0.22	0.39	0.55
	U.S. REITs	5.25	6.26	14.75	5.25	-0.19	0.22	0.22	0.33	0.40	0.45	0.40	0.33	0.17	0.33	0.14	0.15	0.07	0.13	0.33	0.52	0.28	0.56
	Global ex-U.S. REITs	5.50	6.83	17.00	7.00	-0.32	0.14	0.23	0.38	0.53	0.58	0.62	0.46	0.14	0.35	0.00	-0.15	-0.10	-0.19	0.47	0.37	0.44	0.76
	Global Infrastructure Equity	5.00	5.67	12.00	5.25	-0.34	0.02	-0.08	0.23	0.13	0.32	0.30	0.38	-0.13	0.05	-0.17	0.07	-0.18	0.08	0.27	0.18	0.33	0.25
	Diversified Hedge Funds hedged	3.25	3.52	7.50	3.50	-0.17	-0.11	-0.11	0.22	0.34	0.60	0.67	0.64	-0.21	0.13	-0.37	-0.45	-0.41	-0.44	0.36	0.22	0.44	0.72
	Event Driven Hedge Funds hedged	3.75	4.14	9.00	4.00	-0.21	-0.12	-0.13	0.26	0.42	0.77	0.79	0.75	-0.26	0.15	-0.43	-0.54	-0.47	-0.53	0.46	0.27	0.57	0.78
	Long Bias Hedge Funds hedged	3.75	4.33	11.00	4.00	-0.19	-0.09	-0.14	0.29	0.38	0.74	0.71	0.66	-0.25	0.17	-0.40	-0.60	-0.44	-0.60	0.51	0.27	0.59	0.79
	Relative Value Hedge Funds hedged	3.50	3.74	7.00	3.75	-0.11	0.02	-0.05	0.40	0.50	0.84	0.86	0.85	-0.19	0.21	-0.35	-0.43	-0.40	-0.42	0.55	0.38	0.64	0.73
	Macro Hedge Funds hedged	2.75	3.06	8.00	3.00	0.18	0.19	0.19	0.28	0.21	0.16	0.15	0.06	0.16	0.27	0.16	-0.04	0.15	-0.08	0.24	0.14	0.21	0.23
	Commodities*	1.25	2.16	13.75	2.75	-0.08	-0.05	-0.17	0.13	0.13	0.32	0.29	0.37	-0.23	0.05	-0.25	-0.05	-0.22	-0.01	0.14	0.28	0.24	0.29
	Gold*	1.50	2.92	17.25	3.00	0.16	0.32	0.18	0.24	0.12	-0.09	-0.11	-0.13	0.15	0.05	0.28	0.43	0.33	0.44	0.10	0.32	0.11	-0.20

EURO ASSUMPTIONS

Note: All estimates on this page are in euro terms. Given the complex risk-reward trade-offs involved, we advise clients to rely on judgment as well as quantitative optimization approaches in setting strategic allocations to all of these asset classes and strategies. Please note that all information shown is based on qualitative analysis. Exclusive reliance on this information is not advised. This information is not intended as a recommendation to invest in any particular asset class or strategy or as a promise of future performance. Note that these asset class and strategy assumptions are passive only-they do not consider the impact of active management. References to future returns are not promises or even estimates of actual returns a client portfolio may achieve. Assumptions, opinions and estimates are provided for illustrative purposes only. They should not be relied upon as recommendations to buy or sell securities. Forecasts of financial market trends that are based on current market conditions constitute our judgment and are subject to change without notice. We believe the information provided here is reliable, but do not warrant its accuracy or completeness. This material has been prepared for information purposes only and is not intended to provide, and should not be relied on for, accounting, legal or tax advice.

Source: J.P. Morgan Asset Management; as of September 30, 2018. Alternative asset classes (including hedge funds, private equity, real estate, direct lending and infrastructure) are unlike other asset categories shown above in that there is no underlying investible index. The return estimates for these alternative asset classes and strategies are estimates of the industry average, net of manager fees. The dispersion of return among managers of these asset classes and strategies is typically significantly wider than that of traditional asset classes. *Not directly comparable to 2018 assumptions. See strategy class discussion for details. Correlation figures shown are rounded to two significant figures, which may cause a loss of information. Correlations of value-added and core real estate in their local currencies are identical since value-added local returns are scaled versions of their corresponding core real estate local returns. All returns are nominal. *For reference index information, please visit our website.*

European Small Cap	U.S. Large Cap	U.S. Large Cap hedged	Euro Area Large Cap	Euro area Small Cap	UK Large Cap	UK Large Cap hedged	Japanese Equity	Japanese Equity hedged	Emerging Markets Equity	AC Asia ex-Japan Equity	AC World Equity	AC World ex-EMU Equity	Developed World Equity	Global Convertible hedged	Global Credit Sensitive Convertible hedged	Private Equity	U.S. Core Real Estate*	European ex-UK Core Real Estate*	European ex-UK Value-Added Real Estate*	U.S. REITs	Global ex-U.S. REITs	Global Infrastructure Equity	Diversified Hedge Funds hedged	Event Driven Hedge Funds hedged	Long Bias Hedge Funds hedged	Relative Value Hedge Funds hedged	Macro Hedge Funds hedged	Commodities*	Gold*
1.00																													
0.62	1.00																												
0.80	0.72	1.00																											
0.89	0.68	0.83	1.00																										
0.98	0.60	0.77	0.92	1.00																									
0.78	0.79	0.71	0.82	0.77	1.00																								
0.82	0.61	0.82	0.84	0.79	0.79	1.00																							
0.47	0.66	0.38	0.52	0.49	0.64	0.40	1.00																						
0.62	0.51	0.63	0.67	0.62	0.60	0.55	0.70	1.00																					
0.71	0.61	0.67	0.71	0.71	0.72	0.68	0.52	0.55	1.00																				
0.67	0.63	0.62	0.67	0.67	0.71	0.63	0.55	0.53	0.97	1.00																			
0.78	0.94	0.80	0.83	0.78	0.91	0.75	0.72	0.65	0.80	0.80	1.00																		
0.74	0.95	0.76	0.78	0.73	0.89	0.71	0.73	0.62	0.79	0.80	1.00	1.00																	
0.77	0.96	0.79	0.83	0.76	0.90	0.74	0.73	0.64	0.74	0.74	1.00	0.99	1.00																
0.87	0.59	0.85	0.85	0.86	0.75	0.81	0.46	0.68	0.79	0.75	0.77	0.74	0.74	1.00															
0.39	0.23	0.36	0.40	0.41	0.39	0.37	0.19	0.23	0.28	0.25	0.33	0.31	0.32	0.38	1.00														
0.62	0.69	0.60	0.60	0.58	0.74	0.49	0.47	0.51	0.75	0.73	0.75	0.75	0.73	0.65	0.11	1.00													
0.36	0.62	0.42	0.36	0.34	0.55	0.23	0.48	0.33	0.44	0.43	0.58	0.60	0.59	0.28	0.20	0.54	1.00												
0.50	0.56	0.43	0.47	0.50	0.65	0.31	0.47	0.48	0.58	0.54	0.61	0.62	0.60	0.52	0.03	0.82	0.65	1.00											
0.50	0.56	0.43	0.47	0.50	0.65	0.31	0.47	0.48	0.58	0.54	0.61	0.62	0.60	0.52	0.03	0.82	0.65	1.00	1.00										
0.46	0.70	0.54	0.51	0.45	0.53	0.51	0.45	0.29	0.43	0.44	0.66	0.66	0.67	0.43	0.10	0.40	0.68	0.36	0.36	1.00									
0.74	0.56	0.62	0.73	0.73	0.69	0.65	0.42	0.42	0.50	0.49	0.66	0.62	0.66	0.62	0.33	0.48	0.48	0.46	0.46	0.66	1.00								
0.14	0.33	0.15	0.16	0.13	0.36	0.05	0.38	0.21	0.39	0.38	0.36	0.38	0.34	0.25	-0.13	0.48	0.43	0.50	0.50	0.15	0.13	1.00							
0.76	0.51	0.66	0.68	0.76	0.69	0.62	0.43	0.62	0.70	0.64	0.68	0.66	0.65	0.78	0.40	0.72	0.38	0.62	0.62	0.21	0.47	0.32	1.00						
0.83	0.56	0.79	0.75	0.82	0.73	0.71	0.41	0.62	0.73	0.67	0.73	0.70	0.70	0.87	0.49	0.68	0.44	0.59	0.59	0.34	0.56	0.20	0.87	1.00					
0.84	0.55	0.86	0.78	0.83	0.71	0.75	0.41	0.67	0.80	0.74	0.74	0.71	0.70	0.92	0.40	0.65	0.32	0.50	0.50	0.32	0.53	0.22	0.87	0.93	1.00				
0.74	0.50	0.66	0.68	0.74	0.71	0.64	0.44	0.59	0.75	0.69	0.69	0.67	0.65	0.84	0.41	0.70	0.47	0.61	0.61	0.31	0.52	0.33	0.84	0.92	0.85	1.00			
0.24	0.04	0.21	0.22	0.26	0.21	0.30	0.07	0.14	0.31	0.26	0.18	0.16	0.15	0.30	0.12	0.12	-0.18	0.02	0.02	0.01	0.12	0.06	0.55	0.28	0.37	0.28	1.00		
0.21	0.29	0.22	0.18	0.20	0.43	0.27	0.20	0.14	0.43	0.37	0.38	0.40	0.35	0.29	0.17	0.51	0.44	0.51	0.51	0.13	0.15	0.40	0.44	0.42	0.40	0.45	0.31	1.00	
-0.23	-0.10	-0.29	-0.27	-0.23	-0.07	-0.15	-0.08	-0.36	0.03	0.03	-0.10	-0.06	-0.12	-0.14	-0.10	0.03	0.12	-0.02	-0.02	-0.01	-0.15	0.17	-0.03	-0.15	-0.13	-0.06	0.29	0.37	1.00

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

		Compound Return 2018 (%)	Annualized Volatility (%)	Arithmetic Return 2019 (%)	Compound Return 2019 (%)	UK Cash	U.S. Aggregate Bonds hedged	Euro Aggregate Bonds hedged	U.S. Inv Grade Corporate Bonds hedged	Euro Inv Grade Corp Bonds hedged	UK Inv Grade Corporate Bonds	U.S. High Yield Bonds hedged	European High Yield Bonds hedged	U.S. Leveraged Loans hedged	Euro Government Bonds hedged	UK Gilts	UK Inflation-Linked Bonds	World Government Bonds hedged	World Government Bonds	World ex-UK Government Bonds hedged	World ex-UK Government Bonds	Emerging Markets Sovereign Debt hedged	Emerging Markets Local Currency Debt	Emerging Markets Corporate Bonds hedged
FIXED INCOME	UK Cash	1.75	1.75	0.75	1.75	1.00																		
	U.S. Aggregate Bonds hedged	3.75	3.82	3.75	3.00	0.18	1.00																	
	Euro Aggregate Bonds hedged	3.00	3.07	3.75	2.25	0.07	0.64	1.00																
	U.S. Inv Grade Corporate Bonds hedged	4.25	4.41	5.75	3.25	0.05	0.83	0.57	1.00															
	Euro Inv Grade Corp Bonds hedged	3.25	3.35	4.50	2.50	-0.08	0.52	0.71	0.77	1.00														
	UK Inv Grade Corporate Bonds	3.00	3.27	7.50	2.50	-0.14	0.58	0.55	0.75	0.77	1.00													
	U.S. High Yield Bonds hedged	5.25	5.57	8.25	5.00	-0.10	0.19	0.04	0.55	0.55	0.43	1.00												
	European High Yield Bonds hedged	4.75	5.11	8.75	4.00	-0.19	0.07	0.10	0.48	0.64	0.48	0.89	1.00											
	U.S. Leveraged Loans hedged	4.75	5.02	7.50	4.75	-0.23	-0.08	-0.14	0.30	0.41	0.33	0.78	0.86	1.00										
	Euro Government Bonds hedged	2.75	2.83	4.00	2.00	0.09	0.59	0.97	0.45	0.56	0.44	-0.10	-0.05	-0.27	1.00									
	UK Gilts	1.25	1.46	6.50	1.00	0.09	0.68	0.57	0.43	0.26	0.57	-0.19	-0.25	-0.35	0.59	1.00								
	UK Inflation-Linked Bonds	1.25	1.62	8.75	0.50	-0.02	0.56	0.34	0.43	0.26	0.52	0.18	0.07	0.03	0.31	0.70	1.00							
	World Government Bonds hedged	2.50	2.62	3.00	2.25	0.20	0.81	0.83	0.52	0.39	0.44	-0.18	-0.25	-0.42	0.86	0.82	0.52	1.00						
	World Government Bonds	2.25	2.54	9.25	1.75	0.23	0.48	0.42	0.19	0.00	0.13	-0.34	-0.42	-0.53	0.48	0.63	0.40	0.68	1.00					
	World ex-UK Government Bonds hedged	2.75	2.77	2.75	2.25	0.21	0.81	0.84	0.52	0.40	0.41	-0.18	-0.24	-0.42	0.87	0.77	0.48	1.00	0.67	1.00				
	World ex-UK Government Bonds	2.25	2.67	9.50	1.75	0.23	0.46	0.41	0.18	-0.01	0.11	-0.34	-0.42	-0.53	0.47	0.60	0.38	0.67	1.00	0.66	1.00			
	Emerging Markets Sovereign Debt hedged	6.00	6.42	9.50	5.00	0.06	0.60	0.40	0.77	0.66	0.56	0.71	0.59	0.37	0.29	0.22	0.32	0.30	0.04	0.30	0.04	1.00		
	Emerging Markets Local Currency Debt	6.00	6.56	11.00	5.50	0.18	0.46	0.33	0.46	0.37	0.37	0.30	0.19	0.02	0.30	0.32	0.38	0.37	0.49	0.37	0.49	0.64	1.00	
	Emerging Markets Corporate Bonds hedged	5.75	6.05	8.00	5.00	0.04	0.52	0.33	0.78	0.71	0.57	0.73	0.68	0.51	0.18	0.09	0.23	0.15	-0.08	0.15	-0.08	0.89	0.53	1.00
EQUITIES	UK All Cap	5.75	6.53	13.00	5.50	-0.15	0.09	0.05	0.38	0.44	0.45	0.66	0.65	0.51	-0.04	-0.06	0.16	-0.14	-0.12	-0.15	-0.12	0.57	0.47	0.58
	UK Large Cap	5.75	6.57	13.25	5.50	-0.14	0.11	0.06	0.38	0.44	0.45	0.65	0.62	0.50	-0.02	-0.04	0.18	-0.12	-0.09	-0.13	-0.09	0.57	0.49	0.57
	UK Small Cap	6.00	7.10	15.50	5.75	-0.21	-0.01	-0.01	0.29	0.42	0.37	0.64	0.66	0.54	-0.11	-0.14	0.05	-0.23	-0.28	-0.24	-0.28	0.47	0.27	0.52
	U.S. Large Cap	4.50	5.23	13.25	4.75	-0.17	0.06	0.07	0.20	0.28	0.30	0.46	0.39	0.31	0.03	0.07	0.25	-0.03	0.15	-0.05	0.15	0.37	0.54	0.36
	U.S. Large Cap hedged	5.00	5.79	13.75	5.25	-0.21	-0.02	-0.04	0.25	0.38	0.31	0.68	0.64	0.54	-0.12	-0.21	0.04	-0.25	-0.34	-0.25	-0.34	0.50	0.32	0.52
	Euro Area Large Cap	6.25	7.78	18.50	6.00	-0.08	0.12	0.06	0.33	0.36	0.39	0.61	0.58	0.39	0.01	-0.04	0.18	-0.08	-0.02	-0.08	-0.02	0.58	0.54	0.55
	Euro Area Large Cap hedged	6.75	7.93	16.25	6.25	-0.19	-0.02	0.03	0.29	0.44	0.40	0.66	0.70	0.57	-0.05	-0.19	0.05	-0.24	-0.36	-0.24	-0.36	0.48	0.28	0.52
	Euro area Small Cap	6.50	8.22	19.50	6.25	-0.12	0.10	0.04	0.34	0.36	0.38	0.62	0.61	0.42	-0.02	-0.08	0.15	-0.11	-0.03	-0.11	-0.03	0.56	0.50	0.56
	Euro area Small Cap hedged	7.00	8.35	17.25	6.50	-0.23	-0.04	0.00	0.29	0.44	0.40	0.67	0.74	0.61	-0.09	-0.23	0.02	-0.27	-0.36	-0.27	-0.36	0.46	0.24	0.53
	Japanese Equity	6.00	6.78	13.25	5.50	-0.13	0.10	0.11	0.30	0.32	0.32	0.38	0.32	0.24	0.06	0.03	0.23	-0.01	0.12	-0.02	0.12	0.33	0.47	0.36
	Japanese Equity hedged	6.50	7.94	18.00	6.25	-0.21	-0.20	-0.10	0.11	0.28	0.21	0.49	0.51	0.47	-0.16	-0.33	-0.05	-0.38	-0.54	-0.37	-0.54	0.26	0.10	0.35
	AC Asia ex-Japan Equity	7.75	9.19	18.25	7.50	-0.02	0.21	0.12	0.44	0.43	0.37	0.61	0.54	0.39	0.05	0.04	0.21	0.00	0.03	0.00	0.03	0.62	0.65	0.60
	Emerging Markets Equity	7.75	9.22	18.50	7.25	-0.01	0.19	0.08	0.42	0.40	0.35	0.64	0.56	0.42	0.00	0.01	0.22	-0.04	0.01	-0.04	0.02	0.65	0.69	0.62
	AC World Equity	5.25	6.18	13.25	5.25	-0.12	0.12	0.08	0.34	0.38	0.39	0.60	0.53	0.39	0.02	0.03	0.25	-0.05	0.08	-0.06	0.08	0.55	0.63	0.53
	AC World ex-UK Equity	5.25	6.16	13.25	5.25	-0.12	0.12	0.08	0.33	0.37	0.38	0.59	0.52	0.38	0.02	0.03	0.26	-0.04	0.10	-0.05	0.10	0.54	0.64	0.52
	Developed World Equity	5.00	5.85	13.00	5.25	-0.14	0.11	0.08	0.31	0.36	0.38	0.58	0.51	0.38	0.02	0.03	0.25	-0.05	0.09	-0.06	0.09	0.51	0.60	0.50
	Global Convertible hedged	5.25	5.65	9.25	4.75	-0.11	0.07	0.04	0.43	0.52	0.39	0.81	0.79	0.65	-0.07	-0.22	0.03	-0.24	-0.38	-0.24	-0.38	0.62	0.32	0.69
	Global Credit Sensitive Convertible hedged	4.50	4.69	6.25	4.00	-0.27	-0.05	0.08	0.16	0.32	0.34	0.25	0.38	0.32	0.00	-0.16	-0.09	-0.13	-0.16	-0.12	-0.16	0.16	0.06	0.25
ALTERNATIVES	Private Equity	7.50	9.37	20.50	6.50	-0.25	-0.29	-0.22	0.04	0.20	0.22	0.47	0.44	0.43	-0.30	-0.30	0.10	-0.39	-0.30	-0.39	-0.29	0.34	0.13	0.42
	U.S. Core Real Estate*	5.00	5.73	12.50	4.50	-0.52	-0.21	-0.18	-0.03	0.16	0.27	0.42	0.37	0.53	-0.25	-0.24	0.16	-0.29	-0.47	-0.29	-0.48	0.25	-0.16	0.35
	European ex-UK Core Real Estate*	5.75	6.72	14.50	5.00	-0.38	-0.41	-0.30	-0.10	0.02	0.01	0.38	0.33	0.42	-0.33	-0.45	0.03	-0.47	-0.36	-0.47	-0.36	0.16	-0.12	0.27
	European ex-UK Value-Added Real Estate*	8.25	10.47	22.50	6.75	-0.45	-0.46	-0.36	-0.12	0.02	0.01	0.46	0.40	0.53	-0.40	-0.51	0.00	-0.55	-0.53	-0.55	-0.53	0.20	-0.27	0.33
	UK Core Real Estate*	5.00	6.11	15.50	4.75	-0.46	-0.39	-0.35	-0.12	-0.01	-0.04	0.44	0.37	0.56	-0.38	-0.46	-0.11	-0.50	-0.71	-0.49	-0.72	0.16	-0.51	0.30
	U.S. REITs	5.50	6.75	16.50	5.50	-0.13	0.30	0.22	0.36	0.34	0.43	0.46	0.34	0.22	0.19	0.27	0.39	0.22	0.23	0.21	0.23	0.43	0.55	0.32
	European REITs	6.00	7.56	18.50	7.25	-0.17	0.24	0.23	0.39	0.46	0.50	0.55	0.51	0.30	0.18	0.12	0.24	0.11	0.02	0.11	0.01	0.55	0.46	0.46
	Global Infrastructure Equity	5.25	5.70	9.75	5.50	-0.11	0.23	0.14	0.28	0.12	0.18	-0.02	-0.04	-0.07	0.13	0.23	0.35	0.15	0.23	0.14	0.23	0.12	0.13	0.08
	Diversified Hedge Funds hedged	4.00	4.27	7.50	4.00	-0.14	-0.12	-0.11	0.20	0.33	0.30	0.58	0.66	0.64	-0.21	-0.30	0.01	-0.37	-0.50	-0.37	-0.50	0.34	0.09	0.41
	Event Driven Hedge Funds hedged	4.50	4.88	9.00	4.50	-0.19	-0.13	-0.14	0.24	0.41	0.32	0.76	0.79	0.75	-0.26	-0.37	-0.03	-0.43	-0.52	-0.43	-0.51	0.45	0.18	0.55
	Long Bias Hedge Funds hedged	4.50	5.07	11.00	4.50	-0.15	-0.09	-0.15	0.27	0.38	0.29	0.73	0.73	0.65	-0.25	-0.34	-0.03	-0.40	-0.48	-0.40	-0.48	0.50	0.25	0.58
	Relative Value Hedge Funds hedged	4.25	4.48	7.00	4.25	-0.13	0.00	-0.06	0.38	0.49	0.39	0.83	0.85	0.84	-0.20	-0.33	0.04	-0.35	-0.51	-0.34	-0.51	0.54	0.20	0.62
	Macro Hedge Funds hedged	3.50	3.81	8.00	3.50	0.20	0.19	0.20	0.27	0.21	0.25	0.15	0.16	0.04	0.16	0.15	0.18	0.17	0.09	0.17	0.09	0.23	0.21	0.20
	Commodities*	1.50	2.48	14.25	3.00	0.02	0.11	-0.12	0.19	0.08	0.09	0.29	0.17	0.19	-0.15	-0.06	0.17	-0.08	0.11	-0.08	0.12	0.29	0.40	0.30
	Gold*	1.75	3.37	18.50	3.25	0.18	0.44	0.20	0.29	0.08	0.14	-0.06	-0.17	-0.26	0.20	0.39	0.29	0.40	0.51	0.39	0.51	0.23	0.44	0.16

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

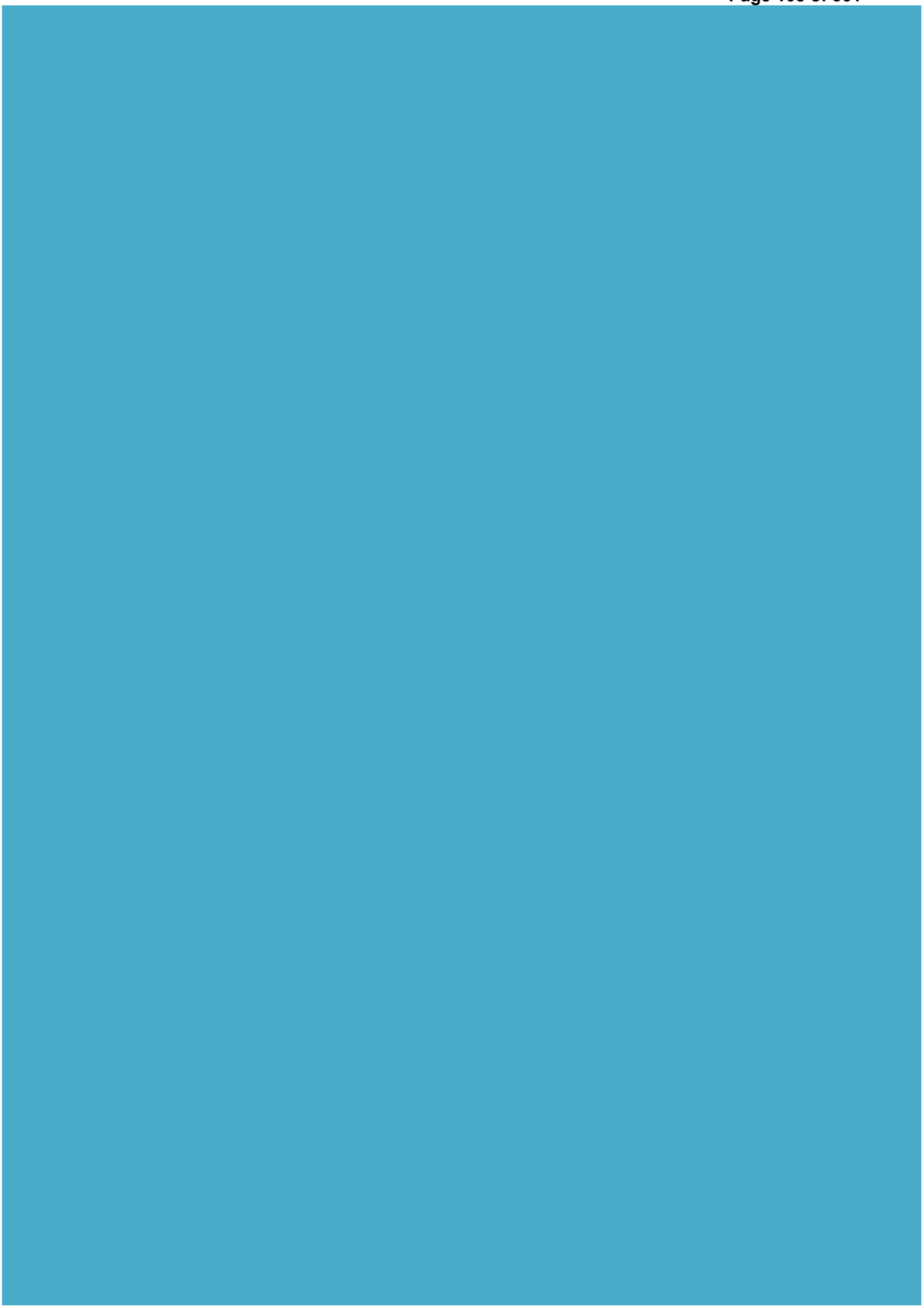
STERLING ASSUMPTIONS

Note: All estimates on this page are in sterling terms. Given the complex risk-reward trade-offs involved, we advise clients to rely on judgment as well as quantitative optimization approaches in setting strategic allocations to all of these asset classes and strategies. Please note that all information shown is based on qualitative analysis. Exclusive reliance on this information is not advised. This information is not intended as a recommendation to invest in any particular asset class or strategy or as a promise of future performance. Note that these asset class and strategy assumptions are passive only-they do not consider the impact of active management. References to future returns are not promises or even estimates of actual returns a client portfolio may achieve. Assumptions, opinions and estimates are provided for illustrative purposes only. They should not be relied upon as recommendations to buy or sell securities. Forecasts of financial market trends that are based on current market conditions constitute our judgment and are subject to change without notice. We believe the information provided here is reliable, but do not warrant its accuracy or completeness. This material has been prepared for information purposes only and is not intended to provide, and should not be relied on for, accounting, legal or tax advice.

Source: J.P. Morgan Asset Management; as of September 30, 2018. Alternative asset classes (including hedge funds, private equity, real estate, direct lending and infrastructure) are unlike other asset categories shown above in that there is no underlying investible index. The return estimates for these alternative asset classes and strategies are estimates of the industry average, net of manager fees. The dispersion of return among managers of these asset classes and strategies is typically significantly wider than that of traditional asset classes. *Not directly comparable to 2018 assumptions. See strategy class discussion for details. Correlation figures shown are rounded to two significant figures, which may cause a loss of information. Correlations of value-added and core real estate in their local currencies are identical since value-added local returns are scaled versions of their corresponding core real estate local returns. All returns are nominal. *For reference index information, please visit our website.*

	UK All Cap	UK Large Cap	UK Small Cap	U.S. Large Cap	U.S. Large Cap hedged	Euro Area Large Cap	Euro Area Large Cap hedged	Euro area Small Cap	Euro area Small Cap hedged	Japanese Equity	Japanese Equity hedged	AC Asia ex-Japan Equity	Emerging Markets Equity	AC World Equity	AC World ex-UK Equity	Developed World Equity	Global Convertible hedged	Global Credit Sensitive Convertible hedged	Private Equity	U.S. Core Real Estate*	European ex-UK Core Real Estate*	European ex-UK Value-Added Real Estate*	UK Core Real Estate*	U.S. REITs	European REITs	Global Infrastructure Equity	Diversified Hedge Funds hedged	Event Driven Hedge Funds hedged	Long Bias Hedge Funds hedged	Relative Value Hedge Funds hedged	Macro Hedge Funds hedged	Commodities*	Gold*
UK All Cap	1.00																																
UK Large Cap	0.99	1.00																															
UK Small Cap	0.85	0.80	1.00																														
U.S. Large Cap	0.77	0.78	0.62	1.00																													
U.S. Large Cap hedged	0.83	0.81	0.74	0.78	1.00																												
Euro Area Large Cap	0.88	0.87	0.75	0.75	0.79	1.00																											
Euro Area Large Cap hedged	0.85	0.83	0.78	0.65	0.83	0.87	1.00																										
Euro area Small Cap	0.85	0.82	0.83	0.69	0.74	0.94	0.80	1.00																									
Euro area Small Cap hedged	0.83	0.79	0.88	0.58	0.77	0.81	0.92	0.88	1.00																								
Japanese Equity	0.58	0.59	0.46	0.63	0.47	0.58	0.51	0.55	0.50	1.00																							
Japanese Equity hedged	0.59	0.57	0.59	0.44	0.65	0.56	0.69	0.52	0.65	0.69	1.00																						
AC Asia ex-Japan Equity	0.73	0.73	0.61	0.66	0.65	0.73	0.62	0.73	0.63	0.55	0.45	1.00																					
Emerging Markets Equity	0.76	0.76	0.63	0.67	0.68	0.76	0.63	0.76	0.65	0.54	0.45	0.97	1.00																				
AC World Equity	0.89	0.89	0.73	0.94	0.83	0.89	0.77	0.84	0.73	0.70	0.55	0.83	0.84	1.00																			
AC World ex-UK Equity	0.88	0.88	0.72	0.94	0.82	0.88	0.76	0.84	0.71	0.71	0.54	0.83	0.84	1.00	1.00																		
Developed World Equity	0.89	0.89	0.72	0.96	0.83	0.88	0.77	0.83	0.72	0.71	0.55	0.77	0.79	1.00	0.99	1.00																	
Global Convertible hedged	0.84	0.81	0.82	0.62	0.85	0.80	0.85	0.80	0.86	0.51	0.69	0.74	0.76	0.78	0.76	0.75	1.00																
Global Credit Sensitive Convertible hedged	0.36	0.36	0.30	0.19	0.35	0.31	0.39	0.29	0.39	0.18	0.26	0.18	0.20	0.26	0.24	0.26	0.36	1.00															
Private Equity	0.66	0.64	0.63	0.58	0.60	0.56	0.56	0.56	0.54	0.29	0.43	0.64	0.69	0.66	0.65	0.64	0.64	0.34	1.00														
U.S. Core Real Estate*	0.31	0.29	0.34	0.36	0.47	0.13	0.36	0.17	0.35	0.12	0.36	0.16	0.21	0.30	0.29	0.30	0.28	0.34	0.26	1.00													
European ex-UK Core Real Estate*	0.48	0.47	0.48	0.34	0.42	0.39	0.40	0.46	0.46	0.21	0.40	0.32	0.42	0.42	0.41	0.41	0.49	0.29	0.71	0.36	1.00												
European ex-UK Value-Added Real Estate*	0.46	0.44	0.50	0.31	0.46	0.32	0.45	0.41	0.51	0.16	0.48	0.31	0.40	0.38	0.37	0.37	0.53	0.22	0.69	0.48	0.97	1.00											
UK Core Real Estate*	0.19	0.17	0.30	0.10	0.35	-0.04	0.35	0.05	0.36	-0.03	0.43	0.09	0.14	0.09	0.08	0.08	0.38	-0.03	0.33	0.60	0.53	0.71	1.00										
U.S. REITs	0.58	0.59	0.45	0.75	0.56	0.58	0.47	0.54	0.43	0.47	0.24	0.51	0.51	0.72	0.72	0.73	0.43	0.05	0.26	0.58	0.20	0.20	0.15	1.00									
European REITs	0.71	0.69	0.68	0.57	0.62	0.75	0.67	0.73	0.65	0.39	0.37	0.50	0.51	0.65	0.65	0.66	0.60	0.25	0.36	0.33	0.37	0.33	0.06	0.68	1.00								
Global Infrastructure Equity	0.06	0.07	-0.03	0.05	-0.05	0.04	-0.09	-0.01	-0.12	0.18	-0.02	0.12	0.16	0.10	0.11	0.09	0.05	0.07	0.20	-0.10	0.13	0.05	-0.21	-0.11	-0.05	1.00							
Diversified Hedge Funds hedged	0.64	0.62	0.68	0.40	0.66	0.54	0.68	0.60	0.76	0.36	0.62	0.53	0.57	0.54	0.53	0.52	0.77	0.41	0.66	0.39	0.56	0.63	0.48	0.15	0.34	0.05	1.00						
Event Driven Hedge Funds hedged	0.73	0.71	0.76	0.50	0.79	0.64	0.75	0.69	0.82	0.38	0.64	0.59	0.64	0.64	0.63	0.62	0.86	0.49	0.65	0.47	0.57	0.62	0.47	0.31	0.47	-0.06	0.87	1.00					
Long Bias Hedge Funds hedged	0.78	0.75	0.77	0.55	0.86	0.72	0.79	0.75	0.83	0.44	0.68	0.71	0.76	0.72	0.71	0.69	0.92	0.40	0.65	0.33	0.48	0.52	0.36	0.33	0.48	0.02	0.87	0.93	1.00				
Relative Value Hedge Funds hedged	0.66	0.64	0.68	0.39	0.67	0.55	0.69	0.60	0.74	0.36	0.60	0.58	0.62	0.55	0.54	0.53	0.83	0.42	0.60	0.47	0.50	0.58	0.50	0.26	0.41	0.00	0.84	0.92	0.85	1.00			
Macro Hedge Funds hedged	0.29	0.30	0.19	0.13	0.21	0.25	0.21	0.27	0.24	0.16	0.10	0.30	0.34	0.25	0.25	0.23	0.30	0.12	0.31	-0.17	0.22	0.14	-0.14	0.06	0.13	0.30	0.54	0.28	0.36	0.28	1.00		
Commodities*	0.39	0.41	0.23	0.32	0.27	0.30	0.14	0.32	0.17	0.18	0.05	0.40	0.48	0.41	0.40	0.38	0.30	0.15	0.36	0.20	0.35	0.31	0.09	0.21	0.17	0.22	0.34	0.36	0.40	0.35	0.36	1.00	
Gold*	-0.03	-0.01	-0.13	0.01	-0.22	-0.05	-0.27	-0.01	-0.22	-0.02	-0.41	0.14	0.16	0.04	0.05	0.02	-0.11	-0.13	-0.12	-0.27	-0.25	-0.34	-0.42	0.10	-0.03	0.18	-0.10	-0.18	-0.12	-0.13	0.33	0.44	1.00

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

IV Appendix

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

GLOSSARY

ACTUAL INDIVIDUAL CONSUMPTION (also called household actual final consumption) As defined by the OECD, the sum total of household final consumption expenditure, non-profit institutions serving households final consumption expenditure and government expenditure on individual consumption of goods and services.

CONDITIONAL VALUE-AT-RISK (CVaR): A risk metric that evaluates the average of the worst outcomes of investment returns at and below a specified risk level (typically at 0.95 or 0.99 quantile of possible losses) given that a loss at or below this risk level occurs. CVaR is also known as expected shortfall.

CUMULATIVE DISTRIBUTION FUNCTION (CDF) In statistics, a function whose value is the probability that a random variable will take a distribution function value less than or equal to a specified value. In financial risk management, CDF value typically measures the probability of a loss event below a specified percentile would occur.

FACTORS Characteristics that describe the risk of a group of securities or financial instruments. Exposure to a factor based on an economic rationale should reward (or compensate) an investor. Equity factors include, for example, momentum, quality, size and value.

FALLEN ANGEL A bond previously rated investment grade, currently at junk bond status.

FAT TAIL A distribution in which, compared with a simple normal distribution, the probability of a negative return is more frequent and more sizable.

G7 (THE GROUP OF SEVEN) A group of seven highly industrialized democracies — Canada, France, Germany, Italy, Japan, the UK and the U.S. — that have consulted to coordinate economic, security, and energy policy.

G10 (THE GROUP OF 10) Eleven industrial countries (Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden, Switzerland, the UK and the U.S.) that consult and cooperate on economic, monetary and financial matters.

HUMAN CAPITAL DEVELOPMENT Adding to labor force skills, knowledge, creativity or leadership, through training or education, which improves workforce innovation and productivity.

ILLIQUIDITY The state of an asset that cannot readily be sold or exchanged for cash without a substantial loss in value. Investors demand an illiquidity premium, or extra return, for holding an asset, such as private equity or real estate, that is less liquid than another. (Liquidity is the state of an asset that is readily convertible to cash.)

LEFT-TAIL RISK A tail is the tapering at the far ends of a distribution curve representing least likely outcomes; left-tail risk is the low probability risk that the value of an asset (or portfolio of assets) moves more than three standard deviations from its current value. Managing downside, or left tail, risk has become a major focus for portfolio risk managers.

MEAN-REVERSION In financial theory, the concept that asset prices, or other indicators, eventually return to their long-run mean or average.

MEAN-VARIANCE OPTIMIZATION In portfolio theory, a mathematical tool for constructing portfolios with the maximum expected return (mean) for a given variance (or standard deviation of returns), or the minimum variance of return for a given mean (expected return). Simply put, considering the trade-off between risk and expected returns to achieve the optimal combination.

NON-ACCELERATING INFLATION RATE OF UNEMPLOYMENT (NAIRU) The unemployment rate at which the inflation rate stabilizes and will not increase. Graphed as the level of unemployment at the prevailing long-run Phillips curve.

PRIMARY BALANCE Government net borrowing or net lending, excluding interest payments on consolidated government liabilities.

PRIMARY SURPLUS The component of the fiscal surplus made up of government spending on programs, less income from tax revenues, excluding interest payments on debt.

TAIL RISK A concept that describes the risk of more severe downside price action than upside price action, such that assets can suffer more severe repricing during periods of stress than may be implied by a simple normal distribution. Market returns of financial assets tend to follow a heavy tailed distribution in relation to normal distribution, so that extreme outcomes occur more than expected.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

TOTAL FACTOR PRODUCTIVITY (TFP) Productivity growth that is not explained by capital stock accumulation or the labor force (increased hours worked) but rather captures the efficiency or intensity with which inputs are utilized. A residual that likely reflects technological change.

VALUE-AT-RISK (VaR) A risk measure introduced by J.P. Morgan in 1990 that defines risk as potential investment loss with a given probability over a pre-set time horizon. In mathematical terms, the VaR metric is defined as the possible loss at a quantile, a point with a specified probability of greater losses, typically set at 0.95 or 0.99 by firms and regulators in financial industry.

WINSORIZATION Applies a cap and a floor to extreme data values to remove the impact of potentially spurious outlier data on statistical results.

Z-SCORE A measure of how many standard deviations a data point is above or below the mean.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

LTCMA ACKNOWLEDGMENTS

EDITORIAL TEAM

John Bilton, CFA
Head of Global Multi-Asset Strategy, Multi-Asset Solutions

Michael Feser, CFA
Portfolio Manager, Multi-Asset Solutions

Jonathon Griggs
Head of Applied Research, Global Fixed Income, Currency & Commodities

Michael Hood
Global Strategist, Multi-Asset Solutions

Dr. David Kelly, CFA
Chief Global Strategist, Head of Global Market Insights Strategy

Grace Koo, Ph.D.
Quantitative Analyst and Portfolio Manager, Multi-Asset Solutions

Stephen Macklow-Smith
Portfolio Manager, European Equity Group

Patrik Schöwitz, CFA
Global Strategist, Multi-Asset Solutions

Anthony Werley
Chief Portfolio Strategist, Endowments & Foundations Group

LTCMA COMMITTEE

Michael Albrecht, CFA
Global Strategist, Multi-Asset Solutions

Nicolas Aguirre, CFA
Portfolio Strategist, Endowments & Foundations Group

Hannah Anderson
Global Market Strategist, Global Market Insights Strategy

Dan Aust
Head of Insights Programs, EMEA

Ivan Chan
Quantitative Analyst, Multi-Asset Solutions

Jason Davis, CFA
Portfolio Manager, Global Fixed Income, Currency and Commodities

Diego Gilsanz
Global Strategist, Multi-Asset Solutions

Leon Goldfeld, CFA
Portfolio Manager, Multi-Asset Solutions

Victoria Helvert
Associate, Multi-Asset Solutions

Vincent Juvyns
Global Market Strategist, Global Market Insights Strategy

Sorca Kelly-Scholte, FIA
Global Strategist, Global Pension Solutions

Akira Kunikyo
Investment Specialist, Multi-Asset Solutions

Pete Klingelhofer, CFA
Portfolio Manager, Multi-Asset Solutions

David Lebovitz
Global Market Strategist, Global Market Insights Strategy

Timothy Lintern
Analyst, Global Strategist, Multi-Asset Solutions

Thushka Maharaj, DPhil, CFA
Global Strategist, Multi-Asset Solutions

Benjamin Mandel, Ph.D.
Global Strategist, Multi-Asset Solutions

Emily Overton
Associate, Global Insights

Catherine Peterson
Global Head of Insights Programs

John C. Manley
Global Market Strategist, Global Market Insights Strategy

Meera Pandit
Market Analyst, Global Market Insights Strategy

Christopher M. Sediqzad, CFA *Research Analyst, Multi-Asset Solutions Manager Research*

Nandini Srivastava, Ph.D.
Quantitative Analyst, Multi-Asset Solutions

Karen Ward
Chief Market Strategist, EMEA, Global Market Insights Strategy

Xiao Xiao CFA
Quantitative Analyst, Multi-Asset Solutions

Leon Xin, CFA
Portfolio Strategist, Endowments & Foundations Group

EXECUTIVE SPONSORS

Chris Willcox
Chief Executive Officer, Asset Management

Mike O'Brien
Co-Chief Executive Officer, Asset Management Solutions

Rob O'Rahilly
Co-Chief Executive Officer, Asset Management Solutions

The *Long-Term Capital Market Assumptions Team and Committee* are grateful to many investment experts throughout the J.P. Morgan network whose input has been incorporated into the 2019 edition, including: Madhur Ambastha, Richard Biebel, Ivan Chan, Michael Cembalest, Marcella Chow, Charles Conrath, Maddi Dessner, James Elliot, Dave Esrig, Jeff Geller, Michael Gubenko, Roger Hallam, Josh Helfat, Jason Ko, Stephen Magyera, Mark Richards, Katherine Rosa, Gabriela Santos, Katy Thorneycroft, Courtney Mee, Meena Gandhi, Robert Michele, Shrenick Shah, Kenneth Tsang, Antony Vallee, Chester Barnes, Spenser Lerner, Karim Hassouna, Stephen Leh, Yazann Romahi, Garrett Norman, Livia Wu, Joe Staines.

We also want to express our utmost appreciation and gratitude to Global Insights and the Investment Writing team, Jill Hamburg-Coplan, Barbara Heubel, Nicola Owen, Barbara Rudolph and Melissa Wiegand; and Global Creative Services for design, Mark Virgo and Jamie Lonie.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

PORTFOLIO INSIGHTS

NOT FOR RETAIL DISTRIBUTION: This communication has been prepared exclusively for institutional/wholesale/professional clients and qualified investors only as defined by local laws and regulations.

JPMAM Long-Term Capital Market Assumptions: Given the complex risk-reward trade-offs involved, we advise clients to rely on judgment as well as quantitative optimization approaches in setting strategic allocations. Please note that all information shown is based on qualitative analysis. Exclusive reliance on the above is not advised. This information is not intended as a recommendation to invest in any particular asset class or strategy or as a promise of future performance. Note that these asset class and strategy assumptions are passive only – they do not consider the impact of active management. References to future returns are not promises or even estimates of actual returns a client portfolio may achieve. Assumptions, opinions and estimates are provided for illustrative purposes only. They should not be relied upon as recommendations to buy or sell securities. Forecasts of financial market trends that are based on current market conditions constitute our judgment and are subject to change without notice. We believe the information provided here is reliable, but do not warrant its accuracy or completeness. This material has been prepared for information purposes only and is not intended to provide, and should not be relied on for, accounting, legal or tax advice. The outputs of the assumptions are provided for illustration/discussion purposes only and are subject to significant limitations. "Expected" or "alpha" return estimates are subject to uncertainty and error. For example, changes in the historical data from which it is estimated will result in different implications for asset class returns. Expected returns for each asset class are conditional on an economic scenario; actual returns in the event the scenario comes to pass could be higher or lower, as they have been in the past, so an investor should not expect to achieve returns similar to the outputs shown herein. References to future returns for either asset allocation strategies or asset classes are not promises of actual returns a client portfolio may achieve. Because of the inherent limitations of all models, potential investors should not rely exclusively on the model when making a decision. The model cannot account for the impact that economic, market, and other factors may have on the implementation and ongoing management of an actual investment portfolio. Unlike actual portfolio outcomes, the model outcomes do not reflect actual trading, liquidity constraints, fees, expenses, taxes and other factors that could impact the future returns. The model assumptions are passive only – they do not consider the impact of active management. A manager's ability to achieve similar outcomes is subject to risk factors over which the manager may have no or limited control. The views contained herein are not to be taken as advice or a recommendation to buy or sell any investment in any jurisdiction, nor is it a commitment from J.P. Morgan Asset Management or any of its subsidiaries to participate in any of the transactions mentioned herein. Any forecasts, figures, opinions or investment techniques and strategies set out are for information purposes only, based on certain assumptions and current market conditions and are subject to change without prior notice. All information presented herein is considered to be accurate at the time of production. This material does not contain sufficient information to support an investment decision and it should not be relied upon by you in evaluating the merits of investing in any securities or products. In addition, users should make an independent assessment of the legal, regulatory, tax, credit and accounting implications and determine, together with their own professional advisers, if any investment mentioned herein is believed to be suitable to their personal goals. Investors should ensure that they obtain all available relevant information before making any investment. It should be noted that investment involves risks, the value of investments and the income from them may fluctuate in accordance with market conditions and taxation agreements and investors may not get back the full amount invested. Both past performance and yield are not a reliable indicator of current and future results.

For the purposes of MiFIDII, the JPM Market Insights and Portfolio Insights programs are marketing communications and are not in scope for any MiFIDII/MiFIR requirements specifically related to investment research. Furthermore, the J.P. Morgan Asset Management Market Insights and Portfolio Insights programs, as non-independent research, have not been prepared in accordance with legal requirements designed to promote the independence of investment research, nor are they subject to any prohibition on dealing ahead of the dissemination of investment research.

J.P. Morgan Asset Management is the brand for the asset management business of JPMorgan Chase & Co. and its affiliates worldwide.

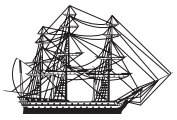
To the extent permitted by applicable law, we may record telephone calls and monitor electronic communications to comply with our legal and regulatory obligations and internal policies. Personal data will be collected, stored and processed by J.P. Morgan Asset Management in accordance with our Company's Privacy Policy. For further information regarding our regional privacy policies please refer to the EMEA Privacy Policy; for locational Asia Pacific privacy policies, please click on the respective links: Hong Kong Privacy Policy, Australia Privacy Policy, Taiwan Privacy Policy, Japan Privacy Policy and Singapore Privacy Policy.

This communication is issued by the following entities: in the United Kingdom by JPMorgan Asset Management (UK) Limited, which is authorized and regulated by the Financial Conduct Authority; in other European jurisdictions by JPMorgan Asset Management (Europe) S.à r.l.; in Hong Kong by JF Asset Management Limited, or JPMorgan Funds (Asia) Limited, or JPMorgan Asset Management Real Assets (Asia) Limited; in Singapore by JPMorgan Asset Management (Singapore) Limited (Co. Reg. No. 197601586K), or JPMorgan Asset Management Real Assets (Singapore) Pte Ltd (Co. Reg. No. 201120355E); in Taiwan by JPMorgan Asset Management (Taiwan) Limited; in Japan by JPMorgan Asset Management (Japan) Limited which is a member of the Investment Trusts Association, Japan, the Japan Investment Advisers Association, Type II Financial Instruments Firms Association and the Japan Securities Dealers Association and is regulated by the Financial Services Agency (registration number "Kanto Local Finance Bureau (Financial Instruments Firm) No. 330"); in Australia to wholesale clients only as defined in section 761A and 761G of the Corporations Act 2001 (Cth) by JPMorgan Asset Management (Australia) Limited (ABN 55143832080) (AFSL 376919); in Brazil by Banco J.P. Morgan S.A.; in Canada for institutional clients' use only by JPMorgan Asset Management (Canada) Inc., and in the United States by JPMorgan Distribution Services Inc. and J.P. Morgan Institutional Investments, Inc., both members of FINRA; and J.P. Morgan Investment Management Inc.

In APAC, distribution is for Hong Kong, Taiwan, Japan and Singapore. For all other countries in APAC, to intended recipients only.

Copyright 2018 JPMorgan Chase & Co. All rights reserved.

PI-LTCMA-WP-2019 | 10/18 | 0903c02a823f664a



Vanguard®

Vanguard economic and market outlook for 2019: Down but not out

Vanguard Research

December 2018

- As the global economy enters its tenth year of expansion following the global financial crisis, concerns are growing that a recession may be imminent. Although several factors will raise the risk of recession in 2019, a slowdown in growth—led by the United States and China—with periodic "growth scares" is the most likely outcome. In short, economic growth should shift down but not out.
- Previous Vanguard outlooks anticipated that the secular forces of globalization and technological disruption would make achieving 2% inflation in the United States, Europe, Japan, and elsewhere more difficult. In 2018, we rightly anticipated a cyclical firming in core inflation across various economies. In 2019, we do not see a material risk of further strong rises in core inflation despite lower unemployment rates and higher wages. This is because higher wages are not likely to funnel through to higher consumer prices, as inflation expectations remain well-anchored.
- As inflation moves toward target, financial stability risks rise, and unemployment rates continue to approach or drop below estimates of full employment, global central banks will stay on their gradual normalization paths. In the United States, we still expect the Federal Reserve to reach terminal rate for this cycle in the summer of 2019, bringing the policy rate range to 2.75%–3% before halting further increases in the face of nonaccelerating inflation and decelerating top-line growth. Other developed-market central banks, though, will only begin to lift interest rates from postcrisis lows.
- With slowing growth, disparate rates of inflation, and continued policy normalization, volatility in financial markets is likely to accelerate. Long term, our ten-year outlook for investment returns remains guarded, given the backdrop of high valuations and depressed risk-free rates across major markets.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Lead authors

Joseph Davis, Ph.D.
Global Chief Economist

Roger A. Aliaga-Díaz, Ph.D.
Chief Economist, Americas

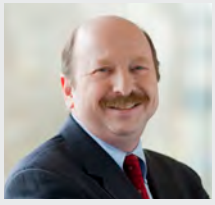
Peter Westaway, Ph.D.
Chief Economist, Europe

Qian Wang, Ph.D.
Chief Economist, Asia-Pacific

Andrew J. Patterson, CFA
Senior Economist

Harshdeep Ahluwalia, M.Sc.
Senior Investment Strategist

Alexis Gray, M.Sc.
Senior Economist



Jonathan Lemco, Ph.D.
Senior Investment Strategist

Editorial note

This publication is an update of Vanguard's annual economic and market outlook for 2019 for key economies around the globe. Aided by Vanguard Capital Markets Model® simulations and other research, we also forecast future performance for a broad array of fixed income and equity asset classes.

Acknowledgments

We thank Kristen M. Storti, Donald B. Foote III, and Andrew S. Clarke, CFA, for their significant contributions to this piece and acknowledge the work of the Global Economics and Capital Markets Outlook Team. Further, we would like to acknowledge the work of Vanguard's broader Investment Strategy Group, without whose tireless research efforts this piece would not be possible.

Vanguard Investment Strategy Group

Vanguard Global Economics and Capital Markets Outlook Team

Joseph Davis, Ph.D., Global Chief Economist

Americas

Roger A. Aliaga-Díaz, Ph.D., Chief Economist, Americas
Harshdeep Ahluwalia, M.Sc.
Kevin DiCiurcio, CFA
Joshua M. Hirt, CFA
Jonathan Lemco, Ph.D.
Vytautas Maciulis, CFA
Darrell Pacheco
David Pakula, CFA
Andrew J. Patterson, CFA
Jonathan Petersen, M.Sc.
Ashish Rajbhandari, Ph.D.
Asawari Sathe, M.Sc.
Adam J. Schickling, CFA
Christos Tasopoulos, M.Sc.
Haifeng Wang, Ph.D.

Europe

Peter Westaway, Ph.D., Chief Economist, Europe
Jack Buesnel
Ankul Daga, CFA
Alexis Gray, M.Sc.
William Palmer
Shaan Raithatha, CFA
Giulio Renzi-Ricci, M.Sc.

Asia-Pacific

Qian Wang, Ph.D., Chief Economist, Asia-Pacific
Matthew C. Tufano
Beatrice Yeo

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Contents

Global outlook summary 4

I. Global economic perspectives 6

Global economic outlook: Down but not out 6
Global growth outlook: Moderating to trend 12
United States: Going for a soft landing 15
Euro area: Stable growth as policy normalizes 19
United Kingdom: Brexit is still the wild card 21
China: Reprioritizing policy goals amid rising risks 23
Japan: No exit, but more flexibility 26
Emerging markets: A mixed bag 29

II. Global capital markets outlook 31

Global equity markets: High risk, low return 31
Global fixed income markets: An improved outlook 34
Portfolio implications: A low return orbit 36

III. Appendix 42

About the Vanguard Capital Markets Model 42
Index simulations 43

Notes on asset-return distributions

The asset-return distributions shown here represent Vanguard's view on the potential range of risk premiums that may occur over the next ten years; such long-term projections are not intended to be extrapolated into a short-term view. These potential outcomes for long-term investment returns are generated by the Vanguard Capital Markets Model® (VCMM) and reflect the collective perspective of our Investment Strategy Group. The expected risk premiums—and the uncertainty surrounding those expectations—are among a number of qualitative and quantitative inputs used in Vanguard's investment methodology and portfolio construction process.

IMPORTANT: The projections and other information generated by the VCMM regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results, and are not guarantees of future results. Distribution of return outcomes from the VCMM are derived from 10,000 simulations for each modeled asset class. Simulations are as of September 30, 2018. Results from the model may vary with each use and over time. For more information, see the Appendix section "About the Vanguard Capital Markets Model."

Vanguard's distinct approach to forecasting

To treat the future with the deference it deserves, Vanguard has long believed that market forecasts are best viewed in a probabilistic framework. This annual publication's primary objectives are to describe the projected long-term return distributions that contribute to strategic asset allocation decisions and to present the rationale for the ranges and probabilities of potential outcomes. This analysis discusses our global outlook from the perspective of a U.S. investor with a dollar-denominated portfolio.

Global outlook summary

Global economy: *Down but not out*

As the global economic expansion enters its tenth year, concerns are growing that a recession may be imminent. Although several factors will raise the risk of recession in 2019, a slowdown in growth—led by the United States and China—is the most likely outcome. In short, economic growth should shift down but not out.

We expect the global economy to continue to grow, albeit at a slightly slower pace, over the next two years, leading at times to so-called growth scares. In 2019, U.S. economic growth should drop back toward a more sustainable 2% as the benefits of expansionary fiscal and monetary policy abate. Europe and Japan are at an earlier stage of the business cycle, though we expect growth there to remain modest.

In emerging markets, China's growth will remain near 6%, with increasing policy stimulus applied to help maintain that trajectory. Unresolved U.S.-China trade tensions remain one of the largest risk factors to our view, in addition to stronger-than-expected tightening by the Federal Reserve should the U.S. unemployment rate approach 3%.

Global inflation: *Unlikely to shoot past 2%*

Previous Vanguard outlooks anticipated that the secular forces of globalization and technological disruption would make achieving 2% inflation in the United States, Europe, Japan, and elsewhere more difficult. In 2018, we rightly anticipated a cyclical firming in core inflation across various economies. In 2019, we do not see a material risk of further strong rises in core inflation despite lower unemployment rates and higher wages, as inflation expectations remain well-anchored.

In the U.S., we expect core inflation to remain near or below 2% throughout 2019; an escalation in tariffs would only temporarily affect U.S. core inflation. In Europe and Japan, price pressures will increase gradually as labor market slack erodes, though core inflation is likely to stay well below 2%. Higher wages are likely, yes, but higher inflation is not.

Monetary policy: *Convergence commences, with the Fed stopping near 3%*

As inflation moves toward target, financial-stability risks rise, and unemployment rates approach full employment, global central banks will stay on their gradual normalization paths.

In the United States, we still expect the Fed to reach terminal rate for this cycle in the summer of 2019, bringing the policy rate range to 2.75%–3% before halting further increases in the face of nonaccelerating inflation and decelerating growth. Other developed-market central banks will only begin to lift interest rates from postcrisis lows. We expect the first rate increase from the European Central Bank in late 2019, followed by a very gradual hiking path thereafter. Japan is late to the party and we do not expect any rate increases in 2019, though some fine-tuning of its policy framework is likely to ease growing financial-stability risk. Emerging-market countries don't control their own destiny and will be proactively forced to tighten along with the Fed, while further modest currency depreciation, tempered by tightened capital controls, is the most likely outcome in China.

Investment outlook: *No pain, no gain*

With slowing growth, disparate rates of inflation, and continued policy normalization, volatility in financial markets is likely to accelerate. Long term, our ten-year outlook for investment returns remains guarded, given the backdrop of high valuations and depressed risk-free rates across major markets.

U.S. fixed income returns are most likely to be in the 2.5%–4.5% range, driven by rising policy rates and higher yields across the maturity curve as policy normalizes. This results in a modestly higher outlook compared with last year's outlook of 1.5%–3.5%—albeit still more muted than the historical precedent of 4.7%.

Returns in global equity markets are likely to be about 4.5%–6.5% for U.S.-dollar-based investors. This remains significantly lower than the experience of previous decades and of the postcrisis years, when global equities have risen 12.6% a year since the trough of the market downturn. We do, however, foresee improving return prospects in non-U.S. developed markets, building on slightly more attractive valuations (a key driver of the equity risk premiums) combined with higher expected risk-free rates.

As was the case last year, the risk of a correction for equities and other high-beta assets is projected to be considerably higher than for high-quality fixed income portfolios.

Indexes used in our historical calculations

The long-term returns for our hypothetical portfolios are based on data for the appropriate market indexes through September 2018. We chose these benchmarks to provide the best history possible, and we split the global allocations to align with Vanguard's guidance in constructing diversified portfolios.

U.S. bonds: Standard & Poor's High Grade Corporate Index from 1926 through 1968; Citigroup High Grade Index from 1969 through 1972; Lehman Brothers U.S. Long Credit AA Index from 1973 through 1975; and Bloomberg Barclays U.S. Aggregate Bond Index thereafter.

Ex-U.S. bonds: Citigroup World Government Bond Ex-U.S. Index from 1985 through January 1989 and Bloomberg Barclays Global Aggregate ex-USD Index thereafter.

Global bonds: Before January 1990, 100% U.S. bonds, as defined above. January 1990 onward, 70% U.S. bonds and 30% ex-U.S. bonds, rebalanced monthly.

U.S. equities: S&P 90 Index from January 1926 through March 1957; S&P 500 Index from March 1957 through 1974; Dow Jones Wilshire 5000 Index from the beginning of 1975 through April 2005; and MSCI US Broad Market Index thereafter.

Ex-U.S. equities: MSCI World ex USA Index from January 1970 through 1987 and MSCI All Country World ex USA Index thereafter.

Global equities: Before January 1970, 100% U.S. equities, as defined above. January 1970 onward, 60% U.S. equities and 40% ex-U.S. equities, rebalanced monthly.

I. Global economic perspectives

Global economic outlook: Down but not out

As the global economic expansion enters its tenth year, concerns are growing that a recession may be imminent. Although several factors raise the risk of recession in 2019, a slowdown in growth—led by the United States and China—is the most likely outcome.

Our global economic outlook is based on:

- an assessment of the stage of the business cycle for each of the world's largest economies (**Figure I-1**);
- estimates of how recent and expected future policy actions (fiscal, monetary, and trade) will affect economic growth and inflation, among other factors, in 2019 and beyond (see regional outlooks); and
- the probabilities of various risk factors and scenarios that could alter our base case (see Figure I-5 on page 10).

Our analysis of fundamentals and the historical drivers of recession leads us to conclude that continued expansion, albeit at a slower pace—rather than imminent collapse—is the most likely scenario for the global economy in 2019. This forecast is not sanguine, however. The expected easing of global growth in the next two years—driven by a fading boost from U.S. fiscal stimulus, more restrictive Federal Reserve policy, and the continued slowing of growth in China—is fraught with economic and market risks.

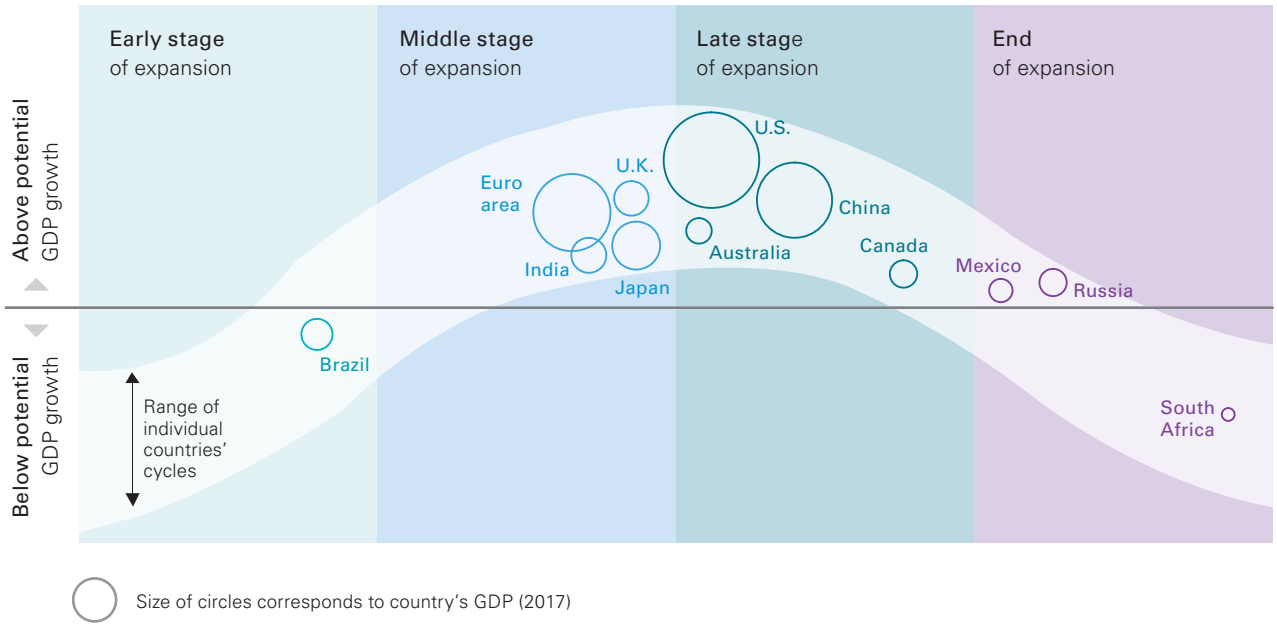
We provide explicit estimates from our Investment Strategy Group's economics team of the most prominent risks for 2019 (see Figure I-5 on page 10).

The global economic cycle

The concern about an imminent global recession often rests on the assumption that the U.S. expansion—which is among the longest on record—is clearly at the latest stage of the business cycle. The typical business cycle is characterized by an economy moving through a series of states: early cycle, when growth recovers strongly after a recession; mid-cycle, as an economy approaches and then exceeds full capacity and growth peaks; and late cycle, as the economy slows down and tips into recession

FIGURE I-1

Where are countries in their economic cycles?



Notes: The vertical axis represents GDP growth rate relative to each country's potential growth rate, represented by the horizontal line. There is no inherent time limit on the length of each stage; different economies progress through the stages at varying speeds. The end of an expansion represents below-trend growth, which may or may not match the common definition of recession of two consecutive quarters of negative real GDP growth.

Sources: Vanguard and the International Monetary Fund (IMF).

again. Yet Figure I-1 illustrates that the United States is only now approaching the later stages of expansion, in which imbalances grow larger, growth begins to decelerate, and recession risks increase. Other major economies, such as Europe and Japan, are even further behind given the slower progress made in their return to full capacity.

As the world's largest economy, the United States is naturally a critical driver of the global business cycle, and so most U.S. recessions are part of global recessions.

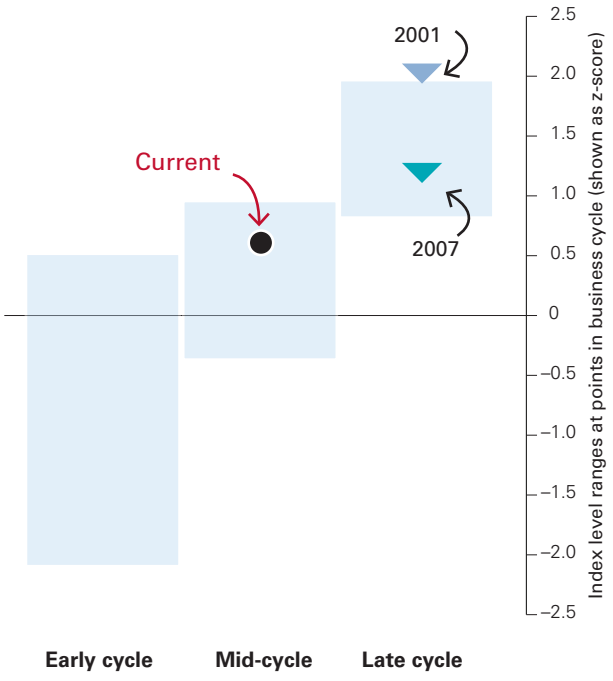
One way to assess the risk of a U.S. recession is to gauge the economy's proximity to the tipping point in the business cycle. **Figure I-2** displays a quantitative assessment of the present stage of the U.S. business cycle (that is, early, mid-, or late cycle). The colored circles indicate that the U.S. economy is only *now* transitioning toward the later stages of the expansion, despite the recovery's near-record length. In other words, current fundamentals such as consumer demand, household balance sheets, price inflation, and the present stance of monetary policy suggest that the U.S. recovery could persist at least through 2020. Other indicators,

FIGURE I-2

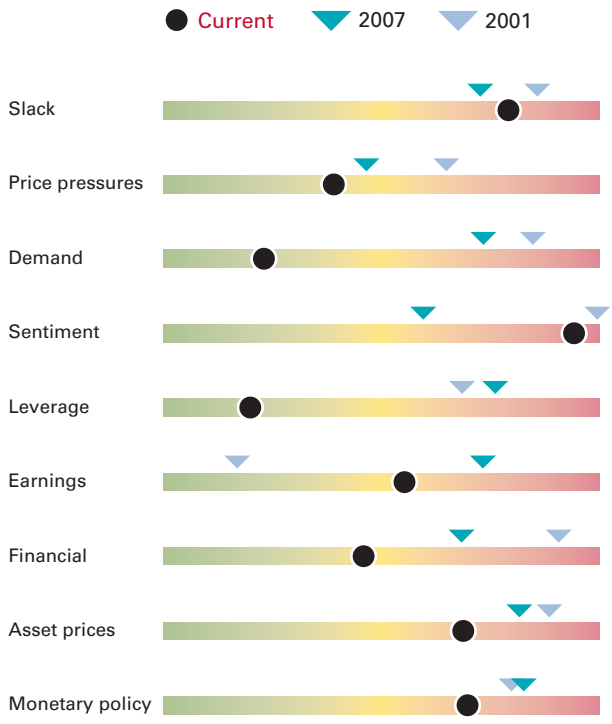
Still too early to call recession in the U.S.

A comparison of the current state of fundamentals with previous business cycles

a. Cyclical index just now moving toward later cycle levels



b. Lack of extremes broadly present across a range of indicators



Notes: Figure I-2a displays the historical ranges of a cyclical index at various points in the business cycle. Index is shown as a z-score and weighted by first principal components of 25 economic indicators (below). The business cycle is determined by historical observations of the output gap. Figure I-2b displays the underlying components of the cyclical index in Figure I-2a, presenting the current level relative to historical observations. The 2007 and 2001 data points indicate the index and component position 12 months prior to the onset of recession. Underlying indicators: slack = output gap, U3 and U6 unemployment rate gap relative to NAIRU. Price pressures = personal consumption expenditures (PCE), core PCE, average hourly earnings, unit labor costs. Demand = housing starts, residential investment, non-residential investment, durable goods consumption. Sentiment = business optimism, consumer sentiment, consumer confidence. Leverage = household financial obligations ratio, nonfinancial corporate debt, FRB Senior Loan Officer Opinion Survey for consumer and commercial and industrial credit terms. Earnings = corporate profits. Financial = Vanguard financial conditions index, yield curve (measured as the 10 year-3 month Treasury yield) Asset prices = Vanguard's fair-value CAPE, corporate OAS spread, high-yield OAS spread. Monetary policy = federal funds rate versus neutral rate estimated by the Laubach-Williams (2003) model. Data range is 1980 Q1-present.

Sources: Vanguard, Moody's Analytics Data Buffet, Federal Reserve Bank of St. Louis, Laubach-Williams (2003).

however, are clearly consistent with a slowdown in growth and a more elevated risk of recession, including tight labor markets and high asset valuations (such as equity price/earnings ratios and tight credit spreads).

Figure I-2 suggests that the chances of a U.S. recession occurring and thereby derailing growth in the global economy are roughly 30% as we enter 2019. U.S. growth in 2019 is likely headed lower, but not below zero—in other words, down but not out.

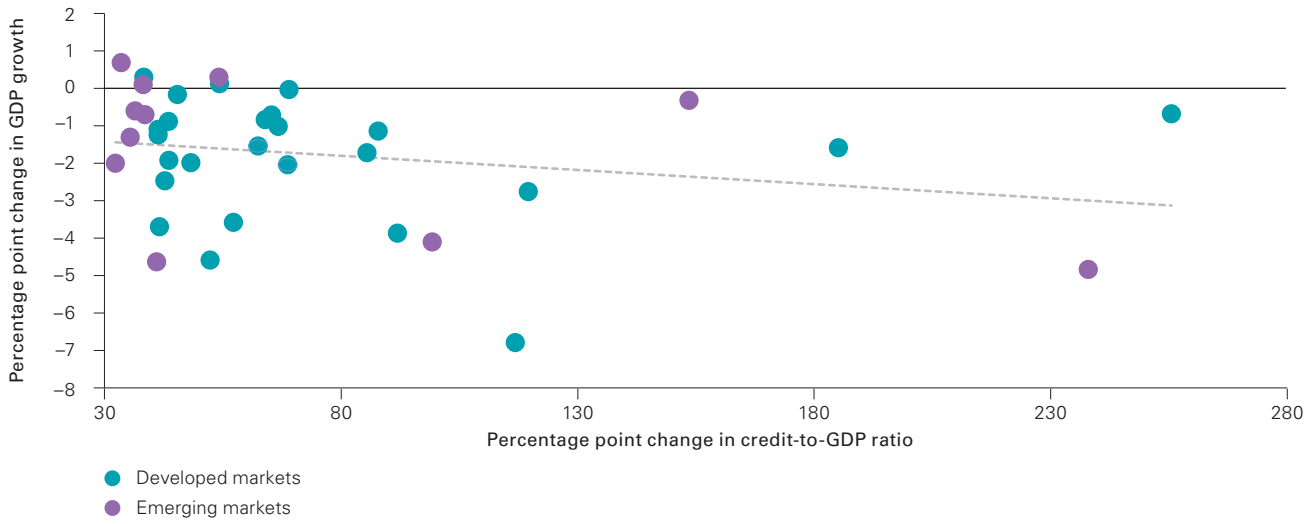
A modest yet persistent challenge that the global economy will face in 2019 (and beyond) is the growth in global debt. In part because of ultrastimulative global monetary policy, global debt levels have rarely if ever been higher, and may be sowing the seeds for the next crisis. The global debt-to-GDP ratio stood at 220% in 2018, up from 175% in 2008.

Specifically, two segments of the global debt markets are concerning: emerging-market debt denominated in hard currency and nonfinancial corporate debt in the U.S. and Europe. In the case of the latter, rapid growth in so-called leveraged loans is particularly alarming, having accounted for about 50% of the total corporate debt issuance in 2018, according to the International Monetary Fund (IMF). As the business cycle continues to mature and financial conditions gradually tighten in 2019, the global economy will be less able to sustain such credit growth (Chen and Kang, 2018). **Figure I-3** illustrates that credit booms eventually fade, helping to contribute to economic slowdowns.

Although many emerging-market economies are vulnerable, China is the key risk factor given the size of its economy, hefty corporate debt, and rapidly rising household debt. China's credit profile stabilized moderately in 2017 and 2018, thanks to a recovery in nominal growth and the government's financial deleveraging campaign. Furthermore, a typical emerging-market debt crisis that is triggered by withdrawal of foreign funding is unlikely, given that over 90% of Chinese debt is domestic. Meanwhile, as downside risk to growth emerges, the Chinese government has engaged in further monetary

FIGURE I-3

Most credit booms eventually lead to slower growth, a headwind for 2019



Notes: Credit booms are defined as periods where the credit-to-GDP ratio is growing at a rate of at least 30 percentage points over a rolling five-year window. The change in credit-to-GDP ratio is the difference between the credit-to-GDP ratio at the start of the credit boom and the credit-to-GDP ratio when credit is growing at its fastest rate, again over a rolling five-year window. The change in GDP growth is the average growth differential between the five-year post-boom and five-year pre-boom periods.

Sources: Vanguard calculations, based on data from Bloomberg, the IMF, and the Bank for International Settlements (BIS).

and fiscal easing. These stimulus measures, alongside strengthened capital controls, will most likely avert a near-term crisis in China and spillover to the global economy. Although China may be delaying important long-term reforms, its near-term growth is unlikely to collapse.

Where could the next recession come from?

To understand what factors might cause a global recession today, it is useful to examine what precipitated such downturns in the past (**Figure I-4**). A more systematic analysis, involving a historical sample of 108 recessions in 23 developed markets over the last 60 years, shows that the length of the expansion is a necessary but not sufficient condition for recession; thus, the duration of the recovery provides little insight into the causes, depth, or even timing of the next recession.

As inflation in most developed markets has fallen to more desired levels since the early 1990s, mainly because of a focus on explicit or implicit inflation-targeting by central banks, the sources of (or catalysts for) global or regional downturns have expanded beyond typical inflation pressures, as they did in the 1970s.

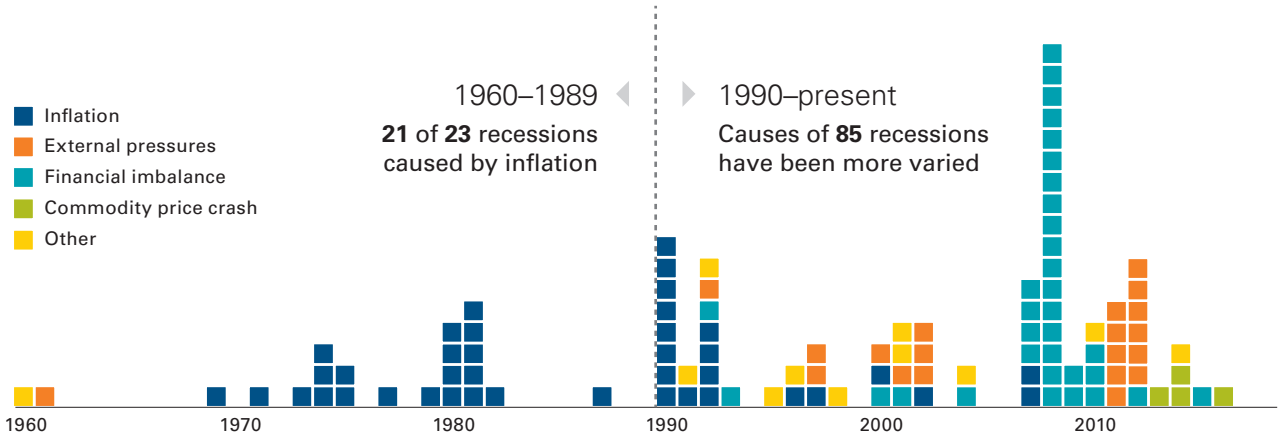
However, there has been no absence of significant inflation shocks to the global economy in the previous four decades. The reason behind the dramatic decline in inflation-induced recessions since the 1980s is that central banks learned to act preemptively in the face of inflation shocks, getting ahead of any price-wage inflationary spirals by better managing market expectations.

In 2019, we do not see a material risk of a strong rise in core inflation despite lower unemployment rates and higher wages, assuming inflation expectations remain well-anchored.

FIGURE I-4

Drivers of recessions vary

Drivers of 108 country-specific recessions since 1960



Notes: Recessions are defined as two consecutive quarters of negative real GDP growth. We examined 23 developed economies starting in 1960, or with the earliest available quarterly data. Recessions were categorized using a variety of macroeconomic indicators and historical analysis. Inflation recessions are those where regional inflation averaged greater than 4% in the 12 months preceding the recession's start. External pressures signify recessions caused by export-demand weakness. Financial imbalance broadly represents a misallocation of capital, either through unsustainable equity, housing, or credit valuations resulting in elevated financial sector stress. Commodity price crashes are most likely to affect commodity export-driven economies. Examples of idiosyncratic factors (other) include weather events, tax increases, and political developments.

Source: Vanguard calculations, based on data from Thomson Reuters, Moody's Analytics Data Buffet, and the Associated Press.

Vanguard's risk scorecard

Although we are not predicting a global recession in our central case, a wide range of triggers could spark a global downturn.

Figure I-5 describes some of the global concerns that are front and center for investors as we head into 2019. For each potential risk, it indicates the odds attached to upside, downside, and base-case scenarios based on our assessment of risks.

Overall, the largest single risk to our forecasts is if an overly aggressive Federal Reserve continues to raise rates beyond 3% in 2019, perhaps because of a temporary rise in core inflation or wages. This risk, if it materialized sometime in 2019, would significantly raise the odds of a U.S. recession in 2020. This would also adversely affect emerging-market countries that are dependent on dollar funding and vulnerable to a strengthening dollar. Other risks are rated at lower odds, yet some of them are interrelated.

FIGURE I-5

Global risks to the outlook

2019 global risks	Description	Vanguard assessment of risks: Negative scenario	Vanguard assessment of risks: Base case	Vanguard assessment of risks: Positive scenario
		27%	**52%**	**21%**
Global monetary policy normalization	Extreme nature of existing policy stimulus, uncharted territory of quantitative tightening, and uncertainty about the neutral setting for policy (r*).	Policy mistake in the U.S.: Fed continues tightening beyond r* and the yield curve inverts. ECB/BOE hold off on normalization plans, increasing the divergence of global policy rates.	Soft landing in the U.S. at 2.75%–3%. Gradual ECB/BOE normalization commences. Global growth slowing back to trend.	Soft landing in the U.S. at 3% or higher. Jump in productivity growth leads to higher growth with no inflation and shifts r* up. Global trend growth increases without global inflation.
		18%	**53%**	**29%**
Trade war and protectionism	Bilateral U.S.-China trade war continues to escalate. Tariffs can be increased further and non-tariff barriers can be put in place.	Trade war extends beyond tariffs to quantitative restrictions, boycotts, etc., with major retaliations from China. Geopolitical risks rise. Impact to GDP growth could be more than 100 basis points.	Trade war escalates in intensity, with level of existing tariffs and coverage of imports increased. Impact on the global economy of 30–50 basis points.	The U.S. and China reach a bilateral agreement. Tariffs are rolled back.
		23%	**57%**	**20%**
Instability of Chinese economy	Fears are rising about a potential hard landing in China, given the collateral damage of financial deleveraging and the expectation of continued deterioration in China-U.S. relations.	Capital flows intensify amid further escalation in the trade war and rising Fed policy rate. Policymakers fail to provide enough stimulus. Headline growth falls below 6%.	Further monetary and fiscal easing will support domestic demand, while financial stability risk remains under control. Headline growth likely moderates to 6.0%–6.3% for 2019.	U.S.-China striking a trade deal and/or policy over-easing represent upside risks to growth.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Two factors that we have built into our *base case* for 2019 are escalating U.S.-China trade tensions and some further moderation in China's economic growth. Those two (interrelated) factors are already acting as a small impediment to global growth in our base case, but the risk is that they could further undermine global demand and ultimately global growth.

We also think there is a nontrivial risk of disruption to economic activity from a flare-up of the standoff in Europe between Italy's government and European policymakers that, *in extremis*, could lead to Italy's exit from the euro area. Brexit-related risks continue to drag on the United Kingdom's economy and, to a lesser extent, Europe's, but we do not see this as one of the major risks likely to lead to a global downturn.

FIGURE I-5 (continued)

Global risks to the outlook

2019 global risks	Description	Vanguard assessment of risks: Negative scenario	Base case	Positive scenario
Euro breakup risk	An escalation in tensions relating to Italy. The risk is that the European Commission will assess penalties on Italy, which further stokes Italian resentment toward the European Union and provokes an Italian exit from the euro.	**16%** The Italian government maintains a loose fiscal policy that results in EU sanctions, prompting a political crisis and eventual departure from the euro. This results in a wider crisis in the euro area and the departure of more countries.	**68%** The Italian government revises fiscal policy to abide by EU rules and market tensions subside, but public and private sector deleveraging is still minimal. Euro breakup concerns are diminished but have not disappeared.	**16%** The Italian government backs down completely and submits a fiscal austerity plan that causes public debt to fall more quickly than currently expected and euro breakup concerns to subside.
Emerging-market debt crises	Key drivers of emerging-market cycles are global monetary divergence, the effect of the U.S. dollar on dollar-denominated debt, and global/China demand for commodities.	**24%** Trade wars, a slowdown of the Chinese economy, or a strong U.S. dollar due to continued divergence of monetary policy lead to spillovers and broader emerging-market crises.	**57%** Emerging-market debt crises remain contained to a few idiosyncratic cases. Global monetary convergence and the stabilization of the Chinese economy ease the risk of contagion to all emerging markets.	**19%** U.S. dollar level normalizes as developed-market central banks commence normalization. Risk-on environment helps emerging markets undergo V-shape bounce-back.

Note: Odds for each scenario are based on median responses to a poll of Vanguard's Global Economics and Capital Markets Outlook Team.
Source: Vanguard.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Global growth outlook: Moderating to trend

Vanguard dashboards of leading economic indicators and implied economic growth for 2019

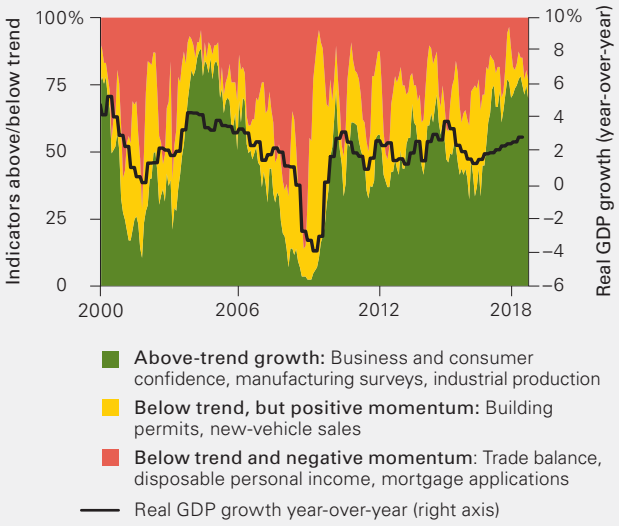
United States: Above trend but falling

Our proprietary U.S. leading indicators dashboard is a statistical model based on more than 80 leading economic indicators from major sectors of the U.S. economy. As **Figure I-6a** shows, in spite of a high proportion of green indicators (above-trend readings) in the dashboard at present, there is an incipient increasein red indicators, signaling the start of a gradual slowdown in the U.S. economy. The most positive (green) indicators are those associated with increased business and consumer confidence, a tightening labor market, and a stronger manufacturing sector. The negative (red) indicators are associated with trade balance, disposable personal income, and mortgage applications. Building permits and new-vehicle sales are below trend but show positive momentum (yellow indicators).

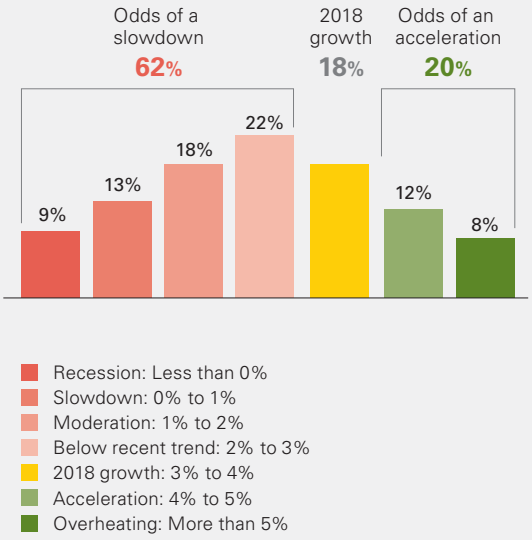
Using regression analysis, we mapped our proprietary indicators to a distribution of potential scenarios for U.S. economic growth in 2019, as shown in **Figure I-6b**. The odds of growth at or exceeding 3% in 2019 (38%) are lower than the odds of growth slowing down (62%). Our base case is for U.S. growth to moderate toward its long-term trend of 2%.

Figure I-6

a. Economic indicators



b. Estimated distribution of U.S. growth outcomes



Notes: Distribution of growth outcomes generated by bootstrapping the residuals from a regression based on a proprietary set of leading economic indicators and historical data, estimated from 1960 to 2018 and adjusting for the time-varying trend growth rate. Trend growth represents projected future estimated trend growth.

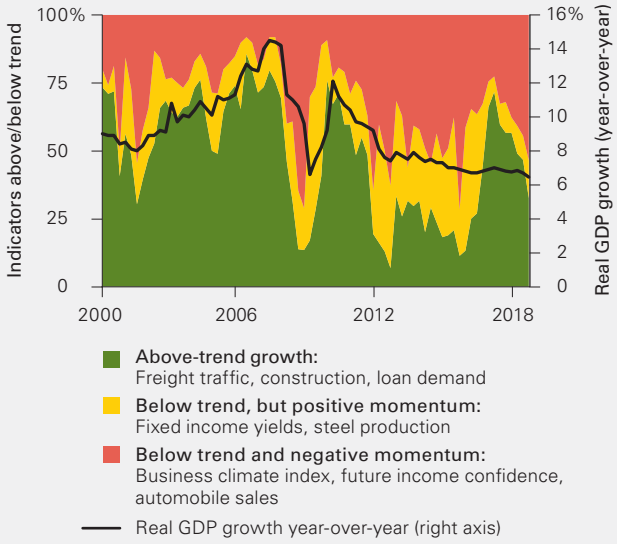
Source: Vanguard calculations, based on data from Moody's Analytics Data Buffet and Thomson Reuters Datastream.

China: Continued deceleration

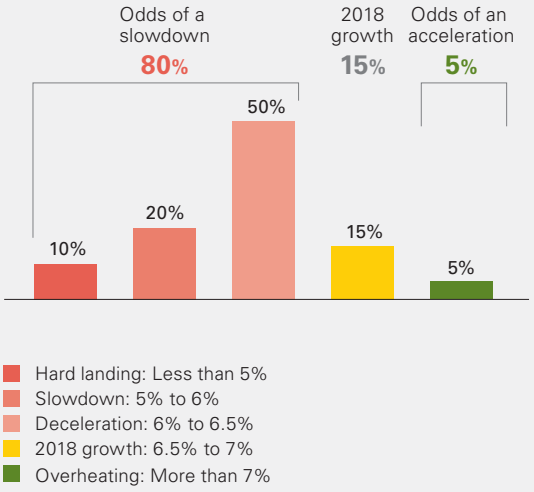
China is expected to continue its modest deceleration in 2019, with risks tilted to the downside, according to our proprietary China leading indicators dashboard (**Figure I-6c**). Specifically, despite ongoing policy efforts to stabilize near-term economic growth and combat international headwinds (as evident in improving fixed asset investment and commodity production), yellow and red indicators associated with softening sentiment and worsening asset returns suggest that more-aggressive stimulus measures may be needed to bolster private enterprise. Against this backdrop, China's economy is expected to grow by about 6%–6.3% in 2019 (**Figure I-6d**), with the risks of a downside slightly greater than those of a growth acceleration.

Figure I-6 (continued)

c. Economic indicators



d. Estimated distribution of China growth outcomes



Notes: Distribution of growth outcomes generated by bootstrapping the residuals from a regression based on a proprietary set of leading economic indicators and historical data, estimated from 1960 to 2018 and adjusting for the time-varying trend growth rate. Trend growth represents projected future estimated trend growth.

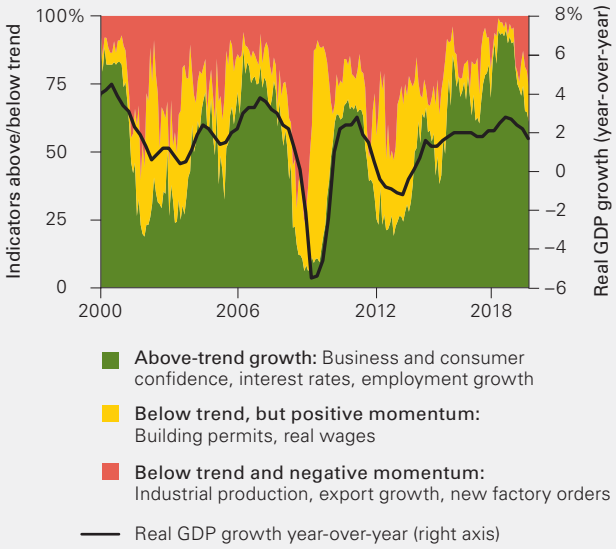
Source: Vanguard calculations, based on data from CEIC and Thomson Reuters Datastream.

Euro area: Above trend but falling

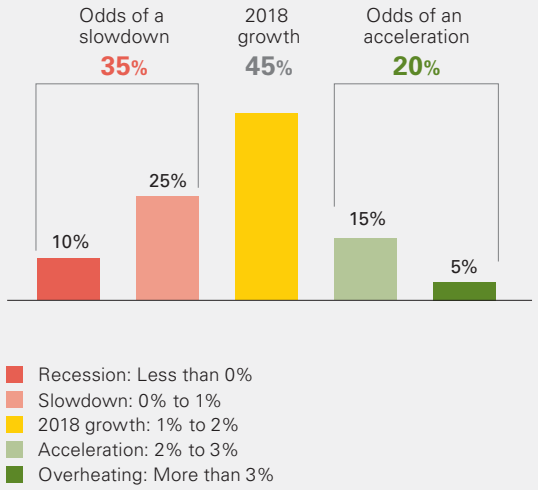
The euro area is expected to grow at a moderate rate of about 1.5% in 2019, which is slightly above trend. As illustrated by our leading indicators dashboard (**Figure I-6e**), the proportion of indicators that are tracking above trend fell throughout 2018, primarily driven by a weaker industrial sector and net trade. A slowdown in the global trade and industrial cycle, in addition to delays in German car production, explains most of this deterioration in economic momentum; German exports and German industrial production are both currently in the red category, indicating below-trend growth and negative momentum. We expect growth to stabilize in the first half of 2019 as car production recovers. Moreover, a large proportion of leading indicators are still in green territory, including business and consumer sentiment, labor market data, and monetary policy. This should provide support to growth next year. However, as shown in **Figure I-6f**, the risks to the growth outlook are skewed to the downside given China's continuing slowdown, U.S.-China trade tensions, and elevated political risks concerning Brexit and Italy.

Figure I-6 (continued)

e. Economic indicators



f. Estimated distribution of euro-area growth outcomes



Notes: Distribution of growth outcomes generated by bootstrapping the residuals from a regression based on a proprietary set of leading economic indicators and historical data, estimated from 1960 to 2018 and adjusting for the time-varying trend growth rate. Trend growth represents projected future estimated trend growth.
Source: Vanguard calculations, based on data from Bloomberg and Macrobond.

United States: Going for a soft landing

Much of our global outlook hinges on our expectations for conditions in the United States. In 2019, U.S. economic growth should decline from current levels toward trend growth of about 2%. While we believe a recession remains some time off (see Figure I-2 on page 7), we expect the U.S. labor market will cool, with employment growth falling closer in line with the trend growth of the labor force (80,000–100,000 per month), and structural factors such as technology and globalization should prevent inflation from rising significantly above the Federal Reserve's 2% target.

The strong performance of the U.S. economy over the last two years is in part explained by significant support from expansionary monetary and fiscal policies. We estimate that the latter contributed over 50 basis points to headline growth in 2018. (A basis point is one-hundredth of a percentage point.) In 2019, we expect monetary policy to dial back to "neutral," with the federal funds rate reaching 2.75%–3% in June of 2019. On the fiscal policy front, we may continue to see the expansionary effects of the Tax Cuts and Jobs Act through the first part of the year. However, we expect the boost to the year-over-year GDP growth rates from consumer spending to begin fading away toward the second half.

But the strong performance of the U.S. economy has been due to more than just policy. The U.S. consumer has been the key engine of growth during the recovery from the global financial crisis, with almost all drivers of spending firing on all cylinders, including recent support from lower income-tax payroll withholdings (see **Figure I-7**). Looking ahead to 2019, the dashboard gets a bit more muddled. Nothing is flashing red, but, with the exception of household debt measures and wage growth, all indicators get worse. Higher interest rates will start to bleed through to mortgage rates and rates for auto and personal loans. They will also affect asset valuations in credit-sensitive sectors such as housing. On the jobs front, it will be hard for the U.S. economy

FIGURE I-7

Dashboard of consumer drivers

	2017/ 2018	2019	Assessment
Wage growth	→	→	Further improvement in wages will be limited by low labor productivity growth
Jobs (growth, lower unemployment)	↑	→	Employment growth will level off
Household debt to disposable income	↑	↑	Outstanding debt and the cost of servicing it will remain low
Wealth effects	↑	→	High equity valuations and market volatility on the rise could be a drag on financial wealth. Rising rates will affect credit-sensitive sectors, including home prices. Year-over-year tax cuts will disappear.
Interest rates and cost of credit	↑	→	Mortgage rates and rates for auto and personal loans will rise
Consumer confidence	↑	→	Unknown; policy uncertainty and market volatility will rise
Consumer prices (inflation and import prices)	↑	→	Inflation will stay close to the Fed's target

Source: Vanguard's Global Economics and Capital Markets Outlook Team.

to replicate the impressive pace of job creation of the last two years. While the labor market will stay strong, it may not provide similar contributions to growth in 2019. And several unknowns such as trade policy uncertainty, increased market volatility, and high equity valuations will possibly affect consumer confidence and stock market wealth.

One of the most puzzling aspects of an otherwise strong U.S. economy continues to be subpar wage growth. As the unemployment rate (3.7% as of November 2018) has fallen to the lowest level since the 1960s, why does wage growth, which is only now reaching 3%, remain so tepid by historical standards?

All else equal, stronger demand for workers should result in higher wages, but all else is not equal. Fundamentally, we should not expect inflation-adjusted (real) wages to exceed the levels of labor productivity growth and inflation. Productivity growth rates have been (1% since the recovery began in 2010, compared with 2% before the global financial crisis. This means we should not expect pre-crisis levels of wage growth, particularly after incorporating inflation, which has struggled to consistently achieve the Fed's 2% target (see **Figure I-8**).[1]

While low labor productivity can explain subdued real wage growth, one concern that investors have for 2019 is that ever tighter labor markets could eventually fuel a wage-inflation spiral involving nominal wages and final consumer prices. The concern is rooted in the strong historical relationship between nominal wages and inflation. However, as shown in **Figure I-9a**, the beta of nominal wage growth on consumer inflation has declined significantly since the 1990s. At the core of this shift in the wage-inflation relationship is the Fed's ability to manage inflation expectations effectively. If they

FIGURE I-8

Absent a significant increase in productivity, higher wage growth is unlikely

Notes: Real wage growth is calculated as the growth rate of hourly wages as reported in the Employment Cost Index (ECI) minus core PCE inflation rate for that year. Trend for real wage growth is estimated as a centered three-year moving average of real wage growth.

Sources: Congressional Budget Office, Bureau of Labor Statistics.

1 See the 2017 Vanguard Global Macro Matters paper *Why Is Inflation So Low? The Growing Deflationary Effects of Moore's Law.*

remain in check, workers would have little reason to fear high inflation and thus would not demand higher nominal wages above and beyond any labor productivity gains plus reasonable levels of inflation around the Fed's 2% target. If wage gains keep pace with productivity and inflation expectations remain near the Fed's target, unit labor costs for businesses would not rise faster than inflation and there would be no impact on final consumer prices.

Inflation expectations and the Fed's ability to manage them (that is, the Fed's credibility) are often overlooked in Phillips curve models that correlate rising inflation with low unemployment. **Figure I-9b** shows our inflation estimates from an augmented Phillips curve model that incorporates not only labor market slack but also inflation expectations and other secular forces affecting inflation, such as globalization and technology.[2] Core inflation is projected to hover closely near the Fed's inflation target in 2019.

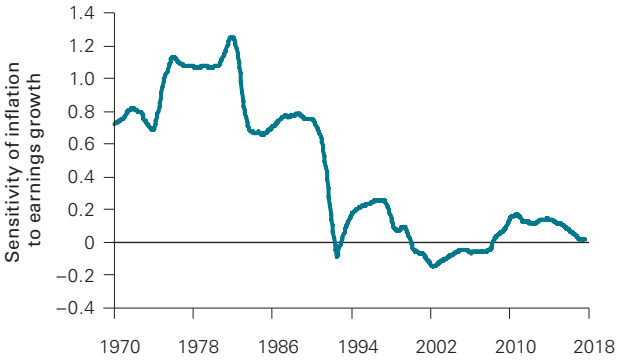
Yet it is this Phillips curve logic that has many who are attempting to anticipate the Fed's next move very focused on the labor market. However, in 2019, the Fed will be able to worry less about the unemployment-inflation link by leaning heavily on its credibility with the market. It will instead rely more on its assessment of a neutral policy stance as its guiding principle.

Calibrating policy rates to neutral is an extremely complex exercise full of risks. The so-called soft landing requires significant skill by policymakers. The neutral rate (usually referred to as r*) is a moving target and not directly observable, as it has to be estimated with statistical models. The Fed's extremely gradualist approach during this rate-hiking cycle does help increase the odds of a successful landing this time, however. Our best attempt to estimate the neutral rate places it somewhere in the 2.5%–3% range. If this is correct, the Fed is likely to

FIGURE I-9

Runaway inflation remains unlikely

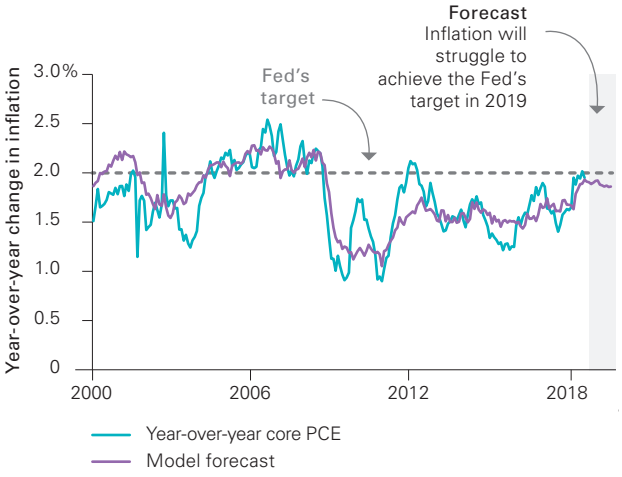
a. Pass-through of earnings to inflation has waned with anchored inflation expectations



Notes: Figure indicates the sensitivity of core PCE inflation to year-over-year growth in average hourly earnings using rolling ten-year regression coefficients. Data cover January 1960–September 2018.

Sources: Vanguard calculations, Moody's Analytics Data Buffet.

b. An "augmented" Phillips curve model



Notes: Core PCE model is a root mean square error (RMSE)-weighted average of two models: a bottom-up model where we model the deviation of augmented Phillips curve fitted values to each major component in the core PCE and a top-down macro model. The RMSE is 0.35 for the bottom-up model and 0.24 for the top-down model. This leads to a 40% weight for the bottom-up model and a 60% weight for the top-down model in the weighted model.

Source: Vanguard calculations, based on Thomson Reuters Datastream, Bureau of Economic Analysis, Bureau of Labor Statistics, Philadelphia Federal Reserve Bank Survey of Professional Forecasters, Congressional Budget Office, and Bloomberg Commodity Index.

2 See the 2018 Vanguard Global Macro Matters paper *From Reflation to Inflation: What's the Tipping Point for Portfolios?*

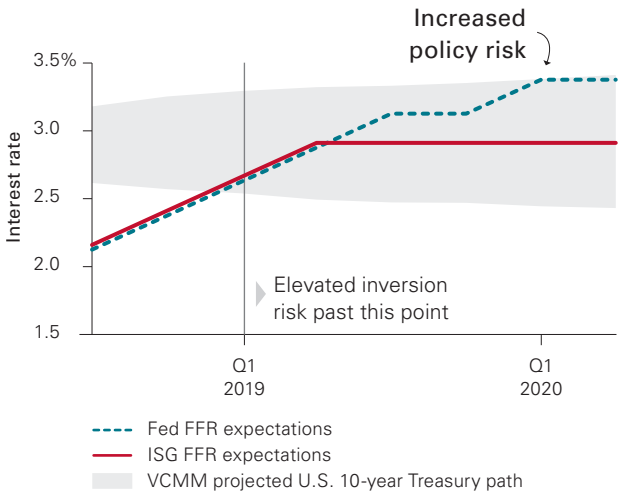
increase the policy rate to a range of 2.75%–3% by June of 2019 and then stop or at least pause to reassess conditions.

The risks to our view are not negligible. Historically, the U.S. Treasury yield curve has provided one of the clearest real-time indicators of overly tight policy. If policy becomes too restrictive, the slope of the yield curve falls, and at some point before a recession, it inverts.[3] Inversion typically occurs when the market believes the Fed has gone too far and drives the yield of the 10-year Treasury below the federal funds rate and that of the 3-month Treasury yield. Recession typically ensues 12 to 18 months later. Since the onset of policy rate increases in 2015, the slope of the Treasury curve has flattened from 300 basis points to around 80 basis points today. As the Fed continues to normalize policy in 2019, the risks of inversion will build (**Figure I-10a**). Some subscribe to the view that a new policy environment means that a flatter yield curve does not hold the same predictive power it once did. Our research leads us to believe that while this power has diminished over time, it still presents a fairly significant risk to our 2019 U.S. base case.[4]

FIGURE I-10

The yield curve remains a relevant leading indicator of economic growth

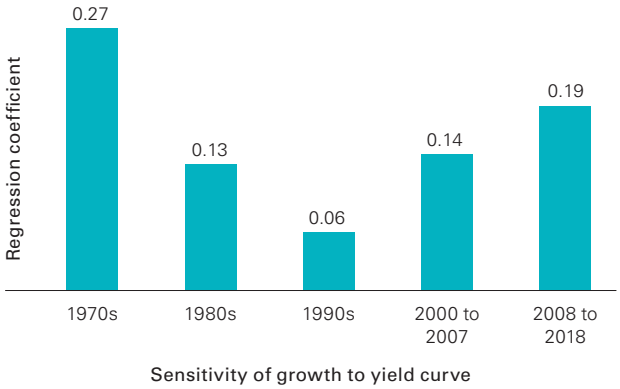
a. Further flattening expected; inversion risk increases in 2019



Notes: FFR refers to federal funds rate. The U.S.10-year Treasury path range uses the 35th to 65th percentile of projected VCMM path observations. Distribution of return outcomes is derived from 10,000 simulations for each modeled asset class. Simulations are as of June 30, 2018. Results from the model may vary with each use and over time.

Sources: Vanguard calculations, based on data from Thomson Reuters Datastream and Moody's Analytics Data Buffet; Federal Reserve Bank of New York.

b. Relationship of growth to yield curve has not deteriorated in the quantitative-easing era



Notes: Data are through June 30, 2018. Sensitivity is represented by coefficients from an ordinary least squares (OLS) regression model of yield curve slope (10-year U.S. Treasury yield minus 3-month T-bill yield) and the Vanguard Leading Economic Indicators series (used as a proxy for growth with monthly observations) 12 months forward. Coefficients are statistically significant at the 1 percent significance level.

Source: Vanguard calculations, based on data from Moody's Analytics Data Buffet and Thomson Reuters Datastream.

3 As measured by the difference between 3-month and 10-year constant-maturity Treasury yields.

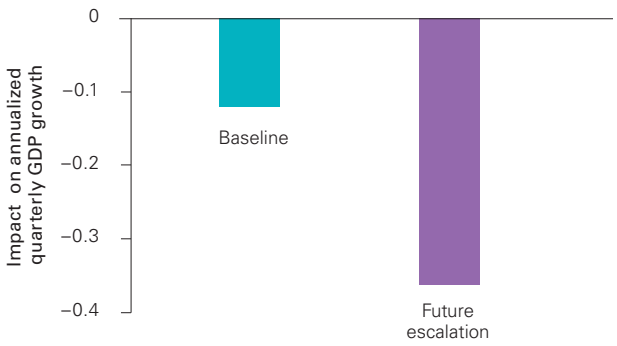
4 See the 2018 Vanguard Global Macro Matters paper *Rising Rates, Flatter Curve: This Time Isn't Different, It Just May Take Longer.*

Outside of monetary policy, the largest domestic risk to our U.S. outlook stems from trade policy. Trade represents a relatively small proportion of the U.S. economy (20% of GDP vs. a developed-market average of 35%). However, if trade tensions reverberate through financial markets (as shown in increases in the BBB spread in **Figure I-11**), the implications for economic conditions, including growth, become more significant. While we believe the U.S. will avoid recession in 2019, if the impacts of monetary and trade policies spread to financial markets, the likelihood of a downturn will become more substantial.

FIGURE I-11

Trade war impacts

GDP impact of higher costs of traded goods and financial market uncertainty



Baseline: A 25% tariff on $350 billion in imported goods (approximate amount of the U.S. trade deficit with China) and a retaliatory 25% tariff on $350 billion in exported goods along with a 25-basis-point widening of the credit spread.

Further escalation: A 25% tariff on a further $200 billion in imported goods (approximate amount of automobile, steel, and aluminum imports exposed to announced tariffs) and retaliatory 25% tariff on a further $200 billion in exported goods along with a 100-basis-point widening of the credit spread.

Notes: Tariff impacts are based on increasing prices of imports and exports by percentage indicated in the Federal Reserve's FRB/US model. The credit spread is the BBB spread. BBB spread impacts are based on shocking the yield spread of long-term BBB corporate bonds versus the 10-year Treasury bond yield by the indicated percentage.

Source: Vanguard calculations, based on the Federal Reserve's FRB/US Model.

Euro area: Stable growth as policy normalizes

After a sharp slowdown in 2018, euro-area growth is likely to stabilize around 1.5% in 2019, which is slightly above trend (see Figure I-6f on page 14). The slowdown was exacerbated by weak global demand for euro-area exports and delays to German car production as carmakers adjust to new European Union (EU) emissions standards.

In early 2019, we expect growth to modestly rebound as car production gets back on track. In addition, domestic demand in the euro area is likely to remain resilient, supported by healthy levels of business and consumer confidence and very low interest rates, which should continue to stimulate demand for credit. A stronger rebound remains unlikely in our view, given China's ongoing slowdown and U.S.-China trade tensions, which will weigh on demand for euro-area exports.

In 2019, risks to the euro area are tilted slightly to the downside, given a number of important global risks we outlined in the global growth outlook section. Domestically, the biggest risk is a further escalation in tensions between Italy's government and European policymakers. In 2019, Italy may break the 3% fiscal-deficit ceiling imposed on all EU members, and given the recent downgrade of Italian sovereign debt by key ratings agencies and the associated rise in Italian bond yields, Italy's debt levels are likely to remain elevated for the foreseeable future. Nervousness about Italy's fiscal position may spill over to other Italian assets and to periphery bond markets, which on its own could dampen growth. The larger risk, however, is that the European Commission imposes penalties on Italy, further stoking Italian resentment toward the EU and provoking Italy to exit from the euro. We think the chance of an Italian exit is only 5% over the next five years, but the situation warrants close attention.

In 2019, we expect the labor market to continue tightening, given that growth is likely to remain above trend for most of the year. The unemployment rate, now close to 8%, is likely to approach 7.5% by year-end, leading to a further lift in wage growth and core inflation (**Figure I-12a**).

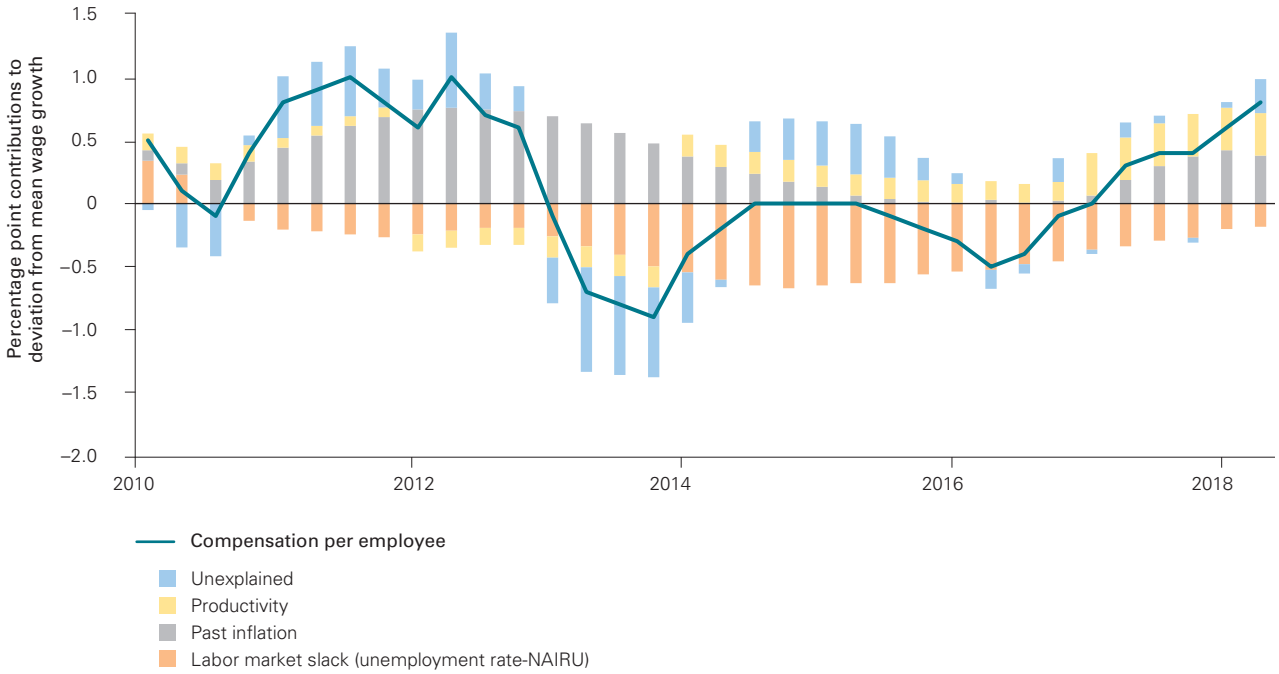
At this stage, we see a low probability of a surprise surge in core inflation, for two key reasons. First, Germany's economy is becoming deeply integrated with low-wage countries in Central and Eastern Europe, so German firms will be unwilling to offer higher wages at home. Second, periphery countries such as Italy, Spain, and Portugal need to contain their labor costs to restore competitiveness with the more efficient German economy.

Given this environment of tightening labor markets and rising inflation pressures, we expect the European Central Bank (ECB) to lift interest rates for the first time in late 2019 (**Figure I-12b**). By that stage, we estimate that the output gap will be slightly positive, with core inflation on track to reach target over the short to medium term. This will be followed by a very gradual hiking path thereafter (25 basis points every six months), given that we do not anticipate strong price pressures, as outlined above. Our analysis suggests that core inflation is unlikely to reach the ECB's target until wage growth increases.

FIGURE 1-12

European wage pressures are building, which will prompt the ECB to initiate a gradual hiking cycle

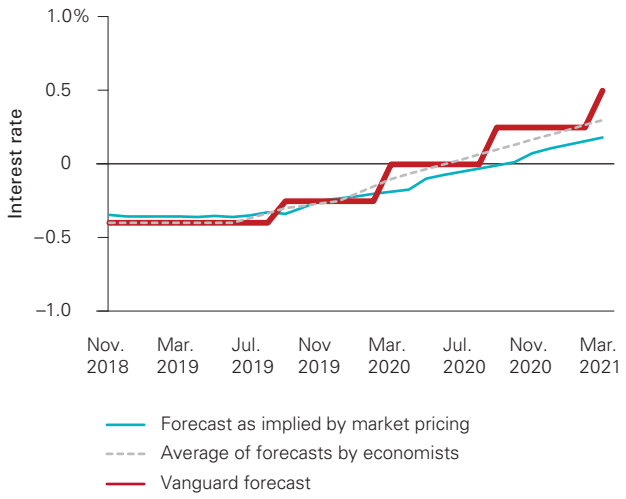
a. Drivers of euro-area wage growth



Notes: This decomposition has been derived from an OLS regression of compensation per employee on productivity growth, past inflation, and labor market slack. The nonaccelerating inflation rate of unemployment (NAIRU) is derived from the estimate by the Organisation for Economic Co-operation and Development (OECD).

Source: Vanguard calculations, based on data from Eurostat and the OECD.

FIGURE I-12 (continued)
b. ECB rate view (versus forward curve and economists' forecast)



Notes: Economists' forecast reflects the median expectation from a survey conducted by Bloomberg. The forecast implied by market pricing is derived from the forward overnight interest rate swap curve.
Sources: Vanguard, Bloomberg.

United Kingdom: Brexit is still the wild card

The United Kingdom is set to leave the EU on March 29, 2019. What happens beyond then depends on what, if any, deal it strikes with the EU. Under our base case, we assume that an agreement is reached that has the United Kingdom leave in March, with some kind of free-trade deal that starts after a transition period.

In the long run, according to government estimates, U.K. GDP would fall by as much as 5%. In 2019, however, the transition period would help limit disruption to the economy, so growth would be likely to remain around trend at 1.6%.

In contrast to previous years, our conviction in our base case is relatively low, given that several Brexit options are still on the table that could materially affect growth. One of the two most prominent risks is a "Crash Brexit," in which the United Kingdom fails to reach a deal and effectively falls out of the EU with no backstop. Such a scenario could be chaotic in the short run, depending on what sort of safety net the government puts in place, leading to sharply lower growth and possibly a recession.

The second risk is a "No Deal Brexit" scenario, in which the U.K. Parliament fails to ratify the deal, which could potentially lead to a second referendum and a vote to remain in the EU. Under this scenario, there would be several months of uncertainty as the referendum takes place, but a decision to remain in the EU could boost growth.

Headline and core inflation are likely to slow and ultimately settle close to 2% in 2019, after being pushed well above target by the sharp drop in the pound sterling after the EU referendum (**Figure I-13a** on page 22). There will still be further upward pressure on inflation, mostly from low unemployment and rising wages. However, we expect the Bank of England to preemptively respond to this potential inflation pickup to keep consumer price growth in line with its 2% target.

U.K. inflation is currently above the Bank of England's 2% target, and in normal times, this would already warrant policy tightening. We are not in normal times, however, given that the country is about to leave the EU.

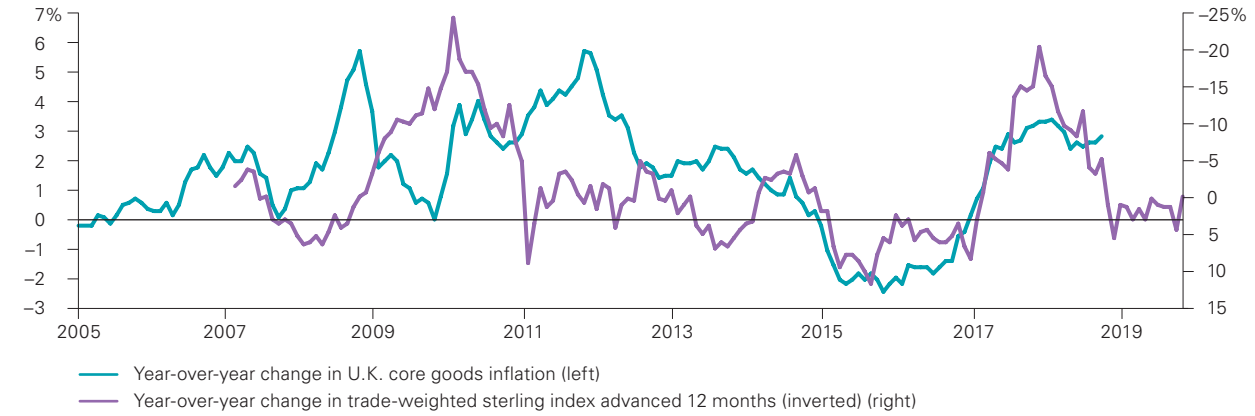
The Bank of England understands that sentiment is fragile and that the possibility of a "No Deal Brexit" is still on the table, so a rate hike could damage sentiment and push the United Kingdom into an unintended slowdown. We therefore believe that the central bank is likely to keep rates on hold until there is further clarity around Brexit.

If our base case plays out, and a "Compromise Brexit" deal is struck before March 2019, we would expect the Bank of England to increase rates twice in 2019, in May and in November, to bring inflation back in line with target (**Figure I-13b** on page 22). If no Brexit deal is reached, however, it will need to reassess its inflation outlook. If the hit to aggregate demand is judged to be greater and more persistent than the hit to aggregate supply, interest rates may be cut. But there is a chance that rates may need to rise even in a "No Deal Brexit" scenario, as the negative supply shock could lead to inflation accelerating above target for a sustained period.

FIGURE I-13

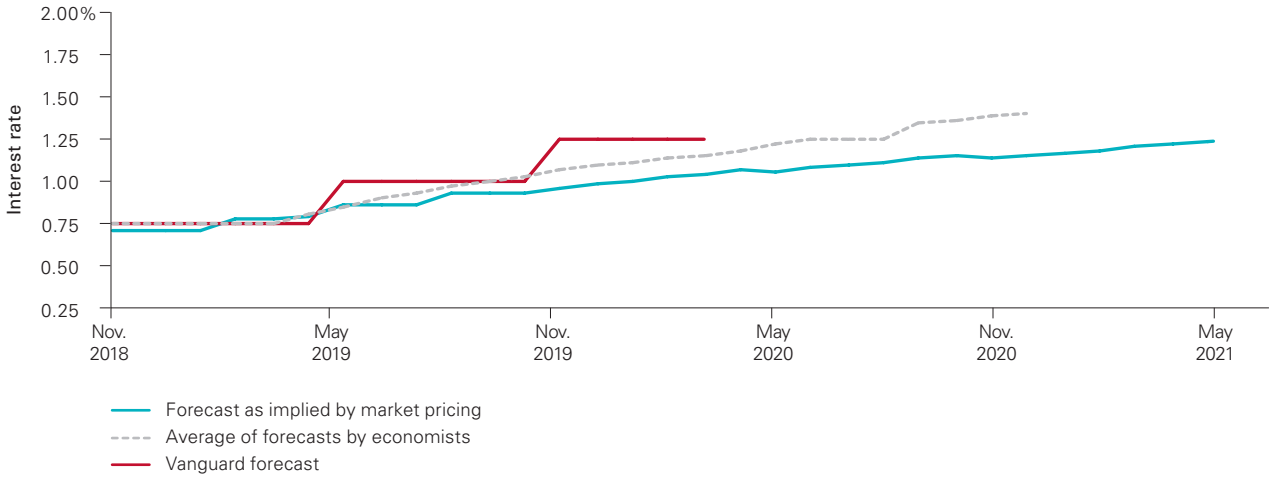
Bank of England to hike rates twice per year to stem inflation pressures

a. U.K. goods inflation is expected to fall because of a stronger pound



Sources: Bloomberg and the Office of National Statistics.

b. Bank of England rate view (versus forward curve and economists' forecast)



Notes: Economists' forecast reflects the median expectation from a survey conducted by Bloomberg. The forecast implied by market pricing is derived from the forward overnight interest rate swap curve.

Sources: Vanguard and Bloomberg.

China: Reprioritizing policy goals amid rising risks

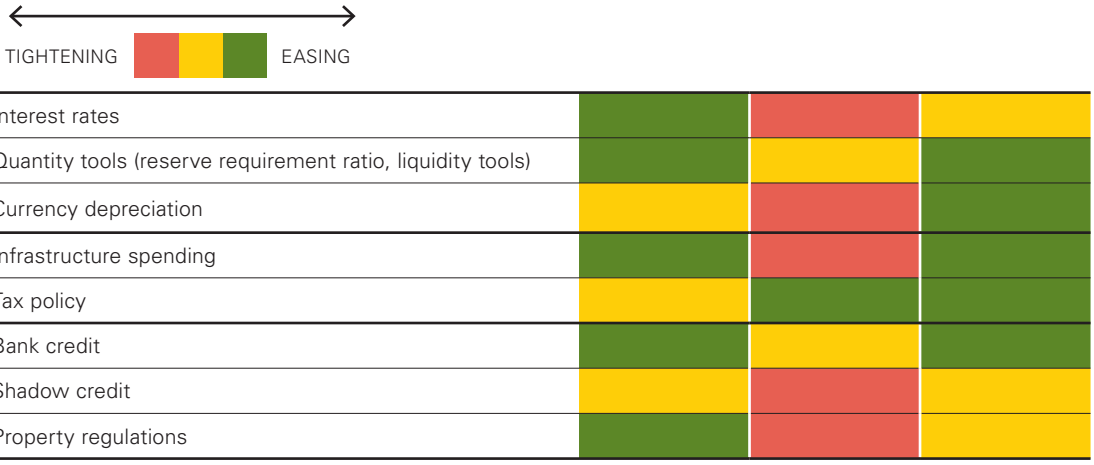
The confluence of China's financial deleveraging campaign and rising geopolitical tensions with the United States has predictably shaken private sector confidence and slowed Chinese economic growth in 2018. These factors, along with the expectation of continued friction in China-U.S. relations, have compelled policymakers to reprioritize near-term growth stability over long-term economic restructuring and medium-term financial stability (see **Figure I-14**). As the government ramps up efforts to boost domestic demand in 2019 amid rising external and domestic challenges, we view the chance of a hard landing as low and expect China's economy to settle into a lower growth range of 6%–6.3% in 2019.

External headwinds have been rising as the United States and China approach a full-blown trade war. The stimulus from export front-loading is waning, and the true economic implications of U.S. tariffs will become apparent. We estimate the direct impact of current tariffs on China's GDP at a modest –0.15%, but this could accelerate to –0.60% with a 25% tariff on all imports from China.

FIGURE I-14

China's current easing is more moderate than in prior cycles

Priority		2014–2016	2017–2018	2018–2019 (projected)
Domestic objectives	Growth stability	HIGH	MEDIUM	HIGH
	Financial stability	LOW	HIGH	MEDIUM
	Structural reform	HIGH	MEDIUM	HIGH



Source: Vanguard.

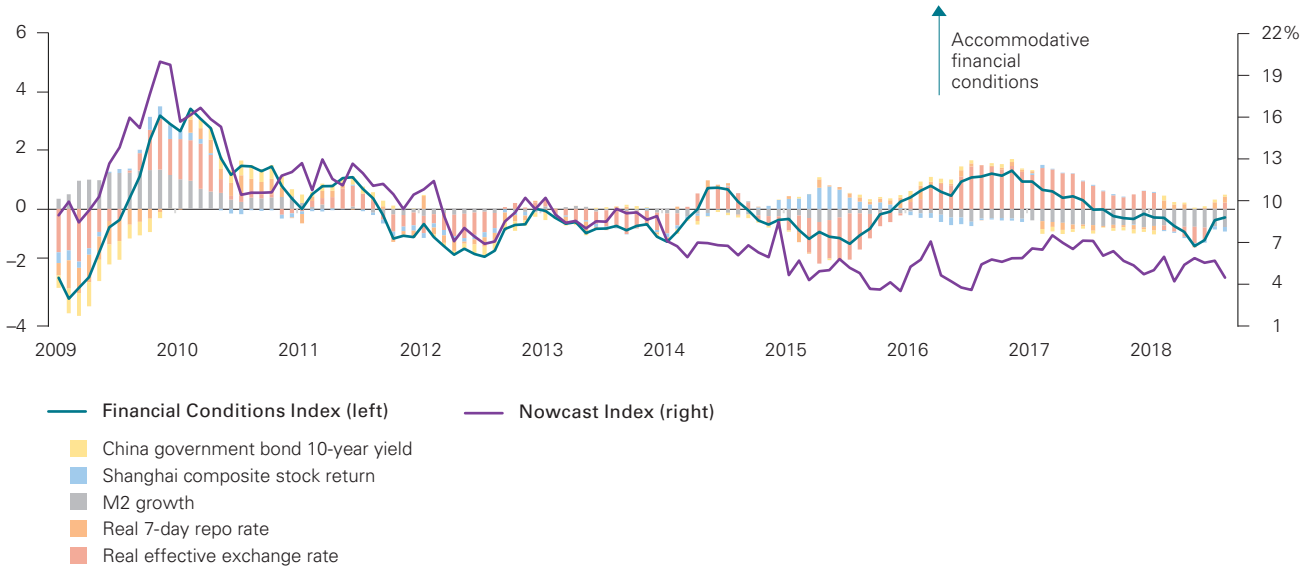
In addition, the potential downside is greater when considering the indirect impact on the labor market, consumption, business confidence, and financial markets. Although there are hopes that a trade deal is imminent, the U.S.-China conflict extends beyond trade to areas such as investment, technology, intellectual property rights, market access, and industry policy. Hence, the path to an eventual truce between the two economic superpowers is likely to be bumpy and prolonged.

China's 2016–2017 financial sector deleveraging campaign and regulatory crackdown on shadow banking had the adverse side effect of curbing credit to small and medium-sized private enterprises, a key component of China's new economy. As policymakers recognize the downside risk to growth, they are ready to pause or even modestly backtrack these deleveraging efforts to boost corporate sentiment; further monetary easing, such as required reserve ratio cuts, is in the pipeline (see **Figure I-15**). We expect regulatory reform aimed at encouraging entrepreneurship and private enterprise,

FIGURE I-15

Proactive policy stimulus should limit growth downside

Vanguard Financial Conditions Index versus Nowcast Index



Notes: Vanguard Financial Conditions Index is a VAR-weighted index of financial indicators. Positive values imply accommodative financial conditions; negative values imply tight conditions. Vanguard's Nowcast Index is designed to track China's economic growth in real time using a dynamic factor approach to weight economic and financial market indicators, accounting for co-movement between the factors.

Source: Vanguard calculations, based on data from Bloomberg, CEIC, and Thomson Reuters Datastream.

alongside fiscal expansionary measures including infrastructure investment and tax cuts, to combat the effects of a trade war.

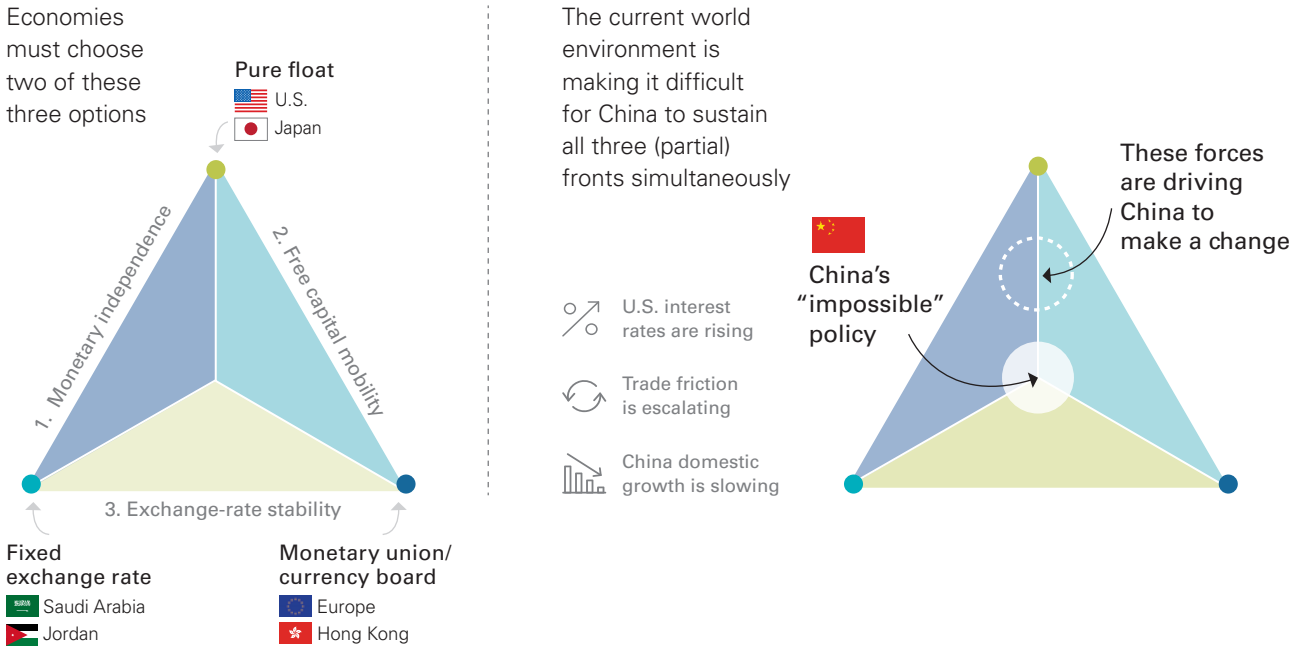
Responding to the slowdown through monetary policy easing revives the "impossible trinity" as the United States continues to raise interest rates.[5] However, we believe a repeat of 2015–2016, when China foreign exchange reserves declined by more than $1 trillion in 18 months amid a surge in capital outflows, is unlikely. With near-term growth stability becoming the top priority, monetary policy independence will prove critical in keeping domestic rates low in a global rising rate environment. As such, an "asymmetric capital control" is likely to be maintained, with tight control on outflows and inflows welcomed. A more flexible exchange rate regime should be allowed, especially when modest depreciation will be needed to offset the negative impact stemming from tariffs (see **Figure I-16**).

Although navigating the trilemma is a challenge in its own right, an ideal "Goldilocks" policy response would neutralize economic headwinds while pushing forward market reforms and safeguarding medium-term financial stability. The government will strive to avoid both under- and over-easing the economy in 2019, but achieving

FIGURE I-16

From an impossible tri-brid approach to a standard corner solution

China is moving toward less capital-account openness and more exchange-rate flexibility



Source: Vanguard.

5 The impossible trinity is a trilemma in international economics that states that it is impossible to have a fixed foreign exchange rate, free capital movement (absence of capital controls), and independent monetary policy at the same time.

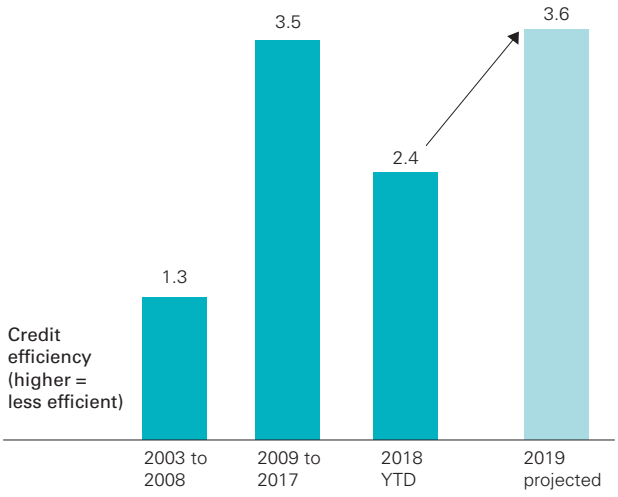
this balance amid multiple goals will be difficult. While we are not as concerned about the near-term growth outlook as many in the market and view the chance of a hard landing as rather low, there are rising concerns that the government is delaying the reforms necessary to alleviate medium-term financial risk and ultimately address distortions in resource allocation (see **Figure I-17**).[6]

Even though the path is likely to be bumpy, we remain cautiously optimistic that China will resume its economic liberalization and reform as a necessary response to enduring international and domestic pressures. The era of "growth at all costs" is coming to an end, and previous inefficiencies and excesses that were masked by China's size and population can no longer go unaddressed. Reform efforts in recent years have demonstrated China's commitment to emphasizing high-quality growth and progressing to a technology-intensive consumption- and service-oriented economy. We believe that continued reforms to improve corporate governance of state-owned enterprises; strengthening intellectual property protection; and providing a level playing field for all firms, including foreign, private, and state-owned enterprises, are critical for China's long-term development through more efficient capital allocation in domestic and international markets. In our view, this is China's ultimate path to higher productivity and future growth potential.

FIGURE I-17

The risk of "kicking the can down the road" remains

Credit efficiency to deteriorate modestly in 2019



Note: Credit efficiency is defined as debt in the economy divided by nominal GDP. 2018 YTD is through September.

Source: Vanguard calculations, based on data from CEIC.

Japan: No exit, but more flexibility

The Japanese economy has managed to weather multiple natural disasters and softening external demand in 2018, thanks to strong domestic demand. In 2019, impediments to growth will likely intensify, given the scheduled consumption tax hike and potential escalation of U.S. protectionism, notably auto tariffs. Nonetheless, we see the downside as being contained because the negative impact should be offset by continued labor market strength, strong corporate profitability, and various mitigating fiscal measures. Households' net burden from the 2019 tax hike is estimated to be only a quarter of the 2014 tax hike as a larger portion of the tax revenue (roughly half, versus one-fifth in 2014) will be rechanneled back to the real economy through social security enhancements, cash subsidies, and infrastructure projects. Overall, we expect growth to revert to its trend of approximately 0.8% in 2019, with the risk skewed modestly to the downside.

Although a positive output gap and tight labor market would warrant monetary policy normalization in most economies, the decades-long struggle with suppressed inflation expectations precludes the Bank of Japan from tightening.We expect core inflation to gradually rise toward 1% throughout 2019, but it is likely several years away from the BoJ target of 2% as a result of these muted expectations (**Figure I-18**).

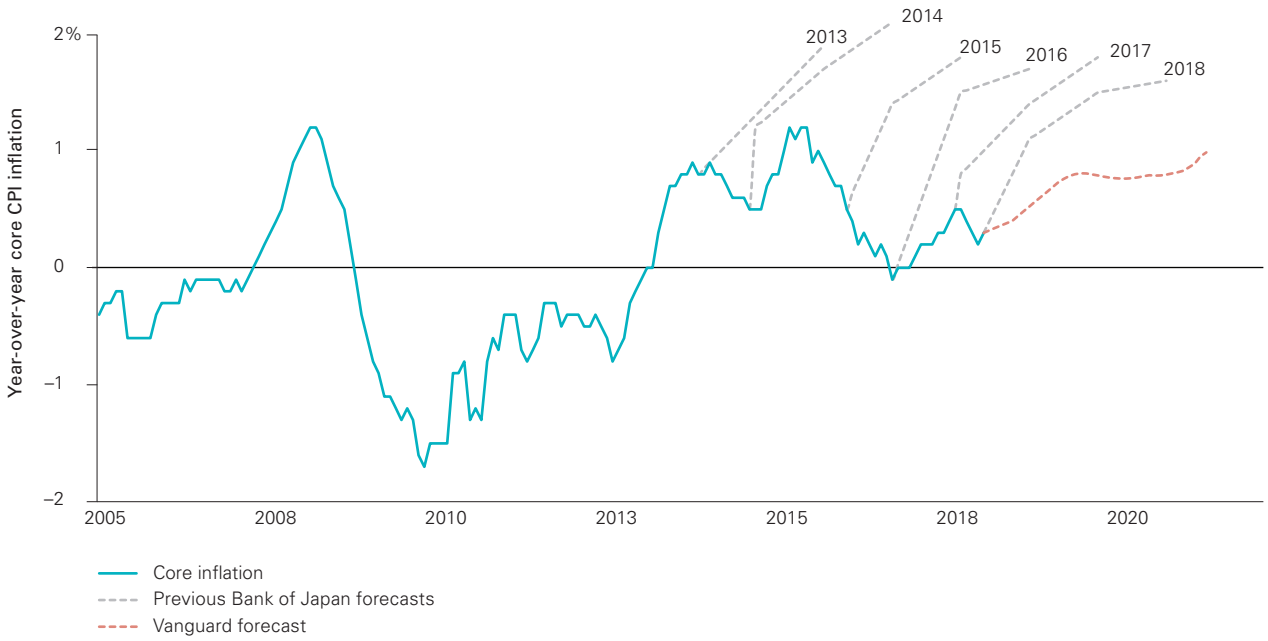
A standard Taylor rule would imply that the bank's current policy stance is accommodative enough, even under our more conservative forecast for inflation and the output gap (see **Figure I-19**). Nonetheless, the Taylor rule estimate based on market inflation expectations demonstrates that the current policy rate is still not low enough to achieve the BoJ's 2% inflation target. This dichotomy is a result of a number of structural factors—

6 See the 2017 Vanguard Global Macro Matters paper *SOE Reforms—China's Path to Higher Productivity.*

FIGURE I-18

The Bank of Japan's inflation woes

Core inflation forecasts (Bank of Japan and Vanguard)



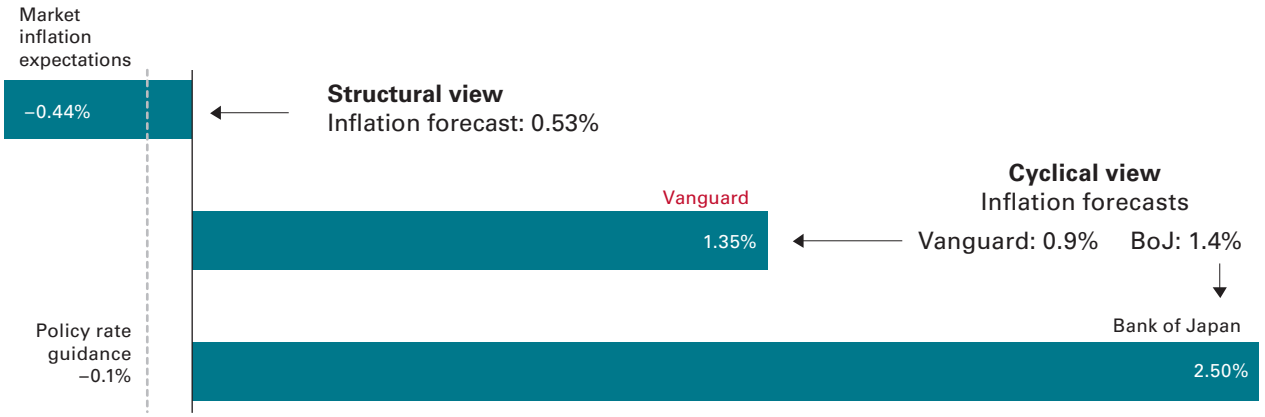
Notes: Core CPI includes all items except fresh food and energy. This measure is also referred to as BoJ Core.

Source: Vanguard calculations, based on data from Thomson Reuters and the Bank of Japan.

FIGURE I-19

A cyclical view of slack suggests current easing is sufficient, but a structural view suggests otherwise

Stylized Taylor rule estimates using inflation forecasts



Notes: The Taylor rule estimate using market inflation expectations takes a structural view of policy setting, taking into account only inflation expectations. It tends to be structurally low because of its highly adaptive nature, with no consideration given to what a cyclical upswing and tight labor market could do to boost prices. Vanguard's and the BoJ's forecasts take a cyclical view of slack by also factoring in the pass-through effects (which are limited in Vanguard's assessment) of a positive output gap and tight labor markets on prices.

Source: Vanguard calculations, based on data from the BoJ, IMF, Bloomberg, and Moody's Analytics Data Buffet.

including labor market duality, the more adaptive nature of Japan's inflation expectations, and global technology advancement—that are preventing labor market and economic pressure from being translated into wage and price increases. As a result, the BoJ is unlikely to raise rates in 2019 and should maintain its forward guidance that interest rates remain low for an extended period.

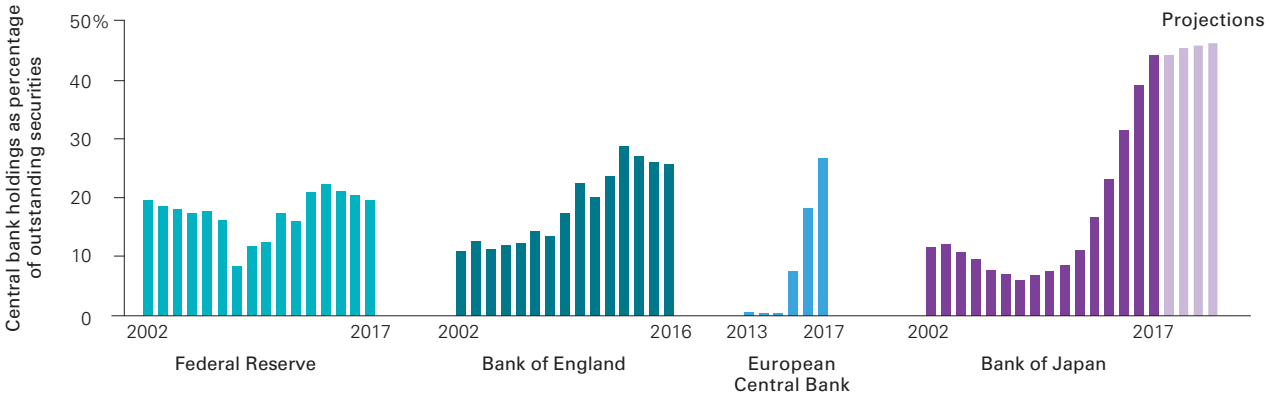
However, additional tweaks and policy fine-tuning measures will likely occur over the next few years. The BoJ is mindful that the side effects accompanying prolonged monetary easing, such as the decrease in Japanese government bond (JGB) market liquidity and deteriorating profitability of financial institutions, are becoming more prominent. The bank's quantitative and qualitative easing program continues to absorb most of the JGBs issued (see **Figure I-20**) and a prevailing low-yield environment continues to dampen profit margins for banks.

Hence, the BoJ will continue to seek more flexibility to enhance the sustainability and credibility of its policy framework without hampering the benefits of easy money. For safe-haven assets such as JGBs, this could mean giving a wider trading band than the current +/- 20 basis points for the 10-year yield. Although this could indirectly result in higher yields, it is by no means an exit from monetary stimulus. The yield curve control target will likely be anchored at approximately 0%, and a negative interest rate policy will still be in place. For risky assets such as the bank's annual 6 trillion yen ETF purchase program, fine-tuning could imply a "soft taper" as in the case of current JGB purchases, with the bank

FIGURE I-20

The side effects of monetary easing are growing

Elevated ownership of outstanding government bond securities poses liquidity risks



Source: Vanguard calculations, based on data from Moody's Analytics Data Buffet, Bloomberg, and the IMF.

intervening only when the equity market falls below a certain threshold instead of treating the 6 trillion yen as a fixed, hard target.

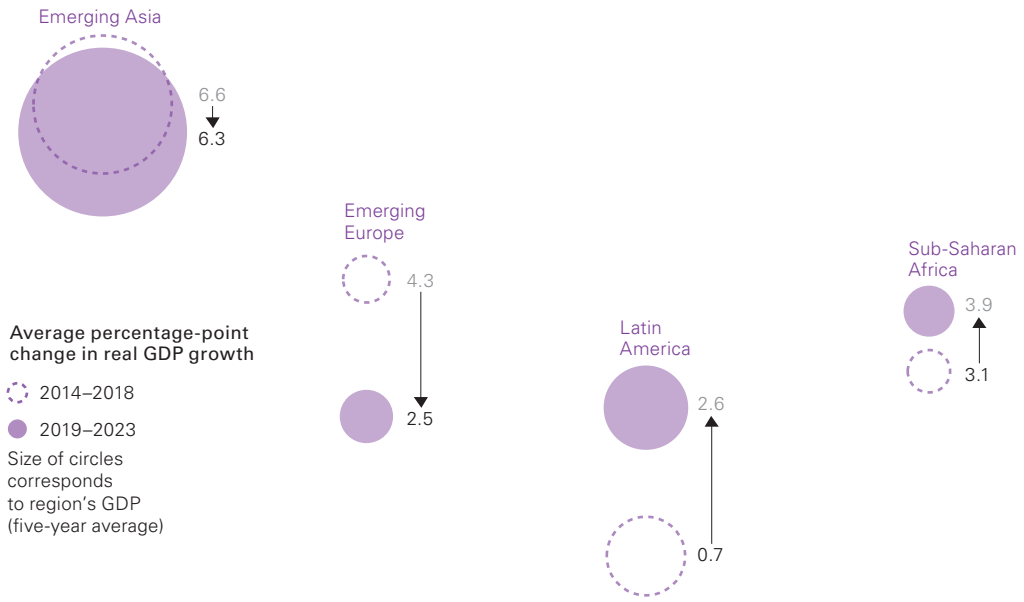
Japan's long-term economic growth prospects remain well below the average of G20 countries. Without the necessary structural reforms, accommodative monetary policy alone is unlikely to lift labor supply, investment, and productivity—and, hence, potential growth. In our view, confidence about economic prospects in the medium term, instead of low interest rates or easy access to credit, is the most important factor driving business investment decisions. The "third arrow" of Prime Minister Shinzo Abe's economic platform has notched notable wins in corporate tax and governance reforms, enhancing labor participation of women and older and foreign workers, reducing pay disparity between regular and nonregular employees, and embracing global trade liberalization. However, progress on immigration reform has been marginal, even as the nation bears a decades-long demographic headwind. Continued deregulation and broader adoption of automation technology, especially in the consumption and service sectors, will be critical to supporting productivity growth in the long term.

Emerging markets: A mixed bag

Growth for emerging markets in aggregate is expected to be 4.6% in 2019; however, there will be vast heterogeneity among and within regions (see **Figure I-21**). The Asia region is expected to register slower growth as China slows down, but it remains the fastest growing of the emerging-market regions. China is projected to register growth lower than 6.5% in 2019. Emerging-market Asian economies are deeply integrated with China-led supply chains and will feel the repercussions of declining export demand from

FIGURE I-21

GDP growth rate



Notes: GDP based on current prices was used to create weighted markers for the regions. Real GDP growth data from the IMF was averaged for the five-year periods 2014–2018 and 2019–2023.

Source: IMF DataMapper.

China. However, the newly ratified Comprehensive and Progressive Agreement for Trans-Pacific Partnership could lessen the blow.

In the Latin American region, the growth projection is 2.8%, an improvement from last year. Central bank policy rates across most emerging-market regions remain low compared with the pre-normalization era (see **Figure I-22**). Across most emerging markets, inflation and currency volatility will determine the pace of central bank hikes in 2019. Apart from some recent volatility, emerging-market currency volatility since normalization (2016–2018) has been lower than during the pre-normalization period (2010–2015).

Most risks for the emerging-market sector are external. The most notable are the U.S.-China trade tensions and a slowdown in China. Monetary policy normalization by the U.S. Federal Reserve has led to tighter financial conditions for emerging markets; this in turn has translated to volatility in emerging-market currencies and declining capital inflows. Populism and geopolitical risks, both at home and abroad, are downside risks for emerging markets. Corporate leverage has increased in emerging markets since the global financial crisis, with high levels of corporate debt issuance in nonlocal currency. A strengthening dollar could severely damage corporate balance sheets within emerging markets.

FIGURE I-22

Idiosyncratic emerging markets

Emerging markets represent a mixed basket; we expect tighter monetary policy to affect growth in countries with unsustainable borrowing

1. Current account (percentage of GDP as of December 2018)
2. Real effective exchange rate (REER) misalignment (as of November 2018)
3. International reserves (percentage of GDP as of Q4 2017)
4. Ease of doing business rank (as of Q4 2017)
5. Household debt (percentage of GDP as of Q1 2018)
6. Per capita GDP (in USD as of Q3 2018)
7. Inflation (percentage change in consumer prices as of September 2018)

	1	2	3	4	5	6	7
Emerging markets Asia	1.0%	3.2%	20%	68	42.6%	$6,104	3.4%
Emerging markets Europe	–0.2%	3.1%	20%	50	24.0%	$11,322	7.2%
Latin America	–2.2%	6.1%	20%	77	23.5%	$9,780	9.8%

Notes: Real exchange rate misalignment is defined as the deviation of the real effective exchange rate (REER) from its past five-year average. This vulnerability indicator is two-sided. Rapid appreciations or depreciations of a country's exchange rate may indicate that flows of foreign funds into or out of the economy may be unsustainable. Depreciations in the exchange rate also reduce purchasing power and increase the risk of economic slowdown. The World Bank Ease of Doing Business score serves as the basis for ranking economies on their business environment and is an indication of an economy's position relative to that of other economies.

Source: Vanguard calculations, based on data from the IMF *World Economic Outlook*, the Bureau of Industry and Security, the World Bank, and Moody's Analytics Data Buffet.

II. Global capital markets outlook

Vanguard's outlook for global stocks and bonds is subdued, yet modestly higher than this time last year. Downside risks are more elevated in the equity market than in the bond market. After factoring in higher short-term interest rates and non-U.S. equity market valuations, the net result is a modestly higher global market outlook for the next decade.

The market's efficient frontier of expected returns for a unit of portfolio risk is still in a lower return orbit. More important, common asset-return-centric portfolio tilts, seeking higher return or yield, are unlikely to escape the strong gravity of low return forces in play.

Global equity markets: High risk, low return

Global equity has rewarded patient investors with a 12.6% annualized return in the 9½ years since the lows of the global financial crisis. As part of this strong performance, valuations are currently much higher. For instance, valuations in the U.S. and emerging markets appear stretched relative to our proprietary fair-value benchmark, thereby making our global equity outlook guarded.

The ten-year outlook for global equities, similar to last year, is centered in the 4.5%–6.5% range based on our Vanguard Capital Markets Model (VCMM) projections.

Expected returns for the U.S. stock market are lower than those for international markets, underscoring the benefits of global equity strategies in this environment.

Equity valuations and Vanguard's "fair-value" CAPE

As discussed in a Vanguard Global Macro Matters piece titled *As U.S. Stock Prices Rise, the Risk-Return Trade-off Gets Tricky,* price/earnings ratios—including Robert Shiller's cyclically adjusted P/E ratio (CAPE)—are at alarming levels. The current CAPE level corresponds to the 95th percentile of its historical range of values, approaching highs seen during the dot-com era. However, a straight comparison of CAPE (or other valuation multiples) with its historical averages can be misleading, failing to account for today's low inflation and interest rates.

Because a secular decline in interest rates and inflation depresses the discount rates used in asset-pricing models, investors are willing to pay a higher price for future earnings, thus inflating P/E ratios. Therefore, a high CAPE may not be indicating overvalued stock prices but rather may be an outcome of low inflation and interest rates.

Vanguard's fair-value CAPE accounts for current interest rates and inflation levels and provides a more useful time-varying benchmark against which the traditional CAPE ratios can be compared, instead of the popular use of historical average benchmarks.

Figure II-1a plots Shiller's CAPE versus our fair-value model. For instance, in the late 1990s, the difference between the CAPE and our fair-value estimate would have suggested a bubble. Today, although the CAPE is approaching historical highs, it's not grossly overvalued, as it would be in a bubble, when compared with its fair value.

We have extended this fair-value concept to other regions. As illustrated in **Figure II-1b**, our equity valuation dashboard indicates that non-U.S. developed markets are fairly valued, even after adjusting valuations for rates and inflation. For emerging markets, it is important to note that their stocks typically trade at lower multiples than those in developed markets because of the higher risk and higher earnings yield required by investors. Even after adjusting for higher risk, emerging markets are overvalued.

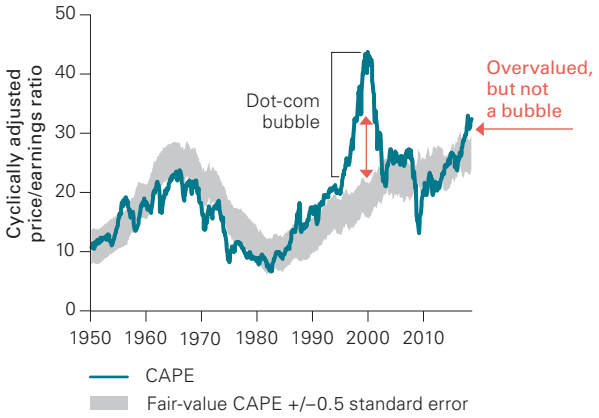
Global equities and the diversification of domestic risks

As shown in **Figure II-2**, our expected return outlook for U.S. equities over the next decade is centered in the 3%–5% range, in stark contrast with the 10.6% annualized return generated over the last 30 years. Although valuation expansion proved to be a tailwind to returns over those 30 years, we expect valuations to contract as interest rates gradually rise over the next decade. The expected equity risk premium (over cash) for the U.S. market appears compressed, primarily because of elevated valuations today.

FIGURE II-1

Divergence in global equity valuations

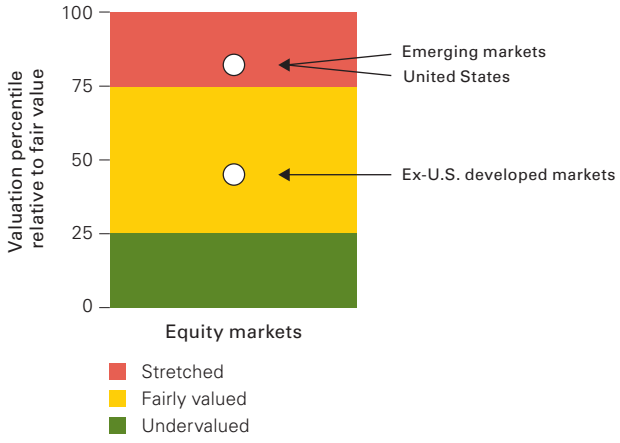
a. CAPE for the U.S. S&P 500 Index is approaching overvalued territory



Notes: Fair-value CAPE is based on a statistical model that corrects CAPE measures for the level of inflation expectations and for lower interest rates. The statistical model specification is a three-variable vector error correction (VEC), including equity earnings yields, ten-year trailing inflation, and ten-year U.S. Treasury yields estimated over the period January 1940–September 2018.

Source: Vanguard calculations, based on data from Robert Shiller's website (aida.wss.yale.edu/~shiller/data.htm), the U.S. Bureau of Labor Statistics, and the Federal Reserve Board.

b. Ex-U.S. developed markets appear to be fairly priced



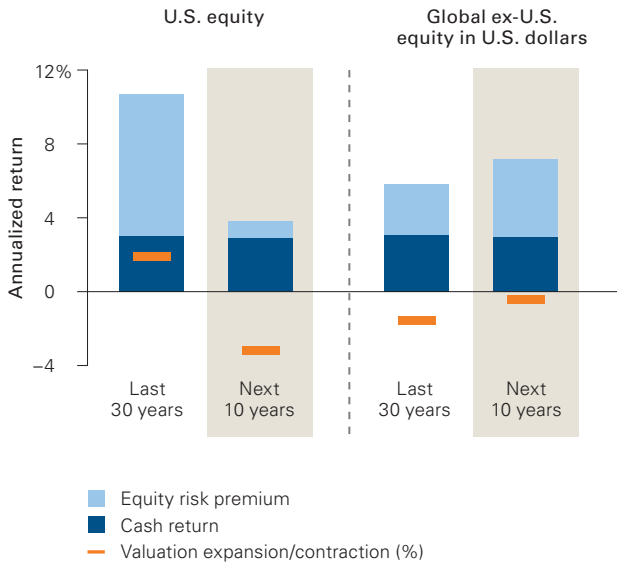
Notes: The U.S. valuation measure is the current CAPE percentile relative to fair-value CAPE for the S&P 500 Index from January 1940–September 2018. The developed markets valuation measure is the weighted average of each region's (Australia, United Kingdom, Germany, Japan, and Canada) current CAPE percentile relative to its own fair-value CAPE. The fair-value CAPE for the regions is a five-variable vector error correction (VEC) with equity earnings yield (MSCI index), ten-year trailing inflation, ten-year government bond yield, equity volatility, and bond volatility estimated over the period January 1970 to September 2018. The emerging markets valuation measure is a composite of emerging markets-to-U.S. relative valuations and current U.S. CAPE percentile relative to fair-value CAPE. The relative valuation is the current ratio of emerging markets-to-U.S. price-to-earnings metrics relative to its historical average, using three-year trailing average earnings from January 1990 to September 2018.

Source: Vanguard calculations, based on data from Robert Shiller's website (aida.wss.yale.edu/~shiller/data.htm), the U.S. Bureau of Labor Statistics, the Federal Reserve Board, and Thomson Reuters Datastream.

FIGURE II-2

The outlook for equity markets is subdued

a. Exposure to non-U.S. equities may be beneficial



Notes: Data for the last 30 years are from January 1988–December 2017, in USD. Next-10-year data are based on the median of 10,000 simulations from VCMM as of September 30, 2018, in USD. Historical returns are computed using indexes defined in "Indexes used in our historical calculations" on page 5. See Appendix for further details on asset classes shown here.

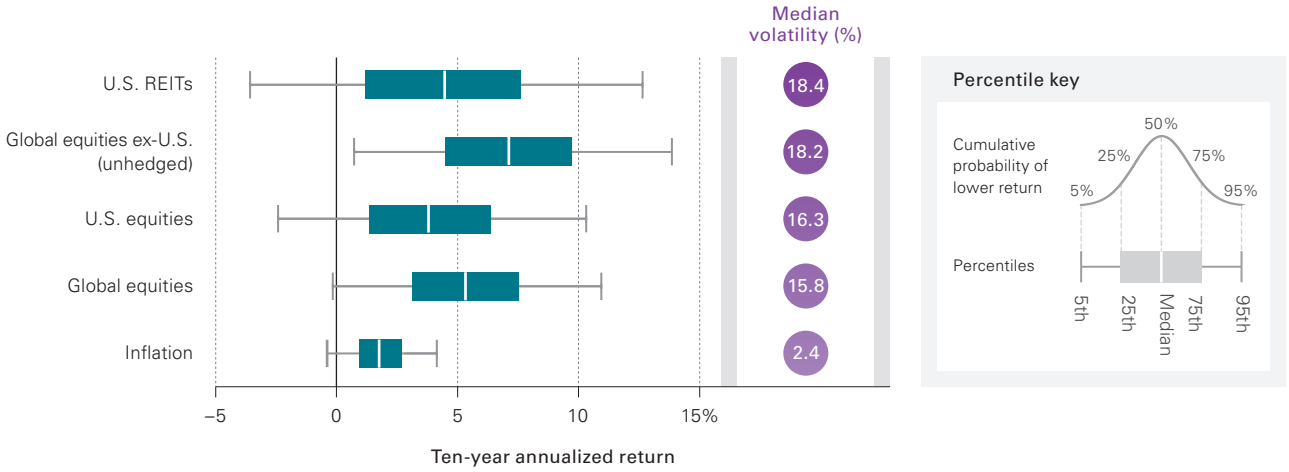
Source: Vanguard calculations, based on data from Dimson-Marsh-Staunton Global Returns Dataset, FactSet, Morningstar Direct, and Thomson Reuters Datastream.

From a U.S. investor's perspective, the expected return outlook for non-U.S. equity markets is in the 6%–8% range, modestly higher than that of U.S. equity (**Figures II-2a** and **II-2b**). The equity risk premium for non-U.S. equity markets, however, may be slightly higher going forward, as the valuation contraction may not be as drastic as that experienced over the last three decades.

This result is a function of the currently moderate level of valuations, as well as long-term expectations of the U.S. dollar decline priced in by the markets, especially with respect to other major currencies such as the euro and yen.

Our ten-year outlook for global equity (in USD) is in the 4.5%–6.5% range, as seen in Figure II-2b. Although the case for global diversification is particularly strong now, for the purposes of asset allocation we caution investors against implementing tactical tilts based on just the median expected return—that is, ignoring the entire distribution of asset returns and their correlations.

b. Equity market ten-year return outlook: Setting reasonable expectations



Notes: Forecast corresponds to distribution of 10,000 VCMM simulations for ten-year annualized nominal returns as of September 30, 2018, in USD, for asset classes shown. Median volatility is the 50th percentile of an asset class's distribution of annual standardized deviation of returns. See Appendix for further details on asset classes shown here.

Source: Vanguard.

Global fixed income markets: An improved outlook

Higher interest rates have improved our outlook for fixed income compared with this time last year. As shown in **Figure II-3**, it is in the 2.5%–4.5% range for the next decade. Expected returns for the riskier fixed income sub-asset classes appear more differentiated compared with previous years, in part because of a recent expansion in credit spreads, thereby giving them the cushion to capture the risk premium.

U.S. interest rates: A slightly higher yield curve

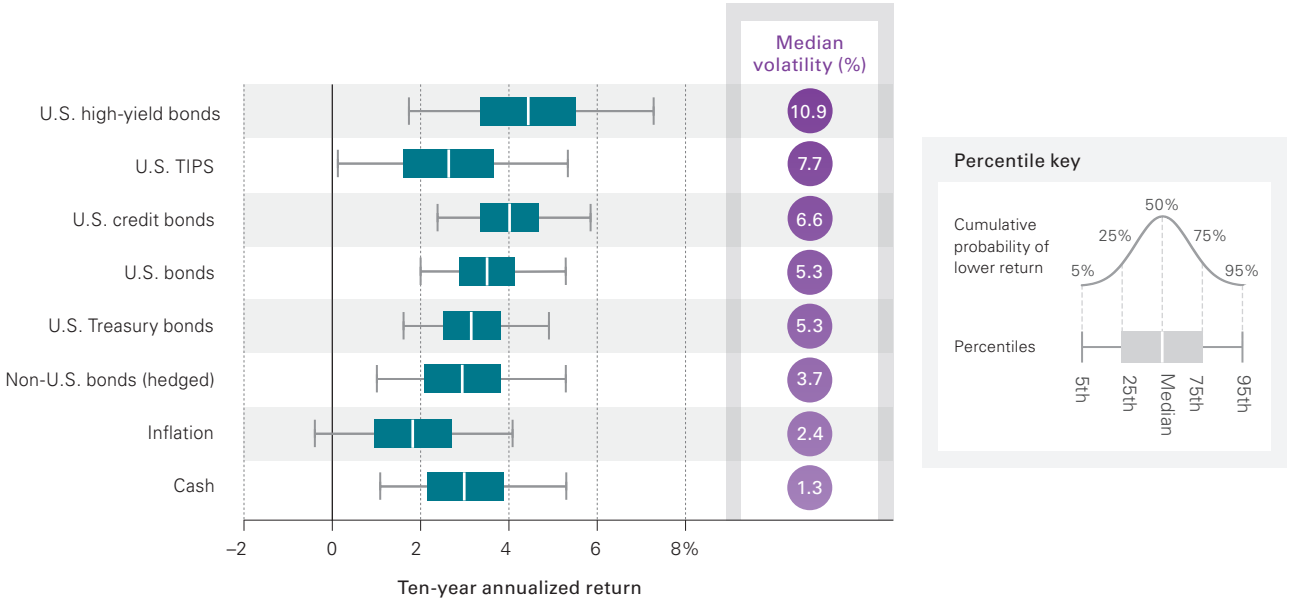
Despite the expected increase in short-term policy rates, the risk of a material rise in long-term interest rates remains modest. As illustrated in **Figure II-4**, duration strategies are fairly valued and less risky than investors may believe in a rising rate environment. This is because we expect the short end of the yield curve to rise more than the long end over the next decade, as the long rates are anchored by inflation expectations.

Corporate bonds: Higher risk, higher return

The central tendency for U.S. credit bonds (specifically, the Bloomberg Barclays U.S. Credit Bond Index) is in the 3.0%–5.0% range, modestly higher than last year because of the rise in the underlying Treasury rates. The central tendency for high-yield corporate bonds (specifically, the Bloomberg Barclays U.S. High Yield Corporate Bond Index) is in the 3.5%–5.5% range, again,

FIGURE II-3

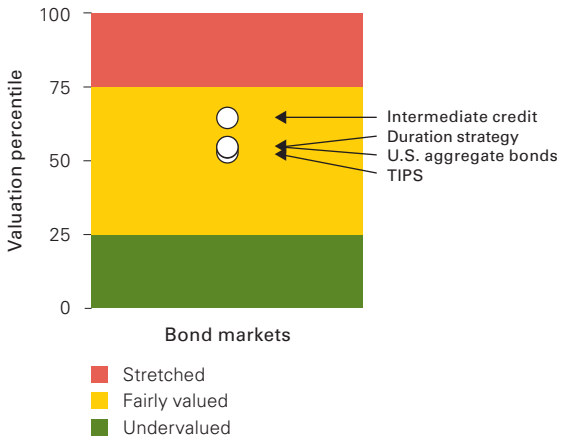
Higher rates have pushed expected fixed income returns higher



Notes: Forecast corresponds to distribution of 10,000 VCMM simulations for ten-year annualized nominal returns as of September 30, 2018, in USD for asset classes shown. Median volatility is the 50th percentile of an asset class's distribution of annual standardized deviation of returns. See Appendix for further details on asset classes shown here.
Source: Vanguard.

FIGURE II-4

Fixed income appears to be fairly valued



Notes: Valuation percentiles are relative to Year 30 projections from VCMM. Intermediate credit and U.S. aggregate bond valuations are current spreads relative to Year 30 from VCMM. Duration valuation is the expected return differential over the next decade between the long-term Treasury index and the short-term Treasury index relative to Years 21–30. The TIPS valuation is the ten-year-ahead annualized inflation expectation relative to Years 21–30.

Source: Vanguard.

higher because of higher underlying Treasury rates. We urge investors to be cautious in reaching for yield in segments such as high-yield corporates, not only because of the higher expected volatility that accompanies the higher yield but also because of the segment's correlation to the equity markets.

As shown in **Figure II-5** (on page 37), a 20% overweight or tilt to high-yield corporates increases a portfolio's volatility excessively relative to a marginal increase in return. The sensitivity of spreads to the economic environment is much larger for high-yield corporate bonds than for other higher-quality segments of the U.S. fixed income market, which also contributes to an increased investment risk.

Treasury Inflation-Protected Securities (TIPS): Markets don't see inflation coming

Break-even inflation expectations inferred from the U.S. TIPS market remain close to the Fed's 2% inflation target and the VCMM long-term median levels. Markets are placing low odds for higher inflation outcomes. Although not attractive from a return perspective, TIPS could be a valuable inflation hedge for some institutions and investors sensitive to inflation risk.

Domestic versus international: Benefits of diversification remain

Although the central tendency of expected return for non-U.S. aggregate bonds appears to be marginally lower than that of U.S. aggregate bonds (see Figure II-3 on page 34), we expect the diversification benefits of global fixed income in a balanced portfolio to persist under most scenarios.

Yields in most developed markets are historically low, particularly in Europe and Japan, yet diversification through exposure to hedged non-U.S. bonds should help offset some risk specific to the U.S. fixed income market (Phillips et al., 2014).

Less-than-perfect correlation between two of the main drivers of bond returns—interest rates and inflation—is expected as global central bank policies are likely to diverge in the near term. Diversification with non-U.S. bonds also helps diversify the risk of policy mistakes by central banks.

Portfolio implications: A low return orbit

Investors have experienced spectacular returns over the last few decades because of two of the strongest equity bull markets in U.S. history, in addition to a secular decline in interest rates from 1980s highs. Figure II-5a contrasts our 4%–6% outlook for a global 60% equity/40% bond portfolio for the next decade against the extraordinary 9.4% return since 1970 and the 7.3% return since 1990. As highlighted in previous sections, elevated equity valuations and low rates have pulled the market's efficient frontier of expected returns into a lower orbit. The efficient frontier is also flatter (that is, with less return per unit of risk), as seen from the return and volatility expectations of balanced portfolios, as shown in Figure II-5c.

To try to increase portfolio returns, a popular strategy is to overweight higher-expected-return assets or higher-yield assets. A common "reach for yield" strategy is to overweight high-yield corporates. Similarly, "reach for return" strategies involve tilting the portfolio toward emerging-market equities to take advantage of higher growth prospects. Home bias causes some to shy away from non-U.S. equities.

Figure II-5b illustrates that these common return-centric strategies are unlikely, by themselves, to restore portfolios to the higher orbit of historical returns.

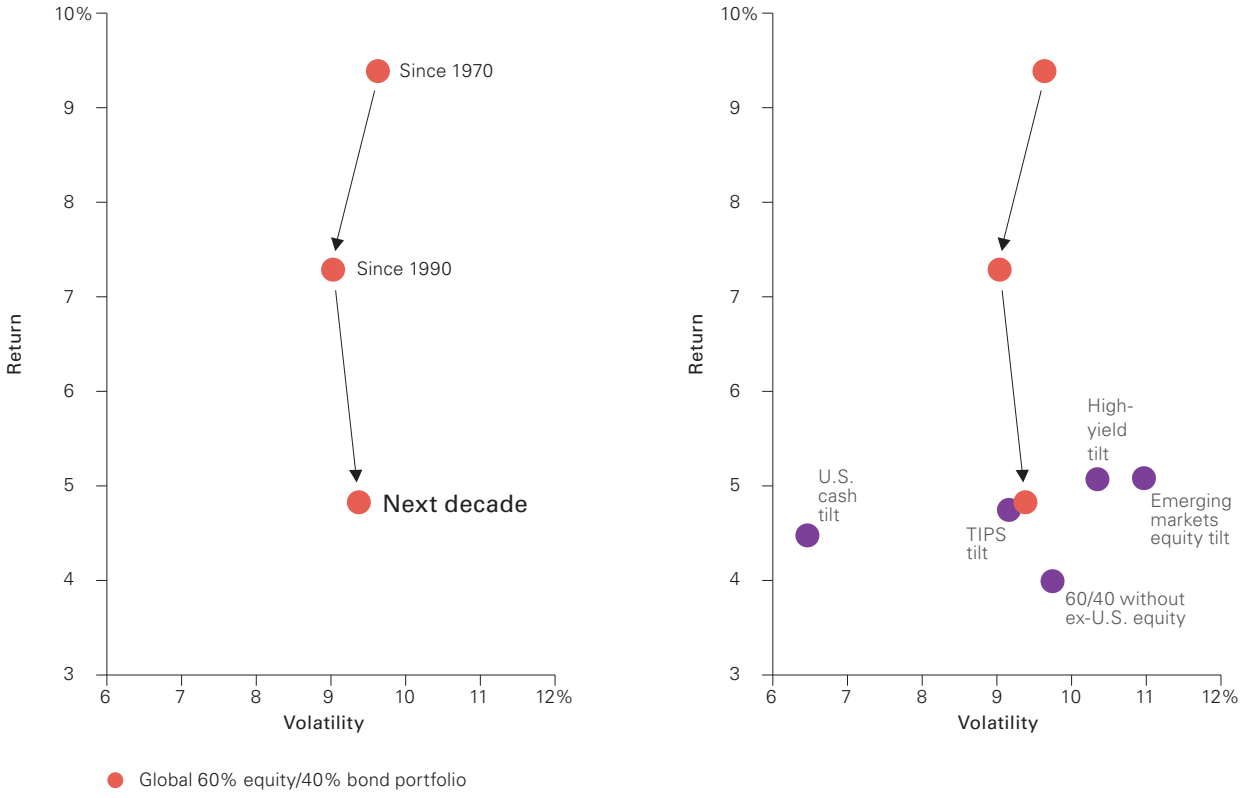
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

FIGURE II-5

Asset allocation for a challenging decade

a. A lower return orbit ...

b. ... that popular "active tilts" will likely fail to escape



c. Projected ten-year annualized nominal returns as of September 2018

	Portfolios	5th percentile	25th percentile	Median	75th percentile	95th percentile	Median volatility
Global balanced portfolios	100% bonds	1.8%	2.7%	3.4%	4.1%	5.1%	4.5%
	20/80 stock/bond	2.3%	3.3%	4.0%	4.7%	5.9%	4.5%
	60/40 stock/bond	1.5%	3.5%	4.9%	6.3%	8.4%	9.4%
	80/20 stock/bond	0.8%	3.4%	5.2%	7.0%	9.7%	12.5%
	100% equity	–0.1%	3.1%	5.3%	7.6%	11.0%	15.8%
Portfolios with common 20% tilts relative to 60/40 stock/bond	**60/40 stock/bond**	**1.5%**	**3.5%**	**4.9%**	**6.3%**	**8.4%**	**9.4%**
	High-yield tilt	1.8%	3.7%	5.1%	6.5%	8.7%	**10.4%**
	Inflation protection tilt	1.4%	3.4%	4.8%	6.2%	8.4%	**9.2%**
	Emerging markets equity tilt	1.4%	3.6%	5.1%	6.6%	8.8%	**11.0%**
	U.S. cash tilt	1.9%	3.4%	4.4%	5.5%	7.1%	**6.4%**
	60/40 without ex-U.S. equity	0.1%	2.5%	4.0%	5.6%	8.1%	**9.8%**

Notes: The figure shows summary statistics of 10,000 VCMM simulations for projected ten-year annualized nominal returns as of September 2018 in USD before costs. Historical returns are computed using indexes defined in "Indexes used in our historical calculations" on page 5. The global equity portfolio is 60% U.S. equity and 40% global ex-U.S. equity. The global bond portfolio is 70% U.S. bonds and 30% global ex-U.S. bonds. Portfolios with tilts include a 20% tilt to the asset specified funded from the fixed income allocation for the fixed income tilts and the equity allocation for the equity tilts.

Source: Vanguard.

Portfolio construction strategies for three potential economic scenarios

Based on our global economic perspective, we examine in **Figure II-6** three possible economic scenarios occurring over the next three years. The high-growth scenario illustrates an upside risk scenario of sustained economic growth with tighter labor markets and a moderate pickup in wages and inflation. The two others are a status quo scenario driven by continued low volatility with positive financial conditions and a recessionary scenario caused by a turn in the business cycle and a correction in the equity markets.

Figure II-6 shows optimal portfolios for each scenario that vary their exposures to the following four factors, or risk premiums: equity risk premium, term premium, credit premium, and inflation-risk premium. In a high-growth scenario, expected global equity returns would be high, causing the efficient frontier to be steep. Long and short rates would also rise faster than expected, resulting in an optimal portfolio loading on equity and short duration.

A recessionary-scenario portfolio would underweight equity and overweight long duration. Surprisingly, the allocation to U.S. equity remains rather large, as the portfolio that is also heavy on long-term Treasuries derives a larger diversification benefit from lower-returning U.S. equity (especially in a recession) than from including higher-returning non-U.S. equity assets. The portfolio strategy in a status quo scenario is well-diversified.

Using our VCMM simulations, we are able not only to illustrate the effectiveness of various portfolio strategies designed for each scenario but also to show the risks of such strategies. The following conclusions can be drawn from our analysis:

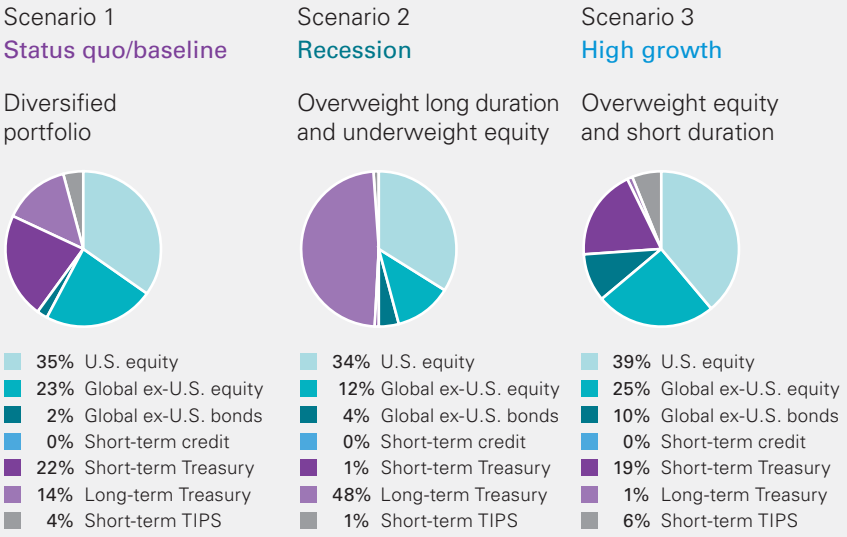
1. **Portfolios designed for specific macroeconomic scenarios entail important trade-offs:** If the scenario for which the portfolio was designed does not take place, then the portfolio performance is the worst of all the options.
2. **A balanced portfolio works well for investors who are agnostic about the future state of the economy:** The 60/40 balanced portfolio is an "all-weather" strategy, with either top or middle-of-the-road performance in each scenario.
3. **Portfolio tilts should be done within an optimization framework:** Ad hoc tilts ignore correlations among assets and lead to inefficient portfolios. For instance, in a recession-scenario strategy, U.S. equities can be relatively overweighted (as opposed to underweighted) because of the added diversification benefits of long-term bonds.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

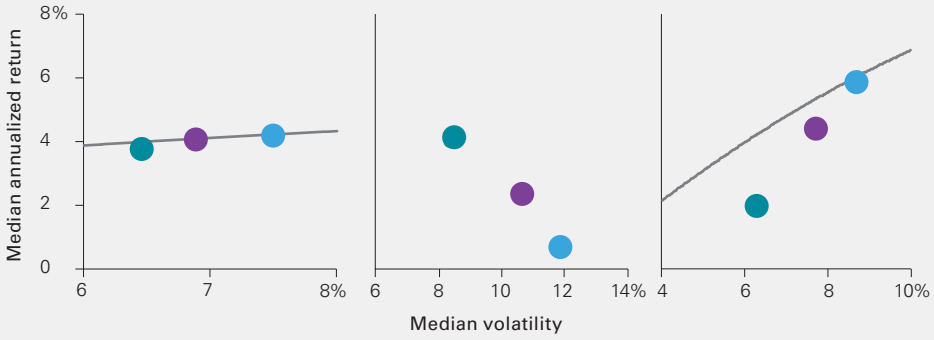
FIGURE II-6

Cyclical surprises and asset allocation trade-offs

a. Optimal portfolios vary for different economic environments



b. A diversified portfolio is not always the best, but it's never the worst



	Scenario 1	Scenario 2	Scenario 3
Best	Diversified portfolio	Overweight long duration and underweight equity	Overweight equity and short duration
Second-best	Overweight equity and short duration	Diversified portfolio	Diversified portfolio
Worst	Overweight long duration and underweight equity	Overweight equity and short duration	Overweight long duration and underweight equity

c. Portfolios designed for a single scenario are tempting but can be risky

Strategy **upside** relative to balanced portfolio	**1.4% higher annualized return** with 2.1% lower volatility in a recessionary scenario	**1.1% higher annualized return** with 1.1% higher volatility in a high-growth scenario
Strategy **downside** relative to balanced portfolio	**1.8% lower annualized return** with 1.4% lower volatility in a high-growth scenario	**1.2% lower annualized return** with 1.2% lower volatility in a a recessionary scenario

Notes: Performance is relative to the efficient frontier. Portfolios are selected from the frontier based on a fixed risk-aversion level using a utility function-based optimization model. The forecast displays a simulation of three-year annualized returns of asset classes shown as of September 2018. Scenarios are derived from sorting the VCMM simulations based on rates, growth, volatility, and equity return. The three scenarios are a subset of the 10,000 VCMM simulations. See Appendix for further details on asset classes shown here.

Source: Vanguard.

Portfolio construction strategies: Time-tested principles apply

Contrary to suggestions that an environment of low rates and compressed equity risk premiums warrants some radically new investment strategy, Figure II-5 (on page 37) reveals that the diversification benefits of global fixed income and global equity are particularly compelling, given the simulated ranges of portfolio returns and volatility.

The market's efficient frontier of expected returns for a unit of portfolio risk is in a lower orbit. More important, common asset-return-centric portfolio tilts, seeking higher return or yield, are unlikely to escape the strong gravity of low-return forces in play, as they ignore the benefits of diversification. Modestly outperforming asset-return-centric tilts requires a portfolio-centric approach that leverages the benefits of diversification by weighing risk, return, and correlation simultaneously.

Our prior research shows that investment success is within the control of long-term investors (Aliaga-Díaz, et al., 2016). Factors within a long-term investor's control—such as saving more, working longer, spending less, and controlling investment costs—far outweigh the less reliable benefits of ad hoc asset-return-seeking tilts. Thus, decisions around saving more, spending less, and controlling costs will be much more important than portfolio tilts.

Investment objectives based either on fixed spending requirements or on fixed portfolio return targets may require investors to consciously weigh their options in conjunction with their risk-tolerance levels. Ultimately, our global market outlook suggests a somewhat more challenging environment ahead, yet one in which investors with an appropriate level of discipline, diversification, and patience are likely to be rewarded over the long term. Adhering to investment principles such as long-term focus, disciplined asset allocation, and periodic portfolio rebalancing will be more crucial than ever before.

References

Aliaga-Díaz, Roger, Harshdeep Ahluwalia, Kevin DiCiurcio, Matthew C. Brancato, Scott Donaldson, and David Pakula, 2016. *Vanguard Life-Cycle Investing Model: A Framework for Building Target-Date Portfolios.* Valley Forge, Pa.: The Vanguard Group.

Chen, Sally, and Joong S. Kang, 2018. *Credit Booms—Is China Different?* Washington D.C.: International Monetary Fund Working Paper.

Davis, Joseph H., Roger Aliaga-Díaz, Andrew J. Patterson, and Charles J. Thomas, 2014. *Vanguard's Economic and Investment Outlook.* Valley Forge, Pa.: The Vanguard Group.

Davis, Joseph H., Roger Aliaga-Díaz, Harshdeep Ahluwalia, Frank Polanco, and Christos Tasopoulos, 2014. *Vanguard Global Capital Markets Model.* Valley Forge, Pa.: The Vanguard Group.

International Monetary Fund, 2018. *World Economic Outlook, October 2018: Challenges to Steady Growth.* Washington, D.C.: International Monetary Fund.

Laubach, Thomas, and John C. Williams. 2003. Measuring the Natural Rate of Interest. *The Review of Economics and Statistics* 85(4): 1063-70.

Philips, Christopher B., Joseph H. Davis, Andrew J. Patterson, and Charles J. Thomas, 2014. *Global Fixed Income: Considerations for U.S. Investors.* Valley Forge, Pa.: The Vanguard Group.

The Vanguard Group, 2017. *Global Macro Matters—As U.S. Stock Prices Rise, the Risk-Return Trade-Off Gets Tricky.* Valley Forge, Pa.: The Vanguard Group.

The Vanguard Group, 2017. *Global Macro Matters—SOE Reforms—China's Path to Higher Productivity.* Valley Forge, Pa.: The Vanguard Group.

The Vanguard Group, 2017. *Global Macro Matters—Why Is Inflation So Low? The Growing Deflationary Effects of Moore's Law.* Valley Forge, Pa.: The Vanguard Group.

The Vanguard Group, 2018. *Global Macro Matters—From Reflation to Inflation: What's the Tipping Point for Portfolios?* Valley Forge, Pa.: The Vanguard Group.

The Vanguard Group, 2018. *Global Macro Matters—Rising Rates, Flatter Curve: This Time Isn't Different, It Just May Take Longer.* Valley Forge, Pa.: The Vanguard Group.

III. Appendix

About the Vanguard Capital Markets Model

IMPORTANT: The projections or other information generated by the Vanguard Capital Markets Model regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results, and are not guarantees of future results. VCMM results will vary with each use and over time.

The VCMM projections are based on a statistical analysis of historical data. Future returns may behave differently from the historical patterns captured in the VCMM. More important, the VCMM may be underestimating extreme negative scenarios unobserved in the historical period on which the model estimation is based.

The VCMM is a proprietary financial simulation tool developed and maintained by Vanguard's Investment Strategy Group. The model forecasts distributions of future returns for a wide array of broad asset classes. Those asset classes include U.S. and international equity markets, several maturities of the U.S. Treasury and corporate fixed income markets, international fixed income markets, U.S. money markets, commodities, and certain alternative investment strategies. The theoretical and empirical foundation for the Vanguard Capital Markets Model is that the returns of various asset classes reflect the compensation investors require for bearing different types of systematic risk (beta). At the core of the model are estimates of the dynamic statistical relationship between risk factors and asset returns, obtained from statistical analysis based on available monthly financial and economic data. Using a system of estimated equations, the model then applies a Monte Carlo simulation method to project the estimated interrelationships among risk factors and asset classes as well as uncertainty and randomness over time. The model generates a large set of simulated outcomes for each asset class over several time horizons. Forecasts are obtained by computing measures of central tendency in these simulations. Results produced by the tool will vary with each use and over time.

The primary value of the VCMM is in its application to analyzing potential client portfolios. VCMM asset-class forecasts—comprising distributions of expected returns, volatilities, and correlations—are key to the evaluation of potential downside risks, various risk–return trade-offs, and the diversification benefits of various asset classes. Although central tendencies are generated in any return distribution, Vanguard stresses that focusing on the full range of potential outcomes for the assets considered, such as the data presented in this paper, is the most effective way to use VCMM output. We encourage readers interested in more details of the VCMM to read Vanguard's white paper (Davis et al., 2014).

The VCMM seeks to represent the uncertainty in the forecast by generating a wide range of potential outcomes. It is important to recognize that the VCMM does not impose "normality" on the return distributions, but rather is influenced by the so-called fat tails and skewness in the empirical distribution of modeled asset-class returns. Within the range of outcomes, individual experiences can be quite different, underscoring the varied nature of potential future paths. Indeed, this is a key reason why we approach asset-return outlooks in a distributional framework.

Index simulations

The long-term returns of our hypothetical portfolios are based on data for the appropriate market indexes through September 2018. We chose these benchmarks to provide the most complete history possible, and we apportioned the global allocations to align with Vanguard's guidance in constructing diversified portfolios. Asset classes and their representative forecast indexes are as follows:

- U.S. equities: MSCI US Broad Market Index.
- Global ex-U.S. equities: MSCI All Country World ex USA Index.
- U.S. REITs: FTSE/NAREIT US Real Estate Index.
- U.S. cash: U.S. 3-Month Treasury–constant maturity.
- U.S. Treasury bonds: Bloomberg Barclays U.S. Treasury Index.
- U.S. short-term Treasury bonds: Bloomberg Barclays U.S. 1–5 Year Treasury Bond Index.
- U.S. long-term Treasury bonds: Bloomberg Barclays U.S. Long Treasury Bond Index.
- U.S. credit bonds: Bloomberg Barclays U.S. Credit Bond Index.
- U.S. short-term credit bonds: Bloomberg Barclays U.S. 1–3 Year Credit Bond Index.
- U.S. high-yield corporate bonds: Bloomberg Barclays U.S. High Yield Corporate Bond Index.
- U.S. bonds: Bloomberg Barclays U.S. Aggregate Bond Index.
- Global ex-U.S. bonds: Bloomberg Barclays Global Aggregate ex-USD Index.
- U.S. TIPS: Bloomberg Barclays U.S. Treasury Inflation Protected Securities Index.
- U.S. short-term TIPS: Bloomberg Barclays U.S. 1–5 Year Treasury Inflation Protected Securities Index.

Notes on risk

All investing is subject to risk, including the possible loss of the money you invest. Past performance is no guarantee of future returns. Investments in bond funds are subject to interest rate, credit, and inflation risk. Foreign investing involves additional risks, including currency fluctuations and political uncertainty. Diversification does not ensure a profit or protect against a loss in a declining market. There is no guarantee that any particular asset allocation or mix of funds will meet your investment objectives or provide you with a given level of income. The performance of an index is not an exact representation of any particular investment, as you cannot invest directly in an index.

Stocks of companies in emerging markets are generally more risky than stocks of companies in developed countries. U.S. government backing of Treasury or agency securities applies only to the underlying securities and does not prevent price fluctuations. Investments that concentrate on a relatively narrow market sector face the risk of higher price volatility. Investments in stocks issued by non-U.S. companies are subject to risks including country/regional risk and currency risk.

Bond funds are subject to the risk that an issuer will fail to make payments on time, and that bond prices will decline because of rising interest rates or negative perceptions of an issuer's ability to make payments. High-yield bonds generally have medium- and lower-range credit-quality ratings and are therefore subject to a higher level of credit risk than bonds with higher credit-quality ratings. Although the income from U.S. Treasury obligations held in the fund is subject to federal income tax, some or all of that income may be exempt from state and local taxes.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Vanguard Research

P.O. Box 2600
Valley Forge, PA 19482-2600

Connect with Vanguard® > vanguard.com

© 2018 The Vanguard Group, Inc.
All rights reserved.
Vanguard Marketing Corporation, Distributor.

CFA® is a registered trademark owned by CFA Institute.

ISGVEMO 122018

Morningstar® Markets Observer

Q2 2019 Data as of March 31, 2019

Morningstar® Research

Timothy Strauts
Director of Quantitative Research

Alina Lamy
Project Manager

James Li
Senior Quantitative Analyst

Daniel Kleeman
Quantitative Analyst

Chau Pham
Quantitative Analyst

Barbara Kennedy
Visual Designer

Michael Manetta
Senior Quantitative Analyst

Kathryn Wing
Quantitative Analyst

Michael O'Leary
Associate Director of
Quantitative Research

Morningstar® Markets Observer

Q2 2019 Data as of March 31, 2019

Table of Contents

- Market Overview 3
- Equities 13
- Fixed Income 21
- Funds 28
- Economic Indicators 37

Market Overview

Market Dashboard

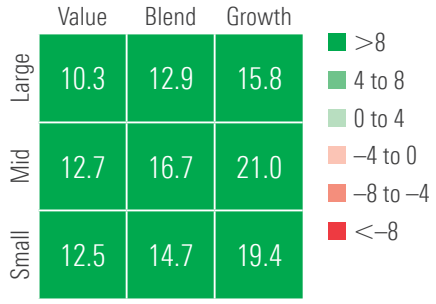
After a correction in the fourth quarter of 2018, global stock markets experienced a strong rebound in the first quarter. For U.S. stocks, the rebound was enough to bring one-year returns into positive territory; for international-developed and emerging-markets stocks, however, it was not. All fixed-income returns were positive as yields dropped. In the Morningstar Style Box, the rally was broad-based, and all nine style categories enjoyed double-digit returns.

		Return (%)					
Equities	**12 Month Yield**	**YTD**	**3 Mo**	**1 Yr**	**3 Yrs**	**5 Yrs**	**10 Yrs**
S&P 500	1.9	13.6	13.6	9.5	13.5	10.9	15.9
Russell 2000	1.3	14.6	14.6	2.0	12.9	7.1	15.4
MSCI EAFE	3.1	10.0	10.0	–3.7	7.3	2.3	9.0
MSCI Emerging Markets	2.6	9.9	9.9	–7.4	10.7	3.7	8.9
Fixed Income	**Current Yield**						
U.S. Aggregate	2.9	2.9	2.9	4.5	2.0	2.7	3.8
U.S. Corporates	3.6	5.4	5.4	6.1	3.6	4.0	7.3
High Yield	6.7	7.4	7.4	5.9	8.7	4.7	11.2
Municipals	2.3	2.9	2.9	5.4	2.7	3.7	4.7
Emerging Markets (USD)	6.0	7.0	7.0	4.2	5.8	5.4	8.5
Broad Commodities							
Bloomberg Commodity		6.3	6.3	–5.3	2.2	–8.9	–2.6
Morningstar Commodity		10.5	10.5	–3.0	4.5	–9.8	–0.7

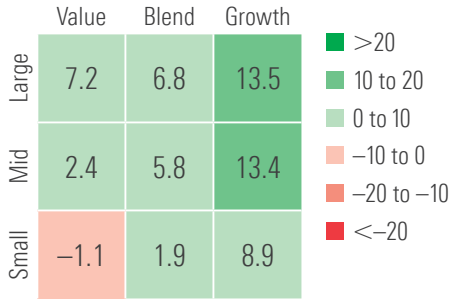
	Fundamental Measures			
	P/E	**P/B**	**P/S**	**P/C**
S&P 500	19.5	3.2	2.1	12.7
Russell 2000	17.8	2.1	1.2	10.1
MSCI EAFE	14.4	1.6	1.1	9.4
MSCI Emerging Markets	12.1	1.6	1.3	7.9

Interest Rates	**Current**	**1 Yr Ago**
2 Yr Treasury	2.3	2.3
5 Yr Treasury	2.2	2.6
10 Yr Treasury	2.4	2.7
20 Yr Treasury	2.8	3.0
Prime Rate	5.5	4.8
Commodities		
Brent Crude Oil	68	70
Gold	1,295	1,324

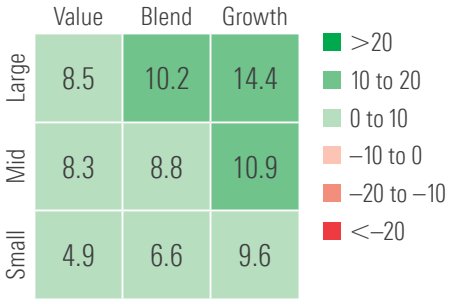
3-Month Return (%)



1-Year Return (%)



5-Year Return (%)



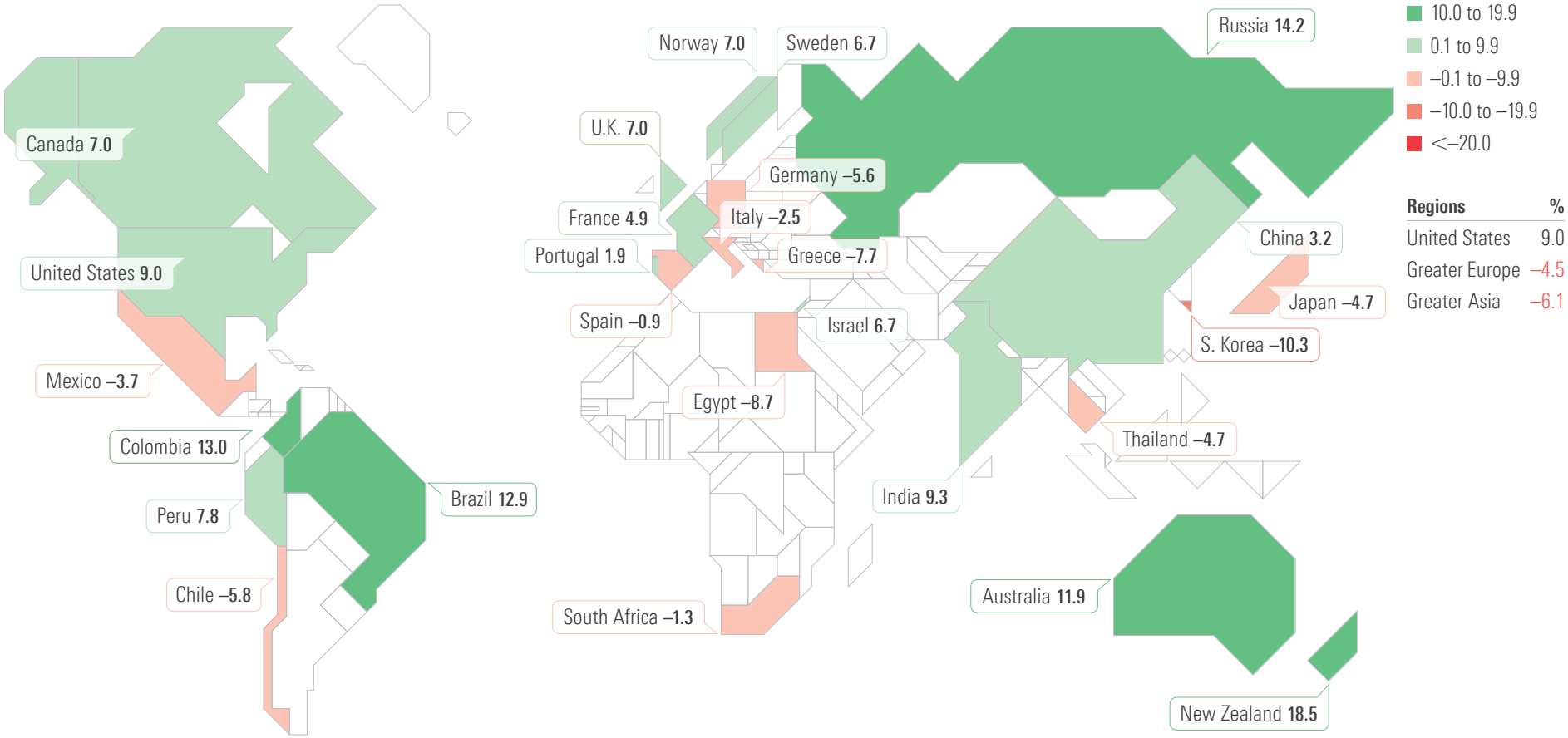
Source: Morningstar Direct. U.S. Aggregate—Bloomberg Barclays U.S. Aggregate Bond Total Return, U.S. Corporates—Bloomberg Barclays U.S. Corporate 5-10 Year Total Return, High Yield—Bank of America Merrill Lynch U.S. High Yield Master II Total Return, Municipals—Bloomberg Barclays Municipal Total Return, Fixed-Income Emerging Markets—J.P. Morgan EMBI Global Diversified Total Return, Gold—London Fix Gold PM Price Return. ©2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

Global Market Barometer

Concerns about slowing global growth took a heavy toll on most international markets in the fourth quarter of 2018. Even though some countries were able to recover in the first quarter, many trailing one-year returns remained negative. Germany, as an export-heavy economy, continued to suffer from the global economic slowdown. Australia and New Zealand posted impressive returns, as well as Brazil, Russia, and India.

1-Year Trailing Returns of Morningstar Country Indexes in Base Currency by Percentage



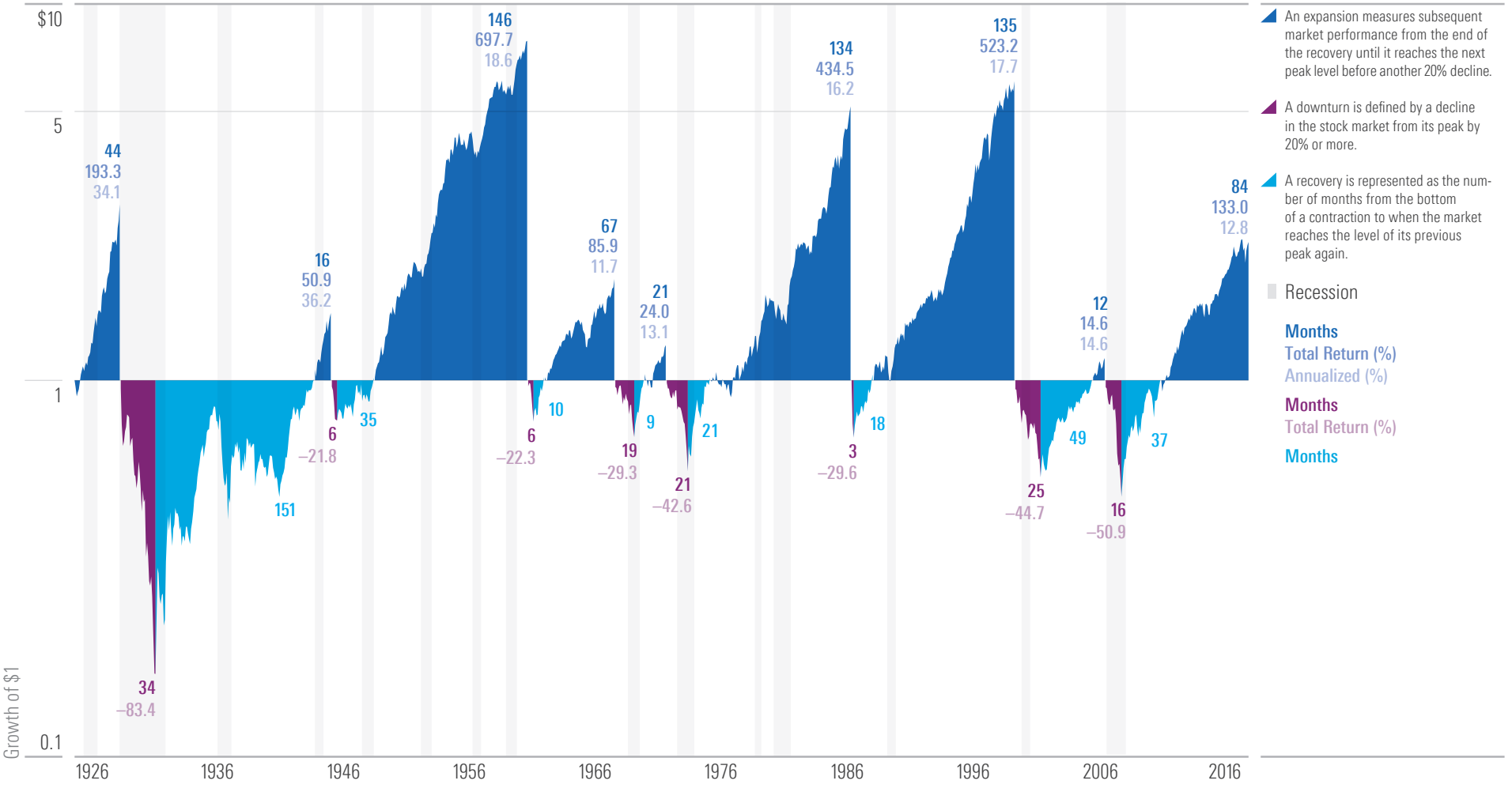
Source: Morningstar Country and Region Indexes. Forecasts from the European Commission and the International Monetary Fund. ©2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

Bear Markets Are Painful, but Markets Rise Over the Long Term

There have been eight market downturns since 1926, the most severe one being the Great Depression. More recently, during the "lost decade," two consecutive downturns with little to no expansion discouraged U.S. investors. However, the market has returned 133.0% since the current expansion started in March 2012, and, based on previous expansionary episodes, there is still ample potential for future growth.

U.S. Market Downturns, Recoveries, and Expansions

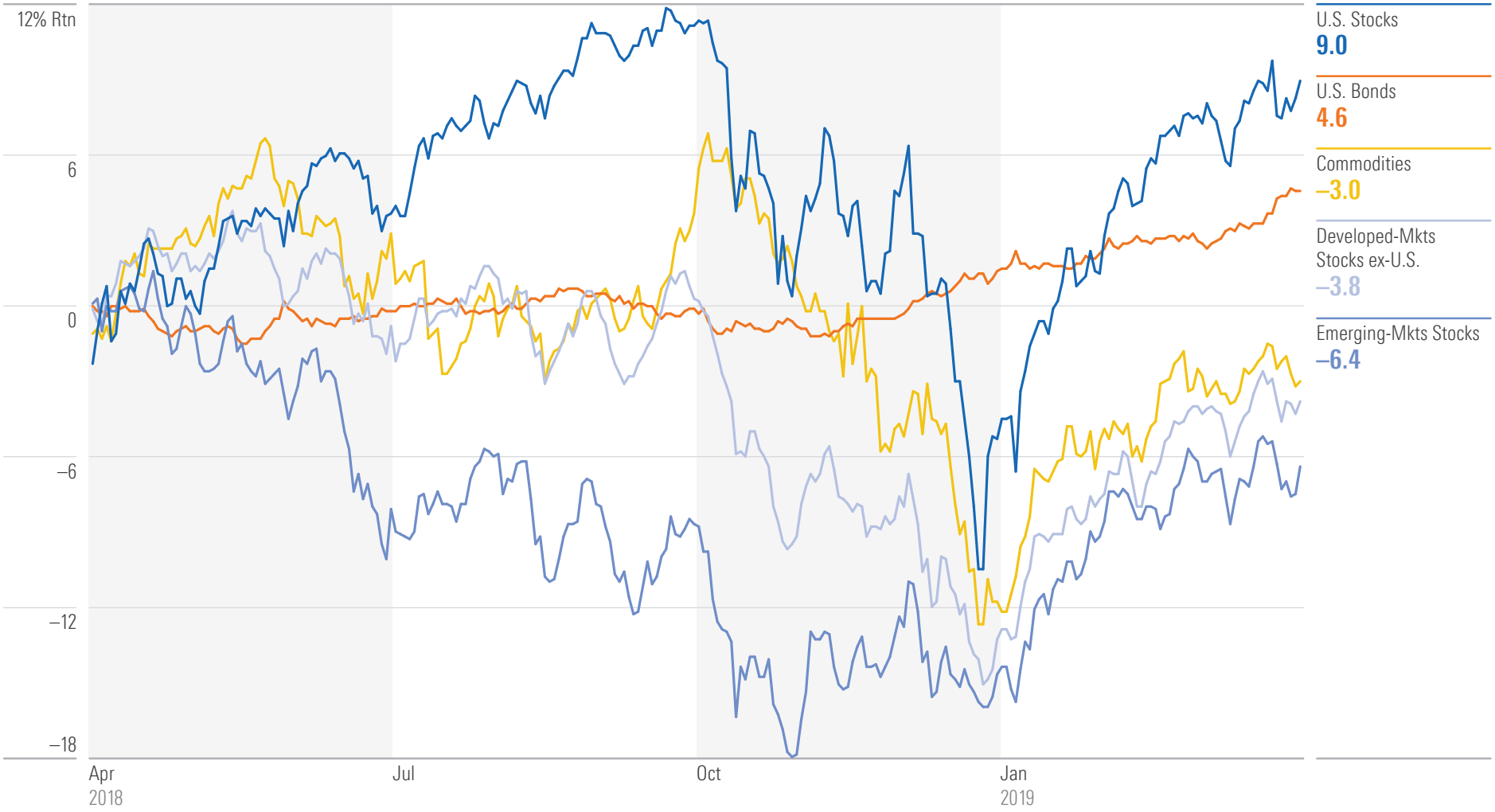


Source: Stocks—Ibbotson Associates SBBI U.S. Large Stock Index. ©2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

Trailing-12-Month Performance of Major Asset Classes

All major equity asset classes experienced elevated volatility during the past year. In the fourth quarter of 2018, weakening earnings growth and downward revisions in GDP growth forecasts contributed to a severe stock market correction. U.S. stocks were able to recover most of the losses in the first quarter of 2019, but the recovery was weaker for international stocks. On the other hand, because of falling Treasury rates, fixed income experienced a very strong quarter.



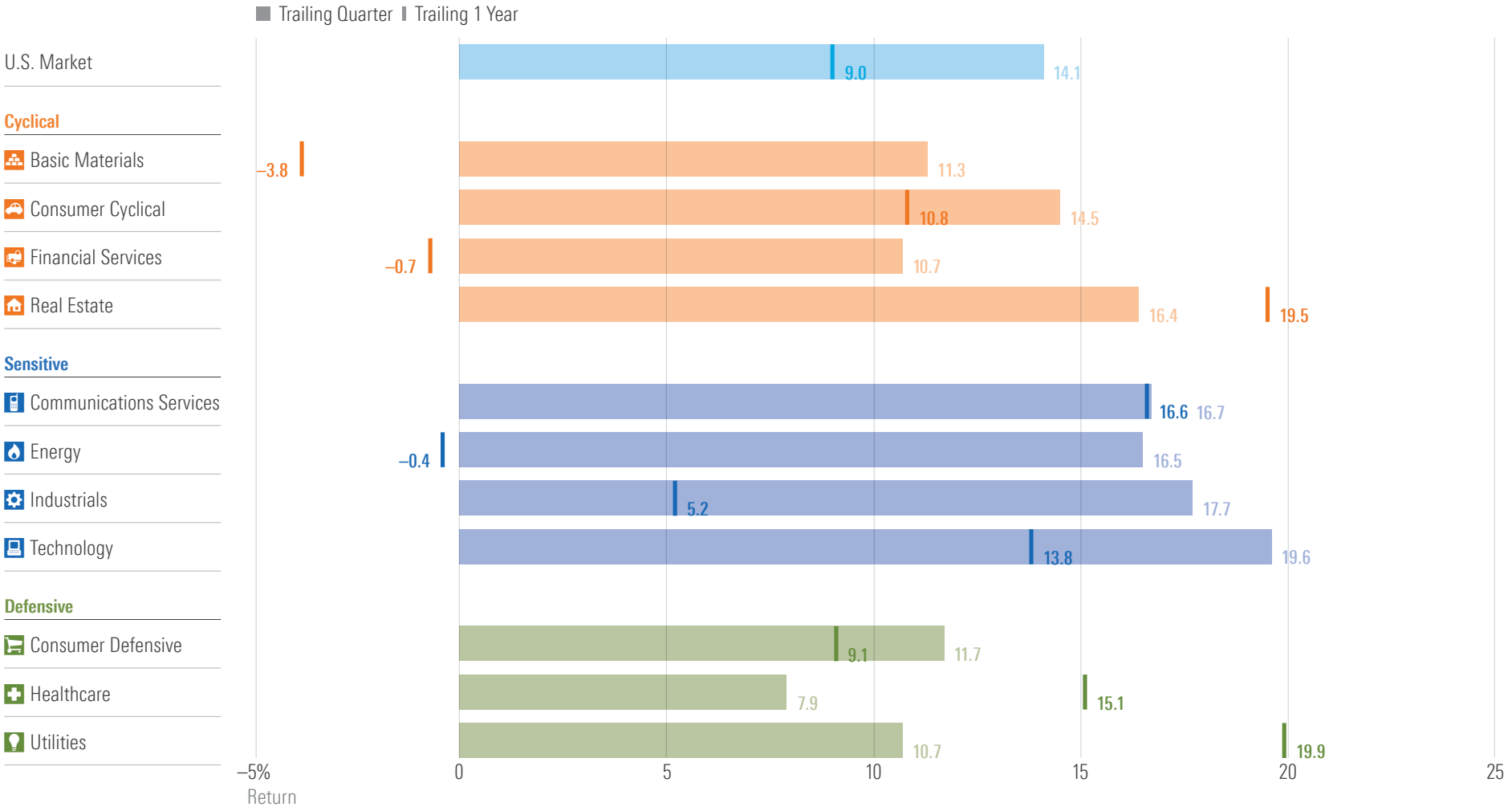
QM01

Source: U.S. stocks—Morningstar U.S. Market Index. Developed-markets stocks ex-U.S.—Morningstar Developed Markets ex-U.S. Index. Emerging-markets stocks—Morningstar Emerging Markets Index. U.S. bonds—Morningstar Core Bond Index. Commodities—Morningstar Long-Only Commodity Index. ©2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

U.S. Sector Performance

After a disastrous 2018 for most sectors, technology and industrials were the quickest to recover in the first quarter of 2019. According to Morningstar equity analysts, there is a growing scarcity of strong buys in the technology sector. However, opportunities remain for long-term investors, particularly in semiconductors and online media. Healthcare was the weakest sector but maintained a healthy trailing-one-year return amid diminishing market concern around healthcare pricing pressures.



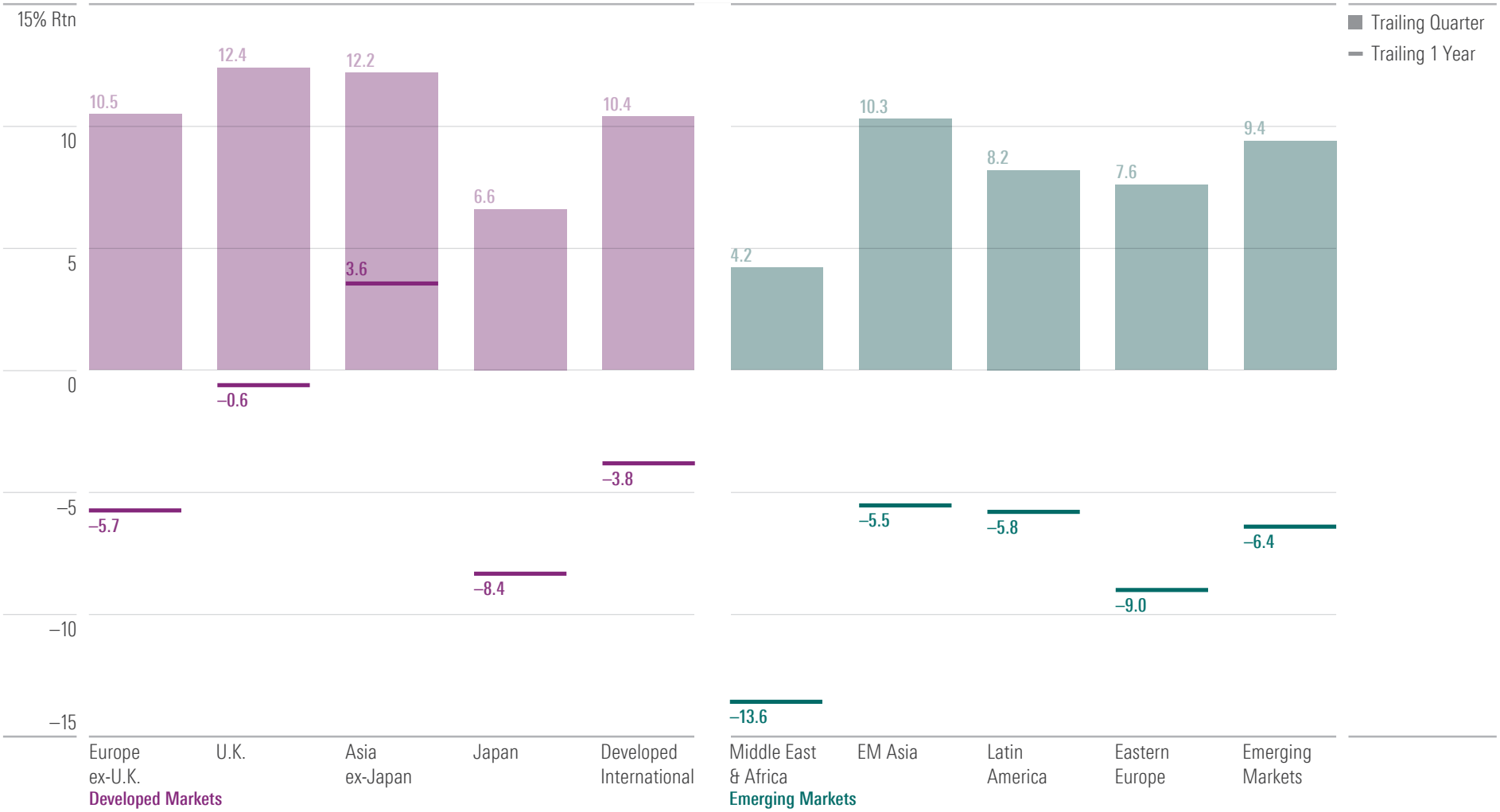
QM04

Source: Morningstar Sector Indexes, Morningstar Equity Market Outlook: Second-Quarter 2019. ©2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

International Stock Market Performance

Surprisingly, despite continued Brexit turmoil, the United Kingdom was the best-performing region in the first quarter and the second-best over the trailing-one-year. Similarly, emerging Asia was the best region among emerging markets despite China's ongoing trade war with the U.S. Normally, uncertainty lowers equity returns, but both of the above examples are directly contradicting that pattern, which is why it is so difficult to predict how equity markets will react.

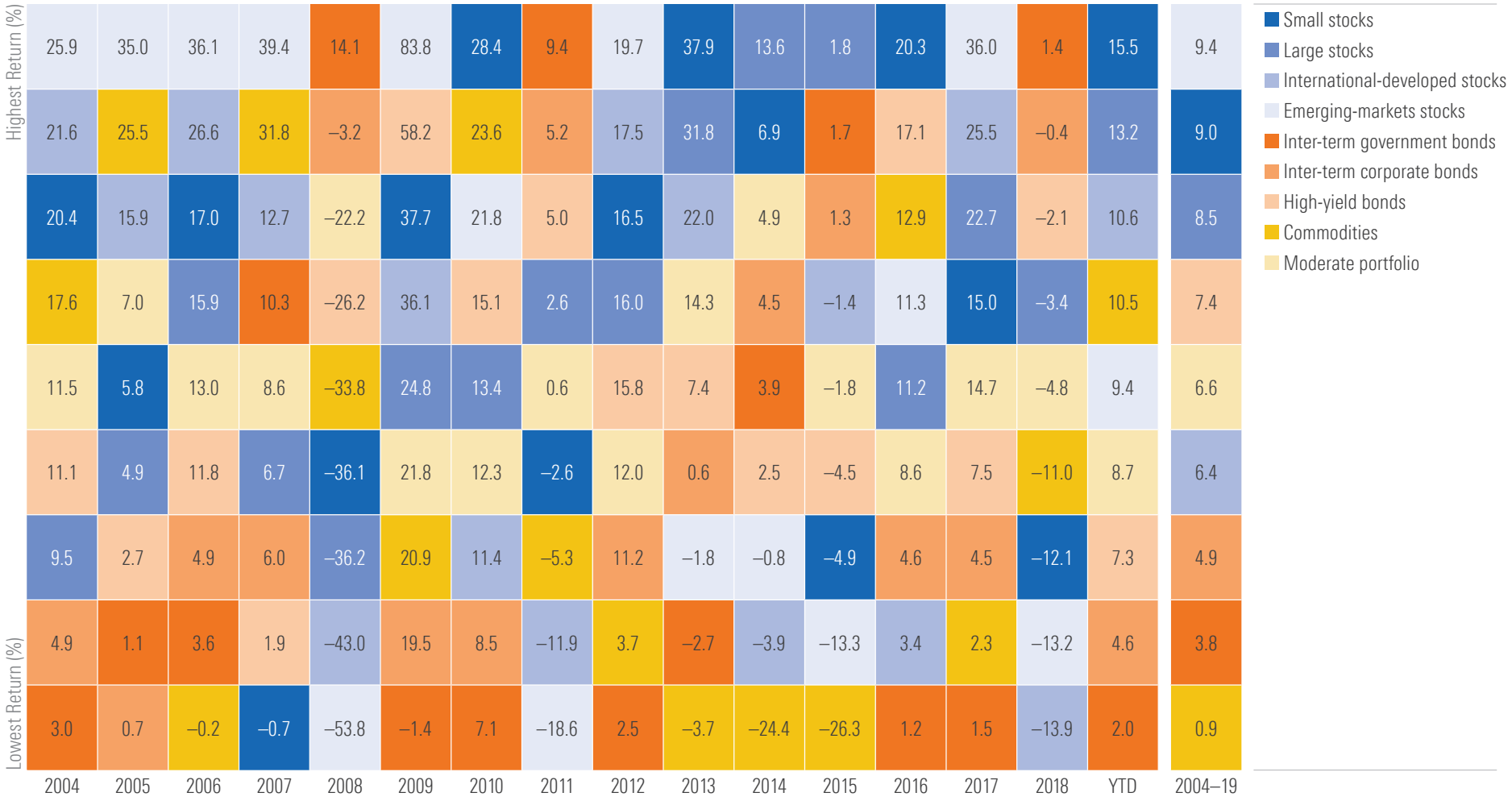


Source: Morningstar Indexes. ©2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

Asset-Class Winners and Losers

2018 was the first year since 2008 when seven out of eight asset classes and the moderate portfolio posted negative returns. All asset classes and the portfolio rebounded in the first quarter, with small stocks leading the way. Ironically, the worst-performing asset class in 2017 (intermediate-term government bonds) became the best-performing one in 2018, then once again the worst-performing for the year to date. Such wild swings illustrate the sometimes-overlooked benefits of diversification.

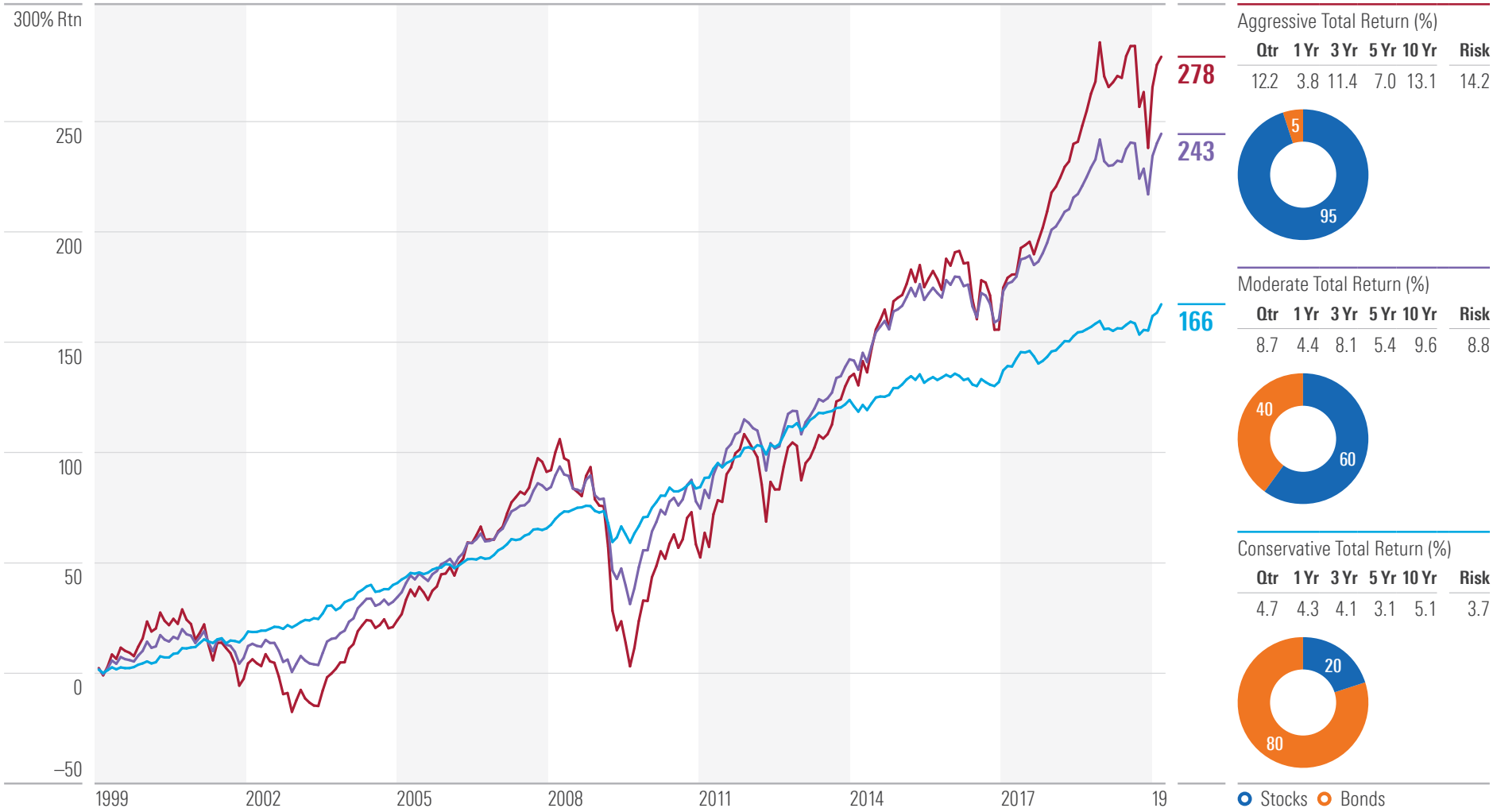


Source: Small stocks—Morningstar Small Cap Index. Large stocks—Morningstar Large Cap Index. Int'l stocks—Morningstar Developed Mkts ex-U.S. Index. Emerging stocks—Morningstar Emerging Mkts Index. Interm. govt bonds—Morningstar Interm. U.S. Govt Bond Index. Interm. corp. bonds—Morningstar Interm. Corp. Bond Index. High-yield bonds—Bloomberg Barclays U.S. High Yield Corp. Bond Index. Commodities—Morningstar Long-Only Commodity Index. Moderate portfolio—Morningstar Moderate Target Risk Index. ©2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

Performance of Risk-Based Portfolios

As expected, an aggressive portfolio with a larger allocation to stocks was able to deliver returns superior to its moderate and conservative counterparts over longer time periods. However, it also assumed a greater risk level, with negative consequences in the second half of 2018. The conservative portfolio posted lower returns but also had much lower volatility, losing much less than its aggressive counterpart, which made it a good option for risk-averse investors.



QAA2

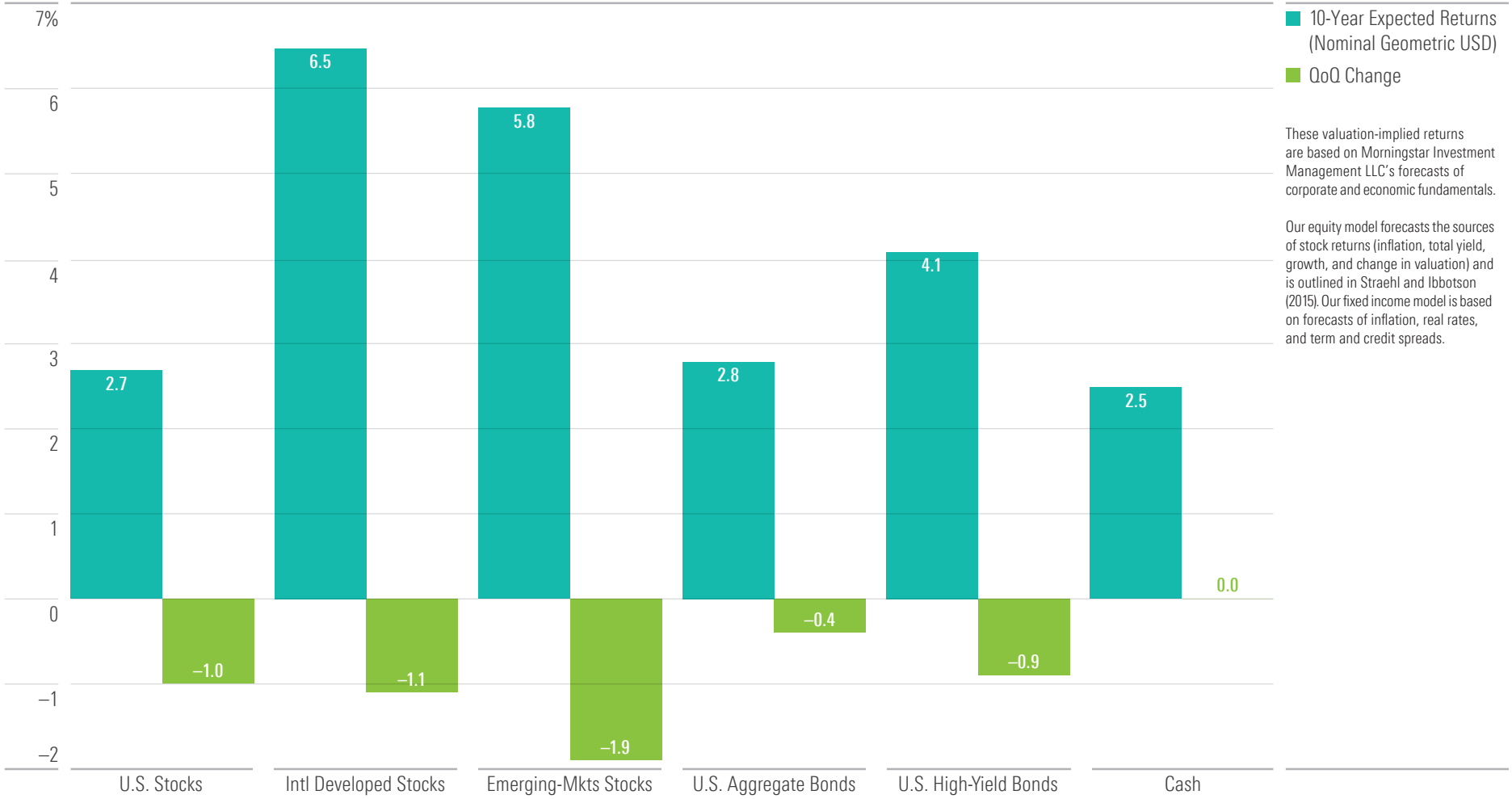
Source: Conservative portfolio—Morningstar Conservative Target Risk Index. Moderate portfolio—Morningstar Moderate Target Risk Index. Aggressive portfolio—Morningstar Aggressive Target Risk Index. Returns for periods longer than one year are annualized. ©2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

International Developed Stocks Expected to Outperform

Our valuation models indicate that international developed stocks will outperform both emerging markets and U.S. stocks over the next 10 years. Investment-grade bonds only offer a small return advantage over USD cash given low starting yields. The first quarter's strong returns significantly lowered the future expected returns for all asset classes except cash.

10-Year Valuation-Implied Returns



These valuation-implied returns are based on Morningstar Investment Management LLC's forecasts of corporate and economic fundamentals.

Our equity model forecasts the sources of stock returns (inflation, total yield, growth, and change in valuation) and is outlined in Straehl and Ibbotson (2015). Our fixed income model is based on forecasts of inflation, real rates, and term and credit spreads.

Ibbotson, R., & Straehl, P. 2015. "The Supply of Stock Returns: Adding Back Buybacks." http://corporate1.morningstar.com/ResearchArticle.aspx?documentId=737061. ©2019 Morningstar Investment Management LLC. All Rights Reserved. Morningstar Investment Management LLC is a registered investment advisor and subsidiary of Morningstar, Inc.

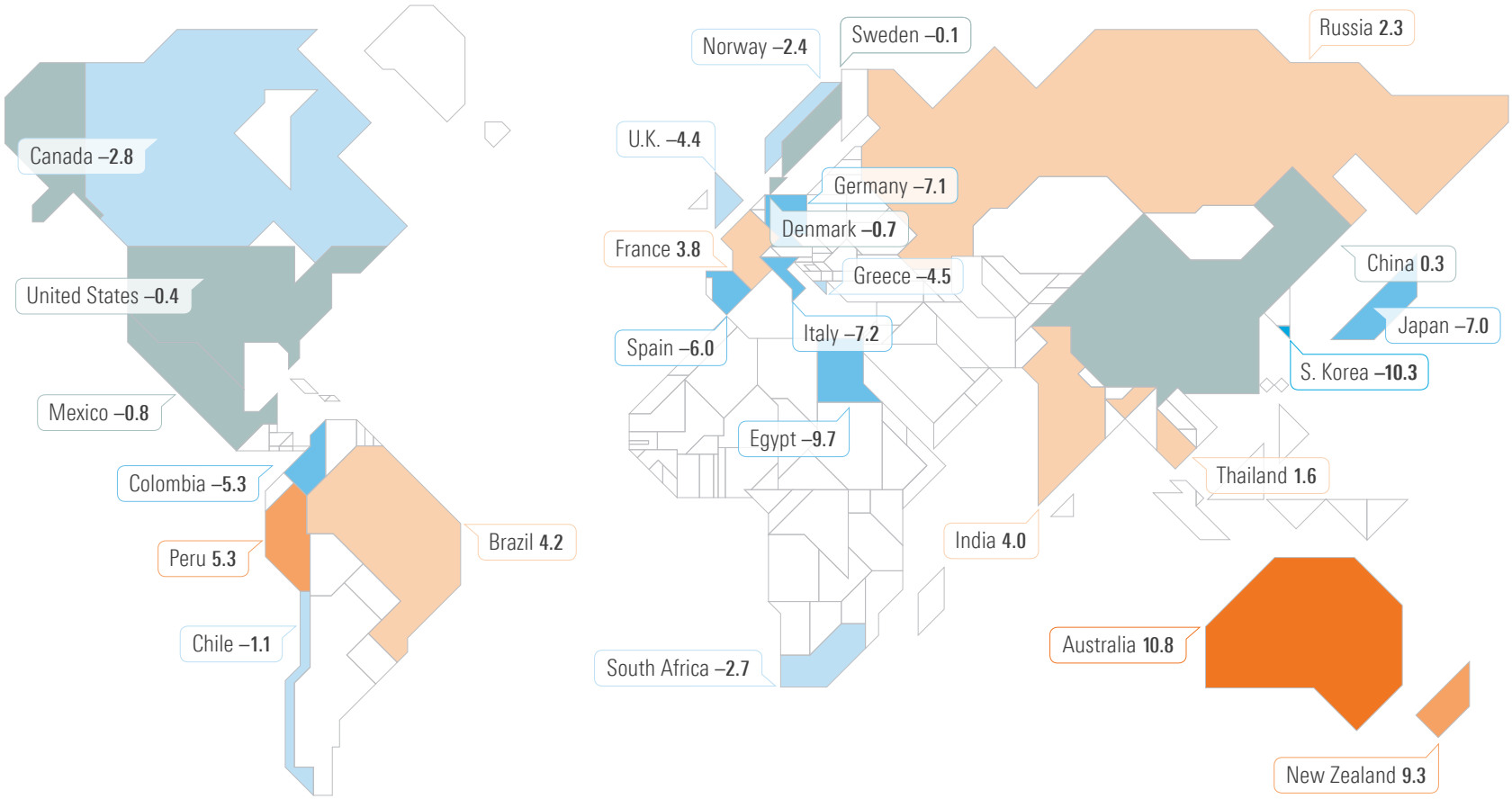
MORNINGSTAR®

Equities

Morningstar Price to Fair Value by Country

Worldwide valuations hovered closer to fair value this quarter--a big swing from the drastic undervaluations seen last quarter. This includes the United States, which sits at a negative 0.4% valuation, up from negative 11.6%. Australia continues to be the most overvalued region, with developing regions like Brazil and Russia switching to overvalued as well.

Market-Cap-Weighted Valuation



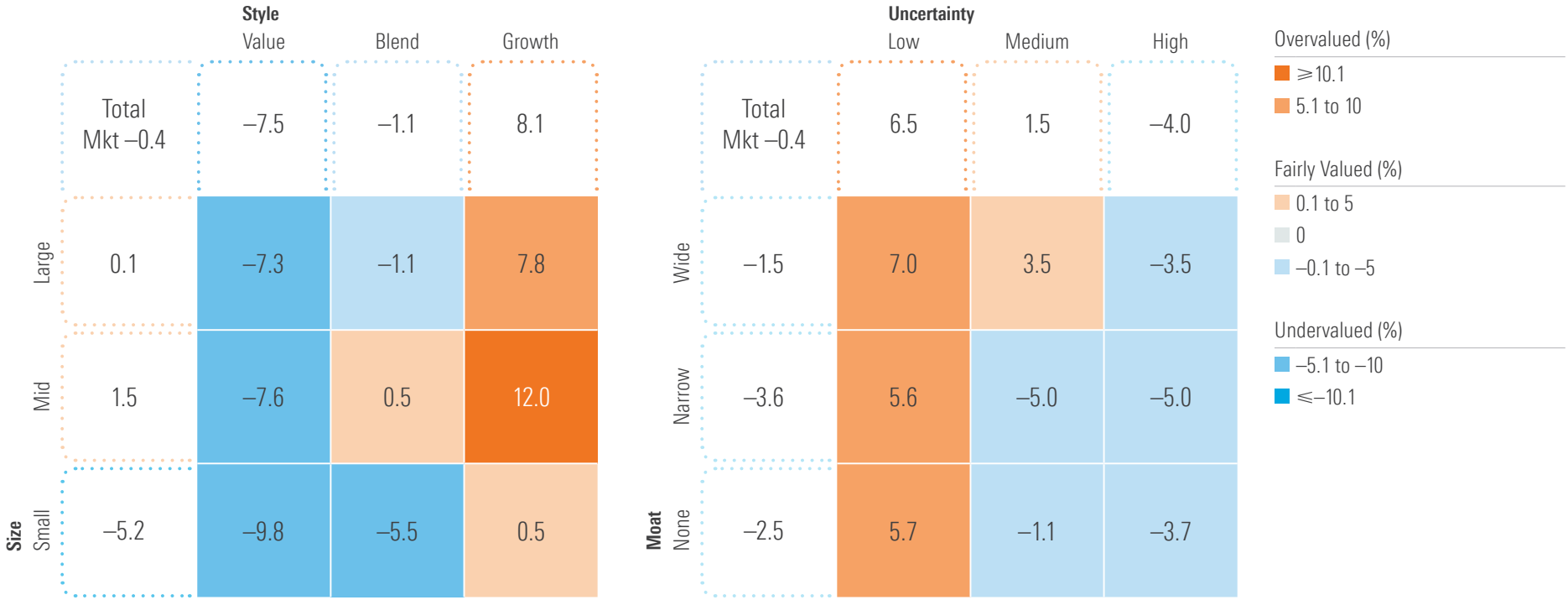
Regions	%
Greater Asia	–3.9%
Greater Europe	–1.9%
United States	–0.4%

Source: Morningstar quantitative and analyst fair value data. ©2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

Morningstar Price to Fair Value, U.S. Equity Style Boxes

The U.S. market normalized this quarter, with valuations bouncing back across the board. Mid-cap growth had an especially strong shift to overvaluation after last quarter's dip. Spreads across the market remain wide between growth and value stocks, with the best buying opportunities still found in small-cap value.

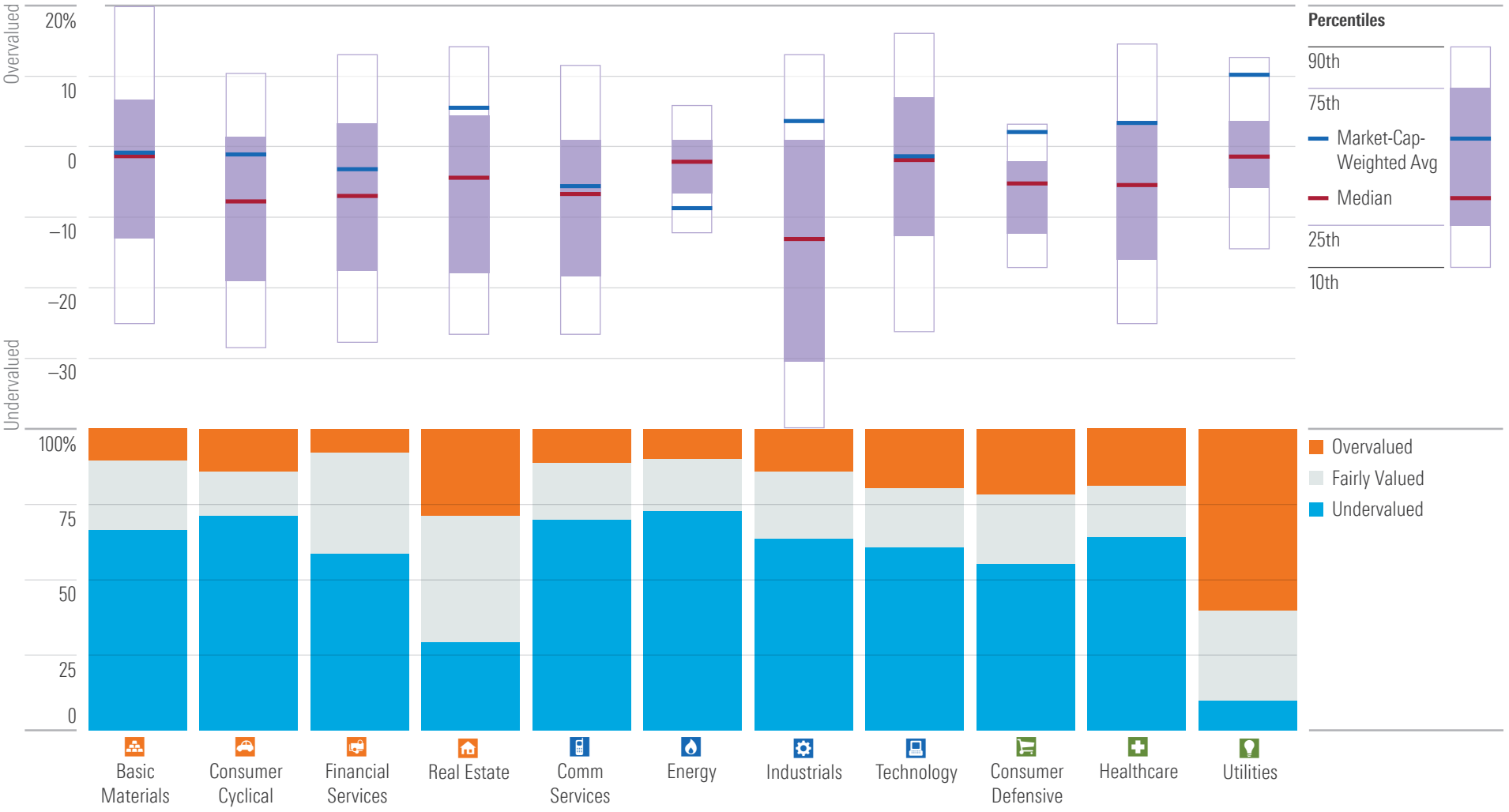


Source: Morningstar quantitative and analyst fair value data. Morningstar Style Boxes based on market-cap-weighted data. ©2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

Morningstar Price to Fair Value Distribution by U.S. Sector

Undervaluations shifted down across sectors this quarter compared with last, with market-weighted average valuations drawing closer to zero. Real estate and utilities saw an influx of overvalued companies with market-cap-weighted averages deviating from their static median, indicating the largest companies in these sectors are driving these changes.



Source: Morningstar quantitative and analyst fair value data. ©2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

Morningstar Price to Fair Value Distribution by Region

Morningstar calculates fair values for 53 countries. Most countries' market-cap-weighted valuations hovered near zero last quarter. Valuation changes were most influenced by the largest companies in each region, as proved by the median valuations, which did not change since last quarter. The top overvalued countries were not concentrated in any particular region but instead were dispersed around the world.

Top 10 Lowest-Valued Countries (Market-Cap-Weighted)

Country	Over/Undervalued by	Uncertainty Rating	Number of Companies
Sri Lanka	–11.5	Very High	165
Belgium	–11.5	High	85
South Korea	–10.3	High	1,637
Tunisia	–9.8	Very High	42
Egypt	–9.7	Very High	152
Iran, Islamic Republic of	–8.6	Very High	141
Hong Kong	–8.5	High	831
Bulgaria	–8.2	Very High	24
Iraq	–7.9	Very High	22
Italy	–7.2	High	183

Top 10 Highest-Valued Countries (Market-Cap-Weighted)

Country	Over/Undervalued by %	Uncertainty Rating	Number of Companies
Argentina	13.8	High	47
Australia	10.8	High	387
New Zealand	9.3	Medium	71
Morocco	7.0	High	34
Finland	5.9	High	98
Peru	5.3	High	26
Indonesia	5.1	High	335
Brazil	4.2	High	286
India	4.0	High	2,144
France	3.8	High	405

Source: Morningstar quantitative and analyst fair value data. ©2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

Sector Statistics

Value and growth have very different sector allocations, which means investors should not focus only on one when creating a diversified portfolio. Currently, the U.S. market is trading at a premium to its long-term price/earnings and price/book ratios, as are all the defensive sectors. Considering the late-stage bull market, defensive sectors may not provide the protection that they have historically because they are all trading at premium valuations.

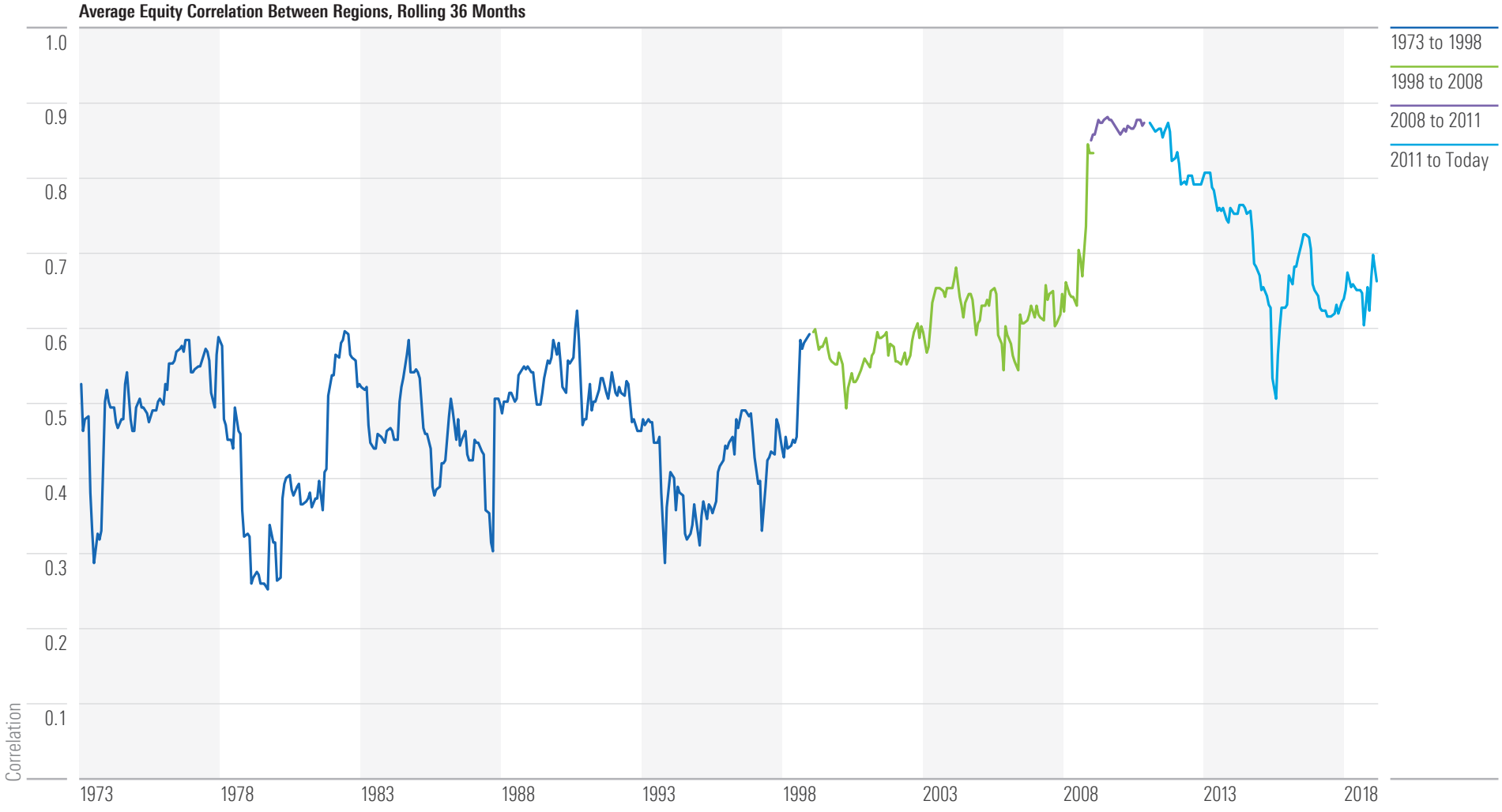
	Morningstar Index Weights (%)			Price to Earnings		Price to Book			
	U.S. Market	U.S. Value	U.S. Growth	Current	15 Yr Avg	Current	15 Yr Avg	Beta (3 Yr)	Dividend Yield (%)
Morningstar U.S. Market	—	—	—	19.5	17.5	3.0	2.5	1.0	1.9
Cyclical									
Basic Materials	2.8	3.4	1.7	19.0	18.2	2.6	2.7	1.0	1.8
Consumer Cyclical	12.3	5.8	17.7	22.2	18.6	4.8	3.0	1.1	1.4
Financial Services	15.0	24.8	9.6	15.7	14.0	1.6	1.4	1.1	1.5
Real Estate	3.8	3.2	2.6	27.6	28.7	2.3	2.2	0.8	4.3
Sensitive									
Communications Services	3.3	6.0	2.3	18.6	18.0	2.0	2.2	0.8	2.7
Energy	5.1	7.2	2.4	14.60	15.3	1.6	2.1	1.2	2.7
Industrials	10.7	5.1	9.0	19.8	18.4	4.3	3.1	1.2	1.8
Technology	22.7	11.6	35.0	19.7	20.6	5.6	3.8	1.1	1.2
Defensive									
Consumer Defensive	7.1	14.2	2.2	19.2	19.0	4.0	3.8	0.6	2.6
Healthcare	13.9	10.3	17.5	25.1	20.8	4.1	3.4	1.0	1.5
Utilities	3.2	8.4	0.0	20.2	16.6	2.1	1.8	0.2	3.2

Source: Morningstar Direct. © 2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

Equity Returns Are Becoming Increasingly Correlated

As passive investing keeps growing in popularity, one would expect correlations between global equity indexes to increase. Before the financial crisis in 2008, equity correlations remained fairly stable. When the crisis hit, however, correlations skyrocketed to 0.9, reducing the benefit of international diversification. As markets settled and passive showed no signs of slowing, correlation between regions remained higher than before, suggesting this is the "new normal" investors have to get used to.

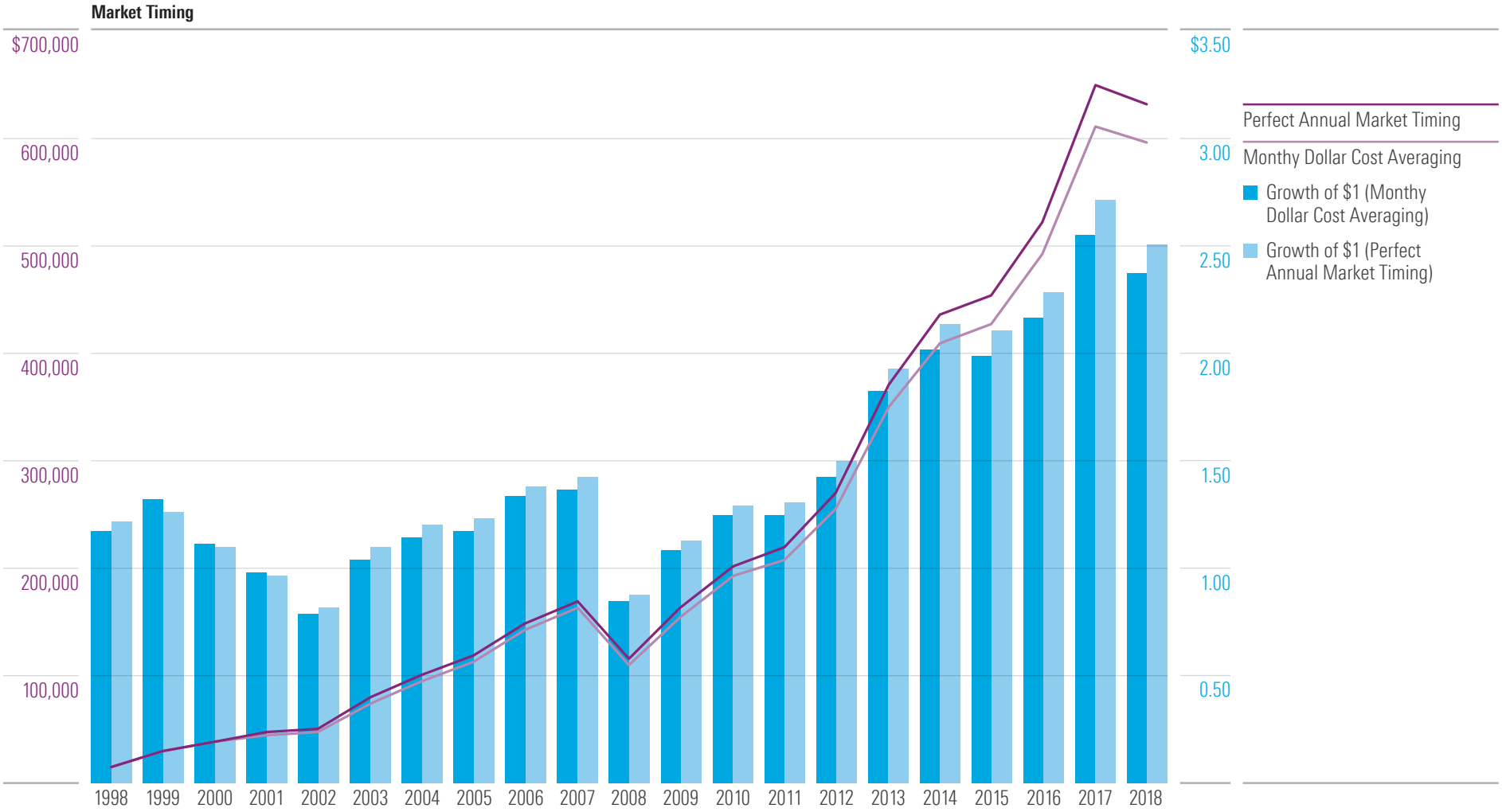


Source: Morningstar Direct. The correlation figure shown is an average of the pairwise rolling 36-month return correlations between the following indexes: MSCI Europe GR, MSCI Far East NR, MSCI USA GR, and IA SBBI US Small Stock TR USD. © 2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

Dollar-Cost Averaging Is the Best Strategy for Most Investors

Dollar-cost averaging is a strategy that allows an investor to buy the same dollar amount of an investment in regular intervals. Below shows the difference between dollar-cost averaging $1,000 per month and investing $12,000 per year before the highest monthly return of the market each year. The difference in returns is minimal, demonstrating that, for the average investor, dollar-cost averaging is the best strategy because it avoids the risk of mistiming the market.



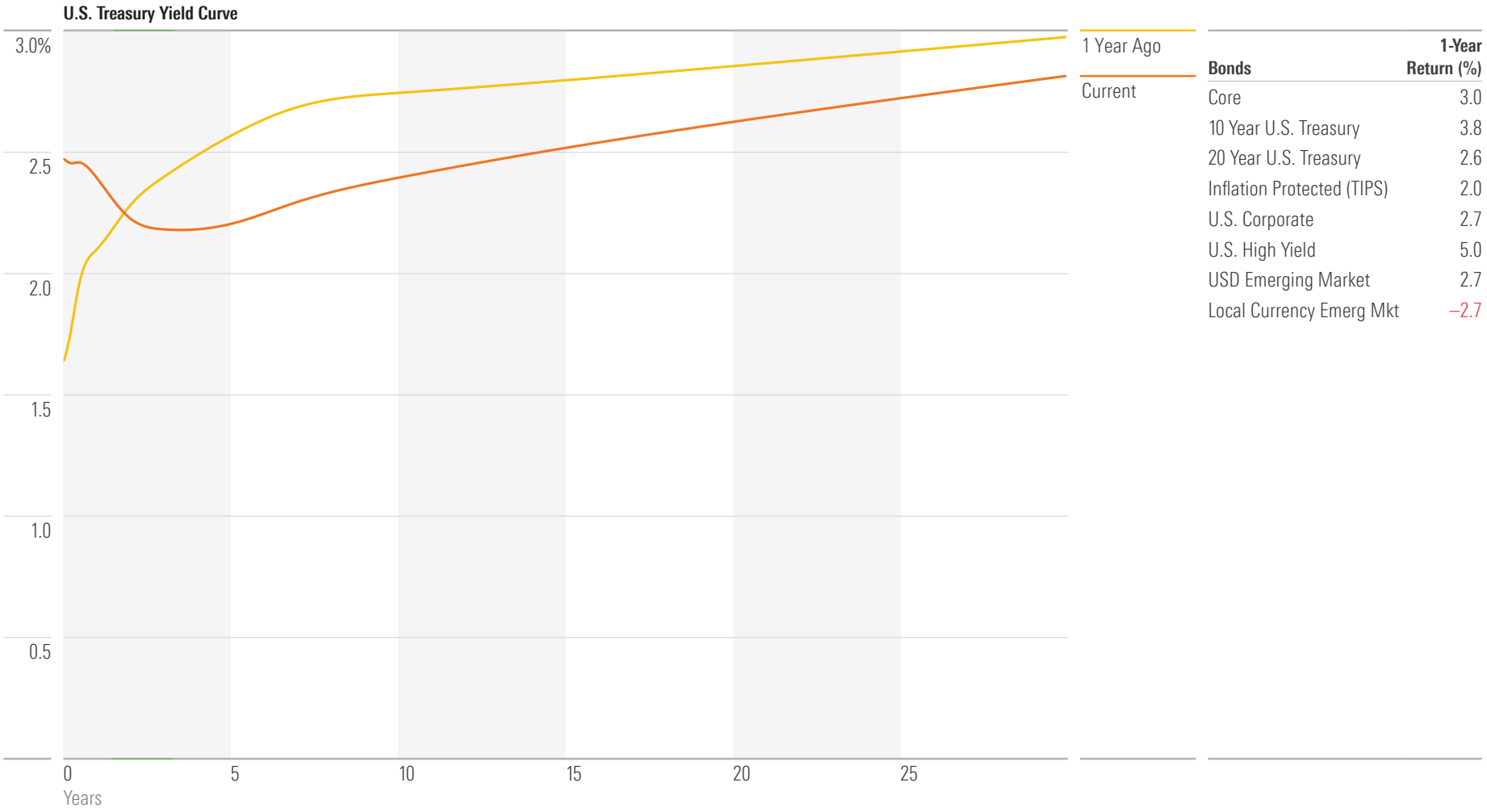
Source: Morningstar Direct. © 2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

Fixed Income

The Short End of the U.S. Treasury Yield Curve Rises Significantly

The Federal Reserve has not raised rates since December 2018, and the positioning of the Fed has led to markets expecting more dovish monetary policy and the continued inversion of the yield curve. This unusual inversion comes from changing expectations for the long-term path of Fed policy as opposed to short-term expectations for the next meeting. The long end of the curve has lowered compared with a year ago but remains positively sloped.



Bonds	1-Year Return (%)
Core	3.0
10 Year U.S. Treasury	3.8
20 Year U.S. Treasury	2.6
Inflation Protected (TIPS)	2.0
U.S. Corporate	2.7
U.S. High Yield	5.0
USD Emerging Market	2.7
Local Currency Emerg Mkt	–2.7

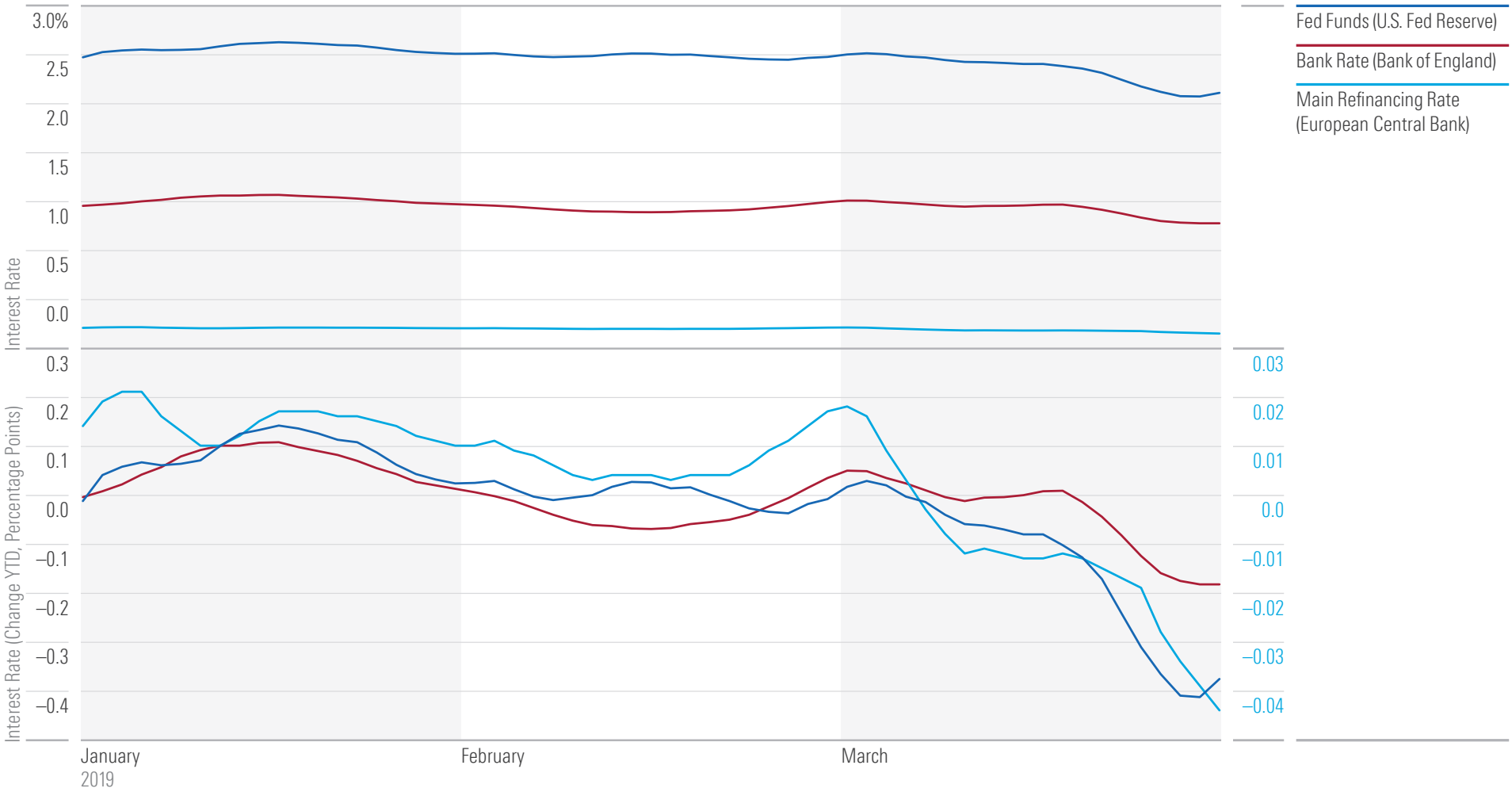
Source: U.S. Federal Reserve. 10-Year US Treasury Bonds—Bloomberg Barclays US Treasury 7-10 Year Bond Index. 20+ Year US Treasury Bonds— Bloomberg Barclays US Treasury 20+ Year Bond Index. US Corporate Bonds—Morningstar Corporate Bond Index. US High Yield Bonds— Bloomberg Barclays US Corporate High Yield Bond Index. USD EM Bonds—Morningstar EM Composite Bond Index. Local Currency EM Bonds—Bloomberg Barclays EM Local Currency Broad Bond Index. Yield curve data as of 3/29/2019. ©2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

Expectations Decline for Major Policy Rates

Market expectations for the path of policy rates at the Federal Reserve, the European Central Bank, and the Bank of England declined in the first quarter of 2019. All three central banks revised down their growth forecasts while noting that inflation risks have softened. Fed and ECB policymakers also lowered their monetary policy guidance. Neither expects to increase rates in 2019, and implied rates on futures contracts show the market also discounting the likelihood of rate increases in 2020.

Market Expectations for Central Bank Policy Rates in December 2020



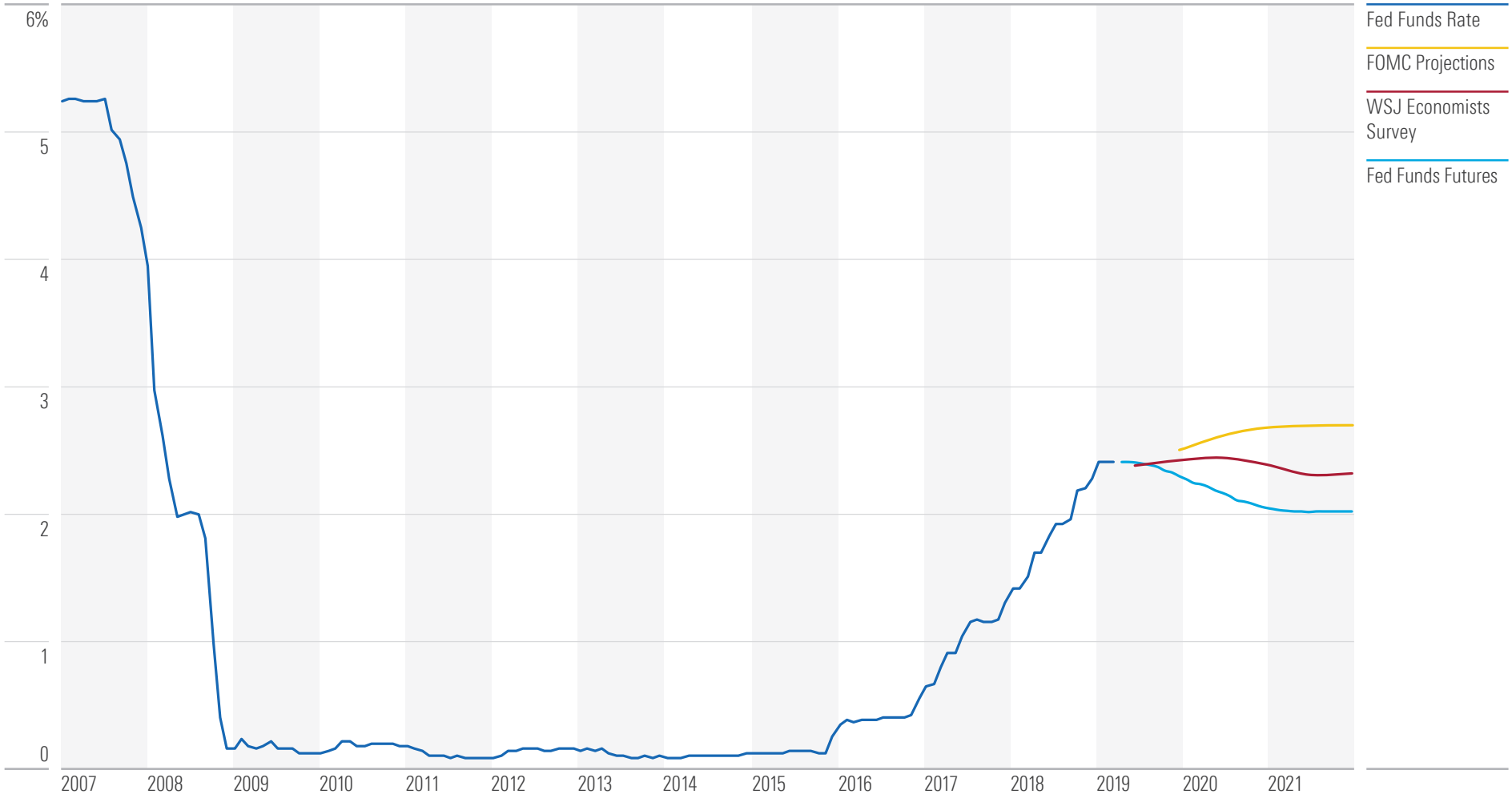
Source: Macrobond Financial. ©2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

Three Different Projections for the Federal-Funds Rate

Projections from three different sources have disparate views on the path for U.S. interest rates. Notably, the market expects rates to decline from current levels through 2020, while economists surveyed by *The Wall Street Journal* predict rates staying mostly flat through the same time horizon. The Federal Reserve, however, projects rates continuing to rise starting in 2020. The difference between these three projections reflects heightened uncertainty about the path of future interest rates in the U.S.

Projections for the Federal Funds Rate from Three Different Sources



QFI14

24

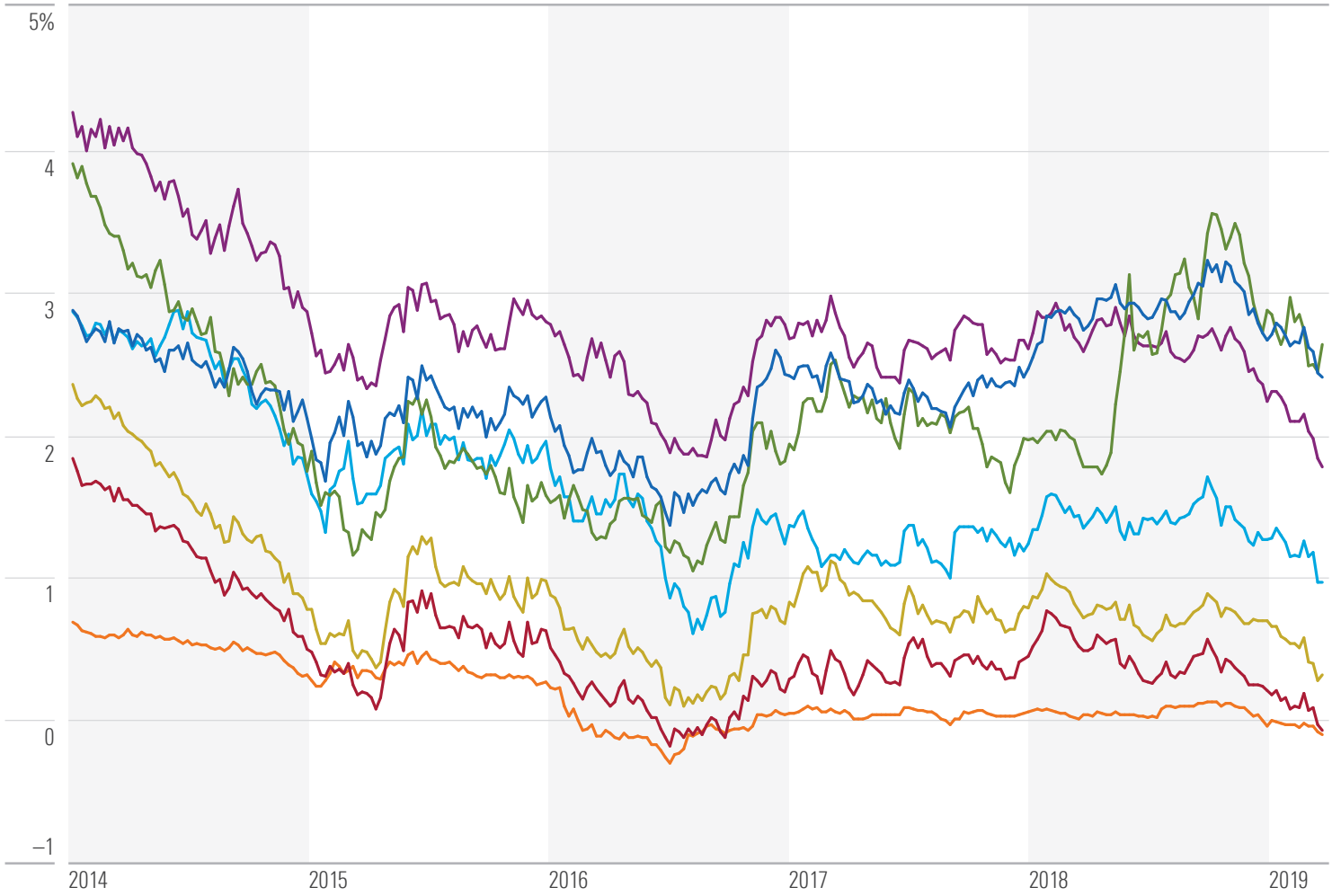
Source: Federal Reserve, The Wall Street Journal, Chicago Mercantile Exchange, Morningstar calculations. ©2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

The United States Has One of the Highest Yields in the Developed World

The 10-year U.S. Treasury yield has fallen from its peak of 3.4% to 2.4%. However, it still remains significantly higher than that of the German bund, which has dropped all the way to negative 0.1%. In the first quarter of 2019, rates in most developed countries continued their decline, reflecting greater uncertainty for the global economic outlook. In the U.S. specifically, the Federal Reserve softened expectations about future rate increases.

10-Year Government Bond Yields



	Current Yield (%)	Change in Last Year (%)
Italy	2.6	0.9
United States	2.4	–0.3
Australia	1.8	–0.8
United Kingdom	1.0	–0.4
France	0.3	–0.4
Germany	–0.1	–0.6
Japan	–0.1	–0.1

QFI10

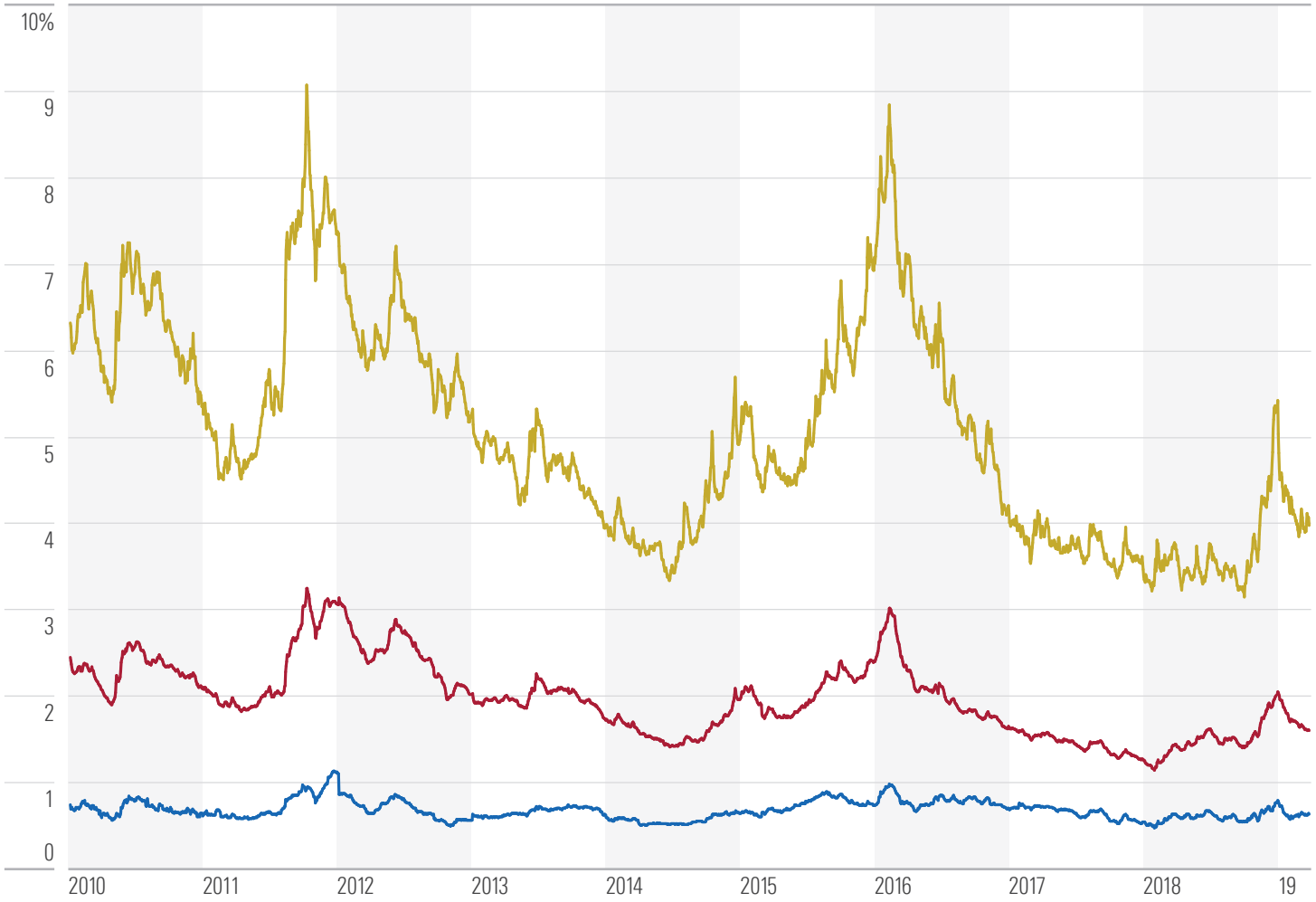
Source: Macrobond Financial. ©2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

Corporate Credit Spreads Narrow in the First Quarter

Credit spreads narrowed in the first quarter of 2019 as equities recovered from the drawdown in late 2018. However, as the credit spreads have narrowed, they have come to rest at levels higher than before they sharply rose in the fourth quarter of 2018. This is particularly true of the high-yield and BBB spreads and implies that market expectations are accounting for more risk than last year.

Corporate Credit Spreads



	Current (%)	Avg (%)	Change Over Last Quarter
AAA	0.7	0.8	–0.1
BBB	1.6	2.0	–0.4
High Yield	4.1	5.6	–1.2

QFI9

26

Source: Bank of America Merrill Lynch Corporate Spread Indexes from the Federal Reserve, Morningstar calculations. ©2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

An Inverted Yield Curve Has Been a Good Recession Indicator

The image illustrates the yield differential between 10-year and two-year Treasuries. A normal yield curve occurs when long-term yields are higher than short-term ones, which would be a positive number on this chart. When the difference becomes negative, however, we have an inverted yield curve, and historically that has happened before every major recession in the past 40 years. Today, the 10-year/two-year spread remains below the long-term average and dangerously close to zero.

QFI20

27

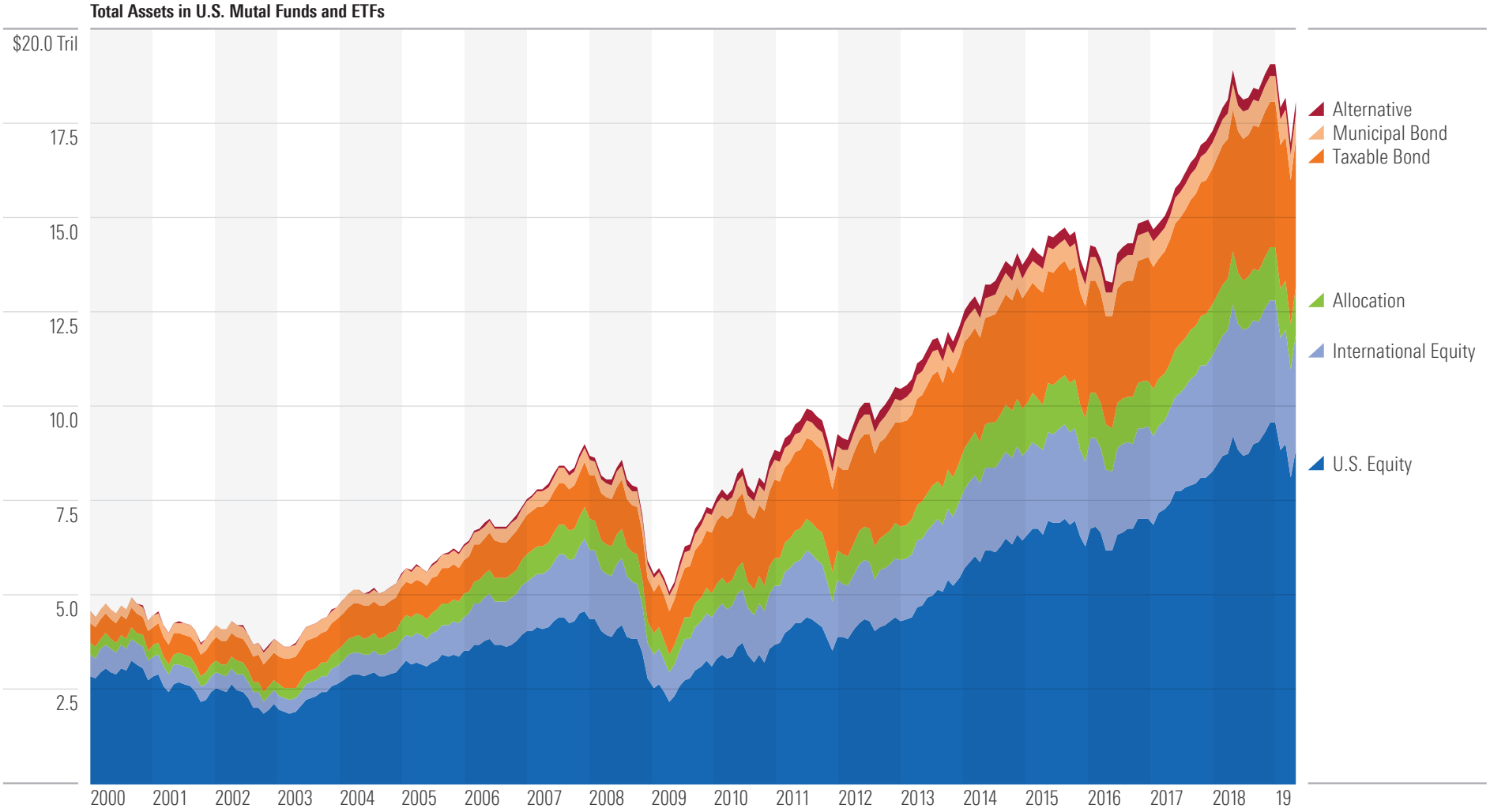
Source: Macrobond Financial. ©2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

Funds

Assets Under Management in U.S. Category Groups

Total assets managed in U.S. open-end and exchanged-traded funds have grown from $4.6 trillion beginning in 2000 to $18.8 trillion this last quarter-end. As a percentage of assets managed, taxable bonds increased from 11% to 21% over this period. Concurrently, U.S. equity fell from 63% to 49% of assets managed. The largest percentage growth occurred in alternative, growing from $12 billion to $292 billion, a 2,300% change.



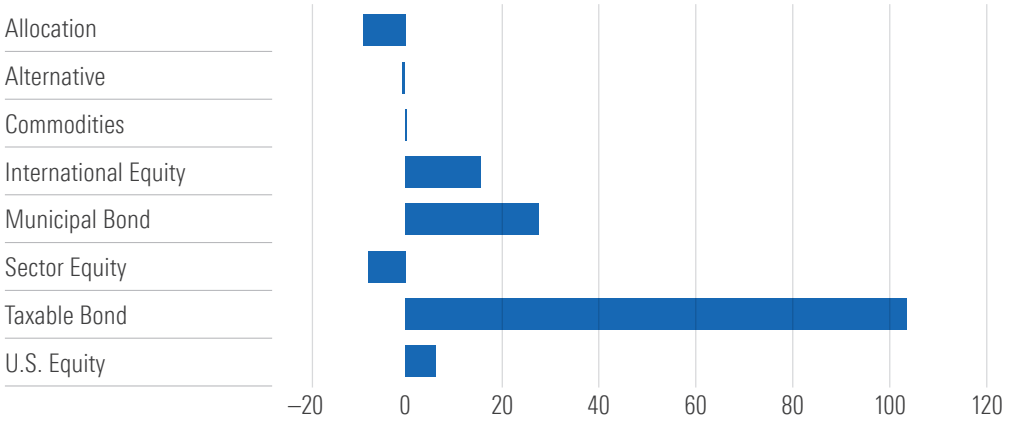
Source: Morningstar Direct. © 2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

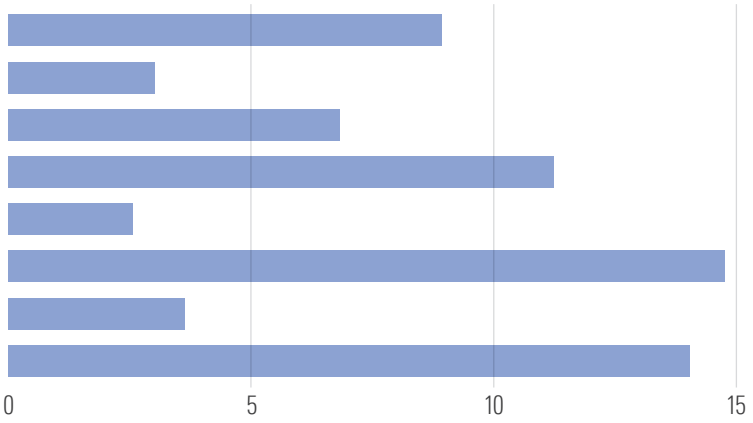
Top- and Bottom-Performing Morningstar Categories

Taxable-bond funds were in high demand last quarter, taking in more than $100 billion, as investors responded favorably to the Fed's pause on further interest-rate hikes. Most asset classes achieved impressive results, especially equity funds, whose returns were in the double digits. As stock markets recovered from their December lows, bear-market funds posted an unsurprising 17.4% loss, while China-region funds gained 20.9% thanks to encouraging developments surrounding the trade talks.

Trailing Quarter Flows ($ Bil)



Trailing Quarter Returns (%)



Top-Performing Morningstar Categories	U.S. Category Group	Return (%) Trailing Quarter	Trailing 1 Year	Quarterly Flow ($ Mil)
China Region	International Equity	20.9	–6.4	2,702
Commodities Energy	Commodities	20.8	–0.7	–357
Technology	Sector Equity	19.7	9.9	–1,041
Energy Limited Partnership	Sector Equity	19.1	13.0	231
Mid-Cap Growth	US Equity	18.2	8.0	–1,328
Small Growth	US Equity	17.0	7.7	–728
Equity Energy	Sector Equity	16.9	–9.5	–4,248
Real Estate	Sector Equity	16.1	17.1	3361
Large Growth	US Equity	15.7	10.7	–8,804
Industrials	Sector Equity	15.2	0.0	–1,457

Bottom-Performing Morningstar Categories	U.S. Category Group	Return (%) Trailing Quarter	Trailing 1 Year	Quarterly Flow ($ Mil)
Bear Market	Alternative	–17.4	–10.1	–58
Commodities Agriculture	Commodities	–3.7	–14.1	–29
Market Neutral	Alternative	0.1	–0.2	1,493
Ultrashort Bond	Taxable Bond	1.0	2.4	7,184
Short Government	Taxable Bond	1.0	2.4	3,218
Muni National Short	Municipal Bond	1.2	2.5	1,669
Managed Futures	Alternative	1.2	–2.4	–1,503
Multicurrency	Alternative	1.4	2.1	–505
Muni Single State Short	Municipal Bond	1.6	3.6	33
Short-Term Bond	Taxable Bond	1.7	3.0	7,406

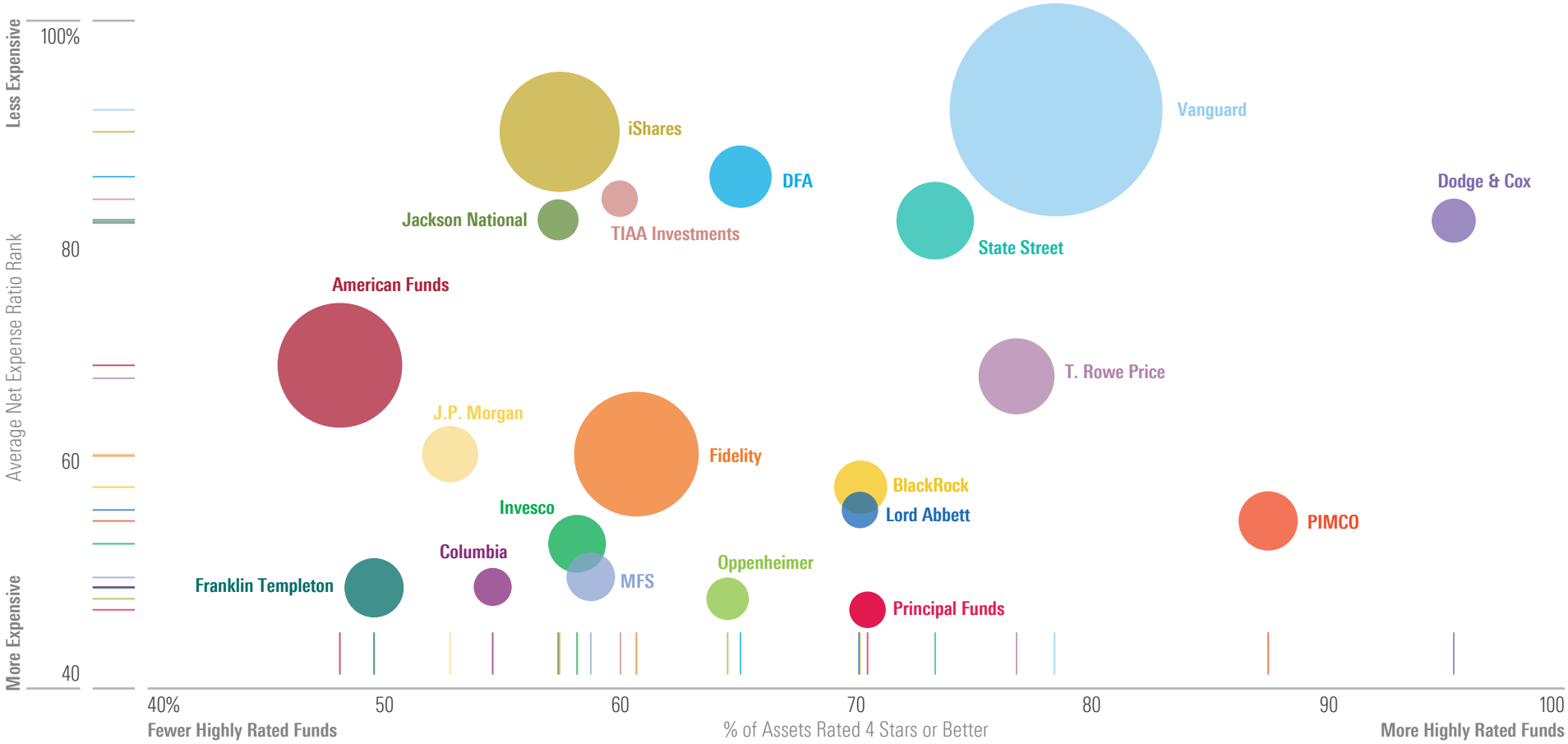
>20
10 to 20
0 to 10
–10 to 0
–20 to –10
<–20

Source: Morningstar Direct. ©2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

Top 20 Fund Companies: Relationship Between Ratings, Expenses, and Assets

Almost all fund companies in the graph below have over 50% of their assets in funds with a Morningstar Rating of 4 stars or higher, confirming investors' strong preference for low-cost funds with above-average long-term results. This chart used to illustrate a stronger linear relationship between low expenses and high returns. In recent quarters, however, that trend has weakened as companies have had a wider dispersion in performance without much change in fee levels.



QMF3

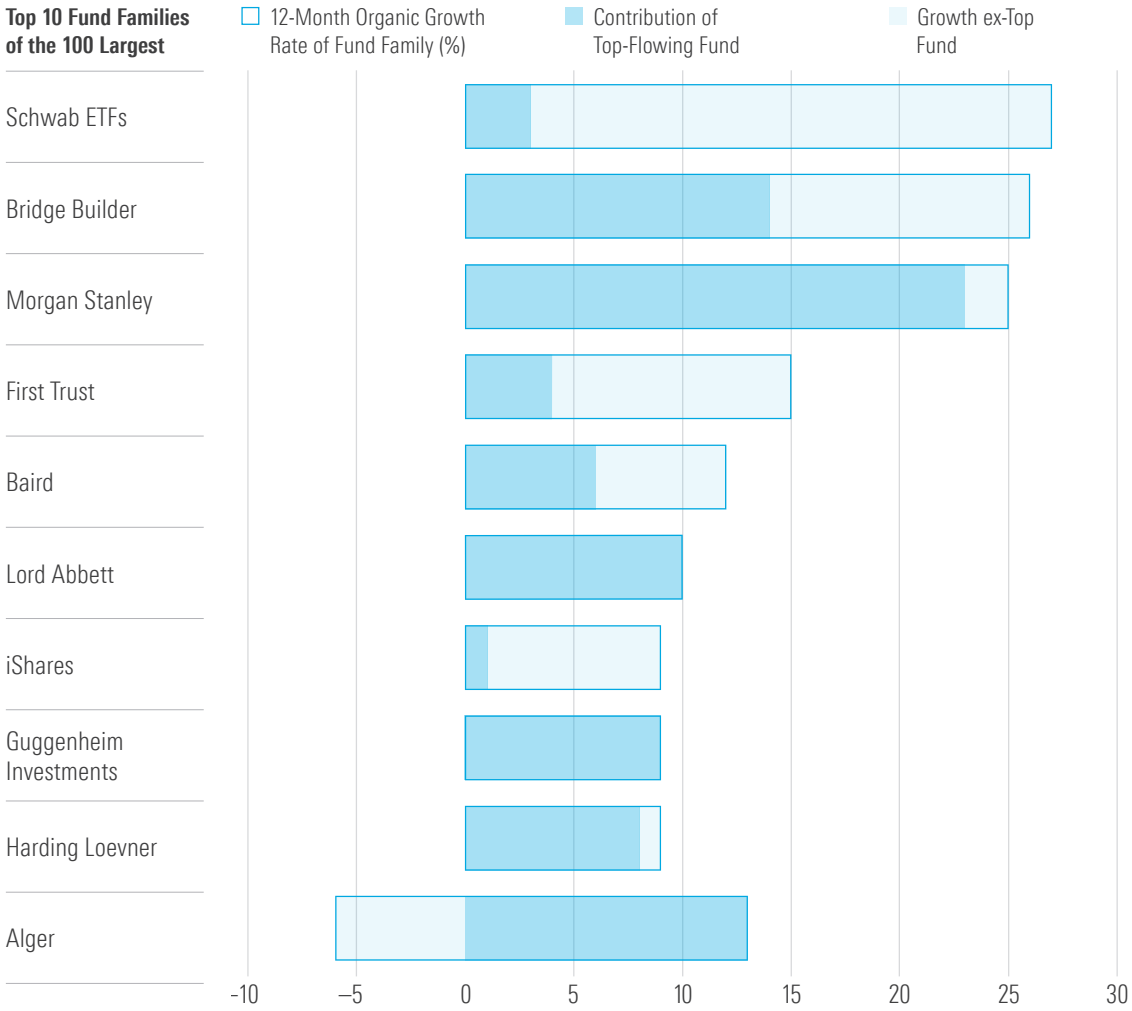
31

Source: Morningstar Direct. ©2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

Fastest-Growing Fund Families

Schwab ETFs and Edward Jones' Bridge Builder funds achieved the two highest trailing-12-month organic growth rates for the eighth consecutive quarter. The market movements in the first quarter of 2019 led to three new fund families in this ranking: Baird, Alger, and Lord Abbett, displacing MassMutual, Primecap, and VanEck. Of particular interest: Six of the top 10 contributing funds are ultrashort- and intermediate-term bond funds, compared with only four in last quarter's ranking.



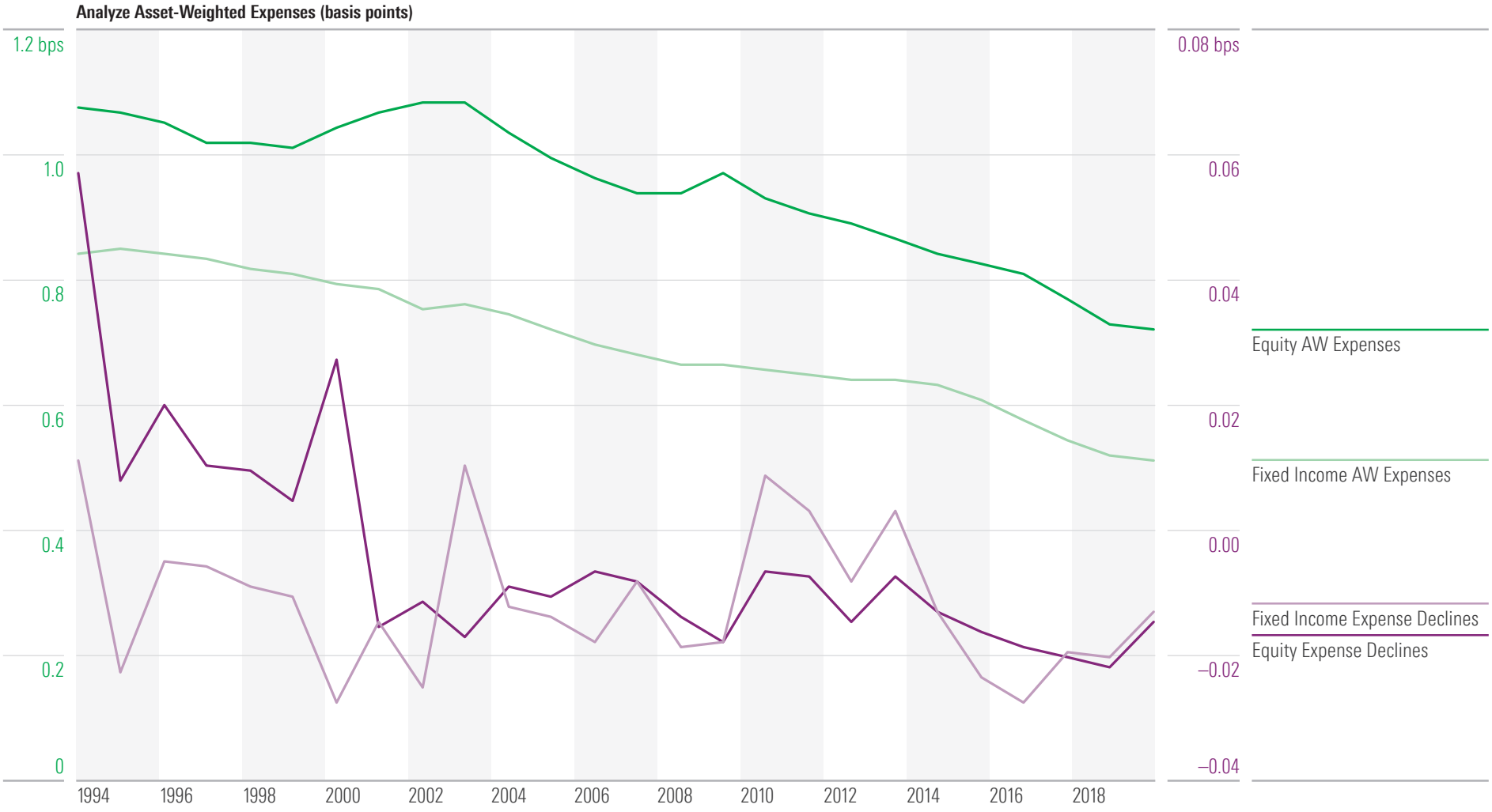
Top Fund for Each Family	Morningstar Category	Firm Active/ Passive
Schwab International Equity ETF	Foreign Large Blend	Passive
Bridge Builder Core Plus Bond	Intermediate-Term Bond	Active
Morgan Stanley Institutional Ultra-Short Income	Ultrashort Bond	Active
First Trust Enhanced Short Maturity ETF	Ultrashort Bond	Active
Baird Aggregate Bond	Intermediate-Term Bond	Active
Lord Abbett Ultra Short Bond	Ultrashort Bond	Active
iShares Core S&P 500 ETF	Large Blend	Passive
Guggenheim Total Return Bond	Intermediate-Term Bond	Active
Harding Loevner International Equity	Foreign Large Growth	Active
Alger Small Cap Focus	Small Growth	Active

Source: Morningstar Direct. ©2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

Despite Price Pressures, Fund Companies Are Hesitant to Lower Fees

Investing costs can fall for two main reasons: fund companies lowering expenses on existing funds, or assets shifting to lower-cost funds. The chart below shows how costs decline as a direct result of fund companies lowering fees. Although asset-weighted expenses have fallen nearly 30 basis points since 1994 for both equity and fixed-income funds, cost declines caused by expense ratio cuts hover near zero, which means that, in general, fund companies are not lowering fees.

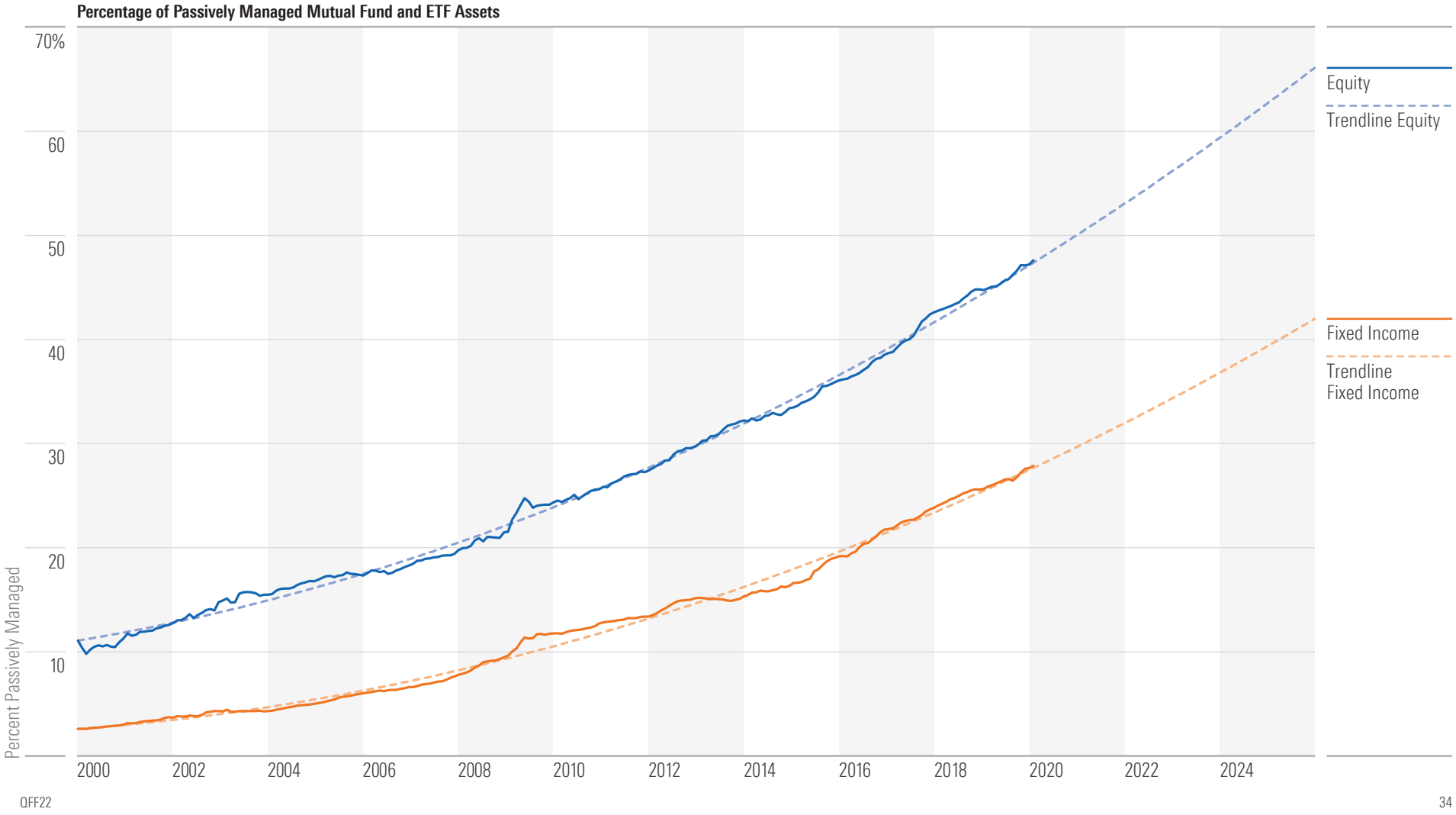


Source: Morningstar Direct. © 2019 Morningstar. All Rights Reserved..

MORNINGSTAR®

Growth of Assets in Passively Managed Vehicles Steadily Continues

The percentage of passively managed open-end and exchanged-traded fund assets continues to grow steadily. The passively managed percentage of equity assets is currently 48% and on track to reach 60% by 2024. Investors have also been moving into passively managed fixed-income funds, but at a slower rate than for equity, likely because of the superior performance of active funds, on average, in the fixed-income space.



QFF22

34

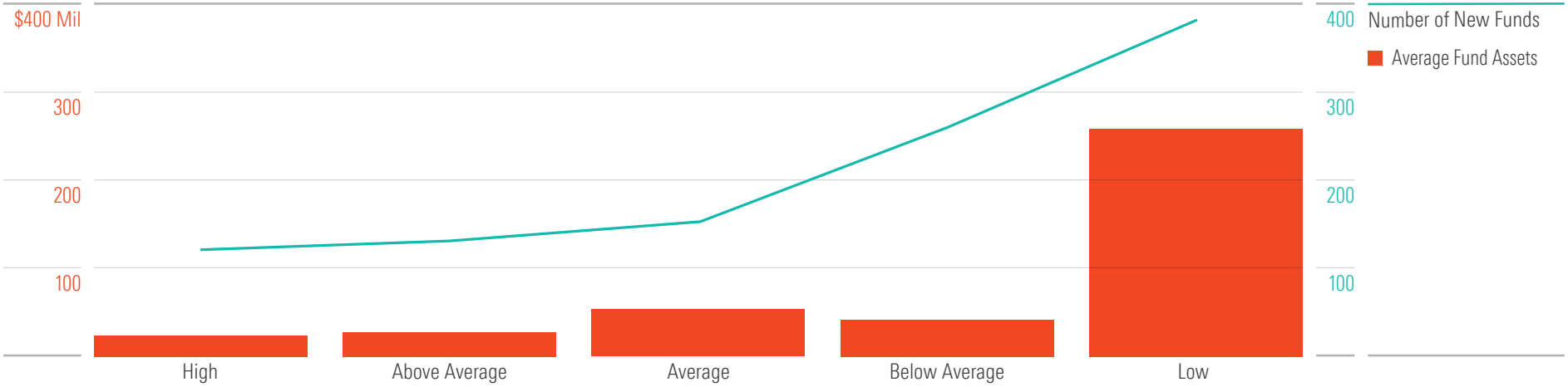
Source: Morningstar Direct. © 2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

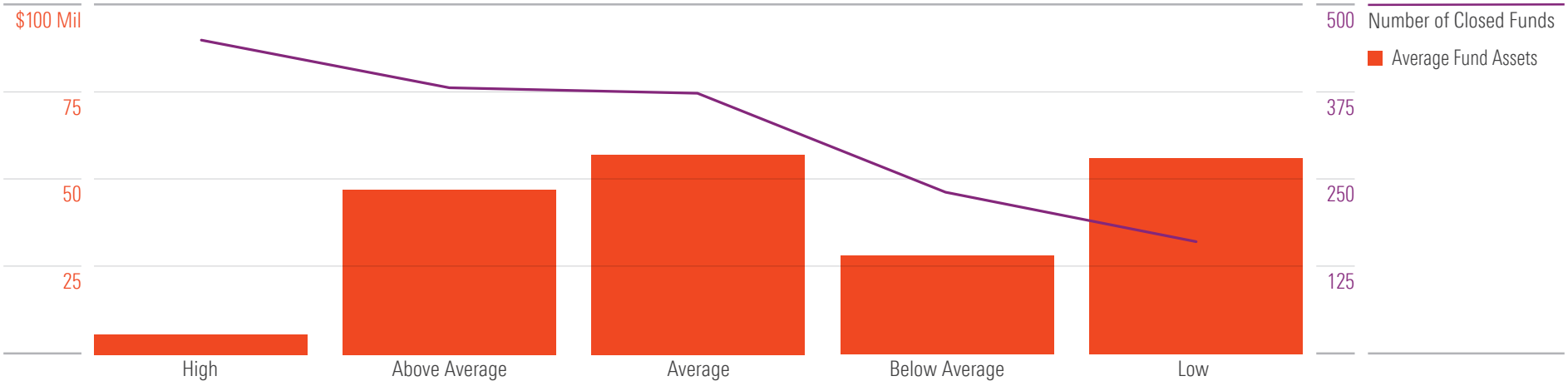
New Funds and Fund Closures

Among the funds that closed between December 2017 and November 2018, a majority had average to high expenses. In terms of net assets, funds with average to low expenses earned the most assets. For the funds that launched during the same period, the cheapest funds, on average, had more assets than all the funds in the higher-fee categories combined. An overwhelming number of new funds had low to below-average fees, while only 10% had high fees.

New Fund Launches From December 2017 to November 2018



Fund Closures From December 2017 to November 2018

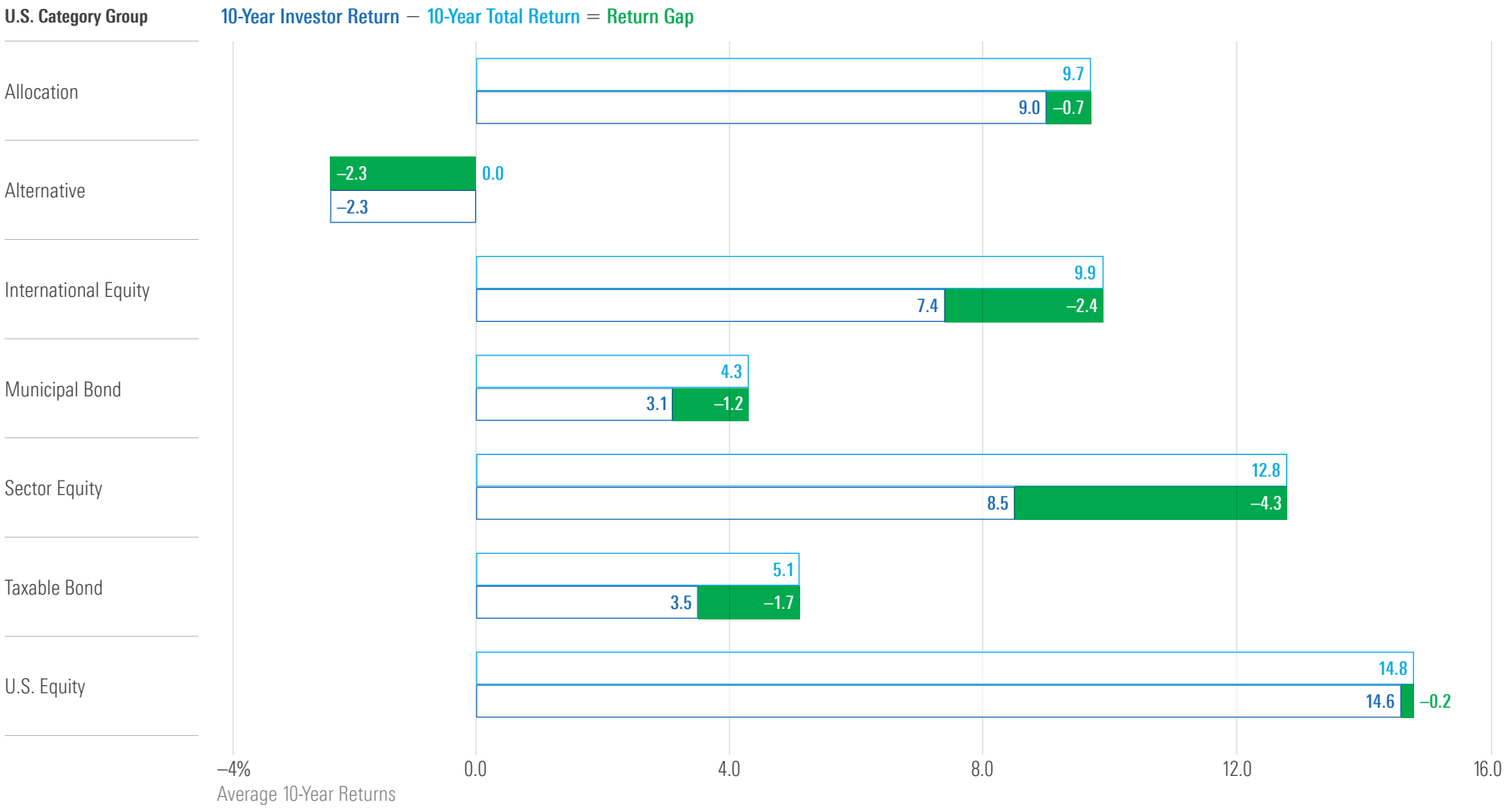


Source: Morningstar Direct. © 2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

U.S. Equity Funds Have the Lowest Return Gap Among U.S. Category Groups

Morningstar Investor Returns take into account monthly fund flows and monthly returns to estimate a typical investor's experience in a fund. Over the past 10 years, investor returns in every category group lagged behind total returns, suggesting that investors are poor market-timers. For sector equity, international equity and alternative, the gap is large, ranging from 2.3% to 4.3%. Investors did better in U.S. equity and allocation, missing out by less than 1%.



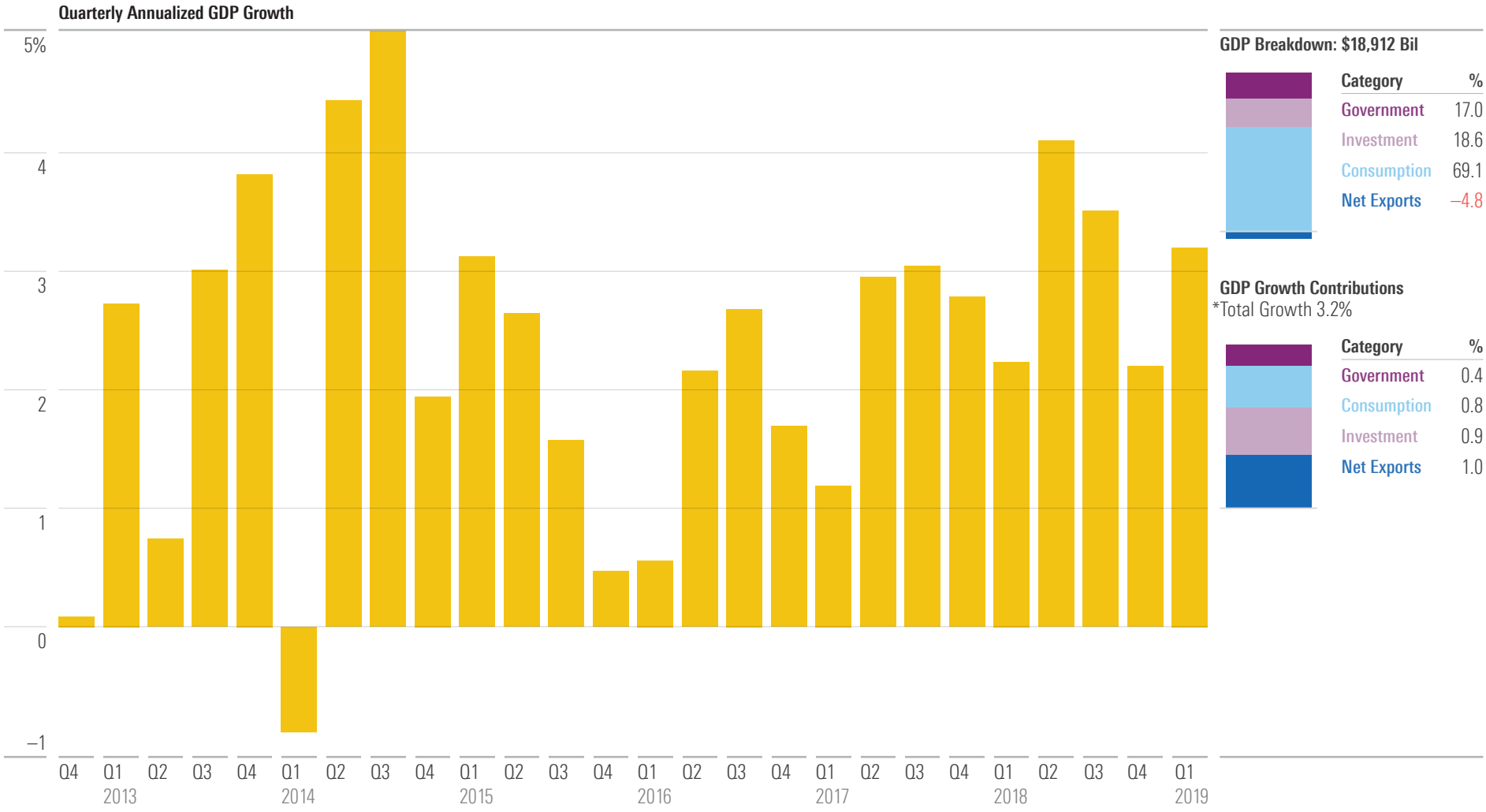
Source: Morningstar Direct. © 2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

Economic Indicators

After a Winter Slowdown Prompted Recession Fears, the U.S. Economy Looks to Be on More Solid Footing

A growth deceleration in the fourth quarter and uninspiring economic data early in 2019 stoked recession fears in some corners of the market, even as equities staged an impressive rebound. In the end, stocks may have gotten it right: The initial estimate of first-quarter GDP growth printed at 3.2%. The impressive headline number belies some softness in consumer spending and fixed investment, but overall the data certainly suggest a low likelihood of recession in the near term.



QEI7

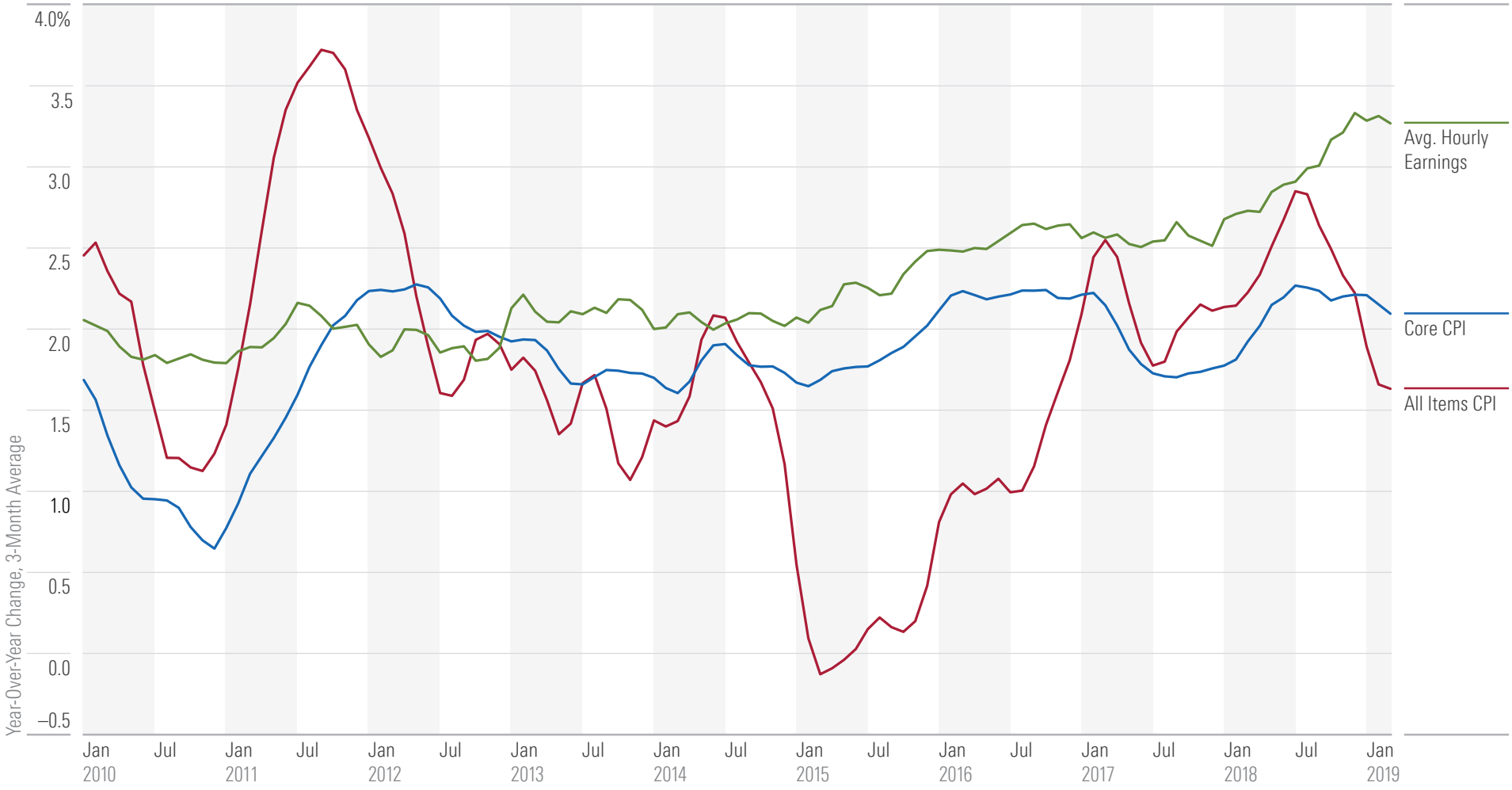
Source: Bureau of Economic Analysis, Morningstar calculations. *Percentage breakdowns might not add up to their totals because of rounding differences. ©2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

U.S. Inflation, Wage Growth Show Signs of Moderating

Average hourly earnings accelerated by nearly 1 percentage point over the course of 2018, though it appears that upward pressure is subsiding. While still holding steady at the fastest pace since the financial crisis, nominal wage growth is still some 50 basis points below peaks of roughly 4% ahead of the past three recessions. Consumer price inflation also appears to be softening. Together, these data suggest the Fed was right to make a "dovish pivot" in January.

Consumer Price Index vs. Wage Growth



QEI5

Source: Bureau of Labor Statistics, Morningstar calculations. ©2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

Retail Sales Take a Hit in the First Quarter; Elevated Sentiment, Strong Labor Market Portend a Rebound

Retail sales growth plunged to its slowest pace in five years in late 2018 and early 2019, contributing to a general pessimism around the near-term growth outlook. Nonetheless, the macroeconomic environment still looks favorable for U.S. households, given a strong labor market, easing financial conditions, and elevated consumer sentiment. Indeed, March retail sales rose 1.7% year over year, beating most economist expectations and assuaging some concerns about a more prolonged slump.

Consumer Sentiment and Retail Sales

QEI118

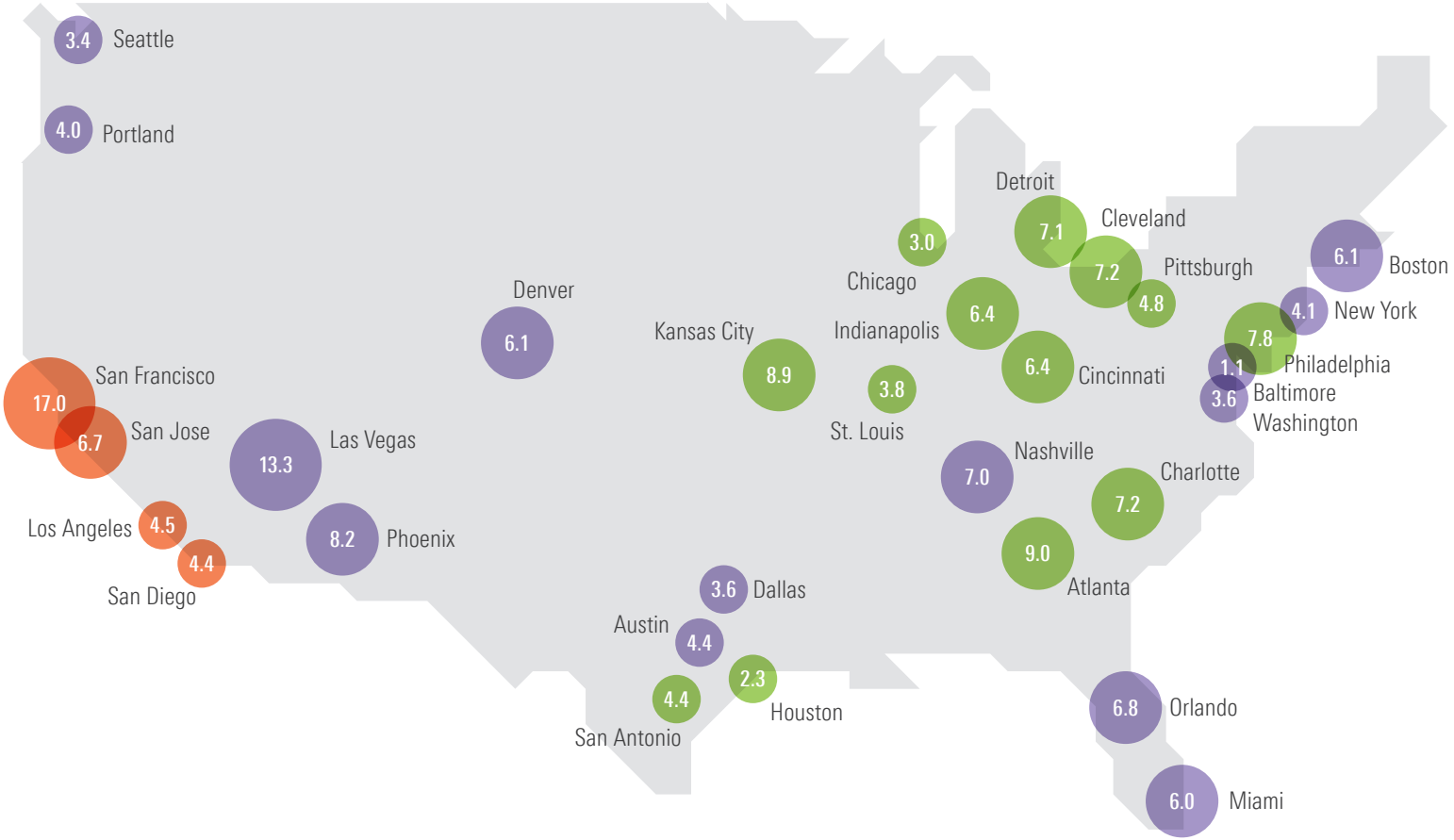
Source: U.S. Department of Commerce, University of Michigan. © 2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

National Real Estate Price Growth Slows to 5.7% in the Fourth Quarter, Slowest Pace in More Than Two Years

U.S. home prices increased by less than 6% year over year for the first time since second-quarter 2016, with only a handful of the 100 largest metropolitan areas showing signs of positive price momentum going into 2019. Seattle saw one of the most significant slowdowns, while price growth in San Francisco and Las Vegas continued to trend higher. Outside of these two markets, the most notable price increases were concentrated in relatively inexpensive cities in the Midwest and South.

Year-Over-Year Price Growth

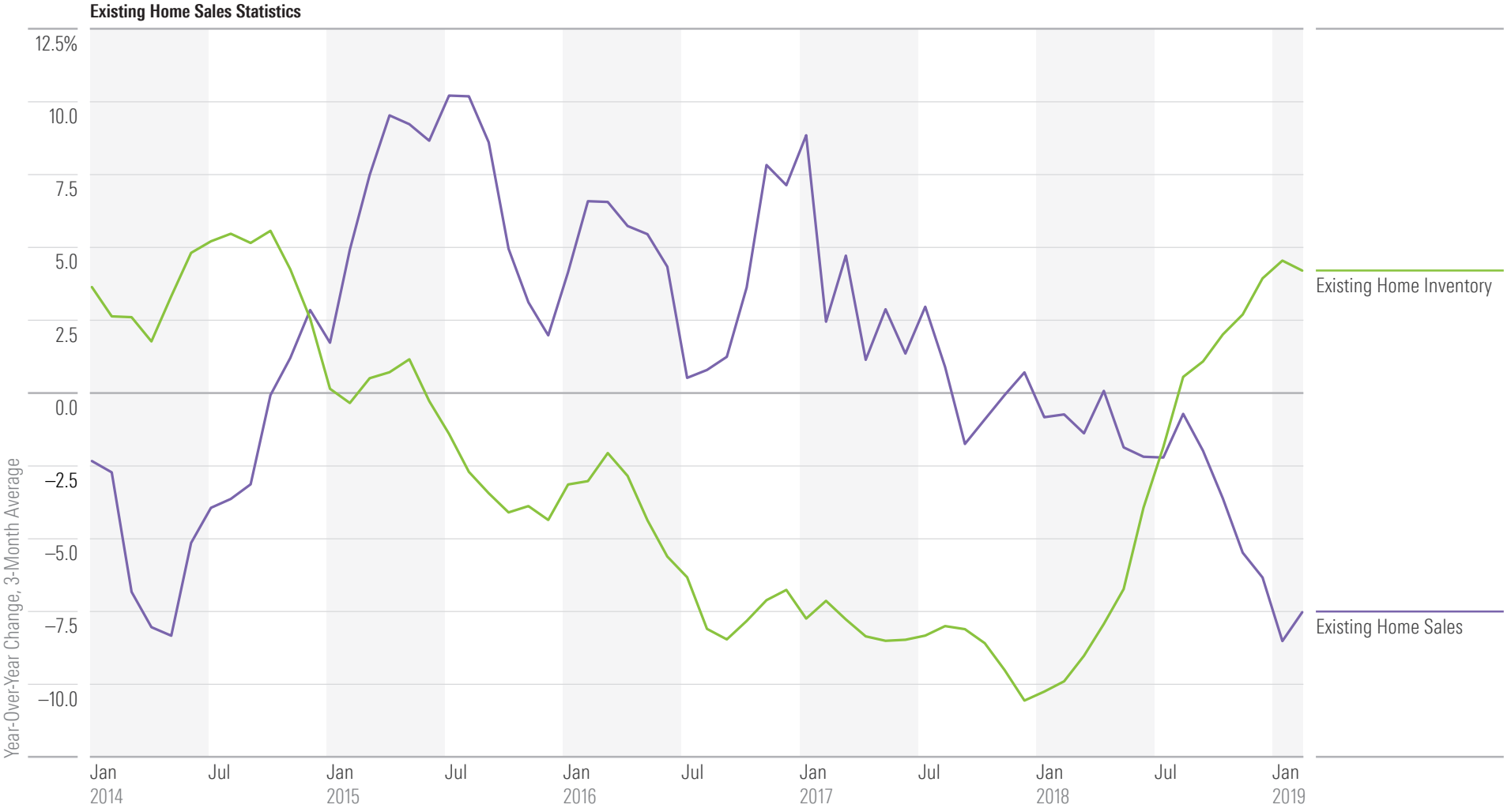


Source: Federal Housing Finance Agency, National Association of Realtors, Zillow. ©2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

Slowing House Price Appreciation Consistent With Ongoing Weakness in the U.S. Housing Market

Existing home sales continued to drop in the first quarter, though there are nascent signs of a bottoming. Lower mortgage rates are expected to help support housing demand going forward, and workers are still enjoying the fruits of a tight labor market and the fastest nominal wage growth since the financial crisis. Still, affordability remains a challenge in many parts of the country. It remains to be seen whether the rise in inventories will put enough downward pressure on prices to pull in buyers.



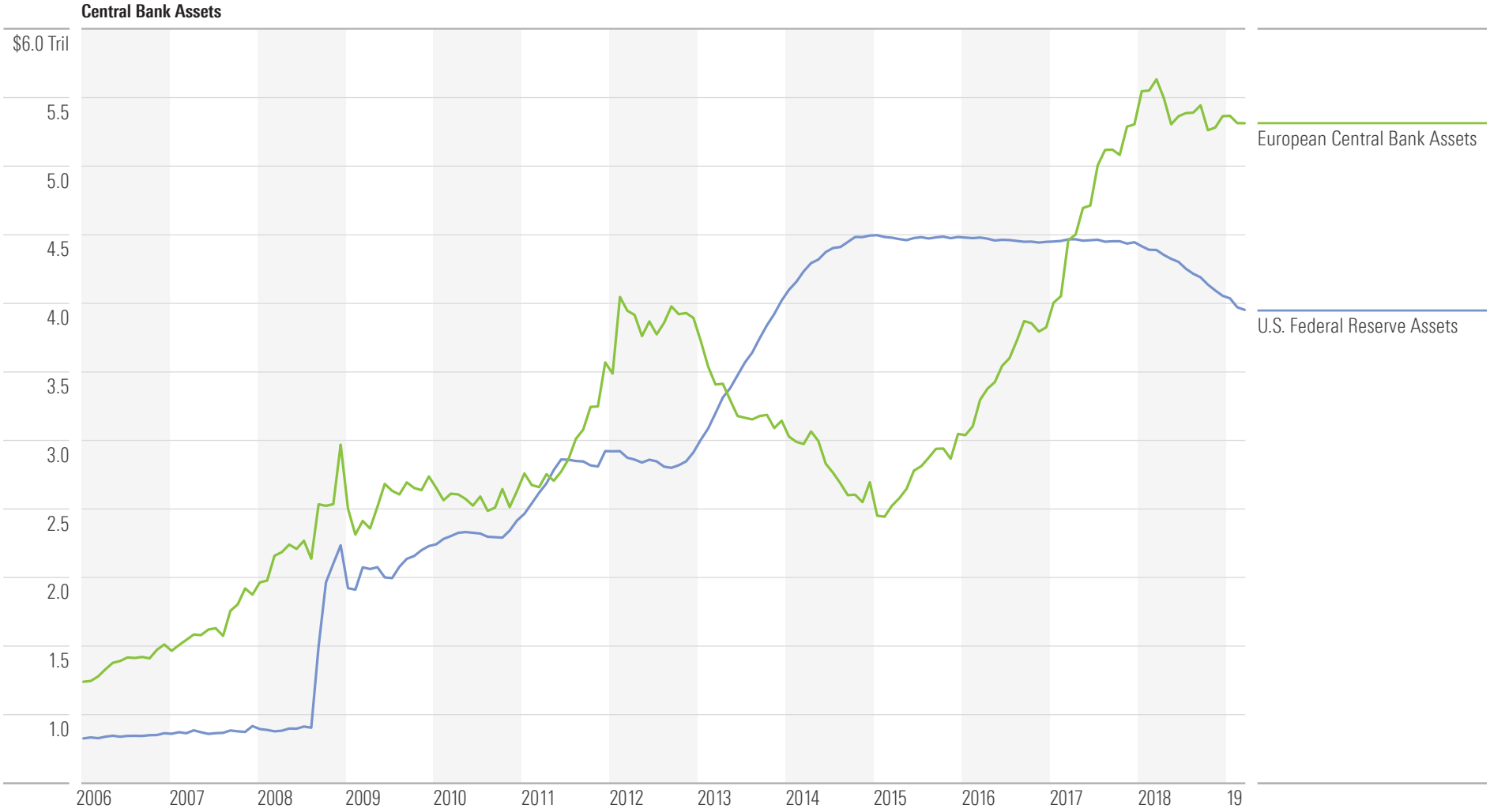
QEI107

Source: National Association of Realtors. © 2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

The European Central Bank Announces New Lending Operation

In the face of moderating inflation and slowing growth momentum, the European Central Bank (ECB) in March announced plans to offer a new targeted long-term refinancing operation (TLTRO) to banks in the currency union in an effort to bolster lending to the real economy. The size of the program will depend on bank demand and eligibility; the previous TLTRO in 2016–17 resulted in roughly $890 billion in loan support to banks, accounting for 15% of the ECB's $5.4 trillion in assets.



QEI119

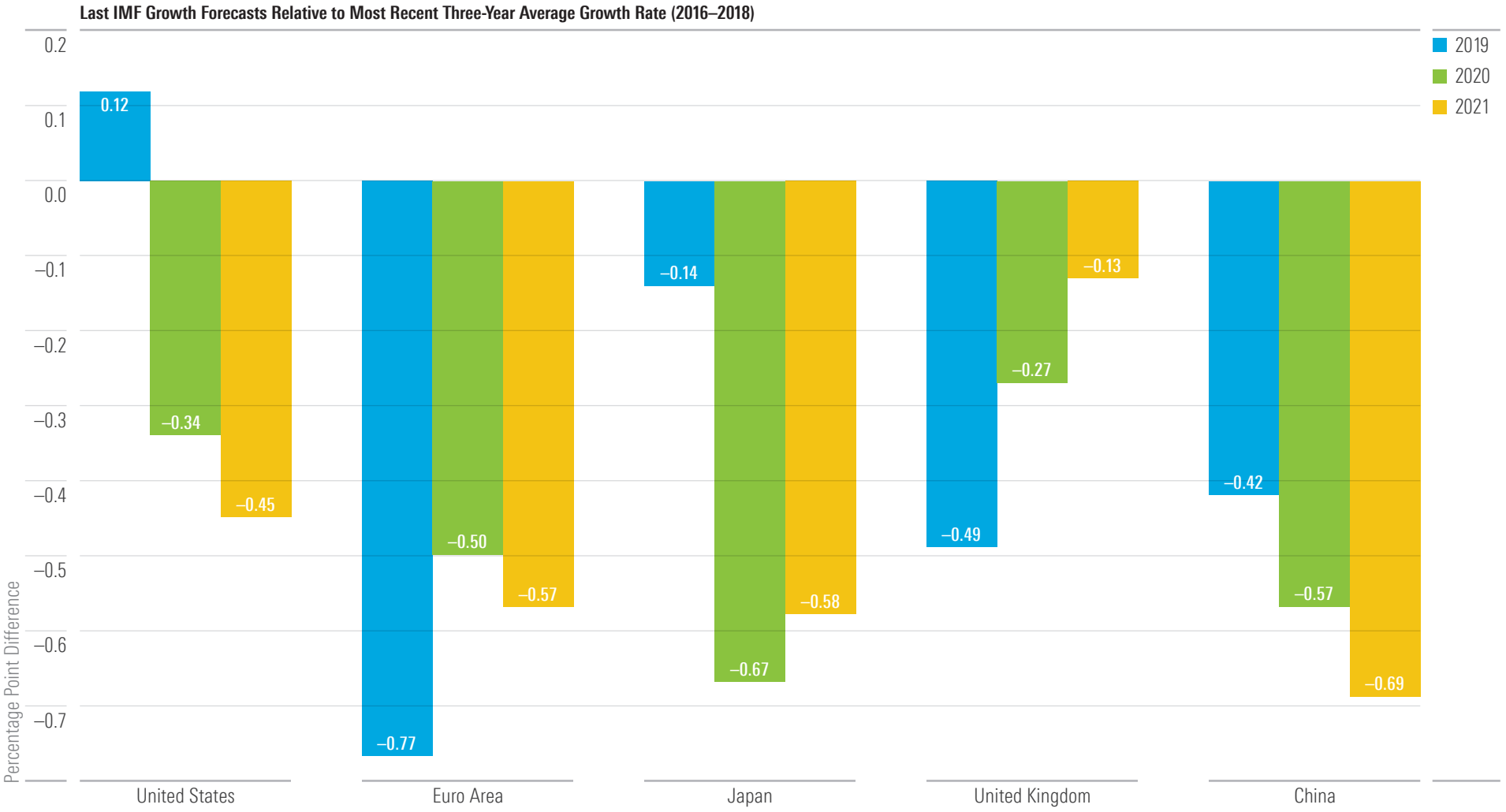
43

Source: Federal Reserve, European Central Bank. © 2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

IMF Expects Global Growth to Slow Over the Next Three Years

The International Monetary Fund's latest forecasts, released in April, show global growth slowing over the coming three years relative to 2016–18 averages. Only the United States is expected to post above-trend growth in 2019 before slowing in 2020–21. An easier monetary-policy stance by the major central banks, fiscal stimulus in China, and a potential trade agreement between the U.S. and China present some upside risk to the medium-term outlook.



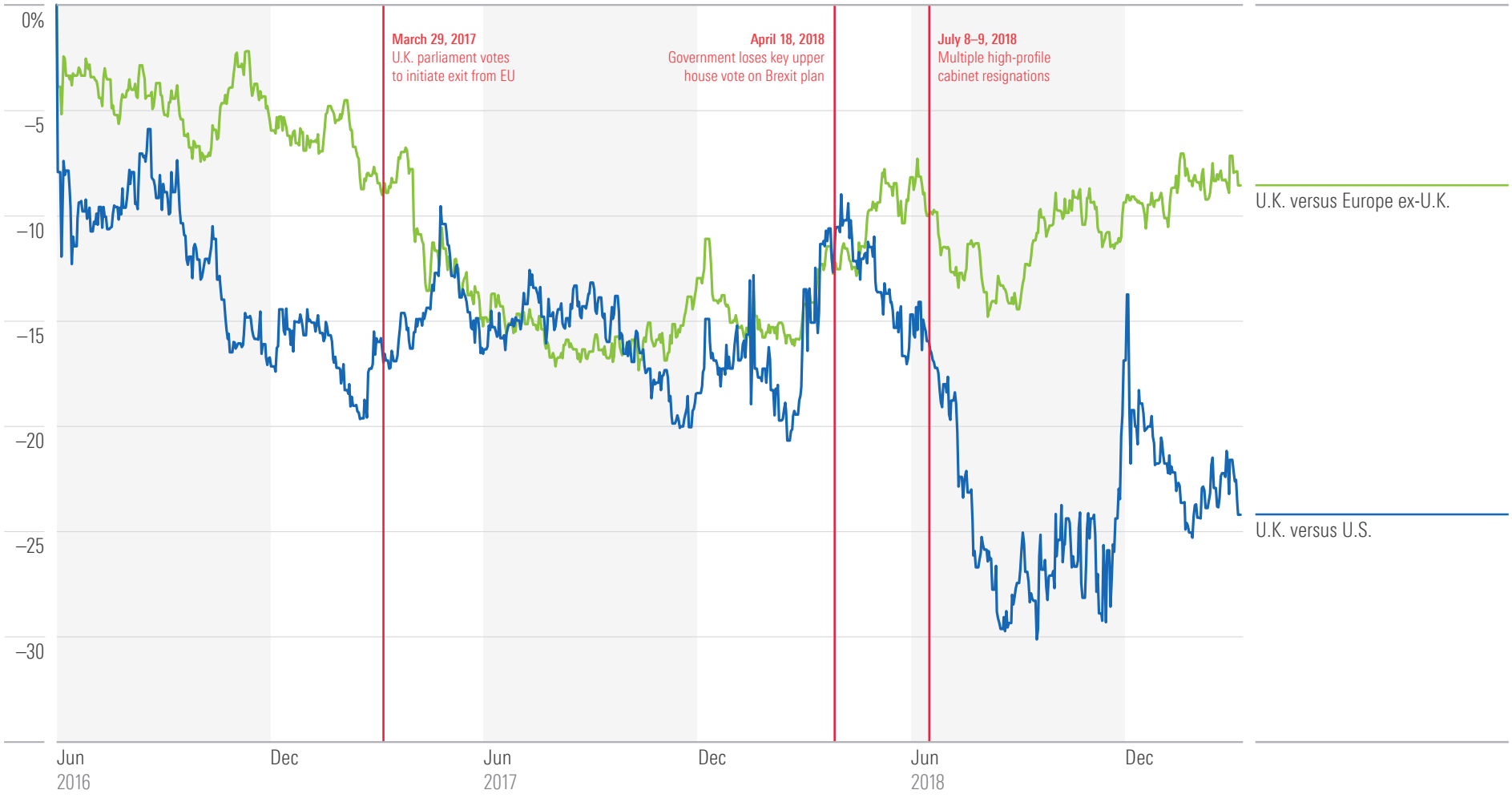
Source: International Monetary Fund, Morningstar calculations. © 2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

Brexit-Related Uncertainty Remained a Major Market Theme in the First Quarter

U.K. equities failed to keep pace with the U.S. rally in the first quarter and remain about 25% lower versus the U.S. market since the Brexit referendum in June 2016. This is just off the lows of late 2018, after several negative developments raised the probability of a "no-deal" Brexit. While continental European equities have also been laggards of late, they remain around 8% higher versus the U.K. since the referendum, suggesting a negative Brexit premium is still being priced into British stocks.

Morningstar U.K. Total Return Index: Relative Performance vs. European and U.S. Equities Since Brexit Referendum (June 23, 2016)



QEI116

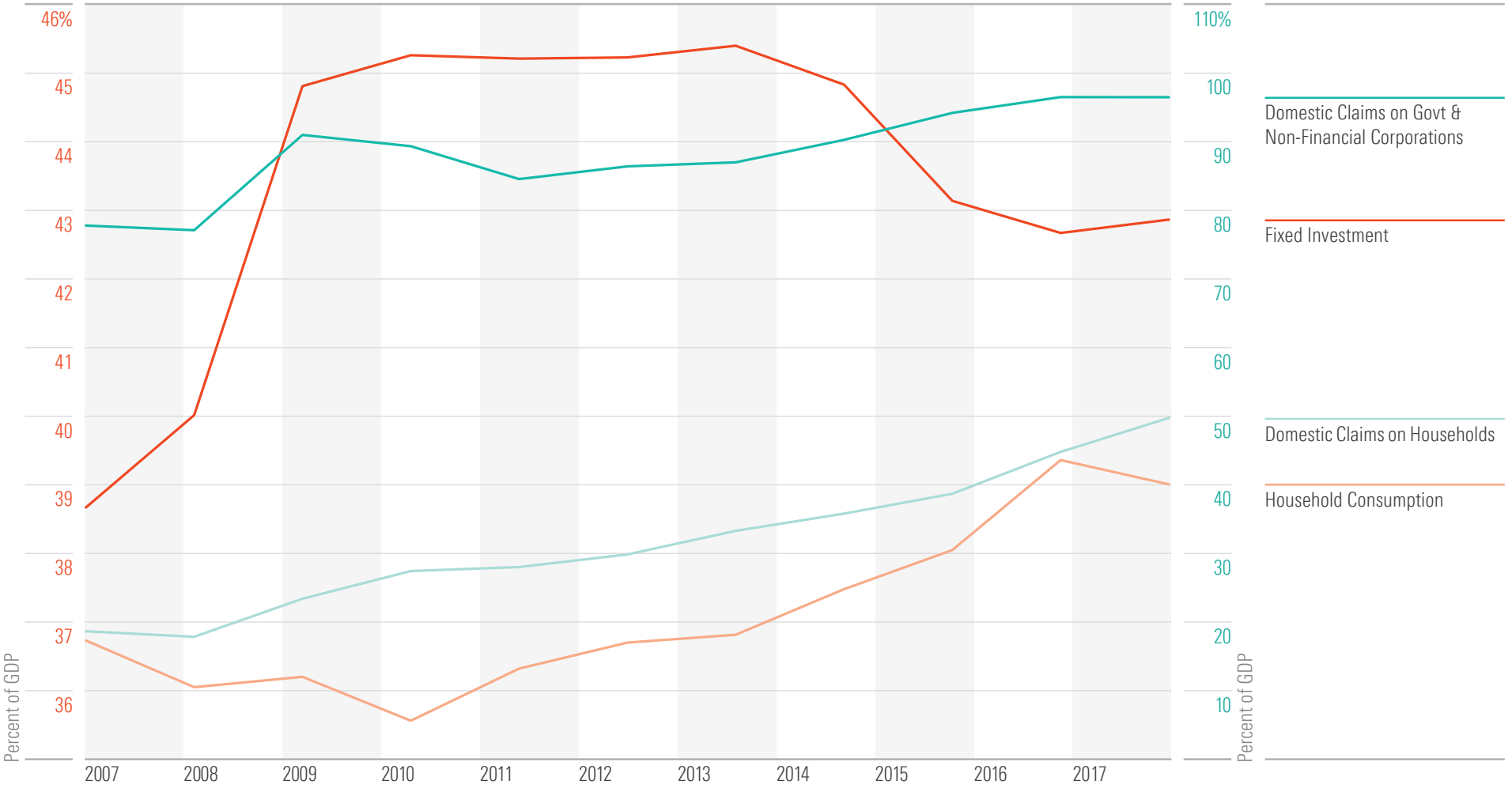
Source: Morningstar. U.K. = Morningstar U.K. Index, Europe ex-U.K. = Morningstar Developed Market Europe ex-U.K. Index, U.S. = Morningstar U.S. Core Index © 2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

China Targets Consumption Over Investment in Most-Recent Stimulus Packages

Over the past 12 months, Chinese authorities have announced tax cuts, deductions, and other incentives worth around $500 billion aimed at bolstering consumer spending and economic activity. Previous stimulus packages tended to focus on investment-related spending, but as debt has piled up for local governments and state-owned enterprises, policymakers have increasingly relied on households as the preferred channel for managing the country's growth trajectory.

China: Consumption, Investment, and Debt as a Percent of GDP



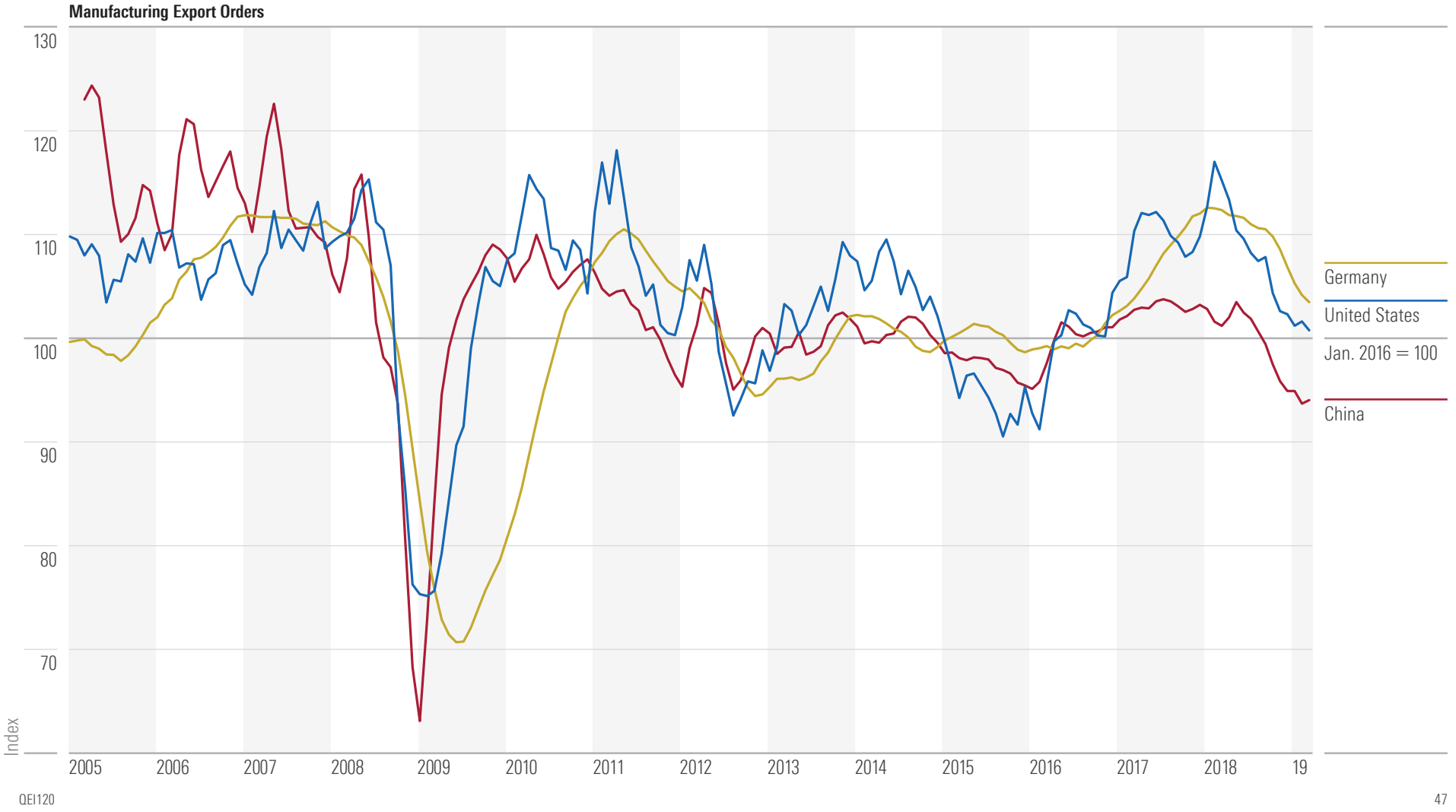
QEI117

Source: China National Bureau of Statistics, People's Bank of China. © 2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

Global Trade Has Slowed: Are We Near the Trough?

The outlook for global trade remains gloomy, but the pace of the slowdown may be moderating. Chinese manufacturers' export orders showed signs of bottoming in the first quarter. U.S. and German exporters have continued to see a slowdown in new orders, but the overall pace remains near post crisis averages. Of course, much of the outlook for trade hinges on politics, namely, whether the U.S. and China can reach a detente.



QEI120

47

Source: Institute for Supply Management, Institute for Economic Research, China Federation of Logistics & Purchasing. © 2019 Morningstar. All Rights Reserved.

MORNINGSTAR®

Index and Disclosure

Index Definitions

The **Morningstar Style index** family consists of 16 indexes that track the U.S. equity market by capitalization and investment style to create an integrated system. The indexes were built using a comprehensive and non-overlapping approach based on the methodology of Morningstar Style Box.

The **Morningstar Sector index** family consists of 14 indexes—three Super Sector and 11 Sector indexes that track the U.S. equity market using a consumption based analysis of economic sectors in a comprehensive, non-overlapping structure. The sector indexes are consumer defensive, healthcare, utilities, basic materials, consumer cyclical, financial services, real estate, communications services, energy, industrials, and technology.

The **Morningstar Global Equity indexes** offer a consistent view of global investment opportunities by applying the same rules for every market around the world. Covering 97% of stocks by market capitalization, the indexes encompass 45 countries in both developed and emerging markets. The index family is designed to work as an integrated system, allowing for meaningful global views across market capitalization and regions.

The **Morningstar Target Risk index** family is designed to meet the needs of investors who would like to maintain a target level of equity exposure. The index family provides global equity market risk levels that are scaled to fit five equity market risk profiles: aggressive, moderately aggressive, moderate, moderately conservative, and conservative.

The **S&P 500® index** includes 500 leading companies and captures approximately 80% coverage of available market capitalization.

The **Russell 2000 index** measures the performance of the 2,000 smallest companies in the Russell 3000 index.

The **MSCI EAFE index** captures the returns of large and mid-cap equities across developed markets in Europe, Australasia, and the Far East, excluding the U.S. and Canada.

The **MSCI Emerging Markets index** captures the returns of large and mid-cap equities across 23 emerging markets countries. The index covers approximately 85% of the free float-adjusted market capitalization in each country.

The **Barclays U.S. Aggregate Bond index** is a broad-based benchmark that measures the investment grade, U.S. dollar-denominated, fixed-rate taxable bond market. The index includes Treasuries, government-related and corporate securities, MBS (agency fixed-rate and hybrid ARM pass-throughs), ABS and CMBS (agency and non-agency).

The **Barclays U.S. 5–10 Year Corporate Bond index** measures the investment return of U.S. dollar denominated, investment-grade, fixed rate, taxable securities issued by industrial, utility, and financial companies with maturities between 5 and 10 years.

The **BofA Merrill Lynch U.S. High Yield Master II Index** tracks the performance of U.S. dollar denominated below investment grade corporate debt publicly issued in the U.S. domestic market. Qualifying securities must have a below investment grade rating (based on an average of Moody's, S&P and Fitch).

The **Barclays Municipal Bond index** measures the broad market for investment grade, tax-exempt bonds with a maturity of at least one year.

The **JP Morgan EMBI Global Diversified index** tracks the performance of dollar-denominated sovereign bonds issued by a selection of emerging market countries. The index limits the weights of countries with larger debt stocks by only including a specified portion of these countries' eligible current face amounts of debt outstanding.

The **London Fix Gold PM index** is the price of gold per ounce at 15:00 GMT determined by the five members of the London Gold Pool.

The **Bloomberg Commodity index** represents 20 commodities, which are weighted for economic significance and market liquidity.

The **Bloomberg Livestock index** reflects the returns of an unlevered investment in futures contracts on livestock commodities. The index consists of two commodity futures (lean hogs and live cattle).

The **Bloomberg Grains index** reflects the returns of an unlevered investment in futures contracts on precious metals commodities. The index consists of three commodity futures (corn, soybeans, and wheat).

The **Bloomberg Precious Metals index** reflects the returns of an unlevered investment in futures contracts on livestock commodities. The index consists of two commodity futures (gold and silver).

The **Bloomberg Industrial Metals index** reflects the returns of an unlevered investment in futures contracts on industrial metals commodities. The index consists of four commodity futures (copper, aluminum, zinc, and nickel).

The **Bloomberg Energy index** reflects the returns of an unlevered investment in futures contracts on energy commodities. The index consists of five commodity futures (natural gas, WTI crude oil, Brent crude oil, unleaded gasoline, and heating oil).

The **Morningstar® Long-Only Commodity index** is a fully collateralized commodity futures index that is long all 20 eligible commodities and uses a dollar weighted open interest weighting scheme.

The **Brent Crude Oil index** tracks the spot price of Brent Crude oil.

The **Morningstar U.S. Market index** covers the top 97% market capitalization of the U.S. equity markets.

The **Morningstar Developed Ex U.S. index** captures the performance of the stocks located in the developed countries across the world. Stocks in the index are weighted by their float capital, which removes corporate cross ownership, government holdings and other locked-in shares.

The **Morningstar Emerging Markets index** captures the performance of the stocks located in the emerging countries across the world. Stocks in the index are weighted by their float capital, which removes corporate cross ownership, government holdings and other locked-in shares.

The **Morningstar Core Bond index** is a broad investment-grade index that includes the largest, most important sectors of the investment-grade U.S. bond market. The index is comprised of the Morningstar U.S. Government Bond, U.S. Corporate Bond and U.S. Mortgage Bond indexes.

The **Morningstar Intermediate U.S. Government Bond index** includes U.S. Treasury and U.S. government agency bonds with maturities between four and seven years. The Morningstar Intermediate Corporate Bond index includes U.S. corporate bonds with maturities of between four and seven years.

The **Morningstar U.S. Corporate Bond index** includes U.S. corporate bonds with maturities of more than one year and at least $500 million outstanding.

The **Morningstar Short-Term Core Bond index** includes all bonds in the Morningstar Core Bond Index that have maturities between one and four years.

The **Morningstar Emerging Markets Composite Bond index** includes the most liquid sovereign and corporate bonds issued in U.S. Dollars (USD) by the governments and corporations of the most prominent emerging markets.

The **Morningstar U.S. Mortgage Bond index** tracks approximately 98% of the fixed-rate mortgages issued by Ginnie Mae, Fannie Mae and Freddie Mac.

The **Morningstar Long-Term U.S. Government Bond index** includes U.S. Treasury and U.S. Government Agency bonds with maturities of seven years or longer.

The **Morningstar Long-Term Corporate Bond index** includes U.S. corporate bonds with maturities of seven years or longer.

The **Barclays U.S. Corporate High Yield index** represents the universe of fixed rate, non-investment grade debt.

The **Barclays U.S. Corporate High Yield ex-Energy index** represents the universe of fixed rate, non-investment grade debt not in the energy sector.

The **Barclays U.S. Treasury 7-10 Year Bond index** measures the performance of U.S. Treasury securities that have a remaining maturity of at least seven years and less than ten years.

The **Barclays U.S. Treasury 20+ Year Bond index** represents the performance of U.S. Treasury securities that have a remaining maturity of greater than 20 years.

The **Barclays Emerging Markets Local Currency Broad Bond index** represents the performance of the sovereign, local currency bond markets of emerging market countries. The Barclays Municipal Bond index is representative of the broad market for investment grade, tax-exempt bonds with a maturity of at least one year.

The **Citigroup WGBI Non-USD 5+ Year Bond index** measures the performance of fixed-rate, local currency, investment grade sovereign bonds. It comprises debt from over 20 countries.

The **S&P/LSTA Leveraged Loan index** tracks the universe of syndicated leveraged loans.

The **MSCI China A Local Currency index** captures large and mid-cap equities listed on the Shanghai and Shenzhen exchanges.

Disclosures

Past performance is no guarantee of future results. This is for illustrative purposes only and not indicative of any investment. The information, data, analyses, and opinions presented herein do not constitute investment advice, are provided solely for informational purposes, and therefore are not an offer to buy or sell a security or invest in a specific asset class or strategy. An investment cannot be made directly in an index. The data assumes reinvestment of all income and does not account for taxes or transaction costs. Diversification does not eliminate the risk of experiencing investment losses. Holding a portfolio of securities for the long-term does not ensure a profitable outcome, and investing in securities always involves risk of loss.

Risk and return are measured by standard deviation and compound annual return, respectively. Standard deviation measures the fluctuation of returns around the arithmetic average return of the investment. The higher the standard deviation, the greater the variability (and thus risk) of the investment returns.

Stocks are not guaranteed and have been more volatile than the other asset classes.

Small company stocks are more volatile than large company stocks and are subject to significant price fluctuations, business risks, and are thinly traded.

Government bonds and Treasury bills are guaranteed by the full faith and credit of the United States government as to the timely payment of principal and interest. Bonds in a portfolio are typically intended to provide income and/or diversification. U.S. government bonds may be exempt from state taxes and income is taxed as ordinary income in the year received. With government bonds, the investor is a creditor of the government.

With **corporate bonds** an investor is a creditor of the corporation and the bond is subject to default risk. Corporate bonds are not guaranteed.

High-yield corporate bonds exhibit significantly more risk of default than investment grade corporate bonds.

Only insured **municipal bonds** are guaranteed as to the timely payment of principal and interest by issuer. However, insurance does not eliminate market risk. A municipal bond investor is a creditor of the issuing municipality and the bond is subject to default risk. Municipal bonds may be subject to the alternative minimum tax (AMT) and state and local taxes, and federal taxes would apply to any capital gains distributions.

International bonds are not guaranteed. With international bonds the investor is a creditor of a foreign government or corporation. International investments involve special risks such as fluctuations in currency, foreign taxation, economic and political risks, liquidity risks, and differences in accounting and financial standards.

International stocks involve special risks such as fluctuations in currency, foreign taxation, economic and political risks, liquidity risks, and differences in accounting and financial standards. Liquidity is typically lower in emerging markets than in developed markets. The risk of principal and return may be significantly greater than that of other developed international markets.

Sector investments are narrowly focused investments that typically exhibit higher volatility than the market in general. Sector investments will fluctuate with current market conditions and may be worth more or less than the original cost upon liquidation.

Growth and value stocks: Although value stocks have outperformed growth stocks, please keep in mind that each type of stock carries unique risks which include, but are not limited to, economic risk, market risk, company risk, and strategy risk.

Gold/commodity investments will be subject to the risks of investing in physical commodities, including regulatory, economic and political developments, weather events, natural disasters, and market disruptions. Exposure to the commodities markets may subject the investment to greater volatility than investments in more traditional securities, such as stocks and bonds.

Holders of **preferred stock** are usually guaranteed a dividend payment and their dividends are always paid out before dividends on common stock. In event that the company fails, there's a priority list for a company's obligations, and obligations to preferred stockholders must be met before those to common stockholders. On the other hand, preferred stockholders are lower on the list of investors to be reimbursed than bondholders are.

Mutual funds are sold by prospectus, which can be obtained from your financial professional or the company and which contains complete information, including investment objectives, risks, charges and expenses. Investors should read the prospectus and consider this information carefully before investing or sending money.

Holding an exchange-traded fund does not ensure a profitable outcome and all investing involves risk, including the loss of the entire principal. Since each ETF is different, investors should read the prospectus and consider this information carefully before investing. The prospectus can be obtained from your financial professional or the ETF provider and contains complete information, including investment objectives, risks, charges and expenses. ETF risks include, but are not limited to, market risk, market trading risk, liquidity risk, imperfect benchmark correlation, leverage, and any other risk associated with the underlying securities. There is no guarantee that any fund will achieve its investment objective. In addition to ETF expenses, brokerage costs apply. Fees are charged regardless of profitability and may result in depletion of assets.

Credit/default risk: Debt securities are subject to credit/default risk, which is the risk associated with the issuer failing to meet its contractual obligations either through a default or credit downgrade.

Interest-rate risk: Debt securities have varying levels of sensitivity to changes in interest rates. In general, the price of a debt security tends to fall when interest rates rise and rise when interest rates fall. Securities with longer maturities and mortgage securities can be more sensitive to interest rate changes.

This publication contains certain forward-looking statements which involve known and unknown risks, uncertainties, and other factors that may cause the actual results to differ materially from any future results expressed or implied by those projected statements. Past performance does not guarantee future results.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

U.S. Capital Markets Performance
by Asset Class 1926–2018

2019
SBBI® Yearbook
Stocks, Bonds, Bills, and Inflation®

Roger G. Ibbotson

DUFF & PHELPS

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Basic Series Summary Statistics

Exhibit 6.9 presents summary statistics of annual total return, and where applicable, income and capital appreciation, for each asset class. The summary statistics presented here are arithmetic mean, geometric mean, standard deviation, and serial correlation. Exhibit 6.10 presents summary statistics for the six inflation-adjusted total return series.

Exhibit 6.9: Total Returns, Income Returns, and Capital Appreciation Returns of the SBBI® Asset Classes; Summary Statistics of Annual Returns (%)
1926–2018

	Geometric Mean (%)	Arithmetic Mean (%)	Standard Deviation (%)	Serial Correlation
Large-Cap Stocks				
Total Return	10.0	11.9	19.8	0.01
Income	3.9	4.0	1.6	0.91
Capital Appreciation	5.8	7.7	19.1	0.01
Small-Cap Stocks (TR)	11.8	16.2	31.6	0.06
Long-term Corp Bonds (TR)	5.9	6.3	8.4	0.03
Long-term Gov't Bonds				
Total Return	5.5	5.9	9.8	-0.15
Income	4.9	5.0	2.6	0.96
Capital Appreciation	0.3	0.7	8.8	-0.26
Inter-term Gov't Bonds				
Total Return	5.1	5.2	5.6	0.15
Income	4.4	4.4	2.9	0.96
Capital Appreciation	0.5	0.6	4.4	-0.17
U.S. Treasury Bills (TR)	3.3	3.4	3.1	0.92
Inflation	2.9	3.0	4.0	0.64

© Duff & Phelps. Source of underlying data: Morningstar, Inc. Used with permission. All rights reserved. Calculations by Duff & Phelps.

Exhibit 6.9 shows that over 1926–2018 small-cap stocks were the riskiest asset class with a standard deviation of 31.6%, but provided the greatest rewards to long-term investors, with an arithmetic mean annual return of 16.2%. The geometric mean of the small-cap series is 11.8%.

Large-cap stocks, long-term government bonds, long-term corporate bonds, and intermediate-term government bonds are progressively less risky, and have lower average returns. U.S. Treasury bills were nearly riskless and had the lowest return. In general, risk is rewarded by a higher return over the long term.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 32, No. 12, December 1, 2013

Wolters Kluwer
Law & Business

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Long-Range Estimates:

The table below contains results of our semi-annual long-range CONSENSUS survey. There are also Top 10 and Bottom 10 averages for each variable. Shown are estimates for the years 2015 through 2019 and averages for the five-year periods 2015-2019 and 2020-2024. Apply these projections cautiously. Few economic, demographic and political forces can be evaluated accurately over such long time spans.

		Average For The Year					Five-Year Averages	
Interest Rates		**2015**	**2016**	**2017**	**2018**	**2019**	**2015-2019**	**2020-2024**
1. Federal Funds Rate	**CONSENSUS**	**0.4**	**1.7**	**2.9**	**3.6**	**3.9**	**2.5**	**3.7**
	Top 10 Average	0.8	2.6	3.9	4.2	4.5	3.2	4.4
	Bottom 10 Average	0.2	0.8	1.6	2.6	3.1	1.6	2.9
2. Prime Rate	**CONSENSUS**	**3.5**	**4.8**	**6.0**	**6.6**	**6.9**	**5.6**	**6.7**
	Top 10 Average	3.9	5.6	6.9	7.2	7.6	6.2	7.4
	Bottom 10 Average	3.3	4.1	5.0	5.7	6.1	4.8	5.8
3. LIBOR, 3-Mo.	**CONSENSUS**	**0.9**	**2.2**	**3.3**	**4.0**	**4.2**	**2.9**	**4.0**
	Top 10 Average	1.6	3.3	4.6	5.0	5.2	3.9	5.0
	Bottom 10 Average	0.4	1.1	2.0	2.8	3.3	1.9	3.0
4. Commercial Paper, 1-Mo.	**CONSENSUS**	**0.6**	**2.0**	**3.1**	**3.7**	**3.9**	**2.6**	**3.7**
	Top 10 Average	1.0	2.7	3.9	4.3	4.5	3.3	4.3
	Bottom 10 Average	0.3	1.3	2.3	2.9	3.1	2.0	3.0
5. Treasury Bill Yield, 3-Mo.	**CONSENSUS**	**0.5**	**1.7**	**2.9**	**3.5**	**3.7**	**2.5**	**3.6**
	Top 10 Average	1.0	2.7	3.9	4.3	4.5	3.3	4.3
	Bottom 10 Average	0.2	0.8	1.7	2.4	3.0	1.6	2.7
6. Treasury Bill Yield, 6-Mo.	**CONSENSUS**	**0.7**	**2.0**	**3.1**	**3.7**	**3.9**	**2.7**	**3.8**
	Top 10 Average	1.2	2.9	4.1	4.5	4.6	3.5	4.5
	Bottom 10 Average	0.3	1.1	1.9	2.7	3.1	1.8	2.8
7. Treasury Bill Yield, 1-Yr.	**CONSENSUS**	**0.9**	**2.2**	**3.2**	**3.8**	**4.0**	**2.8**	**3.9**
	Top 10 Average	1.5	3.2	4.3	4.7	4.8	3.7	4.6
	Bottom 10 Average	0.4	1.2	2.0	2.8	3.1	1.9	2.9
8. Treasury Note Yield, 2-Yr.	**CONSENSUS**	**1.4**	**2.6**	**3.6**	**4.0**	**4.3**	**3.2**	**4.2**
	Top 10 Average	2.0	3.5	4.5	4.9	5.0	4.0	4.9
	Bottom 10 Average	0.8	1.7	2.4	3.1	3.5	2.3	3.3
10. Treasury Note Yield, 5-Yr.	**CONSENSUS**	**2.3**	**3.3**	**4.1**	**4.4**	**4.6**	**3.7**	**4.4**
	Top 10 Average	2.9	4.0	4.8	5.1	5.3	4.4	5.1
	Bottom 10 Average	1.7	2.6	3.2	3.5	3.7	2.9	3.6
11. Treasury Note Yield, 10-Yr.	**CONSENSUS**	**3.4**	**4.1**	**4.6**	**4.8**	**5.0**	**4.4**	**4.9**
	Top 10 Average	3.9	4.8	5.3	5.6	5.8	5.1	5.6
	Bottom 10 Average	2.8	3.5	3.8	4.0	4.1	3.7	4.0
12. Treasury Bond Yield, 30-Yr.	**CONSENSUS**	**4.3**	**4.7**	**5.2**	**5.5**	**5.6**	**5.0**	**5.5**
	Top 10 Average	4.8	5.5	6.0	6.3	6.5	5.8	6.2
	Bottom 10 Average	3.7	4.0	4.4	4.6	4.7	4.3	4.6
13. Corporate Aaa Bond Yield	**CONSENSUS**	**4.9**	**5.4**	**5.9**	**6.2**	**6.3**	**5.7**	**6.2**
	Top 10 Average	5.6	6.2	6.7	7.0	7.2	6.5	7.0
	Bottom 10 Average	4.2	4.5	4.9	5.2	5.3	4.8	5.3
13. Corporate Baa Bond Yield	**CONSENSUS**	**5.9**	**6.3**	**6.8**	**7.1**	**7.2**	**6.7**	**7.0**
	Top 10 Average	6.5	7.1	7.5	7.9	8.1	7.4	7.9
	Bottom 10 Average	5.1	5.4	5.7	6.1	6.1	5.7	6.0
14. State & Local Bonds Yield	**CONSENSUS**	**4.8**	**5.2**	**5.6**	**5.7**	**5.7**	**5.4**	**5.5**
	Top 10 Average	5.2	5.9	6.3	6.5	6.6	6.1	6.3
	Bottom 10 Average	4.3	4.5	4.8	4.9	4.9	4.7	4.7
15. Home Mortgage Rate	**CONSENSUS**	**5.1**	**5.6**	**6.1**	**6.4**	**6.5**	**5.9**	**6.4**
	Top 10 Average	5.6	6.3	6.9	7.1	7.3	6.6	7.1
	Bottom 10 Average	4.4	5.0	5.3	5.5	5.6	5.2	5.6
A. FRB - Major Currency Index	**CONSENSUS**	**77.8**	**78.4**	**78.8**	**79.1**	**79.2**	**78.7**	**79.7**
	Top 10 Average	81.0	82.3	83.4	84.2	84.4	83.1	84.8
	Bottom 10 Average	74.6	74.3	74.0	73.7	74.0	74.1	74.7
		Year-Over-Year, % Change					Five-Year Averages	
		2015	**2016**	**2017**	**2018**	**2019**	**2015-2019**	**2020-2024**
B. Real GDP	**CONSENSUS**	**3.0**	**2.9**	**2.7**	**2.6**	**2.5**	**2.7**	**2.4**
	Top 10 Average	3.5	3.3	3.1	2.9	2.9	3.1	2.7
	Bottom 10 Average	2.5	2.5	2.3	2.1	2.2	2.3	2.1
C. GDP Chained Price Index	**CONSENSUS**	**2.0**	**2.1**	**2.1**	**2.1**	**2.1**	**2.1**	**2.1**
	Top 10 Average	2.5	2.5	2.6	2.5	2.5	2.5	2.5
	Bottom 10 Average	1.5	1.7	1.7	1.7	1.7	1.7	1.7
D. Consumer Price Index	**CONSENSUS**	**2.2**	**2.3**	**2.3**	**2.3**	**2.3**	**2.3**	**2.3**
	Top 10 Average	2.6	2.8	2.8	2.8	2.8	2.8	2.8
	Bottom 10 Average	1.7	1.9	1.9	1.9	2.0	1.9	1.9

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 33, No. 1, January 1, 2014

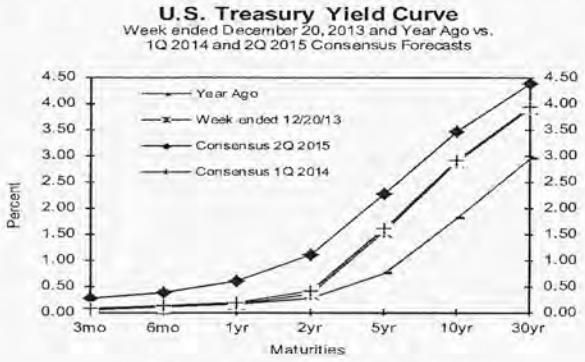
Wolters Kluwer
Law & Business

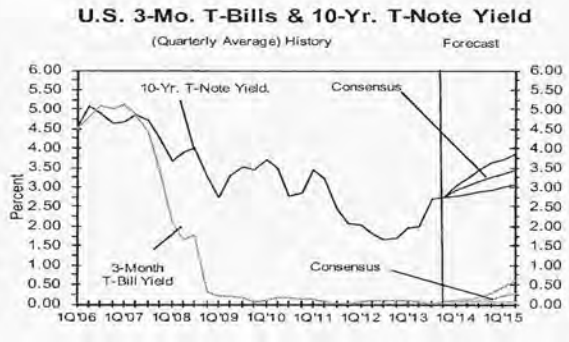
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

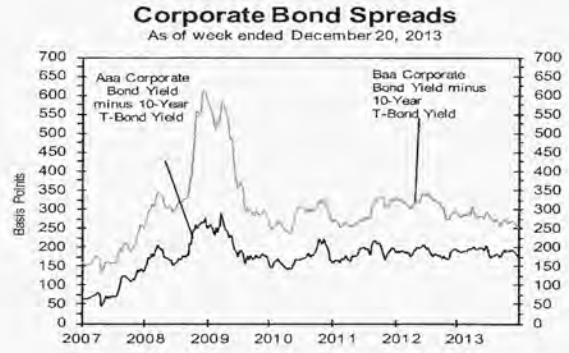
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

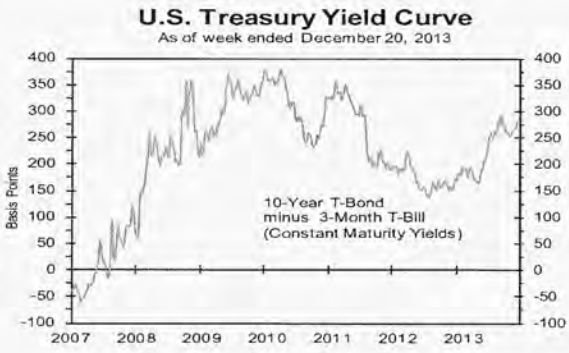
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Q*	1Q	2Q	3Q	4Q	1Q	2Q
Interest Rates	Dec. 20	Dec. 13	Dec. 6	Nov. 29	Nov.	Oct.	Sep.	4Q 2013	2014	2014	2014	2014	2015	2015
Federal Funds Rate	0.09	0.09	0.08	0.09	0.08	0.09	0.08	*0.09*	**0.1**	**0.1**	**0.2**	**0.2**	**0.2**	**0.3**
Prime Rate	3.25	3.25	3.25	3.25	3.25	3.25	3.25	*3.25*	**3.3**	**3.3**	**3.3**	**3.3**	**3.3**	**3.4**
LIBOR, 3-mo.	0.24	0.24	0.24	0.24	0.24	0.24	0.25	*0.24*	**0.3**	**0.3**	**0.3**	**0.4**	**0.4**	**0.5**
Commercial Paper, 1-mo.	0.07	0.08	0.05	0.06	0.05	0.07	0.05	*0.06*	**0.1**	**0.1**	**0.1**	**0.2**	**0.2**	**0.3**
Treasury bill, 3-mo.	0.07	0.07	0.06	0.07	0.07	0.05	0.02	*0.06*	**0.1**	**0.1**	**0.1**	**0.1**	**0.2**	**0.3**
Treasury bill, 6-mo.	0.09	0.10	0.10	0.11	0.10	0.08	0.04	*0.09*	**0.1**	**0.1**	**0.2**	**0.2**	**0.3**	**0.4**
Treasury bill, 1 yr.	0.14	0.14	0.13	0.13	0.12	0.12	0.12	*0.13*	**0.2**	**0.2**	**0.3**	**0.3**	**0.5**	**0.6**
Treasury note, 2 yr.	0.34	0.32	0.30	0.29	0.30	0.34	0.40	*0.32*	**0.4**	**0.5**	**0.6**	**0.8**	**0.9**	**1.1**
Treasury note, 5 yr.	1.54	1.51	1.46	1.36	1.37	1.37	1.60	*1.41*	**1.6**	**1.7**	**1.8**	**2.0**	**2.1**	**2.3**
Treasury note, 10 yr.	2.88	2.86	2.84	2.74	2.72	2.62	2.81	*2.73*	**2.9**	**3.0**	**3.1**	**3.3**	**3.3**	**3.4**
Treasury note, 30 yr.	3.89	3.87	3.88	3.82	3.80	3.68	3.79	*3.79*	**3.9**	**4.0**	**4.1**	**4.2**	**4.3**	**4.4**
Corporate Aaa bond	4.64	4.66	4.69	4.62	4.63	4.53	4.64	*4.61*	**4.7**	**4.8**	**4.9**	**5.0**	**5.1**	**5.2**
Corporate Baa bond	5.39	5.40	5.44	5.37	5.38	5.31	5.47	*5.37*	**5.5**	**5.6**	**5.7**	**5.8**	**5.9**	**6.0**
State & Local bonds	4.73	4.74	4.70	4.61	4.60	4.56	4.79	*4.63*	**4.7**	**4.8**	**4.8**	**4.9**	**4.9**	**5.0**
Home mortgage rate	4.47	4.42	4.46	4.29	4.26	4.19	4.49	*4.30*	**4.6**	**4.7**	**4.8**	**4.9**	**5.0**	**5.1**
	History								Consensus Forecasts-Quarterly					
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q*	1Q	2Q	3Q	4Q	1Q	2Q
Key Assumptions	2012	2012	2012	2012	2013	2013	2013	2013	2014	2014	2014	2014	2015	2015
Major Currency Index	72.9	73.9	74.0	73.2	74.7	76.4	76.7	*76.4*	**76.4**	**76.8**	**77.1**	**77.4**	**77.5**	**77.5**
Real GDP	3.7	1.2	2.8	0.1	1.1	2.5	4.1	*1.9*	**2.5**	**2.7**	**2.8**	**2.9**	**3.0**	**3.0**
GDP Price Index	2.0	1.8	2.3	1.1	1.3	0.6	2.0	*1.4*	**1.7**	**1.8**	**1.9**	**1.9**	**2.0**	**2.0**
Consumer Price Index	2.3	1.0	2.1	2.2	1.4	0.0	2.6	*0.9*	**1.7**	**1.9**	**2.1**	**2.0**	**2.1**	**2.1**

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS). **Interest rate data for 4Q 2014 based on historical data through the week ended December 20th. *Data for 4Q 2013 Major Currency Index is based on data through week ended December 20th. Figures for 4Q 2013 Real GDP, GDP Chained Price Index and Consumer Price Index are consensus forecasts based on a special question asked of the panelists' this month*









20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 33, No. 2, February 1, 2014

Wolters Kluwer
Law & Business

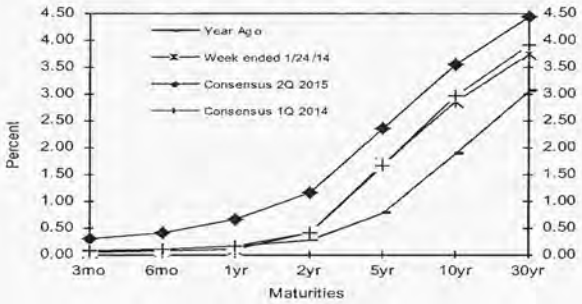
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

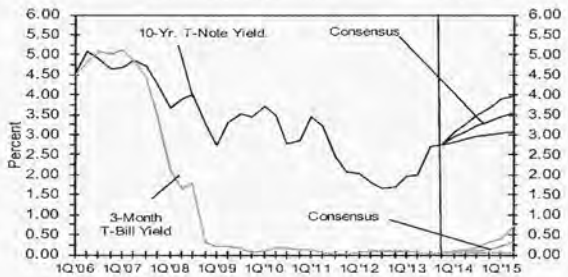
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Q	1Q	2Q	3Q	4Q	1Q	2Q
Interest Rates	Jan. 24	Jan. 17	Jan. 10	Jan. 3	Dec.	Nov.	Oct.	4Q 2013	2014	2014	2014	2014	2015	2015
Federal Funds Rate	0.07	0.07	0.08	0.08	0.09	0.08	0.09	0.09	0.1	0.1	0.2	0.2	0.2	0.3
Prime Rate	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.3	3.3	3.3	3.3	3.3	3.4
LIBOR, 3-mo.	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.3	0.3	0.3	0.4	0.4	0.5
Commercial Paper, 1-mo.	0.05	0.05	0.05	0.05	0.06	0.05	0.07	0.06	0.1	0.1	0.1	0.2	0.2	0.4
Treasury bill, 3-mo.	0.04	0.04	0.05	0.07	0.07	0.07	0.05	0.06	0.1	0.1	0.1	0.1	0.2	0.3
Treasury bill, 6-mo.	0.07	0.06	0.07	0.10	0.10	0.10	0.08	0.09	0.1	0.1	0.2	0.2	0.3	0.4
Treasury bill, 1 yr.	0.11	0.11	0.13	0.13	0.13	0.12	0.12	0.12	0.2	0.2	0.3	0.4	0.5	0.7
Treasury note, 2 yr.	0.41	040	0.41	0.39	0.34	0.30	0.34	0.33	0.4	0.5	0.6	0.8	1.0	1.2
Treasury note, 5 yr.	1.67	1.65	1.71	1.73	1.58	1.37	1.37	1.44	1.7	1.8	1.9	2.1	2.2	2.4
Treasury note, 10 yr.	2.86	2.86	2.96	3.01	2.90	2.72	2.62	2.75	3.0	3.1	3.2	3.3	3.4	3.5
Treasury note, 30 yr.	3.75	3.78	3.87	3.93	3.89	3.80	3.68	3.79	3.9	4.0	4.1	4.3	4.3	4.4
Corporate Aaa bond	4.47	4.48	4.53	4.55	4.62	4.63	4.53	4.59	4.6	4.8	4.9	5.0	5.1	5.2
Corporate Baa bond	5.17	5.19	5.28	5.35	5.38	5.38	5.31	5.36	5.4	5.6	5.7	5.8	5.9	6.0
State & Local bonds	4.50	4.55	4.68	4.75	4.73	4.60	4.56	4.63	4.6	4.7	4.8	4.8	4.9	5.0
Home mortgage rate	4.39	4.41	4.51	4.53	4.46	4.26	4.19	4.30	4.6	4.7	4.8	5.0	5.1	5.2
	History								Consensus Forecasts-Quarterly					
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	*4Q**	1Q	2Q	3Q	4Q	1Q	2Q
Key Assumptions	2012	2012	2012	2012	2013	2013	2013	*2013*	2014	2014	2014	2014	2015	2015
Major Currency Index	72.9	73.9	74.0	73.2	74.7	76.4	76.7	76.0	76.8	77.2	77.6	77.6	77.7	77.7
Real GDP	3.7	1.2	2.8	0.1	1.1	2.5	4.1	*3.1*	2.5	2.8	2.9	3.0	3.0	3.0
GDP Price Index	2.0	1.8	2.3	1.1	1.3	0.6	2.0	*1.4*	1.7	1.7	1.9	1.9	2.0	2.0
Consumer Price Index	2.3	1.0	2.1	2.2	1.4	0.0	2.6	0.9	1.8	1.8	2.1	2.0	2.1	2.0

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS). **Figures for 4Q 2013 Real GDP and GDP Chained Price Index are consensus forecasts based on a special question asked of the panelists' this month.*

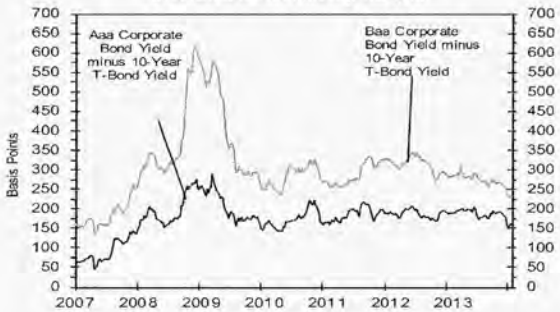
U.S. Treasury Yield Curve
Week ended January 24, 2014 and Year Ago vs. 1Q 2014 and 2Q 2015 Consensus Forecasts



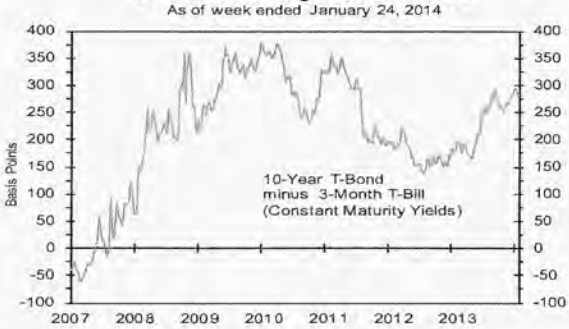
U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average) History Forecast



Corporate Bond Spreads
As of week ended January 24, 2014



U.S. Treasury Yield Curve
As of week ended January 24, 2014



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 33, No. 3, March 1, 2014

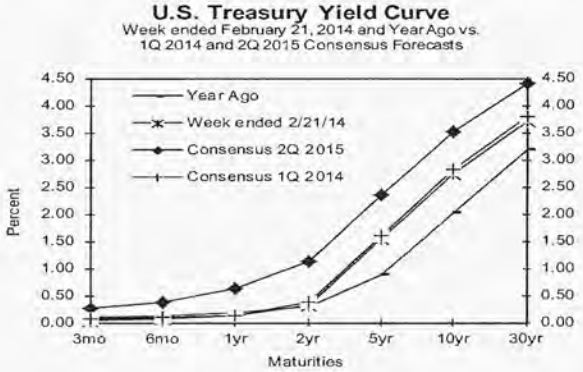
Wolters Kluwer
Law & Business

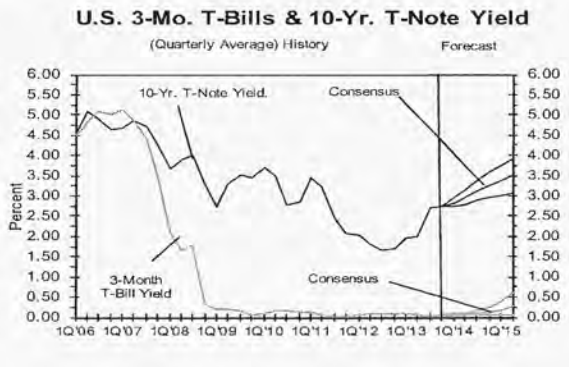
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

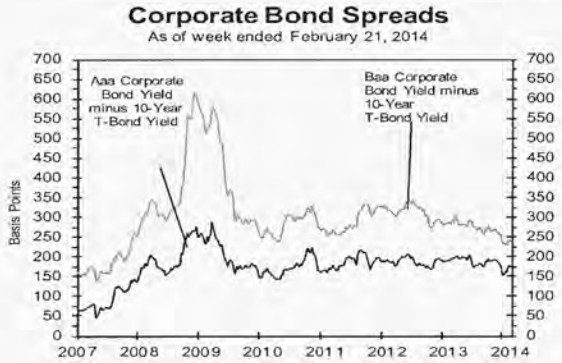
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

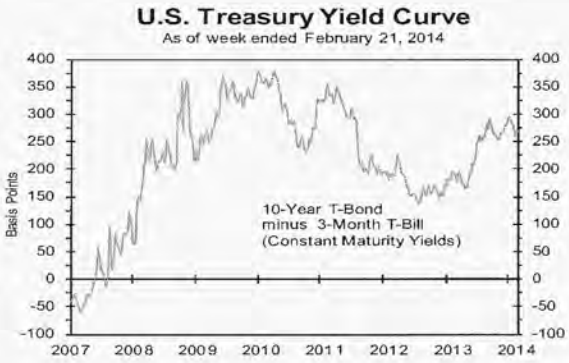
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Q	1Q	2Q	3Q	4Q	1Q	2Q
Interest Rates	Feb. 21	Feb. 14	Feb. 7	Jan. 31	Jan.	Dec.	Nov.	4Q 2013	2014	2014	2014	2014	2015	2015
Federal Funds Rate	0.06	0.06	0.07	0.07	0.07	0.09	0.08	0.09	0.1	0.1	0.1	0.2	0.2	0.3
Prime Rate	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.3	3.3	3.3	3.3	3.3	3.3
LIBOR, 3-mo.	0.24	0.24	0.23	0.23	0.24	0.24	0.24	0.24	0.3	0.3	0.3	0.3	0.4	0.5
Commercial Paper, 1-mo.	0.06	0.06	0.06	0.05	0.05	0.06	0.05	0.06	0.1	0.1	0.1	0.2	0.2	0.3
Treasury bill, 3-mo.	0.05	0.04	0.07	0.04	0.04	0.07	0.07	0.06	0.1	0.1	0.1	0.1	0.2	0.3
Treasury bill, 6-mo.	0.08	0.09	0.08	0.07	0.07	0.10	0.10	0.09	0.1	0.1	0.2	0.2	0.3	0.4
Treasury bill, 1 yr.	0.12	0.12	0.12	0.11	0.12	0.13	0.12	0.12	0.1	0.2	0.3	0.3	0.5	0.6
Treasury note, 2 yr.	0.33	0.33	0.31	0.36	0.39	0.34	0.30	0.33	0.4	0.5	0.6	0.8	0.9	1.1
Treasury note, 5 yr.	1.54	1.53	1.48	1.55	1.65	1.58	1.37	1.44	1.6	1.7	1.9	2.0	2.2	2.3
Treasury note, 10 yr.	2.73	2.75	2.68	2.73	2.86	2.90	2.72	2.75	2.8	3.0	3.1	3.3	3.4	3.5
Treasury note, 30 yr.	3.70	3.69	3.63	3.65	3.77	3.89	3.80	3.79	3.8	3.9	4.1	4.2	4.3	4.4
Corporate Aaa bond	4.48	4.50	4.45	4.45	4.49	4.62	4.63	4.59	4.6	4.7	4.8	4.9	5.0	5.2
Corporate Baa bond	5.13	5.13	5.09	5.10	5.19	5.38	5.38	5.36	5.2	5.4	5.5	5.7	5.8	5.9
State & Local bonds	4.44	4.46	4.46	4.48	4.59	4.73	4.60	4.63	4.5	4.6	4.7	4.8	4.9	4.9
Home mortgage rate	4.33	4.28	4.23	4.32	4.43	4.46	4.26	4.30	4.4	4.6	4.7	4.8	5.0	5.1
	History								Consensus Forecasts-Quarterly					
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q
Key Assumptions	2012	2012	2012	2012	2013	2013	2013	2013	2014	2014	2014	2014	2015	2015
Major Currency Index	72.9	73.9	74.0	73.2	74.7	76.4	76.7	76.0	77.1	77.5	77.9	78.2	78.2	78.1
Real GDP	3.7	1.2	2.8	0.1	1.1	2.5	4.1	2.4	1.9	2.8	2.9	3.0	3.0	3.0
GDP Price Index	2.0	1.8	2.3	1.1	1.3	0.6	2.0	1.6	1.6	1.7	1.9	1.9	2.0	1.9
Consumer Price Index	2.1	1.4	1.7	2.4	1.2	0.4	2.2	1.1	1.8	1.8	2.1	2.0	2.0	2.1

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).









20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 33, No. 4, April 1, 2014

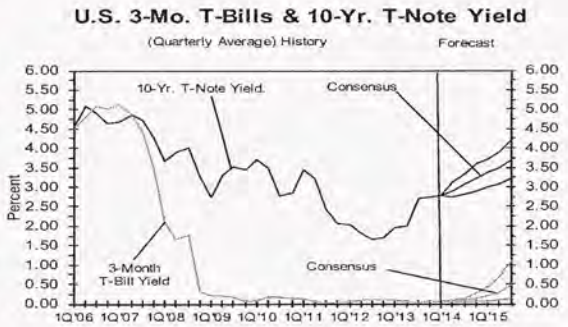
Wolters Kluwer
Law & Business

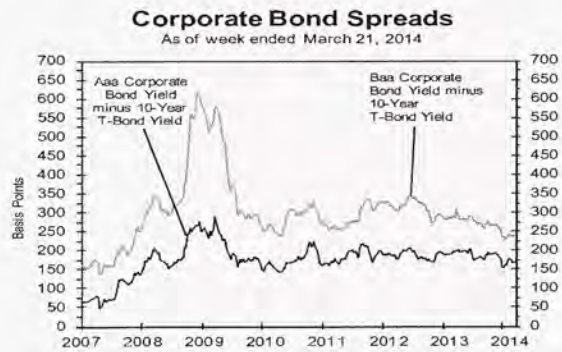
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

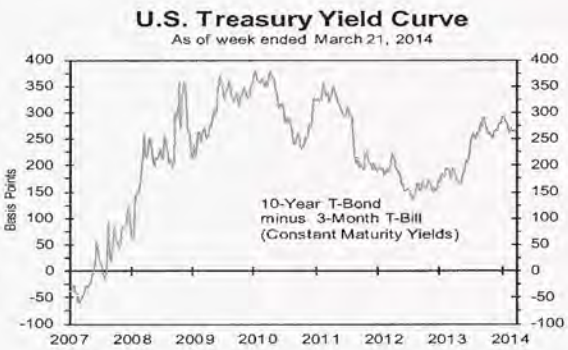
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			*Latest Q**	2Q	3Q	4Q	1Q	2Q	3Q
Interest Rates	Mar. 21	Mar. 14	Mar. 7	Feb. 28	Feb.	Jan.	Dec.	*1Q 2014*	2014	2014	2014	2015	2015	2015
Federal Funds Rate	0.08	0.08	0.07	0.07	0.07	0.07	0.09	*0.07*	0.1	0.1	0.2	0.2	0.3	0.5
Prime Rate	3.25	3.25	3.25	3.25	3.25	3.25	3.25	*3.25*	3.3	3.3	3.3	3.3	3.4	3.6
LIBOR, 3-mo.	0.23	0.23	0.23	0.23	0.24	0.24	0.24	*0.24*	0.3	0.3	0.3	0.4	0.5	0.8
Commercial Paper, 1-mo.	0.06	0.05	0.07	0.05	0.06	0.05	0.06	*0.06*	0.1	0.1	0.2	0.2	0.4	0.6
Treasury bill, 3-mo.	0.06	0.05	0.05	0.05	0.05	0.04	0.07	*0.05*	0.1	0.1	0.1	0.2	0.3	0.5
Treasury bill, 6-mo.	0.08	0.08	0.08	0.08	0.08	0.07	0.10	*0.08*	0.1	0.1	0.2	0.3	0.4	0.7
Treasury bill, 1 yr.	0.14	0.12	0.12	0.11	0.12	0.12	0.13	*0.12*	0.2	0.2	0.3	0.4	0.6	0.9
Treasury note, 2 yr.	0.42	0.36	0.35	0.34	0.33	0.39	0.34	*0.37*	0.5	0.6	0.8	0.9	1.2	1.4
Treasury note, 5 yr.	1.67	1.59	1.55	1.52	1.52	1.65	1.58	*1.59*	1.7	1.9	2.0	2.2	2.4	2.6
Treasury note, 10 yr.	2.74	2.72	2.71	2.69	2.71	2.86	2.90	*2.76*	2.9	3.1	3.2	3.4	3.5	3.7
Treasury note, 30 yr.	3.64	3.66	3.65	3.64	3.66	3.77	3.89	*3.69*	3.8	4.0	4.1	4.2	4.3	4.5
Corporate Aaa bond	4.42	4.41	4.38	4.37	4.45	4.49	4.62	*4.45*	4.6	4.7	4.9	5.0	5.2	5.3
Corporate Baa bond	5.11	5.10	5.07	5.06	5.10	5.19	5.38	*5.13*	5.3	5.4	5.6	5.7	5.9	6.0
State & Local bonds	4.51	4.47	4.41	4.38	4.44	4.59	4.73	*4.50*	4.5	4.6	4.7	4.8	4.9	5.0
Home mortgage rate	4.32	4.37	4.28	4.37	4.30	4.43	4.46	*4.35*	4.5	4.7	4.8	4.9	5.1	5.3
	History								Consensus Forecasts-Quarterly					
	2Q	3Q	4Q	1Q	2Q	3Q	4Q	*1Q**	2Q	3Q	4Q	1Q	2Q	3Q
Key Assumptions	2012	2012	2012	2013	2013	2013	2013	*2014*	2014	2014	2014	2015	2015	2015
Major Currency Index	73.9	74.0	73.2	74.7	76.4	76.7	76.0	*77.1*	77.2	77.5	78.3	78.1	78.2	78.6
Real GDP	1.2	2.8	0.1	1.1	2.5	4.1	2.6	*1.8*	2.9	3.0	3.0	3.0	3.0	3.1
GDP Price Index	1.8	2.3	1.1	1.3	0.6	2.0	1.6	*1.6*	1.7	1.9	1.9	1.9	1.9	2.0
Consumer Price Index	1.4	1.7	2.4	1.2	0.4	2.2	1.1	*1.7*	1.8	2.1	2.0	2.0	2.0	2.2

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS). **Interest rate data for 1Q 2014 based on historical data through the week ended March 21st. *Data for 1Q 2014 Major Currency Index is based on data through week ended March 21th. Figure: for 1Q 2014 Real GDP, GDP Chained Price Index and Consumer Price Index are consensus forecasts based on a special question asked of the panelists' this month.*







20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 33, No. 5, May 1, 2014

Wolters Kluwer
Law & Business

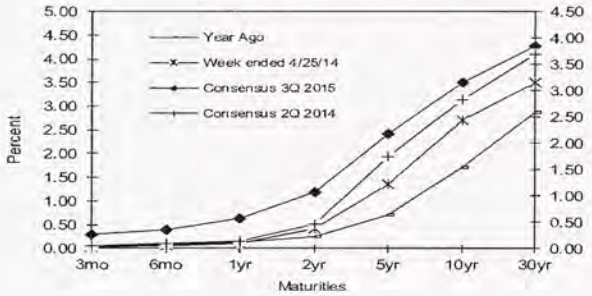
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

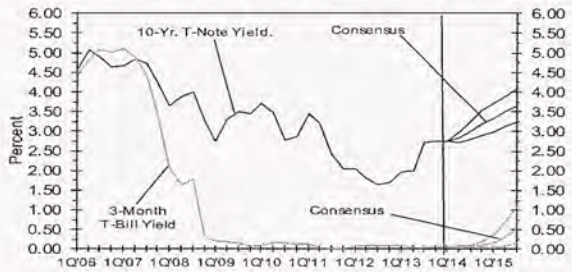
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Q*	2Q	3Q	4Q	1Q	2Q	3Q
Interest Rates	Apr. 25	Apr. 18	Apr. 11	Apr. 4	Mar.	Feb.	Jan.	1Q 2014	2014	2014	2014	2015	2015	2015
Federal Funds Rate	0.10	0.09	0.08	0.08	0.08	0.07	0.07	0.07	0.1	0.1	0.1	0.2	0.3	0.5
Prime Rate	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.3	3.3	3.3	3.3	3.4	3.6
LIBOR, 3-mo.	0.23	0.23	0.23	0.23	0.23	0.24	0.24	0.24	0.3	0.3	0.3	0.4	0.5	0.7
Commercial Paper, 1-mo.	0.06	0.06	0.05	0.06	0.06	0.06	0.05	0.06	0.1	0.1	0.1	0.2	0.3	0.6
Treasury bill, 3-mo.	0.03	0.04	0.04	0.03	0.05	0.05	0.04	0.05	0.1	0.1	0.1	0.2	0.3	0.5
Treasury bill, 6-mo.	0.06	0.05	0.06	0.06	0.08	0.08	0.07	0.08	0.1	0.1	0.2	0.2	0.4	0.7
Treasury bill, 1 yr.	0.11	0.11	0.10	0.12	0.13	0.12	0.12	0.12	0.2	0.2	0.3	0.4	0.6	1.0
Treasury note, 2 yr.	0.43	0.40	0.38	0.45	0.40	0.33	0.39	0.37	0.5	0.6	0.8	1.0	1.2	1.5
Treasury note, 5 yr.	1.35	1.67	1.63	1.75	1.64	1.52	1.65	1.59	1.7	1.9	2.1	2.3	2.4	2.6
Treasury note, 10 yr.	2.72	2.67	2.68	2.77	2.72	2.71	2.86	2.76	2.8	3.0	3.2	3.3	3.5	3.7
Treasury note, 30 yr.	3.50	3.48	3.53	3.60	3.62	3.66	3.77	3.69	3.7	3.9	4.0	4.1	4.3	4.4
Corporate Aaa bond	4.24	4.22	4.24	4.31	4.38	4.45	4.49	4.45	4.4	4.6	4.7	4.9	5.0	5.2
Corporate Baa bond	4.88	4.86	4.92	5.02	5.06	5.10	5.19	5.13	5.1	5.3	5.5	5.6	5.8	5.9
State & Local bonds	4.32	4.32	4.32	4.44	4.46	4.44	4.59	4.50	4.4	4.5	4.6	4.7	4.8	5.0
Home mortgage rate	4.33	4.27	4.34	4.41	4.34	4.30	4.43	4.35	4.4	4.6	4.8	4.9	5.1	5.2
	History								Consensus Forecasts-Quarterly					
	2Q	3Q	4Q	1Q	2Q	3Q	4Q	*1Q**	2Q	3Q	4Q	1Q	2Q	3Q
Key Assumptions	2012	2012	2012	2013	2013	2013	2013	*2014*	2014	2014	2014	2015	2015	2015
Major Currency Index	73.9	74.0	73.2	74.7	76.4	76.7	76.0	77.1	76.9	77.3	77.7	77.9	78.2	78.4
Real GDP	1.2	2.8	0.1	1.1	2.5	4.1	2.6	*1.3*	3.1	3.0	3.1	3.0	3.1	3.1
GDP Price Index	1.8	2.3	1.1	1.3	0.6	2.0	1.6	*1.5*	1.7	1.9	1.9	1.9	2.0	2.1
Consumer Price Index	1.4	1.7	2.4	1.2	0.4	2.2	1.1	1.7	1.9	2.0	2.0	2.0	2.0	2.2

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS). ***Figures for Q1 2014 Real GDP and GDP price index are consensus forecasts based on special question asked of panelists this month. BEA will release its first estimates of Q1 2014 Real GDP and GDP price index on Wednesday, April 30th.***

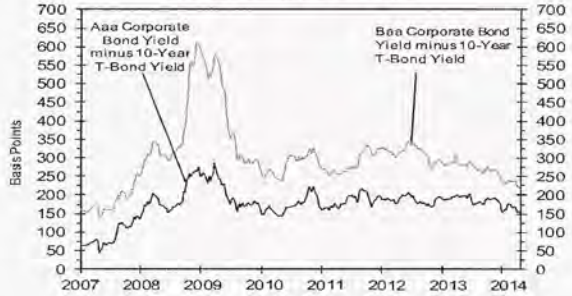
U.S. Treasury Yield Curve
Week ended April 25, 2014 and Year Ago vs. 2Q 2014 and 3Q 2015 Consensus Forecasts



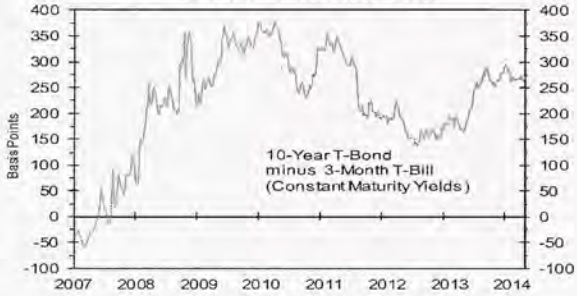
U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average) History Forecast



Corporate Bond Spreads
As of week ended April 25, 2014



U.S. Treasury Yield Curve
As of week ended April 25, 2014



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 33, No. 6, June 1, 2014

Wolters Kluwer
Law & Business

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

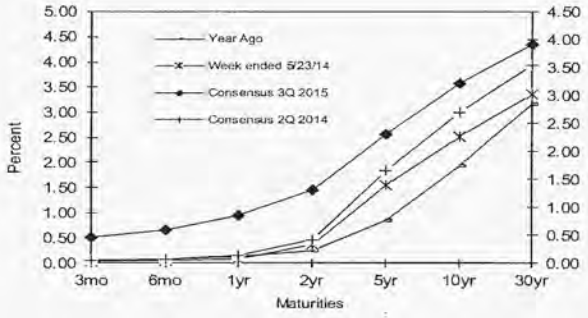
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Q	2Q	3Q	4Q	1Q	2Q	3Q
Interest Rates	May 23	May 16	May 9	May 2	Apr.	Mar.	Feb.	1Q 2014	2014	2014	2014	2015	2015	2015
Federal Funds Rate	0.09	0.08	0.09	0.09	0.09	0.08	0.07	0.07	0.1	0.1	0.1	0.2	0.3	0.5
Prime Rate	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.3	3.3	3.3	3.3	3.3	3.6
LIBOR, 3-mo.	0.23	0.23	0.23	0.23	0.23	0.23	0.24	0.24	0.2	0.3	0.3	0.4	0.5	0.7
Commercial Paper, 1-mo.	0.14	0.06	0.05	0.05	0.05	0.06	0.06	0.06	0.1	0.1	0.1	0.2	0.3	0.6
Treasury bill, 3-mo.	0.03	0.03	0.03	0.03	0.03	0.05	0.05	0.05	0.0	0.1	0.1	0.2	0.3	0.5
Treasury bill, 6-mo.	0.05	0.05	0.05	0.05	0.05	0.08	0.08	0.08	0.1	0.1	0.2	0.2	0.4	0.7
Treasury bill, 1 yr.	0.09	0.09	0.10	0.10	0.11	0.13	0.12	0.12	0.1	0.2	0.3	0.4	0.6	0.9
Treasury note, 2 yr.	0.37	0.39	0.41	0.43	0.42	0.40	0.33	0.37	0.4	0.5	0.7	0.9	1.2	1.5
Treasury note, 5 yr.	1.55	1.59	1.65	1.70	1.70	1.64	1.52	1.59	1.7	1.8	2.0	2.2	2.4	2.6
Treasury note, 10 yr.	2.52	2.57	2.62	2.66	2.71	2.72	2.71	2.76	2.7	2.9	3.1	3.3	3.4	3.6
Treasury note, 30 yr.	3.37	3.40	3.42	3.44	3.52	3.62	3.66	3.69	3.5	3.7	3.9	4.1	4.2	4.3
Corporate Aaa bond	4.13	4.15	4.17	4.19	4.24	4.38	4.45	4.45	4.3	4.5	4.6	4.8	4.9	5.1
Corporate Baa bond	4.75	4.77	4.79	4.81	4.90	5.06	5.10	5.13	5.0	5.2	5.4	5.5	5.6	5.8
State & Local bonds	4.28	4.26	4.31	4.33	4.35	4.46	4.44	4.50	4.3	4.4	4.6	4.7	4.8	4.9
Home mortgage rate	4.14	4.20	4.21	4.29	4.34	4.34	4.30	4.35	4.3	4.5	4.7	4.8	5.0	5.2
	History								Consensus Forecasts-Quarterly					
	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q
Key Assumptions	2012	2012	2012	2013	2013	2013	2013	2014	2014	2014	2014	2015	2015	2015
Major Currency Index	73.9	74.0	73.2	74.7	76.4	76.7	76.0	77.1	76.7	77.0	77.4	77.6	77.8	78.1
Real GDP	1.2	2.8	0.1	1.1	2.5	4.1	2.6	0.1	3.4	3.0	3.1	3.0	3.0	3.0
GDP Price Index	1.8	2.3	1.1	1.3	0.6	2.0	1.6	1.3	1.8	1.9	1.9	1.9	1.9	2.0
Consumer Price Index	1.4	1.7	2.4	1.2	0.4	2.2	1.1	1.9	2.2	2.1	1.9	2.0	2.0	2.1

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).

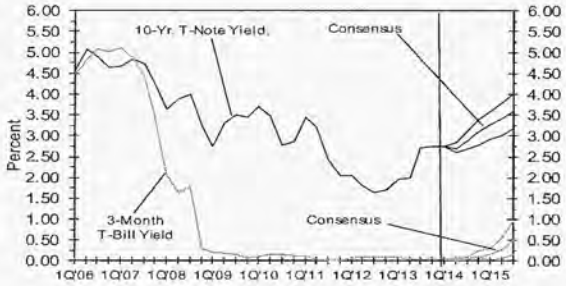
U.S. Treasury Yield Curve

Week ended May 23, 2014 and Year Ago vs. 2Q 2014 and 3Q 2015 Consensus Forecasts



U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield

(Quarterly Average) History Forecast

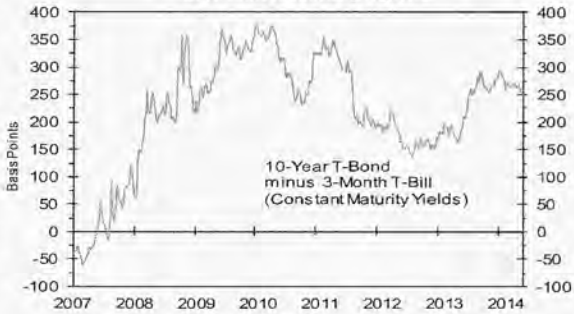


Corporate Bond Spreads

As of week ended May23, 2014

U.S. Treasury Yield Curve

As of week ended May23, 2014



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 33, No. 6, June 1, 2014

Wolters Kluwer
Law & Business

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Long-Range Estimates:

The table below contains the results of our twice-year long-range CONSENSUS survey. There are also Top 10 and Bottom 10 averages for each variable. Shown are estimates for the years 2016 through 2020 and averages for the five-year periods 2016-2020 and 2021-2025. Apply these projections cautiously. Few economic, demographic and political forces can be evaluated accurately over such long time spans.

		Average For The Year					Five-Year Averages	
Interest Rates		**2016**	**2017**	**2018**	**2019**	**2020**	**2016-2020**	**2021-2025**
1. Federal Funds Rate	**CONSENSUS**	**1.8**	**3.0**	**3.6**	**3.8**	**3.7**	**3.2**	**3.8**
	Top 10 Average	2.5	3.6	4.2	4.3	4.2	3.7	4.1
	Bottom 10 Average	1.1	2.1	2.8	3.0	3.1	2.4	3.2
2. Prime Rate	**CONSENSUS**	**4.9**	**6.0**	**6.5**	**6.7**	**6.7**	**6.2**	**6.7**
	Top 10 Average	5.5	6.6	7.1	7.2	7.1	6.7	7.1
	Bottom 10 Average	4.2	5.2	5.8	6.0	6.0	5.4	6.1
3. LIBOR, 3-Mo.	**CONSENSUS**	**2.1**	**3.2**	**3.8**	**4.0**	**4.0**	**3.4**	**4.0**
	Top 10 Average	2.7	3.8	4.4	4.6	4.5	4.0	4.5
	Bottom 10 Average	1.4	2.4	3.0	3.2	3.3	2.7	3.4
4. Commercial Paper, 1-Mo.	**CONSENSUS**	**2.0**	**3.0**	**3.5**	**3.7**	**3.7**	**3.2**	**3.7**
	Top 10 Average	2.4	3.5	4.2	4.3	4.2	3.7	4.1
	Bottom 10 Average	1.4	2.4	2.8	3.0	3.1	2.6	3.2
5. Treasury Bill Yield, 3-Mo.	**CONSENSUS**	**1.8**	**2.9**	**3.4**	**3.6**	**3.6**	**3.1**	**3.7**
	Top 10 Average	2.4	3.5	4.0	4.3	4.2	3.7	4.2
	Bottom 10 Average	1.2	2.1	2.7	2.9	3.0	2.3	3.1
6. Treasury Bill Yield, 6-Mo.	**CONSENSUS**	**2.0**	**3.0**	**3.6**	**3.8**	**3.8**	**3.2**	**3.8**
	Top 10 Average	2.6	3.7	4.2	4.4	4.3	3.9	4.3
	Bottom 10 Average	1.3	2.2	2.8	3.0	3.1	2.5	3.2
7. Treasury Bill Yield, 1-Yr.	**CONSENSUS**	**2.3**	**3.2**	**3.7**	**3.9**	**3.9**	**3.4**	**4.0**
	Top 10 Average	3.0	4.0	4.4	4.7	4.6	4.1	4.5
	Bottom 10 Average	1.6	2.3	2.9	3.1	3.2	2.6	3.4
8. Treasury Note Yield, 2-Yr.	**CONSENSUS**	**2.7**	**3.6**	**4.0**	**4.2**	**4.2**	**3.7**	**4.3**
	Top 10 Average	3.4	4.4	4.8	4.9	4.9	4.5	4.9
	Bottom 10 Average	2.0	2.7	3.1	3.3	3.5	2.9	3.7
10. Treasury Note Yield, 5-Yr.	**CONSENSUS**	**3.4**	**4.0**	**4.4**	**4.5**	**4.5**	**4.2**	**4.6**
	Top 10 Average	3.8	4.6	5.0	5.3	5.3	4.8	5.3
	Bottom 10 Average	2.9	3.4	3.6	3.7	3.8	3.5	4.0
11. Treasury Note Yield, 10-Yr.	**CONSENSUS**	**4.1**	**4.5**	**4.8**	**5.0**	**5.0**	**4.7**	**5.0**
	Top 10 Average	4.6	5.1	5.6	5.9	5.9	5.4	5.9
	Bottom 10 Average	3.6	3.9	4.0	4.2	4.2	4.0	4.3
12. Treasury Bond Yield, 30-Yr.	**CONSENSUS**	**4.7**	**5.1**	**5.4**	**5.5**	**5.6**	**5.3**	**5.6**
	Top 10 Average	5.3	5.9	6.3	6.6	6.6	6.1	6.6
	Bottom 10 Average	4.1	4.3	4.4	4.6	4.7	4.4	4.7
13. Corporate Aaa Bond Yield	**CONSENSUS**	**5.5**	**5.9**	**6.3**	**6.4**	**6.4**	**6.1**	**6.4**
	Top 10 Average	5.9	6.5	7.0	7.2	7.2	6.8	7.3
	Bottom 10 Average	4.9	5.3	5.5	5.6	5.6	5.4	5.6
13. Corporate Baa Bond Yield	**CONSENSUS**	**6.3**	**6.8**	**7.1**	**7.2**	**7.3**	**6.9**	**7.3**
	Top 10 Average	6.8	7.4	7.8	8.1	8.1	7.6	8.1
	Bottom 10 Average	5.7	6.0	6.2	6.4	6.5	6.2	6.5
14. State & Local Bonds Yield	**CONSENSUS**	**5.1**	**5.4**	**5.6**	**5.8**	**5.8**	**5.5**	**5.8**
	Top 10 Average	5.6	6.0	6.4	6.7	6.8	6.3	6.8
	Bottom 10 Average	4.7	4.8	4.8	4.9	4.9	4.8	4.9
15. Home Mortgage Rate	**CONSENSUS**	**5.6**	**6.1**	**6.4**	**6.6**	**6.6**	**6.3**	**6.7**
	Top 10 Average	6.1	6.7	7.2	7.4	7.5	7.0	7.5
	Bottom 10 Average	5.0	5.3	5.5	5.7	5.7	5.4	5.8
A. FRB - Major Currency Index	**CONSENSUS**	**77.7**	**78.1**	**78.6**	**79.2**	**79.3**	**78.6**	**79.5**
	Top 10 Average	80.5	81.3	82.1	83.1	83.5	82.1	84.2
	Bottom 10 Average	74.7	74.8	75.1	75.5	75.2	75.1	75.0
		Year-Over-Year, % Change					Five-Year Averages	
		2016	**2017**	**2018**	**2019**	**2020**	**2016-2020**	**2021-2025**
B. Real GDP	**CONSENSUS**	**2.9**	**2.8**	**2.5**	**2.5**	**2.4**	**2.6**	**2.4**
	Top 10 Average	3.3	3.1	3.0	2.9	2.7	3.0	2.7
	Bottom 10 Average	2.5	2.3	2.0	2.1	2.0	2.2	2.0
C. GDP Chained Price Index	**CONSENSUS**	**2.0**	**2.2**	**2.2**	**2.2**	**2.1**	**2.1**	**2.1**
	Top 10 Average	2.4	2.7	2.6	2.6	2.4	2.5	2.4
	Bottom 10 Average	1.7	1.8	1.9	1.9	1.9	1.8	1.9
D. Consumer Price Index	**CONSENSUS**	**2.2**	**2.5**	**2.5**	**2.4**	**2.3**	**2.4**	**2.3**
	Top 10 Average	2.7	3.1	3.0	2.9	2.7	2.9	2.7
	Bottom 10 Average	1.8	1.9	2.0	2.0	2.0	2.0	2.0

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 33, No. 7, July 1, 2014

Wolters Kluwer
Law & Business

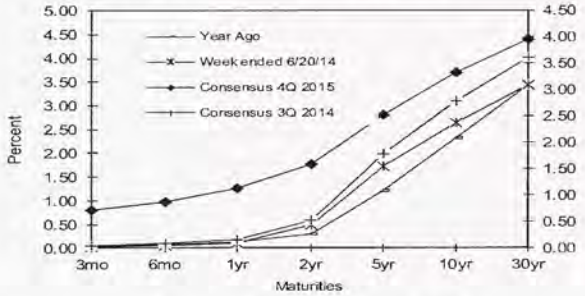
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

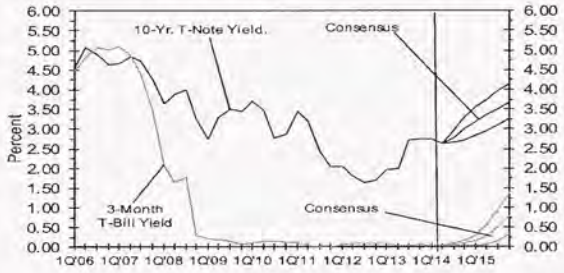
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			*Latest Q**	3Q	4Q	1Q	2Q	3Q	4Q
Interest Rates	June 20	June 13	June 6	May 30	May	Apr.	Mar.	*2Q 2014*	**2014**	**2014**	**2014**	**2015**	**2015**	**2015**
Federal Funds Rate	0.10	0.09	0.09	0.09	0.09	0.09	0.08	*0.09*	**0.1**	**0.1**	**0.2**	**0.3**	**0.5**	**0.8**
Prime Rate	3.25	3.25	3.25	3.25	3.25	3.25	3.25	*3.25*	**3.3**	**3.3**	**3.3**	**3.3**	**3.5**	**3.9**
LIBOR, 3-mo.	0.23	0.23	0.23	0.23	0.23	0.23	0.23	*0.23*	**0.3**	**0.3**	**0.4**	**0.5**	**0.7**	**1.0**
Commercial Paper, 1-mo.	0.07	0.06	0.06	0.06	0.05	0.05	0.06	*0.05*	**0.1**	**0.1**	**0.2**	**0.3**	**0.5**	**0.9**
Treasury bill, 3-mo.	0.03	0.04	0.04	0.04	0.03	0.03	0.05	*0.03*	**0.1**	**0.1**	**0.1**	**0.3**	**0.5**	**0.8**
Treasury bill, 6-mo.	0.06	0.06	0.06	0.06	0.05	0.05	0.08	*0.05*	**0.1**	**0.1**	**0.2**	**0.4**	**0.6**	**1.0**
Treasury bill, 1 yr.	0.10	0.11	0.10	0.10	0.10	0.11	0.13	*0.10*	**0.2**	**0.3**	**0.4**	**0.6**	**0.9**	**1.3**
Treasury note, 2 yr.	0.49	0.44	0.40	0.38	0.39	0.42	0.40	*0.42*	**0.5**	**0.7**	**0.9**	**1.1**	**1.4**	**1.8**
Treasury note, 5 yr.	1.72	1.69	1.64	1.53	1.59	1.70	1.64	*1.66*	**1.8**	**2.0**	**2.2**	**2.4**	**2.6**	**2.8**
Treasury note, 10 yr.	2.63	2.62	2.59	2.47	2.56	2.71	2.72	*2.63*	**2.8**	**3.0**	**3.2**	**3.3**	**3.5**	**3.7**
Treasury note, 30 yr.	3.44	3.44	3.43	3.33	3.39	3.52	3.62	*3.45*	**3.6**	**3.8**	**4.0**	**4.1**	**4.3**	**4.4**
Corporate Aaa bond	4.27	4.28	4.27	4.16	4.16	4.24	4.38	*4.22*	**4.4**	**4.6**	**4.7**	**4.9**	**5.0**	**5.2**
Corporate Baa bond	4.81	4.82	4.82	4.70	4.76	4.90	5.06	*4.83*	**5.1**	**5.3**	**5.5**	**5.6**	**5.8**	**5.9**
State & Local bonds	4.36	4.37	4.37	4.26	4.29	4.35	4.46	*4.34*	**4.4**	**4.6**	**4.7**	**4.8**	**4.9**	**5.0**
Home mortgage rate	4.17	4.20	4.14	4.12	4.19	4.34	4.34	*4.23*	**4.4**	**4.6**	**4.8**	**4.9**	**5.1**	**5.3**
	History								Consensus Forecasts-Quarterly					
	3Q	4Q	1Q	2Q	3Q	4Q	1Q	*2Q**	3Q	4Q	1Q	2Q	3Q	4Q
Key Assumptions	2012	2012	2013	2013	2013	2013	2014	*2014*	**2014**	**2014**	**2014**	**2015**	**2015**	**2015**
Major Currency Index	74.0	73.2	74.7	76.4	76.7	76.0	77.1	*76.8*	**77.2**	**77.4**	**77.5**	**77.7**	**78.2**	**78.4**
Real GDP	2.8	0.1	1.1	2.5	4.1	2.6	-2.9	*3.4*	**3.1**	**3.1**	**3.0**	**3.0**	**3.0**	**2.9**
GDP Price Index	2.3	1.1	1.3	0.6	2.0	1.6	1.3	*2.0*	**1.9**	**1.9**	**2.0**	**1.9**	**2.0**	**2.1**
Consumer Price Index	1.7	2.4	1.2	0.4	2.2	1.1	1.9	*2.7*	**2.4**	**2.0**	**2.0**	**2.1**	**2.2**	**2.3**

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS). **Interest rate data for 2Q 2014 based on historical data through the week ended June 20th. *Data for 2Q 2014 Major Currency Index is based on data through week ended June 20th. Figures for 2Q 2014 Real GDP, GDP Chained Price Index and Consumer Price Index are consensus forecasts based on a special question asked of the panelists' this month.*

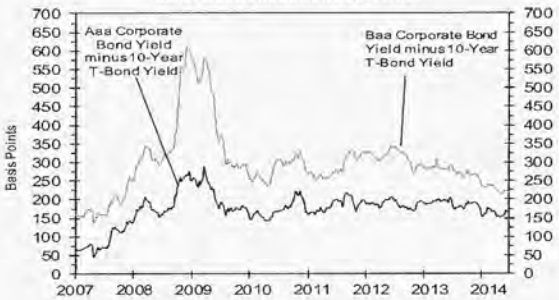
U.S. Treasury Yield Curve
Week ended June 20, 2014 and Year Ago vs. 3Q 2014 and 4Q 2015 Consensus Forecasts



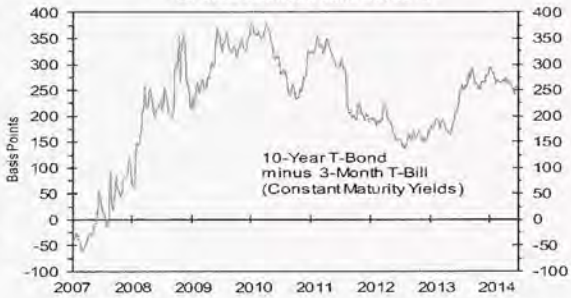
U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average) History Forecast



Corporate Bond Spreads
As of week ended June 20, 2014



U.S. Treasury Yield Curve
As of week ended June 20, 2014



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 33, No. 8, August 1, 2014

Wolters Kluwer
Law & Business

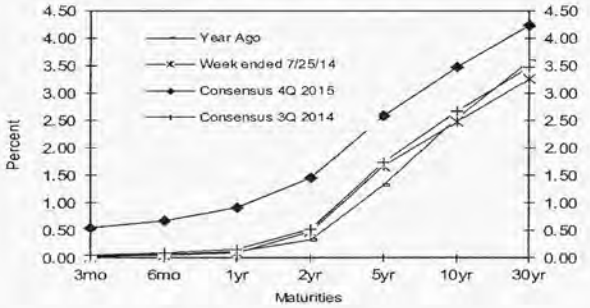
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

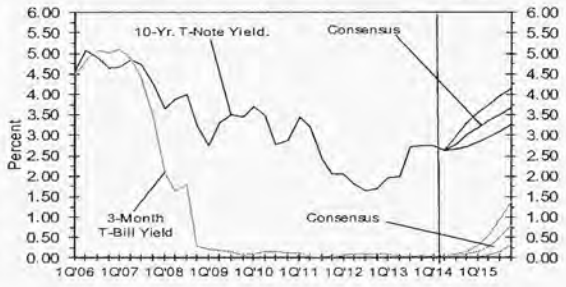
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Q	3Q	4Q	1Q	2Q	3Q	4Q
Interest Rates	July 25	July 18	July 11	July 4	June	May	Apr.	2Q 2014	2014	2014	2014	2015	2015	2015
Federal Funds Rate	0.09	0.09	0.09	0.10	0.10	0.09	0.09	0.09	**0.1**	**0.1**	**0.2**	**0.3**	**0.5**	**0.9**
Prime Rate	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	**3.3**	**3.3**	**3.3**	**3.4**	**3.6**	**3.9**
LIBOR, 3-mo.	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	**0.3**	**0.3**	**0.4**	**0.5**	**0.8**	**1.1**
Commercial Paper, 1-mo.	0.08	0.08	0.06	0.06	0.06	0.05	0.05	0.05	**0.1**	**0.1**	**0.2**	**0.4**	**0.6**	**1.0**
Treasury bill, 3-mo.	0.03	0.02	0.03	0.02	0.04	0.03	0.03	0.03	**0.1**	**0.1**	**0.1**	**0.3**	**0.6**	**0.9**
Treasury bill, 6-mo.	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.05	**0.1**	**0.1**	**0.2**	**0.4**	**0.7**	**1.0**
Treasury bill, 1 yr.	0.11	0.11	0.11	0.11	0.10	0.10	0.11	0.10	**0.2**	**0.2**	**0.4**	**0.6**	**0.9**	**1.3**
Treasury note, 2 yr.	0.50	0.49	0.50	0.49	0.45	0.39	0.42	0.42	**0.5**	**0.7**	**0.9**	**1.2**	**1.5**	**1.8**
Treasury note, 5 yr.	1.68	1.69	1.69	1.68	1.68	1.59	1.70	1.66	**1.8**	**1.9**	**2.1**	**2.4**	**2.6**	**2.8**
Treasury note, 10 yr.	2.48	2.53	2.57	2.60	2.60	2.56	2.71	2.62	**2.7**	**2.9**	**3.1**	**3.3**	**3.5**	**3.7**
Treasury note, 30 yr.	3.27	3.33	3.38	3.42	3.42	3.39	3.52	3.44	**3.5**	**3.7**	**3.9**	**4.0**	**4.2**	**4.4**
Corporate Aaa bond	4.11	4.16	4.19	4.23	4.25	4.16	4.24	4.22	**4.3**	**4.5**	**4.6**	**4.8**	**5.0**	**5.2**
Corporate Baa bond	4.68	4.73	4.76	4.80	4.80	4.76	4.90	4.82	**5.0**	**5.2**	**5.4**	**5.6**	**5.8**	**5.9**
State & Local bonds	4.29	4.36	4.38	4.31	4.35	4.29	4.35	4.33	**4.4**	**4.5**	**4.6**	**4.8**	**4.9**	**5.0**
Home mortgage rate	4.13	4.13	4.15	4.12	4.16	4.19	4.34	4.23	**4.3**	**4.5**	**4.7**	**4.9**	**5.1**	**5.2**
	History								Consensus Forecasts-Quarterly					
	3Q	4Q	1Q	2Q	3Q	4Q	1Q	*2Q**	3Q	4Q	1Q	2Q	3Q	4Q
Key Assumptions	2012	2012	2013	2013	2013	2013	2014	*2014*	2014	2014	2014	2015	2015	2015
Major Currency Index	74.0	73.2	74.7	76.4	76.7	76.0	77.1	76.6	**76.9**	**77.3**	**77.5**	**77.8**	**78.2**	**78.4**
Real GDP	2.8	0.1	1.1	2.5	4.1	2.6	-2.9	*2.9*	**3.1**	**3.1**	**3.0**	**3.0**	**3.0**	**3.0**
GDP Price Index	2.3	1.1	1.3	0.6	2.0	1.6	1.3	*2.1*	**1.9**	**1.9**	**1.9**	**2.0**	**2.1**	**2.1**
Consumer Price Index	1.7	2.4	1.2	0.4	2.2	1.1	1.9	3.0	**2.4**	**2.0**	**2.1**	**2.2**	**2.3**	**2.3**

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS). *Figures for 2Q 2014 Real GDP and GDP Chained Price Index forecasts based on a special question asked of the panelists' this month.*

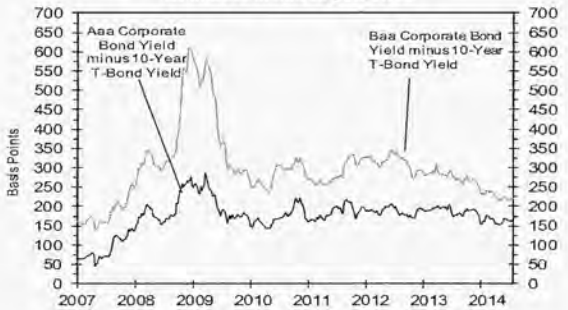
U.S. Treasury Yield Curve
Week ended July 25, 2014 and Year Ago vs. 3Q 2014 and 4Q 2015 Consensus Forecasts



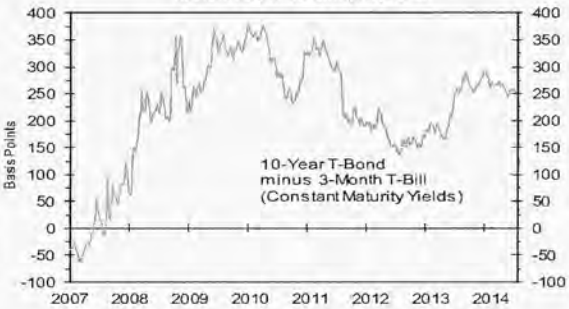
U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average) History Forecast



Corporate Bond Spreads
As of week ended July 25, 2014



U.S. Treasury Yield Curve
As of week ended July 25, 2014



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 33, No. 9, September 1, 2014

Wolters Kluwer
Law & Business

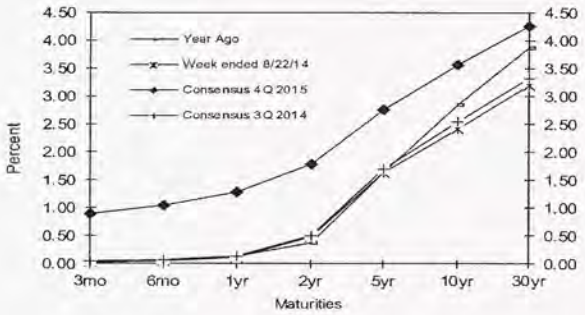
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

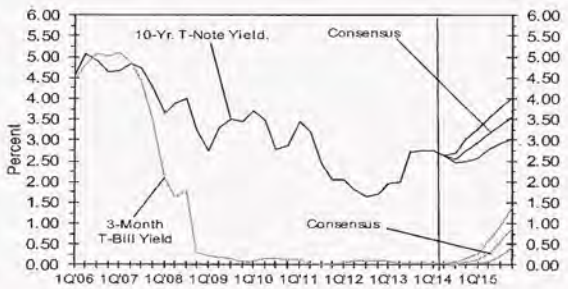
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Q	3Q	4Q	1Q	2Q	3Q	4Q
Interest Rates	Aug. 22	Aug. 15	Aug. 8	Aug. 1	July	June	May	2Q 2014	2014	2014	2015	2015	2015	2015
Federal Funds Rate	0.09	0.09	0.09	0.09	0.09	0.10	0.09	0.09	0.1	0.1	0.2	0.3	0.5	0.9
Prime Rate	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.3	3.3	3.3	3.4	3.6	3.9
LIBOR, 3-mo.	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.2	0.3	0.4	0.5	0.8	1.1
Commercial Paper, 1-mo.	0.10	0.07	0.08	0.07	0.07	0.06	0.05	0.05	0.1	0.1	0.2	0.3	0.6	1.0
Treasury bill, 3-mo.	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.0	0.1	0.1	0.3	0.6	0.9
Treasury bill, 6-mo.	0.06	0.05	0.05	0.06	0.06	0.06	0.05	0.05	0.1	0.1	0.2	0.4	0.7	1.1
Treasury bill, 1 yr.	0.11	0.10	0.11	0.12	0.11	0.10	0.10	0.10	0.1	0.2	0.4	0.6	1.0	1.3
Treasury note, 2 yr.	0.48	0.44	0.46	0.53	0.51	0.45	0.39	0.42	0.5	0.7	0.9	1.2	1.5	1.8
Treasury note, 5 yr.	1.63	1.59	1.64	1.73	1.70	1.68	1.59	1.66	1.7	1.9	2.1	2.3	2.5	2.8
Treasury note, 10 yr.	2.41	2.41	2.47	2.53	2.54	2.60	2.56	2.62	2.5	2.8	2.9	3.2	3.4	3.6
Treasury note, 30 yr.	3.20	3.22	3.26	3.28	3.33	3.42	3.39	3.44	3.3	3.5	3.7	3.9	4.1	4.3
Corporate Aaa bond	4.08	4.08	4.14	4.13	4.16	4.25	4.16	4.22	4.2	4.3	4.5	4.7	4.9	5.1
Corporate Baa bond	4.70	4.71	4.73	4.72	4.68	4.80	4.76	4.82	4.9	5.1	5.3	5.5	5.7	5.9
State & Local bonds	4.21	4.24	4.31	4.33	4.33	4.35	4.29	4.33	4.3	4.4	4.5	4.7	4.8	5.0
Home mortgage rate	4.10	4.12	4.14	4.12	4.13	4.16	4.19	4.23	4.2	4.4	4.5	4.8	5.0	5.2
	History								Consensus Forecasts-Quarterly					
	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Key Assumptions	2012	2012	2013	2013	2013	2013	2014	2014	2014	2014	2015	2015	2015	2015
Major Currency Index	74.0	73.2	74.7	76.4	76.7	76.0	77.1	76.6	77.4	78.1	78.4	78.7	79.0	79.3
Real GDP	2.5	0.1	2.7	1.8	4.5	3.5	-2.1	4.2	2.9	3.0	3.0	3.0	3.0	2.9
GDP Price Index	2.1	1.3	1.3	1.2	1.7	1.5	1.3	2.1	1.9	1.8	1.9	2.0	2.1	2.1
Consumer Price Index	1.7	2.4	1.2	0.4	2.2	1.1	1.9	3.0	2.1	2.0	2.1	2.2	2.3	2.3

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).

U.S. Treasury Yield Curve
Week ended August 22, 2014 and Year Ago vs.
3Q 2014 and 4Q 2015 Consensus Forecasts

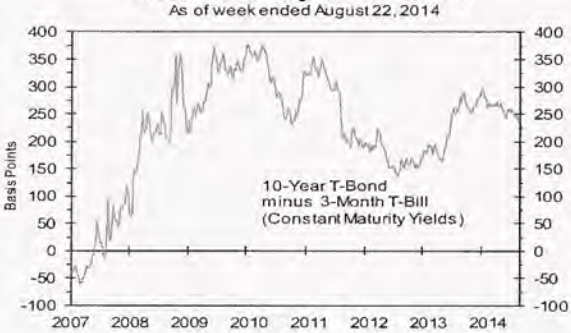


U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average) History Forecast



Corporate Bond Spreads
As of week ended August 22, 2014

U.S. Treasury Yield Curve
As of week ended August 22, 2014



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 33, No. 10, October 1, 2014

Wolters Kluwer
Law & Business

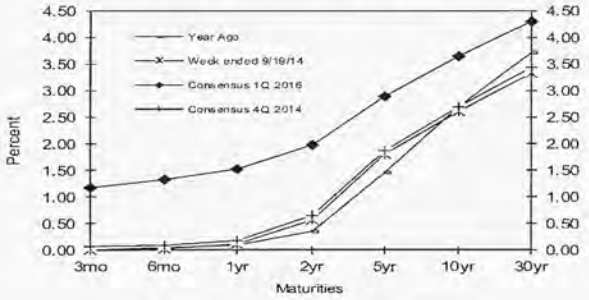
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

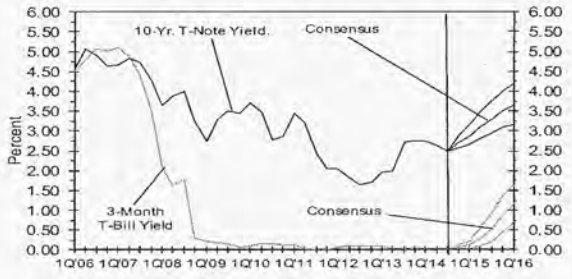
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			*Latest Q**	4Q	1Q	2Q	3Q	4Q	1Q
Interest Rates	Sep. 19	Sep. 12	Sep. 5	Aug. 29	Aug.	July	June	*3Q 2014*	2014	2015	2015	2015	2015	2016
Federal Funds Rate	0.09	0.09	0.08	0.09	0.09	0.09	0.10	*0.09*	0.1	0.2	0.3	0.6	0.9	1.2
Prime Rate	3.25	3.25	3.25	3.25	3.25	3.25	3.25	*3.25*	3.3	3.3	3.4	3.6	3.9	4.3
LIBOR, 3-mo.	0.23	0.23	0.23	0.23	0.23	0.23	0.23	*0.23*	0.3	0.3	0.5	0.8	1.1	1.5
Commercial Paper, 1-mo.	0.06	0.07	0.08	0.07	0.08	0.07	0.06	*0.07*	0.1	0.2	0.3	0.6	1.0	1.3
Treasury bill, 3-mo.	0.02	0.02	0.03	0.03	0.03	0.03	0.03	*0.03*	0.1	0.1	0.3	0.6	0.9	1.2
Treasury bill, 6-mo.	0.04	0.05	0.05	0.05	0.05	0.06	0.06	*0.05*	0.1	0.2	0.4	0.7	1.0	1.3
Treasury bill, 1 yr.	0.12	0.11	0.10	0.11	0.11	0.11	0.10	*0.11*	0.2	0.3	0.6	0.9	1.3	1.5
Treasury note, 2 yr.	0.58	0.57	0.53	0.51	0.47	0.51	0.45	*0.51*	0.7	0.9	1.2	1.5	1.8	2.0
Treasury note, 5 yr.	1.82	1.78	1.70	1.66	1.63	1.70	1.68	*1.70*	1.9	2.0	2.3	2.5	2.7	2.9
Treasury note, 10 yr.	2.61	2.54	2.44	2.37	2.42	2.54	2.60	*2.50*	2.7	2.9	3.1	3.3	3.5	3.7
Treasury note, 30 yr.	3.34	3.27	3.19	3.11	3.20	3.33	3.42	*3.27*	3.4	3.6	3.8	4.0	4.2	4.3
Corporate Aaa bond	4.21	4.13	4.03	3.98	4.08	4.16	4.25	*4.12*	4.3	4.4	4.7	4.9	5.1	5.2
Corporate Baa bond	4.89	4.79	4.69	4.61	4.69	4.68	4.80	*4.72*	5.0	5.2	5.4	5.6	5.8	5.9
State & Local bonds	4.17	4.14	4.09	4.17	4.23	4.33	4.35	*4.23*	4.2	4.3	4.5	4.7	4.8	4.9
Home mortgage rate	4.23	4.12	4.10	4.10	4.12	4.13	4.16	*4.13*	4.3	4.5	4.7	4.9	5.1	5.3
	History								Consensus Forecasts-Quarterly					
	4Q	1Q	2Q	3Q	4Q	1Q	2Q	*3Q**	4Q	1Q	2Q	3Q	4Q	1Q
Key Assumptions	2012	2013	2013	2013	2013	2014	2014	*2014*	2014	2015	2015	2015	2015	2016
Major Currency Index	73.2	74.7	76.4	76.7	76.0	77.1	76.6	*77.9*	79.2	79.9	80.3	80.6	80.9	80.9
Real GDP	0.1	2.7	1.8	4.5	3.5	-2.1	4.6	*3.0*	3.0	3.0	3.0	3.0	2.9	2.9
GDP Price Index	1.3	1.3	1.2	1.7	1.5	1.3	2.1	*1.7*	1.9	2.0	2.0	2.1	2.1	2.1
Consumer Price Index	2.4	1.2	0.4	2.2	1.1	1.9	3.0	*1.5*	1.9	2.0	2.2	2.2	2.3	2.3

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS). **Interest rate data for 3Q 2014 based on historical data through the week ended September 19th. *Data for 3Q 2014 Major Currency Index is based on data through week ended September 19th Figures for 3Q 2014 Real GDP, GDP Chained Price Index and Consumer Price Index are consensus forecasts based on a special question asked of the panelists' this month.*

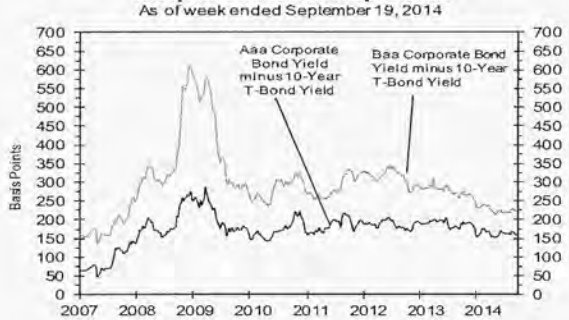
U.S. Treasury Yield Curve
Week ended September 19, 2014 and Year Ago vs.
4Q 2014 and 1Q 2016 Consensus Forecasts



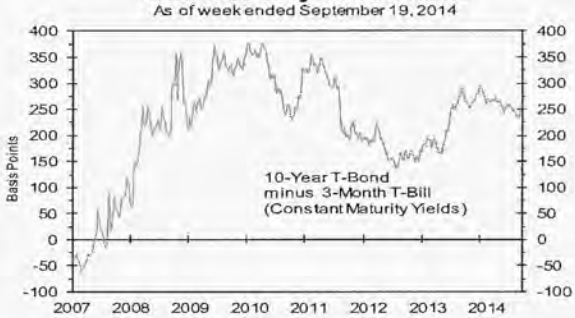
U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average) Forecast



Corporate Bond Spreads
As of week ended September 19, 2014



U.S. Treasury Yield Curve
As of week ended September 19, 2014



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 33, No. 11, November 1, 2014

Wolters Kluwer
Law & Business

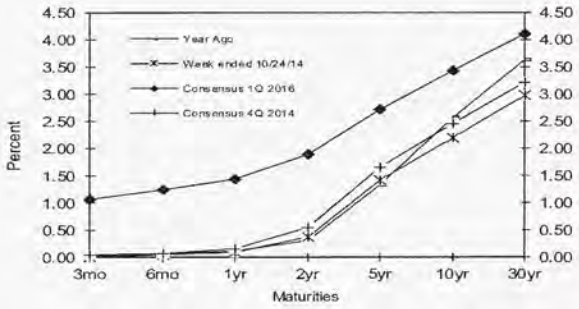
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

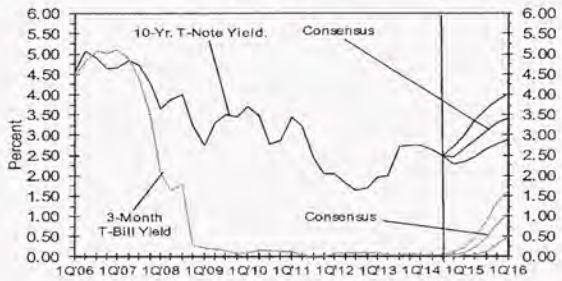
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Q	4Q	1Q	2Q	3Q	4Q	1Q
Interest Rates	Oct. 24	Oct. 17	Oct. 10	Oct. 3	Sep.	Aug.	July	3Q 2014	2014	2015	2015	2015	2015	2016
Federal Funds Rate	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	**0.1**	**0.1**	**0.3**	**0.5**	**0.8**	**1.1**
Prime Rate	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	**3.3**	**3.3**	**3.3**	**3.5**	**3.9**	**4.2**
LIBOR, 3-mo.	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	**0.3**	**0.3**	**0.4**	**0.7**	**1.1**	**1.4**
Commercial Paper, 1-mo.	0.07	0.07	0.06	0.05	0.06	0.08	0.07	0.07	**0.1**	**0.2**	**0.3**	**0.6**	**0.9**	**1.2**
Treasury bill, 3-mo.	0.02	0.02	0.01	0.02	0.02	0.03	0.03	0.03	**0.1**	**0.1**	**0.2**	**0.5**	**0.8**	**1.1**
Treasury bill, 6-mo.	0.06	0.05	0.05	0.04	0.04	0.05	0.06	0.05	**0.1**	**0.1**	**0.3**	**0.6**	**0.9**	**1.2**
Treasury bill, 1 yr.	0.10	0.10	0.10	0.11	0.11	0.11	0.11	0.11	**0.2**	**0.3**	**0.5**	**0.8**	**1.1**	**1.4**
Treasury note, 2 yr.	0.38	0.37	0.49	0.56	0.57	0.47	0.51	0.52	**0.6**	**0.7**	**1.1**	**1.4**	**1.7**	**1.9**
Treasury note, 5 yr.	1.43	1.41	1.61	1.73	1.77	1.63	1.70	1.70	**1.7**	**1.8**	**2.1**	**2.3**	**2.6**	**2.7**
Treasury note, 10 yr.	2.21	2.19	2.36	2.47	2.53	2.42	2.54	2.50	**2.5**	**2.6**	**2.9**	**3.1**	**3.3**	**3.4**
Treasury note, 30 yr.	2.98	2.95	3.07	3.16	3.26	3.20	3.33	3.26	**3.2**	**3.4**	**3.6**	**3.8**	**4.0**	**4.1**
Corporate Aaa bond	3.89	3.83	3.92	4.00	4.11	4.08	4.16	4.12	**4.1**	**4.2**	**4.5**	**4.7**	**4.9**	**5.0**
Corporate Baa bond	4.66	4.62	4.68	4.76	4.80	4.69	4.68	4.72	**4.8**	**5.0**	**5.2**	**5.4**	**5.6**	**5.8**
State & Local bonds	3.90	3.87	4.01	4.11	4.13	4.23	4.33	4.23	**4.0**	**4.2**	**4.4**	**4.6**	**4.7**	**4.8**
Home mortgage rate	3.92	3.97	4.12	4.19	4.16	4.12	4.13	4.14	**4.1**	**4.3**	**4.5**	**4.7**	**4.9**	**5.1**
	History								Consensus Forecasts-Quarterly					
	4Q	1Q	2Q	3Q	4Q	1Q	2Q	*3Q**	4Q	1Q	2Q	3Q	4Q	1Q
Key Assumptions	2012	2013	2013	2013	2013	2014	2014	*2014*	**2014**	**2015**	**2015**	**2015**	**2015**	**2016**
Major Currency Index	73.2	74.7	76.4	76.7	76.0	77.1	76.6	77.9	**80.6**	**81.3**	**81.6**	**81.8**	**82.0**	**81.5**
Real GDP	0.1	2.7	1.8	4.5	3.5	-2.1	4.6	*3.1*	**3.0**	**2.9**	**2.9**	**3.0**	**3.0**	**2.9**
GDP Price Index	1.3	1.3	1.2	1.7	1.5	1.3	2.1	*1.6*	**1.7**	**1.9**	**2.0**	**2.1**	**2.1**	**2.1**
Consumer Price Index	2.4	1.2	0.4	2.2	1.1	1.9	3.0	1.1	**1.3**	**1.8**	**2.1**	**2.2**	**2.3**	**2.3**

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS). *Figures for 3Q 2014 Real GDP and GDP Chained Price Index are consensus forecasts based on a special question asked of the panelists' this month.*

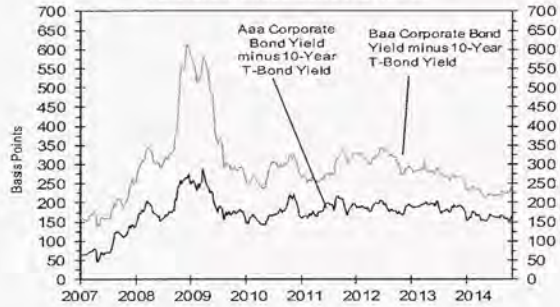
U.S. Treasury Yield Curve
Week ended October 24, 2014 and Year Ago vs.
4Q 2014 and 1Q 2016 Consensus Forecasts



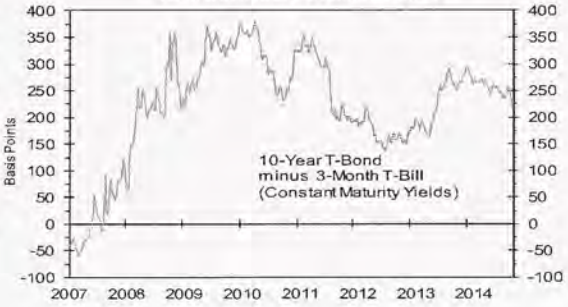
U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average) Forecast



Corporate Bond Spreads
As of week ended October 24, 2014



U.S. Treasury Yield Curve
As of week ended October 24, 2014



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 33, No. 12, December 1, 2014

Wolters Kluwer
Law & Business

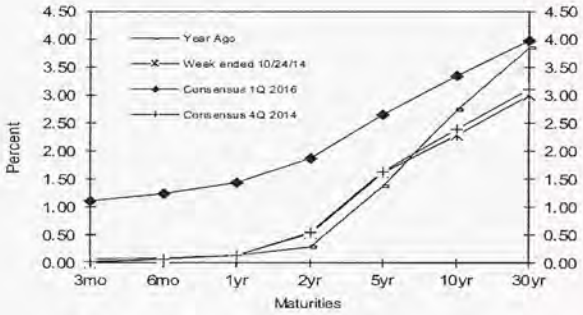
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

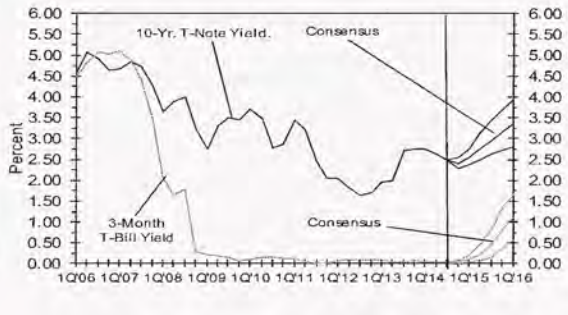
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Q	4Q	1Q	2Q	3Q	4Q	1Q
Interest Rates	Nov. 28	Nov. 21	Nov. 14	Nov. 7	Oct.	Sep.	Aug.	3Q 2014	2014	2015	2015	2015	2015	2016
Federal Funds Rate	0.10	0.10	0.09	0.08	0.09	0.09	0.09	0.09	**0.1**	**0.1**	**0.2**	**0.5**	**0.8**	**1.1**
Prime Rate	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	**3.3**	**3.3**	**3.3**	**3.5**	**3.8**	**4.1**
LIBOR, 3-mo.	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	**0.3**	**0.3**	**0.4**	**0.7**	**1.0**	**1.4**
Commercial Paper, 1-mo.	0.07	0.07	0.07	0.07	0.06	0.06	0.08	0.07	**0.1**	**0.1**	**0.3**	**0.5**	**0.9**	**1.2**
Treasury bill, 3-mo.	0.02	0.02	0.02	0.03	0.02	0.02	0.03	0.03	**0.0**	**0.1**	**0.2**	**0.5**	**0.8**	**1.1**
Treasury bill, 6-mo.	0.07	0.07	0.07	0.06	0.05	0.04	0.05	0.05	**0.1**	**0.1**	**0.3**	**0.6**	**0.9**	**1.2**
Treasury bill, 1 yr.	0.14	0.14	0.14	0.12	0.10	0.11	0.11	0.11	**0.1**	**0.3**	**0.5**	**0.8**	**1.1**	**1.4**
Treasury note, 2 yr.	0.53	0.53	0.54	0.52	0.45	0.57	0.47	0.52	**0.5**	**0.7**	**1.0**	**1.3**	**1.6**	**1.9**
Treasury note, 5 yr.	1.61	1.64	1.64	1.63	1.55	1.77	1.63	1.70	**1.6**	**1.8**	**2.0**	**2.2**	**2.4**	**2.7**
Treasury note, 10 yr.	2.29	2.33	2.36	2.36	2.30	2.53	2.42	2.50	**2.4**	**2.5**	**2.7**	**3.0**	**3.2**	**3.3**
Treasury note, 30 yr.	3.00	3.05	3.08	3.06	3.04	3.26	3.20	3.26	**3.1**	**3.3**	**3.4**	**3.6**	**3.8**	**4.0**
Corporate Aaa bond	3.93	3.96	3.95	3.90	3.92	4.11	4.08	4.12	**4.0**	**4.2**	**4.4**	**4.6**	**4.7**	**4.9**
Corporate Baa bond	4.80	4.84	4.80	4.76	4.69	4.80	4.69	4.72	**4.8**	**5.0**	**5.2**	**5.4**	**5.5**	**5.7**
State & Local bonds	n.a.	3.93	3.98	3.98	3.96	4.13	4.23	4.23	**4.0**	**4.1**	**4.3**	**4.5**	**4.6**	**4.8**
Home mortgage rate	3.97	3.99	4.01	4.02	4.04	4.16	4.12	4.14	**4.1**	**4.2**	**4.4**	**4.6**	**4.8**	**5.0**
	History								Consensus Forecasts-Quarterly					
	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q
Key Assumptions	2012	2013	2013	2013	2013	2014	2014	2014	2014	2015	2015	2015	2015	2016
Major Currency Index	73.2	74.7	76.4	76.7	76.0	77.1	76.6	77.8	**82.1**	**82.9**	**83.3**	**83.6**	**83.7**	**83.5**
Real GDP	0.1	2.7	1.8	4.5	3.5	-2.1	4.6	3.9	**2.7**	**2.9**	**2.9**	**3.0**	**3.0**	**2.8**
GDP Price Index	1.3	1.3	1.2	1.7	1.5	1.3	2.1	1.4	**1.4**	**1.7**	**1.9**	**1.9**	**2.0**	**2.0**
Consumer Price Index	2.4	1.2	0.4	2.2	1.1	1.9	3.0	1.1	**0.6**	**1.7**	**2.1**	**2.2**	**2.2**	**2.2**

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).

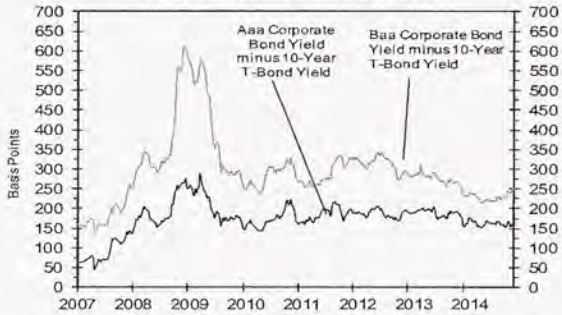
U.S. Treasury Yield Curve
Week ended November 28, 2014 and Year Ago vs. 4Q 2014 and 1Q 2016 Consensus Forecasts



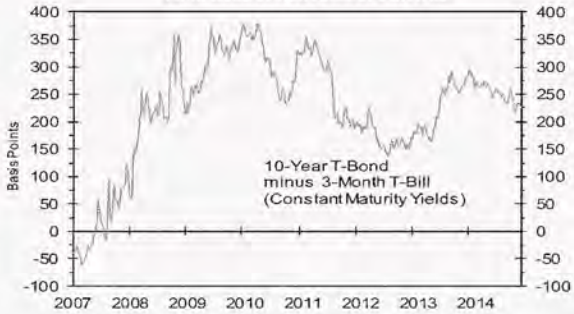
U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average) Forecast



Corporate Bond Spreads
As of week ended October 24, 2014



U.S. Treasury Yield Curve
As of week ended October 24, 2014



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 33, No. 12, December 1, 2014

Wolters Kluwer
Law & Business

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Long-Range Estimates:

The table below contains results of our semi-annual long-range CONSENSUS survey. There are also Top 10 and bottom 10 averages for each variable. Shown are estimates for the years 2016 through 2020 and averages for the five-year periods 2016-2020 and 2020-2025. Apply these projections cautiously. Few economic, demographic and political forces can be evaluated accurately over such long time spans.

		Average For The Year					Five-Year Averages	
Interest Rates		**2016**	**2017**	**2018**	**2019**	**2020**	**2016-2020**	**2021-2025**
1. Federal Funds Rate	**CONSENSUS**	**1.8**	**2.9**	**3.6**	**3.7**	**3.7**	**3.1**	**3.6**
	Top 10 Average	2.4	3.7	4.2	4.2	4.2	3.7	4.1
	Bottom 10 Average	1.2	2.3	2.9	3.0	3.0	2.5	2.9
2. Prime Rate	**CONSENSUS**	**4.7**	**5.8**	**6.5**	**6.6**	**6.6**	**6.0**	**6.5**
	Top 10 Average	5.4	6.6	7.1	7.2	7.2	6.7	7.1
	Bottom 10 Average	4.2	5.2	5.8	5.9	5.8	5.4	5.6
3. LIBOR, 3-Mo.	**CONSENSUS**	**2.1**	**3.2**	**3.7**	**3.9**	**3.9**	**3.3**	**3.8**
	Top 10 Average	2.7	3.9	4.3	4.4	4.4	3.9	4.3
	Bottom 10 Average	1.5	2.5	3.1	3.2	3.3	2.7	3.3
4. Commercial Paper, 1-Mo.	**CONSENSUS**	**1.9**	**3.0**	**3.5**	**3.7**	**3.7**	**3.1**	**3.7**
	Top 10 Average	2.4	3.5	4.0	4.2	4.2	3.6	4.2
	Bottom 10 Average	1.5	2.5	3.0	3.1	3.2	2.7	3.2
5. Treasury Bill Yield, 3-Mo.	**CONSENSUS**	**1.8**	**2.9**	**3.4**	**3.6**	**3.6**	**3.0**	**3.5**
	Top 10 Average	2.4	3.6	4.0	4.2	4.1	3.7	4.1
	Bottom 10 Average	1.3	2.2	2.9	2.9	2.9	2.4	2.7
6. Treasury Bill Yield, 6-Mo.	**CONSENSUS**	**2.0**	**3.0**	**3.6**	**3.7**	**3.7**	**3.2**	**3.6**
	Top 10 Average	2.5	3.8	4.2	4.4	4.3	3.8	4.2
	Bottom 10 Average	1.5	2.4	3.0	3.1	3.1	2.6	2.8
7. Treasury Bill Yield, 1-Yr.	**CONSENSUS**	**2.1**	**3.2**	**3.7**	**3.8**	**3.8**	**3.3**	**3.7**
	Top 10 Average	2.8	3.9	4.4	4.5	4.4	4.0	4.3
	Bottom 10 Average	1.6	2.5	3.1	3.1	3.2	2.7	2.9
8. Treasury Note Yield, 2-Yr.	**CONSENSUS**	**2.5**	**3.4**	**3.9**	**4.0**	**4.0**	**3.6**	**4.0**
	Top 10 Average	3.3	4.1	4.5	4.7	4.6	4.2	4.5
	Bottom 10 Average	1.9	2.8	3.3	3.3	3.3	2.9	3.2
10. Treasury Note Yield, 5-Yr.	**CONSENSUS**	**3.1**	**3.8**	**4.2**	**4.3**	**4.3**	**4.0**	**4.3**
	Top 10 Average	3.8	4.5	4.9	5.1	5.1	4.7	4.9
	Bottom 10 Average	2.6	3.2	3.6	3.5	3.6	3.3	3.6
11. Treasury Note Yield, 10-Yr.	**CONSENSUS**	**3.7**	**4.3**	**4.6**	**4.7**	**4.7**	**4.4**	**4.6**
	Top 10 Average	4.4	5.0	5.4	5.6	5.6	5.2	5.4
	Bottom 10 Average	3.2	3.5	3.8	3.8	3.9	3.7	3.9
12. Treasury Bond Yield, 30-Yr.	**CONSENSUS**	**4.3**	**4.8**	**5.0**	**5.1**	**5.2**	**4.9**	**5.1**
	Top 10 Average	5.0	5.6	5.9	6.2	6.2	5.8	6.0
	Bottom 10 Average	3.7	4.0	4.2	4.2	4.3	4.1	4.3
13. Corporate Aaa Bond Yield	**CONSENSUS**	**5.1**	**5.6**	**6.0**	**6.1**	**6.1**	**5.8**	**6.1**
	Top 10 Average	5.8	6.4	6.8	7.0	7.0	6.6	6.8
	Bottom 10 Average	4.5	4.8	5.1	5.1	5.2	5.0	5.4
13. Corporate Baa Bond Yield	**CONSENSUS**	**6.0**	**6.5**	**6.8**	**6.9**	**7.0**	**6.6**	**7.0**
	Top 10 Average	6.7	7.3	7.7	7.9	7.9	7.5	7.7
	Bottom 10 Average	5.4	5.6	5.9	5.9	6.0	5.8	6.2
14. State & Local Bonds Yield	**CONSENSUS**	**4.9**	**5.2**	**5.4**	**5.4**	**5.4**	**5.2**	**5.3**
	Top 10 Average	5.5	5.7	6.0	6.1	6.1	5.9	6.0
	Bottom 10 Average	4.3	4.6	4.7	4.7	4.7	4.6	4.7
15. Home Mortgage Rate	**CONSENSUS**	**5.2**	**5.8**	**6.2**	**6.3**	**6.3**	**6.0**	**6.2**
	Top 10 Average	5.9	6.5	7.1	7.2	7.2	6.8	7.0
	Bottom 10 Average	4.6	5.1	5.5	5.5	5.5	5.2	5.3
A. FRB - Major Currency Index	**CONSENSUS**	**83.6**	**83.3**	**82.7**	**82.4**	**82.1**	**82.8**	**82.0**
	Top 10 Average	86.7	86.7	86.6	86.5	86.6	86.6	86.3
	Bottom 10 Average	80.3	79.8	78.5	77.9	77.3	78.7	77.4
		Year-Over-Year, % Change					Five-Year Averages	
		2016	**2017**	**2018**	**2019**	**2020**	**2016-2020**	**2021-2025**
B. Real GDP	**CONSENSUS**	**2.8**	**2.8**	**2.6**	**2.4**	**2.4**	**2.6**	**2.3**
	Top 10 Average	3.2	3.1	2.9	2.8	2.7	2.9	2.6
	Bottom 10 Average	2.6	2.4	2.3	1.8	2.0	2.2	2.0
C. GDP Chained Price Index	**CONSENSUS**	**2.0**	**2.2**	**2.2**	**2.1**	**2.1**	**2.1**	**2.1**
	Top 10 Average	2.3	2.7	2.6	2.5	2.4	2.5	2.5
	Bottom 10 Average	1.7	1.8	1.8	1.8	1.8	1.8	1.8
D. Consumer Price Index	**CONSENSUS**	**2.3**	**2.5**	**2.4**	**2.3**	**2.3**	**2.4**	**2.3**
	Top 10 Average	2.7	3.1	3.0	2.8	2.7	2.8	2.7
	Bottom 10 Average	2.0	2.0	2.0	1.9	1.9	1.9	1.9

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 34, No. 1, January 1, 2015

Wolters Kluwer
Law & Business

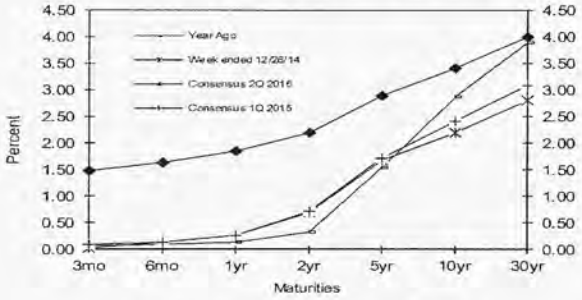
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

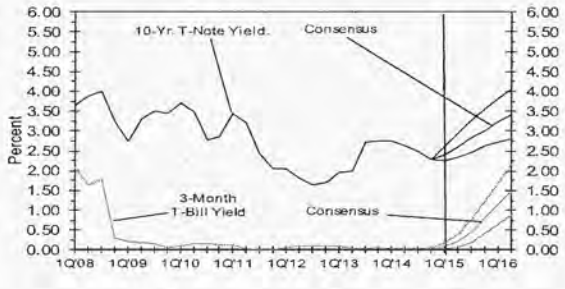
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			*Latest Q**	1Q	2Q	3Q	4Q	1Q	2Q
Interest Rates	Dec. 26	Dec. 19	Dec. 12	Dec. 5	Nov.	Oct.	Sep.	*4Q 2014*	2015	2015	2015	2015	2016	2016
Federal Funds Rate	0.13	0.12	0.12	0.10	0.09	0.09	0.09	0.10	**0.1**	**0.2**	**0.5**	**0.8**	**1.2**	**1.5**
Prime Rate	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	**3.3**	**3.3**	**3.5**	**3.9**	**4.2**	**4.6**
LIBOR, 3-mo.	0.24	0.23	0.23	0.23	0.23	0.23	0.23	0.23	**0.3**	**0.4**	**0.7**	**1.0**	**1.4**	**1.8**
Commercial Paper, 1-mo.	0.12	0.11	0.11	0.10	0.07	0.06	0.06	0.08	**0.1**	**0.2**	**0.5**	**0.9**	**1.3**	**1.6**
Treasury bill, 3-mo.	0.04	0.04	0.03	0.02	0.02	0.02	0.02	0.03	**0.1**	**0.2**	**0.5**	**0.8**	**1.2**	**1.5**
Treasury bill, 6-mo.	0.13	0.11	0.10	0.08	0.07	0.05	0.04	0.08	**0.1**	**0.3**	**0.6**	**0.9**	**1.3**	**1.6**
Treasury bill, 1 yr.	0.26	0.23	0.20	0.15	0.13	0.10	0.11	0.15	**0.3**	**0.5**	**0.8**	**1.2**	**1.5**	**1.9**
Treasury note, 2 yr.	0.70	0.63	0.61	0.56	0.53	0.45	0.57	0.54	**0.7**	**1.0**	**1.3**	**1.6**	**1.9**	**2.2**
Treasury note, 5 yr.	1.69	1.61	1.61	1.60	1.62	1.55	1.77	1.60	**1.7**	**1.9**	**2.2**	**2.4**	**2.7**	**2.9**
Treasury note, 10 yr.	2.21	2.14	2.19	2.27	2.33	2.30	2.53	2.27	**2.4**	**2.6**	**2.8**	**3.0**	**3.2**	**3.4**
Treasury note, 30 yr.	2.80	2.75	2.84	2.97	3.04	3.04	3.26	2.96	**3.1**	**3.3**	**3.5**	**3.7**	**3.9**	**4.0**
Corporate Aaa bond	3.78	3.74	3.75	3.90	3.92	3.92	4.11	3.87	**4.0**	**4.2**	**4.3**	**4.6**	**4.8**	**5.0**
Corporate Baa bond	4.75	4.72	4.72	4.79	4.79	4.69	4.80	4.74	**4.9**	**5.1**	**5.3**	**5.5**	**5.7**	**5.8**
State & Local bonds	na	3.65	3.65	3.83	3.96	3.96	4.13	3.86	**3.9**	**4.1**	**4.3**	**4.5**	**4.6**	**4.8**
Home mortgage rate	na	3.80	3.93	3.89	4.00	4.04	4.16	3.97	**4.1**	**4.3**	**4.5**	**4.7**	**4.9**	**5.1**
	History								Consensus Forecasts-Quarterly					
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	*4Q**	1Q	2Q	3Q	4Q	1Q	2Q
Key Assumptions	2013	2013	2013	2013	2014	2014	2014	*2014*	2015	2015	2015	2015	2016	2016
Major Currency Index	74.7	76.4	76.7	76.0	77.1	76.6	77.8	*83.9*	**84.0**	**84.7**	**85.3**	**85.5**	**85.7**	**85.5**
Real GDP	2.7	1.8	4.5	3.5	-2.1	4.6	5.0	*2.7*	**2.9**	**2.9**	**3.0**	**3.0**	**2.9**	**2.9**
GDP Price Index	1.3	1.2	1.7	1.5	1.3	2.1	1.4	*1.0*	**1.3**	**1.7**	**1.9**	**2.0**	**2.1**	**2.0**
Consumer Price Index	1.2	0.4	2.2	1.1	1.9	3.0	1.1	*-0.9*	**0.4**	**1.9**	**2.1**	**2.3**	**2.2**	**2.2**

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS). **Data for 4Q 2014 Major Currency Index is based on data through December 23. Figures for 4Q 2014 Real GDP, GDP Chained Price Index and Consumer Price Index are consensus forecasts based on a special question asked of the panelists' this month.*

U.S. Treasury Yield Curve
Week ended December 26, 2014 and Year Ago vs.
1Q 2014 and 2Q 2016 Consensus Forecasts

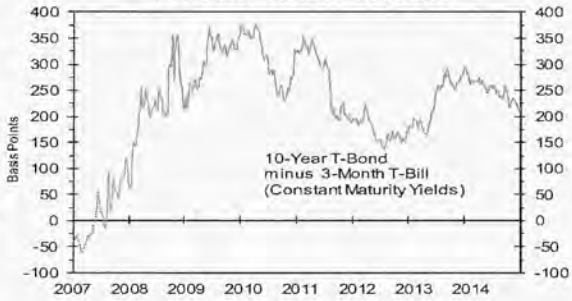


U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average) Forecast



Corporate Bond Spreads
As of week ended December 26, 2014

U.S. Treasury Yield Curve
As of week ended December 26, 2014



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 34, No. 2, February 1, 2015

Wolters Kluwer
Law & Business

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

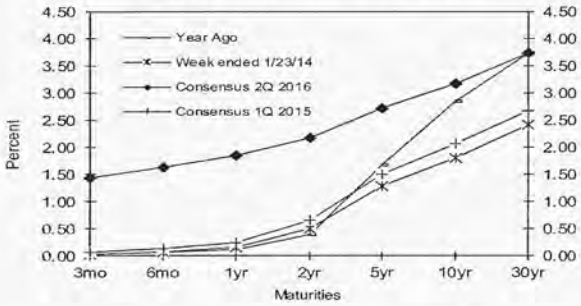
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Q	1Q	2Q	3Q	4Q	1Q	2Q
Interest Rates	Jan. 23	Jan. 16	Jan. 9	Jan. 2	Dec.	Nov.	Oct.	4Q 2014	2015	2015	2015	2015	2016	2016
Federal Funds Rate	0.12	0.12	0.11	0.12	0.12	0.09	0.09	0.10	0.1	0.2	0.5	0.8	1.1	1.5
Prime Rate	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.3	3.3	3.5	3.8	4.1	4.5
LIBOR, 3-mo.	0.26	0.25	0.25	0.25	0.23	0.23	0.23	0.23	0.3	0.4	0.6	0.9	1.3	1.7
Commercial Paper, 1-mo.	0.08	0.11	0.09	0.13	0.11	0.07	0.06	0.08	0.1	0.2	0.5	0.8	1.2	1.5
Treasury bill, 3-mo.	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.1	0.2	0.4	0.7	1.1	1.5
Treasury bill, 6-mo.	0.08	0.08	0.09	0.12	0.11	0.07	0.05	0.08	0.1	0.3	0.5	0.9	1.2	1.6
Treasury bill, 1 yr.	0.17	0.18	0.24	0.25	0.21	0.13	0.10	0.15	0.2	0.4	0.7	1.1	1.4	1.8
Treasury note, 2 yr.	0.50	0.51	0.63	0.69	0.64	0.53	0.45	0.54	0.7	0.9	1.2	1.5	1.8	2.2
Treasury note, 5 yr.	1.29	1.32	1.50	1.67	1.64	1.62	1.55	1.60	1.5	1.7	2.0	2.2	2.5	2.7
Treasury note, 10 yr.	1.82	1.86	2.00	2.18	2.21	2.33	2.30	2.28	2.1	2.3	2.5	2.7	3.0	3.2
Treasury note, 30 yr.	2.42	2.46	2.56	2.75	2.83	3.04	3.04	2.97	2.7	2.9	3.1	3.3	3.5	3.7
Corporate Aaa bond	3.45	3.46	3.54	3.72	3.79	3.92	3.92	3.88	3.7	3.9	4.1	4.3	4.6	4.8
Corporate Baa bond	4.44	4.45	4.53	4.68	4.74	4.79	4.69	4.74	4.6	4.8	5.0	5.2	5.4	5.6
State & Local bonds	3.36	3.29	3.42	3.56	3.70	3.96	3.96	3.87	3.5	3.7	3.9	4.1	4.4	4.6
Home mortgage rate	3.63	3.66	3.73	3.87	3.86	4.00	4.04	3.97	3.8	4.0	4.2	4.5	4.7	4.9
	History								Consensus Forecasts-Quarterly					
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q*	1Q	2Q	3Q	4Q	1Q	2Q
Key Assumptions	2013	2013	2013	2013	2014	2014	2014	2014	2015	2015	2015	2015	2016	2016
Major Currency Index	74.7	76.4	76.7	76.0	77.1	76.6	77.8	82.6	86.7	87.7	88.4	88.8	88.3	87.8
Real GDP	2.7	1.8	4.5	3.5	-2.1	4.6	5.0	*3.0*	2.9	3.0	3.0	3.0	2.9	2.9
GDP Price Index	1.3	1.2	1.7	1.5	1.3	2.1	1.4	*0.9*	0.8	1.6	1.8	2.0	2.0	2.1
Consumer Price Index	1.2	0.4	2.2	1.1	1.9	3.0	1.1	-0.9	-1.5	1.8	2.2	2.2	2.3	2.3

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS). * *Figures for 4Q 2014 Real GDP and GDP Chained Price Index.*

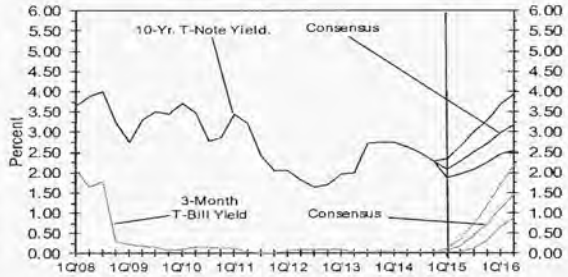
U.S. Treasury Yield Curve

Week ended January 23, 2015 and Year Ago vs. 1Q 2015 and 2Q 2016 Consensus Forecasts



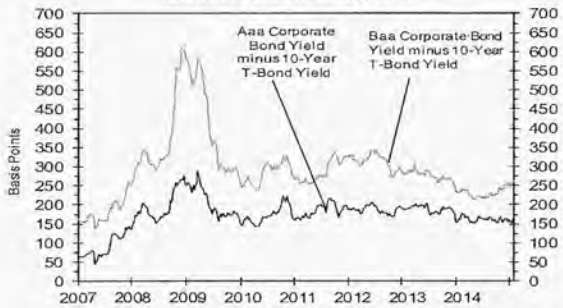
U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield

(Quarterly Average) Forecast



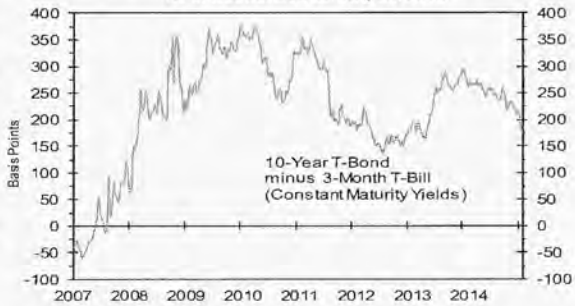
Corporate Bond Spreads

As of week ended January, 2015



U.S. Treasury Yield Curve

As of week ended January 23, 2015



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 34, No. 3, March 1, 2015

Wolters Kluwer
Law & Business

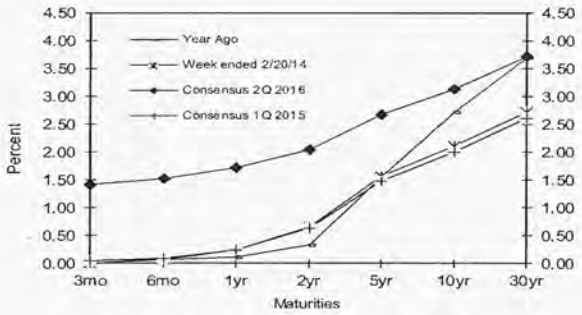
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

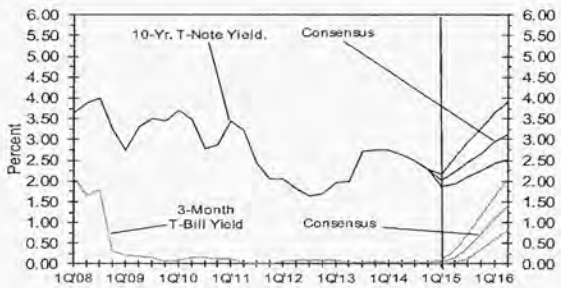
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Q	1Q	2Q	3Q	4Q	1Q	2Q
Interest Rates	Feb. 20	Feb. 13	Feb. 6	Jan. 30	Jan.	Dec.	Nov.	4Q 2014	2015	2015	2015	2015	2016	2016
Federal Funds Rate	0.12	0.12	0.09	0.12	0.11	0.12	0.09	0.10	0.1	0.2	0.4	0.8	1.1	1.4
Prime Rate	3.25	3.25	325	3.25	3.25	3.25	3.25	3.25	3.3	3.3	3.5	3.8	4.1	4.5
LIBOR, 3-mo.	0.26	0.26	0.26	0.26	0.26	0.23	0.23	0.23	0.3	0.4	0.6	0.9	1.3	1.6
Commercial Paper, 1-mo.	0.06	0.08	0.08	0.08	0.09	0.11	0.07	0.08	0.1	0.2	0.4	0.8	1.1	1.5
Treasury bill, 3-mo.	0.02	0.01	0.02	0.02	0.03	0.03	0.02	0.02	0.0	0.2	0.4	0.7	1.1	1.4
Treasury bill, 6-mo.	0.07	0.07	0.07	0.08	0.08	0.11	0.07	0.08	0.1	0.2	0.5	0.8	1.2	1.5
Treasury bill, 1 yr.	0.24	0.24	0.21	0.17	0.20	0.21	0.13	0.15	0.2	0.4	0.7	1.1	1.4	1.7
Treasury note, 2 yr.	0.67	0.65	0.54	0.51	0.55	0.64	0.53	0.54	0.6	0.9	1.1	1.5	1.8	2.1
Treasury note, 5 yr.	1.58	1.51	1.31	1.28	1.37	1.64	1.62	1.60	1.5	1.7	1.9	2.1	2.4	2.7
Treasury note, 10 yr.	2.11	2.00	1.81	1.77	1.88	2.21	2.33	2.28	2.0	2.2	2.4	2.7	2.9	3.1
Treasury note, 30 yr.	2.72	2.58	2.39	2.33	2.46	2.83	3.04	2.97	2.6	2.8	3.0	3.3	3.5	3.7
Corporate Aaa bond	3.77	3.62	3.42	3.36	3.46	3.79	3.92	3.88	3.7	3.8	4.1	4.3	4.6	4.8
Corporate Baa bond	4.64	4.53	4.41	4.36	4.45	4.74	4.79	4.74	4.6	4.7	5.0	5.2	5.4	5.6
State & Local bonds	3.62	3.60	3.49	3.36	3.40	3.70	3.96	3.87	3.5	3.7	3.9	4.2	4.4	4.5
Home mortgage rate	3.76	3.69	3.59	3.66	3.71	3.86	4.00	3.97	3.8	3.9	4.2	4.4	4.7	4.9
	History								Consensus Forecasts-Quarterly					
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q
Key Assumptions	2013	2013	2013	2013	2014	2014	2014	2014	2015	2015	2015	2015	2016	2016
Major Currency Index	74.7	76.4	76.7	76.0	77.1	76.6	77.8	82.6	87.7	89.0	89.5	90.0	89.6	89.1
Real GDP	2.7	1.8	4.5	3.5	-2.1	4.6	5.0	2.2	2.6	3.0	3.1	3.0	2.9	2.9
GDP Price Index	1.3	1.2	1.7	1.5	1.3	2.1	1.4	0.1	0.4	1.6	1.8	1.9	2.0	2.0
Consumer Price Index	1.2	0.4	2.2	1.1	1.9	3.0	1.1	-1.2	-1.8	2.0	2.2	2.2	2.2	2.2

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).

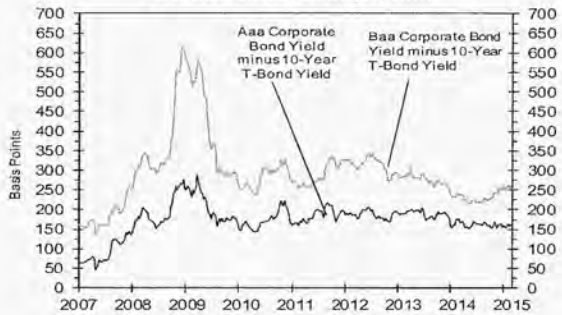
U.S. Treasury Yield Curve
Week ended February 20, 2015 and Year Ago vs.
1Q 2015 and 2Q 2016 Consensus Forecasts



U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average) Forecast



Corporate Bond Spreads
As of week ended February 20, 2015



U.S. Treasury Yield Curve
As of week ended February 20, 2015

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 34, No. 4, April 1, 2015

Wolters Kluwer
Law & Business

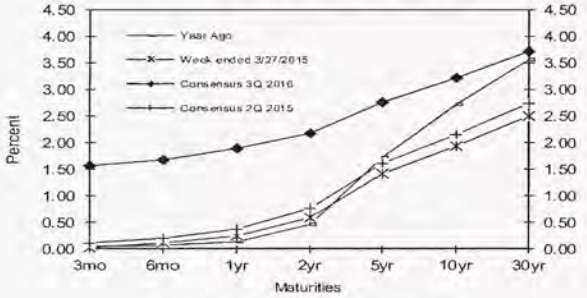
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

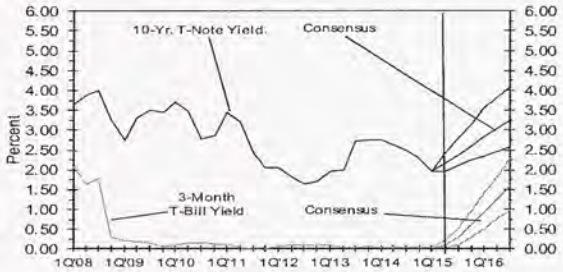
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Q*	2Q	3Q	4Q	1Q	2Q	3Q
Interest Rates	Mar. 27	Mar. 20	Mar. 13	Mar. 6	Feb.	Jan.	Dec.	1Q 2015	2015	2015	2015	2016	2016	2016
Federal Funds Rate	0.12	0.11	0.12	0.09	0.11	0.11	0.12	*0.11*	0.2	0.4	0.7	1.0	1.3	1.6
Prime Rate	3.25	3.25	3.25	3.25	3.25	3.25	3.25	*3.25*	3.3	3.4	3.7	4.0	4.3	4.6
LIBOR, 3-mo.	0.27	0.27	0.27	0.27	0.26	0.26	0.23	*0.26*	0.3	0.5	0.9	1.2	1.5	1.9
Commercial Paper, 1-mo.	0.08	0.09	0.08	0.07	0.08	0.09	0.11	*0.08*	0.2	0.3	0.7	1.0	1.4	1.7
Treasury bill, 3-mo.	0.03	0.03	0.03	0.02	0.02	0.03	0.03	*0.03*	0.1	0.3	0.6	0.9	1.3	1.6
Treasury bill, 6-mo.	0.11	0.13	0.10	0.08	0.07	0.08	0.11	*0.09*	0.2	0.4	0.7	1.1	1.4	1.7
Treasury bill, 1 yr.	0.25	0.25	0.25	0.25	0.22	0.20	0.21	*0.22*	0.4	0.6	0.9	1.3	1.6	1.9
Treasury note, 2 yr.	0.60	0.63	0.69	0.68	0.62	0.55	0.64	*0.61*	0.8	1.0	1.3	1.6	1.9	2.2
Treasury note, 5 yr.	1.42	1.49	1.61	1.61	1.57	1.37	1.64	*1.49*	1.6	1.8	2.1	2.3	2.5	2.8
Treasury note, 10 yr.	1.93	2.00	2.14	2.13	1.98	1.88	2.21	*1.97*	2.2	2.4	2.6	2.8	3.0	3.2
Treasury note, 30 yr.	2.50	2.57	2.72	2.73	2.57	2.46	2.83	*2.55*	2.7	2.9	3.1	3.4	3.6	3.7
Corporate Aaa bond	3.54	3.62	3.70	3.74	3.61	3.46	3.79	*3.57*	3.7	4.0	4.2	4.5	4.7	4.9
Corporate Baa bond	4.45	4.51	4.59	4.60	4.51	4.45	4.74	*4.50*	4.6	4.8	5.1	5.3	5.5	5.7
State & Local bonds	3.52	3.52	3.62	3.68	3.58	3.40	3.70	*3.52*	3.7	3.9	4.1	4.3	4.5	4.6
Home mortgage rate	3.69	3.78	3.86	3.75	3.71	3.71	3.86	*3.73*	3.9	4.1	4.4	4.6	4.8	5.0
	History								Consensus Forecasts-Quarterly					
	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q*	2Q	3Q	4Q	1Q	2Q	3Q
Key Assumptions	2013	2013	2013	2014	2014	2014	2014	2015	2015	2015	2015	2016	2016	2016
Major Currency Index	76.4	76.7	76.0	77.1	76.6	77.8	82.6	*89.5*	91.5	92.1	92.6	92.2	91.6	91.2
Real GDP	1.8	4.5	3.5	-2.1	4.6	5.0	2.2	*1.7*	3.2	3.0	3.0	2.8	2.8	2.8
GDP Price Index	1.2	1.7	1.5	1.3	2.1	1.4	0.1	*0.2*	1.6	1.8	1.9	1.9	2.0	2.1
Consumer Price Index	-0.1	2.3	1.4	2.1	2.4	1.2	-0.9	*-2.3*	1.9	1.9	2.1	2.2	2.2	2.3

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS). **Interest rate data for 1Q 2015 based on historical data through the week ended March 27th. *Data for 1Q 2015 Major Currency Index is based on data through week ended March 20th. Figures for 1Q 2015 Real GDP, GDP Chained Price Index and Consumer Price Index are consensus forecasts based on a special question asked of the panelists' this month*

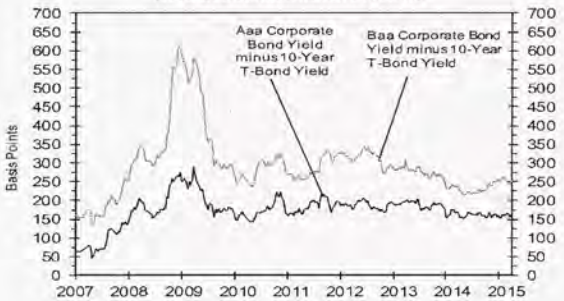
U.S. Treasury Yield Curve
Week ended March 27, 2015 and Year Ago vs.
2Q 2015 and 3Q 2016 Consensus Forecasts



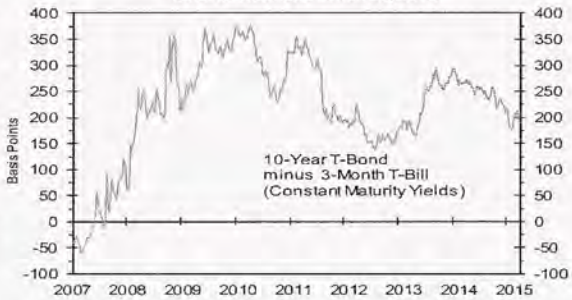
U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average) Forecast



Corporate Bond Spreads
As of week ended March 27, 2015



U.S. Treasury Yield Curve
As of week ended March 27, 2015



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 34, No. 5, May 1, 2015

Wolters Kluwer

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

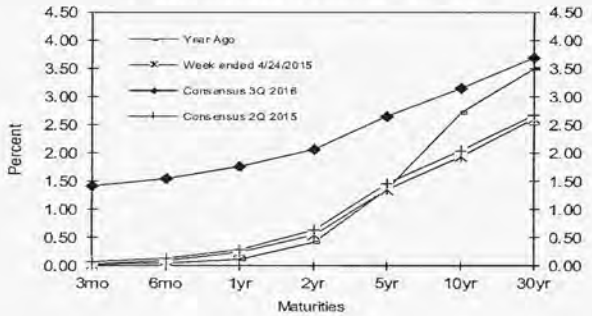
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Q	2Q	3Q	4Q	1Q	2Q	3Q
Interest Rates	Apr. 24	Apr. 17	Apr. 10	Apr. 3	Mar.	Feb.	Jan.	1Q 2015	2015	2015	2015	2016	2016	2016
Federal Funds Rate	0.13	0.12	0.12	0.11	0.11	0.11	0.11	0.11	0.1	0.3	0.6	0.9	1.2	1.5
Prime Rate	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.3	3.4	3.6	3.9	4.2	4.5
LIBOR, 3-mo.	0.28	0.28	0.28	0.27	0.26	0.26	0.26	0.26	0.3	0.5	0.8	1.1	1.4	1.7
Commercial Paper, 1-mo.	0.07	0.08	0.07	0.08	0.08	0.08	0.09	0.08	0.1	0.3	0.6	1.0	1.3	1.6
Treasury bill, 3-mo.	0.03	0.02	0.02	0.02	0.03	0.02	0.03	0.03	0.1	0.2	0.5	0.8	1.1	1.4
Treasury bill, 6-mo.	0.10	0.09	0.10	0.12	0.11	0.07	0.08	0.09	0.1	0.4	0.6	1.0	1.3	1.6
Treasury bill, 1 yr.	0.24	0.23	0.22	0.25	0.25	0.22	0.20	0.22	0.3	0.5	0.8	1.2	1.5	1.8
Treasury note, 2 yr.	0.55	0.52	0.54	0.55	0.64	0.62	0.55	0.60	0.6	0.9	1.2	1.5	1.8	2.1
Treasury note, 5 yr.	1.36	1.33	1.36	1.34	1.52	1.57	1.37	1.49	1.5	1.7	1.9	2.2	2.4	2.7
Treasury note, 10 yr.	1.94	1.90	1.93	1.91	2.04	1.98	1.88	1.97	2.0	2.3	2.5	2.7	3.0	3.2
Treasury note, 30 yr.	2.61	2.55	2.56	2.52	2.63	2.57	2.46	2.55	2.7	2.9	3.1	3.3	3.5	3.7
Corporate Aaa bond	3.54	3.47	3.50	3.49	3.64	3.61	3.46	3.57	3.6	3.8	4.1	4.4	4.6	4.8
Corporate Baa bond	4.48	4.44	4.47	4.46	4.54	4.51	4.45	4.50	4.5	4.7	5.0	5.2	5.4	5.6
State & Local bonds	3.52	3.45	3.49	3.49	3.59	3.58	3.40	3.52	3.5	3.7	4.0	4.2	4.4	4.6
Home mortgage rate	3.65	3.67	3.66	3.70	3.77	3.71	3.71	3.73	3.8	4.0	4.2	4.5	4.7	4.9
	History								Consensus Forecasts-Quarterly					
	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q
Key Assumptions	2013	2013	2013	2014	2014	2014	2014	2015	2015	2015	2015	2016	2016	2016
Major Currency Index	76.4	76.7	76.0	77.1	76.6	77.8	82.6	89.4	91.1	91.7	92.2	92.2	92.1	92.0
Real GDP	1.8	4.5	3.5	-2.1	4.6	5.0	2.2	0.2	3.3	3.1	3.0	2.8	2.8	2.7
GDP Price Index	1.2	1.7	1.5	1.3	2.1	1.4	0.1	-0.1	1.8	1.8	1.8	1.9	2.0	2.1
Consumer Price Index	-0.1	2.3	1.4	2.1	2.4	1.2	-0.9	-3.1	1.9	2.2	2.2	2.1	2.3	2.4

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).

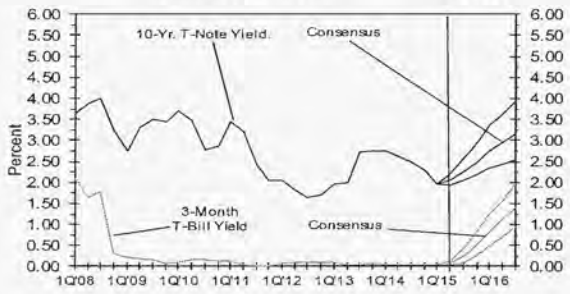
U.S. Treasury Yield Curve

Week ended April 24, 2015 and Year Ago vs. 2Q 2015 and 3Q 2016 Consensus Forecasts



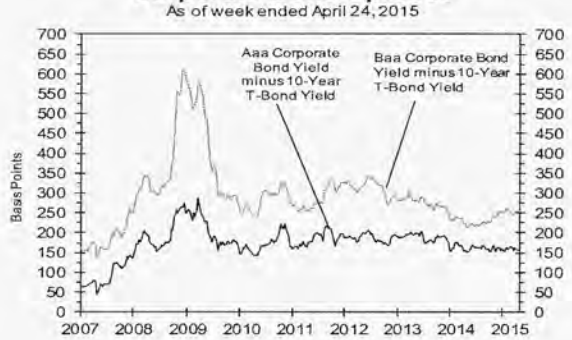
U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield

(Quarterly Average) Forecast



Corporate Bond Spreads

As of week ended April 24, 2015



U.S. Treasury Yield Curve

As of week ended April 24, 2015

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 34, No. 6, June 1, 2015

Wolters Kluwer

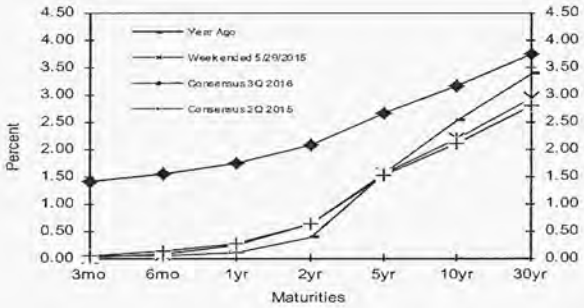
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

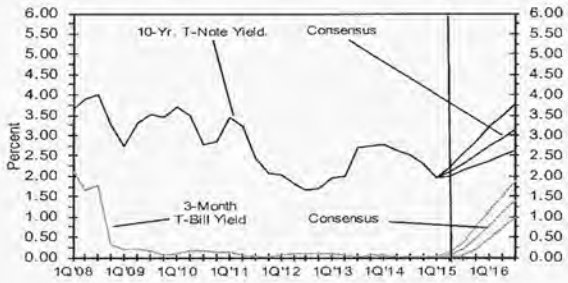
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Q	2Q	3Q	4Q	1Q	2Q	3Q
Interest Rates	May 29	May 22	May 15	May 8	Apr.	Mar.	Feb.	1Q 2015	2015	2015	2015	2016	2016	2016
Federal Funds Rate	0.12	0.13	0.13	0.12	0.12	0.11	0.11	0.11	0.1	0.3	0.5	0.8	1.1	1.4
Prime Rate	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.3	3.3	3.5	3.8	4.1	4.5
LIBOR, 3-mo.	0.29	0.29	0.29	0.29	0.28	0.26	0.26	0.26	0.3	0.4	0.7	1.0	1.4	1.7
Commercial Paper, 1-mo.	0.08	0.08	0.08	0.08	0.07	0.08	0.08	0.08	0.1	0.3	0.5	0.9	1.2	1.5
Treasury bill, 3-mo.	0.02	0.02	0.02	0.01	0.02	0.03	0.02	0.03	0.0	0.2	0.5	0.8	1.1	1.4
Treasury bill, 6-mo.	0.08	0.08	0.09	0.08	0.09	0.11	0.07	0.09	0.1	0.3	0.6	0.9	1.2	1.5
Treasury bill, 1 yr.	0.24	0.23	0.24	0.24	0.23	0.25	0.22	0.22	0.3	0.5	0.8	1.1	1.4	1.7
Treasury note, 2 yr.	0.63	0.61	0.59	0.62	0.54	0.64	0.62	0.60	0.6	0.9	1.2	1.5	1.8	2.1
Treasury note, 5 yr.	1.54	1.54	1.54	1.54	1.35	1.52	1.57	1.49	1.5	1.7	2.0	2.2	2.4	2.7
Treasury note, 10 yr.	2.17	2.23	224	2.19	1.94	2.04	1.98	1.97	2.1	2.3	2.5	2.7	2.9	3.1
Treasury note, 30 yr.	2.94	3.02	3.02	2.91	2.59	2.63	2.57	2.55	2.8	3.0	3.2	3.4	3.6	3.7
Corporate Aaa bond	3.99	4.07	4.02	3.91	3.52	3.64	3.61	3.57	3.8	4.0	4.2	4.4	4.7	4.9
Corporate Baa bond	4.90	4.96	4.94	4.82	4.48	4.54	4.51	4.50	4.7	4.9	5.0	5.2	5.4	5.6
State & Local bonds	3.73	3.81	3.74	3.74	3.51	3.59	3.58	3.52	3.7	3.8	4.0	4.2	4.4	4.6
Home mortgage rate	3.87	3.84	3.85	3.80	3.67	3.77	3.71	3.73	3.8	4.0	4.2	4.5	4.7	4.9
	History								Consensus Forecasts-Quarterly					
	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q
Key Assumptions	2013	2013	2013	2014	2014	2014	2014	2015	2015	2015	2015	2016	2016	2016
Major Currency Index	76.4	76.7	76.0	77.1	76.6	77.8	82.6	89.4	90.4	90.9	91.6	91.7	91.6	91.3
Real GDP	1.8	4.5	3.5	-2.1	4.6	5.0	2.2	-0.7	2.6	3.2	3.0	2.7	2.8	2.8
GDP Price Index	1.2	1.7	1.5	1.3	2.1	1.4	0.1	-0.1	1.7	1.8	1.8	1.9	2.0	2.1
Consumer Price Index	-0.1	2.3	1.4	2.1	2.4	1.2	-0.9	-3.1	2.2	2.2	2.2	2.1	2.3	2.4

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).

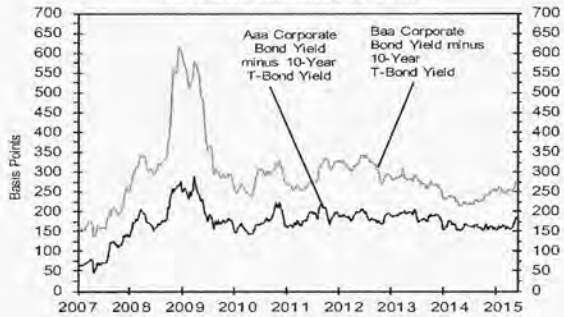
U.S. Treasury Yield Curve
Week ended May 29, 2015 and Year Ago vs.
2Q 2015 and 3Q 2016 Consensus Forecasts



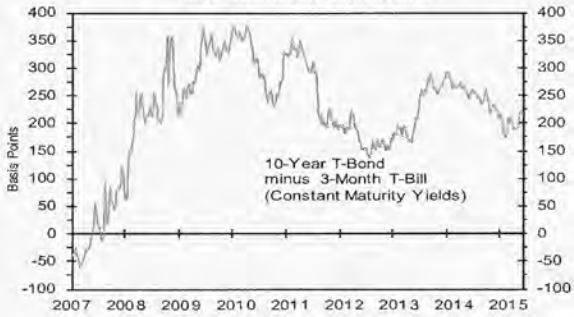
U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average)



Corporate Bond Spreads
As of week ended May 29, 2015



U.S. Treasury Yield Curve
As of week ended May 29, 2015



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 34, No. 6, June 1, 2015

Wolters Kluwer

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Long-Range Estimates:

The table below contains results of our semi-annual long-range CONSENSUS survey. There are also Top 10 and bottom 10 averages for each variable. Shown are estimates for the years 2017 through 2021 and averages for the five-year periods 2017-2021 and 2022-2026. Apply these projections cautiously. Few economic, demographic and political forces can be evaluated accurately over such long time spans.

		Average For The Year					Five-Year Averages	
Interest Rates		**2017**	**2018**	**2019**	**2020**	**2021**	**2017-2021**	**2022-2026**
1. Federal Funds Rate	**CONSENSUS**	**2.5**	**3.3**	**3.5**	**3.6**	**3.7**	**3.3**	**3.5**
	Top 10 Average	3.1	4.0	4.2	4.3	4.2	4.0	4.0
	Bottom 10 Average	1.8	2.5	2.7	2.8	3.0	2.6	2.9
2. Prime Rate	**CONSENSUS**	**5.5**	**6.2**	**6.5**	**6.6**	**6.6**	**6.3**	**6.5**
	Top 10 Average	6.1	7.0	7.3	7.3	7.3	7.0	7.0
	Bottom 10 Average	4.7	5.3	5.6	5.8	5.9	5.5	5.8
3. LIBOR, 3-Mo.	**CONSENSUS**	**2.7**	**3.5**	**3.8**	**3.9**	**3.9**	**3.6**	**3.8**
	Top 10 Average	3.4	4.3	4.6	4.6	4.6	4.3	4.4
	Bottom 10 Average	1.9	2.7	2.9	3.1	3.1	2.7	3.0
4. Commercial Paper, 1-Mo.	**CONSENSUS**	**2.6**	**3.4**	**3.7**	**3.8**	**3.8**	**3.5**	**3.7**
	Top 10 Average	3.2	4.0	4.3	4.3	4.3	4.0	4.0
	Bottom 10 Average	2.1	2.8	3.0	3.2	3.2	2.9	3.3
5. Treasury Bill Yield, 3-Mo.	**CONSENSUS**	**2.4**	**3.1**	**3.4**	**3.5**	**3.5**	**3.2**	**3.4**
	Top 10 Average	3.2	3.9	4.2	4.3	4.2	3.9	4.0
	Bottom 10 Average	1.7	2.3	2.6	2.8	2.9	2.4	2.7
6. Treasury Bill Yield, 6-Mo.	**CONSENSUS**	**2.5**	**3.2**	**3.5**	**3.7**	**3.7**	**3.3**	**3.5**
	Top 10 Average	3.4	4.1	4.4	4.5	4.4	4.1	4.2
	Bottom 10 Average	1.8	2.4	2.7	2.9	3.0	2.6	2.8
7. Treasury Bill Yield, 1-Yr.	**CONSENSUS**	**2.8**	**3.5**	**3.7**	**3.8**	**3.8**	**3.5**	**3.7**
	Top 10 Average	3.6	4.3	4.5	4.6	4.5	4.3	4.4
	Bottom 10 Average	1.9	2.6	2.9	3.0	3.0	2.7	2.9
8. Treasury Note Yield, 2-Yr.	**CONSENSUS**	**3.0**	**3.6**	**3.9**	**4.0**	**4.0**	**3.7**	**3.9**
	Top 10 Average	3.9	4.4	4.7	4.8	4.8	4.5	4.6
	Bottom 10 Average	2.1	2.8	3.0	3.1	3.1	2.8	3.0
10. Treasury Note Yield, 5-Yr.	**CONSENSUS**	**3.4**	**3.9**	**4.1**	**4.3**	**4.3**	**4.0**	**4.2**
	Top 10 Average	4.1	4.7	5.1	5.2	5.2	4.8	5.0
	Bottom 10 Average	2.6	3.0	3.1	3.3	3.3	3.1	3.3
11. Treasury Note Yield, 10-Yr.	**CONSENSUS**	**3.7**	**4.2**	**4.4**	**4.6**	**4.6**	**4.3**	**4.5**
	Top 10 Average	4.5	5.1	5.5	5.7	5.8	5.3	5.6
	Bottom 10 Average	3.0	3.2	3.4	3.5	3.6	3.3	3.5
12. Treasury Bond Yield, 30-Yr.	**CONSENSUS**	**4.3**	**4.7**	**4.9**	**5.1**	**5.1**	**4.8**	**5.0**
	Top 10 Average	5.1	5.7	6.0	6.2	6.2	5.8	6.1
	Bottom 10 Average	3.4	3.7	3.8	4.0	4.0	3.8	3.8
13. Corporate Aaa Bond Yield	**CONSENSUS**	**5.4**	**5.8**	**5.9**	**6.1**	**6.1**	**5.9**	**6.1**
	Top 10 Average	6.0	6.5	6.8	7.0	7.1	6.7	6.9
	Bottom 10 Average	4.8	5.0	5.1	5.2	5.2	5.0	5.3
13. Corporate Baa Bond Yield	**CONSENSUS**	**6.1**	**6.6**	**6.8**	**6.9**	**6.9**	**6.7**	**6.9**
	Top 10 Average	6.9	7.4	7.8	8.0	8.0	7.6	8.0
	Bottom 10 Average	5.4	5.7	5.7	5.8	5.8	5.7	5.9
14. State & Local Bonds Yield	**CONSENSUS**	**4.9**	**5.1**	**5.3**	**5.4**	**5.4**	**5.2**	**5.3**
	Top 10 Average	5.6	5.9	6.1	6.2	6.2	6.0	6.1
	Bottom 10 Average	4.2	4.4	4.4	4.5	4.5	4.4	4.6
15. Home Mortgage Rate	**CONSENSUS**	**5.4**	**5.8**	**6.0**	**6.1**	**6.1**	**5.9**	**6.0**
	Top 10 Average	6.0	6.6	7.0	7.1	7.1	6.8	6.9
	Bottom 10 Average	4.7	4.9	5.0	5.2	5.2	5.0	5.0
A. FRB - Major Currency Index	**CONSENSUS**	**90.0**	**89.8**	**89.1**	**88.5**	**88.1**	**89.1**	**87.9**
	Top 10 Average	93.7	93.8	93.4	92.9	92.7	93.3	92.4
	Bottom 10 Average	86.4	85.8	84.7	84.2	83.5	84.9	83.4
		Year-Over-Year, % Change					Five-Year Averages	
		2017	**2018**	**2019**	**2020**	**2021**	**2017-2021**	**2022-2026**
B. Real GDP	**CONSENSUS**	**2.6**	**2.5**	**2.4**	**2.4**	**2.4**	**2.5**	**2.3**
	Top 10 Average	3.0	2.9	2.8	2.8	2.8	2.9	2.7
	Bottom 10 Average	2.2	2.1	2.0	1.9	2.0	2.0	2.0
C. GDP Chained Price Index	**CONSENSUS**	**2.1**	**2.1**	**2.1**	**2.1**	**2.1**	**2.1**	**2.1**
	Top 10 Average	2.3	2.5	2.4	2.4	2.4	2.4	2.4
	Bottom 10 Average	1.8	1.8	1.9	1.9	1.8	1.8	1.9
D. Consumer Price Index	**CONSENSUS**	**2.4**	**2.4**	**2.3**	**2.3**	**2.3**	**2.3**	**2.3**
	Top 10 Average	2.7	2.7	2.7	2.6	2.5	2.6	2.5
	Bottom 10 Average	2.1	2.1	2.1	2.0	2.1	2.1	2.0

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 34, No. 7, July 1, 2015

Wolters Kluwer

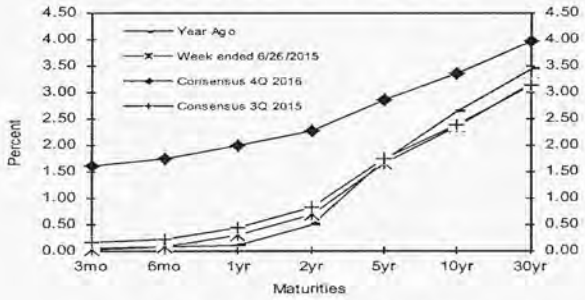
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

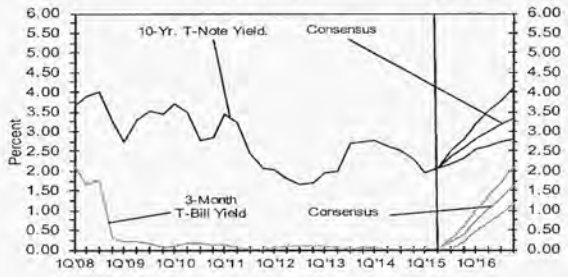
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Q*	3Q	4Q	1Q	2Q	3Q	4Q
Interest Rates	June 26	June 19	June 12	June 5	May	Apr.	Mar.	2Q 2015	2015	2015	2016	2016	2016	2016
Federal Funds Rate	0.13	0.13	0.13	0.10	0.12	0.12	0.11	*0.11*	**0.2**	**0.5**	**0.8**	**1.1**	**1.4**	**1.7**
Prime Rate	3.25	3.25	3.25	3.25	3.25	3.25	3.25	*3.25*	**3.3**	**3.5**	**3.8**	**4.1**	**4.4**	**4.7**
LIBOR, 3-mo.	0.28	0.28	0.28	0.28	0.28	0.28	0.26	*0.27*	**0.4**	**0.7**	**1.0**	**1.3**	**1.7**	**2.0**
Commercial Paper, 1-mo.	0.11	0.01	0.02	0.02	0.02	0.07	0.08	*0.07*	**0.2**	**0.5**	**0.8**	**1.2**	**1.5**	**1.8**
Treasury bill, 3-mo.	0.01	0.01	0.02	0.02	0.02	0.02	0.03	*0.02*	**0.1**	**0.4**	**0.7**	**1.0**	**1.3**	**1.6**
Treasury bill, 6-mo.	0.08	0.09	0.09	0.07	0.08	0.09	0.11	*0.08*	**0.2**	**0.5**	**0.8**	**1.1**	**1.5**	**1.8**
Treasury bill, 1 yr.	0.28	0.27	0.28	0.27	0.24	0.23	0.25	*0.23*	**0.4**	**0.7**	**1.1**	**1.4**	**1.7**	**2.0**
Treasury note, 2 yr.	0.67	0.68	0.73	0.67	0.61	0.54	0.64	*0.62*	**0.8**	**1.1**	**1.4**	**1.7**	**2.0**	**2.3**
Treasury note, 5 yr.	1.66	1.65	1.75	1.65	1.54	1.35	1.52	*1.54*	**1.7**	**2.0**	**2.2**	**2.4**	**2.7**	**2.9**
Treasury note, 10 yr.	2.36	2.32	2.42	2.31	2.20	1.94	2.04	*2.07*	**2.4**	**2.6**	**2.8**	**3.0**	**3.2**	**3.4**
Treasury note, 30 yr.	3.14	3.09	3.14	3.04	2.96	2.59	2.63	*2.71*	**3.1**	**3.3**	**3.5**	**3.7**	**3.8**	**4.0**
Corporate Aaa bond	4.22	4.17	4.20	4.13	3.98	3.52	3.64	*3.75*	**4.1**	**4.3**	**4.5**	**4.7**	**4.9**	**5.1**
Corporate Baa bond	5.17	5.10	5.13	5.04	4.89	4.48	4.54	*4.69*	**5.0**	**5.1**	**5.3**	**5.5**	**5.7**	**5.9**
State & Local bonds	3.80	3.79	3.87	3.81	3.76	3.51	3.59	*3.60*	**3.9**	**4.1**	**4.3**	**4.4**	**4.6**	**4.7**
Home mortgage rate	4.02	4.00	4.04	3.87	3.84	3.67	3.77	*3.80*	**4.0**	**4.3**	**4.5**	**4.7**	**4.9**	**5.1**
	History								Consensus Forecasts-Quarterly					
	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q*	3Q	4Q	1Q	2Q	3Q	4Q
Key Assumptions	2013	2013	2014	2014	2014	2014	2015	*2015*	**2015**	**2015**	**2016**	**2016**	**2016**	**2016**
Major Currency Index	76.7	76.0	77.1	76.6	77.8	82.6	89.4	*89.9*	**90.5**	**91.0**	**91.2**	**91.3**	**91.1**	**90.7**
Real GDP	4.5	3.5	-2.1	4.6	5.0	2.2	-0.2	*2.9*	**3.2**	**3.1**	**2.6**	**2.8**	**2.8**	**2.7**
GDP Price Index	1.7	1.5	1.3	2.1	1.4	0.1	0.0	*1.8*	**1.8**	**1.8**	**1.9**	**2.0**	**2.0**	**2.1**
Consumer Price Index	2.3	1.4	2.1	2.4	1.2	-0.9	-3.1	*2.4*	**2.2**	**2.0**	**2.1**	**2.3**	**2.4**	**2.4**

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS). **Interest rate data for 2Q 2015 based on historical data through the week ended June 26th. *Data for 2Q 2015 Major Currency Index is based on data through week ended June 26th. Figures for 2Q 2015 Real GDP, GDP Chained Price Index and Consumer Price Index are consensus forecasts based on a special question asked of the panelists' this month*

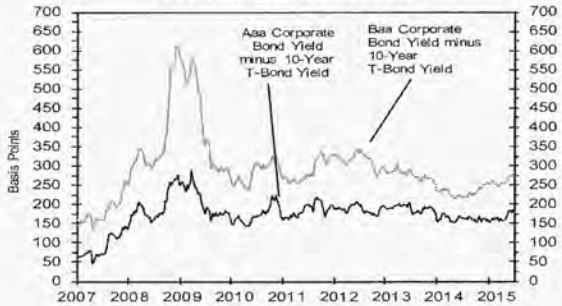
U.S. Treasury Yield Curve
Week ended June 26, 2015 and Year Ago vs.
3Q 2015 and 4Q 2016 Consensus Forecasts



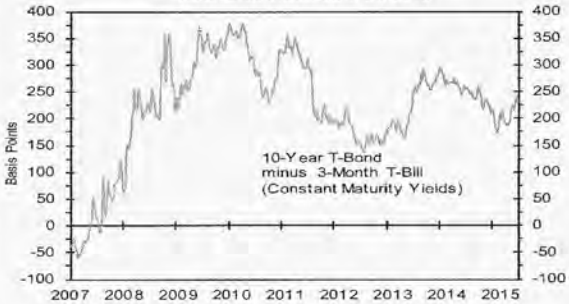
U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average)



Corporate Bond Spreads
As of week ended June 26, 2015



U.S. Treasury Yield Curve
As of week ended June 26, 2015



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 34, No. 8, August 1, 2015

Wolters Kluwer

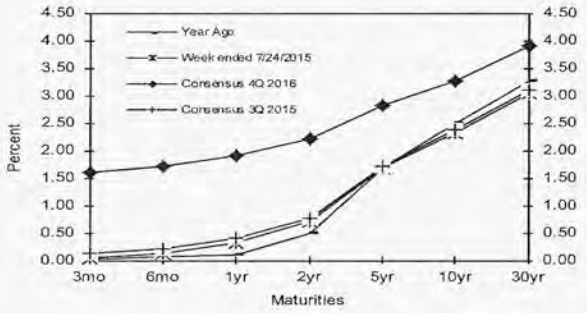
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

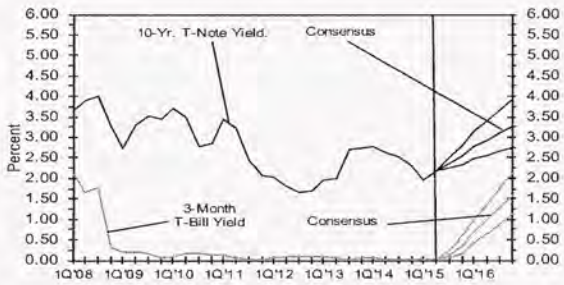
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Q	3Q	4Q	1Q	2Q	3Q	4Q
Interest Rates	July 24	July 17	July 10	July 3	Jun.	May	Apr.	2Q 2015	2015	2015	2016	2016	2016	2016
Federal Funds Rate	0.13	0.13	0.13	0.12	0.13	0.12	0.12	0.12	0.2	0.5	0.7	1.0	1.3	1.6
Prime Rate	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.3	3.5	3.8	4.1	4.4	4.7
LIBOR, 3-mo.	0.30	0.30	0.29	0.28	0.28	0.28	0.28	0.28	0.4	0.6	1.0	1.3	1.6	1.9
Commercial Paper, 1-mo.	0.08	0.08	0.09	0.09	0.09	0.02	0.07	0.06	0.2	0.4	0.8	1.1	1.5	1.8
Treasury bill, 3-mo.	0.04	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.1	0.4	0.7	1.0	1.3	1.6
Treasury bill, 6-mo.	0.13	0.10	0.08	0.11	0.09	0.08	0.09	0.09	0.2	0.5	0.8	1.1	1.4	1.7
Treasury bill, 1 yr.	0.33	0.28	0.26	0.27	0.28	0.24	0.23	0.25	0.4	0.7	1.0	1.3	1.6	1.9
Treasury note, 2 yr.	0.72	0.67	0.60	0.65	0.69	0.61	0.54	0.61	0.8	1.1	1.4	1.7	1.9	2.2
Treasury note, 5 yr.	1.68	1.67	1.57	1.65	1.68	1.54	1.35	1.52	1.7	1.9	2.2	2.4	2.6	2.8
Treasury note, 10 yr.	2.32	2.38	2.31	2.38	2.36	2.20	1.94	2.17	2.4	2.6	2.8	2.9	3.1	3.3
Treasury note, 30 yr.	3.03	3.15	3.08	3.15	3.11	2.96	2.59	2.89	3.1	3.3	3.4	3.6	3.8	3.9
Corporate Aaa bond	4.13	4.22	4.15	4.23	4.19	3.98	3.52	3.90	4.1	4.3	4.5	4.7	4.8	5.0
Corporate Baa bond	5.18	5.27	5.17	5.22	5.13	4.89	4.48	4.83	5.1	5.2	5.4	5.5	5.7	5.8
State & Local bonds	3.75	3.82	3.76	3.85	3.82	3.76	3.51	3.70	3.8	4.0	4.2	4.4	4.5	4.6
Home mortgage rate	4.04	4.09	4.04	4.08	3.98	3.84	3.67	3.83	4.1	4.3	4.5	4.7	4.9	5.1
	History								Consensus Forecasts-Quarterly					
	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Key Assumptions	2013	2013	2014	2014	2014	2014	2015	2015	2015	2015	2016	2016	2016	2016
Major Currency Index	76.7	76.0	77.1	76.6	77.8	82.6	89.4	89.9	91.4	92.3	92.6	92.6	92.6	92.4
Real GDP	3.0	3.8	-0.9	4.6	4.3	2.1	0.6	2.3	3.1	3.0	2.6	2.7	2.7	2.7
GDP Price Index	2.0	1.8	1.5	2.2	1.6	0.1	0.1	2.0	1.8	1.7	1.9	2.0	2.0	2.1
Consumer Price Index	2.3	1.4	2.1	2.4	1.2	-0.9	-3.1	3.0	2.0	1.9	2.1	2.3	2.4	2.4

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).

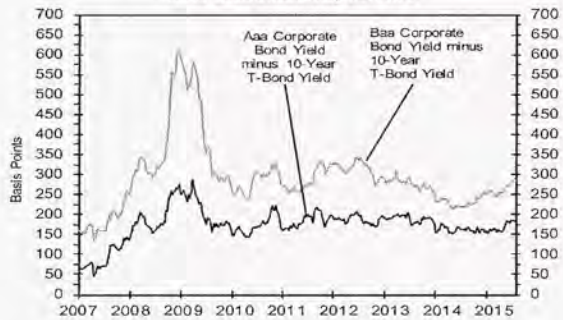
U.S. Treasury Yield Curve
Week ended July 24, 2015 and Year Ago vs.
3Q 2015 and 4Q 2016 Consensus Forecasts



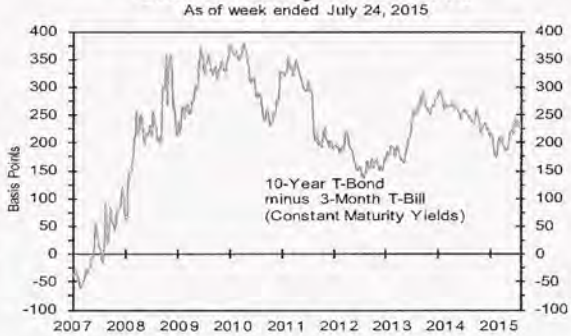
U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average) Forecast



Corporate Bond Spreads
As of week ended July 24, 2015



U.S. Treasury Yield Curve
As of week ended July 24, 2015



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 34, No. 9, September 1, 2015

Wolters Kluwer

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

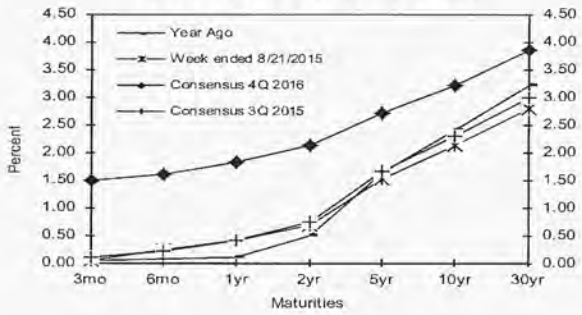
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Q	3Q	4Q	1Q	2Q	3Q	4Q
Interest Rates	Aug. 21	Aug. 14	Aug. 7	July 31	Jun.	May	Apr.	2Q 2015	2015	2015	2016	2016	2016	2016
Federal Funds Rate	0.15	0.14	0.11	0.13	0.13	0.13	0.12	0.12	0.2	0.4	0.7	0.9	1.2	1.5
Prime Rate	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.3	3.4	3.7	4.0	4.2	4.5
LIBOR, 3-mo.	0.33	0.33	0.32	0.32	0.29	0.28	0.28	0.28	0.4	0.6	0.9	1.2	1.5	1.8
Commercial Paper, 1-mo.	0.11	0.10	0.08	0.08	0.08	0.09	0.02	0.06	0.2	0.4	0.7	1.0	1.3	1.7
Treasury bill, 3-mo.	0.05	0.10	0.07	0.06	0.03	0.02	0.02	0.02	0.1	0.4	0.6	0.9	1.2	1.5
Treasury bill, 6-mo.	0.23	0.24	0.19	0.14	0.12	0.09	0.08	0.09	0.2	0.4	0.7	1.0	1.3	1.6
Treasury bill, 1 yr.	0.39	0.39	0.36	0.33	0.30	0.28	0.24	0.25	0.4	0.6	0.9	1.2	1.5	1.8
Treasury note, 2 yr.	0.69	0.71	0.72	0.69	0.67	0.69	0.61	0.61	0.7	1.0	1.3	1.6	1.9	2.1
Treasury note, 5 yr.	1.52	1.57	1.60	1.59	1.63	1.68	1.54	1.52	1.6	1.8	2.1	2.3	2.5	2.7
Treasury note, 10 yr.	2.12	2.18	2.22	2.25	2.32	2.36	2.20	2.17	2.3	2.5	2.6	2.8	3.0	3.2
Treasury note, 30 yr.	2.80	2.85	2.89	2.95	3.07	3.11	2.96	2.89	3.0	3.1	3.3	3.5	3.7	3.8
Corporate Aaa bond	3.99	4.02	4.02	4.06	4.15	4.19	3.98	3.90	4.1	4.2	4.4	4.6	4.7	4.9
Corporate Baa bond	5.16	5.14	5.12	5.16	5.20	5.13	4.89	4.83	5.1	5.2	5.4	5.5	5.7	5.8
State & Local bonds	3.73	3.69	3.75	3.75	3.79	3.82	3.76	3.70	3.8	3.9	4.1	4.2	4.4	4.5
Home mortgage rate	3.93	3.94	3.91	3.98	4.05	3.98	3.84	3.83	4.0	4.2	4.4	4.6	4.8	5.0
	History								Consensus Forecasts-Quarterly					
	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Key Assumptions	2013	2013	2014	2014	2014	2014	2015	2015	2015	2015	2016	2016	2016	2016
Major Currency Index	76.7	76.0	77.1	76.6	77.8	82.6	89.4	89.9	91.5	92.5	92.8	93.0	93.1	93.2
Real GDP	3.0	3.8	-0.9	4.6	4.3	2.1	0.6	3.7	2.7	2.8	2.7	2.8	2.7	2.6
GDP Price Index	2.0	1.8	1.5	2.2	1.6	0.1	0.1	2.1	1.7	1.6	1.9	2.0	2.0	2.1
Consumer Price Index	2.3	1.4	2.1	2.4	1.2	-0.9	-3.1	3.0	1.8	1.4	2.0	2.3	2.3	2.3

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).

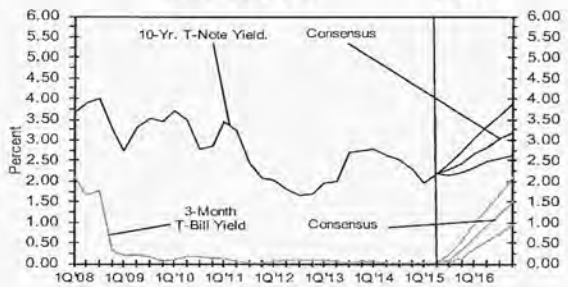
U.S. Treasury Yield Curve

Week ended August 21, 2015 and Year Ago vs. 3Q 2015 and 4Q 2016 Consensus Forecasts



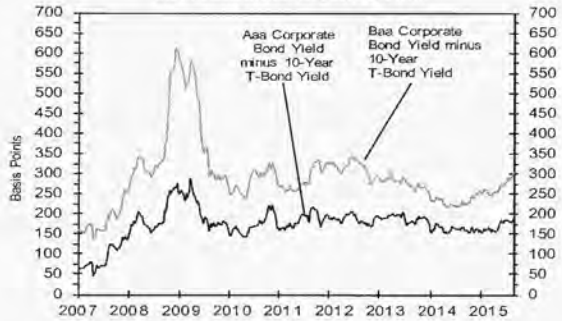
U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield

(Quarterly Average) Forecast



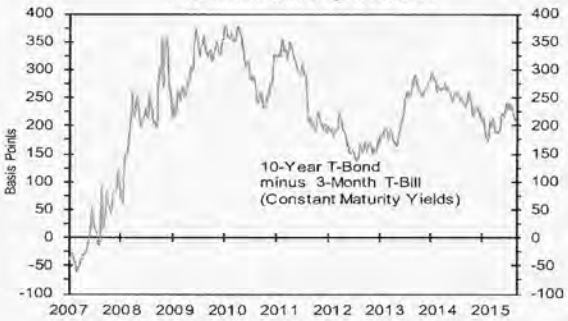
Corporate Bond Spreads

As of week ended August 21, 2015



U.S. Treasury Yield Curve

As of week ended August 21, 2015



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 34, No. 10, October 1, 2015

Wolters Kluwer

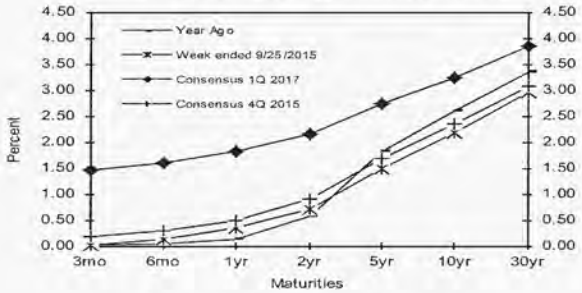
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

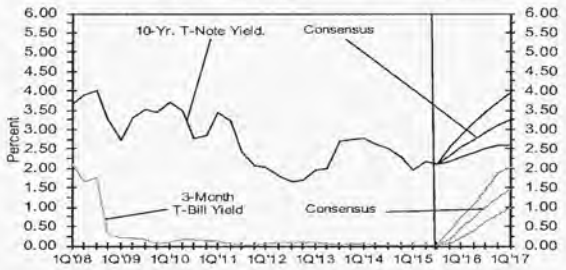
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Q*	4Q	1Q	2Q	3Q	4Q	1Q
Interest Rates	Sep. 25	Sep. 18	Sep. 11	Sep. 4	Aug.	Jul.	Jun.	3Q 2015	2015	2015	2016	2016	2016	2017
Federal Funds Rate	0.14	0.14	0.14	0.13	0.14	0.13	0.13	*0.13*	0.2	0.5	0.8	1.1	1.3	1.6
Prime Rate	3.25	3.25	3.25	3.25	3.25	3.25	3.25	*3.25*	3.3	3.6	3.8	4.1	4.4	4.6
LIBOR, 3-mo.	0.33	0.34	0.33	0.33	0.32	0.29	0.28	*0.30*	0.5	0.7	1.0	1.3	1.6	1.9
Commercial Paper, 1-mo.	0.13	0.15	0.14	0.12	0.10	0.08	0.09	*0.08*	0.3	0.6	0.8	1.1	1.4	1.8
Treasury bill, 3-mo.	0.01	0.02	0.04	0.04	0.07	0.03	0.02	*0.02*	0.2	0.4	0.7	1.0	1.3	1.5
Treasury bill, 6-mo.	0.11	0.21	0.26	0.25	0.22	0.12	0.09	*0.12*	0.3	0.5	0.8	1.1	1.4	1.6
Treasury bill, 1 yr.	0.36	0.41	0.39	0.37	0.38	0.30	0.28	*0.29*	0.5	0.8	1.1	1.3	1.6	1.8
Treasury note, 2 yr.	0.70	0.75	0.74	0.72	0.70	0.67	0.69	*0.63*	0.9	1.2	1.4	1.7	1.9	2.2
Treasury note, 5 yr.	1.47	1.54	1.53	1.50	1.54	1.63	1.68	*1.47*	1.7	1.9	2.1	2.3	2.6	2.7
Treasury note, 10 yr.	2.17	2.22	2.21	2.18	2.17	2.32	2.36	*2.11*	2.3	2.5	2.7	2.9	3.1	3.2
Treasury note, 30 yr.	2.97	3.01	2.97	2.94	2.86	3.07	3.11	*2.84*	3.1	3.2	3.4	3.6	3.7	3.9
Corporate Aaa bond	4.04	4.10	4.09	4.12	4.04	4.15	4.19	*3.86*	4.2	4.4	4.5	4.7	4.9	5.0
Corporate Baa bond	5.33	5.37	5.33	5.34	5.19	5.20	5.13	*4.90*	5.2	5.4	5.5	5.7	5.8	6.0
State & Local bonds	3.71	3.78	3.82	3.82	3.74	3.79	3.82	*3.68*	3.8	4.0	4.2	4.3	4.5	4.6
Home mortgage rate	3.86	3.91	3.90	3.89	3.91	4.05	3.98	*3.80*	4.0	4.3	4.5	4.7	4.9	5.0
	History								Consensus Forecasts-Quarterly					
	4Q	1Q	2Q	3Q	4Q	1Q	2Q	*3Q**	4Q	1Q	2Q	3Q	4Q	1Q
Key Assumptions	2013	2014	2014	2014	2014	2015	2015	*2015*	2015	2015	2016	2016	2016	2017
Major Currency Index	76.0	77.1	76.6	77.8	82.6	89.4	89.9	*91.56*	92.4	92.9	93.1	93.1	92.9	92.1
Real GDP	3.8	-0.9	4.6	4.3	2.1	0.6	3.9	*2.4*	2.8	2.6	2.7	2.7	2.6	2.5
GDP Price Index	1.8	1.5	2.2	1.6	0.1	0.1	2.1	*1.6*	1.5	1.8	1.9	2.0	2.0	2.1
Consumer Price Index	1.4	2.1	2.4	1.2	-0.9	-3.1	3.0	*1.4*	1.3	2.0	2.1	2.3	2.4	2.3

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS). **Interest rate data for 3Q 2015 based on historical data through the week ended September 25th. *Data for 3Q 2015 Major Currency Index is based on data through week ended September18th. Figures for 3Q 2015 Real GDP, GDP Chained Price Index and Consumer Price Index are consensus forecasts based on a special question asked of the panelists' this month*

U.S. Treasury Yield Curve
Week ended September 25, 2015 and Year Ago vs.
4Q 2015 and 1Q 2017 Consensus Forecasts

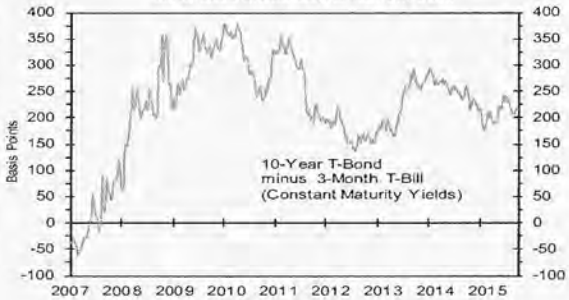


U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average) Forecast



Corporate Bond Spreads
As of week ended September 25, 2015

U.S. Treasury Yield Curve
As of week ended September 25, 2015



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 34, No. 11, November 1, 2015

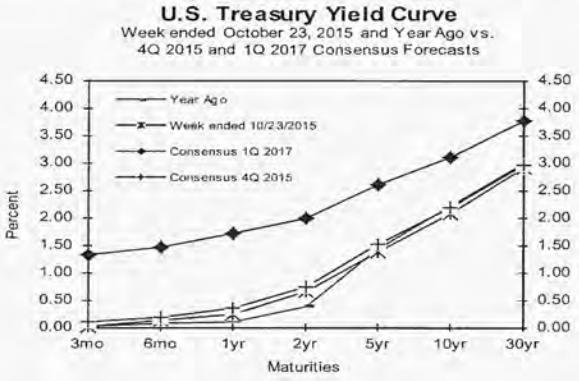
Wolters Kluwer

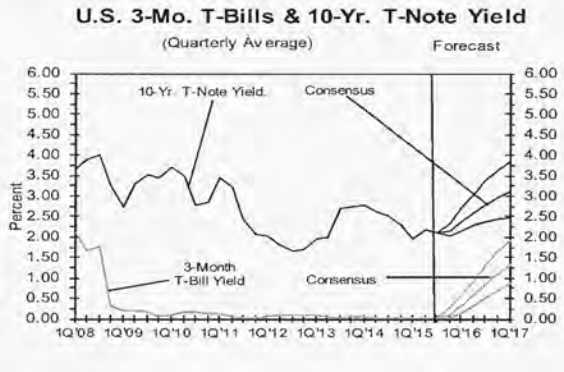
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

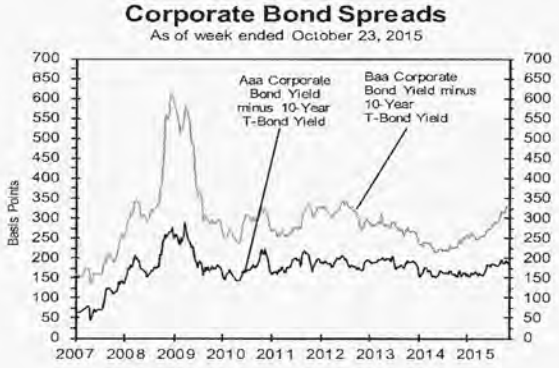
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

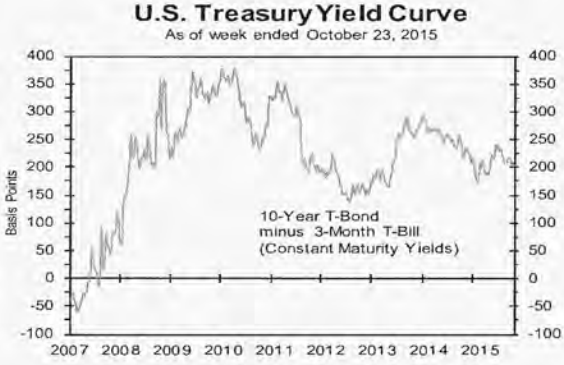
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Q	4Q	1Q	2Q	3Q	4Q	1Q
Interest Rates	Oct. 23	Oct. 16	Oct. 9	Oct. 2	Sep.	Aug.	Jul.	3Q 2015	2015	2016	2016	2016	2016	2017
Federal Funds Rate	0.13	0.13	0.13	0.12	0.14	0.14	0.13	0.13	0.2	0.4	0.6	0.9	1.2	1.4
Prime Rate	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.3	3.5	3.7	3.9	4.2	4.4
LIBOR, 3-mo.	0.32	0.32	0.32	0.32	0.32	0.32	0.29	0.30	0.4	0.6	0.9	1.2	1.4	1.7
Commercial Paper, 1-mo.	0.12	0.11	0.11	0.11	0.13	0.10	0.08	0.08	0.2	0.4	0.7	0.9	1.2	1.5
Treasury bill, 3-mo.	0.01	0.01	0.00	0.00	0.02	0.07	0.03	0.02	0.1	0.3	0.6	0.8	1.1	1.3
Treasury bill, 6-mo.	0.12	0.08	0.07	0.08	0.18	0.22	0.12	0.12	0.2	0.4	0.7	1.0	1.2	1.5
Treasury bill, 1 yr.	0.23	0.23	0.27	0.31	0.37	0.38	0.30	0.29	0.4	0.6	0.9	1.2	1.5	1.7
Treasury note, 2 yr.	0.64	0.61	0.63	0.63	0.71	0.70	0.67	0.63	0.7	1.0	1.3	1.5	1.8	2.0
Treasury note, 5 yr.	1.38	1.34	1.37	1.36	1.49	1.54	1.63	1.47	1.5	1.8	2.0	2.2	2.4	2.6
Treasury note, 10 yr.	2.06	2.03	2.09	2.05	2.17	2.17	2.32	2.11	2.2	2.4	2.6	2.8	3.0	3.1
Treasury note, 30 yr.	2.89	2.87	2.91	2.85	2.95	2.86	3.07	2.84	2.9	3.1	3.3	3.5	3.6	3.8
Corporate Aaa bond	3.92	3.92	4.01	3.98	4.07	4.04	4.15	3.86	4.0	4.2	4.4	4.6	4.7	4.9
Corporate Baa bond	5.33	5.32	5.38	5.33	5.34	5.19	5.20	4.90	5.2	5.3	5.4	5.6	5.7	5.8
State & Local bonds	3.67	3.68	3.68	3.67	3.78	3.74	3.79	3.68	3.7	3.9	4.1	4.2	4.4	4.5
Home mortgage rate	3.79	3.82	3.76	3.85	3.89	3.91	4.05	3.80	3.9	4.1	4.3	4.5	4.7	4.9
	History								Consensus Forecasts-Quarterly					
	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q
Key Assumptions	2013	2014	2014	2014	2014	2015	2015	2015	2015	2016	2016	2016	2016	2017
Major Currency Index	76.0	77.1	76.6	77.8	82.6	89.4	89.9	91.8	91.7	91.9	92.3	92.2	91.8	90.7
Real GDP	3.8	-0.9	4.6	4.3	2.1	0.6	3.9	1.5	2.6	2.5	2.7	2.6	2.6	2.5
GDP Price Index	1.8	1.5	2.2	1.6	0.1	0.1	2.1	1.2	1.4	1.8	1.9	2.0	2.0	2.1
Consumer Price Index	1.4	2.1	2.4	1.2	-0.9	-3.1	3.0	1.6	1.0	1.9	2.3	2.2	2.3	2.3

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).









20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 34, No. 12, December 1, 2015

Wolters Kluwer

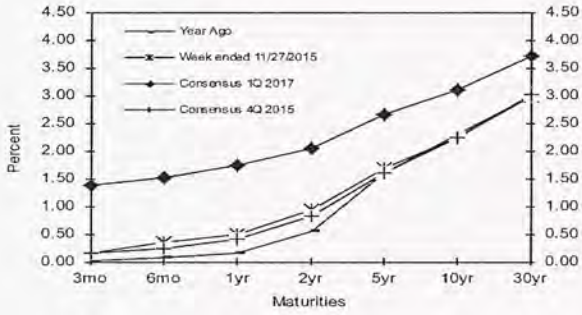
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

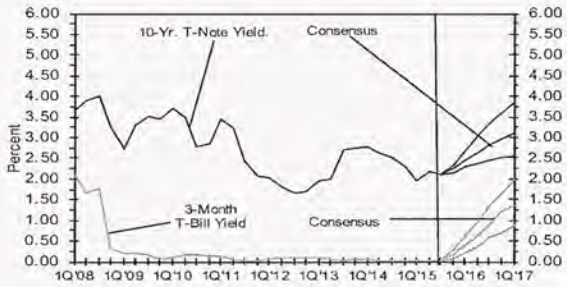
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Q	4Q	1Q	2Q	3Q	4Q	1Q
Interest Rates	Nov. 27	Nov. 20	Nov. 13	Nov. 6	Oct.	Sep.	Aug.	3Q 2015	2015	2016	2016	2016	2016	2017
Federal Funds Rate	0.12	0.12	0.12	0.10	0.12	0.14	0.14	0.13	0.2	0.5	0.7	0.9	1.2	1.4
Prime Rate	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.3	3.5	3.7	4.0	4.2	4.5
LIBOR, 3-mo.	0.39	0.36	0.35	0.35	0.34	0.32	0.32	0.30	0.4	0.7	0.9	1.2	1.4	1.7
Commercial Paper, 1-mo.	0.12	0.10	0.10	0.10	0.11	0.13	0.10	0.08	0.2	0.4	0.7	1.0	1.2	1.5
Treasury bill, 3-mo.	0.14	0.13	0.14	0.06	0.02	0.02	0.07	0.02	0.1	0.4	0.6	0.9	1.1	1.4
Treasury bill, 6-mo.	0.34	0.32	0.34	0.28	0.11	0.18	0.22	0.12	0.2	0.5	0.7	1.0	1.3	1.5
Treasury bill, 1 yr.	0.50	0.49	0.50	0.41	0.26	0.37	0.38	0.29	0.4	0.7	1.0	1.3	1.5	1.7
Treasury note, 2 yr.	0.93	0.90	0.88	0.83	0.64	0.71	0.70	0.63	0.8	1.1	1.3	1.6	1.8	2.0
Treasury note, 5 yr.	1.68	1.68	1.72	1.64	1.39	1.49	1.54	1.47	1.6	1.9	2.0	2.3	2.4	2.6
Treasury note, 10 yr.	2.24	2.26	2.32	2.26	2.07	2.17	2.17	2.11	2.2	2.4	2.6	2.8	3.0	3.1
Treasury note, 30 yr.	3.00	3.03	3.09	3.01	2.89	2.95	2.86	2.84	3.0	3.2	3.3	3.5	3.6	3.7
Corporate Aaa bond	4.03	4.07	4.11	4.05	3.95	4.07	4.04	3.86	4.0	4.2	4.4	4.6	4.8	4.9
Corporate Baa bond	5.45	5.47	5.50	5.43	5.34	5.34	5.19	4.90	5.3	5.4	5.5	5.7	5.8	5.9
State & Local bonds	3.65	3.65	3.74	3.69	3.67	3.78	3.74	3.68	3.7	3.9	4.1	4.3	4.4	4.5
Home mortgage rate	3.95	3.97	3.98	3.87	3.80	3.89	3.91	3.80	4.0	4.2	4.4	4.6	4.7	4.9
	History								Consensus Forecasts-Quarterly					
	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q
Key Assumptions	2013	2014	2014	2014	2014	2015	2015	2015	2015	2016	2016	2016	2016	2017
Major Currency Index	76.0	77.1	76.6	77.8	82.6	89.4	89.9	91.8	92.8	93.4	93.9	94.0	93.9	93.2
Real GDP	3.8	-0.9	4.6	4.3	2.1	0.6	3.9	2.1	2.5	2.5	2.7	2.6	2.6	2.5
GDP Price Index	1.8	1.5	2.2	1.6	0.1	0.1	2.1	1.3	1.3	1.8	2.0	2.0	2.0	2.1
Consumer Price Index	1.4	2.1	2.4	1.2	-0.9	-3.1	3.0	1.6	0.8	1.7	2.3	2.2	2.4	2.2

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).

U.S. Treasury Yield Curve
Week ended November 27, 2015 and Year Ago vs.
4Q 2015 and 1Q 2017 Consensus Forecasts

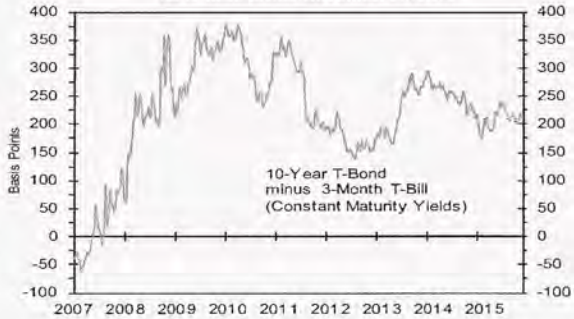


U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average) Forecast



Corporate Bond Spreads
As of week ended November 27, 2015

U.S. Treasury Yield Curve
As of week ended November 27, 2015



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 34, No. 12, December 1, 2015

Wolters Kluwer

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Long-Range Estimates:

The table below contains the results of our twice-annual long-range CONSENSUS survey. There are also Top 10 and Bottom 10 averages for each variable. Shown are consensus estimates for the years 2017 through 2021 and averages for the five-year periods 2017-2021 and 2022-2026. Apply these projections cautiously. Few if any economic, demographic and political forces can be evaluated accurately over such long time spans.

		Average For The Year					Five-Year Averages	
Interest Rates		**2017**	**2018**	**2019**	**2020**	**2021**	**2017-2021**	**2022-2026**
1. Federal Funds Rate	**CONSENSUS**	**2.0**	**2.8**	**3.2**	**3.3**	**3.4**	**2.9**	**3.3**
	Top 10 Average	2.7	3.6	4.0	4.0	4.0	3.7	3.8
	Bottom 10 Average	1.4	2.1	2.3	2.4	2.7	2.2	2.7
2. Prime Rate	**CONSENSUS**	**5.0**	**5.8**	**6.2**	**6.4**	**6.4**	**6.0**	**6.3**
	Top 10 Average	5.7	6.5	7.0	7.1	7.0	6.7	6.8
	Bottom 10 Average	4.4	5.2	5.5	5.7	5.8	5.3	5.7
3. LIBOR, 3-Mo.	**CONSENSUS**	**2.3**	**3.1**	**3.3**	**3.4**	**3.6**	**3.1**	**3.5**
	Top 10 Average	2.8	3.7	4.0	4.2	4.1	3.8	4.0
	Bottom 10 Average	1.8	2.4	2.6	2.7	3.0	2.5	3.0
4. Commercial Paper, 1-Mo.	**CONSENSUS**	**2.2**	**3.0**	**3.4**	**3.5**	**3.4**	**3.1**	**3.4**
	Top 10 Average	2.6	3.5	3.9	4.1	4.0	3.6	3.8
	Bottom 10 Average	1.7	2.4	2.9	2.9	2.9	2.6	2.9
5. Treasury Bill Yield, 3-Mo.	**CONSENSUS**	**2.0**	**2.8**	**3.2**	**3.3**	**3.3**	**2.9**	**3.2**
	Top 10 Average	2.8	3.5	3.9	4.0	3.9	3.6	3.7
	Bottom 10 Average	1.4	2.1	2.5	2.7	2.7	2.3	2.6
6. Treasury Bill Yield, 6-Mo.	**CONSENSUS**	**2.1**	**2.9**	**3.3**	**3.4**	**3.4**	**3.0**	**3.3**
	Top 10 Average	3.0	3.6	4.0	4.1	4.0	3.7	3.8
	Bottom 10 Average	1.5	2.2	2.6	2.8	2.8	2.4	2.7
7. Treasury Bill Yield, 1-Yr.	**CONSENSUS**	**2.3**	**3.1**	**3.4**	**3.5**	**3.5**	**3.2**	**3.4**
	Top 10 Average	3.2	3.8	4.1	4.2	4.2	3.9	4.0
	Bottom 10 Average	1.6	2.3	2.7	2.9	2.9	2.5	2.8
8. Treasury Note Yield, 2-Yr.	**CONSENSUS**	**2.5**	**3.2**	**3.5**	**3.6**	**3.7**	**3.3**	**3.7**
	Top 10 Average	3.4	4.0	4.4	4.4	4.4	4.1	4.3
	Bottom 10 Average	1.8	2.4	2.6	2.7	3.0	2.5	3.0
10. Treasury Note Yield, 5-Yr.	**CONSENSUS**	**3.0**	**3.6**	**3.8**	**3.9**	**4.0**	**3.6**	**4.0**
	Top 10 Average	3.8	4.4	4.7	4.8	4.8	4.5	4.7
	Bottom 10 Average	2.3	2.7	2.8	2.9	3.2	2.8	3.3
11. Treasury Note Yield, 10-Yr.	**CONSENSUS**	**3.4**	**3.8**	**4.1**	**4.2**	**4.3**	**4.0**	**4.3**
	Top 10 Average	4.2	4.7	5.0	5.2	5.2	4.9	5.1
	Bottom 10 Average	2.8	2.9	3.0	3.2	3.5	3.1	3.5
12. Treasury Bond Yield, 30-Yr.	**CONSENSUS**	**4.0**	**4.4**	**4.6**	**4.8**	**4.9**	**4.5**	**4.8**
	Top 10 Average	4.9	5.3	5.7	5.9	5.9	5.5	5.7
	Bottom 10 Average	3.3	3.6	3.5	3.7	3.9	3.6	3.9
13. Corporate Aaa Bond Yield	**CONSENSUS**	**5.1**	**5.5**	**5.7**	**5.8**	**5.8**	**5.6**	**5.8**
	Top 10 Average	5.7	6.2	6.5	6.6	6.6	6.3	6.5
	Bottom 10 Average	4.5	4.9	5.0	5.0	4.9	4.9	5.2
13. Corporate Baa Bond Yield	**CONSENSUS**	**6.0**	**6.5**	**6.7**	**6.8**	**6.7**	**6.5**	**6.8**
	Top 10 Average	6.8	7.2	7.6	7.7	7.6	7.4	7.5
	Bottom 10 Average	5.2	5.7	5.9	6.0	5.8	5.7	6.0
14. State & Local Bonds Yield	**CONSENSUS**	**4.5**	**4.9**	**5.0**	**5.1**	**5.1**	**4.9**	**5.1**
	Top 10 Average	5.0	5.5	5.7	5.8	5.8	5.6	5.8
	Bottom 10 Average	4.0	4.3	4.3	4.4	4.4	4.3	4.4
15. Home Mortgage Rate	**CONSENSUS**	**5.1**	**5.6**	**5.8**	**5.9**	**6.0**	**5.7**	**6.0**
	Top 10 Average	5.8	6.3	6.7	6.8	6.8	6.5	6.7
	Bottom 10 Average	4.4	4.8	4.9	5.0	5.1	4.9	5.2
A. FRB - Major Currency Index	**CONSENSUS**	**92.8**	**91.7**	**91.2**	**90.8**	**91.1**	**91.5**	**90.1**
	Top 10 Average	96.9	96.6	96.4	96.4	96.4	96.5	96.0
	Bottom 10 Average	88.4	86.6	85.7	85.1	85.7	86.3	84.2
		Year-Over-Year, % Change					Five-Year Averages	
		2017	**2018**	**2019**	**2020**	**2021**	**2017-2021**	**2022-2026**
B. Real GDP	**CONSENSUS**	**2.5**	**2.4**	**2.2**	**2.2**	**2.3**	**2.3**	**2.2**
	Top 10 Average	2.9	2.8	2.6	2.6	2.6	2.7	2.5
	Bottom 10 Average	2.2	1.8	1.8	1.9	1.9	1.9	2.0
C. GDP Chained Price Index	**CONSENSUS**	**2.1**	**2.1**	**2.1**	**2.1**	**2.1**	**2.1**	**2.0**
	Top 10 Average	2.3	2.5	2.4	2.3	2.2	2.3	2.2
	Bottom 10 Average	1.8	1.8	1.9	1.9	1.9	1.9	1.9
D. Consumer Price Index	**CONSENSUS**	**2.3**	**2.4**	**2.3**	**2.3**	**2.3**	**2.3**	**2.2**
	Top 10 Average	2.8	2.8	2.7	2.6	2.5	2.7	2.5
	Bottom 10 Average	2.0	2.0	2.0	2.0	2.1	2.0	2.0

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 35, No. 1, January 1, 2016

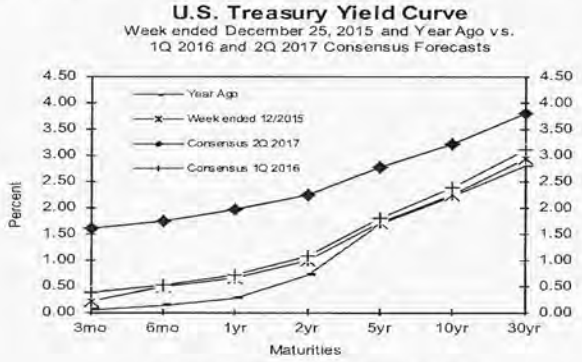
Wolters Kluwer

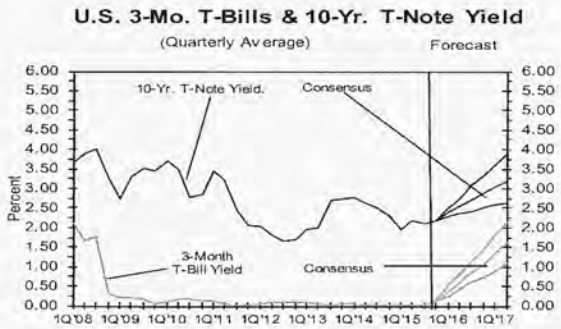
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

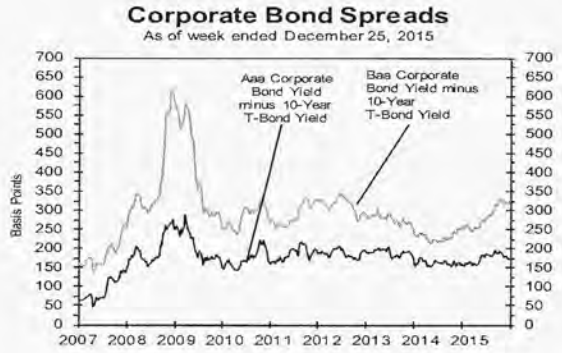
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

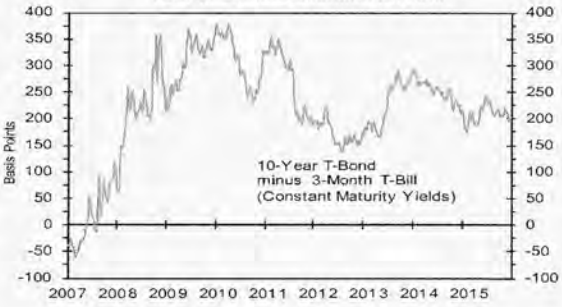
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Q*	1Q	2Q	3Q	4Q	1Q	2Q
Interest Rates	Dec. 25	Dec. 18	Dec. 11	Dec. 4	Nov.	Oct.	Sep.	4Q 2015	2016	2016	2016	2016	2017	2017
Federal Funds Rate	0.36	0.14	0.13	0.12	0.12	0.12	0.14	*0.15*	0.4	0.7	0.9	1.1	1.4	1.7
Prime Rate	3.50	3.25	3.25	3.25	3.25	3.25	3.25	*3.28*	3.5	3.7	3.9	4.2	4.4	4.7
LIBOR, 3-mo.	0.58	0.52	0.46	0.42	0.39	0.34	0.32	*0.42*	0.7	0.9	1.1	1.4	1.6	1.9
Commercial Paper, 1-mo.	0.35	0.35	0.26	0.16	0.11	0.11	0.13	*0.18*	0.4	0.7	0.9	1.2	1.4	1.7
Treasury bill, 3-mo.	0.21	0.24	0.26	0.22	0.13	0.02	0.02	*0.13*	0.4	0.6	0.8	1.1	1.3	1.6
Treasury bill, 6-mo.	0.48	0.51	0.55	0.44	0.33	0.11	0.18	*0.32*	0.5	0.7	1.0	1.2	1.4	1.7
Treasury bill, 1 yr.	0.66	0.69	0.71	0.54	0.48	0.26	0.37	*0.48*	0.7	0.9	1.2	1.4	1.7	1.9
Treasury note, 2 yr.	0.99	0.99	0.93	0.94	0.88	0.64	0.71	*0.83*	1.1	1.3	1.5	1.7	2.0	2.2
Treasury note, 5 yr.	1.70	1.70	1.65	1.66	1.67	1.39	1.49	*1.58*	1.8	2.0	2.2	2.4	2.6	2.8
Treasury note, 10 yr.	2.23	2.25	2.21	2.23	2.26	2.07	2.17	*2.19*	2.4	2.6	2.7	2.9	3.0	3.2
Treasury note, 30 yr.	2.94	2.96	2.95	2.98	3.03	2.89	2.95	*2.96*	3.1	3.2	3.4	3.5	3.7	3.8
Corporate Aaa bond	3.95	3.97	3.95	3.97	4.06	3.95	4.07	*3.99*	4.1	4.3	4.4	4.7	4.8	4.9
Corporate Baa bond	5.48	5.47	5.40	5.41	5.46	5.34	5.34	*5.42*	5.4	5.6	5.7	5.9	6.0	6.1
State & Local bonds	na	3.57	3.57	3.57	3.68	3.67	3.78	*3.64*	3.8	3.9	4.1	4.2	4.4	4.5
Home mortgage rate	na	3.97	3.95	3.93	3.94	3.80	3.89	*3.90*	4.1	4.3	4.5	4.7	4.8	5.0
	History								Consensus Forecasts-Quarterly					
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q*	1Q	2Q	3Q	4Q	1Q	2Q
Key Assumptions	2014	2014	2014	2014	2015	2015	2015	2015	2016	2016	2016	2016	2017	2017
Major Currency Index	77.1	76.6	77.8	82.6	89.4	89.9	91.8	*94.1*	94.0	94.7	94.9	94.8	94.5	94.1
Real GDP	-0.9	4.6	4.3	2.1	0.6	3.9	2.1	*2.0*	2.5	2.6	2.6	2.5	2.4	2.5
GDP Price Index	1.5	2.2	1.6	0.1	0.1	2.1	1.3	*1.1*	1.7	1.9	1.9	2.0	2.0	2.1
Consumer Price Index	2.1	2.4	1.2	-0.9	-3.1	3.0	1.6	*0.6*	1.3	2.2	2.3	2.3	2.2	2.4

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS). **Interest rate data for 4Q 2015 based on historical data through the week ended December 25th. *Data for 4Q 2015 Major Currency Index is based on data through week ended December 18th Figures for 4Q 2015 Real GDP, GDP Chained Price Index and Consumer Price Index are consensus forecasts based on a special question asked of the panelists' this month.*









20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 35, No. 2, February 1, 2016

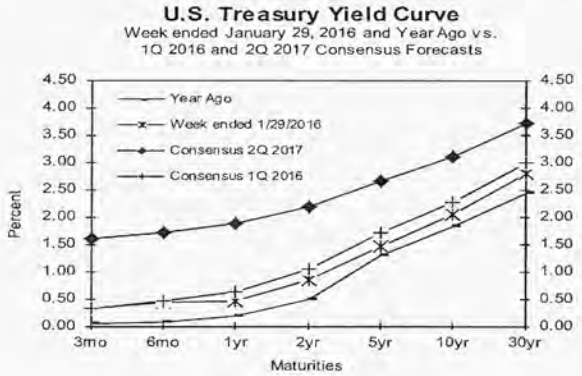
Wolters Kluwer

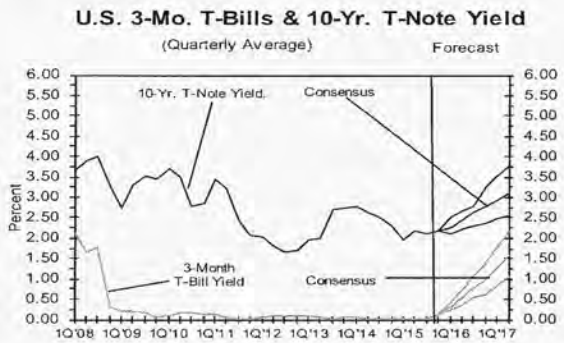
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

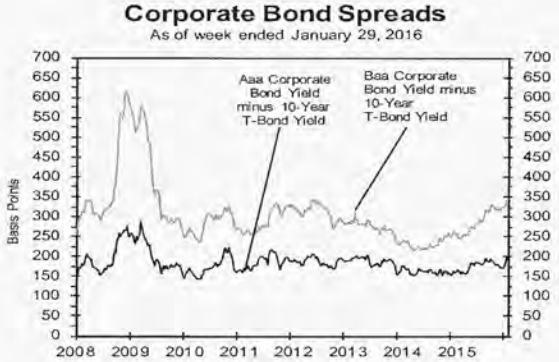
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

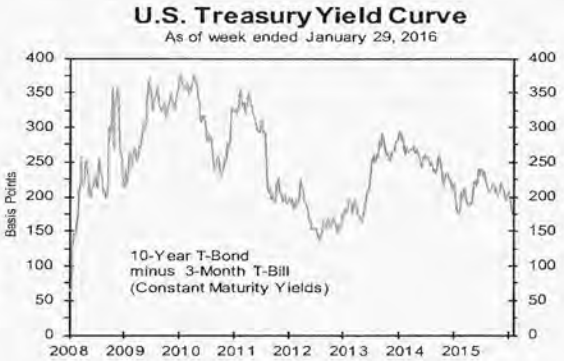
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	1Q	2Q	3Q	4Q	1Q	2Q
Interest Rates	Jan. 29	Jan. 22	Jan. 15	Jan. 8	Dec.	Nov.	Oct.	4Q2015	2016	2016	2016	2016	2017	2017
Federal Funds Rate	0.38	0.36	0.36	0.27	0.16	0.12	0.12	0.16	0.4	0.6	0.9	1.1	1.3	1.6
Prime Rate	3.50	3.50	3.50	3.50	3.29	3.25	3.25	3.29	3.5	3.7	3.9	4.1	4.4	4.7
LIBOR, 3-mo.	0.62	0.62	0.62	0.61	0.41	0.37	0.32	0.41	0.7	0.9	1.1	1.3	1.6	1.9
Commercial Paper, 1-mo.	0.33	0.34	0.35	0.33	0.17	0.11	0.11	0.17	0.4	0.6	0.9	1.1	1.4	1.7
Treasury bill, 3-mo.	0.31	0.28	0.23	0.21	0.13	0.13	0.02	0.13	0.3	0.5	0.8	1.0	1.3	1.6
Treasury bill, 6-mo.	0.42	0.38	0.44	0.47	0.31	0.33	0.11	0.31	0.5	0.7	0.9	1.1	1.4	1.7
Treasury bill, 1 yr.	0.46	0.46	0.58	0.65	0.25	0.48	0.26	0.46	0.6	0.9	1.1	1.3	1.6	1.9
Treasury note, 2 yr.	0.86	0.86	0.91	0.99	0.83	0.88	0.64	0.83	1.0	1.2	1.5	1.7	1.9	2.2
Treasury note, 5 yr.	1.46	1.47	1.52	1.66	1.59	1.67	1.39	1.59	1.7	1.9	2.1	2.2	2.5	2.7
Treasury note, 10 yr.	2.03	2.04	2.10	2.19	2.19	2.26	2.07	2.19	2.3	2.4	2.6	2.8	2.9	3.1
Treasury note, 30 yr.	2.80	2.80	2.88	2.95	2.96	3.03	2.89	2.96	3.0	3.1	3.3	3.4	3.6	3.7
Corporate Aaa bond	4.04	4.03	3.95	3.98	3.99	4.06	3.95	3.99	4.0	4.2	4.4	4.6	4.7	4.9
Corporate Baa bond	5.48	5.45	5.42	5.46	5.42	5.46	5.34	5.42	5.4	5.5	5.6	5.8	5.9	6.1
State & Local bonds	n.a.	3.37	3.45	3.45	3.64	3.68	3.67	3.64	3.6	3.8	4.0	4.1	4.3	4.4
Home mortgage rate	n.a.	3.81	3.92	3.97	3.90	3.94	3.80	3.90	4.0	4.2	4.4	4.6	4.7	4.9
	History								Consensus Forecasts-Quarterly					
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q
Key Assumptions	2014	2014	2014	2014	2015	2015	2015	2015	2016	2016	2016	2016	2017	2017
Major Currency Index	77.1	76.6	77.8	82.6	89.4	89.9	91.8	93.1	94.8	95.6	95.8	95.6	95.3	94.8
Real GDP	-0.9	4.6	4.3	2.1	0.6	3.9	2.0	0.7	2.3	2.5	2.5	2.5	2.4	2.5
GDP Price Index	1.5	2.2	1.6	0.1	0.1	2.1	1.3	0.8	1.2	1.9	1.9	1.9	2.0	2.1
Consumer Price Index	2.1	2.4	1.2	-0.9	-3.1	3.0	1.6	0.2	0.5	2.2	2.2	2.2	2.3	2.5

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).









20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 35, No. 3, March 1, 2016

Wolters Kluwer

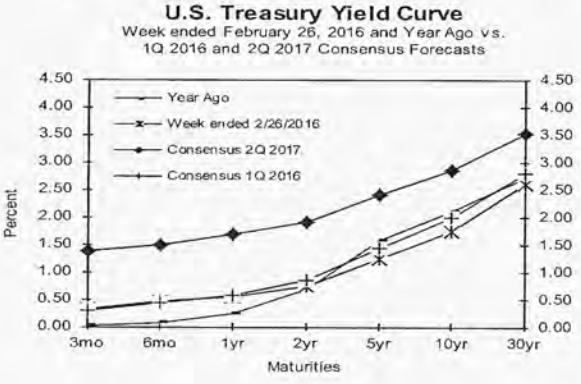
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

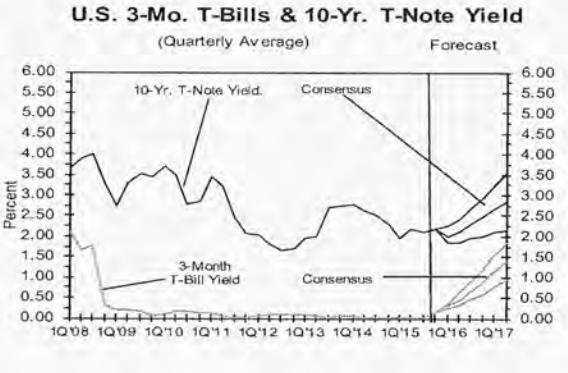
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

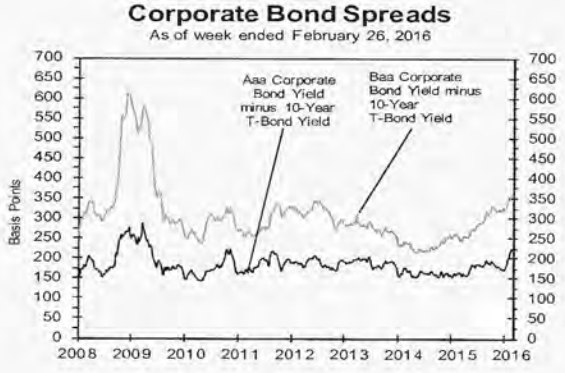
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	1Q	2Q	3Q	4Q	1Q	2Q
Interest Rates	Feb. 26	Feb. 19	Feb. 12	Feb. 5	Jan.	Dec.	Nov.	4Q2015	2016	2016	2016	2016	2017	2017
Federal Funds Rate	0.38	0.38	0.38	0.34	0.34	0.16	0.12	0.16	0.4	0.5	0.7	0.9	1.2	1.4
Prime Rate	3.50	3.50	3.50	3.50	3.50	3.29	3.25	3.29	3.5	3.6	3.8	4.0	4.2	4.5
LIBOR, 3-mo.	0.62	0.62	0.62	0.62	0.62	0.41	0.37	0.41	0.6	0.7	1.0	1.1	1.4	1.7
Commercial Paper, 1-mo.	0.36	0.35	0.35	0.35	0.34	0.17	0.11	0.17	0.4	0.5	0.8	1.0	1.3	1.5
Treasury bill, 3-mo.	0.32	0.30	0.30	0.32	0.26	0.13	0.13	0.13	0.3	0.4	0.7	0.9	1.1	1.4
Treasury bill, 6-mo.	0.46	0.44	0.41	0.46	0.43	0.31	0.33	0.31	0.4	0.6	0.8	1.0	1.2	1.5
Treasury bill, 1 yr.	0.54	0.53	0.51	0.52	0.54	0.25	0.48	0.46	0.6	0.7	1.0	1.2	1.4	1.7
Treasury note, 2 yr.	0.75	0.74	0.68	0.74	0.90	0.83	0.88	0.83	0.8	1.0	1.2	1.4	1.7	1.9
Treasury note, 5 yr.	1.23	1.24	1.15	1.29	1.52	1.59	1.67	1.59	1.4	1.6	1.8	2.0	2.2	2.4
Treasury note, 10 yr.	1.75	1.78	1.71	1.89	2.09	2.19	2.26	2.19	2.0	2.1	2.3	2.5	2.7	2.8
Treasury note, 30 yr.	2.61	2.64	2.55	2.70	2.86	2.96	3.03	2.96	2.8	2.9	3.1	3.2	3.4	3.5
Corporate Aaa bond	3.96	4.01	3.92	4.03	4.00	3.99	4.06	3.99	4.0	4.1	4.3	4.4	4.6	4.8
Corporate Baa bond	5.33	5.37	5.29	5.40	5.45	5.42	5.46	5.42	5.3	5.4	5.5	5.6	5.7	5.9
State & Local bonds	3.27	3.27	3.27	3.30	3.41	3.64	3.68	3.64	3.4	3.5	3.8	3.9	4.0	4.2
Home mortgage rate	3.65	3.65	3.65	3.72	3.87	3.90	3.94	3.90	3.8	3.9	4.1	4.3	4.5	4.7

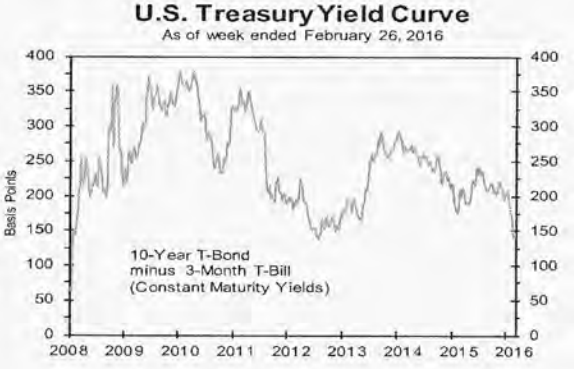
	History								Consensus Forecasts-Quarterly					
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q
Key Assumptions	2014	2014	2014	2014	2015	2015	2015	2015	2016	2016	2016	2016	2017	2017
Major Currency Index	77.1	76.6	77.8	82.6	89.4	89.9	91.8	93.1	93.9	94.4	94.8	94.8	94.5	94.2
Real GDP	-0.9	4.6	4.3	2.1	0.6	3.9	2.0	1.0	2.1	2.5	2.5	2.4	2.4	2.4
GDP Price Index	1.5	2.2	1.6	0.1	0.1	2.1	1.3	0.9	1.1	1.8	1.9	1.9	2.0	2.1
Consumer Price Index	2.1	2.4	1.2	-0.9	-3.1	3.0	1.6	0.2	0.2	1.9	2.2	2.3	2.3	2.4

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).









20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 35, No. 4, April 1, 2016

Wolters Kluwer

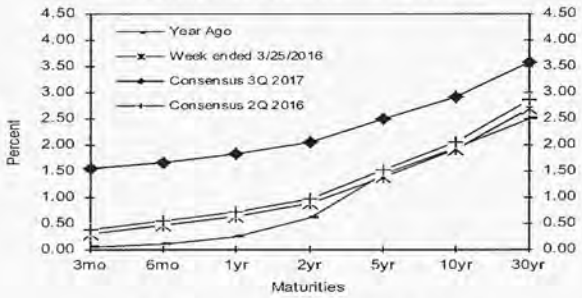
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

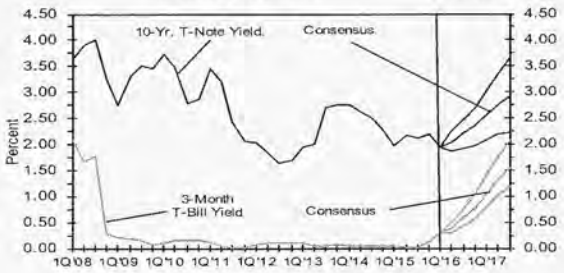
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	2Q	3Q	4Q	1Q	2Q	3Q
Interest Rates	Mar. 25	Mar. 18	Mar. 11	Mar. 4	Feb.	Jan.	Dec.	1Q2016*	2016	2016	2016	2017	2017	2017
Federal Funds Rate	0.37	0.36	0.36	0.36	0.38	0.34	0.16	*0.36*	**0.5**	**0.6**	**0.8**	**1.0**	**1.3**	**1.5**
Prime Rate	3.25	3.50	3.50	3.50	3.50	3.50	3.29	*3.47*	**3.6**	**3.7**	**3.9**	**4.1**	**4.4**	**4.6**
LIBOR, 3-mo.	0.62	0.63	0.63	0.63	0.62	0.61	0.41	*0.62*	**0.7**	**0.9**	**1.0**	**1.3**	**1.6**	**1.8**
Commercial Paper, 1-mo.	0.34	0.33	0.34	0.35	0.35	0.34	0.17	*0.34*	**0.5**	**0.7**	**0.9**	**1.1**	**1.4**	**1.7**
Treasury bill, 3-mo.	0.30	0.32	0.31	0.32	0.31	0.26	0.13	*0.29*	**0.4**	**0.6**	**0.8**	**1.0**	**1.3**	**1.6**
Treasury bill, 6-mo.	0.46	0.48	0.49	0.48	0.45	0.43	0.31	*0.45*	**0.5**	**0.7**	**0.9**	**1.2**	**1.4**	**1.7**
Treasury bill, 1 yr.	0.63	0.67	0.68	0.66	0.53	0.54	0.25	*0.58*	**0.7**	**0.9**	**1.1**	**1.3**	**1.6**	**1.8**
Treasury note, 2 yr.	0.87	0.91	0.92	0.84	0.73	0.90	0.83	*0.84*	**1.0**	**1.2**	**1.4**	**1.6**	**1.8**	**2.0**
Treasury note, 5 yr.	1.38	1.43	1.42	1.32	1.22	1.52	1.59	*1.38*	**1.5**	**1.7**	**1.9**	**2.1**	**2.3**	**2.5**
Treasury note, 10 yr.	1.91	1.93	1.91	1.82	1.78	2.09	2.19	*1.93*	**2.0**	**2.2**	**2.4**	**2.6**	**2.8**	**2.9**
Treasury note, 30 yr.	2.69	2.71	2.69	2.67	2.62	2.86	2.96	*2.73*	**2.8**	**3.0**	**3.1**	**3.3**	**3.5**	**3.6**
Corporate Aaa bond	3.78	3.80	3.88	3.89	3.96	4.00	3.99	*3.93*	**3.9**	**4.1**	**4.3**	**4.5**	**4.6**	**4.8**
Corporate Baa bond	5.04	5.13	5.25	5.32	5.32	5.45	5.42	*5.30*	**5.3**	**5.4**	**5.5**	**5.7**	**5.8**	**5.9**
State & Local bonds	3.38	3.40	3.42	3.34	3.30	3.41	3.64	*3.37*	**3.5**	**3.7**	**3.8**	**3.9**	**4.1**	**4.2**
Home mortgage rate	3.71	3.73	3.68	3.64	3.66	3.87	3.90	*3.75*	**3.9**	**4.0**	**4.2**	**4.4**	**4.6**	**4.8**
	History								Consensus Forecasts-Quarterly					
	2Q	3Q	4Q	1Q	2Q	3Q	4Q	*1Q*	2Q	3Q	4Q	1Q	2Q	3Q
Key Assumptions	2014	2014	2014	2015	2015	2015	2015	*2016**	2016	2016	2016	2017	2017	2017
Major Currency Index	76.6	77.8	82.6	89.4	89.9	91.8	93.1	*92.0*	**92.9**	**93.3**	**93.7**	**93.7**	**92.9**	**93.2**
Real GDP	4.6	4.3	2.1	0.6	3.9	2.0	1.4	*1.9*	**2.3**	**2.5**	**2.4**	**2.4**	**2.4**	**2.3**
GDP Price Index	2.2	1.6	0.1	0.1	2.1	1.3	0.9	*1.1*	**1.7**	**1.8**	**1.9**	**2.0**	**2.1**	**2.1**
Consumer Price Index	1.9	0.9	-0.3	-2.9	2.4	1.4	0.8	*0.1*	**1.9**	**2.1**	**2.3**	**2.3**	**2.4**	**2.3**

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS). **Interest rate data for 1Q 2016 based on historical data through the week ended March 25th. *Data for 1Q 2016 Major Currency Index is based on data through week ended March 18th. Figures for 1Q 2016 Real GDP, GDP Chained Price Index and Consumer Price Index are consensus forecasts based on a special question asked of the panelists' this month*

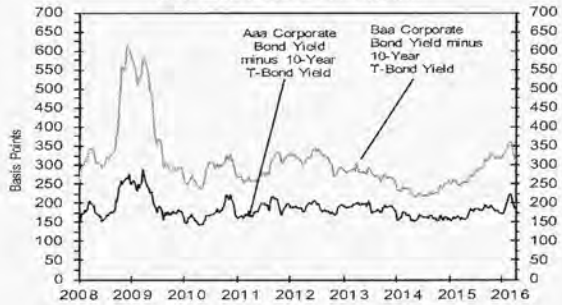
U.S. Treasury Yield Curve
Week ended March 25, 2016 and Year Ago vs.
2Q 2016 and 3Q 2017 Consensus Forecasts



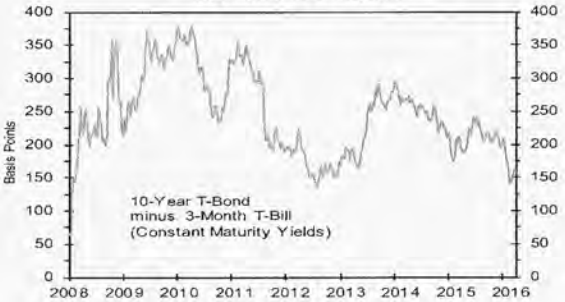
U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average)



Corporate Bond Spreads
As of week ended March 25, 2016



U.S. Treasury Yield Curve
As of week March 25, 2016



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 35, No. 5, May 1, 2016

Wolters Kluwer

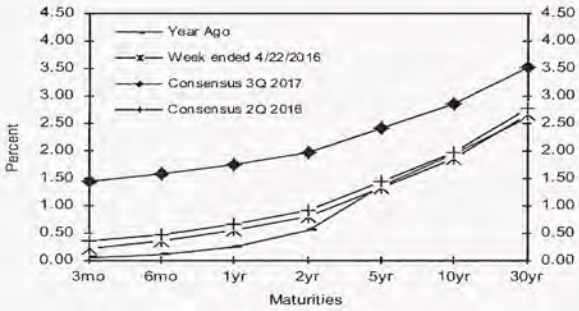
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

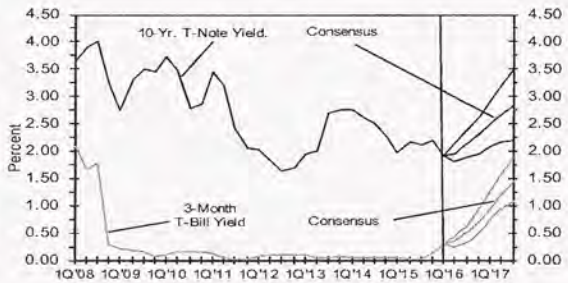
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	2Q	3Q	4Q	1Q	2Q	3Q
Interest Rates	Apr. 22	Apr. 15	Apr. 8	Apr. 1	Mar.	Feb.	Jan.	1Q 2016	2016	2016	2016	2017	2017	2017
Federal Funds Rate	0.37	0.37	0.35	0.37	0.36	0.38	0.34	0.36	0.4	0.6	0.8	1.0	1.2	1.5
Prime Rate	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.6	3.7	3.8	4.1	4.3	4.5
LIBOR, 3-mo.	0.63	0.63	0.63	0.63	0.63	0.62	0.61	0.62	0.7	0.9	1.0	1.3	1.5	1.8
Commercial Paper, 1-mo.	0.34	0.35	0.33	0.32	0.34	0.35	0.34	0.34	0.5	0.6	0.8	1.1	1.3	1.6
Treasury bill, 3-mo.	0.22	0.22	0.23	0.23	0.30	0.31	0.26	0.29	0.3	0.5	0.7	1.0	1.2	1.4
Treasury bill, 6-mo.	0.36	0.36	0.36	0.42	0.47	0.45	0.43	0.45	0.5	0.7	0.8	1.1	1.3	1.6
Treasury bill, 1 yr.	0.54	0.54	0.55	0.62	0.66	0.53	0.54	0.58	0.6	0.8	1.0	1.3	1.5	1.7
Treasury note, 2 yr.	0.80	0.74	0.72	0.78	0.88	0.73	0.90	0.84	0.9	1.1	1.3	1.5	1.7	1.9
Treasury note, 5 yr.	1.31	1.22	1.18	1.27	1.38	1.22	1.52	1.37	1.4	1.6	1.8	2.0	2.2	2.4
Treasury note, 10 yr.	1.84	1.77	1.74	1.82	1.89	1.78	2.09	1.92	2.0	2.1	2.3	2.5	2.7	2.8
Treasury note, 30 yr.	2.65	2.58	2.56	2.63	2.68	2.62	2.86	2.72	2.8	2.9	3.1	3.2	3.4	3.5
Corporate Aaa bond	3.57	3.61	3.63	3.73	3.82	3.96	4.00	3.93	3.8	4.0	4.1	4.3	4.5	4.6
Corporate Baa bond	4.77	4.78	4.82	4.91	5.13	5.32	5.45	5.30	5.0	5.2	5.3	5.5	5.6	5.8
State & Local bonds	3.28	3.30	3.28	3.38	3.38	3.30	3.41	3.36	3.4	3.6	3.7	3.9	4.1	4.2
Home mortgage rate	3.59	3.58	3.59	3.71	3.69	3.66	3.87	3.74	3.8	4.0	4.1	4.3	4.5	4.7
	History								Consensus Forecasts-Quarterly					
	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q
Key Assumptions	2014	2014	2014	2015	2015	2015	2015	2016	2016	2016	2016	2017	2017	2017
Major Currency Index	76.6	77.8	82.6	89.4	89.9	91.8	93.1	93.3	90.8	91.2	91.9	92.1	92.0	91.9
Real GDP	4.6	4.3	2.1	0.6	3.9	2.0	1.4	0.5	2.3	2.4	2.4	2.3	2.4	2.3
GDP Price Index	2.2	1.6	0.1	0.1	2.1	1.3	0.9	0.7	1.8	1.9	1.9	2.0	2.1	2.0
Consumer Price Index	1.9	0.9	-0.3	-2.9	2.4	1.4	0.8	-0.3	1.9	2.2	2.3	2.3	2.4	2.3

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).

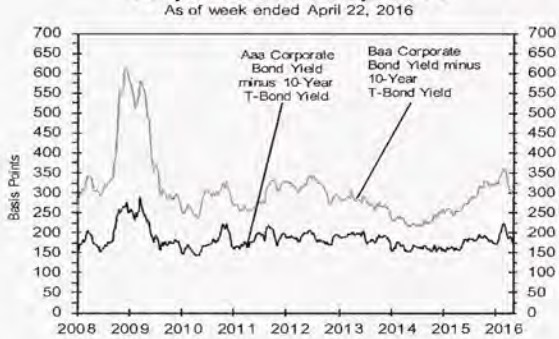
U.S. Treasury Yield Curve
Week ended April 22, 2016 and Year Ago vs.
2Q 2016 and 3Q 2017 Consensus Forecasts



U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average)



Corporate Bond Spreads
As of week ended April 22, 2016



U.S. Treasury Yield Curve
As of week April 22, 2016

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 35, No. 6, June 1, 2016

Wolters Kluwer

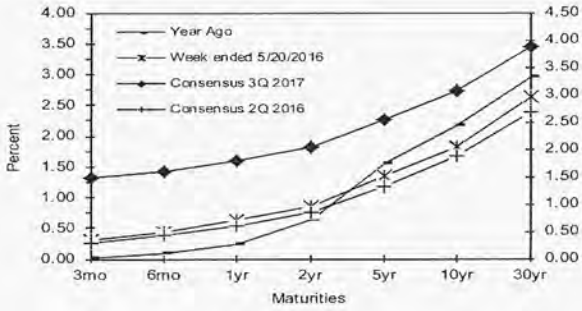
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

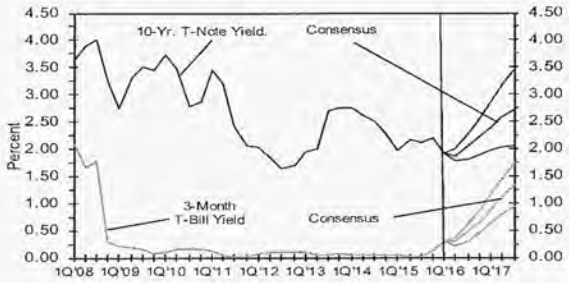
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	2Q	3Q	4Q	1Q	2Q	3Q
Interest Rates	May 20	May 13	May 6	Apr. 29	Apr.	Mar.	Feb.	1Q 2016	2016	2016	2016	2017	2017	2017
Federal Funds Rate	0.37	0.37	0.34	0.37	0.37	0.36	0.38	0.36	0.4	0.6	0.7	0.9	1.1	1.3
Prime Rate	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.5	3.7	3.8	4.0	4.2	4.4
LIBOR, 3-mo.	0.63	0.63	0.63	0.63	0.63	0.63	0.62	0.62	0.6	0.8	1.0	1.2	1.4	1.7
Commercial Paper, 1-mo.	0.35	0.34	0.35	0.36	0.35	0.34	0.35	0.34	0.4	0.6	0.8	1.0	1.3	1.5
Treasury bill, 3-mo.	0.30	0.26	0.20	0.23	0.23	0.30	0.31	0.29	0.3	0.5	0.7	0.9	1.1	1.3
Treasury bill, 6-mo.	0.42	0.37	0.40	0.40	0.37	0.47	0.45	0.45	0.4	0.6	0.8	1.0	1.2	1.4
Treasury bill, 1 yr.	0.62	0.53	0.52	0.58	0.56	0.66	0.53	0.58	0.6	0.8	1.0	1.2	1.4	1.6
Treasury note, 2 yr.	0.86	0.74	0.75	0.82	0.77	0.88	0.73	0.84	0.8	1.0	1.2	1.4	1.6	1.8
Treasury note, 5 yr.	1.34	1.21	1.25	1.33	1.26	1.38	1.22	1.37	1.3	1.5	1.7	1.9	2.1	2.3
Treasury note, 10 yr.	1.82	1.75	1.81	1.88	1.81	1.89	1.78	1.92	1.9	2.1	2.2	2.4	2.6	2.7
Treasury note, 30 yr.	2.62	2.59	2.65	2.71	2.62	2.68	2.62	2.72	2.7	2.9	3.0	3.2	3.3	3.4
Corporate Aaa bond	3.65	3.63	3.66	3.62	3.62	3.82	3.96	3.93	3.7	3.9	4.1	4.3	4.4	4.6
Corporate Baa bond	4.69	4.64	4.66	4.75	4.79	5.13	5.32	5.30	4.9	5.1	5.2	5.4	5.5	5.7
State & Local bonds	3.26	3.32	3.32	3.32	3.30	3.38	3.30	3.36	3.4	3.5	3.6	3.8	4.0	4.1
Home mortgage rate	3.58	3.57	3.61	3.66	3.61	3.69	3.66	3.74	3.7	3.9	4.0	4.2	4.4	4.5
	History								Consensus Forecasts-Quarterly					
	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q
Key Assumptions	2014	2014	2014	2015	2015	2015	2015	2016	2016	2016	2016	2017	2017	2017
Major Currency Index	76.6	77.8	82.6	89.4	89.9	91.8	93.1	93.3	90.4	91.3	92.1	92.4	92.3	92.3
Real GDP	4.6	4.3	2.1	0.6	3.9	2.0	1.4	0.8	2.3	2.4	2.4	2.3	2.4	2.3
GDP Price Index	2.2	1.6	0.1	0.1	2.1	1.3	0.9	0.6	1.8	1.8	1.9	1.9	2.2	2.1
Consumer Price Index	1.9	0.9	-0.3	-2.9	2.4	1.4	0.8	-0.3	2.2	2.4	2.3	2.2	2.4	2.3

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).

U.S. Treasury Yield Curve
Week ended May 20, 2016 and Year Ago vs. 2Q 2016 and 3Q 2017 Consensus Forecasts

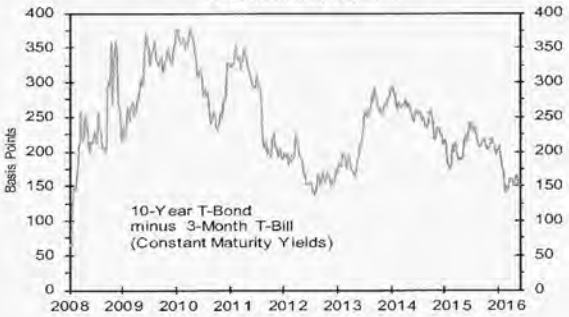


U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average) Forecast



Corporate Bond Spreads
As of week ended May 20, 2016

U.S. Treasury Yield Curve
As of week May 20, 2016



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 35, No. 6, June 1, 2016

Wolters Kluwer

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Long-Range Survey:

The table below contains results of our semi-annual long-range CONSENSUS survey. There are also Top 10 and bottom 10 averages for each variable. Shown are estimates for the years 2018 through 2022 and averages for the five-year periods 2018-2022 and 2023-2027. Apply these projections cautiously. Few economic, demographic and political forces can be evaluated accurately over such long time spans.

		Average For The Year					Five-Year Averages	
Interest Rates		2018	2019	2020	2021	2022	2018-2022	2023-2027
1. Federal Funds Rate	**CONSENSUS**	**2.2**	**2.7**	**3.0**	**3.2**	**3.2**	**2.9**	**3.2**
	Top 10 Average	3.1	3.6	3.8	3.9	3.9	3.7	3.8
	Bottom 10 Average	1.4	1.6	2.0	2.5	2.4	2.0	2.5
2. Prime Rate	**CONSENSUS**	**5.2**	**5.7**	**6.0**	**6.1**	**6.1**	**5.8**	**6.0**
	Top 10 Average	6.1	6.6	6.9	6.9	6.9	6.7	6.7
	Bottom 10 Average	4.4	4.7	5.1	5.4	5.3	5.0	5.4
3. LIBOR, 3-Mo.	**CONSENSUS**	**2.5**	**3.0**	**3.2**	**3.4**	**3.4**	**3.1**	**3.4**
	Top 10 Average	3.4	3.9	4.0	4.1	4.1	3.9	4.0
	Bottom 10 Average	1.7	1.9	2.3	2.8	2.7	2.3	2.7
4. Commercial Paper, 1-Mo.	**CONSENSUS**	**2.5**	**3.0**	**3.2**	**3.4**	**3.3**	**3.1**	**3.3**
	Top 10 Average	3.2	3.7	3.9	4.0	4.0	3.7	3.8
	Bottom 10 Average	1.8	2.2	2.6	2.8	2.6	2.4	2.7
5. Treasury Bill Yield, 3-Mo.	**CONSENSUS**	**2.2**	**2.7**	**2.9**	**3.1**	**3.1**	**2.8**	**3.1**
	Top 10 Average	3.0	3.6	3.8	3.8	3.8	3.6	3.7
	Bottom 10 Average	1.4	1.6	1.9	2.5	2.4	2.0	2.4
6. Treasury Bill Yield, 6-Mo.	**CONSENSUS**	**2.4**	**2.9**	**3.2**	**3.3**	**3.2**	**3.0**	**3.2**
	Top 10 Average	3.2	3.7	4.0	4.0	4.0	3.8	3.8
	Bottom 10 Average	1.6	1.9	2.4	2.6	2.5	2.2	2.6
7. Treasury Bill Yield, 1-Yr.	**CONSENSUS**	**2.5**	**3.0**	**3.2**	**3.4**	**3.3**	**3.1**	**3.3**
	Top 10 Average	3.4	4.0	4.0	4.1	4.1	3.9	4.0
	Bottom 10 Average	1.7	2.0	2.4	2.6	2.5	2.3	2.7
8. Treasury Note Yield, 2-Yr.	**CONSENSUS**	**2.7**	**3.1**	**3.4**	**3.6**	**3.5**	**3.3**	**3.5**
	Top 10 Average	3.6	4.1	4.3	4.3	4.3	4.1	4.2
	Bottom 10 Average	1.8	2.0	2.4	2.8	2.8	2.4	2.7
10. Treasury Note Yield, 5-Yr.	**CONSENSUS**	**3.0**	**3.4**	**3.6**	**3.8**	**3.8**	**3.5**	**3.8**
	Top 10 Average	3.9	4.3	4.5	4.6	4.6	4.4	4.5
	Bottom 10 Average	2.1	2.3	2.7	3.0	2.9	2.6	3.0
11. Treasury Note Yield, 10-Yr.	**CONSENSUS**	**3.3**	**3.7**	**3.9**	**4.1**	**4.0**	**3.8**	**4.1**
	Top 10 Average	4.2	4.6	4.8	4.8	4.8	4.6	4.8
	Bottom 10 Average	2.5	2.7	3.0	3.2	3.2	2.9	3.3
12. Treasury Bond Yield, 30-Yr.	**CONSENSUS**	**3.9**	**4.2**	**4.4**	**4.6**	**4.5**	**4.3**	**4.6**
	Top 10 Average	4.8	5.2	5.3	5.4	5.4	5.2	5.4
	Bottom 10 Average	3.1	3.3	3.5	3.7	3.6	3.4	3.8
13. Corporate Aaa Bond Yield	**CONSENSUS**	**5.1**	**5.4**	**5.5**	**5.5**	**5.5**	**5.4**	**5.6**
	Top 10 Average	5.7	6.2	6.3	6.3	6.3	6.2	6.3
	Bottom 10 Average	4.4	4.6	4.6	4.7	4.7	4.6	4.9
13. Corporate Baa Bond Yield	**CONSENSUS**	**6.1**	**6.4**	**6.5**	**6.5**	**6.5**	**6.4**	**6.6**
	Top 10 Average	6.7	7.2	7.3	7.3	7.3	7.1	7.3
	Bottom 10 Average	5.4	5.6	5.7	5.7	5.6	5.6	5.9
14. State & Local Bonds Yield	**CONSENSUS**	**4.4**	**4.6**	**4.7**	**4.7**	**4.7**	**4.7**	**4.8**
	Top 10 Average	5.2	5.5	5.6	5.6	5.6	5.5	5.6
	Bottom 10 Average	3.7	3.7	3.8	3.9	3.8	3.8	4.0
15. Home Mortgage Rate	**CONSENSUS**	**5.1**	**5.5**	**5.6**	**5.7**	**5.7**	**5.5**	**5.8**
	Top 10 Average	5.8	6.3	6.4	6.4	6.5	6.3	6.4
	Bottom 10 Average	4.3	4.6	4.8	4.9	4.8	4.7	5.0
A. FRB - Major Currency Index	**CONSENSUS**	**92.2**	**91.5**	**91.2**	**91.1**	**91.0**	**91.4**	**90.1**
	Top 10 Average	95.6	95.7	96.1	96.0	95.9	95.9	95.2
	Bottom 10 Average	88.8	87.2	86.1	86.0	85.9	86.8	85.0
		Year-Over-Year, % Change					Five-Year Averages	
		2018	2019	2020	2021	2022	2018-2022	2023-2027
B. Real GDP	**CONSENSUS**	**2.2**	**2.1**	**2.1**	**2.2**	**2.2**	**2.2**	**2.2**
	Top 10 Average	2.7	2.7	2.6	2.6	2.5	2.6	2.5
	Bottom 10 Average	1.7	1.6	1.6	1.8	1.8	1.7	1.9
C. GDP Chained Price Index	**CONSENSUS**	**2.1**	**2.1**	**2.1**	**2.1**	**2.1**	**2.1**	**2.1**
	Top 10 Average	2.4	2.4	2.4	2.3	2.2	2.4	2.3
	Bottom 10 Average	1.8	1.9	1.9	1.9	1.9	1.9	1.9
D. Consumer Price Index	**CONSENSUS**	**2.3**	**2.3**	**2.3**	**2.3**	**2.2**	**2.3**	**2.2**
	Top 10 Average	2.7	2.6	2.5	2.4	2.5	2.6	2.5
	Bottom 10 Average	1.9	2.0	2.0	2.1	2.0	2.0	2.0

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 35, No. 7, July 1, 2016

Wolters Kluwer

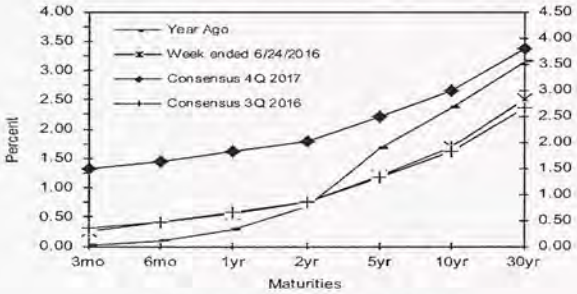
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

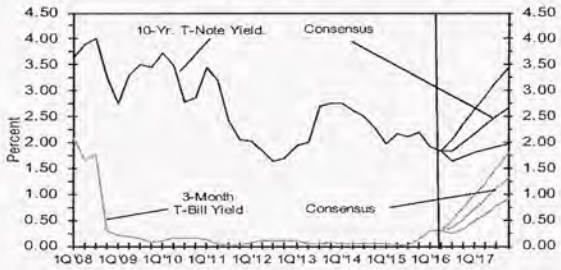
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	3Q	4Q	1Q	2Q	3Q	4Q
Interest Rates	June 24	June 17	June 10	June 3	May	Apr.	Mar.	2Q 2016*	2016	2016	2017	2017	2017	2017
Federal Funds Rate	0.38	0.37	0.37	0.36	0.37	0.37	0.36	*0.36*	**0.4**	**0.6**	**0.8**	**0.9**	**1.1**	**1.3**
Prime Rate	3.50	3.50	3.50	3.50	3.50	3.50	3.50	*3.50*	**3.6**	**3.7**	**3.9**	**4.0**	**4.2**	**4.4**
LIBOR, 3-mo.	0.64	0.65	0.66	0.68	0.64	0.63	0.63	*0.63*	**0.7**	**0.8**	**1.1**	**1.2**	**1.5**	**1.7**
Commercial Paper, 1-mo.	0.36	0.37	0.40	0.38	0.35	0.35	0.34	*0.36*	**0.4**	**0.6**	**0.8**	**1.0**	**1.3**	**1.5**
Treasury bill, 3-mo.	0.27	0.27	0.26	0.31	0.28	0.23	0.30	*0.28*	**0.4**	**0.5**	**0.7**	**0.9**	**1.1**	**1.3**
Treasury bill, 6-mo.	0.40	0.38	0.43	0.47	0.42	0.37	0.47	*0.43*	**0.5**	**0.6**	**0.8**	**1.0**	**1.2**	**1.5**
Treasury bill, 1 yr.	0.56	0.53	0.59	0.67	0.59	0.56	0.66	*0.54*	**0.7**	**0.8**	**1.0**	**1.2**	**1.4**	**1.6**
Treasury note, 2 yr.	0.75	0.71	0.77	0.86	0.82	0.77	0.88	*0.79*	**0.9**	**1.0**	**1.2**	**1.4**	**1.6**	**1.8**
Treasury note, 5 yr.	1.20	1.12	1.22	1.34	1.30	1.26	1.38	*1.30*	**1.3**	**1.5**	**1.7**	**1.9**	**2.0**	**2.2**
Treasury note, 10 yr.	1.69	1.61	1.70	1.80	1.81	1.81	1.89	*1.84*	**1.8**	**2.0**	**2.2**	**2.3**	**2.5**	**2.7**
Treasury note, 30 yr.	2.50	2.42	2.50	2.59	2.63	2.62	2.68	*2.65*	**2.6**	**2.8**	**2.9**	**3.1**	**3.2**	**3.4**
Corporate Aaa bond	3.56	3.45	3.51	3.59	3.65	3.62	3.82	*3.82*	**3.7**	**3.8**	**4.0**	**4.1**	**4.3**	**4.4**
Corporate Baa bond	4.55	4.49	4.55	4.64	4.68	4.79	5.13	*5.10*	**4.8**	**4.9**	**5.1**	**5.2**	**5.3**	**5.5**
State & Local bonds	3.18	3.18	3.18	3.26	3.29	3.30	3.38	*3.30*	**3.3**	**3.4**	**3.6**	**3.8**	**3.9**	**4.0**
Home mortgage rate	3.56	3.54	3.60	3.66	3.60	3.61	3.69	*3.70*	**3.7**	**3.8**	**4.0**	**4.2**	**4.3**	**4.5**
	History								Consensus Forecasts-Quarterly					
	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Key Assumptions	2014	2014	2015	2015	2015	2015	2016	2016	2016	2016	2017	2017	2017	2017
Major Currency Index	77.8	82.6	89.4	89.9	91.8	93.1	93.3	*89.5*	**91.1**	**92.0**	**92.5**	**92.6**	**92.5**	**92.5**
Real GDP	4.3	2.1	0.6	3.9	2.0	1.4	0.8	*2.5*	**2.3**	**2.3**	**2.2**	**2.3**	**2.3**	**2.2**
GDP Price Index	1.6	0.1	0.1	2.1	1.3	0.9	0.6	*1.9*	**1.8**	**1.9**	**1.9**	**2.2**	**2.1**	**2.1**
Consumer Price Index	0.9	-0.3	-2.9	2.4	1.4	0.8	-0.3	*2.3*	**2.5**	**2.3**	**2.2**	**2.4**	**2.3**	**2.3**

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS). **Interest rate data for 2Q 2016 based on historical data through the week ended June 24th. *Data for 2Q 2016 Major Currency Index is based on data through week ended June 17th. Figures fo 2Q 2016 Real GDP, GDP Chained Price Index and Consumer Price Index are consensus forecasts based on a special question asked of the panelists' this month.*

U.S. Treasury Yield Curve
Week ended June 24, 2016 and Year Ago vs.
3Q 2016 and 4Q 2017 Consensus Forecasts

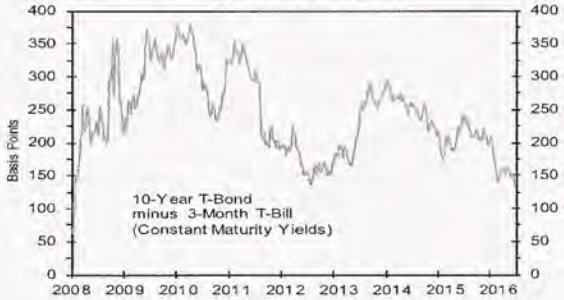


U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average)



Corporate Bond Spreads
As of week ended June 24, 2016

U.S. Treasury Yield Curve
As of week June 24, 2016



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 35, No. 8, August 1, 2016

Wolters Kluwer

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

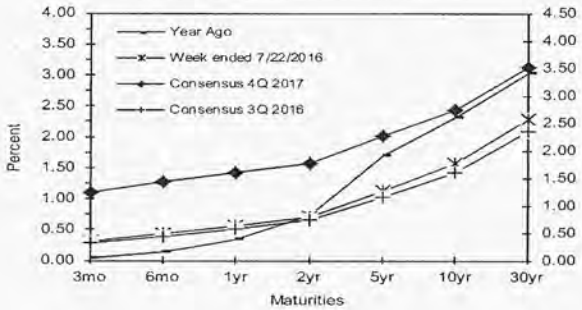
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	3Q	4Q	1Q	2Q	3Q	4Q
Interest Rates	July 22	July 15	July 8	July 1	Jun	May	Apr	2Q 2016	2016	2016	2017	2017	2017	2017
Federal Funds Rate	0.40	0.40	0.39	0.40	0.38	0.37	0.37	0.37	0.4	0.5	0.6	0.8	1.0	1.1
Prime Rate	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.5	3.6	3.7	3.9	4.0	4.2
LIBOR, 3-mo.	0.70	0.67	0.67	0.66	0.69	0.64	0.63	0.63	0.7	0.8	0.9	1.1	1.3	1.5
Commercial Paper, 1-mo.	0.33	0.37	0.37	0.38	0.38	0.35	0.35	0.36	0.4	0.5	0.7	0.9	1.1	1.3
Treasury bill, 3-mo.	0.32	0.31	0.28	0.27	0.27	0.28	0.23	0.28	0.3	0.4	0.6	0.7	0.9	1.1
Treasury bill, 6-mo.	0.44	0.41	0.36	0.36	0.40	0.42	0.37	0.43	0.4	0.6	0.7	0.9	1.1	1.3
Treasury bill, 1 yr.	0.55	0.52	0.46	0.45	0.55	0.59	0.56	0.54	0.6	0.7	0.9	1.1	1.2	1.4
Treasury note, 2 yr.	0.70	0.68	0.58	0.60	0.73	0.82	0.77	0.79	0.7	0.9	1.1	1.2	1.4	1.6
Treasury note, 5 yr.	1.13	1.09	0.95	1.01	1.17	1.30	1.26	1.30	1.1	1.3	1.5	1.7	1.8	2.0
Treasury note, 10 yr.	1.58	1.51	1.38	1.47	1.64	1.81	1.81	1.84	1.6	1.8	1.9	2.1	2.3	2.4
Treasury note, 30 yr.	2.29	2.22	2.13	2.28	2.45	2.63	2.62	2.64	2.4	2.5	2.7	2.8	3.0	3.1
Corporate Aaa bond	3.34	3.27	3.21	3.39	3.50	3.65	3.62	3.82	3.4	3.6	3.8	3.9	4.1	4.2
Corporate Baa bond	4.24	4.21	4.19	4.39	4.53	4.68	4.79	5.10	4.5	4.6	4.8	5.0	5.1	5.3
State & Local bonds	2.87	2.80	3.18	3.18	3.20	3.29	3.30	3.30	3.1	3.2	3.3	3.5	3.6	3.8
Home mortgage rate	3.45	3.42	3.41	3.48	3.57	3.60	3.61	3.70	3.5	3.7	3.8	4.0	4.2	4.3
	History								Consensus Forecasts-Quarterly					
	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Key Assumptions	2014	2014	2015	2015	2015	2015	2016	2016	2016	2016	2017	2017	2017	2017
Major Currency Index	77.8	82.6	89.4	89.9	91.8	93.1	93.3	89.6	91.0	91.8	92.4	92.5	92.5	92.3
Real GDP	5.0	2.3	2.0	2.6	2.0	0.9	0.8	1.2	2.3	2.3	2.2	2.3	2.3	2.2
GDP Price Index	1.7	0.5	-0.1	2.3	1.3	0.8	0.5	2.2	1.8	1.8	1.9	2.1	2.1	2.1
Consumer Price Index	0.9	-0.3	-2.9	2.4	1.4	0.8	-0.3	2.5	2.2	2.2	2.2	2.3	2.3	2.3

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).

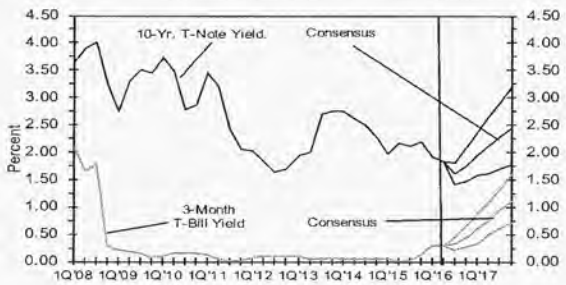
U.S. Treasury Yield Curve

Week ended July 22, 2016 and Year Ago vs.
3Q 2016 and 4Q 2017 Consensus Forecasts



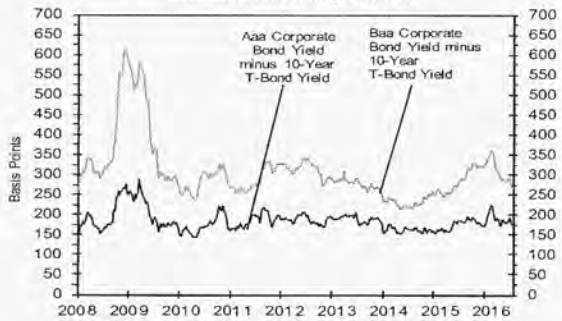
U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield

(Quarterly Average) Forecast



Corporate Bond Spreads

As of week ended July 22, 2016



U.S. Treasury Yield Curve

As of week July 22, 2016

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 35, No. 9, September 1, 2016

Wolters Kluwer

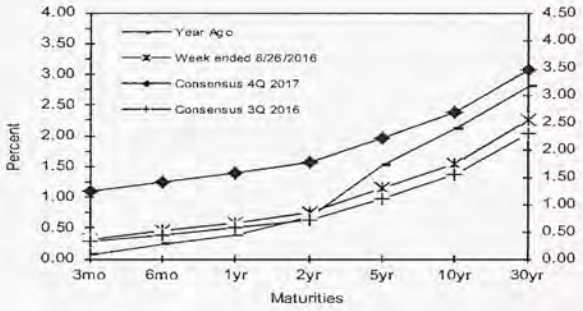
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

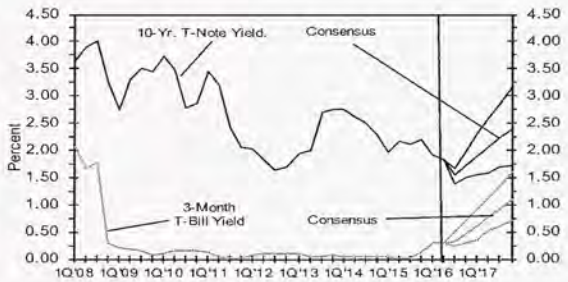
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	3Q	4Q	1Q	2Q	3Q	4Q
Interest Rates	Aug. 26	Aug. 19	Aug. 12	Aug. 5	Jul	Jun	May	2Q 2016	2016	2016	2017	2017	2017	2017
Federal Funds Rate	0.40	0.40	0.40	0.36	0.39	0.38	0.37	0.37	0.4	0.5	0.6	0.8	0.9	1.1
Prime Rate	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.5	3.6	3.7	3.9	4.0	4.2
LIBOR, 3-mo.	0.82	0.82	0.82	0.78	0.70	0.69	0.64	0.63	0.8	0.9	1.0	1.1	1.3	1.5
Commercial Paper, 1-mo.	0.38	0.37	0.36	0.37	0.35	0.38	0.35	0.36	0.4	0.5	0.7	0.9	1.0	1.2
Treasury bill, 3-mo.	0.30	0.30	0.29	0.28	0.30	0.27	0.28	0.28	0.3	0.5	0.6	0.8	0.9	1.1
Treasury bill, 6-mo.	0.45	0.45	0.44	0.42	040	0.40	0.42	0.43	0.4	0.6	0.7	0.9	1.1	1.3
Treasury bill, 1 yr.	0.58	0.58	0.56	0.52	0.51	0.55	0.59	0.54	0.6	0.7	0.9	1.1	1.2	1.4
Treasury note, 2 yr.	0.75	0.74	0.72	0.67	0.67	0.73	0.82	0.79	0.7	0.9	1.1	1.2	1.4	1.6
Treasury note, 5 yr.	1.14	1.15	1.12	1.07	1.07	1.17	1.30	1.30	1.1	1.3	1.5	1.6	1.8	2.0
Treasury note, 10 yr.	1.55	1.56	1.54	1.54	1.50	1.64	1.81	1.84	1.5	1.7	1.9	2.1	2.2	2.4
Treasury note, 30 yr.	2.25	2.28	2.26	2.28	2.23	2.45	2.63	2.64	2.3	2.5	2.6	2.8	2.9	3.1
Corporate Aaa bond	3.27	3.31	3.34	3.40	3.28	3.50	3.65	3.82	3.3	3.6	3.8	3.9	4.1	4.2
Corporate Baa bond	4.21	4.25	4.25	4.29	4.22	4.53	4.68	5.10	4.4	4.6	4.8	4.9	5.0	5.2
State & Local bonds	2.84	2.84	2.85	2.85	2.83	3.20	3.29	3.30	3.0	3.1	3.3	3.4	3.6	3.7
Home mortgage rate	3.43	3.43	3.45	3.43	3.44	3.57	3.60	3.70	3.5	3.7	3.8	4.0	4.2	4.3
	History								Consensus Forecasts-Quarterly					
	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Key Assumptions	2014	2014	2015	2015	2015	2015	2016	2016	2016	2016	2017	2017	2017	2017
Major Currency Index	77.8	82.6	89.4	89.9	91.8	93.1	93.3	89.6	90.4	91.2	91.8	91.9	92.0	92.0
Real GDP	5.0	2.3	2.0	2.6	2.0	0.9	0.8	1.1	2.7	2.4	2.2	2.3	2.2	2.2
GDP Price Index	1.7	0.5	-0.1	2.3	1.3	0.8	0.5	2.3	1.6	1.8	1.9	2.1	2.1	2.1
Consumer Price Index	0.9	-0.3	-2.9	2.4	1.4	0.8	-0.3	2.5	1.8	2.2	2.2	2.3	2.3	2.3

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).

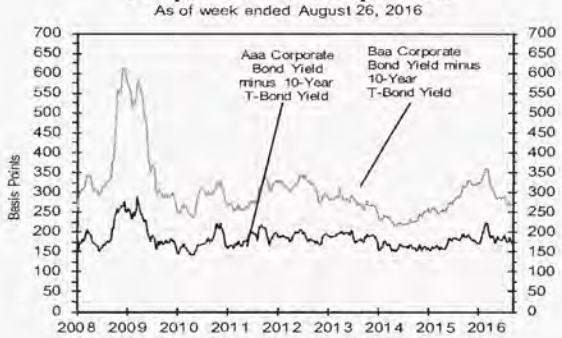
U.S. Treasury Yield Curve
Week ended August 26, 2016 and Year Ago vs. 3Q 2016 and 4Q 2017 Consensus Forecasts



U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average)



Corporate Bond Spreads
As of week ended August 26, 2016



U.S. Treasury Yield Curve
As of week August 26, 2016

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 35, No. 10, October 1, 2016

Wolters Kluwer

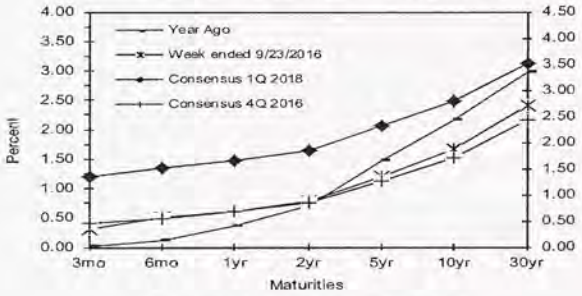
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

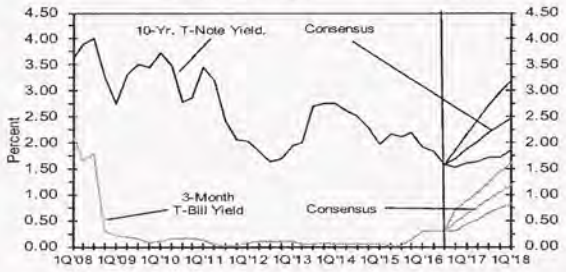
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			*Latest Qtr*	4Q	1Q	2Q	3Q	4Q	1Q
Interest Rates	Sep. 23	Sep. 16	Sep. 9	Sep. 2	Aug	Jul	Jun	*3Q 2016**	2016	2017	2017	2017	2017	2018
Federal Funds Rate	0.40	0.40	0.40	0.39	0.40	0.39	0.38	*0.39*	0.5	0.6	0.8	0.9	1.1	1.3
Prime Rate	3.50	3.50	3.50	3.50	3.50	3.50	3.50	*3.50*	3.6	3.7	3.9	4.0	4.2	4.3
LIBOR, 3-mo.	0.85	0.85	0.84	0.84	0.81	0.70	0.69	*0.72*	0.9	1.0	1.1	1.3	1.5	1.6
Commercial Paper, 1-mo.	0.40	0.41	0.37	0.39	0.37	0.35	0.38	*0.37*	0.5	0.7	0.8	1.0	1.2	1.3
Treasury bill, 3-mo.	0.32	0.33	0.34	0.33	0.30	0.30	0.27	*0.29*	0.5	0.6	0.8	0.9	1.1	1.2
Treasury bill, 6-mo.	0.50	0.52	0.49	0.47	0.45	0.40	0.40	*0.42*	0.6	0.7	0.9	1.0	1.2	1.3
Treasury bill, 1 yr.	0.60	0.61	0.57	0.61	0.57	0.51	0.55	*0.54*	0.7	0.9	1.0	1.2	1.3	1.5
Treasury note, 2 yr.	0.77	0.77	0.76	0.80	0.74	0.67	0.73	*0.71*	0.9	1.1	1.2	1.4	1.5	1.6
Treasury note, 5 yr.	1.20	1.22	1.17	1.19	1.13	1.07	1.17	*1.12*	1.3	1.5	1.6	1.8	1.9	2.0
Treasury note, 10 yr.	1.66	1.70	1.59	1.58	1.56	1.50	1.64	*1.57*	1.7	1.9	2.0	2.2	2.3	2.5
Treasury note, 30 yr.	2.40	2.45	2.30	2.24	2.26	2.23	2.45	*2.31*	2.4	2.6	2.8	2.9	3.0	3.1
Corporate Aaa bond	3.44	3.49	3.33	3.24	3.32	3.28	3.50	*3.37*	3.5	3.7	3.9	4.0	4.1	4.3
Corporate Baa bond	4.35	4.41	4.25	4.19	4.24	4.22	4.53	*4.33*	4.5	4.7	4.8	5.0	5.1	5.3
State & Local bonds	2.98	2.96	2.83	2.84	2.85	2.83	3.20	*2.96*	3.1	3.2	3.4	3.5	3.6	3.6
Home mortgage rate	3.48	3.50	3.44	3.46	3.44	3.44	3.57	*3.48*	3.6	3.8	3.9	4.1	4.2	4.3
	History								Consensus Forecasts-Quarterly					
	4Q	1Q	2Q	3Q	4Q	1Q	2Q	*3Q*	4Q	1Q	2Q	3Q	4Q	1Q
Key Assumptions	2014	2015	2015	2015	2015	2016	2016	*2016**	2016	2017	2017	2017	2017	2018
Major Currency Index	82.6	89.4	89.9	91.8	93.1	93.3	89.6	*90.0*	90.8	91.6	91.9	92.0	92.0	91.5
Real GDP	2.3	2.0	2.6	2.0	0.9	0.8	1.1	*2.8*	2.4	2.2	2.3	2.2	2.2	2.1
GDP Price Index	0.5	-0.1	2.3	1.3	0.8	0.5	2.3	*1.5*	1.8	1.9	2.0	2.0	2.1	2.0
Consumer Price Index	-0.3	-2.9	2.4	1.4	0.8	-0.3	2.5	*1.7*	2.3	2.1	2.3	2.3	2.4	2.3

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS). **Interest rate data for 3Q 2016 based on historical data through the week ended September 23rd. *Data for 3Q 2016 Major Currency Index is based on data through week ended September 16th. Figures for 3Q 2016 Real GDP, GDP Chained Price Index and Consumer Price Index are consensus forecasts based on a special question asked of the panelists' this month.*

U.S. Treasury Yield Curve
Week ended September 23, 2016 and Year Ago vs.
4Q 2016 and 1Q 2018 Consensus Forecasts



U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average)



Corporate Bond Spreads
As of week ended September 23, 2016

U.S. Treasury Yield Curve
As of week September 23, 2016

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 35, No. 11, November 1, 2016

Wolters Kluwer

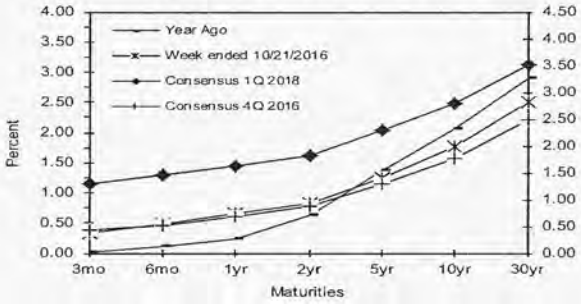
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

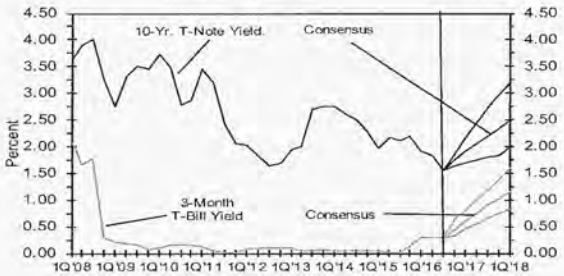
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	4Q	1Q	2Q	3Q	4Q	1Q
Interest Rates	Oct. 21	Oct. 14	Oct. 7	Sep. 30	Sep	Aug	Jul	3Q 2016	2016	2017	2017	2017	2017	2018
Federal Funds Rate	0.41	0.40	0.35	0.40	0.40	0.40	0.39	0.40	0.5	0.7	0.8	0.9	1.1	1.2
Prime Rate	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.6	3.7	3.9	4.0	4.2	4.3
LIBOR, 3-mo.	0.88	0.88	0.87	0.85	0.85	0.81	0.70	0.79	0.9	1.0	1.2	1.3	1.5	1.6
Commercial Paper, 1-mo.	0.43	0.46	0.41	0.39	0.40	0.37	0.35	0.37	0.5	0.7	0.8	1.0	1.1	1.3
Treasury bill, 3-mo.	0.34	0.34	0.33	0.27	0.29	0.30	0.30	0.30	0.4	0.6	0.8	0.9	1.0	1.2
Treasury bill, 6-mo.	0.47	0.47	0.47	0.43	0.47	0.45	0.40	0.44	0.5	0.7	0.9	1.0	1.2	1.3
Treasury bill, 1 yr.	0.66	0.67	0.65	0.59	0.59	0.57	0.51	0.56	0.7	0.9	1.0	1.2	1.3	1.4
Treasury note, 2 yr.	0.82	0.86	0.83	0.75	0.77	0.74	0.67	0.73	0.9	1.1	1.2	1.3	1.5	1.6
Treasury note, 5 yr.	1.25	1.29	1.24	1.13	1.18	1.13	1.07	1.13	1.3	1.5	1.6	1.7	1.9	2.0
Treasury note, 10 yr.	1.76	1.78	1.70	1.58	1.63	1.56	1.50	1.56	1.8	1.9	2.1	2.2	2.3	2.5
Treasury note, 30 yr.	2.50	2.51	2.42	2.30	2.35	2.26	2.23	2.28	2.5	2.6	2.8	2.9	3.0	3.1
Corporate Aaa bond	3.67	3.70	3.65	3.56	3.41	3.32	3.28	3.34	3.5	3.7	3.9	4.0	4.2	4.3
Corporate Baa bond	4.32	4.35	4.31	4.22	4.31	4.24	4.22	4.26	4.5	4.7	4.8	5.0	5.1	5.3
State & Local bonds	3.37	3.36	3.32	3.28	2.93	2.85	2.83	2.87	3.2	3.3	3.4	3.5	3.7	3.7
Home mortgage rate	3.54	3.52	3.47	3.42	3.46	3.44	3.44	3.45	3.6	3.8	3.9	4.1	4.2	4.4
	History								Consensus Forecasts-Quarterly					
	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q
Key Assumptions	2014	2015	2015	2015	2015	2016	2016	2016	2016	2017	2017	2017	2017	2018
Major Currency Index	82.6	89.4	89.9	91.8	93.1	93.3	89.6	90.0	91.6	92.3	92.6	92.6	92.7	92.2
Real GDP	2.3	2.0	2.6	2.0	0.9	0.8	1.4	2.9	2.3	2.2	2.3	2.2	2.1	2.1
GDP Price Index	0.5	-0.1	2.3	1.3	0.8	0.5	2.3	1.5	2.0	2.0	2.1	2.1	2.2	2.2
Consumer Price Index	-0.3	-2.9	2.4	1.4	0.8	-0.3	2.5	1.6	2.7	2.2	2.3	2.2	2.4	2.3

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AA-AAA and BBB-A corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).

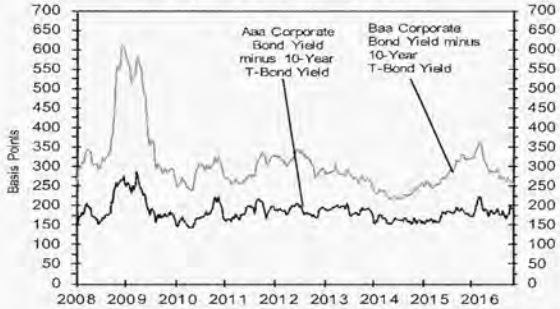
U.S. Treasury Yield Curve
Week ended October 21, 2016 and Year Ago vs.
4Q 2016 and 1Q 2018 Consensus Forecasts



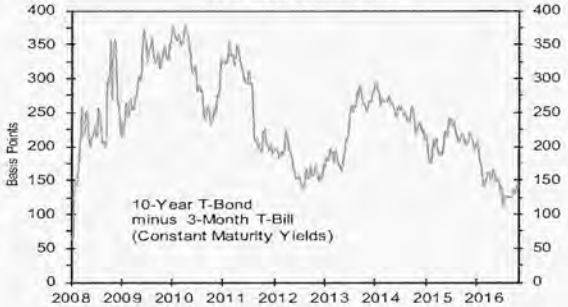
U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average) Forecast



Corporate Bond Spreads
As of week ended October 21, 2016



U.S. Treasury Yield Curve
As of week October, 2016



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 35, No. 12, December 1, 2016

Wolters Kluwer

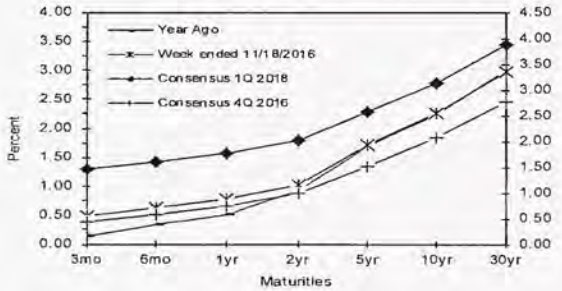
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

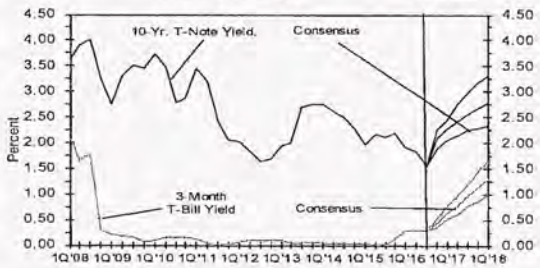
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	4Q	1Q	2Q	3Q	4Q	1Q
Interest Rates	Nov. 18	Nov. 11	Nov. 4	Oct. 28	Oct	Sep	Aug	3Q 2016	2016	2017	2017	2017	2017	2018
Federal Funds Rate	0.41	0.41	0.40	0.41	0.39	0.40	0.40	0.40	0.5	0.7	0.8	1.0	1.1	1.3
Prime Rate	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.6	3.8	3.9	4.1	4.2	4.4
LIBOR, 3-mo.	0.91	0.89	0.88	0.89	0.88	0.85	0.81	0.79	0.9	1.1	1.2	1.4	1.5	1.7
Commercial Paper, 1-mo.	0.43	0.42	0.42	0.40	0.43	0.40	0.37	0.37	0.5	0.7	0.9	1.1	1.3	1.4
Treasury bill, 3-mo.	0.48	0.44	0.36	0.32	0.33	0.29	0.30	0.30	0.4	0.6	0.8	1.0	1.1	1.3
Treasury bill, 6-mo.	0.62	0.56	0.51	0.48	0.47	0.47	0.45	0.44	0.6	0.8	0.9	1.1	1.3	1.4
Treasury bill, 1 yr.	0.77	0.70	0.64	0.67	0.66	0.59	0.57	0.56	0.7	0.9	1.1	1.3	1.4	1.6
Treasury note, 2 yr.	1.03	0.88	0.82	0.86	0.84	0.77	0.74	0.73	1.0	1.1	1.3	1.5	1.6	1.8
Treasury note, 5 yr.	1.71	1.42	1.27	1.30	1.27	1.18	1.13	1.13	1.5	1.7	1.9	2.0	2.2	2.3
Treasury note, 10 yr.	2.26	1.98	1.82	1.81	1.76	1.63	1.56	1.56	2.1	2.3	2.4	2.6	2.7	2.8
Treasury note, 30 yr.	2.98	2.76	2.58	2.55	2.50	2.35	2.26	2.28	2.8	3.0	3.1	3.2	3.3	3.4
Corporate Aaa bond	4.10	3.95	3.79	3.73	3.69	3.41	3.32	3.34	3.8	4.0	4.1	4.2	4.4	4.5
Corporate Baa bond	4.77	4.61	4.44	4.37	4.34	4.31	4.24	4.26	4.7	4.9	5.1	5.2	5.3	5.5
State & Local bonds	3.59	3.40	3.36	3.37	3.35	2.93	2.85	2.87	3.4	3.6	3.7	3.8	3.9	4.0
Home mortgage rate	3.94	3.57	3.54	3.47	3.47	3.46	3.44	3.45	3.8	4.0	4.2	4.3	4.4	4.6
	History								Consensus Forecasts-Quarterly					
	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q
Key Assumptions	2014	2015	2015	2015	2015	2016	2016	2016	2016	2017	2017	2017	2017	2018
Major Currency Index	82.6	89.4	89.9	91.8	93.1	93.3	89.6	90.0	92.8	93.9	94.3	94.2	94.2	93.8
Real GDP	2.3	2.0	2.6	2.0	0.9	0.8	1.4	2.9	2.3	2.2	2.2	2.3	2.2	2.3
GDP Price Index	0.5	-0.1	2.3	1.3	0.8	0.5	2.3	1.5	2.1	1.9	2.1	2.1	2.1	2.2
Consumer Price Index	-0.3	-2.9	2.4	1.4	0.8	-0.3	2.5	1.6	2.8	2.1	2.4	2.3	2.5	2.3

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data is sourced from Haver Analytics. Historical data for Fed's Major Currency Index is from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).

U.S. Treasury Yield Curve
Week ended November 18, 2016 and Year Ago vs. 4Q 2016 and 1Q 2018 Consensus Forecasts



U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average)



Corporate Bond Spreads
As of week ended November 18, 2016

U.S. Treasury Yield Curve
As of week November 18, 2016

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Long-Range Survey:

The table below contains the results of our twice-annual long-range CONSENSUS survey. There are also Top 10 and Bottom 10 averages for each variable. Shown are consensus estimates for the years 2018 through 2022 and averages for the five-year periods 2018-2022 and 2023-2027. Apply these projections cautiously. Few if any economic, demographic and political forces can be evaluated accurately over such long time spans.

		Average For The Year					Five-Year Averages	
Interest Rates		2018	2019	2020	2021	2022	2018-2022	2023-2027
1. Federal Funds Rate	**CONSENSUS**	**1.8**	**2.4**	**2.8**	**3.0**	**3.0**	**2.6**	**3.0**
	Top 10 Average	2.4	3.1	3.5	3.6	3.7	3.3	3.6
	Bottom 10 Average	1.3	1.5	2.0	2.2	2.2	1.9	2.2
2. Prime Rate	**CONSENSUS**	**4.8**	**5.5**	**5.8**	**6.0**	**6.0**	**5.6**	**5.9**
	Top 10 Average	5.4	6.2	6.6	6.7	6.7	6.3	6.6
	Bottom 10 Average	4.3	4.7	5.0	5.3	5.2	4.9	5.1
3. LIBOR, 3-Mo.	**CONSENSUS**	**2.1**	**2.8**	**3.1**	**3.2**	**3.3**	**2.9**	**3.2**
	Top 10 Average	2.7	3.4	3.8	3.9	3.9	3.5	3.8
	Bottom 10 Average	1.7	2.1	2.4	2.5	2.5	2.2	2.5
4. Commercial Paper, 1-Mo.	**CONSENSUS**	**2.0**	**2.7**	**3.1**	**3.2**	**3.2**	**2.8**	**3.2**
	Top 10 Average	2.5	3.2	3.6	3.7	3.8	3.4	3.7
	Bottom 10 Average	1.6	2.1	2.5	2.6	2.6	2.3	2.6
5. Treasury Bill Yield, 3-Mo.	**CONSENSUS**	**1.7**	**2.4**	**2.8**	**2.9**	**2.9**	**2.6**	**2.9**
	Top 10 Average	2.4	3.2	3.5	3.6	3.7	3.3	3.6
	Bottom 10 Average	1.3	1.7	2.0	2.1	2.1	1.8	2.1
6. Treasury Bill Yield, 6-Mo.	**CONSENSUS**	**1.9**	**2.6**	**2.9**	**3.1**	**3.1**	**2.7**	**3.0**
	Top 10 Average	2.6	3.3	3.7	3.8	3.8	3.4	3.7
	Bottom 10 Average	1.4	1.9	2.1	2.2	2.2	2.0	2.2
7. Treasury Bill Yield, 1-Yr.	**CONSENSUS**	**2.1**	**2.7**	**3.0**	**3.1**	**3.2**	**2.8**	**3.2**
	Top 10 Average	2.8	3.5	3.8	3.9	3.9	3.6	3.8
	Bottom 10 Average	1.5	1.9	2.2	2.3	2.3	2.1	2.3
8. Treasury Note Yield, 2-Yr.	**CONSENSUS**	**2.2**	**2.9**	**3.2**	**3.3**	**3.3**	**3.0**	**3.3**
	Top 10 Average	2.9	3.6	4.0	4.0	4.0	3.7	4.1
	Bottom 10 Average	1.7	2.1	2.4	2.5	2.5	2.2	2.4
10. Treasury Note Yield, 5-Yr.	**CONSENSUS**	**2.7**	**3.2**	**3.5**	**3.6**	**3.6**	**3.3**	**3.6**
	Top 10 Average	3.3	4.0	4.3	4.3	4.4	4.0	4.4
	Bottom 10 Average	2.2	2.4	2.6	2.8	2.8	2.6	2.8
11. Treasury Note Yield, 10-Yr.	**CONSENSUS**	**3.1**	**3.5**	**3.8**	**3.9**	**3.9**	**3.6**	**3.9**
	Top 10 Average	3.8	4.3	4.6	4.6	4.6	4.4	4.7
	Bottom 10 Average	2.5	2.7	2.9	3.1	3.1	2.8	3.1
12. Treasury Bond Yield, 30-Yr.	**CONSENSUS**	**3.8**	**4.1**	**4.3**	**4.4**	**4.4**	**4.2**	**4.5**
	Top 10 Average	4.5	5.0	5.2	5.2	5.3	5.0	5.3
	Bottom 10 Average	3.1	3.3	3.5	3.6	3.6	3.4	3.6
13. Corporate Aaa Bond Yield	**CONSENSUS**	**4.8**	**5.2**	**5.4**	**5.5**	**5.5**	**5.3**	**5.5**
	Top 10 Average	5.4	5.8	6.1	6.1	6.1	5.9	6.2
	Bottom 10 Average	4.3	4.6	4.8	4.8	4.8	4.7	4.9
13. Corporate Baa Bond Yield	**CONSENSUS**	**5.9**	**6.2**	**6.4**	**6.4**	**6.4**	**6.3**	**6.4**
	Top 10 Average	6.5	6.9	7.0	7.1	7.2	6.9	7.2
	Bottom 10 Average	5.3	5.5	5.8	5.8	5.7	5.6	5.7
14. State & Local Bonds Yield	**CONSENSUS**	**4.3**	**4.6**	**4.5**	**4.8**	**4.8**	**4.6**	**4.8**
	Top 10 Average	4.9	5.3	5.4	5.5	5.6	5.3	5.6
	Bottom 10 Average	3.8	3.8	3.5	4.0	4.0	3.8	4.0
15. Home Mortgage Rate	**CONSENSUS**	**4.9**	**5.3**	**5.5**	**5.6**	**5.6**	**5.4**	**5.6**
	Top 10 Average	5.5	6.0	6.2	6.3	6.3	6.0	6.3
	Bottom 10 Average	4.3	4.6	4.7	4.9	4.9	4.7	4.9
A. FRB - Major Currency Index	**CONSENSUS**	**94.6**	**93.8**	**93.6**	**93.5**	**93.2**	**93.8**	**92.1**
	Top 10 Average	97.6	97.9	98.3	98.4	98.4	98.1	97.4
	Bottom 10 Average	91.5	89.6	88.7	88.4	87.9	89.2	86.6
		Year-Over-Year, % Change					Five-Year Averages	
		2018	2019	2020	2021	2022	2018-2022	2023-2027
B. Real GDP	**CONSENSUS**	**2.3**	**2.2**	**2.1**	**2.1**	**2.1**	**2.2**	**2.1**
	Top 10 Average	2.7	2.5	2.4	2.4	2.4	2.5	2.5
	Bottom 10 Average	1.9	1.8	1.7	1.8	1.8	1.8	1.8
C. GDP Chained Price Index	**CONSENSUS**	**2.1**	**2.1**	**2.1**	**2.1**	**2.0**	**2.1**	**2.0**
	Top 10 Average	2.4	2.4	2.4	2.4	2.2	2.3	2.2
	Bottom 10 Average	1.8	1.8	1.9	1.9	1.9	1.9	1.9
D. Consumer Price Index	**CONSENSUS**	**2.4**	**2.3**	**2.3**	**2.3**	**2.3**	**2.3**	**2.3**
	Top 10 Average	2.7	2.6	2.6	2.6	2.5	2.6	2.5
	Bottom 10 Average	2.1	2.1	2.2	2.1	2.0	2.1	2.1

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 36, No. 1, January 1, 2017

Wolters Kluwer

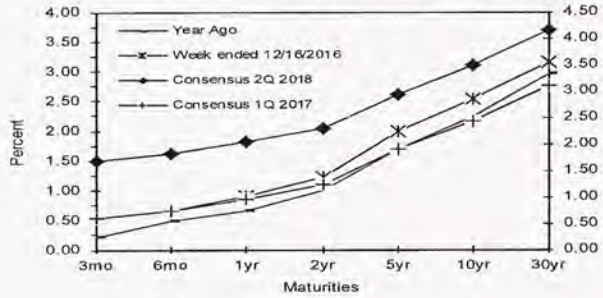
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

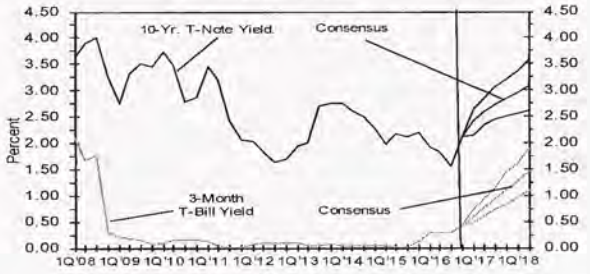
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	1Q	2Q	3Q	4Q	1Q	2Q
Interest Rates	Dec. 16	Dec. 9	Dec. 2	Nov. 25	Nov	Oct	Sep	*4Q 2016**	2017	2017	2017	2017	2018	2018
Federal Funds Rate	0.41	0.41	0.41	0.41	0.41	0.39	0.40	*0.40*	0.7	0.8	1.0	1.2	1.3	1.5
Prime Rate	3.50	3.50	3.50	3.50	3.50	3.50	3.50	*3.50*	3.8	3.9	4.1	4.2	4.4	4.6
LIBOR, 3-mo.	0.98	0.95	0.94	0.93	0.90	0.88	0.85	*0.92*	1.1	1.2	1.4	1.5	1.7	1.9
Commercial Paper, 1-mo.	0.63	0.52	0.49	0.41	0.43	0.43	0.40	*0.48*	0.7	0.9	1.1	1.2	1.4	1.6
Treasury bill, 3-mo.	0.52	0.51	0.48	0.49	0.45	0.33	0.29	*0.43*	0.6	0.8	1.0	1.1	1.3	1.5
Treasury bill, 6-mo.	0.65	0.63	0.61	0.62	0.58	0.47	0.47	*0.56*	0.7	0.9	1.1	1.3	1.4	1.6
Treasury bill, 1 yr.	0.89	0.84	0.80	0.79	0.74	0.66	0.59	*0.76*	0.9	1.1	1.3	1.5	1.6	1.8
Treasury note, 2 yr.	1.23	1.12	1.11	1.10	0.98	0.84	0.77	*1.00*	1.2	1.4	1.6	1.7	1.9	2.0
Treasury note, 5 yr.	2.00	1.84	1.83	1.81	1.60	1.27	1.18	*1.60*	1.9	2.1	2.2	2.4	2.5	2.6
Treasury note, 10 yr.	2.54	2.40	2.37	2.34	2.14	1.76	1.63	*2.12*	2.4	2.6	2.7	2.8	3.0	3.1
Treasury note, 30 yr.	3.16	3.08	3.03	3.01	2.86	2.50	2.35	*2.83*	3.1	3.2	3.3	3.5	3.6	3.7
Corporate Aaa bond	4.24	4.19	4.15	4.15	4.00	3.69	3.41	*3.97*	4.1	4.3	4.4	4.5	4.6	4.7
Corporate Baa bond	4.86	4.82	4.81	4.82	4.66	4.34	4.31	*4.61*	5.0	5.1	5.2	5.4	5.5	5.6
State & Local bonds	3.78	3.78	3.80	3.67	3.51	3.35	2.93	*3.55*	3.7	3.8	3.9	4.1	4.1	4.3
Home mortgage rate	4.16	4.13	4.08	4.03	3.77	3.47	3.46	*3.80*	4.2	4.3	4.4	4.5	4.6	4.8
	History								Consensus Forecasts-Quarterly					
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	*4Q*	1Q	2Q	3Q	4Q	1Q	2Q
Key Assumptions	2015	2015	2015	2015	2016	2016	2016	*2016**	2017	2017	2017	2017	2018	2018
Major Currency Index	89.4	89.9	91.8	93.1	93.3	89.6	90.3	*93.2*	95.2	95.6	95.9	96.0	95.4	95.2
Real GDP	2.0	2.6	2.0	0.9	0.8	1.4	3.5	*2.1*	2.3	2.3	2.4	2.4	2.5	2.5
GDP Price Index	-0.1	2.3	1.3	0.8	0.5	2.3	1.4	*2.1*	2.0	2.1	2.1	2.1	2.2	2.2
Consumer Price Index	-2.9	2.4	1.4	0.8	-0.3	2.5	1.6	*2.9*	2.3	2.4	2.4	2.5	2.3	2.4

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data is sourced from Haver Analytics. Historical data for Fed's Major Currency Index is from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS). **Interest rate data for 4Q 2016 based on historical data through the week ended December 16th *Data for 4Q 2016 Major Currency Index is based on data through week ended December 16th. Figures for 4Q 2016 Real GDP, GDP Chained Price Index and Consumer Price Index are consensus forecasts based on a special question asked of the panelists' this month.*

U.S. Treasury Yield Curve
Week ended December 16, 2016 and Year Ago vs.
1Q 2017 and 2Q 2018 Consensus Forecasts

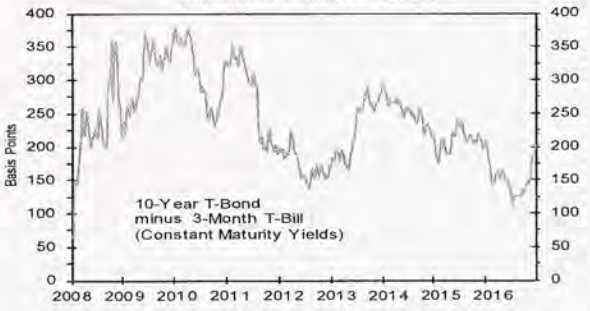


U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average) Forecast



Corporate Bond Spreads
As of week ended December 18, 2016

U.S. Treasury Yield Curve
As of week December 16, 2016



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 36, No. 2, February 1, 2017

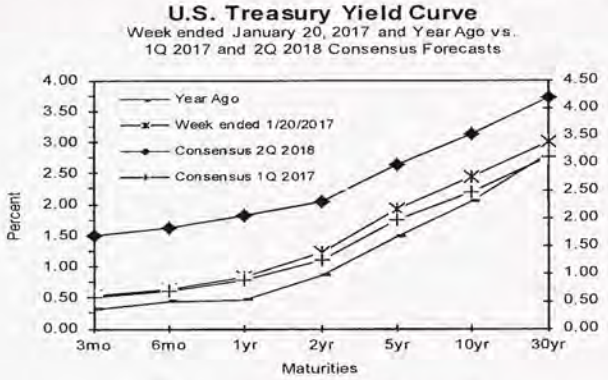
Wolters Kluwer

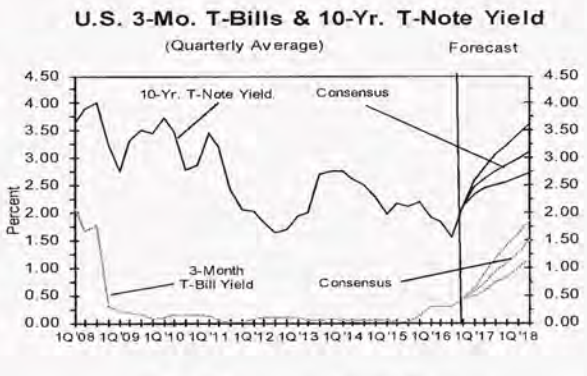
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

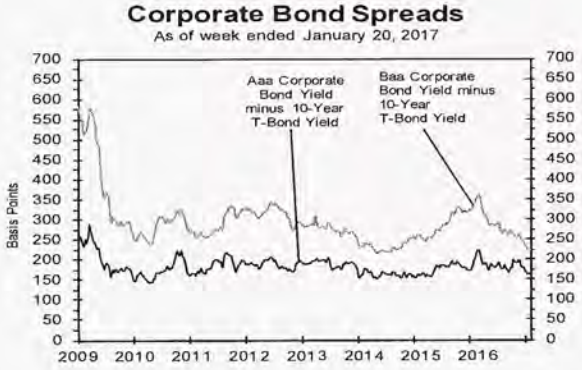
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

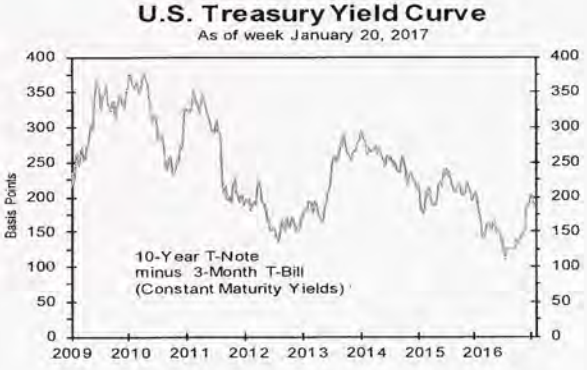
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	1Q	2Q	3Q	4Q	1Q	2Q
Interest Rates	Jan. 20	Jan. 13	Jan. 6	Dec. 31	Dec	Nov	Oct	4Q 2016*	2017	2017	2017	2017	2018	2018
Federal Funds Rate	0.66	0.66	0.60	0.66	0.54	0.41	0.39	0.45	0.7	0.8	1.0	1.1	1.3	1.6
Prime Rate	3.75	3.75	3.75	3.73	3.63	3.50	3.50	3.54	3.8	3.9	4.1	4.3	4.4	4.6
LIBOR, 3-mo.	1.03	1.02	1.01	1.00	0.97	0.90	0.88	0.92	1.0	1.2	1.3	1.5	1.7	1.9
Commercial Paper, 1-mo.	0.66	0.63	0.62	0.65	0.56	0.43	0.43	0.47	0.7	0.8	1.0	1.2	1.4	1.6
Treasury bill, 3-mo.	0.53	0.52	0.53	0.51	0.51	0.45	0.33	0.43	0.6	0.7	0.9	1.1	1.3	1.5
Treasury bill, 6-mo.	0.62	0.60	0.63	0.63	0.63	0.58	0.47	0.56	0.7	0.8	1.1	1.2	1.4	1.6
Treasury bill, 1 yr.	0.82	0.82	0.86	0.87	0.86	0.74	0.66	0.75	0.9	1.0	1.3	1.4	1.6	1.8
Treasury note, 2 yr.	1.21	1.20	1.21	1.24	1.19	0.98	0.84	1.00	1.2	1.4	1.5	1.7	1.9	2.0
Treasury note, 5 yr.	1.92	1.89	1.92	2.00	1.94	1.60	1.27	1.60	1.9	2.1	2.2	2.4	2.5	2.6
Treasury note, 10 yr.	2.43	2.38	2.43	2.51	2.47	2.14	1.76	2.12	2.5	2.6	2.7	2.9	3.0	3.1
Treasury note, 30 yr.	3.01	2.98	3.01	3.09	3.10	2.86	2.50	2.82	3.1	3.2	3.4	3.5	3.6	3.7
Corporate Aaa bond	4.04	4.02	4.05	4.14	4.18	4.00	3.69	3.96	4.1	4.2	4.4	4.5	4.6	4.8
Corporate Baa bond	4.64	4.63	4.67	4.75	4.81	4.66	4.34	4.60	4.9	5.0	5.2	5.3	5.4	5.6
State & Local bonds	3.67	3.67	3.73	3.75	3.78	3.51	3.35	3.55	3.7	3.8	3.9	4.1	4.2	4.3
Home mortgage rate	4.09	4.12	4.20	4.32	4.20	3.77	3.47	3.81	4.2	4.3	4.4	4.6	4.7	4.8
	History								Consensus Forecasts-Quarterly					
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q
Key Assumptions	2015	2015	2015	2015	2016	2016	2016	2016*	2017	2017	2017	2017	2018	2018
Major Currency Index	89.4	89.9	91.8	93.1	93.3	89.6	90.3	93.7	94.8	95.3	95.6	95.7	95.5	95.1
Real GDP	2.0	2.6	2.0	0.9	0.8	1.4	3.5	1.9	2.2	2.3	2.4	2.4	2.4	2.5
GDP Price Index	-0.1	2.3	1.3	0.8	0.5	2.3	1.4	2.1	2.0	2.1	2.0	2.1	2.1	2.2
Consumer Price Index	-2.9	2.4	1.4	0.8	-0.3	2.5	1.6	3.4	2.5	2.3	2.4	2.4	2.3	2.3

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data is sourced from Haver Analytics. Historical data for Fed's Major Currency Index is from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).









20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 36, No. 3, March 1, 2017

Wolters Kluwer

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

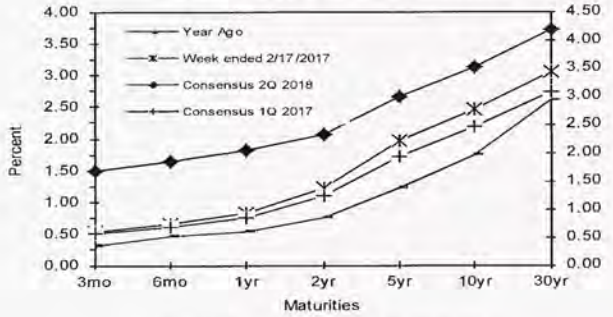
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	1Q	2Q	3Q	4Q	1Q	2Q
Interest Rates	Feb. 17	Feb. 10	Feb. 3	Jan. 27	Jan	Dec	Nov	4Q 2016*	2017	2017	2017	2017	2018	2018
Federal Funds Rate	0.66	0.66	0.65	0.66	0.65	0.54	0.41	0.45	0.7	0.8	1.0	1.2	1.4	1.6
Prime Rate	3.75	3.75	3.75	3.75	3.75	3.63	3.50	3.54	3.8	3.9	4.1	4.3	4.5	4.6
LIBOR, 3-mo.	1.05	1.04	1.03	1.04	1.02	0.97	0.90	0.92	1.0	1.2	1.4	1.5	1.7	1.9
Commercial Paper, 1-mo.	0.60	0.62	0.62	0.65	0.64	0.56	0.43	0.47	0.7	0.8	1.0	1.2	1.4	1.6
Treasury bill, 3-mo.	0.53	0.54	0.51	0.51	0.52	0.51	0.45	0.43	0.6	0.7	0.9	1.1	1.3	1.5
Treasury bill, 6-mo.	0.66	0.63	0.64	0.61	0.62	0.63	0.58	0.56	0.7	0.8	1.1	1.2	1.4	1.6
Treasury bill, 1 yr.	0.83	0.80	0.83	0.81	0.83	0.86	0.74	0.75	0.8	1.0	1.2	1.4	1.6	1.8
Treasury note, 2 yr.	1.23	1.17	1.21	1.21	1.21	1.19	0.98	1.00	1.2	1.4	1.5	1.7	1.9	2.1
Treasury note, 5 yr.	1.96	1.86	1.92	1.94	1.92	1.94	1.60	1.60	1.9	2.1	2.2	2.4	2.5	2.7
Treasury note, 10 yr.	2.46	2.39	2.48	2.48	2.43	2.47	2.14	2.12	2.5	2.6	2.7	2.9	3.0	3.1
Treasury note, 30 yr.	3.05	3.01	3.08	3.06	3.02	3.10	2.86	2.82	3.1	3.2	3.3	3.5	3.6	3.7
Corporate Aaa bond	4.11	4.08	4.15	4.11	4.06	4.18	4.00	3.96	4.0	4.2	4.3	4.5	4.6	4.7
Corporate Baa bond	4.69	4.67	4.74	4.70	4.66	4.81	4.66	4.60	4.7	4.9	5.1	5.3	5.4	5.5
State & Local bonds	3.73	3.71	3.74	3.72	3.70	3.78	3.51	3.55	3.7	3.8	3.9	4.0	4.2	4.3
Home mortgage rate	4.15	4.17	4.19	4.19	4.15	4.20	3.77	3.81	4.2	4.3	4.4	4.6	4.7	4.8
	History								Consensus Forecasts-Quarterly					
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q
Key Assumptions	2015	2015	2015	2015	2016	2016	2016	2016*	2017	2017	2017	2017	2018	2018
Major Currency Index	89.4	89.9	91.8	93.1	93.3	89.6	90.3	93.7	94.3	94.6	95.0	95.3	95.4	95.1
Real GDP	2.0	2.6	2.0	0.9	0.8	1.4	3.5	1.9	2.2	2.3	2.4	2.4	2.5	2.5
GDP Price Index	-0.1	2.3	1.3	0.8	0.5	2.3	1.4	2.1	2.2	2.0	2.1	2.1	2.2	2.2
Consumer Price Index	-2.9	2.4	1.4	0.8	-0.3	2.5	1.6	3.4	2.9	2.2	2.4	2.3	2.4	2.3

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data is sourced from Haver Analytics. Historical data for Fed's Major Currency Index is from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).

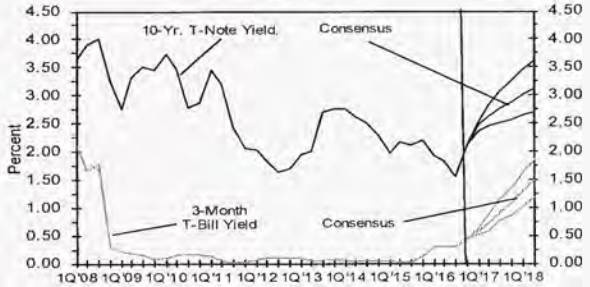
U.S. Treasury Yield Curve

Week ended February 17, 2017 and Year Ago vs. 1Q 2017 and 2Q 2018 Consensus Forecasts



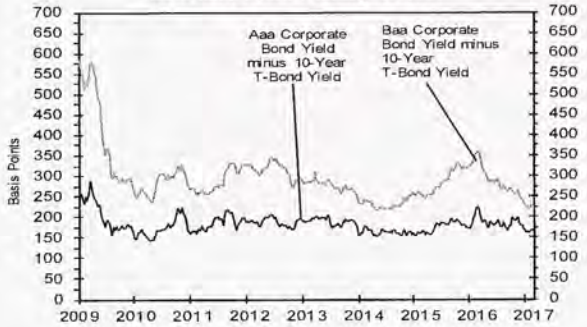
U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield

(Quarterly Average)



Corporate Bond Spreads

As of week ended February 17, 2017



U.S. Treasury Yield Curve

As of week February 17, 2017

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 36, No. 4, April 1, 2017

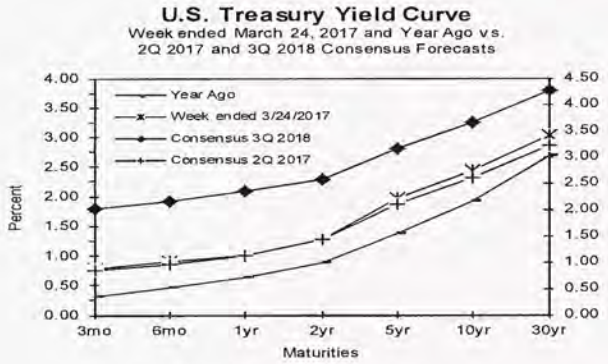
Wolters Kluwer

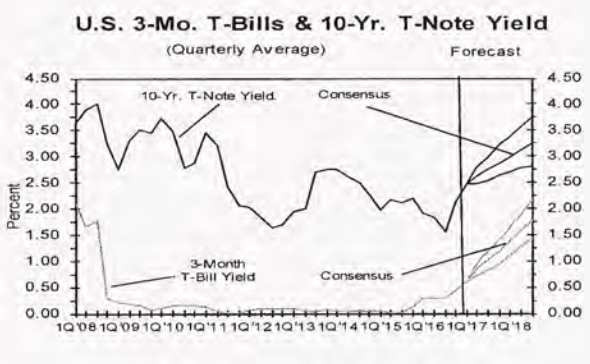
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

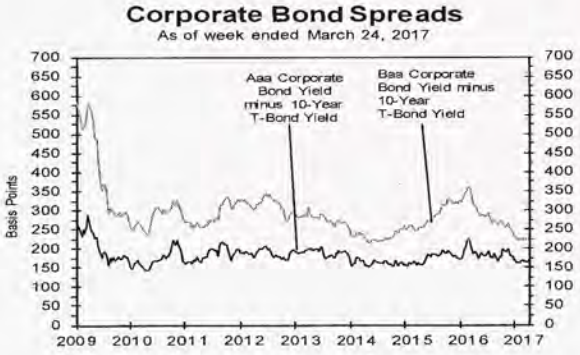
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	2Q	3Q	4Q	1Q	2Q	3Q
Interest Rates	Mar. 24	Mar. 17	Mar. 10	Mar. 3	Feb.	Jan.	Dec.	1Q 2017*	2017	2017	2017	2018	2018	2018
Federal Funds Rate	0.91	0.66	0.65	0.66	0.66	0.65	0.54	*0.68*	**0.9**	**1.1**	**1.3**	**1.5**	**1.7**	**1.9**
Prime Rate	4.00	3.75	3.75	3.75	3.75	3.75	3.63	*3.78*	**4.0**	**4.2**	**4.4**	**4.6**	**4.7**	**4.9**
LIBOR, 3-mo.	1.15	1.14	1.11	1.08	1.04	1.02	0.97	*1.06*	**1.3**	**1.4**	**1.6**	**1.8**	**2.0**	**2.2**
Commercial Paper, 1-mo.	0.82	0.85	0.74	0.63	0.61	0.64	0.56	*0.68*	**1.0**	**1.1**	**1.3**	**1.5**	**1.7**	**1.9**
Treasury bill, 3-mo.	0.77	0.75	0.74	0.61	0.53	0.52	0.51	*0.60*	**0.8**	**1.0**	**1.2**	**1.4**	**1.6**	**1.8**
Treasury bill, 6-mo.	0.90	0.90	0.87	0.77	0.65	0.62	0.63	*0.72*	**1.0**	**1.1**	**1.3**	**1.5**	**1.7**	**1.9**
Treasury bill, 1 yr.	1.00	1.03	1.02	0.91	0.82	0.83	0.86	*0.89*	**1.1**	**1.3**	**1.5**	**1.7**	**1.9**	**2.1**
Treasury note, 2 yr.	1.27	1.36	1.34	1.27	1.20	1.21	1.19	*1.24*	**1.4**	**1.6**	**1.8**	**1.9**	**2.1**	**2.3**
Treasury note, 5 yr.	1.96	2.07	2.08	1.96	1.91	1.92	1.94	*1.96*	**2.1**	**2.2**	**2.4**	**2.5**	**2.7**	**2.8**
Treasury note, 10 yr.	2.42	2.55	2.55	2.43	2.43	2.43	2.47	*2.46*	**2.6**	**2.7**	**2.9**	**3.0**	**3.1**	**3.2**
Treasury note, 30 yr.	3.03	3.15	3.14	3.04	3.04	3.02	3.10	*3.06*	**3.2**	**3.3**	**3.5**	**3.6**	**3.7**	**3.8**
Corporate Aaa bond	4.10	4.20	4.19	4.07	4.10	4.06	4.18	*4.11*	**4.2**	**4.3**	**4.5**	**4.6**	**4.8**	**4.9**
Corporate Baa bond	4.68	4.79	4.77	4.65	4.68	4.66	4.81	*4.70*	**4.9**	**5.1**	**5.3**	**5.4**	**5.5**	**5.6**
State & Local bonds	3.71	3.77	3.76	3.71	3.72	3.70	3.78	*3.72*	**3.9**	**4.0**	**4.1**	**4.3**	**4.4**	**4.5**
Home mortgage rate	4.23	4.30	4.21	4.10	4.17	4.15	4.20	*4.19*	**4.3**	**4.4**	**4.6**	**4.7**	**4.8**	**4.9**
	History								Consensus Forecasts-Quarterly					
	2Q	3Q	4Q	1Q	2Q	3Q	4Q	*1Q*	2Q	3Q	4Q	1Q	2Q	3Q
Key Assumptions	2015	2015	2015	2016	2016	2016	2016*	*2017**	2017	2017	2017	2018	2018	2018
Major Currency Index	89.9	91.8	93.1	93.3	89.6	90.3	93.7	*94.5*	**94.5**	**95.0**	**95.4**	**95.5**	**95.1**	**94.9**
Real GDP	2.6	2.0	0.9	0.8	1.4	3.5	1.9	*1.7*	**2.5**	**2.4**	**2.4**	**2.4**	**2.5**	**2.4**
GDP Price Index	2.3	1.3	0.8	0.5	2.3	1.4	2.1	*2.2*	**1.9**	**2.1**	**2.2**	**2.3**	**2.2**	**2.2**
Consumer Price Index	2.4	1.5	0.4	0.1	2.3	1.8	3.0	*3.1*	**1.9**	**2.4**	**2.3**	**2.4**	**2.4**	**2.4**

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data is sourced from Haver Analytics. Historical data for Fed's Major Currency Index is from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS). **Interest rate data for 1Q 2017 based on historical data through the week ended March 24th. *Data for 1Q 2017 Major Currency Index is based on data through week ended March 24th. Figures for 1Q 2017 Real GDP, GDP Chained Price Index and Consumer Price Index are consensus forecasts based on a special question asked of the panelists' this month.*







20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 36, No. 5, May 1, 2017

Wolters Kluwer

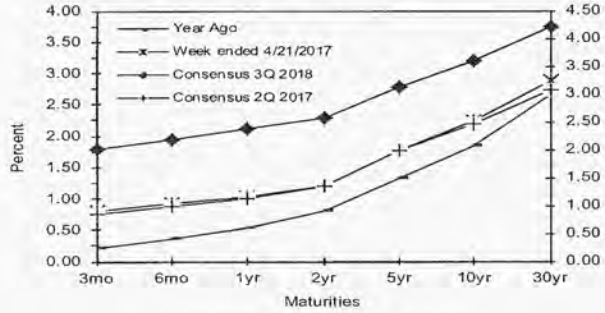
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

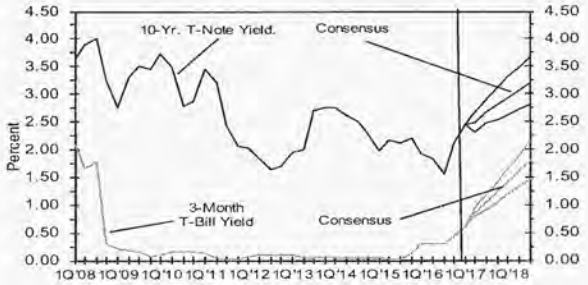
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	2Q	3Q	4Q	1Q	2Q	3Q
Interest Rates	Apr. 21	Apr. 14	Apr. 7	Mar. 31	Mar.	Feb.	Jan.	1Q 2017	2017	2017	2017	2018	2018	2018
Federal Funds Rate	0.91	0.91	0.87	0.91	0.76	0.66	0.65	0.69	1.0	1.2	1.3	1.5	1.7	1.9
Prime Rate	4.00	4.00	4.00	4.00	3.85	3.75	3.75	3.78	4.0	4.2	4.4	4.6	4.8	5.0
LIBOR, 3-mo.	1.15	1.16	1.15	1.15	1.13	1.04	1.02	1.06	1.2	1.4	1.6	1.8	2.0	2.2
Commercial Paper, 1-mo.	0.83	0.82	0.83	0.82	0.77	0.61	0.64	0.67	1.0	1.1	1.4	1.6	1.7	1.9
Treasury bill, 3-mo.	0.81	0.82	0.80	0.78	0.73	0.53	0.52	0.59	0.9	1.1	1.2	1.4	1.6	1.8
Treasury bill, 6-mo.	0.93	0.95	0.93	0.91	0.87	0.65	0.62	0.71	1.0	1.2	1.4	1.5	1.7	1.9
Treasury bill, 1 yr.	1.02	1.05	1.04	1.03	1.00	0.82	0.83	0.88	1.1	1.3	1.5	1.7	1.9	2.1
Treasury note, 2 yr.	1.20	1.25	1.25	1.28	1.30	1.20	1.21	1.24	1.4	1.6	1.8	1.9	2.1	2.3
Treasury note, 5 yr.	1.76	1.83	1.88	1.94	2.00	1.91	1.92	1.94	2.0	2.2	2.4	2.5	2.6	2.8
Treasury note, 10 yr.	2.23	2.30	2.35	2.40	2.47	2.43	2.43	2.44	2.5	2.7	2.8	2.9	3.1	3.2
Treasury note, 30 yr.	2.88	2.93	2.99	3.01	3.07	3.04	3.02	3.04	3.1	3.3	3.4	3.5	3.6	3.7
Corporate Aaa bond	3.94	3.99	4.06	4.06	4.13	4.10	4.06	4.10	4.1	4.3	4.5	4.6	4.7	4.9
Corporate Baa bond	4.54	4.59	4.65	4.65	4.71	4.68	4.66	4.68	4.8	5.0	5.2	5.3	5.5	5.6
State & Local bonds	3.51	3.55	3.59	3.64	3.72	3.72	3.70	3.71	3.8	4.0	4.2	4.3	4.4	4.5
Home mortgage rate	3.97	4.08	4.10	4.23	4.20	4.17	4.15	4.17	4.2	4.4	4.5	4.7	4.8	4.9
	History								Consensus Forecasts-Quarterly					
	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q
Key Assumptions	2015	2015	2015	2016	2016	2016	2016	2017	2017	2017	2017	2018	2018	2018
Major Currency Index	89.9	91.8	93.1	93.3	89.6	90.3	93.7	94.4	94.3	94.7	95.0	95.1	94.8	94.5
Real GDP	2.6	2.0	0.9	0.8	1.4	3.5	2.1	0.7	2.7	2.4	2.4	2.4	2.5	2.4
GDP Price Index	2.3	1.3	0.8	0.5	2.3	1.4	2.1	2.3	1.7	2.1	2.1	2.2	2.2	2.2
Consumer Price Index	2.4	1.5	0.4	0.1	2.3	1.8	3.0	3.1	1.6	2.4	2.3	2.4	2.3	2.4

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data is sourced from Haver Analytics. Historical data for Fed's Major Currency Index is from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).

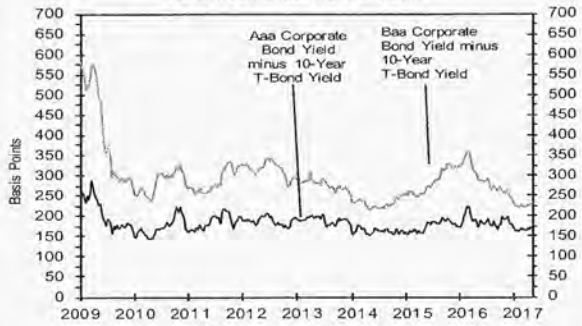
U.S. Treasury Yield Curve
Week ended April 21, 2017 and Year Ago vs.
2Q 2017 and 3Q 2018 Consensus Forecasts



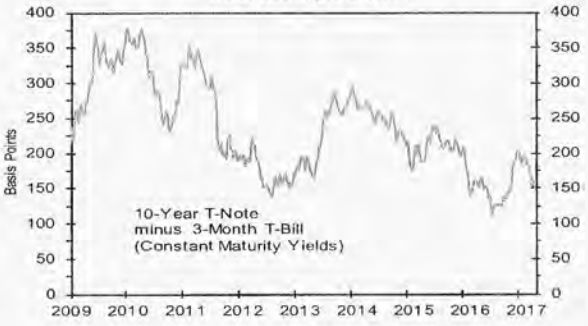
U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average)



Corporate Bond Spreads
As of week ended April 21, 2017



U.S. Treasury Yield Curve
As of week April 21, 2017



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 36, No. 6, June 1, 2017

Wolters Kluwer

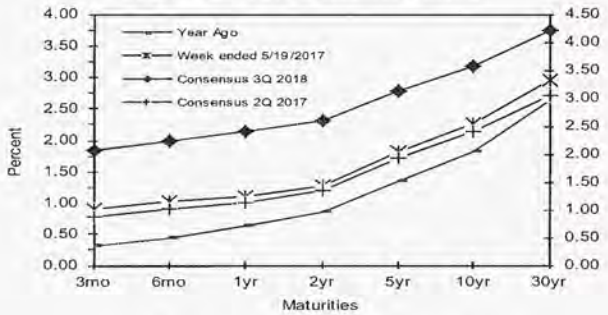
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

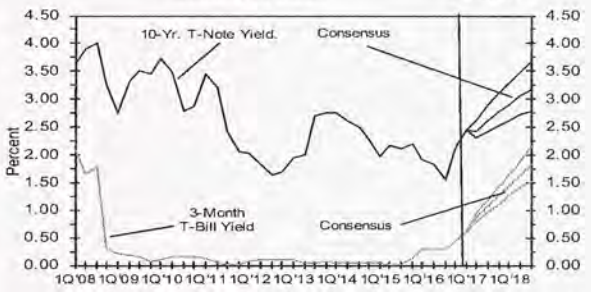
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	2Q	3Q	4Q	1Q	2Q	3Q
Interest Rates	May 19	May 12	May 5	Apr. 28	Apr.	Mar.	Feb.	1Q 2017	2017	2017	2017	2018	2018	2018
Federal Funds Rate	0.91	0.91	0.88	0.91	0.90	0.76	0.66	0.69	1.0	1.2	1.4	1.5	1.7	1.9
Prime Rate	4.00	4.00	4.00	4.00	4.00	3.85	3.75	3.78	4.1	4.2	4.4	4.6	4.8	5.0
LIBOR, 3-mo.	1.18	1.18	1.18	1.17	1.16	1.13	1.04	1.06	1.2	1.4	1.6	1.8	2.0	2.2
Commercial Paper, 1-mo.	0.84	0.83	0.83	0.83	0.83	0.77	0.61	0.67	1.0	1.2	1.4	1.6	1.8	2.0
Treasury bill, 3-mo.	0.91	0.90	0.85	0.81	0.81	0.73	0.53	0.59	0.9	1.1	1.3	1.4	1.6	1.8
Treasury bill, 6-mo.	1.02	1.03	1.00	0.98	0.95	0.87	0.65	0.71	1.0	1.2	1.4	1.6	1.8	2.0
Treasury bill, 1 yr.	1.10	1.13	1.10	1.06	1.04	1.00	0.82	0.88	1.1	1.4	1.6	1.7	1.9	2.1
Treasury note, 2 yr.	1.28	1.34	1.30	1.27	1.24	1.30	1.20	1.24	1.3	1.6	1.8	1.9	2.1	2.3
Treasury note, 5 yr.	1.81	1.91	1.86	1.83	1.83	2.00	1.91	1.94	1.9	2.2	2.3	2.5	2.6	2.8
Treasury note, 10 yr.	2.27	2.39	2.33	2.31	2.30	2.47	2.43	2.44	2.4	2.6	2.8	2.9	3.1	3.2
Treasury note, 30 yr.	2.94	3.02	2.99	2.96	2.94	3.07	3.04	3.04	3.0	3.2	3.4	3.5	3.6	3.7
Corporate Aaa bond	3.94	4.05	4.03	4.00	4.00	4.13	4.10	4.10	4.0	4.3	4.5	4.6	4.7	4.9
Corporate Baa bond	4.52	4.64	4.62	4.60	4.60	4.71	4.68	4.68	4.7	5.0	5.2	5.3	5.5	5.6
State & Local bonds	3.49	3.55	3.56	3.54	3.55	3.72	3.72	3.71	3.7	3.9	4.1	4.2	4.3	4.4
Home mortgage rate	4.02	4.05	4.02	4.03	4.05	4.20	4.17	4.17	4.1	4.3	4.5	4.6	4.8	4.9
	History								Consensus Forecasts-Quarterly					
	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q
Key Assumptions	2015	2015	2015	2016	2016	2016	2016	2017	2017	2017	2017	2018	2018	2018
Major Currency Index	89.9	91.8	93.1	93.3	89.6	90.3	93.7	94.4	94.0	94.1	94.5	94.6	94.4	94.2
Real GDP	2.6	2.0	0.9	0.8	1.4	3.5	2.1	1.2	3.1	2.4	2.4	2.4	2.5	2.4
GDP Price Index	2.3	1.3	0.8	0.5	2.3	1.4	2.1	2.2	1.5	2.0	2.1	2.2	2.1	2.2
Consumer Price Index	2.4	1.5	0.4	0.1	2.3	1.8	3.0	3.1	1.1	2.2	2.3	2.4	2.2	2.4

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data is sourced from Haver Analytics. Historical data for Fed's Major Currency Index is from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).

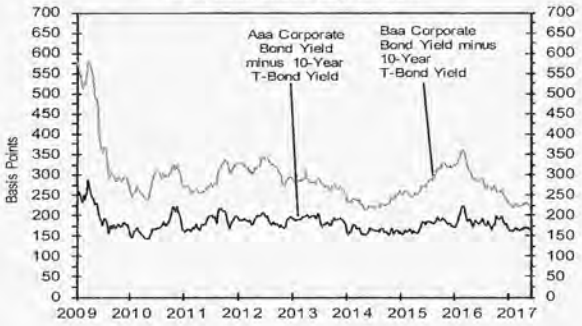
U.S. Treasury Yield Curve
Week ended May 19, 2017 and Year Ago vs. 2Q 2017 and 3Q 2018 Consensus Forecasts



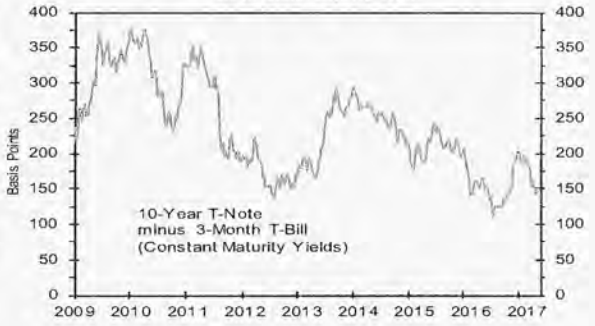
U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average)



Corporate Bond Spreads
As of week ended May 19, 2017



U.S. Treasury Yield Curve
As of week May 19, 2017



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Long-Range Survey:

The table below contains the results of our twice-annual long-range CONSENSUS survey. There are also Top 10 and Bottom 10 averages for each variable. Shown are consensus estimates for the years 2019 through 2023 and averages for the five-year periods 2019-2023 and 2024-2028. Apply these projections cautiously. Few if any economic, demographic and political forces can be evaluated accurately over such long time spans.

		Average For The Year					Five-Year Averages	
Interest Rates		**2019**	**2020**	**2021**	**2022**	**2023**	**2019-2023**	**2024-2028**
1. Federal Funds Rate	**CONSENSUS**	**2.6**	**2.9**	**2.9**	**2.9**	**2.9**	**2.8**	**3.0**
	Top 10 Average	3.1	3.5	3.4	3.5	3.5	3.4	3.5
	Bottom 10 Average	2.0	2.3	2.3	2.3	2.4	2.3	2.4
2. Prime Rate	**CONSENSUS**	**5.6**	**5.9**	**5.9**	**5.9**	**5.9**	**5.8**	**6.0**
	Top 10 Average	6.1	6.5	6.5	6.5	6.5	6.4	6.5
	Bottom 10 Average	5.0	5.3	5.3	5.2	5.3	5.2	5.4
3. LIBOR, 3-Mo.	**CONSENSUS**	**2.9**	**3.1**	**3.2**	**3.1**	**3.2**	**3.1**	**3.2**
	Top 10 Average	3.4	3.7	3.7	3.7	3.8	3.7	3.8
	Bottom 10 Average	2.4	2.6	2.6	2.5	2.6	2.5	2.6
4. Commercial Paper, 1-Mo.	**CONSENSUS**	**2.7**	**3.0**	**3.0**	**3.0**	**3.1**	**3.0**	**3.1**
	Top 10 Average	3.2	3.5	3.5	3.6	3.6	3.5	3.6
	Bottom 10 Average	2.2	2.5	2.5	2.4	2.5	2.4	2.6
5. Treasury Bill Yield, 3-Mo.	**CONSENSUS**	**2.5**	**2.8**	**2.8**	**2.8**	**2.9**	**2.8**	**2.9**
	Top 10 Average	3.1	3.4	3.4	3.4	3.5	3.3	3.5
	Bottom 10 Average	1.9	2.2	2.3	2.2	2.3	2.2	2.3
6. Treasury Bill Yield, 6-Mo.	**CONSENSUS**	**2.6**	**2.9**	**3.0**	**3.0**	**3.0**	**2.9**	**3.0**
	Top 10 Average	3.2	3.6	3.5	3.6	3.6	3.5	3.6
	Bottom 10 Average	2.0	2.4	2.4	2.4	2.4	2.3	2.4
7. Treasury Bill Yield, 1-Yr.	**CONSENSUS**	**2.8**	**3.1**	**3.1**	**3.1**	**3.1**	**3.0**	**3.2**
	Top 10 Average	3.4	3.7	3.7	3.7	3.7	3.6	3.7
	Bottom 10 Average	2.1	2.5	2.5	2.5	2.5	2.4	2.5
8. Treasury Note Yield, 2-Yr.	**CONSENSUS**	**2.9**	**3.2**	**3.3**	**3.3**	**3.3**	**3.2**	**3.3**
	Top 10 Average	3.5	3.9	3.9	3.9	3.9	3.8	4.0
	Bottom 10 Average	2.3	2.6	2.7	2.6	2.6	2.6	2.7
10. Treasury Note Yield, 5-Yr.	**CONSENSUS**	**3.3**	**3.5**	**3.5**	**3.6**	**3.6**	**3.5**	**3.6**
	Top 10 Average	3.9	4.2	4.2	4.2	4.2	4.1	4.3
	Bottom 10 Average	2.7	2.9	2.9	3.0	3.0	2.9	3.0
11. Treasury Note Yield, 10-Yr.	**CONSENSUS**	**3.6**	**3.8**	**3.8**	**3.9**	**3.9**	**3.8**	**3.9**
	Top 10 Average	4.2	4.5	4.4	4.5	4.5	4.4	4.6
	Bottom 10 Average	2.9	3.1	3.1	3.2	3.3	3.1	3.3
12. Treasury Bond Yield, 30-Yr.	**CONSENSUS**	**4.2**	**4.3**	**4.4**	**4.4**	**4.4**	**4.3**	**4.5**
	Top 10 Average	4.9	5.0	5.0	5.0	5.0	5.0	5.1
	Bottom 10 Average	3.5	3.7	3.7	3.8	3.8	3.7	3.8
13. Corporate Aaa Bond Yield	**CONSENSUS**	**5.2**	**5.4**	**5.4**	**5.4**	**5.5**	**5.4**	**5.5**
	Top 10 Average	5.7	5.9	5.9	6.0	5.9	5.9	6.0
	Bottom 10 Average	4.7	4.9	4.9	4.9	5.0	4.9	5.1
13. Corporate Baa Bond Yield	**CONSENSUS**	**6.1**	**6.3**	**6.3**	**6.3**	**6.3**	**6.3**	**6.4**
	Top 10 Average	6.8	7.0	6.9	7.0	6.9	6.9	7.0
	Bottom 10 Average	5.5	5.6	5.7	5.6	5.8	5.6	5.7
14. State & Local Bonds Yield	**CONSENSUS**	**4.6**	**4.7**	**4.7**	**4.7**	**4.7**	**4.7**	**4.8**
	Top 10 Average	5.1	5.3	5.2	5.3	5.3	5.2	5.3
	Bottom 10 Average	4.2	4.2	4.2	4.1	4.1	4.2	4.2
15. Home Mortgage Rate	**CONSENSUS**	**5.3**	**5.5**	**5.5**	**5.5**	**5.5**	**5.4**	**5.6**
	Top 10 Average	5.9	6.2	6.1	6.2	6.1	6.1	6.2
	Bottom 10 Average	4.6	4.8	4.8	4.7	4.9	4.8	4.9
A. FRB - Major Currency Index	**CONSENSUS**	**93.8**	**93.2**	**93.1**	**93.0**	**92.7**	**93.2**	**92.5**
	Top 10 Average	96.5	96.6	96.9	97.1	97.2	96.9	97.1
	Bottom 10 Average	91.0	89.7	89.2	88.7	88.1	89.3	88.1
		Year-Over-Year, % Change					Five-Year Averages	
		2019	**2020**	**2021**	**2022**	**2023**	**2019-2023**	**2024-2028**
B. Real GDP	**CONSENSUS**	**2.2**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.1**
	Top 10 Average	2.6	2.4	2.4	2.4	2.3	2.4	2.3
	Bottom 10 Average	1.7	1.6	1.6	1.6	1.6	1.6	1.8
C. GDP Chained Price Index	**CONSENSUS**	**2.2**	**2.1**	**2.1**	**2.0**	**2.0**	**2.1**	**2.0**
	Top 10 Average	2.5	2.3	2.3	2.2	2.2	2.3	2.3
	Bottom 10 Average	1.9	1.9	1.9	1.9	1.7	1.8	1.9
D. Consumer Price Index	**CONSENSUS**	**2.3**	**2.3**	**2.3**	**2.3**	**2.2**	**2.2**	**2.2**
	Top 10 Average	2.6	2.6	2.5	2.5	2.4	2.5	2.4
	Bottom 10 Average	1.9	2.0	2.0	2.1	1.8	2.0	2.0

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 36, No. 7, July 1, 2017

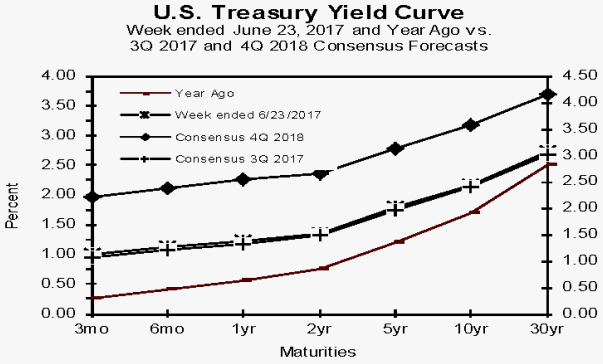
Wolters Kluwer

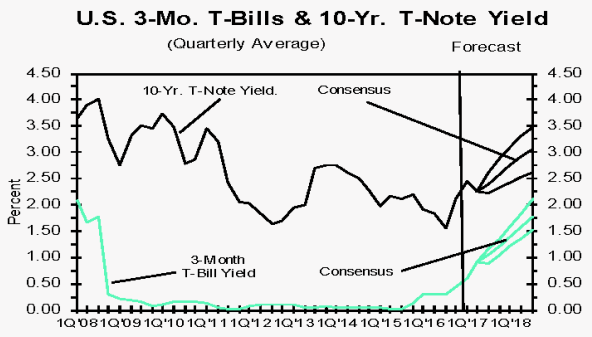
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

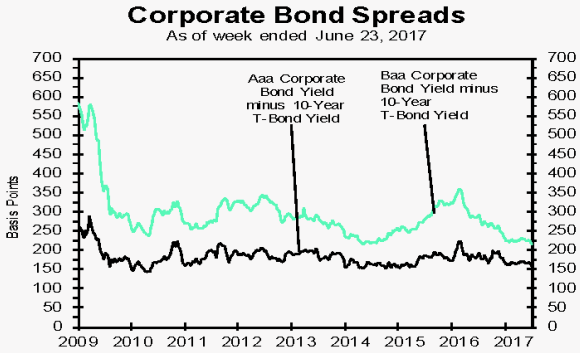
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

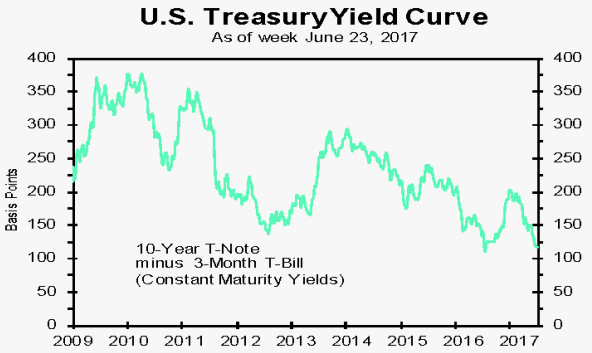
Interest Rates	History: Average For Week Ending June 23	June 16	June 9	June 2	History: Average For Month May	Apr.	Mar.	*Latest Qtr 2Q 2017**	Consensus Forecasts-Quarterly Avg. 3Q 2017	4Q 2017	1Q 2018	2Q 2018	3Q 2018	4Q 2018
Federal Funds Rate	1.16	0.91	0.91	0.90	0.90	0.90	0.76	0.93	**1.2**	**1.3**	**1.5**	**1.7**	**1.9**	**2.1**
Prime Rate	4.25	4.00	4.00	4.00	4.00	4.00	3.85	4.03	**4.3**	**4.4**	**4.6**	**4.7**	**4.9**	**5.1**
LIBOR, 3-mo.	1.29	1.26	1.22	1.21	1.18	1.16	1.13	1.20	**1.4**	**1.5**	**1.7**	**1.9**	**2.1**	**2.3**
Commercial Paper, 1-mo.	1.10	1.05	0.93	0.87	0.84	0.83	0.77	0.90	**1.2**	**1.3**	**1.5**	**1.7**	**1.9**	**2.1**
Treasury bill, 3-mo.	0.99	1.01	0.99	0.97	0.90	0.81	0.73	0.90	**1.1**	**1.2**	**1.4**	**1.6**	**1.8**	**2.0**
Treasury bill, 6-mo.	1.12	1.12	1.09	1.07	1.03	0.95	0.87	1.03	**1.2**	**1.3**	**1.5**	**1.7**	**1.9**	**2.1**
Treasury bill, 1 yr.	1.22	1.21	1.18	1.16	1.12	1.04	1.00	1.12	**1.3**	**1.5**	**1.7**	**1.9**	**2.1**	**2.3**
Treasury note, 2 yr.	1.35	1.35	1.32	1.28	1.31	1.24	1.30	1.30	**1.5**	**1.7**	**1.8**	**2.0**	**2.2**	**2.4**
Treasury note, 5 yr.	1.78	1.76	1.74	1.75	1.85	1.83	2.00	1.81	**2.0**	**2.1**	**2.3**	**2.5**	**2.6**	**2.8**
Treasury note, 10 yr.	2.16	2.18	2.18	2.20	2.31	2.30	2.47	2.26	**2.4**	**2.6**	**2.7**	**2.9**	**3.1**	**3.2**
Treasury note, 30 yr.	2.74	2.82	2.84	2.86	2.97	2.94	3.07	2.90	**3.0**	**3.2**	**3.3**	**3.5**	**3.6**	**3.7**
Corporate Aaa bond	3.74	3.82	3.85	3.88	3.99	4.00	4.13	3.93	**4.0**	**4.2**	**4.4**	**4.6**	**4.7**	**4.8**
Corporate Baa bond	4.32	4.39	4.43	4.46	4.57	4.60	4.71	4.52	**4.7**	**4.9**	**5.1**	**5.3**	**5.4**	**5.6**
State & Local bonds	3.37	3.37	3.35	3.39	3.51	3.55	3.72	3.47	**3.7**	**3.9**	**4.1**	**4.2**	**4.3**	**4.4**
Home mortgage rate	3.90	3.91	3.89	3.94	4.01	4.05	4.20	3.99	**4.1**	**4.3**	**4.5**	**4.6**	**4.8**	**4.9**
	History: 3Q	4Q	1Q	2Q	3Q	4Q	1Q	*2Q*	Consensus Forecasts-Quarterly 3Q	4Q	1Q	2Q	3Q	4Q
Key Assumptions	2015	2015	2016	2016	2016	2016	2017	*2017**	**2017**	**2017**	**2018**	**2018**	**2018**	**2018**
Major Currency Index	91.8	93.1	93.3	89.6	90.3	93.7	94.4	*92.0*	**92.8**	**93.3**	**93.6**	**93.5**	**93.2**	**92.9**
Real GDP	2.0	0.9	0.8	1.4	3.5	2.1	1.4	*2.8*	**2.4**	**2.3**	**2.3**	**2.5**	**2.3**	**2.3**
GDP Price Index	1.3	0.8	0.5	2.3	1.4	2.1	1.9	*1.3*	**1.9**	**2.0**	**2.1**	**2.1**	**2.1**	**2.2**
Consumer Price Index	1.5	0.4	0.1	2.3	1.8	3.0	3.1	*0.4*	**1.9**	**2.2**	**2.3**	**2.2**	**2.3**	**2.4**

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data is sourced from Haver Analytics. Historical data for Fed's Major Currency Index is from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS). **Interest rate data for 2Q 2017 based on historical data through the week ended June 23rd.* *Data for 2Q 2017 Major Currency Index is based on data through week ended June 23rd.. *Figures for 2Q 2017 Real GDP, GDP Chained Price Index and Consumer Price Index are consensus forecasts based on a special question asked of the panelists' this month.*









20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 36, No. 8, August 1, 2017

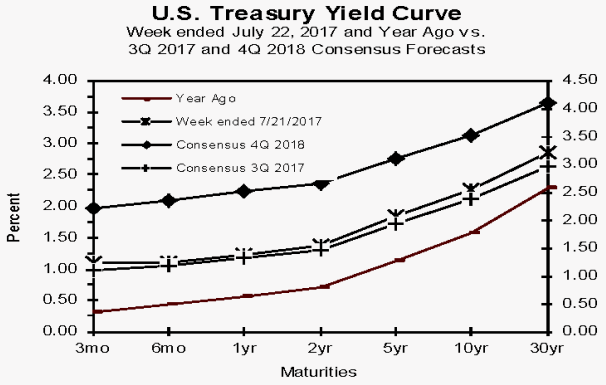
Wolters Kluwer

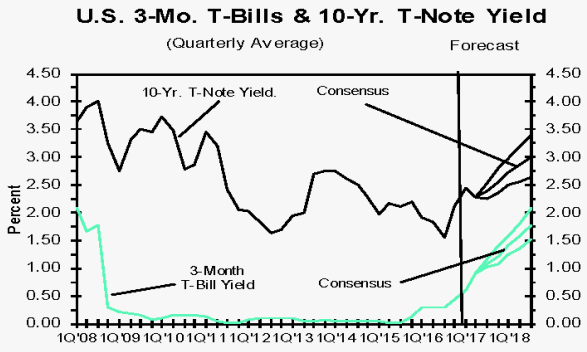
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

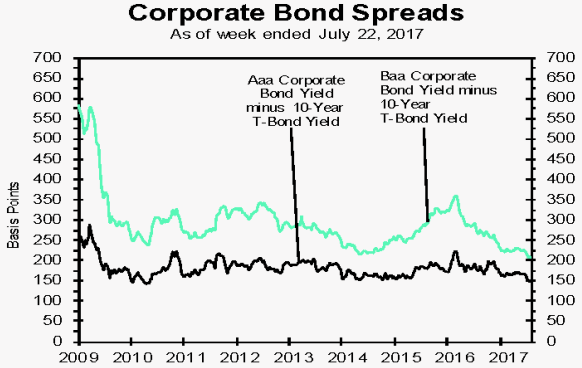
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

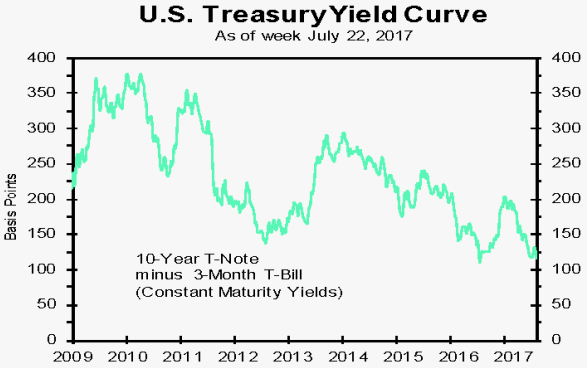
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	3Q	4Q	1Q	2Q	3Q	4Q
Interest Rates	July 21	July 14	July 7	June 30	Jun	May	Apr	2Q 2017	2017	2017	2018	2018	2018	2018
Federal Funds Rate	1.16	1.16	1.12	1.16	1.03	0.90	0.90	0.94	**1.2**	**1.3**	**1.5**	**1.6**	**1.8**	**2.0**
Prime Rate	4.25	4.25	4.25	4.25	4.13	4.00	4.00	4.04	**4.3**	**4.4**	**4.5**	**4.7**	**4.9**	**5.1**
LIBOR, 3-mo.	1.31	1.30	1.30	1.30	1.26	1.18	1.16	1.20	**1.4**	**1.5**	**1.7**	**1.9**	**2.1**	**2.3**
Commercial Paper, 1-mo.	1.11	1.10	1.09	1.06	1.00	0.84	0.83	0.89	**1.2**	**1.3**	**1.5**	**1.7**	**1.9**	**2.1**
Treasury bill, 3-mo.	1.11	1.05	1.05	1.02	1.00	0.90	0.81	0.90	**1.1**	**1.2**	**1.4**	**1.6**	**1.8**	**2.0**
Treasury bill, 6-mo.	1.11	1.13	1.14	1.13	1.11	1.03	0.95	1.03	**1.2**	**1.3**	**1.5**	**1.7**	**1.9**	**2.1**
Treasury bill, 1 yr.	1.22	1.22	1.23	1.22	1.20	1.12	1.04	1.12	**1.3**	**1.5**	**1.7**	**1.9**	**2.1**	**2.2**
Treasury note, 2 yr.	1.36	1.37	1.41	1.37	1.33	1.31	1.24	1.29	**1.5**	**1.6**	**1.8**	**2.0**	**2.2**	**2.3**
Treasury note, 5 yr.	1.83	1.90	1.94	1.83	1.77	1.85	1.83	1.82	**1.9**	**2.1**	**2.3**	**2.4**	**2.6**	**2.7**
Treasury note, 10 yr.	2.27	2.35	2.36	2.23	2.19	2.31	2.30	2.27	**2.4**	**2.6**	**2.7**	**2.9**	**3.0**	**3.1**
Treasury note, 30 yr.	2.85	2.91	2.89	2.78	2.81	2.97	2.94	2.91	**3.0**	**3.1**	**3.3**	**3.4**	**3.6**	**3.7**
Corporate Aaa bond	3.75	3.84	3.85	3.76	3.81	3.99	4.00	3.93	**3.9**	**4.1**	**4.3**	**4.5**	**4.7**	**4.8**
Corporate Baa bond	4.34	4.44	4.44	4.34	4.39	4.57	4.60	4.52	**4.6**	**4.8**	**5.0**	**5.1**	**5.4**	**5.5**
State & Local bonds	3.41	3.46	3.47	3.40	3.37	3.51	3.55	3.48	**3.6**	**3.8**	**4.0**	**4.1**	**4.3**	**4.4**
Home mortgage rate	3.96	4.03	3.96	3.88	3.90	4.01	4.05	3.99	**4.1**	**4.2**	**4.4**	**4.6**	**4.7**	**4.8**
	History								Consensus Forecasts-Quarterly					
	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Key Assumptions	2015	2015	2016	2016	2016	2016	2017	2017	2017	2017	2018	2018	2018	2018
Major Currency Index	91.8	93.1	93.3	89.6	90.3	93.7	94.4	93.0	**90.9**	**90.9**	**91.1**	**91.6**	**91.4**	**91.4**
Real GDP	1.6	0.5	0.6	2.2	2.8	1.8	1.2	2.6	**2.4**	**2.3**	**2.3**	**2.4**	**2.3**	**2.2**
GDP Price Index	1.4	0.8	0.3	2.4	1.4	2.0	2.0	1.0	**1.7**	**2.0**	**2.1**	**2.1**	**2.1**	**2.2**
Consumer Price Index	1.5	0.4	0.1	2.3	1.8	3.0	3.1	-0.3	**1.6**	**2.2**	**2.3**	**2.2**	**2.2**	**2.4**

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data is sourced from Haver Analytics. Historical data for Fed's Major Currency Index is from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).









20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 36, No. 9, September 1, 2017

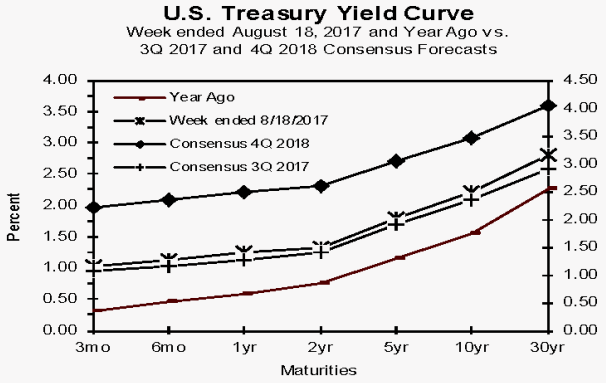
Wolters Kluwer

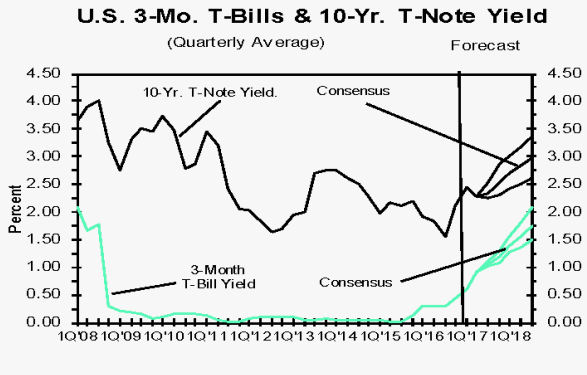
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

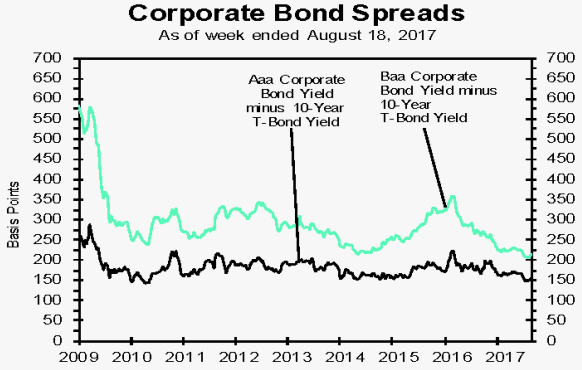
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

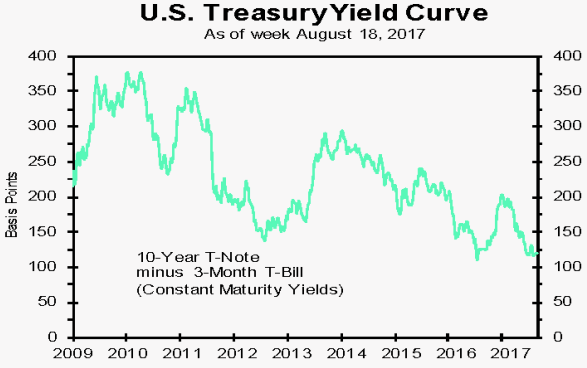
	History				History				Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	3Q	4Q	1Q	2Q	3Q	4Q
Interest Rates	Aug 18	Aug 11	Aug 4	Jul 28	Jul	Jun	May	2Q 2017	2017	2017	2018	2018	2018	2018
Federal Funds Rate	1.16	1.16	1.15	1.16	1.15	1.03	0.90	0.94	**1.15**	**1.25**	**1.46**	**1.63**	**1.84**	**2.03**
Prime Rate	4.25	4.25	4.25	4.25	4.25	4.13	4.00	4.04	**4.25**	**4.34**	**4.53**	**4.70**	**4.90**	**5.09**
LIBOR, 3-mo.	1.32	1.31	1.31	1.31	1.31	1.26	1.18	1.20	**1.33**	**1.47**	**1.68**	**1.86**	**2.06**	**2.27**
Commercial Paper, 1-mo.	1.09	1.11	1.10	1.11	1.10	1.00	0.84	0.89	**1.15**	**1.27**	**1.48**	**1.67**	**1.89**	**2.11**
Treasury bill, 3-mo.	1.02	1.04	1.08	1.13	1.09	1.00	0.90	0.90	**1.06**	**1.18**	**1.38**	**1.56**	**1.76**	**1.95**
Treasury bill, 6-mo.	1.13	1.15	1.14	1.13	1.13	1.11	1.03	1.03	**1.15**	**1.30**	**1.51**	**1.68**	**1.90**	**2.09**
Treasury bill, 1 yr.	1.24	1.22	1.23	1.23	1.23	1.20	1.12	1.12	**1.26**	**1.44**	**1.65**	**1.83**	**2.03**	**2.20**
Treasury note, 2 yr.	1.33	1.34	1.35	1.37	1.38	1.33	1.31	1.29	**1.41**	**1.60**	**1.79**	**1.96**	**2.16**	**2.31**
Treasury note, 5 yr.	1.78	1.80	1.81	1.85	1.88	1.77	1.85	1.82	**1.90**	**2.09**	**2.26**	**2.40**	**2.57**	**2.70**
Treasury note, 10 yr.	2.22	2.24	2.27	2.30	2.32	2.19	2.31	2.27	**2.34**	**2.52**	**2.69**	**2.83**	**2.98**	**3.08**
Treasury note, 30 yr.	2.80	2.82	2.85	2.89	2.89	2.81	2.97	2.91	**2.91**	**3.06**	**3.24**	**3.36**	**3.50**	**3.59**
Corporate Aaa bond	3.77	3.77	3.77	3.79	3.81	3.81	3.99	3.93	**3.81**	**4.00**	**4.22**	**4.41**	**4.57**	**4.66**
Corporate Baa bond	4.36	4.35	4.34	4.36	4.39	4.39	4.57	4.52	**4.49**	**4.70**	**4.93**	**5.12**	**5.29**	**5.44**
State & Local bonds	3.33	3.35	3.39	3.38	3.43	3.37	3.51	3.48	**3.51**	**3.69**	**3.92**	**4.08**	**4.22**	**4.34**
Home mortgage rate	3.89	3.90	3.93	3.92	3.97	3.90	4.01	3.99	**3.99**	**4.14**	**4.34**	**4.48**	**4.64**	**4.77**
	History								Consensus Forecasts-Quarterly					
	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Key Assumptions	2015	2015	2016	2016	2016	2016	2017	2017	2017	2017	2018	2018	2018	2018
Major Currency Index	91.8	93.1	93.3	89.6	90.3	93.7	94.4	93.0	**89.6**	**89.5**	**89.7**	**89.8**	**89.8**	**89.8**
Real GDP	1.6	0.5	0.6	2.2	2.8	1.8	1.2	2.6	**2.7**	**2.4**	**2.3**	**2.4**	**2.3**	**2.2**
GDP Price Index	1.4	0.8	0.3	2.4	1.4	2.0	2.0	1.0	**1.7**	**2.0**	**2.1**	**2.0**	**2.1**	**2.1**
Consumer Price Index	1.5	0.4	0.1	2.3	1.8	3.0	3.1	-0.3	**1.5**	**2.2**	**2.2**	**2.1**	**2.2**	**2.4**

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data is sourced from Haver Analytics. Historical data for Fed's Major Currency Index is from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).









20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 36, No. 10, October 1, 2017

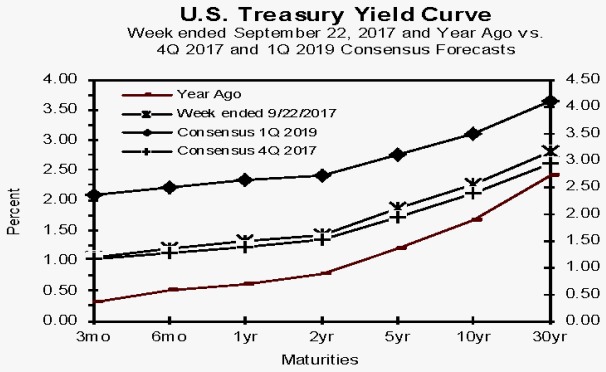
Wolters Kluwer

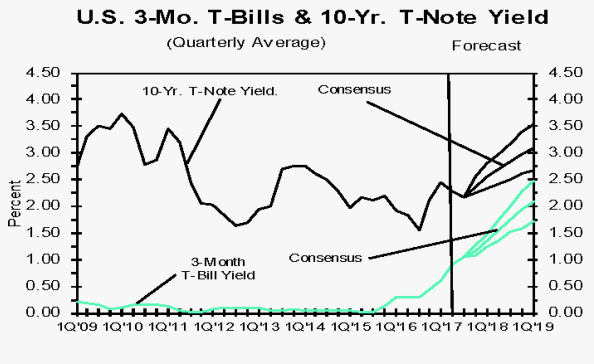
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

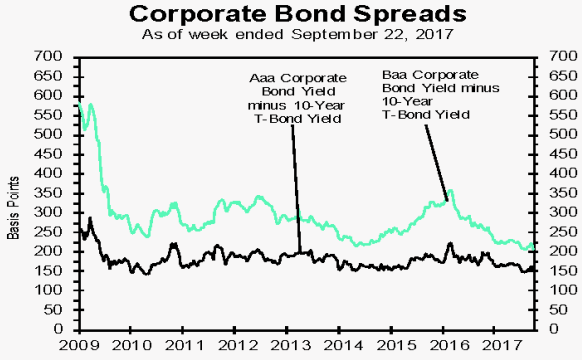
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

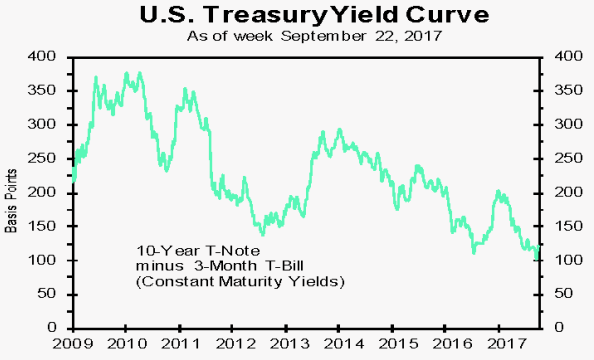
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	4Q	1Q	2Q	3Q	4Q	1Q
Interest Rates	Sep. 22	Sep. 15	Sep. 8	Sep. 1	Aug	Jul	Jun	3Q 2017*	2017	2018	2018	2018	2018	2019
Federal Funds Rate	1.16	1.16	1.15	1.16	1.16	1.15	1.03	1.16	1.2	1.4	1.6	1.8	2.0	2.2
Prime Rate	4.25	4.25	4.25	4.25	4.25	4.25	4.13	4.25	4.3	4.5	4.7	4.9	5.1	5.2
LIBOR, 3-mo.	1.33	1.32	1.32	1.32	1.31	1.31	1.26	1.32	1.4	1.6	1.8	2.0	2.2	2.4
Commercial Paper, 1-mo.	1.11	1.11	1.10	1.11	1.10	1.10	1.00	1.11	1.2	1.4	1.6	1.8	2.0	2.2
Treasury bill, 3-mo.	1.04	1.04	1.05	1.04	1.04	1.09	1.00	1.04	1.2	1.4	1.5	1.7	1.9	2.1
Treasury bill, 6-mo.	1.19	1.16	1.15	1.11	1.13	1.13	1.11	1.17	1.3	1.5	1.7	1.9	2.1	2.2
Treasury bill, 1 yr.	1.31	1.27	1.23	1.23	1.23	1.23	1.20	1.27	1.4	1.6	1.8	2.0	2.2	2.3
Treasury note, 2 yr.	1.43	1.35	1.29	1.33	1.34	1.38	1.33	1.36	1.5	1.7	1.9	2.1	2.3	2.4
Treasury note, 5 yr.	1.87	1.77	1.65	1.72	1.79	1.88	1.77	1.76	1.9	2.1	2.3	2.5	2.6	2.8
Treasury note, 10 yr.	2.26	2.18	2.07	2.14	2.23	2.32	2.19	2.17	2.4	2.5	2.7	2.8	3.0	3.1
Treasury note, 30 yr.	2.81	2.77	2.69	2.75	2.81	2.89	2.81	2.76	2.9	3.1	3.3	3.4	3.5	3.6
Corporate Aaa bond	3.77	3.76	3.70	3.72	3.76	3.81	3.81	3.74	3.9	4.1	4.3	4.4	4.6	4.7
Corporate Baa bond	4.33	4.34	4.3	4.31	4.34	4.39	4.39	4.32	4.5	4.8	5.0	5.1	5.3	5.5
State & Local bonds	3.32	3.31	3.29	3.30	3.35	3.43	3.37	3.31	3.6	3.8	4.0	4.1	4.2	4.3
Home mortgage rate	3.83	3.78	3.78	3.82	3.88	3.97	3.90	3.80	4.0	4.2	4.4	4.5	4.7	4.8
	History								Consensus Forecasts-Quarterly					
	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q
Key Assumptions	2015	2016	2016	2016	2016	2017	2017	2017*	2017	2018	2018	2018	2018	2019
Major Currency Index	93.1	93.3	89.6	90.3	93.7	94.4	93.0	88.3	88.4	88.9	89.1	89.1	89.2	88.6
Real GDP	0.5	0.6	2.2	2.8	1.8	1.2	3.1	2.2	2.6	2.3	2.4	2.3	2.2	2.1
GDP Price Index	0.8	0.3	2.4	1.4	2.0	2.0	1.0	1.7	2.0	1.9	1.9	2.1	2.1	2.2
Consumer Price Index	0.4	0.1	2.3	1.8	3.0	3.1	-0.3	1.9	2.4	2.0	2.0	2.2	2.3	2.3

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data is sourced from Haver Analytics. Historical data for Fed's Major Currency Index is from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS). *Interest rate data for 3Q 2017 based on historical data through the week ended September 22nd. *Data for 3Q 2017 Major Currency Index is based on data through week ended September 22nd. Figures for 3Q 2017 Real GDP, GDP Chained Price Index and Consumer Price Index are consensus forecasts based on a special question asked of the panelists' this month.









20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 36, No. 11, November 1, 2017

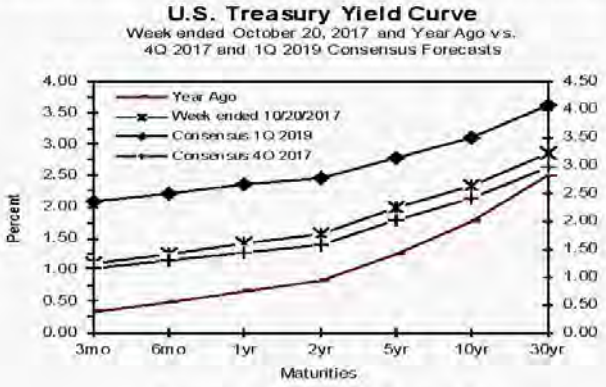
Wolters Kluwer

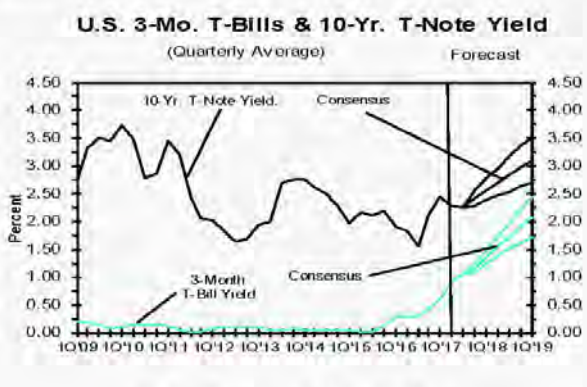
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

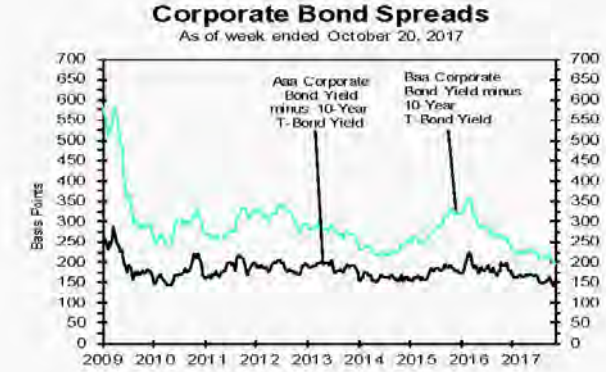
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	4Q	1Q	2Q	3Q	4Q	1Q
Interest Rates	Oct. 20	Oct. 13	Oct. 6	Sep. 29	Sep	Aug	Jul	3Q 2017	2017	2018	2018	2018	2018	2019
Federal Funds Rate	1.16	1.16	1.12	1.16	1.16	1.16	1.15	1.16	1.2	1.4	1.6	1.8	2.0	2.1
Prime Rate	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.3	4.5	4.7	4.9	5.1	5.2
LIBOR, 3-mo.	1.36	1.36	1.35	1.33	1.33	1.31	1.31	1.32	1.4	1.6	1.8	2.0	2.2	2.4
Commercial Paper, 1-mo.	1.14	1.12	1.10	1.11	1.12	1.10	1.10	1.11	1.2	1.4	1.6	1.8	2.0	2.2
Treasury bill, 3-mo.	1.10	1.09	1.06	1.04	1.06	1.04	1.09	1.05	1.2	1.3	1.5	1.7	1.9	2.1
Treasury bill, 6-mo.	1.25	1.26	1.21	1.19	1.19	1.13	1.13	1.17	1.3	1.5	1.7	1.9	2.1	2.2
Treasury bill, 1 yr.	1.42	1.41	1.33	1.31	1.31	1.23	1.23	1.28	1.4	1.6	1.8	2.0	2.2	2.4
Treasury note, 2 yr.	1.57	1.51	1.49	1.43	1.46	1.34	1.38	1.41	1.6	1.8	1.9	2.1	2.3	2.5
Treasury note, 5 yr.	1.98	1.94	1.94	1.87	1.89	1.79	1.88	1.85	2.0	2.2	2.3	2.5	2.7	2.8
Treasury note, 10 yr.	2.33	2.33	2.34	2.26	2.28	2.23	2.32	2.26	2.4	2.6	2.7	2.8	3.0	3.1
Treasury note, 30 yr.	2.84	2.86	2.88	2.81	2.83	2.81	2.89	2.82	3.0	3.1	3.3	3.4	3.5	3.6
Corporate Aaa bond	3.71	3.74	3.76	3.77	3.75	3.76	3.81	3.76	3.8	4.0	4.2	4.4	4.5	4.6
Corporate Baa bond	4.29	4.32	4.34	4.33	4.32	4.34	4.39	4.33	4.5	4.7	4.9	5.1	5.3	5.4
State & Local bonds	3.35	3.37	3.38	3.32	3.34	3.35	3.43	3.34	3.5	3.7	3.9	4.1	4.2	4.3
Home mortgage rate	3.86	3.88	3.91	3.85	3.82	3.88	3.97	3.85	4.0	4.2	4.4	4.5	4.7	4.8
	History								Consensus Forecasts-Quarterly					
	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q
Key Assumptions	2015	2016	2016	2016	2016	2017	2017	2017	2017	2018	2018	2018	2018	2019
Major Currency Index	93.1	93.3	89.6	90.3	93.7	94.4	93.0	88.3	88.4	88.8	89.0	89.0	88.9	88.4
Real GDP	0.5	0.6	2.2	2.8	1.8	1.2	3.1	3.0	2.7	2.4	2.5	2.4	2.3	2.1
GDP Price Index	0.8	0.3	2.4	1.4	2.0	2.0	1.0	2.2	2.0	1.9	2.0	2.1	2.1	2.2
Consumer Price Index	0.4	0.1	2.3	1.8	3.0	3.1	-0.3	2.0	2.6	2.0	2.0	2.2	2.3	2.3

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data is sourced from Haver Analytics. Historical data for Fed's Major Currency Index is from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).







20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 36, No. 12, December 1, 2017

Wolters Kluwer

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

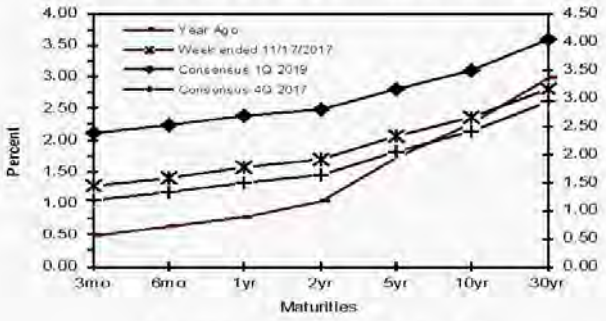
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	4Q	1Q	2Q	3Q	4Q	1Q
Interest Rates	Nov. 17	Nov. 10	Nov. 3	Oct. 27	Oct	Sep	Aug	3Q 2017	2017	2018	2018	2018	2018	2019
Federal Funds Rate	1.16	1.16	1.15	1.16	1.15	1.16	1.16	1.16	1.2	1.4	1.6	1.8	2.0	2.2
Prime Rate	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.25	4.3	4.5	4.7	4.9	5.1	5.2
LIBOR, 3-mo.	1.43	1.41	1.39	1.37	1.36	1.33	1.31	1.32	1.4	1.6	1.8	2.0	2.2	2.4
Commercial Paper, 1-mo.	1.15	1.16	1.14	1.14	1.13	1.12	1.10	1.11	1.2	1.4	1.6	1.8	2.0	2.2
Treasury bill, 3-mo.	1.26	1.22	1.16	1.11	1.09	1.06	1.04	1.05	1.2	1.4	1.6	1.7	2.0	2.1
Treasury bill, 6-mo.	1.40	1.34	1.28	1.27	1.25	1.19	1.13	1.17	1.3	1.5	1.7	1.9	2.1	2.2
Treasury bill, 1 yr.	1.57	1.52	1.45	1.43	1.40	1.31	1.23	1.28	1.5	1.7	1.9	2.0	2.3	2.4
Treasury note, 2 yr.	1.70	1.64	1.61	1.60	1.54	1.46	1.34	1.41	1.6	1.8	2.0	2.2	2.3	2.5
Treasury note, 5 yr.	2.06	2.01	2.00	2.04	1.98	1.89	1.79	1.85	2.0	2.2	2.4	2.5	2.7	2.8
Treasury note, 10 yr.	2.37	2.34	2.36	2.42	2.36	2.28	2.23	2.26	2.4	2.6	2.7	2.8	3.0	3.1
Treasury note, 30 yr.	2.81	2.81	2.85	2.93	2.88	2.83	2.81	2.82	2.9	3.1	3.3	3.4	3.5	3.6
Corporate Aaa bond	3.74	3.71	3.71	3.77	3.75	3.75	3.76	3.76	3.8	4.0	4.2	4.3	4.5	4.6
Corporate Baa bond	4.32	4.29	4.29	4.35	4.32	4.32	4.34	4.33	4.4	4.6	4.9	5.1	5.2	5.3
State & Local bonds	3.41	3.37	3.40	3.38	3.37	3.34	3.35	3.34	3.5	3.7	3.9	4.0	4.2	4.3
Home mortgage rate	3.95	3.90	3.94	3.94	3.90	3.82	3.88	3.85	4.0	4.2	4.4	4.5	4.6	4.8
	History								Consensus Forecasts-Quarterly					
	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q
Key Assumptions	2015	2016	2016	2016	2016	2017	2017	2017	2017	2018	2018	2018	2018	2019
Major Currency Index	93.1	93.3	89.6	90.3	93.7	94.4	93.0	88.3	88.7	89.0	89.1	89.1	88.9	88.5
Real GDP	0.5	0.6	2.2	2.8	1.8	1.2	3.1	3.0	2.7	2.4	2.6	2.3	2.3	2.1
GDP Price Index	0.8	0.3	2.4	1.4	2.0	2.0	1.0	2.2	2.2	2.0	1.9	2.1	2.1	2.2
Consumer Price Index	0.4	0.1	2.3	1.8	3.0	3.1	-0.3	2.0	3.0	2.2	1.9	2.2	2.2	2.3

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data is sourced from Haver Analytics. Historical data for Fed's Major Currency Index is from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).

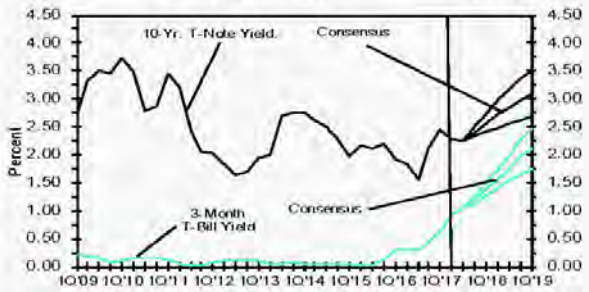
U.S. Treasury Yield Curve

Week ended November 17, 2017 and Year Ago vs. 4Q 2017 and 1Q 2019 Consensus Forecasts



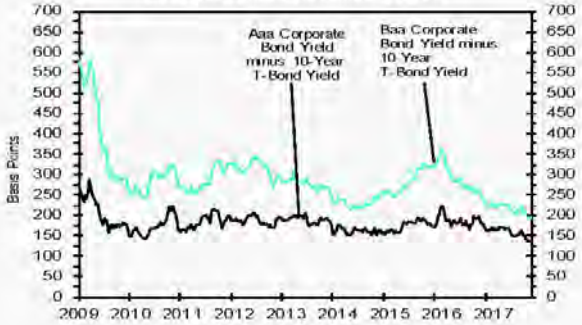
U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield

(Quarterly Average)



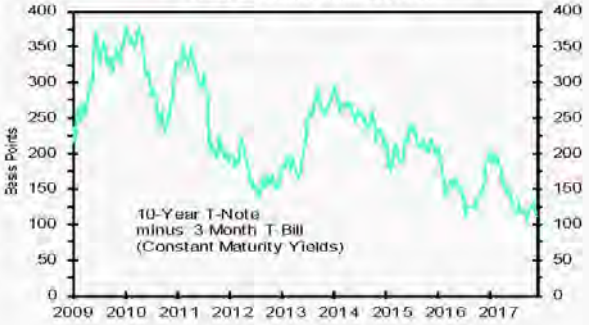
Corporate Bond Spreads

As of week ended November 17, 2017



U.S. Treasury Yield Curve

As of week November 17, 2017



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Long-Range Survey:

The table below contains the results of our twice-annual long-range CONSENSUS survey. There are also Top 10 and Bottom 10 averages for each variable. Shown are consensus estimates for the years 2019 through 2023 and averages for the five-year periods 2019-2023 and 2024-2028. Apply these projections cautiously. Few if any economic, demographic and political forces can be evaluated accurately over such long time spans.

		Average For The Year					Five-Year Averages	
Interest Rates		2019	2020	2021	2022	2023	2019-2023	2024-2028
1. Federal Funds Rate	**CONSENSUS**	**2.5**	**2.7**	**2.9**	**2.9**	**2.9**	**2.8**	**3.0**
	Top 10 Average	2.9	3.2	3.4	3.4	3.5	3.3	3.5
	Bottom 10 Average	2.1	2.0	2.3	2.3	2.4	2.2	2.4
2. Prime Rate	**CONSENSUS**	**5.5**	**5.8**	**5.9**	**5.9**	**5.9**	**5.8**	**5.9**
	Top 10 Average	5.9	6.3	6.4	6.5	6.6	6.3	6.5
	Bottom 10 Average	5.0	5.1	5.2	5.2	5.2	5.1	5.3
3. LIBOR, 3-Mo.	**CONSENSUS**	**2.8**	**3.1**	**3.2**	**3.1**	**3.2**	**3.1**	**3.2**
	Top 10 Average	3.2	3.6	3.8	3.8	3.9	3.7	3.8
	Bottom 10 Average	2.4	2.6	2.6	2.5	2.6	2.5	2.6
4. Commercial Paper, 1-Mo.	**CONSENSUS**	**2.6**	**2.9**	**3.0**	**3.0**	**3.1**	**2.9**	**3.1**
	Top 10 Average	3.1	3.5	3.6	3.7	3.8	3.5	3.8
	Bottom 10 Average	2.2	2.5	2.6	2.5	2.5	2.5	2.6
5. Treasury Bill Yield, 3-Mo.	**CONSENSUS**	**2.5**	**2.8**	**2.9**	**2.9**	**2.9**	**2.8**	**2.9**
	Top 10 Average	2.9	3.3	3.4	3.4	3.5	3.3	3.5
	Bottom 10 Average	2.1	2.3	2.4	2.3	2.3	2.3	2.4
6. Treasury Bill Yield, 6-Mo.	**CONSENSUS**	**2.6**	**2.9**	**3.0**	**3.0**	**3.0**	**2.9**	**3.1**
	Top 10 Average	3.0	3.4	3.5	3.6	3.7	3.5	3.7
	Bottom 10 Average	2.2	2.4	2.5	2.4	2.4	2.4	2.5
7. Treasury Bill Yield, 1-Yr.	**CONSENSUS**	**2.7**	**3.0**	**3.1**	**3.1**	**3.2**	**3.0**	**3.2**
	Top 10 Average	3.2	3.6	3.7	3.7	3.8	3.6	3.9
	Bottom 10 Average	2.3	2.5	2.6	2.5	2.5	2.5	2.6
8. Treasury Note Yield, 2-Yr.	**CONSENSUS**	**2.8**	**3.1**	**3.3**	**3.2**	**3.3**	**3.1**	**3.3**
	Top 10 Average	3.3	3.8	3.8	3.8	3.9	3.7	4.0
	Bottom 10 Average	2.4	2.6	2.7	2.6	2.6	2.6	2.7
10. Treasury Note Yield, 5-Yr.	**CONSENSUS**	**3.1**	**3.4**	**3.5**	**3.5**	**3.5**	**3.4**	**3.6**
	Top 10 Average	3.6	3.9	4.1	4.1	4.1	3.9	4.3
	Bottom 10 Average	2.6	2.8	2.9	2.9	2.9	2.8	3.0
11. Treasury Note Yield, 10-Yr.	**CONSENSUS**	**3.3**	**3.6**	**3.7**	**3.7**	**3.8**	**3.6**	**3.8**
	Top 10 Average	3.9	4.2	4.3	4.3	4.3	4.2	4.5
	Bottom 10 Average	2.8	2.9	3.1	3.1	3.1	3.0	3.2
12. Treasury Bond Yield, 30-Yr.	**CONSENSUS**	**3.8**	**4.1**	**4.2**	**4.2**	**4.2**	**4.1**	**4.3**
	Top 10 Average	4.4	4.7	4.7	4.7	4.8	4.7	5.0
	Bottom 10 Average	3.3	3.5	3.6	3.5	3.6	3.5	3.7
13. Corporate Aaa Bond Yield	**CONSENSUS**	**4.9**	**5.1**	**5.2**	**5.2**	**5.3**	**5.1**	**5.4**
	Top 10 Average	5.5	5.9	5.9	6.0	6.0	5.9	6.2
	Bottom 10 Average	4.3	4.5	4.5	4.5	4.6	4.5	4.7
13. Corporate Baa Bond Yield	**CONSENSUS**	**5.7**	**6.0**	**6.0**	**6.0**	**6.1**	**6.0**	**6.2**
	Top 10 Average	6.4	6.8	6.8	6.9	6.9	6.8	7.0
	Bottom 10 Average	5.0	5.2	5.3	5.2	5.3	5.2	5.4
14. State & Local Bonds Yield	**CONSENSUS**	**4.4**	**4.5**	**4.6**	**4.5**	**4.6**	**4.5**	**4.8**
	Top 10 Average	5.0	5.2	5.2	5.3	5.3	5.2	5.5
	Bottom 10 Average	3.9	4.0	4.0	3.9	4.1	4.0	4.1
15. Home Mortgage Rate	**CONSENSUS**	**5.0**	**5.2**	**5.3**	**5.3**	**5.4**	**5.2**	**5.5**
	Top 10 Average	5.5	5.8	5.9	6.0	6.0	5.8	6.1
	Bottom 10 Average	4.5	4.7	4.7	4.6	4.7	4.6	4.9
A. FRB - Major Currency Index	**CONSENSUS**	**90.4**	**90.0**	**89.9**	**89.9**	**90.0**	**90.0**	**90.4**
	Top 10 Average	94.7	94.8	95.0	95.1	95.3	95.0	95.4
	Bottom 10 Average	86.9	85.8	85.4	85.5	85.6	85.8	86.1
		Year-Over-Year, % Change					Five-Year Averages	
		2019	2020	2021	2022	2023	2019-2023	2024-2028
B. Real GDP	**CONSENSUS**	**2.2**	**1.9**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**
	Top 10 Average	2.5	2.4	2.5	2.4	2.3	2.4	2.4
	Bottom 10 Average	1.8	1.4	1.7	1.6	1.7	1.6	1.7
C. GDP Chained Price Index	**CONSENSUS**	**2.2**	**2.1**	**2.1**	**2.1**	**2.1**	**2.1**	**2.1**
	Top 10 Average	2.5	2.3	2.3	2.3	2.3	2.3	2.3
	Bottom 10 Average	1.8	1.9	1.9	2.0	1.9	1.9	1.9
D. Consumer Price Index	**CONSENSUS**	**2.3**	**2.3**	**2.3**	**2.2**	**2.2**	**2.3**	**2.2**
	Top 10 Average	2.7	2.6	2.6	2.4	2.4	2.5	2.4
	Bottom 10 Average	1.9	1.9	2.0	2.0	2.0	2.0	2.0

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 37, No. 11, January 1, 2018

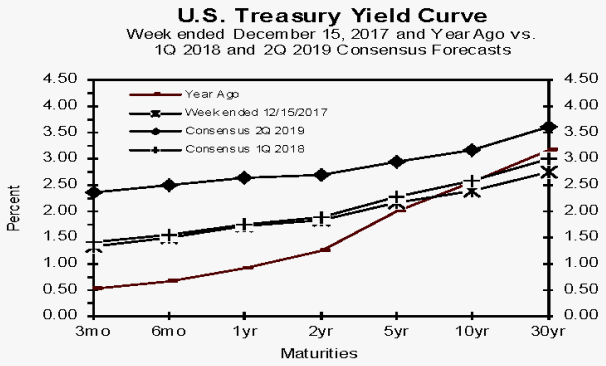
Wolters Kluwer

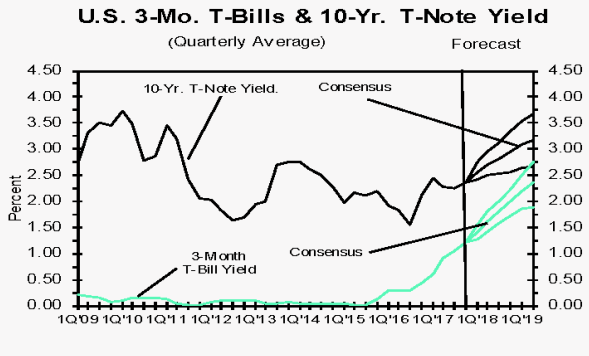
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

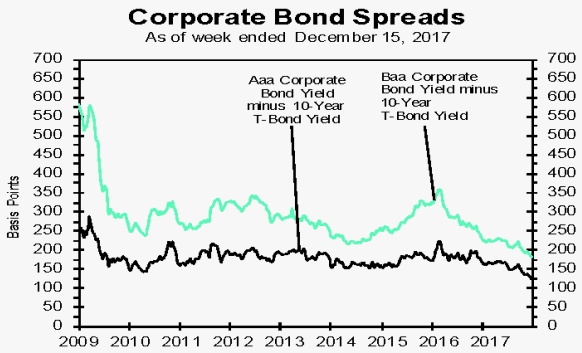
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

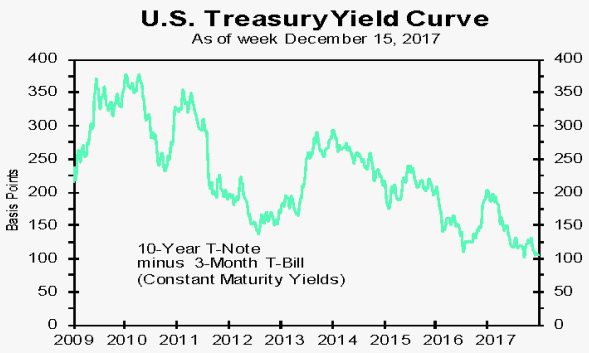
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			*Latest Qtr*	1Q	2Q	3Q	4Q	1Q	2Q
Interest Rates	Dec. 15	Dec. 8	Dec. 1	Nov. 24	Nov	Oct	Sep	*4Q 2017**	2018	2018	2018	2018	2019	2019
Federal Funds Rate	1.16	1.16	1.16	1.16	1.16	1.15	1.16	*1.16*	**1.5**	**1.7**	**1.9**	**2.0**	**2.2**	**2.4**
Prime Rate	4.25	4.25	4.25	4.25	4.25	4.25	4.25	*4.25*	**4.5**	**4.7**	**4.9**	**5.1**	**5.3**	**5.5**
LIBOR, 3-mo.	1.59	1.53	1.48	1.46	1.42	1.36	1.33	*1.45*	**1.7**	**1.9**	**2.1**	**2.3**	**2.5**	**2.7**
Commercial Paper, 1-mo.	1.35	1.26	1.18	1.16	1.15	1.13	1.12	*1.20*	**1.5**	**1.7**	**1.9**	**2.1**	**2.3**	**2.5**
Treasury bill, 3-mo.	1.32	1.29	1.28	1.30	1.23	1.09	1.06	*1.21*	**1.4**	**1.6**	**1.8**	**2.0**	**2.2**	**2.3**
Treasury bill, 6-mo.	1.48	1.47	1.44	1.45	1.37	1.25	1.19	*1.37*	**1.6**	**1.7**	**2.0**	**2.1**	**2.3**	**2.5**
Treasury bill, 1 yr.	1.70	1.66	1.62	1.62	1.54	1.40	1.31	*1.54*	**1.7**	**1.9**	**2.1**	**2.3**	**2.5**	**2.6**
Treasury note, 2 yr.	1.82	1.80	1.77	1.76	1.68	1.54	1.46	*1.68*	**1.9**	**2.1**	**2.2**	**2.4**	**2.6**	**2.7**
Treasury note, 5 yr.	2.15	2.14	2.10	2.08	2.04	1.98	1.89	*2.06*	**2.3**	**2.4**	**2.5**	**2.7**	**2.8**	**2.9**
Treasury note, 10 yr.	2.37	2.36	2.36	2.35	2.36	2.36	2.28	*2.36*	**2.6**	**2.7**	**2.8**	**2.9**	**3.1**	**3.2**
Treasury note, 30 yr.	2.74	2.75	2.79	2.76	2.81	2.88	2.83	*2.81*	**3.0**	**3.1**	**3.3**	**3.4**	**3.5**	**3.6**
Corporate Aaa bond	3.60	3.63	3.68	3.67	3.70	3.75	3.75	*3.69*	**3.8**	**4.0**	**4.2**	**4.4**	**4.5**	**4.6**
Corporate Baa bond	4.18	4.21	4.26	4.25	4.29	4.32	4.32	*4.27*	**4.5**	**4.7**	**4.9**	**5.1**	**5.2**	**5.4**
State & Local bonds	3.44	3.43	3.51	3.45	3.41	3.37	3.34	*3.41*	**3.6**	**3.8**	**3.9**	**4.1**	**4.2**	**4.3**
Home mortgage rate	3.94	3.93	3.94	3.92	3.92	3.90	3.82	*3.92*	**4.1**	**4.3**	**4.4**	**4.6**	**4.7**	**4.8**
	History								Consensus Forecasts-Quarterly					
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	*4Q*	1Q	2Q	3Q	4Q	1Q	2Q
Key Assumptions	2016	2016	2016	2016	2017	2017	2017	*2017**	2018	2018	2018	2018	2019	2019
Major Currency Index	93.3	89.6	90.3	93.7	94.4	93.0	88.3	*89.1*	**89.1**	**89.5**	**89.5**	**89.2**	**89.0**	**88.6**
Real GDP	0.6	2.2	2.8	1.8	1.2	3.1	3.2	*2.8*	**2.5**	**2.6**	**2.5**	**2.4**	**2.2**	**2.2**
GDP Price Index	0.3	2.4	1.4	2.0	2.0	1.0	2.1	*2.2*	**2.0**	**1.9**	**2.0**	**2.1**	**2.2**	**2.0**
Consumer Price Index	0.1	2.3	1.8	3.0	3.1	-0.3	2.0	*3.1*	**2.1**	**1.9**	**2.2**	**2.2**	**2.3**	**2.2**

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data is sourced from Haver Analytics. Historical data for Fed's Major Currency Index is from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS). **Interest rate data for 4Q 2017 based on historical data through the week ended December 15th. *Data for 4Q 2017 Major Currency Index is based on data through week ended December 15th. Figures for 4Q 2017 Real GDP, GDP Chained Price Index and Consumer Price Index are consensus forecasts based on a special question asked of the panelists' this month.*









20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 37, No. 2, February 1, 2018

Wolters Kluwer

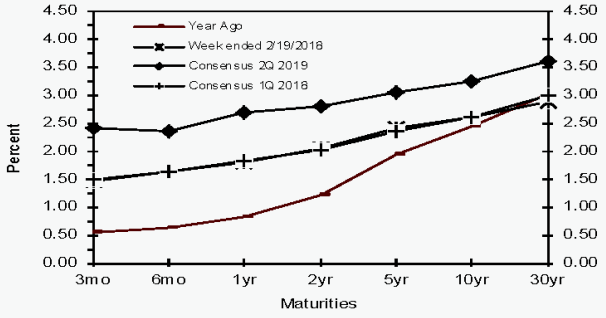
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

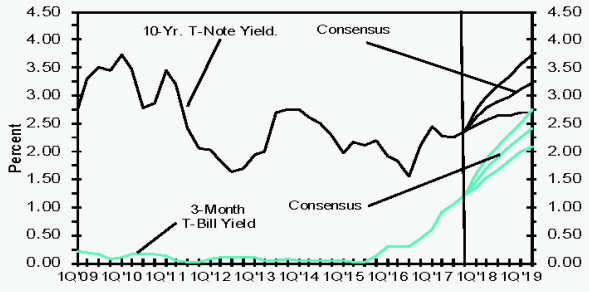
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	1Q	2Q	3Q	4Q	1Q	2Q
Interest Rates	Jan. 19	Jan. 12	Jan. 5	Dec. 29	Dec	Nov	Oct	4Q 2017	2018	2018	2018	2018	2019	2019
Federal Funds Rate	1.42	1.42	1.37	1.42	1.29	1.16	1.15	1.20	1.5	1.7	1.9	2.1	2.3	2.5
Prime Rate	4.50	4.50	4.50	4.50	4.38	4.25	4.25	4.29	4.5	4.8	5.0	5.2	5.3	5.5
LIBOR, 3-mo.	1.74	1.71	1.70	1.69	1.59	1.42	1.36	1.46	1.7	1.9	2.1	2.3	2.5	2.7
Commercial Paper, 1-mo.	1.50	1.50	1.49	1.52	1.38	1.15	1.13	1.22	1.5	1.7	1.9	2.1	2.3	2.5
Treasury bill, 3-mo.	1.45	1.43	1.41	1.42	1.33	1.23	1.09	1.22	1.5	1.7	1.9	2.1	2.2	2.4
Treasury bill, 6-mo.	1.63	1.59	1.60	1.53	1.49	1.37	1.25	1.37	1.6	1.8	2.0	2.2	2.4	2.6
Treasury bill, 1 yr.	1.79	1.78	1.82	1.76	1.69	1.54	1.40	1.54	1.8	2.0	2.2	2.4	2.5	2.7
Treasury note, 2 yr.	2.05	1.98	1.95	1.90	1.83	1.68	1.54	1.68	2.0	2.2	2.3	2.5	2.7	2.8
Treasury note, 5 yr.	2.41	2.32	2.27	2.23	2.17	2.04	1.98	2.06	2.3	2.5	2.6	2.8	2.9	3.0
Treasury note, 10 yr.	2.59	2.54	2.46	2.43	2.40	2.36	2.36	2.37	2.6	2.8	2.9	3.0	3.1	3.2
Treasury note, 30 yr.	2.87	2.87	2.80	2.77	2.77	2.81	2.88	2.82	3.0	3.1	3.3	3.4	3.5	3.6
Corporate Aaa bond	3.67	3.68	3.64	3.59	3.63	3.70	3.75	3.69	3.8	4.0	4.2	4.3	4.5	4.6
Corporate Baa bond	4.23	4.24	4.21	4.17	4.21	4.29	4.32	4.27	4.5	4.7	4.9	5.0	5.2	5.4
State & Local bonds	3.43	3.42	3.40	3.43	3.46	3.41	3.37	3.41	3.6	3.7	3.9	4.0	4.2	4.3
Home mortgage rate	4.04	3.99	3.95	3.99	3.95	3.92	3.90	3.92	4.1	4.3	4.4	4.6	4.7	4.8
	History								Consensus Forecasts-Quarterly					
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q
Key Assumptions	2016	2016	2016	2016	2017	2017	2017	2017	2018	2018	2018	2018	2019	2019
Major Currency Index	93.3	89.6	90.3	93.7	94.4	93.0	88.3	88.9	87.3	87.2	87.3	87.2	87.0	86.9
Real GDP	0.6	2.2	2.8	1.8	1.2	3.1	3.2	2.6	2.6	2.8	2.7	2.5	2.3	2.3
GDP Price Index	0.3	2.4	1.4	2.0	2.0	1.0	2.1	2.4	2.0	2.0	2.1	2.1	2.2	2.1
Consumer Price Index	0.1	2.3	1.8	3.0	3.1	-0.3	2.0	3.7	2.5	1.9	2.2	2.2	2.3	2.2

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data is sourced from Haver Analytics. Historical data for Fed's Major Currency Index is from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).

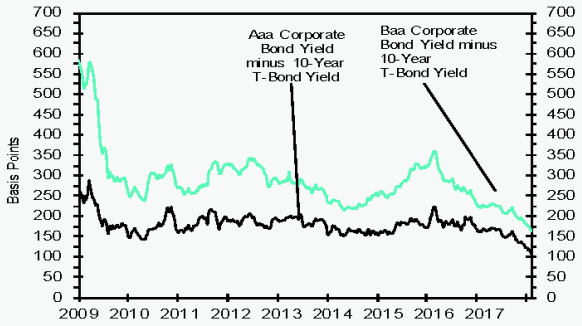
U.S. Treasury Yield Curve
Week ended January 19, 2018 and Year Ago vs.
1Q 2018 and 2Q 2019 Consensus Forecasts



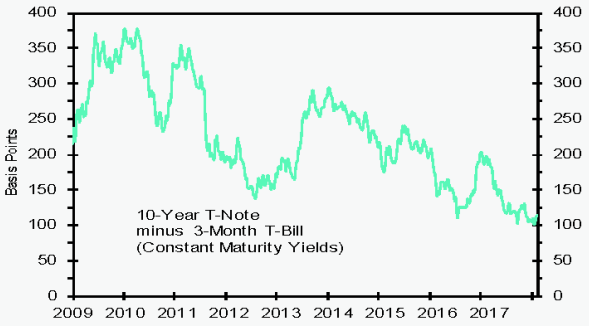
U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average)



Corporate Bond Spreads
As of week ended January 19, 2018



U.S. Treasury Yield Curve
As of week January 19, 2018



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 37, No. 3, March 1, 2018

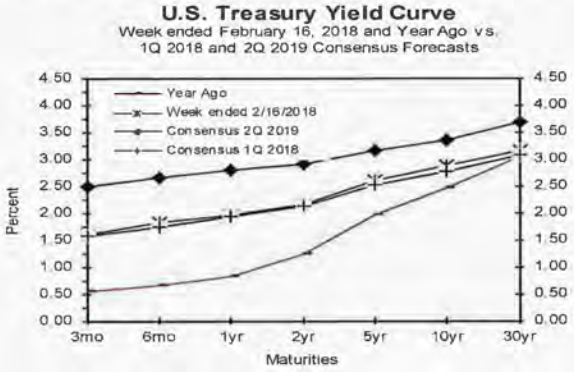
Wolters Kluwer

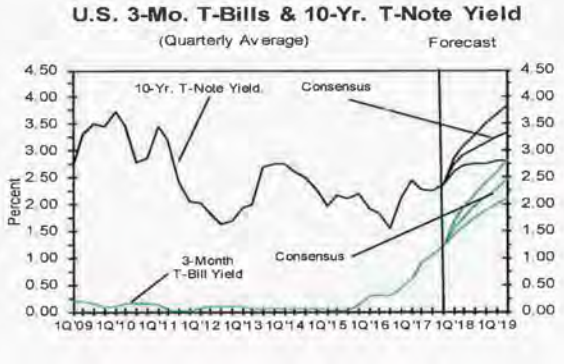
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

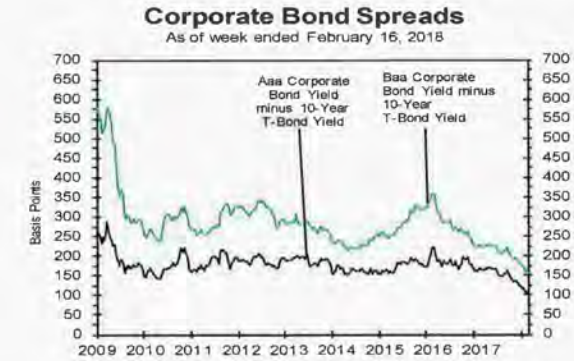
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

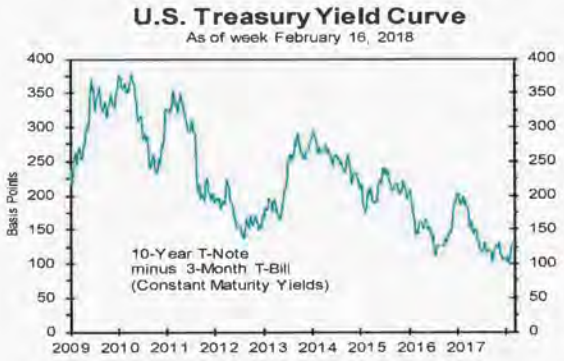
	History				History				Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	1Q	2Q	3Q	4Q	1Q	2Q
Interest Rates	Feb. 16	Feb. 9	Feb. 2	Jan. 26	Jan	Dec	Nov	4Q 2017	2018	2018	2018	2018	2019	2019
Federal Funds Rate	1.42	1.42	1.42	1.41	1.41	1.29	1.16	1.20	1.5	1.7	1.9	2.2	2.3	2.5
Prime Rate	4.50	4.50	4.50	4.50	4.50	4.38	4.25	4.29	4.6	4.8	5.0	5.2	5.4	5.6
LIBOR, 3-mo.	1.86	1.80	1.78	1.75	1.73	1.59	1.42	1.46	1.8	2.0	2.2	2.4	2.6	2.8
Commercial Paper, 1-mo.	1.53	1.50	1.50	1.52	1.50	1.38	1.15	1.22	1.5	1.7	2.0	2.2	2.4	2.5
Treasury bill, 3-mo.	1.60	1.54	1.46	1.43	1.43	1.33	1.23	1.22	1.6	1.8	2.0	2.1	2.3	2.5
Treasury bill, 6-mo.	1.82	1.71	1.65	1.64	1.62	1.49	1.37	1.37	1.7	1.9	2.1	2.3	2.5	2.6
Treasury bill, 1 yr.	1.97	1.89	1.87	1.79	1.80	1.69	1.54	1.54	1.9	2.1	2.3	2.5	2.6	2.8
Treasury note, 2 yr.	2.15	2.10	2.14	2.09	2.02	1.83	1.68	1.68	2.1	2.3	2.5	2.6	2.8	2.9
Treasury note, 5 yr.	2.61	2.54	2.53	2.44	2.36	2.17	2.04	2.06	2.5	2.7	2.8	2.9	3.1	3.2
Treasury note, 10 yr.	2.87	2.82	2.75	2.65	2.56	2.40	2.36	2.37	2.8	2.9	3.0	3.1	3.3	3.3
Treasury note, 30 yr.	3.14	3.10	2.99	2.91	2.86	2.77	2.81	2.82	3.1	3.2	3.4	3.5	3.6	3.7
Corporate Aaa bond	3.97	3.89	3.79	3.73	3.68	3.63	3.70	3.69	3.8	4.1	4.3	4.4	4.6	4.7
Corporate Baa bond	4.54	4.45	4.31	4.26	4.24	4.21	4.29	4.27	4.5	4.8	5.0	5.2	5.3	5.4
State & Local bonds	3.58	3.57	3.53	3.45	3.42	3.46	3.41	3.41	3.6	3.8	3.9	4.1	4.2	4.3
Home mortgage rate	4.38	4.32	4.22	4.15	4.03	3.95	3.92	3.92	4.3	4.5	4.6	4.7	4.9	5.0
	History								Consensus Forecasts-Quarterly					
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q
Key Assumptions	2016	2016	2016	2016	2017	2017	2017	2017	2018	2018	2018	2018	2019	2019
Major Currency Index	93.3	89.6	90.3	93.7	94.4	93.0	88.3	88.9	86.5	86.5	86.5	86.4	86.4	86.3
Real GDP	0.6	2.2	2.8	1.8	1.2	3.1	3.2	2.6	2.7	3.0	2.9	2.7	2.5	2.4
GDP Price Index	0.3	2.4	1.4	2.0	2.0	1.0	2.1	2.4	2.1	2.0	2.2	2.1	2.2	2.2
Consumer Price Index	0.1	2.3	1.8	3.0	3.1	-0.3	2.0	3.7	3.0	2.0	2.3	2.1	2.3	2.3

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data is sourced from Haver Analytics. Historical data for Fed's Major Currency Index is from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).









20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 37, No. 4, April 1, 2018

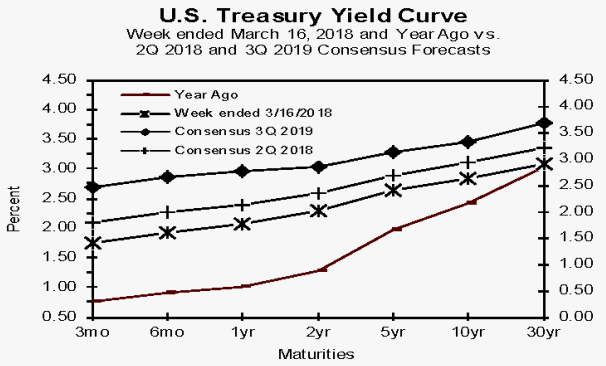
Wolters Kluwer

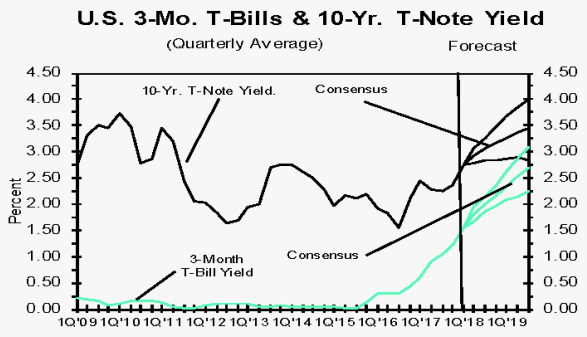
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

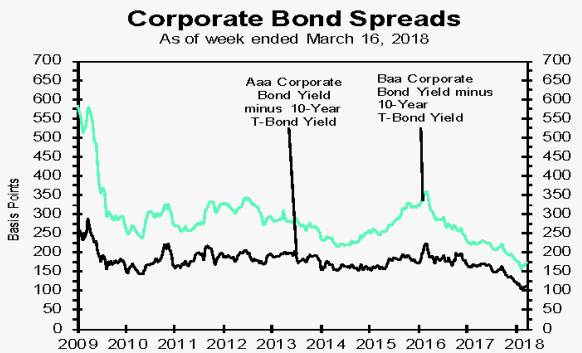
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

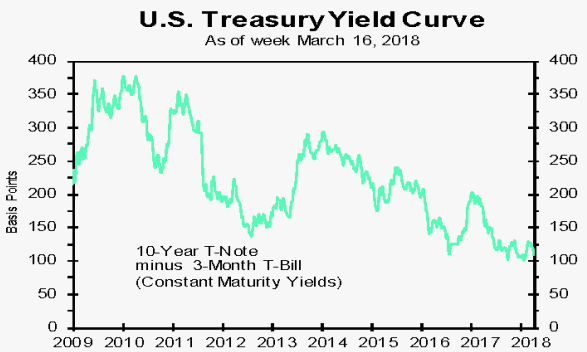
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month									
Interest Rates	Mar. 16	Mar. 9	Mar. 2	Feb. 23	Feb	Jan	Dec	*Latest Qtr 1Q 2018**	2Q 2018	3Q 2018	4Q 2018	1Q 2019	2Q 2019	3Q 2019
Federal Funds Rate	1.42	1.42	1.41	1.42	1.42	1.41	1.29	*1.42*	**1.7**	**2.0**	**2.2**	**2.4**	**2.6**	**2.7**
Prime Rate	4.50	4.50	4.50	4.50	4.50	4.50	4.38	*4.50*	**4.8**	**5.0**	**5.2**	**5.4**	**5.6**	**5.8**
LIBOR, 3-mo.	2.15	2.06	2.01	1.92	1.84	1.73	1.59	*1.88*	**2.1**	**2.3**	**2.5**	**2.7**	**2.9**	**3.1**
Commercial Paper, 1-mo.	1.79	1.68	1.64	1.56	1.52	1.50	1.38	*1.57*	**1.8**	**2.0**	**2.3**	**2.5**	**2.7**	**2.9**
Treasury bill, 3-mo.	1.75	1.68	1.65	1.64	1.56	1.43	1.33	*1.56*	**1.8**	**2.0**	**2.2**	**2.3**	**2.5**	**2.7**
Treasury bill, 6-mo.	1.93	1.88	1.86	1.85	1.76	1.62	1.49	*1.76*	**2.0**	**2.2**	**2.3**	**2.5**	**2.7**	**2.9**
Treasury bill, 1 yr.	2.06	2.05	2.06	2.02	1.94	1.80	1.69	*1.93*	**2.1**	**2.3**	**2.5**	**2.7**	**2.8**	**3.0**
Treasury note, 2 yr.	2.28	2.25	2.24	2.25	2.16	2.02	1.83	*2.15*	**2.4**	**2.5**	**2.7**	**2.8**	**2.9**	**3.0**
Treasury note, 5 yr.	2.63	2.65	2.63	2.66	2.59	2.36	2.17	*2.53*	**2.7**	**2.8**	**2.9**	**3.1**	**3.2**	**3.3**
Treasury note, 10 yr.	2.84	2.88	2.86	2.91	2.84	2.56	2.40	*2.75*	**2.9**	**3.1**	**3.2**	**3.3**	**3.4**	**3.4**
Treasury note, 30 yr.	3.08	3.15	3.14	3.19	3.11	2.86	2.77	*3.03*	**3.2**	**3.3**	**3.5**	**3.6**	**3.7**	**3.8**
Corporate Aaa bond	3.97	4.00	3.97	3.99	3.91	3.68	3.63	*3.86*	**4.1**	**4.2**	**4.4**	**4.6**	**4.7**	**4.8**
Corporate Baa bond	4.58	4.61	4.56	4.56	4.47	4.24	4.21	*4.43*	**4.8**	**5.0**	**5.1**	**5.3**	**5.4**	**5.5**
State & Local bonds	3.61	3.60	3.60	3.59	3.57	3.42	3.46	*3.53*	**3.8**	**3.9**	**4.1**	**4.2**	**4.3**	**4.4**
Home mortgage rate	4.44	4.46	4.43	4.40	4.33	4.03	3.95	*4.27*	**4.5**	**4.6**	**4.8**	**4.9**	**5.0**	**5.2**
	History								Consensus Forecasts-Quarterly					
	2Q	3Q	4Q	1Q	2Q	3Q	4Q	*1Q**	2Q	3Q	4Q	1Q	2Q	3Q
Key Assumptions	2016	2016	2016	2017	2017	2017	2017	*2018*	**2018**	**2018**	**2018**	**2019**	**2019**	**2019**
Major Currency Index	89.6	90.3	93.7	94.4	93.0	88.3	88.9	*86.3*	**86.4**	**86.4**	**86.5**	**86.5**	**86.6**	**86.7**
Real GDP	2.2	2.8	1.8	1.2	3.1	3.2	2.6	*2.2*	**3.1**	**3.0**	**2.8**	**2.5**	**2.4**	**2.1**
GDP Price Index	2.4	1.4	2.0	2.0	1.0	2.1	2.4	*2.3*	**2.0**	**2.2**	**2.1**	**2.2**	**2.1**	**2.2**
Consumer Price Index	2.3	1.8	3.0	3.1	-0.3	2.0	3.7	*3.3*	**1.9**	**2.2**	**2.1**	**2.2**	**2.2**	**2.3**

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data is sourced from Haver Analytics. Historical data for Fed's Major Currency Index is from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS). **Interest rate data for 1Q 2018 based on historical data through the week ended March 16th. *Data for 1Q 2018 Major Currency Index is based on data through week ended March 16th. Figures for 1Q 2018 Real GDP, GDP Chained Price Index and Consumer Price Index are consensus forecasts based on a special question asked of the panelists' this month.*









20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 37, No. 5, May 1, 2018

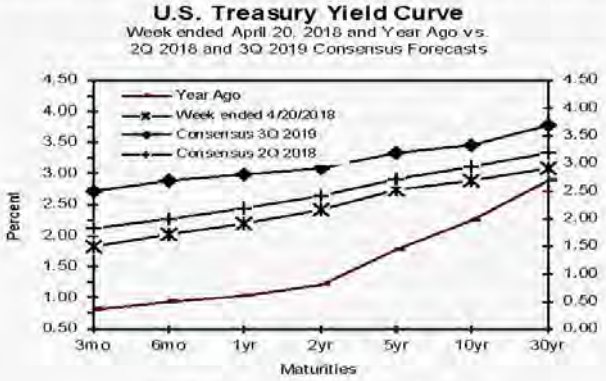
Wolters Kluwer

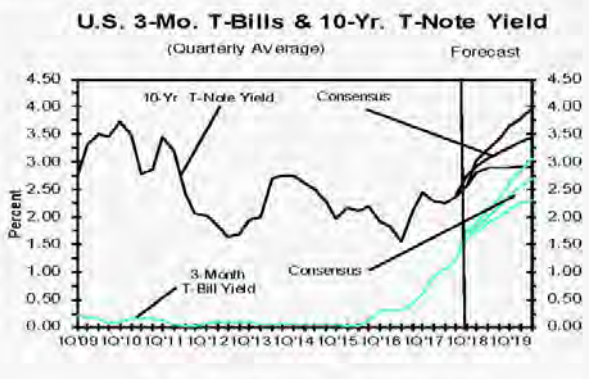
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

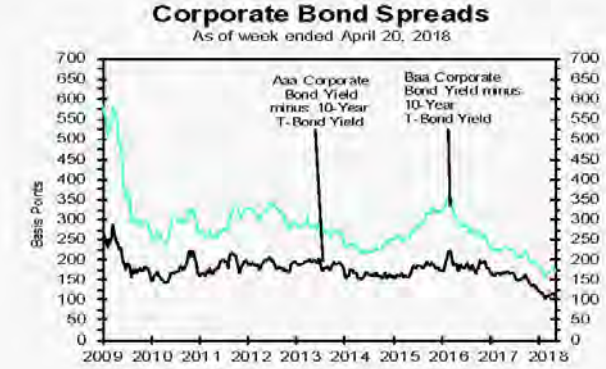
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	2Q	3Q	4Q	1Q	2Q	3Q
Interest Rates	Apr. 20	Apr. 13	Apr. 6	Mar. 30	Mar	Feb	Jan	1Q 2018	2018	2018	2018	2019	2019	2019
Federal Funds Rate	1.69	1.69	1.68	1.68	1.49	1.42	1.41	1.44	1.7	2.0	2.2	2.4	2.6	2.8
Prime Rate	4.75	4.75	4.75	4.75	4.75	4.50	4.50	4.58	4.8	5.0	5.2	5.4	5.6	5.8
LIBOR, 3-mo.	2.36	2.34	2.32	2.30	2.16	1.84	1.73	1.91	2.3	2.4	2.6	2.8	2.9	3.1
Commercial Paper, 1-mo.	1.83	1.81	1.83	1.86	1.76	1.52	1.50	1.59	1.8	2.1	2.3	2.5	2.7	2.9
Treasury bill, 3-mo.	1.81	1.75	1.74	1.76	1.72	1.56	1.43	1.57	1.8	2.0	2.2	2.4	2.6	2.7
Treasury bill, 6-mo.	2.01	1.95	1.92	1.94	1.91	1.76	1.62	1.76	2.0	2.2	2.4	2.6	2.7	2.9
Treasury bill, 1 yr.	2.18	2.10	2.07	2.09	2.06	1.94	1.80	1.93	2.2	2.3	2.5	2.7	2.9	3.0
Treasury note, 2 yr.	2.42	2.33	2.28	2.29	2.27	2.16	2.02	2.15	2.4	2.6	2.7	2.9	3.0	3.1
Treasury note, 5 yr.	2.73	2.64	2.60	2.59	2.63	2.59	2.36	2.53	2.7	2.9	3.0	3.1	3.2	3.3
Treasury note, 10 yr.	2.88	2.80	2.78	2.79	2.85	2.84	2.56	2.75	2.9	3.1	3.2	3.3	3.4	3.5
Treasury note, 30 yr.	3.07	3.02	3.02	3.02	3.10	3.11	2.86	3.02	3.2	3.3	3.5	3.6	3.7	3.8
Corporate Aaa bond	3.98	3.93	3.95	3.95	3.98	3.91	3.68	3.86	4.0	4.2	4.4	4.6	4.7	4.8
Corporate Baa bond	4.60	4.55	4.58	4.58	4.59	4.47	4.24	4.43	4.8	5.0	5.2	5.3	5.4	5.5
State & Local bonds	3.63	3.62	3.62	3.62	3.61	3.57	3.42	3.53	3.8	3.9	4.0	4.1	4.3	4.4
Home mortgage rate	4.47	4.42	4.40	4.44	4.44	4.33	4.03	4.27	4.5	4.7	4.8	4.9	5.0	5.1
	History								Consensus Forecasts-Quarterly					
	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q
Key Assumptions	2016	2016	2016	2017	2017	2017	2017	2018	2018	2018	2018	2019	2019	2019
Major Currency Index	89.6	90.3	93.7	94.4	93.0	88.3	88.9	86.1	86.6	86.7	86.7	86.7	86.5	86.6
Real GDP	2.2	2.8	1.8	1.2	3.1	3.2	2.9	2.3	3.1	3.0	2.9	2.5	2.4	2.2
GDP Price Index	2.4	1.4	2.0	2.0	1.0	2.1	2.3	2.0	2.0	2.2	2.1	2.2	2.2	2.3
Consumer Price Index	2.7	1.8	2.7	3.0	0.1	2.1	3.3	3.5	1.9	2.3	2.1	2.2	2.2	2.3

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data is sourced from Haver Analytics. Historical data for Fed's Major Currency Index is from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).







20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 37, No. 6, June 1, 2018

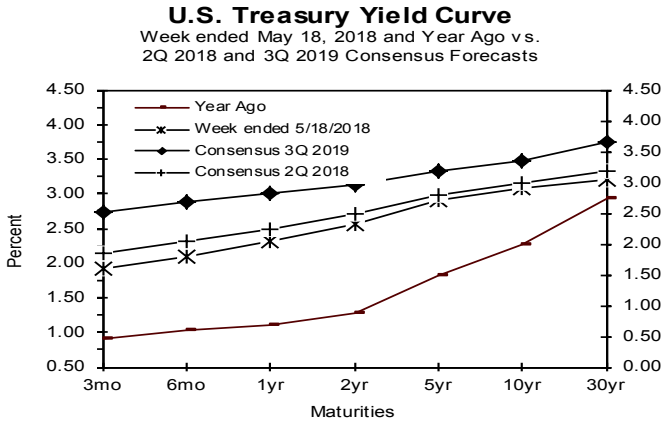
Wolters Kluwer

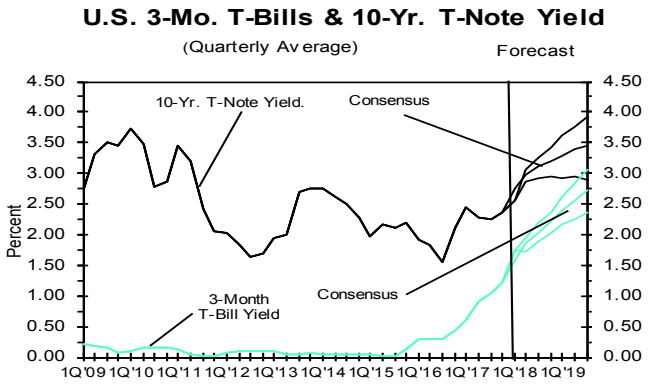
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

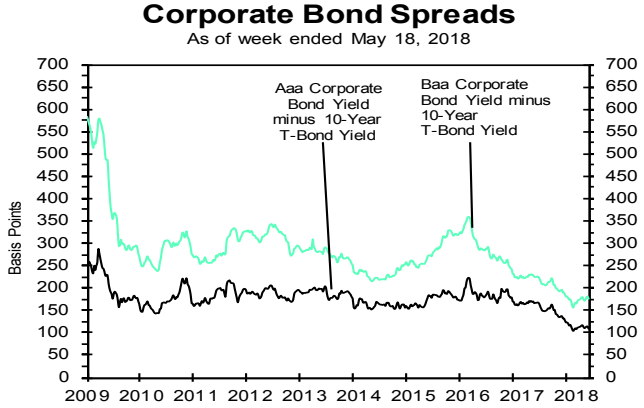
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

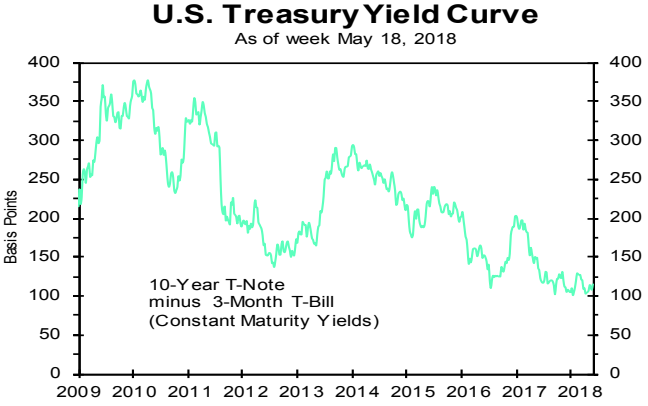
	History				History				Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	2Q	3Q	4Q	1Q	2Q	3Q
Interest Rates	May 18	May 11	May 4	Apr. 27	Apr.	Mar.	Feb.	1Q 2018	2018	2018	2018	2019	2019	2019
Federal Funds Rate	1.70	1.70	1.70	1.70	1.69	1.49	1.42	1.44	1.7	2.0	2.2	2.4	2.6	2.8
Prime Rate	4.75	4.75	4.75	4.75	4.75	4.75	4.50	4.58	4.8	5.0	5.2	5.4	5.6	5.8
LIBOR, 3-mo.	2.33	2.35	2.36	2.36	2.35	2.16	1.84	1.91	2.3	2.4	2.6	2.8	3.0	3.1
Commercial Paper, 1-mo.	1.81	1.79	1.85	1.82	1.82	1.76	1.52	1.59	1.8	2.1	2.3	2.5	2.7	2.9
Treasury bill, 3-mo.	1.92	1.89	1.85	1.85	1.79	1.72	1.56	1.57	1.9	2.0	2.2	2.4	2.6	2.7
Treasury bill, 6-mo.	2.09	2.05	2.03	2.03	1.98	1.91	1.76	1.76	2.0	2.2	2.4	2.6	2.7	2.9
Treasury bill, 1 yr.	2.31	2.27	2.24	2.25	2.15	2.06	1.94	1.93	2.2	2.4	2.6	2.7	2.9	3.0
Treasury note, 2 yr.	2.57	2.52	2.50	2.49	2.38	2.27	2.16	2.15	2.5	2.6	2.8	2.9	3.0	3.1
Treasury note, 5 yr.	2.91	2.82	2.79	2.82	2.70	2.63	2.59	2.53	2.8	2.9	3.0	3.1	3.2	3.3
Treasury note, 10 yr.	3.07	2.97	2.96	2.99	2.86	2.85	2.84	2.75	3.0	3.1	3.2	3.3	3.4	3.5
Treasury note, 30 yr.	3.20	3.13	3.12	3.17	3.07	3.10	3.11	3.02	3.2	3.3	3.4	3.5	3.7	3.8
Corporate Aaa bond	4.16	4.11	4.10	4.11	3.99	3.98	3.91	3.86	4.1	4.3	4.4	4.6	4.7	4.8
Corporate Baa bond	4.83	4.78	4.75	4.73	4.61	4.59	4.47	4.43	4.8	5.0	5.2	5.3	5.5	5.6
State & Local bonds	3.64	3.63	3.67	3.69	3.64	3.61	3.57	3.53	3.8	3.9	4.0	4.2	4.3	4.4
Home mortgage rate	4.66	4.61	4.55	4.55	4.47	4.44	4.33	4.27	4.6	4.7	4.8	4.9	5.1	5.1
	History								Consensus Forecasts-Quarterly					
	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q
Key Assumptions	2016	2016	2016	2017	2017	2017	2017	2018	2018	2018	2018	2019	2019	2019
Major Currency Index	89.6	90.3	93.7	94.4	93.0	88.3	88.9	86.1	87.3	87.6	87.3	87.0	87.0	87.1
Real GDP	2.2	2.8	1.8	1.2	3.1	3.2	2.9	2.3	3.2	3.0	2.8	2.4	2.4	2.2
GDP Price Index	2.4	1.4	2.0	2.0	1.0	2.1	2.3	2.0	2.1	2.2	2.1	2.2	2.2	2.2
Consumer Price Index	2.7	1.8	2.7	3.0	0.1	2.1	3.3	3.5	2.2	2.5	2.1	2.2	2.2	2.3

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data is sourced from Haver Analytics. Historical data for Fed's Major Currency Index is from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).









20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Long-Range Survey:

The table below contains the results of our twice-annual long-range CONSENSUS survey. There are also Top 10 and Bottom 10 averages for each variable. Shown are consensus estimates for the years 2020 through 2024 and averages for the five-year periods 2020-2024 and 2025-2029. Apply these projections cautiously. Few if any economic, demographic and political forces can be evaluated accurately over such long time spans.

		----------Average For The Year----------					Five-Year Averages	
Interest Rates		**2020**	**2021**	**2022**	**2023**	**2024**	**2020-2024**	**2025-2029**
1. Federal Funds Rate	**CONSENSUS**	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**
	Top 10 Average	3.5	3.6	3.6	3.5	3.5	3.5	3.5
	Bottom 10 Average	2.6	2.5	2.4	2.4	2.6	2.5	2.6
2. Prime Rate	**CONSENSUS**	**6.1**	**6.0**	**6.0**	**6.0**	**6.1**	**6.0**	**6.0**
	Top 10 Average	6.5	6.6	6.6	6.5	6.5	6.6	6.5
	Bottom 10 Average	5.6	5.5	5.4	5.5	5.6	5.5	5.6
3. LIBOR, 3-Mo.	**CONSENSUS**	**3.3**	**3.3**	**3.3**	**3.3**	**3.4**	**3.3**	**3.3**
	Top 10 Average	3.7	3.9	4.0	3.9	3.9	3.9	3.8
	Bottom 10 Average	2.9	2.8	2.7	2.7	2.9	2.8	2.9
4. Commercial Paper, 1-Mo.	**CONSENSUS**	**3.1**	**3.2**	**3.1**	**3.1**	**3.2**	**3.1**	**3.2**
	Top 10 Average	3.5	3.7	3.7	3.7	3.7	3.6	3.6
	Bottom 10 Average	2.7	2.6	2.6	2.6	2.7	2.6	2.7
5. Treasury Bill Yield, 3-Mo.	**CONSENSUS**	**3.0**	**3.0**	**2.9**	**2.9**	**3.0**	**3.0**	**3.0**
	Top 10 Average	3.5	3.6	3.6	3.5	3.6	3.5	3.5
	Bottom 10 Average	2.5	2.4	2.4	2.4	2.5	2.4	2.5
6. Treasury Bill Yield, 6-Mo.	**CONSENSUS**	**3.1**	**3.1**	**3.1**	**3.1**	**3.2**	**3.1**	**3.2**
	Top 10 Average	3.6	3.7	3.7	3.7	3.7	3.7	3.7
	Bottom 10 Average	2.7	2.6	2.5	2.5	2.7	2.6	2.7
7. Treasury Bill Yield, 1-Yr.	**CONSENSUS**	**3.2**	**3.3**	**3.2**	**3.2**	**3.3**	**3.2**	**3.3**
	Top 10 Average	3.7	3.8	3.8	3.8	3.8	3.8	3.9
	Bottom 10 Average	2.8	2.7	2.6	2.7	2.8	2.7	2.8
8. Treasury Note Yield, 2-Yr.	**CONSENSUS**	**3.4**	**3.4**	**3.4**	**3.4**	**3.4**	**3.4**	**3.5**
	Top 10 Average	3.9	4.0	4.0	3.8	4.0	3.9	4.1
	Bottom 10 Average	2.9	2.9	2.8	2.8	2.9	2.8	2.9
10. Treasury Note Yield, 5-Yr.	**CONSENSUS**	**3.6**	**3.6**	**3.6**	**3.6**	**3.7**	**3.6**	**3.8**
	Top 10 Average	4.0	4.1	4.1	4.1	4.2	4.1	4.4
	Bottom 10 Average	3.2	3.2	3.0	3.1	3.2	3.1	3.2
11. Treasury Note Yield, 10-Yr.	**CONSENSUS**	**3.8**	**3.8**	**3.8**	**3.8**	**3.8**	**3.8**	**3.9**
	Top 10 Average	4.3	4.3	4.4	4.3	4.4	4.3	4.5
	Bottom 10 Average	3.3	3.3	3.2	3.2	3.3	3.2	3.4
12. Treasury Bond Yield, 30-Yr.	**CONSENSUS**	**4.1**	**4.2**	**4.2**	**4.2**	**4.2**	**4.2**	**4.4**
	Top 10 Average	4.7	4.7	4.7	4.8	4.8	4.7	5.0
	Bottom 10 Average	3.6	3.6	3.6	3.6	3.7	3.6	3.7
13. Corporate Aaa Bond Yield	**CONSENSUS**	**5.2**	**5.2**	**5.2**	**5.3**	**5.4**	**5.3**	**5.4**
	Top 10 Average	5.7	5.8	5.9	6.0	6.0	5.9	6.0
	Bottom 10 Average	4.7	4.7	4.6	4.6	4.7	4.6	4.7
13. Corporate Baa Bond Yield	**CONSENSUS**	**6.0**	**6.0**	**6.0**	**6.1**	**6.2**	**6.1**	**6.3**
	Top 10 Average	6.6	6.8	6.9	7.0	7.0	6.9	7.0
	Bottom 10 Average	5.3	5.3	5.3	5.3	5.4	5.3	5.4
14. State & Local Bonds Yield	**CONSENSUS**	**4.6**	**4.5**	**4.5**	**4.5**	**4.6**	**4.5**	**4.6**
	Top 10 Average	5.1	5.1	5.1	5.1	5.1	5.1	5.2
	Bottom 10 Average	4.0	3.9	3.9	4.0	4.1	4.0	4.1
15. Home Mortgage Rate	**CONSENSUS**	**5.4**	**5.4**	**5.4**	**5.4**	**5.5**	**5.4**	**5.6**
	Top 10 Average	5.8	5.9	6.0	6.0	6.0	6.0	6.1
	Bottom 10 Average	4.9	4.9	4.8	4.8	4.9	4.9	5.0
A. FRB - Major Currency Index	**CONSENSUS**	**89.6**	**89.4**	**89.6**	**90.0**	**90.1**	**89.7**	**90.4**
	Top 10 Average	94.3	94.6	94.5	94.5	94.5	94.5	94.8
	Bottom 10 Average	84.6	84.0	84.3	85.4	85.6	84.8	85.9
		----------Year-Over-Year, % Change----------					Five-Year Averages	
		2020	**2021**	**2022**	**2023**	**2024**	**2020-2024**	**2025-2029**
B. Real GDP	**CONSENSUS**	**1.9**	**1.9**	**2.0**	**2.1**	**2.1**	**2.0**	**2.1**
	Top 10 Average	2.4	2.4	2.4	2.4	2.5	2.4	2.4
	Bottom 10 Average	1.5	1.3	1.5	1.8	1.8	1.6	1.8
C. GDP Chained Price Index	**CONSENSUS**	**2.2**	**2.2**	**2.1**	**2.1**	**2.1**	**2.1**	**2.1**
	Top 10 Average	2.4	2.4	2.3	2.2	2.3	2.3	2.2
	Bottom 10 Average	2.0	2.0	2.0	1.9	2.0	2.0	2.0
D. Consumer Price Index	**CONSENSUS**	**2.3**	**2.3**	**2.3**	**2.2**	**2.2**	**2.3**	**2.2**
	Top 10 Average	2.7	2.6	2.5	2.4	2.5	2.5	2.4
	Bottom 10 Average	1.9	2.0	2.1	2.0	2.0	2.0	2.1

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 37, No. 7, July 1, 2018

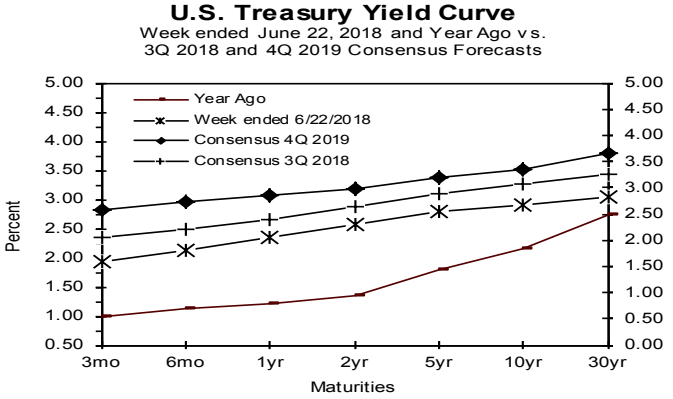
Wolters Kluwer

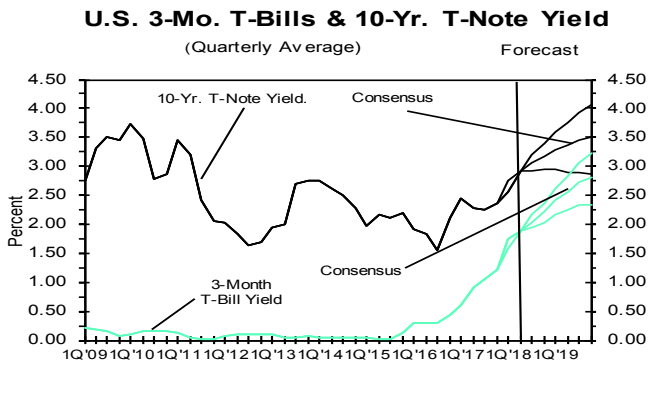
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

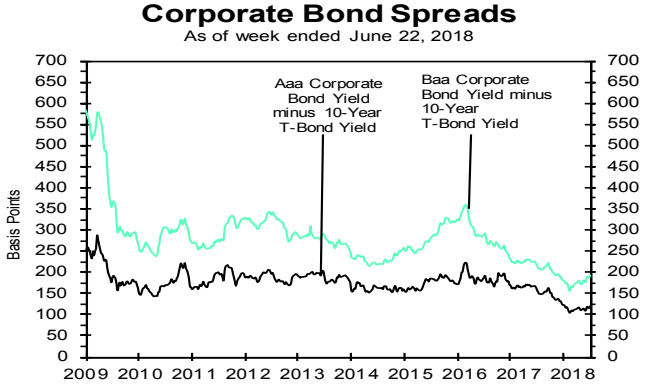
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

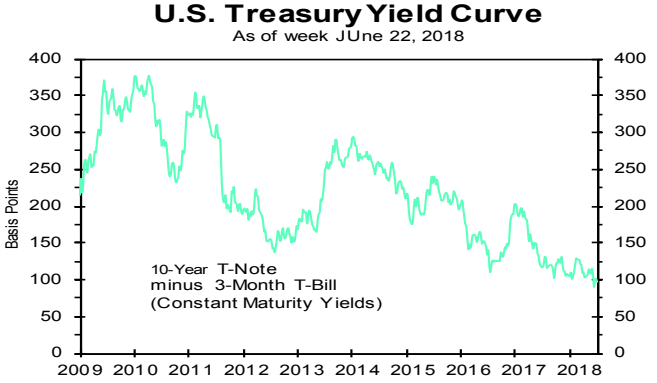
	History: Average For Week Ending				History: Average For Month			Latest Qtr	Consensus Forecasts-Quarterly Avg.					
Interest Rates	Jun 22	Jun 15	Jun 8	Jun 1	May.	Apr.	Mar.	*2Q 2018**	3Q 2018	4Q 2018	1Q 2019	2Q 2019	3Q 2019	4Q 2019
Federal Funds Rate	1.90	1.82	1.70	1.70	1.70	1.69	1.49	*1.73*	**2.0**	**2.2**	**2.4**	**2.6**	**2.8**	**2.9**
Prime Rate	5.00	5.00	4.75	4.75	4.75	4.75	4.75	*4.81*	**5.0**	**5.2**	**5.4**	**5.6**	**5.8**	**5.9**
LIBOR, 3-mo.	2.33	2.33	2.32	2.31	2.34	2.35	2.16	*2.34*	**2.4**	**2.6**	**2.8**	**2.9**	**3.1**	**3.2**
Commercial Paper, 1-mo.	1.96	1.96	1.88	1.85	1.82	1.82	1.76	*1.86*	**2.0**	**2.3**	**2.5**	**2.7**	**2.8**	**3.0**
Treasury bill, 3-mo.	1.94	1.94	1.94	1.93	1.90	1.79	1.72	*1.88*	**2.0**	**2.2**	**2.4**	**2.6**	**2.7**	**2.8**
Treasury bill, 6-mo.	2.13	2.09	2.13	2.08	2.07	1.98	1.91	*2.06*	**2.2**	**2.4**	**2.6**	**2.7**	**2.9**	**3.0**
Treasury bill, 1 yr.	2.34	2.34	2.31	2.23	2.28	2.15	2.06	*2.25*	**2.4**	**2.6**	**2.7**	**2.9**	**3.0**	**3.1**
Treasury note, 2 yr.	2.56	2.56	2.51	2.40	2.53	2.38	2.27	*2.48*	**2.6**	**2.8**	**2.9**	**3.0**	**3.1**	**3.2**
Treasury note, 5 yr.	2.78	2.82	2.78	2.67	2.84	2.70	2.63	*2.78*	**2.9**	**3.0**	**3.1**	**3.2**	**3.3**	**3.4**
Treasury note, 10 yr.	2.91	2.95	2.94	2.83	3.00	2.86	2.85	*2.93*	**3.1**	**3.2**	**3.3**	**3.4**	**3.4**	**3.5**
Treasury note, 30 yr.	3.04	3.08	3.09	3.00	3.15	3.07	3.10	*3.10*	**3.3**	**3.4**	**3.5**	**3.6**	**3.7**	**3.8**
Corporate Aaa bond	4.11	4.10	4.11	4.02	4.12	3.99	3.98	*4.07*	**4.2**	**4.4**	**4.6**	**4.7**	**4.8**	**4.9**
Corporate Baa bond	4.84	4.82	4.82	4.72	4.79	4.61	4.59	*4.74*	**5.0**	**5.2**	**5.3**	**5.5**	**5.6**	**5.6**
State & Local bonds	3.62	3.63	3.63	3.60	3.65	3.64	3.61	*3.64*	**3.9**	**4.0**	**4.1**	**4.3**	**4.3**	**4.4**
Home mortgage rate	4.57	4.62	4.54	4.56	4.59	4.47	4.44	*4.55*	**4.7**	**4.8**	**4.9**	**5.1**	**5.1**	**5.2**
	History								Consensus Forecasts-Quarterly					
Key Assumptions	3Q 2016	4Q 2016	1Q 2017	2Q 2017	3Q 2017	4Q 2017	1Q 2018	*2Q 2018**	**3Q 2018**	**4Q 2018**	**1Q 2019**	**2Q 2019**	**3Q 2019**	**4Q 2019**
Major Currency Index	90.3	93.7	94.4	93.0	88.3	88.9	86.1	*88.2*	**89.1**	**89.0**	**88.8**	**88.7**	**88.6**	**88.4**
Real GDP	2.8	1.8	1.2	3.1	3.2	2.9	2.0	*3.8*	**2.9**	**2.8**	**2.4**	**2.4**	**2.2**	**1.9**
GDP Price Index	1.4	2.0	2.0	1.0	2.1	2.3	2.2	*2.1*	**2.2**	**2.2**	**2.2**	**2.2**	**2.3**	**2.2**
Consumer Price Index	1.8	2.7	3.0	0.1	2.1	3.3	3.5	*2.1*	**2.4**	**2.2**	**2.3**	**2.1**	**2.4**	**2.3**

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data is sourced from Haver Analytics. Historical data for Fed's Major Currency Index is from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS). **Interest rate data for 2Q 2018 based on historical data through the week ended June 22nd. *Data for 2Q 2018 Major Currency Index is based on data through week ended June 22nd. Figures for 2Q 2018 Real GDP, GDP Chained Price Index and Consumer Price Index are consensus forecasts based on a special question asked of the panelists' this month.*









20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 37, No. 8, August 1, 2018

Wolters Kluwer

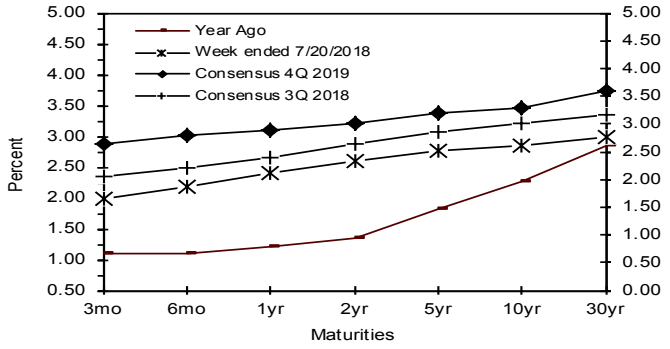
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

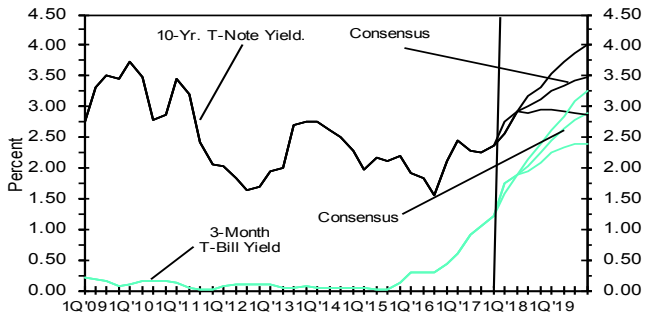
	History				History				Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	3Q	4Q	1Q	2Q	3Q	4Q
Interest Rates	July 20	July 13	July 6	June 29	Jun.	May	Apr	2Q 2018	2018	2018	2019	2019	2019	2019
Federal Funds Rate	1.91	1.91	1.91	1.92	1.81	1.70	1.69	1.73	2.0	2.2	2.4	2.6	2.8	2.9
Prime Rate	5.00	5.00	5.00	5.00	4.88	4.75	4.75	4.79	5.0	5.3	5.5	5.7	5.8	5.9
LIBOR, 3-mo.	2.34	2.34	2.34	2.34	2.33	2.34	2.35	2.34	2.4	2.6	2.8	3.0	3.1	3.2
Commercial Paper, 1-mo.	1.97	1.96	1.96	1.97	1.92	1.82	1.82	1.85	2.0	2.3	2.5	2.7	2.9	3.0
Treasury bill, 3-mo.	2.00	1.98	1.97	1.93	1.94	1.90	1.79	1.88	2.0	2.2	2.4	2.6	2.8	2.9
Treasury bill, 6-mo.	2.17	2.15	2.13	2.12	2.11	2.07	1.98	2.05	2.2	2.4	2.6	2.8	2.9	3.0
Treasury bill, 1 yr.	2.40	2.36	2.33	2.33	2.31	2.28	2.15	2.25	2.4	2.6	2.8	2.9	3.0	3.1
Treasury note, 2 yr.	2.60	2.59	2.55	2.53	2.51	2.53	2.38	2.47	2.6	2.8	2.9	3.1	3.2	3.2
Treasury note, 5 yr.	2.76	2.75	2.73	2.73	2.76	2.84	2.70	2.77	2.9	3.0	3.1	3.2	3.3	3.4
Treasury note, 10 yr.	2.86	2.85	2.84	2.85	2.90	3.00	2.86	2.92	3.0	3.1	3.3	3.3	3.4	3.5
Treasury note, 30 yr.	2.98	2.95	2.96	2.99	3.04	3.15	3.07	3.09	3.2	3.3	3.5	3.6	3.7	3.7
Corporate Aaa bond	4.03	4.02	4.07	4.11	4.09	4.12	3.99	4.07	4.1	4.3	4.6	4.7	4.8	4.9
Corporate Baa bond	4.76	4.76	4.83	4.85	4.81	4.79	4.61	4.74	5.0	5.2	5.3	5.5	5.6	5.7
State & Local bonds	3.59	3.61	3.62	3.61	3.62	3.65	3.64	3.64	3.9	4.0	4.2	4.3	4.4	4.5
Home mortgage rate	4.52	4.53	4.52	4.55	4.57	4.59	4.47	4.54	4.6	4.8	4.9	5.0	5.1	5.2
	History				History				Consensus Forecasts-Quarterly					
	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Key Assumptions	2016	2016	2017	2017	2017	2017	2018	2018	2018	2018	2019	2019	2019	2019
Major Currency Index	90.3	93.7	94.4	93.0	88.3	88.9	86.1	88.3	89.5	89.5	89.2	88.9	88.7	88.4
Real GDP	1.9	1.8	1.8	3.0	2.8	2.3	2.2	4.1	2.9	2.7	2.4	2.4	2.2	2.0
GDP Price Index	1.4	2.3	2.0	1.2	2.2	2.5	2.0	3.0	2.3	2.2	2.3	2.2	2.3	2.2
Consumer Price Index	1.8	2.7	3.0	0.1	2.1	3.3	3.5	1.7	2.4	2.2	2.3	2.2	2.3	2.3

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data is sourced from Haver Analytics. Historical data for Fed's Major Currency Index is from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS.

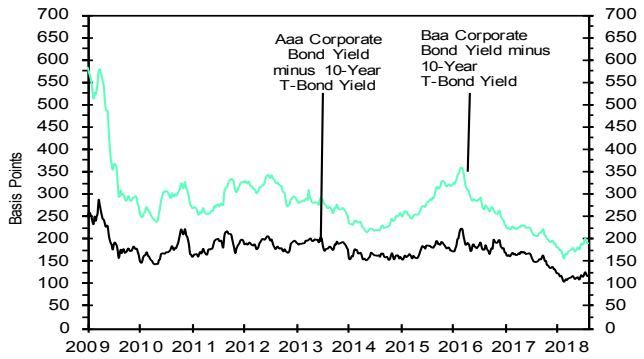
U.S. Treasury Yield Curve
Week ended July 20, 2018 and Year Ago vs.
3Q 2018 and 4Q 2019 Consensus Forecasts



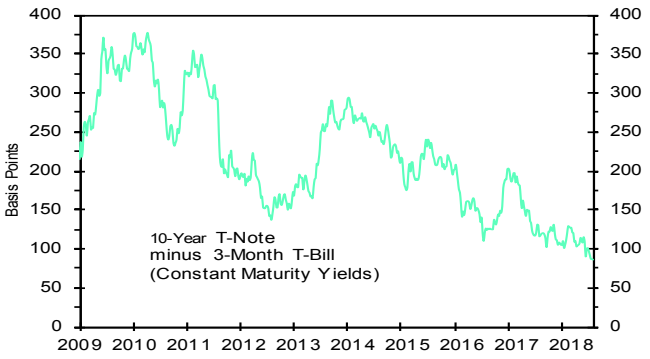
U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average)



Corporate Bond Spreads
As of week ended July 20, 2018



U.S. Treasury Yield Curve
As of week July 20, 2018



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 37, No. 9, September 1, 2018

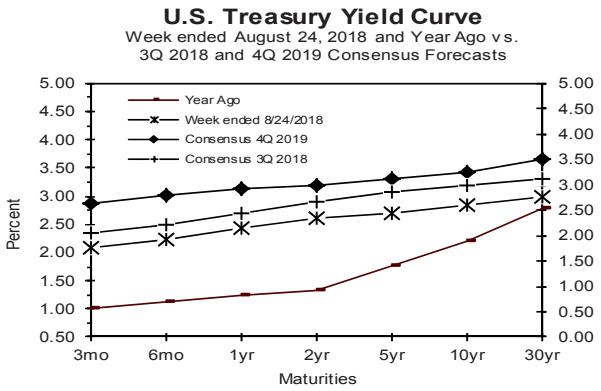
Wolters Kluwer

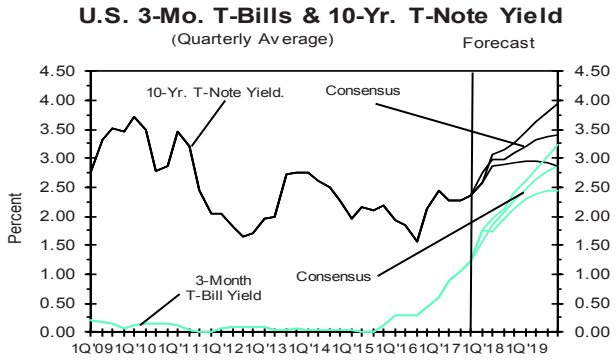
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

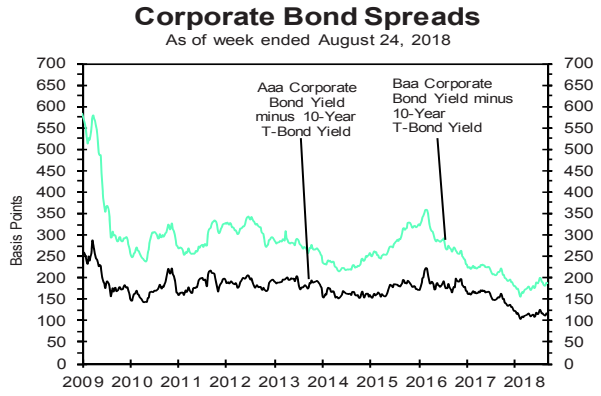
Consensus Forecasts of U.S. Interest Rates and Key Assumptions

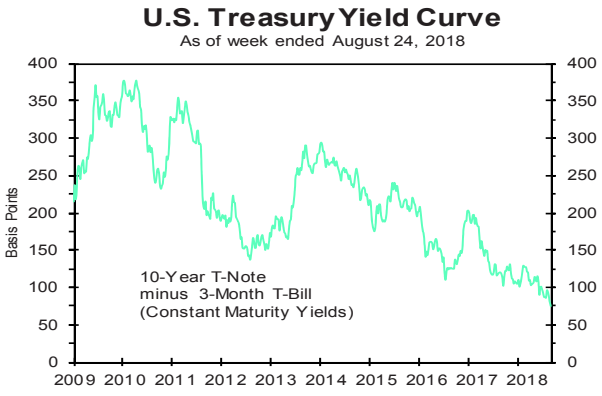
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	3Q	4Q	1Q	2Q	3Q	4Q
Interest Rates	Aug 24	Aug 17	Aug 10	Aug 3	July	June	May	Q2 2018	2018	2018	2019	2019	2019	2019
Federal Funds Rate	1.92	1.91	1.91	1.91	1.91	1.81	1.70	1.73	2.0	2.2	2.4	2.6	2.8	2.9
Prime Rate	5.00	5.00	5.00	5.00	5.00	4.88	4.75	4.79	5.0	5.3	5.5	5.7	5.9	6.0
LIBOR, 3-mo.	2.31	2.32	2.34	2.34	2.34	2.33	2.34	2.34	2.4	2.6	2.8	3.0	3.1	3.2
Commercial Paper, 1-mo.	1.95	1.95	1.95	1.96	1.96	1.92	1.82	1.86	2.0	2.3	2.5	2.7	2.8	2.9
Treasury bill, 3-mo.	2.08	2.07	2.06	2.03	1.99	1.94	1.90	1.88	2.1	2.3	2.5	2.6	2.8	2.9
Treasury bill, 6-mo.	2.24	2.24	2.24	2.22	2.16	2.11	2.07	2.06	2.2	2.4	2.6	2.8	2.9	3.0
Treasury bill, 1 yr.	2.44	2.44	2.44	2.44	2.38	2.31	2.28	2.25	2.4	2.6	2.8	2.9	3.0	3.1
Treasury note, 2 yr.	2.61	2.62	2.65	2.66	2.60	2.51	2.53	2.48	2.7	2.8	2.9	3.1	3.1	3.2
Treasury note, 5 yr.	2.71	2.75	2.80	2.85	2.77	2.76	2.84	2.76	2.9	3.0	3.1	3.2	3.3	3.3
Treasury note, 10 yr.	2.83	2.87	2.94	2.97	2.88	2.90	3.00	2.92	3.0	3.1	3.2	3.3	3.4	3.4
Treasury note, 30 yr.	2.98	3.04	3.09	3.11	3.00	3.04	3.15	3.08	3.1	3.3	3.4	3.5	3.6	3.7
Corporate Aaa bond	3.99	4.04	4.06	4.10	4.06	4.09	4.12	4.07	4.1	4.3	4.5	4.6	4.7	4.8
Corporate Baa bond	4.71	4.76	4.77	4.79	4.79	4.81	4.79	4.74	4.9	5.1	5.3	5.4	5.5	5.6
State & Local bonds	3.62	3.63	3.65	3.63	3.60	3.62	3.65	3.63	3.8	4.0	4.1	4.2	4.3	4.4
Home mortgage rate	4.51	4.53	4.59	4.60	4.53	4.57	4.59	4.54	4.6	4.7	4.9	5.0	5.1	5.1
	History								Consensus Forecasts-Quarterly					
	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Key Assumptions	2016	2016	2017	2017	2017	2017	2018	2018	2018	2018	2019	2019	2019	2019
Major Currency Index	90.2	93.6	94.3	92.9	88.3	88.9	86.1	88.3	89.8	89.9	89.8	89.6	89.2	88.9
Real GDP	1.9	1.8	1.8	3.0	2.8	2.3	2.2	4.2	3.1	2.8	2.4	2.4	2.1	1.9
GDP Price Index	1.4	2.3	2.0	1.2	2.2	2.5	2.0	3.0	2.2	2.3	2.3	2.3	2.2	2.2
Consumer Price Index	1.8	2.7	3.0	0.1	2.1	3.3	3.5	1.7	2.3	2.3	2.4	2.2	2.3	2.3

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data are sourced from Haver Analytics. Historical data for Fed's Major Currency Index are from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).









20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 37, No. 10, October 1, 2018

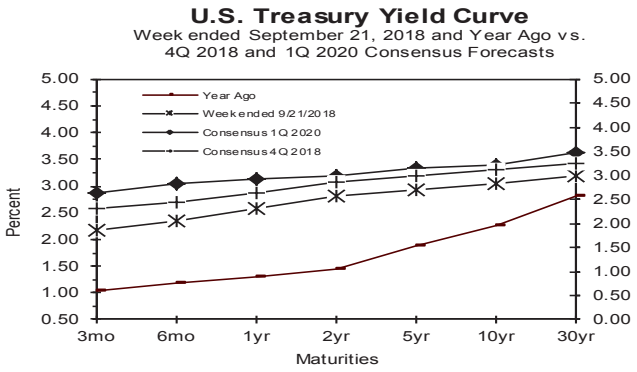
Wolters Kluwer

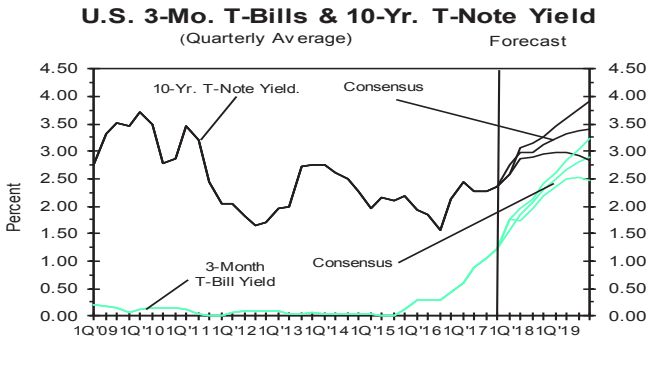
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

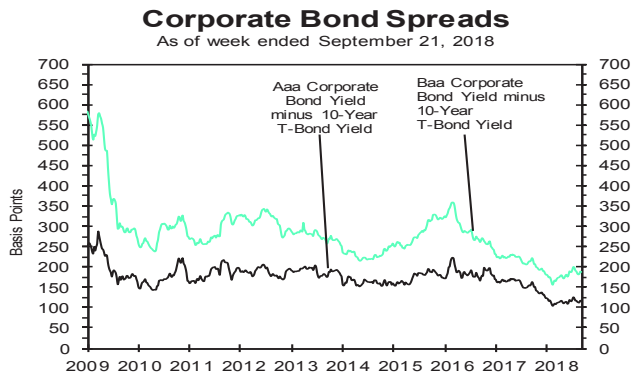
Consensus Forecasts of U.S. Interest Rates and Key Assumptions

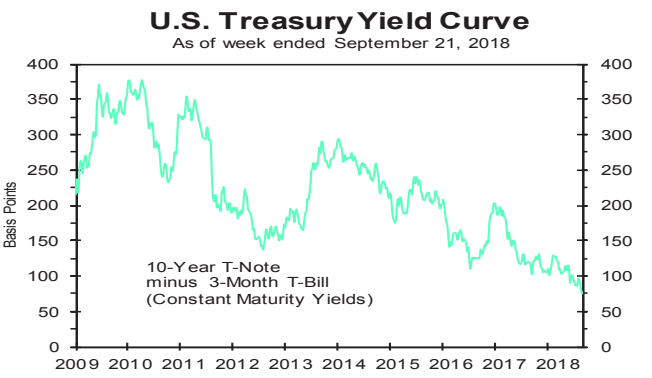
	History				History				Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	4Q	1Q	2Q	3Q	4Q	1Q
Interest Rates	Sep 21	Sep 14	Sep 7	Aug 31	Aug	Jul	Jun	*Q3 2018**	**2018**	**2019**	**2019**	**2019**	**2019**	**2020**
Federal Funds Rate	1.92	1.92	1.91	1.92	1.91	1.91	1.81	*1.91*	**2.2**	**2.4**	**2.7**	**2.8**	**2.9**	**2.9**
Prime Rate	5.00	5.00	5.00	5.00	5.00	5.00	4.88	*5.00*	**5.3**	**5.5**	**5.7**	**5.9**	**6.0**	**5.9**
LIBOR, 3-mo.	2.35	2.33	2.32	2.32	2.33	2.34	2.33	*2.33*	**2.6**	**2.8**	**3.0**	**3.1**	**3.2**	**3.2**
Commercial Paper, 1-mo.	2.10	2.03	2.00	1.99	1.96	1.96	1.92	*1.98*	**2.3**	**2.5**	**2.7**	**2.8**	**2.9**	**2.9**
Treasury bill, 3-mo.	2.17	2.15	2.14	2.12	2.07	1.99	1.94	*2.06*	**2.3**	**2.5**	**2.7**	**2.8**	**2.9**	**2.9**
Treasury bill, 6-mo.	2.36	2.32	2.30	2.27	2.24	2.16	2.11	*2.24*	**2.4**	**2.6**	**2.8**	**2.9**	**3.0**	**3.0**
Treasury bill, 1 yr.	2.58	2.55	2.50	2.47	2.45	2.38	2.31	*2.45*	**2.6**	**2.8**	**2.9**	**3.1**	**3.1**	**3.1**
Treasury note, 2 yr.	2.80	2.75	2.67	2.65	2.64	2.60	2.51	*2.65*	**2.8**	**3.0**	**3.1**	**3.2**	**3.2**	**3.2**
Treasury note, 5 yr.	2.94	2.87	2.78	2.76	2.77	2.77	2.76	*2.80*	**3.0**	**3.1**	**3.2**	**3.3**	**3.3**	**3.3**
Treasury note, 10 yr.	3.05	2.97	2.91	2.87	2.90	2.88	2.90	*2.91*	**3.1**	**3.2**	**3.3**	**3.4**	**3.4**	**3.4**
Treasury note, 30 yr.	3.19	3.11	3.08	3.01	3.05	3.00	3.04	*3.05*	**3.3**	**3.4**	**3.5**	**3.6**	**3.7**	**3.6**
Corporate Aaa bond	4.17	4.12	4.10	4.03	4.04	4.06	4.09	*4.07*	**4.3**	**4.5**	**4.6**	**4.7**	**4.7**	**4.7**
Corporate Baa bond	4.86	4.83	4.82	4.75	4.75	4.79	4.81	*4.78*	**5.1**	**5.3**	**5.4**	**5.5**	**5.6**	**5.6**
State & Local bonds	3.75	3.71	3.67	3.63	3.63	3.60	3.62	*3.64*	**4.0**	**4.1**	**4.2**	**4.3**	**4.4**	**4.4**
Home mortgage rate	4.65	4.60	4.54	4.52	4.55	4.53	4.57	*4.57*	**4.7**	**4.9**	**5.0**	**5.1**	**5.1**	**5.2**
	History								Consensus Forecasts-Quarterly					
	4Q	1Q	2Q	3Q	4Q	1Q	2Q	*3Q*	4Q	1Q	2Q	3Q	4Q	1Q
Key Assumptions	2016	2017	2017	2017	2017	2018	2018	*2018**	**2018**	**2019**	**2019**	**2019**	**2019**	**2020**
Major Currency Index	93.6	94.3	92.9	88.3	88.9	86.1	88.3	*90.2*	**90.0**	**89.8**	**89.4**	**88.6**	**88.5**	**88.5**
Real GDP	1.8	1.8	3.0	2.8	2.3	2.2	4.2	*3.2*	**2.8**	**2.4**	**2.4**	**2.2**	**1.9**	**1.8**
GDP Price Index	2.3	2.0	1.2	2.2	2.5	2.0	3.0	*2.2*	**2.3**	**2.3**	**2.3**	**2.2**	**2.2**	**2.2**
Consumer Price Index	2.7	3.0	0.1	2.1	3.3	3.5	1.7	*2.2*	**2.4**	**2.4**	**2.2**	**2.3**	**2.3**	**2.3**

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data are sourced from Haver Analytics. Historical data for Fed's Major Currency Index are from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).). *Interest rate data for Q3 2018 based on historical data through the week ended September 21. *Data for Q3 2018 Major Currency Index based on data through week ended September 21. Figures for Q3 2018 Real GDP, GDP Chained Price Index and Consumer Price Index are consensus forecasts based on a special question asked of the panelists this month.







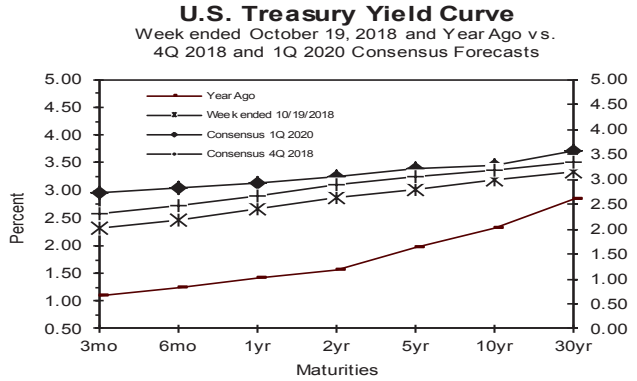


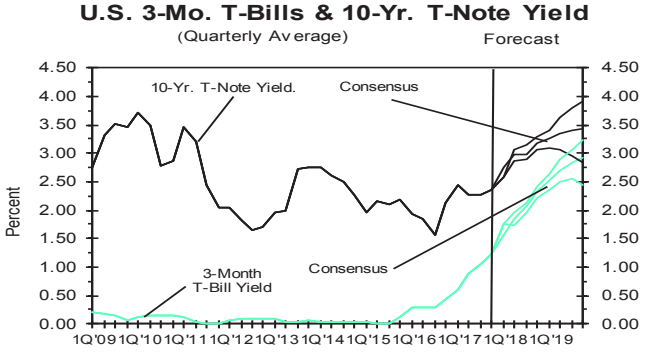
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

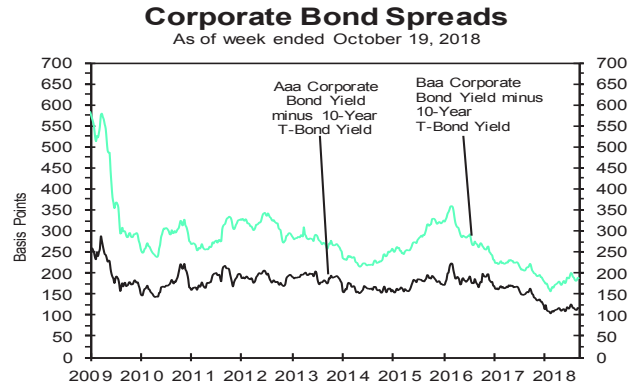
Consensus Forecasts of U.S. Interest Rates and Key Assumptions

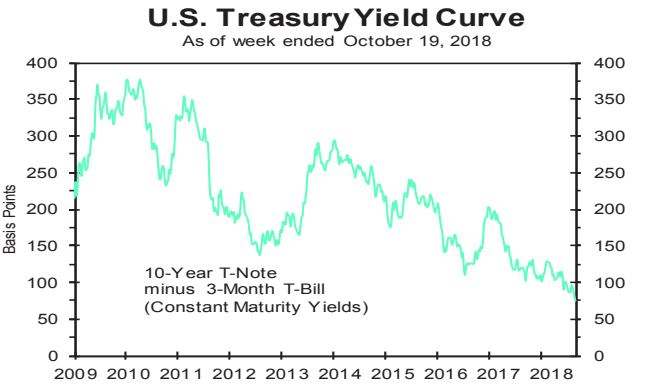
	History: Average For Week Ending				History: Average For Month				Consensus Forecasts-Quarterly Avg.					
Interest Rates	Oct 19	Oct 12	Oct 5	Sep 28	Sep	Aug	Jul	Latest Qtr Q3 2018	4Q 2018	1Q 2019	2Q 2019	3Q 2019	4Q 2019	1Q 2020
Federal Funds Rate	2.18	2.18	2.18	1.92	1.95	1.91	1.91	1.92	**2.3**	**2.5**	**2.7**	**2.8**	**3.0**	**3.0**
Prime Rate	5.25	5.25	5.25	5.00	5.03	5.00	5.00	5.01	**5.3**	**5.5**	**5.7**	**5.9**	**6.0**	**6.0**
LIBOR, 3-mo.	2.46	2.43	2.41	2.39	2.35	2.32	2.34	2.34	**2.6**	**2.8**	**3.0**	**3.1**	**3.2**	**3.2**
Commercial Paper, 1-mo.	2.23	2.22	2.20	2.11	2.06	1.96	1.95	1.99	**2.3**	**2.5**	**2.7**	**2.9**	**2.9**	**2.9**
Treasury bill, 3-mo.	2.31	2.27	2.23	2.20	2.17	2.07	1.99	2.08	**2.3**	**2.5**	**2.7**	**2.8**	**2.9**	**2.9**
Treasury bill, 6-mo.	2.47	2.45	2.41	2.37	2.34	2.24	2.17	2.25	**2.5**	**2.7**	**2.8**	**2.9**	**3.0**	**3.1**
Treasury bill, 1 yr.	2.67	2.66	2.62	2.59	2.56	2.45	2.39	2.47	**2.7**	**2.8**	**3.0**	**3.1**	**3.1**	**3.1**
Treasury note, 2 yr.	2.88	2.87	2.85	2.83	2.77	2.64	2.61	2.67	**2.9**	**3.0**	**3.1**	**3.2**	**3.2**	**3.3**
Treasury note, 5 yr.	3.03	3.03	3.01	2.96	2.89	2.77	2.78	2.81	**3.1**	**3.2**	**3.3**	**3.3**	**3.4**	**3.4**
Treasury note, 10 yr.	3.18	3.18	3.14	3.07	3.00	2.89	2.89	2.93	**3.2**	**3.3**	**3.4**	**3.4**	**3.4**	**3.5**
Treasury note, 30 yr.	3.35	3.35	3.30	3.20	3.15	3.04	3.01	3.07	**3.3**	**3.5**	**3.6**	**3.6**	**3.7**	**3.7**
Corporate Aaa bond	4.30	4.29	4.23	4.16	4.14	4.04	4.06	4.08	**4.2**	**4.5**	**4.6**	**4.7**	**4.7**	**4.7**
Corporate Baa bond	5.02	5.00	4.93	4.84	4.84	4.75	4.78	4.79	**5.1**	**5.3**	**5.4**	**5.5**	**5.6**	**5.6**
State & Local bonds	3.86	3.85	3.80	3.77	3.72	3.63	3.61	3.65	**4.0**	**4.1**	**4.2**	**4.3**	**4.3**	**4.3**
Home mortgage rate	4.85	4.90	4.71	4.72	4.63	4.55	4.53	4.57	**4.8**	**5.0**	**5.1**	**5.1**	**5.2**	**5.2**
	History								Consensus Forecasts-Quarterly					
Key Assumptions	4Q 2016	1Q 2017	2Q 2017	3Q 2017	4Q 2017	1Q 2018	2Q 2018	*3Q 2018*	4Q 2018	1Q 2019	2Q 2019	3Q 2019	4Q 2019	1Q 2020
Major Currency Index	93.6	94.3	92.9	88.3	88.9	86.1	88.3	90.2	**90.6**	**90.5**	**90.0**	**89.2**	**89.0**	**89.1**
Real GDP	1.8	1.8	3.0	2.8	2.3	2.2	4.2	3.5	**2.8**	**2.4**	**2.4**	**2.2**	**1.9**	**1.8**
GDP Price Index	2.3	2.0	1.2	2.2	2.5	2.0	3.0	1.7	**2.4**	**2.3**	**2.3**	**2.2**	**2.3**	**2.2**
Consumer Price Index	2.7	3.0	0.1	2.1	3.3	3.5	1.7	2.0	**2.5**	**2.5**	**2.2**	**2.3**	**2.4**	**2.3**

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data are sourced from Haver Analytics. Historical data for Fed's Major Currency Index are from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).).







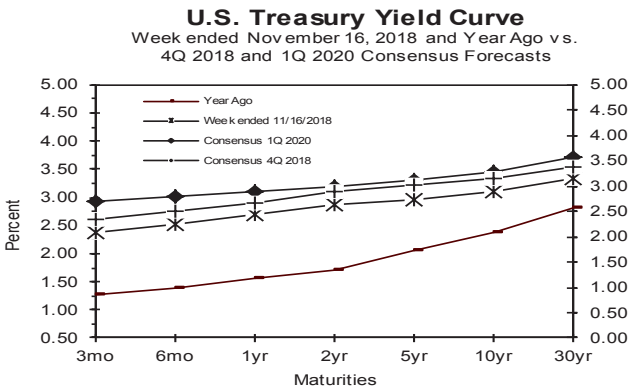


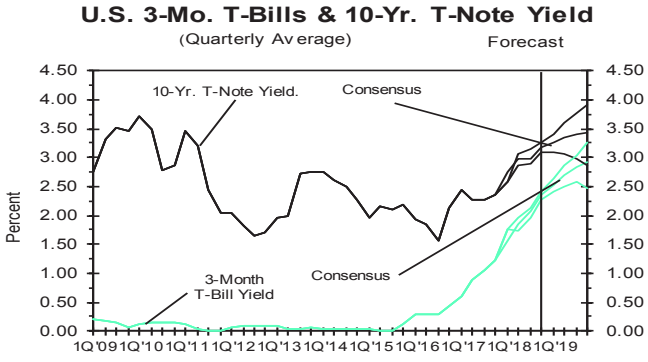
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

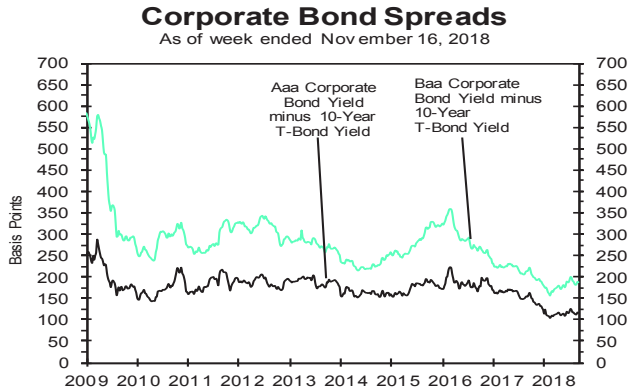
Consensus Forecasts of U.S. Interest Rates and Key Assumptions

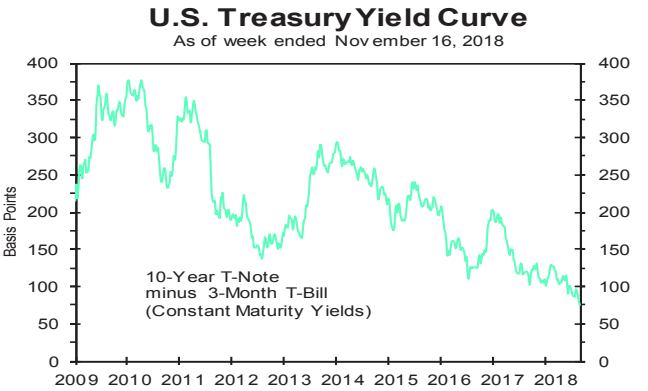
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	4Q	1Q	2Q	3Q	4Q	1Q
Interest Rates	Nov 16	Nov 9	Nov 2	Oct 26	Oct	Sep	Aug	Q3 2018	2018	2019	2019	2019	2019	2020
Federal Funds Rate	2.19	2.20	2.20	2.19	2.19	1.95	1.91	1.92	**2.3**	**2.5**	**2.7**	**2.9**	**3.0**	**3.0**
Prime Rate	5.25	5.25	5.25	5.25	5.25	5.03	5.00	5.01	**5.3**	**5.5**	**5.7**	**5.9**	**6.0**	**6.0**
LIBOR, 3-mo.	2.63	2.60	2.56	2.50	2.46	2.35	2.32	2.34	**2.6**	**2.8**	**3.0**	**3.2**	**3.3**	**3.3**
Commercial Paper, 1-mo.	2.29	2.27	2.25	2.26	2.23	2.06	1.96	1.99	**2.3**	**2.5**	**2.7**	**2.9**	**2.9**	**2.9**
Treasury bill, 3-mo.	2.37	2.36	2.33	2.34	2.29	2.17	2.07	2.08	**2.4**	**2.5**	**2.7**	**2.8**	**2.9**	**2.9**
Treasury bill, 6-mo.	2.52	2.52	2.49	2.48	2.46	2.34	2.24	2.25	**2.5**	**2.7**	**2.8**	**3.0**	**3.0**	**3.0**
Treasury bill, 1 yr.	2.70	2.73	2.67	2.66	2.65	2.56	2.45	2.47	**2.7**	**2.8**	**3.0**	**3.1**	**3.1**	**3.1**
Treasury note, 2 yr.	2.86	2.94	2.85	2.86	2.86	2.77	2.64	2.67	**2.9**	**3.0**	**3.1**	**3.2**	**3.2**	**3.2**
Treasury note, 5 yr.	2.95	3.06	2.97	2.98	3.00	2.89	2.77	2.81	**3.0**	**3.1**	**3.2**	**3.3**	**3.4**	**3.3**
Treasury note, 10 yr.	3.11	3.21	3.14	3.14	3.15	3.00	2.89	2.93	**3.2**	**3.3**	**3.4**	**3.4**	**3.4**	**3.4**
Treasury note, 30 yr.	3.35	3.42	3.38	3.35	3.34	3.15	3.04	3.07	**3.4**	**3.5**	**3.6**	**3.6**	**3.7**	**3.7**
Corporate Aaa bond	4.34	4.38	4.38	4.33	4.30	4.14	4.04	4.08	**4.2**	**4.5**	**4.6**	**4.7**	**4.8**	**4.8**
Corporate Baa bond	5.15	5.14	5.13	5.06	5.02	4.84	4.75	4.79	**5.1**	**5.3**	**5.5**	**5.5**	**5.6**	**5.6**
State & Local bonds	3.87	3.91	3.87	3.85	3.84	3.72	3.63	3.65	**4.1**	**4.2**	**4.3**	**4.4**	**4.4**	**4.4**
Home mortgage rate	4.94	4.94	4.83	4.86	4.83	4.63	4.55	4.57	**4.8**	**5.0**	**5.1**	**5.2**	**5.2**	**5.2**
	History								Consensus Forecasts-Quarterly					
	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q
Key Assumptions	2016	2017	2017	2017	2017	2018	2018	2018	2018	2019	2019	2019	2019	2020
Major Currency Index	93.6	94.3	92.9	88.3	88.9	86.1	88.3	90.2	**90.6**	**90.5**	**90.1**	**89.2**	**89.1**	**88.9**
Real GDP	1.8	1.8	3.0	2.8	2.3	2.2	4.2	3.5	**2.6**	**2.4**	**2.4**	**2.2**	**2.0**	**1.8**
GDP Price Index	2.3	2.0	1.2	2.2	2.5	2.0	3.0	1.7	**2.3**	**2.2**	**2.3**	**2.2**	**2.2**	**2.2**
Consumer Price Index	2.7	3.0	0.1	2.1	3.3	3.5	1.7	2.0	**2.2**	**2.2**	**2.2**	**2.3**	**2.3**	**2.3**

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data are sourced from Haver Analytics. Historical data for Fed's Major Currency Index are from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).









20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Long-Range Survey:

The table below contains the results of our twice-annual long-range CONSENSUS survey. There are also Top 10 and Bottom 10 averages for each variable. Shown are consensus estimates for the years 2020 through 2024 and averages for the five-year periods 2020-2024 and 2025-2029. Apply these projections cautiously. Few if any economic, demographic and political forces can be evaluated accurately over such long time spans.

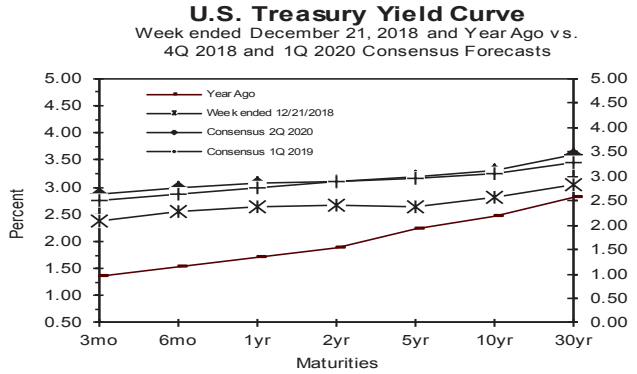
		Average For The Year					Five-Year Averages	
Interest Rates		**2020**	**2021**	**2022**	**2023**	**2024**	**2020-2024**	**2025-2029**
1. Federal Funds Rate	**CONSENSUS**	**2.9**	**2.8**	**2.8**	**3.0**	**3.0**	**2.9**	**3.1**
	Top 10 Average	3.5	3.6	3.6	3.6	3.6	3.6	3.6
	Bottom 10 Average	2.1	1.9	2.0	2.3	2.5	2.2	2.6
2. Prime Rate	**CONSENSUS**	**5.9**	**5.8**	**5.9**	**6.0**	**6.1**	**5.9**	**6.1**
	Top 10 Average	6.5	6.6	6.6	6.6	6.6	6.6	6.6
	Bottom 10 Average	5.2	4.9	5.1	5.4	5.6	5.2	5.7
3. LIBOR, 3-Mo.	**CONSENSUS**	**3.3**	**3.2**	**3.2**	**3.5**	**3.5**	**3.3**	**3.5**
	Top 10 Average	3.9	4.0	4.0	4.2	4.2	4.0	4.0
	Bottom 10 Average	2.7	2.5	2.5	2.8	2.9	2.7	3.1
4. Commercial Paper, 1-Mo.	**CONSENSUS**	**3.0**	**2.9**	**3.0**	**3.1**	**3.1**	**3.0**	**3.1**
	Top 10 Average	3.5	3.6	3.6	3.6	3.6	3.6	3.6
	Bottom 10 Average	2.5	2.3	2.3	2.6	2.6	2.4	2.6
5. Treasury Bill Yield, 3-Mo.	**CONSENSUS**	**2.9**	**2.8**	**2.8**	**3.0**	**3.0**	**2.9**	**3.1**
	Top 10 Average	3.5	3.6	3.6	3.6	3.6	3.6	**3.6**
	Bottom 10 Average	2.1	1.9	2.0	2.3	2.5	2.1	**2.6**
6. Treasury Bill Yield, 6-Mo.	**CONSENSUS**	**3.0**	**2.9**	**3.0**	**3.1**	**3.2**	**3.1**	**3.2**
	Top 10 Average	3.6	3.7	3.7	3.7	3.8	3.7	**3.7**
	Bottom 10 Average	2.4	2.1	2.2	2.5	2.7	2.4	**2.8**
7. Treasury Bill Yield, 1-Yr.	**CONSENSUS**	**3.1**	**3.1**	**3.1**	**3.2**	**3.3**	**3.2**	**3.4**
	Top 10 Average	3.7	3.8	3.8	3.8	3.8	3.8	**3.9**
	Bottom 10 Average	2.5	2.3	2.3	2.6	2.8	2.5	**2.9**
8. Treasury Note Yield, 2-Yr.	**CONSENSUS**	**3.2**	**3.2**	**3.2**	**3.3**	**3.4**	**3.3**	**3.5**
	Top 10 Average	3.8	3.9	3.9	3.9	4.0	3.9	**4.0**
	Bottom 10 Average	2.5	2.4	2.4	2.7	2.8	2.6	**2.9**
10. Treasury Note Yield, 5-Yr.	**CONSENSUS**	**3.4**	**3.3**	**3.4**	**3.5**	**3.5**	**3.4**	**3.6**
	Top 10 Average	4.0	4.0	4.1	4.1	4.1	4.1	**4.2**
	Bottom 10 Average	2.7	2.7	2.6	2.8	2.9	2.7	**3.0**
11. Treasury Note Yield, 10-Yr.	**CONSENSUS**	**3.5**	**3.5**	**3.5**	**3.6**	**3.7**	**3.6**	**3.8**
	Top 10 Average	4.2	4.2	4.3	4.3	4.3	4.3	**4.4**
	Bottom 10 Average	2.9	2.9	2.8	3.0	3.0	2.9	**3.2**
12. Treasury Bond Yield, 30-Yr.	**CONSENSUS**	**3.8**	**3.8**	**3.9**	**4.0**	**4.0**	**3.9**	**4.2**
	Top 10 Average	4.5	4.5	4.6	4.7	4.7	4.6	**4.9**
	Bottom 10 Average	3.2	3.2	3.2	3.3	3.4	3.2	**3.5**
13. Corporate Aaa Bond Yield	**CONSENSUS**	**4.9**	**4.9**	**4.9**	**5.0**	**5.1**	**5.0**	**5.1**
	Top 10 Average	5.6	5.7	5.8	5.8	5.8	5.7	**5.9**
	Bottom 10 Average	4.2	4.1	4.1	4.2	4.3	4.2	**4.4**
13. Corporate Baa Bond Yield	**CONSENSUS**	**5.8**	**5.8**	**5.9**	**5.9**	**6.0**	**5.9**	**6.0**
	Top 10 Average	6.5	6.6	6.8	6.8	6.8	6.7	**6.9**
	Bottom 10 Average	5.2	5.1	5.1	5.2	5.3	5.2	**5.3**
14. State & Local Bonds Yield	**CONSENSUS**	**4.6**	**4.5**	**4.5**	**4.5**	**4.6**	**4.5**	**4.7**
	Top 10 Average	5.1	5.0	5.0	5.0	5.1	5.1	**5.2**
	Bottom 10 Average	4.2	4.0	3.9	4.0	4.0	4.0	**4.1**
15. Home Mortgage Rate	**CONSENSUS**	**5.2**	**5.2**	**5.2**	**5.3**	**5.4**	**5.3**	**5.5**
	Top 10 Average	5.8	5.8	5.9	6.0	6.0	5.9	**6.1**
	Bottom 10 Average	4.6	4.5	4.5	4.7	4.8	4.6	**4.9**
A. FRB - Major Currency Index	**CONSENSUS**	**90.1**	**89.7**	**89.4**	**90.0**	**89.8**	**89.8**	**89.9**
	Top 10 Average	94.6	94.6	94.4	94.2	94.0	94.3	93.9
	Bottom 10 Average	85.5	84.8	84.2	85.8	85.6	85.2	85.8
		Year-Over-Year, % Change					Five-Year Averages	
		2020	**2021**	**2022**	**2023**	**2024**	**2020-2024**	**2025-2029**
B. Real GDP	**CONSENSUS**	**1.8**	**1.8**	**2.1**	**2.2**	**2.1**	**2.0**	**2.1**
	Top 10 Average	2.4	2.3	2.4	2.6	2.5	2.5	2.5
	Bottom 10 Average	1.3	1.3	1.7	1.8	1.7	1.6	1.8
C. GDP Chained Price Index	**CONSENSUS**	**2.1**	**2.1**	**2.1**	**2.1**	**2.1**	**2.1**	**2.1**
	Top 10 Average	2.4	2.4	2.3	2.4	2.3	2.3	2.3
	Bottom 10 Average	1.9	1.8	1.9	1.9	1.9	1.9	1.9
D. Consumer Price Index	**CONSENSUS**	**2.1**	**2.1**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**
	Top 10 Average	2.5	2.5	2.5	2.5	2.4	2.5	2.4
	Bottom 10 Average	1.7	1.8	1.9	2.0	1.9	1.9	2.0

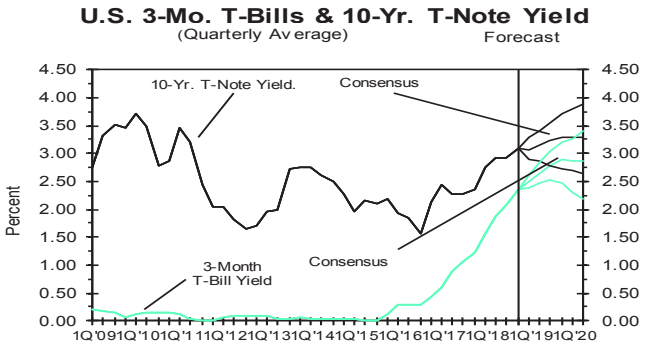
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

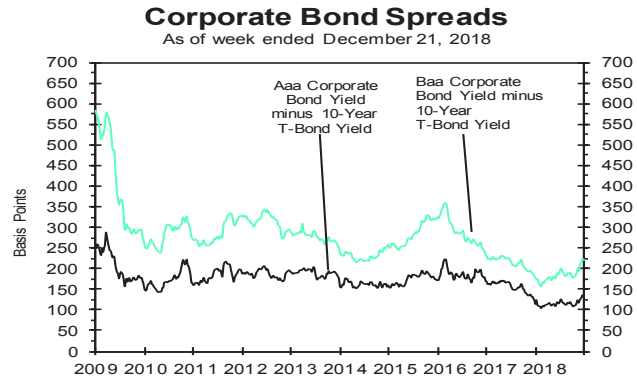
Consensus Forecasts of U.S. Interest Rates and Key Assumptions

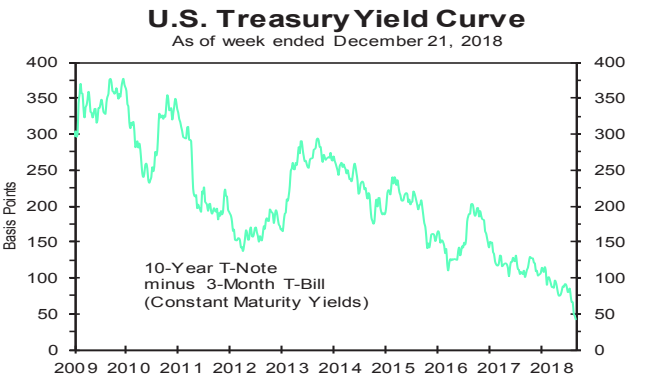
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	1Q	2Q	3Q	4Q	1Q	2Q
Interest Rates	Dec 14	Dec 7	Nov 30	Nov 23	Nov	Oct	Sep	Q4 2018*	2019	2019	2019	2019	2020	2020
Federal Funds Rate	2.19	2.20	2.20	2.20	2.20	2.19	1.95	2.19	2.5	2.6	2.8	2.9	2.9	2.9
Prime Rate	5.25	5.25	5.25	5.25	5.25	5.25	5.03	5.25	5.5	5.7	5.8	5.9	5.9	5.9
LIBOR, 3-mo.	2.78	2.76	2.72	2.67	2.65	2.46	2.35	2.59	2.8	3.0	3.1	3.2	3.2	3.2
Commercial Paper, 1-mo.	2.43	2.36	2.30	2.29	2.29	2.23	2.06	2.28	2.5	2.7	2.8	2.9	2.9	2.9
Treasury bill, 3-mo.	2.42	2.40	2.39	2.40	2.37	2.29	2.17	2.35	2.5	2.7	2.8	2.9	2.9	2.9
Treasury bill, 6-mo.	2.55	2.56	2.53	2.52	2.52	2.46	2.34	2.50	2.6	2.8	2.9	3.0	3.0	3.0
Treasury bill, 1 yr.	2.69	2.70	2.70	2.67	2.70	2.65	2.56	2.68	2.8	2.9	3.0	3.1	3.1	3.1
Treasury note, 2 yr.	2.75	2.78	2.82	2.80	2.86	2.86	2.77	2.84	2.9	3.0	3.1	3.1	3.1	3.1
Treasury note, 5 yr.	2.74	2.77	2.87	2.88	2.95	3.00	2.89	2.94	2.9	3.1	3.2	3.2	3.2	3.2
Treasury note, 10 yr.	2.89	2.90	3.05	3.06	3.12	3.15	3.00	3.09	3.1	3.2	3.2	3.3	3.3	3.3
Treasury note, 30 yr.	3.14	3.18	3.32	3.31	3.36	3.34	3.15	3.31	3.3	3.4	3.5	3.5	3.6	3.6
Corporate Aaa bond	4.22	4.26	4.35	4.33	4.36	4.30	4.14	4.31	4.2	4.4	4.5	4.5	4.6	4.6
Corporate Baa bond	5.10	5.14	5.21	5.18	5.17	5.02	4.84	5.10	5.2	5.3	5.4	5.5	5.5	5.5
State & Local bonds	3.75	3.76	3.81	3.83	3.86	3.84	3.72	3.83	4.0	4.1	4.1	4.2	4.2	4.3
Home mortgage rate	4.63	4.75	4.81	4.81	4.87	4.83	4.63	4.80	4.8	4.9	4.9	5.0	5.0	5.0
	History								Consensus Forecasts-Quarterly					
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q
Key Assumptions	2017	2017	2017	2017	2018	2018	2018	2018*	2019	2019	2019	2019	2020	2020
Major Currency Index	94.3	92.9	88.3	88.8	86.1	88.3	90.2	91.4	91.5	91.1	90.7	90.3	90.0	89.7
Real GDP	1.8	3.0	2.8	2.3	2.2	4.2	3.4	2.6	2.4	2.4	2.2	2.0	1.6	1.5
GDP Price Index	2.0	1.2	2.2	2.5	2.0	3.0	1.8	2.0	2.1	2.3	2.2	2.2	2.2	2.2
Consumer Price Index	3.0	0.1	2.1	3.3	3.5	1.7	2.0	1.8	1.9	2.2	2.3	2.3	2.3	2.1

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data are sourced from Haver Analytics. Historical data for Fed's Major Currency Index are from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS). **Interest rate data for Q4 2018 based on historical data through the week ended December 14. *Data for Q4 2018 Major Currency Index based on data through week ended December 14. Figures for Q4 2018 Real GDP, GDP Chained Price Index and Consumer Price Index are consensus forecasts based on a special question asked of the panelists this month.*







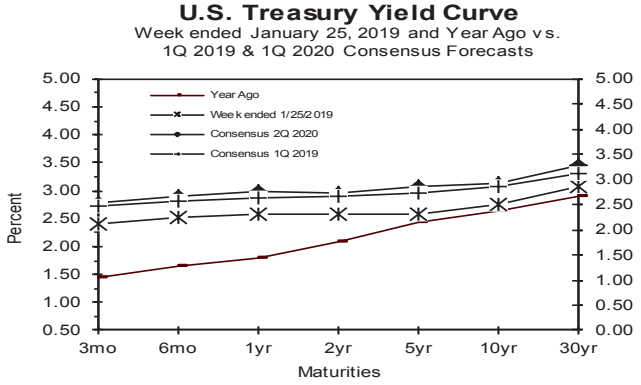


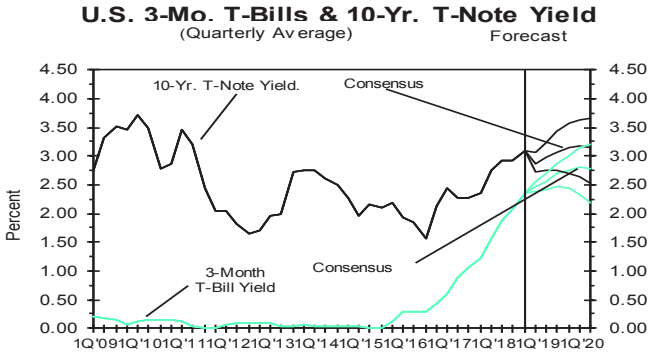
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

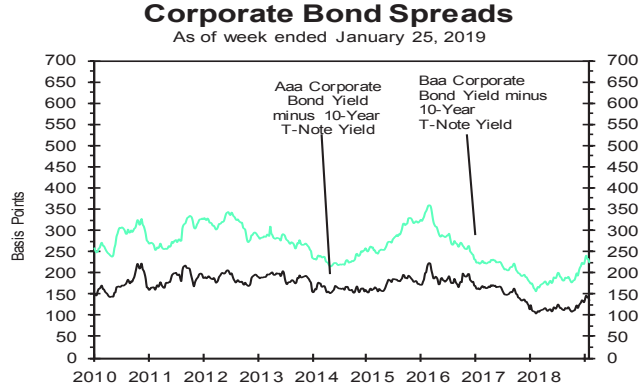
Consensus Forecasts of U.S. Interest Rates and Key Assumptions

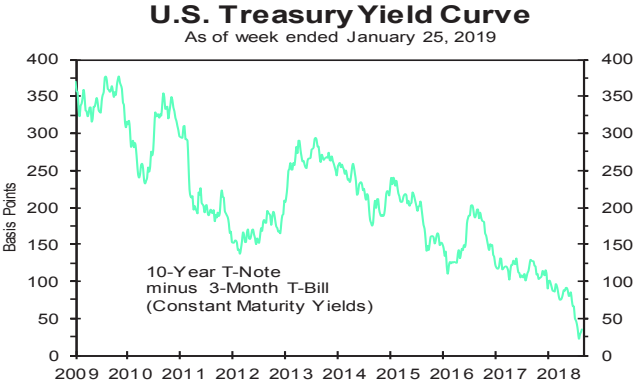
	History: Average For Week Ending				History: Average For Month				Consensus Forecasts-Quarterly Avg.					
Interest Rates	Jan 18	Jan 11	Jan 4	Dec 28	Dec	Nov	Oct	*Latest Qtr* Q4 2018	1Q 2019	2Q 2019	3Q 2019	4Q 2019	1Q 2020	2Q 2020
Federal Funds Rate	2.40	2.40	2.40	2.40	2.27	2.20	2.19	2.22	**2.4**	**2.5**	**2.7**	**2.8**	**2.8**	**2.8**
Prime Rate	5.50	5.50	5.50	5.50	5.35	5.25	5.25	5.28	**5.5**	**5.6**	**5.7**	**5.8**	**5.9**	**5.8**
LIBOR, 3-mo.	2.77	2.79	2.80	2.80	2.79	2.65	2.46	2.63	**2.8**	**2.9**	**3.0**	**3.1**	**3.1**	**3.1**
Commercial Paper, 1-mo.	2.49	2.49	2.50	2.42	2.44	2.29	2.23	2.32	**2.5**	**2.5**	**2.7**	**2.8**	**2.9**	**2.8**
Treasury bill, 3-mo.	2.43	2.44	2.43	2.43	2.41	2.37	2.29	2.36	**2.5**	**2.5**	**2.7**	**2.8**	**2.8**	**2.8**
Treasury bill, 6-mo.	2.51	2.52	2.51	2.51	2.54	2.52	2.46	2.51	**2.6**	**2.7**	**2.8**	**2.9**	**2.9**	**2.9**
Treasury bill, 1 yr.	2.58	2.59	2.58	2.59	2.66	2.70	2.65	2.67	**2.6**	**2.7**	**2.9**	**3.0**	**3.0**	**3.0**
Treasury note, 2 yr.	2.56	2.56	2.47	2.56	2.68	2.86	2.86	2.80	**2.7**	**2.8**	**2.9**	**3.0**	**3.0**	**3.0**
Treasury note, 5 yr.	2.56	2.55	2.47	2.60	2.68	2.95	3.00	2.88	**2.7**	**2.9**	**3.0**	**3.0**	**3.1**	**3.1**
Treasury note, 10 yr.	2.74	2.72	2.65	2.76	2.83	3.12	3.15	3.03	**2.9**	**3.0**	**3.1**	**3.1**	**3.2**	**3.1**
Treasury note, 30 yr.	3.07	3.02	2.97	3.04	3.10	3.36	3.34	3.27	**3.1**	**3.2**	**3.3**	**3.4**	**3.5**	**3.5**
Corporate Aaa bond	4.17	4.14	4.12	4.15	4.19	4.36	4.30	4.28	**4.1**	**4.2**	**4.4**	**4.5**	**4.5**	**4.5**
Corporate Baa bond	5.07	5.05	5.06	5.07	5.08	5.17	5.02	5.09	**5.1**	**5.3**	**5.4**	**5.5**	**5.5**	**5.5**
State & Local bonds	3.67	3.67	3.68	3.70	3.73	3.86	3.84	3.81	**3.9**	**4.0**	**4.1**	**4.2**	**4.2**	**4.3**
Home mortgage rate	4.45	4.45	4.51	4.55	4.64	4.87	4.83	4.78	**4.6**	**4.8**	**4.9**	**5.0**	**5.0**	**5.0**
	History								Consensus Forecasts-Quarterly					
Key Assumptions	1Q 2017	2Q 2017	3Q 2017	4Q 2017	1Q 2018	2Q 2018	3Q 2018	*4Q 2018**	**1Q 2019**	**2Q 2019**	**3Q 2019**	**4Q 2019**	**1Q 2020**	**2Q 2020**
Major Currency Index	94.3	92.9	88.3	88.9	86.1	88.3	90.2	91.5	**91.3**	**91.2**	**91.0**	**90.8**	**90.5**	**90.1**
Real GDP	1.8	3.0	2.8	2.3	2.2	4.2	3.4	2.6	**2.1**	**2.5**	**2.2**	**1.9**	**1.6**	**1.6**
GDP Price Index	2.0	1.2	2.2	2.5	2.0	3.0	1.8	2.0	**1.9**	**2.3**	**2.1**	**2.2**	**2.2**	**2.2**
Consumer Price Index	3.0	0.1	2.1	3.3	3.5	1.7	2.0	1.8	**1.6**	**2.2**	**2.3**	**2.3**	**2.3**	**2.2**

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data are sourced from Haver Analytics. Historical data for Fed's Major Currency Index are from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS). **Figures for Q4 2018 for Real GDP and GDP Chained Price Index are consensus forecasts based on a special question asked of the panelists this month.*









20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 38, No. 3, March 1, 2019

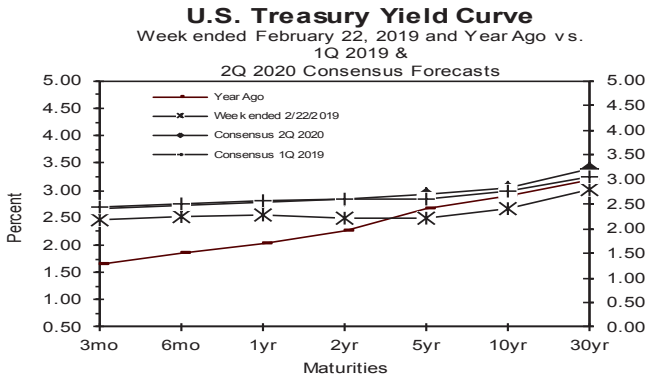
Wolters Kluwer

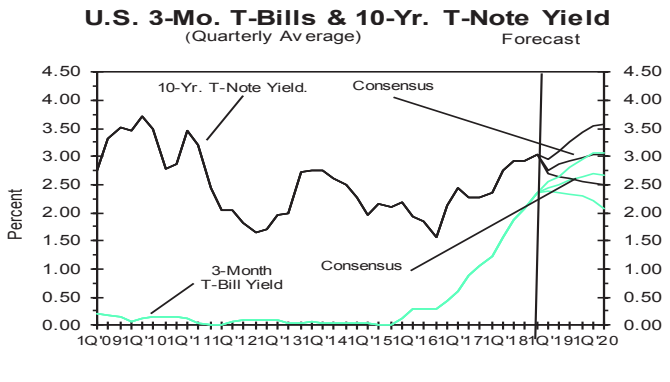
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

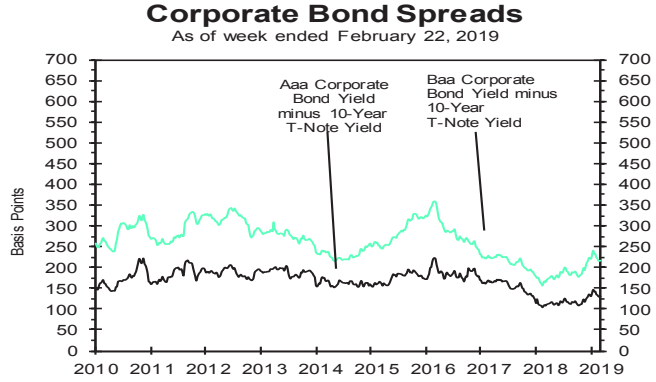
Consensus Forecasts of U.S. Interest Rates and Key Assumptions

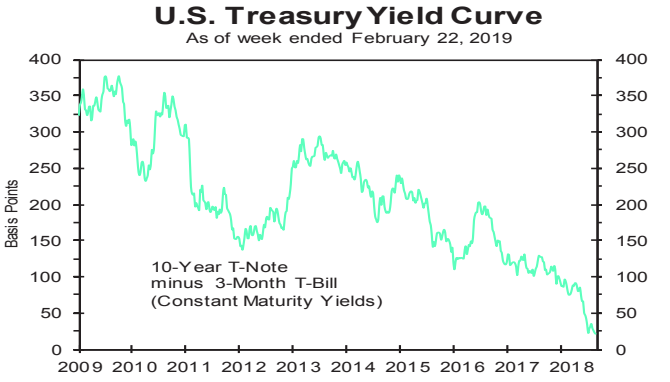
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			*Latest Qtr*	1Q	2Q	3Q	4Q	1Q	2Q
Interest Rates	Feb 22	Feb 15	Feb 8	Feb 1	Jan	Dec	Nov	Q4 2018	2019	2019	2019	2019	2020	2020
Federal Funds Rate	2.40	2.40	2.40	2.40	2.40	2.27	2.20	2.22	**2.4**	**2.4**	**2.5**	**2.6**	**2.7**	**2.6**
Prime Rate	5.50	5.50	5.50	5.50	5.50	5.35	5.25	5.28	**5.5**	**5.5**	**5.6**	**5.7**	**5.7**	**5.7**
LIBOR, 3-mo.	2.65	2.69	2.72	2.74	2.77	2.79	2.65	2.63	**2.7**	**2.8**	**2.9**	**2.9**	**3.0**	**3.0**
Commercial Paper, 1-mo.	2.43	2.42	2.43	2.45	2.48	2.44	2.29	2.32	**2.5**	**2.5**	**2.6**	**2.7**	**2.7**	**2.7**
Treasury bill, 3-mo.	2.45	2.44	2.42	2.41	2.42	2.41	2.37	2.36	**2.4**	**2.5**	**2.6**	**2.7**	**2.7**	**2.7**
Treasury bill, 6-mo.	2.51	2.51	2.49	2.49	2.51	2.54	2.52	2.51	**2.5**	**2.6**	**2.7**	**2.7**	**2.8**	**2.7**
Treasury bill, 1 yr.	2.55	2.55	2.56	2.58	2.58	2.66	2.70	2.67	**2.6**	**2.6**	**2.7**	**2.8**	**2.8**	**2.8**
Treasury note, 2 yr.	2.50	2.51	2.50	2.53	2.54	2.68	2.86	2.80	**2.6**	**2.7**	**2.8**	**2.8**	**2.9**	**2.8**
Treasury note, 5 yr.	2.48	2.49	2.49	2.51	2.54	2.68	2.95	2.88	**2.6**	**2.7**	**2.8**	**2.9**	**2.9**	**2.9**
Treasury note, 10 yr.	2.66	2.67	2.68	2.70	2.71	2.83	3.12	3.03	**2.8**	**2.9**	**2.9**	**3.0**	**3.0**	**3.0**
Treasury note, 30 yr.	3.02	3.01	3.02	3.04	3.04	3.10	3.36	3.27	**3.1**	**3.1**	**3.2**	**3.3**	**3.4**	**3.4**
Corporate Aaa bond	3.97	3.96	3.98	4.04	4.12	4.19	4.36	4.28	**3.9**	**4.1**	**4.1**	**4.2**	**4.3**	**4.4**
Corporate Baa bond	4.83	4.83	4.84	4.92	5.02	5.08	5.17	5.09	**5.0**	**5.1**	**5.2**	**5.3**	**5.4**	**5.4**
State & Local bonds	3.61	3.62	3.64	3.65	3.67	3.73	3.86	3.81	**3.9**	**3.9**	**4.0**	**4.1**	**4.2**	**4.2**
Home mortgage rate	4.35	4.37	4.41	4.46	4.46	4.64	4.87	4.78	**4.5**	**4.6**	**4.7**	**4.8**	**4.8**	**4.8**
	History								Consensus Forecasts-Quarterly					
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	*4Q*	1Q	2Q	3Q	4Q	1Q	2Q
Key Assumptions	2017	2017	2017	2017	2018	2018	2018	*2018*	2019	2019	2019	2019	2020	2020
Major Currency Index	94.3	92.9	88.3	88.9	86.1	88.3	90.2	91.5	**91.3**	**91.2**	**90.8**	**90.5**	**90.1**	**89.7**
Real GDP	1.8	3.0	2.8	2.3	2.2	4.2	3.4	2.6	**1.9**	**2.5**	**2.2**	**1.9**	**1.6**	**1.6**
GDP Price Index	2.0	1.2	2.2	2.5	2.0	3.0	1.8	1.8	**1.8**	**2.2**	**2.1**	**2.2**	**2.1**	**2.2**
Consumer Price Index	2.8	0.4	2.2	3.1	3.2	2.1	2.0	1.5	**1.3**	**2.3**	**2.3**	**2.2**	**2.2**	**2.2**

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data are sourced from Haver Analytics. Historical data for Fed's Major Currency Index are from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).









20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 38, No. 4, April 1, 2019

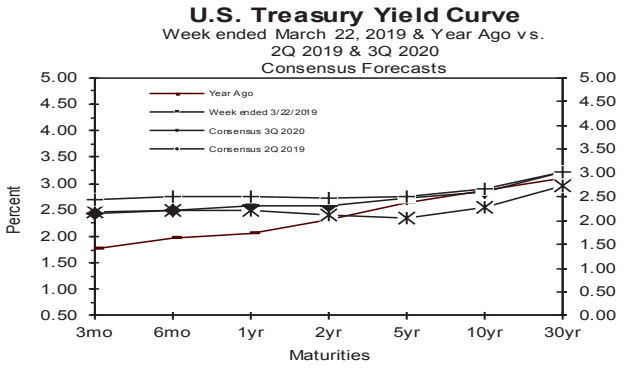
Wolters Kluwer

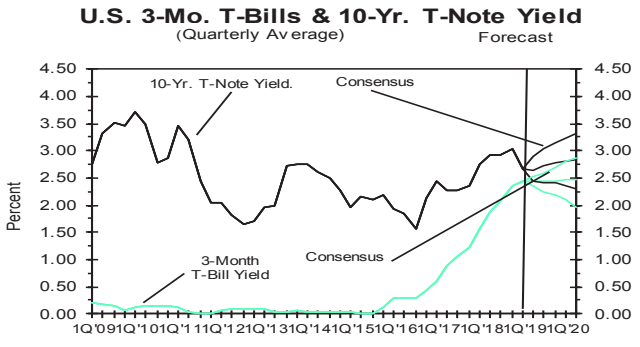
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

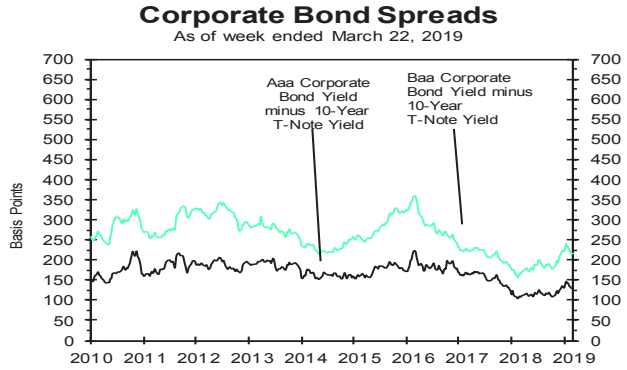
Consensus Forecasts of U.S. Interest Rates and Key Assumptions

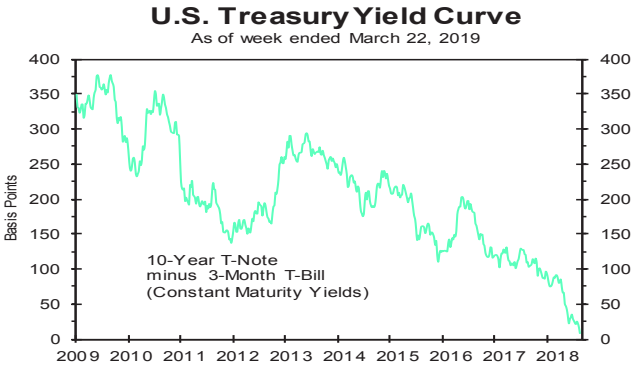
	History				History				Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			*Latest Qtr*	2Q	3Q	4Q	1Q	2Q	3Q
Interest Rates	Mar 22	Mar 15	Mar 8	Mar 1	Feb	Jan	Dec	Q1 2019*	**2019**	**2019**	**2019**	**2020**	**2020**	**2020**
Federal Funds Rate	2.40	2.40	2.40	2.40	2.40	2.40	2.27	2.40	**2.4**	**2.4**	**2.4**	**2.5**	**2.5**	**2.4**
Prime Rate	5.50	5.50	5.50	5.50	5.50	5.50	5.35	5.50	**5.5**	**5.5**	**5.5**	**5.5**	**5.5**	**5.5**
LIBOR, 3-mo.	2.61	2.61	2.60	2.62	2.68	2.77	2.79	2.70	**2.7**	**2.7**	**2.7**	**2.7**	**2.8**	**2.7**
Commercial Paper, 1-mo.	2.45	2.43	2.42	2.44	2.43	2.48	2.44	2.45	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**
Treasury bill, 3-mo.	2.47	2.45	2.46	2.45	2.44	2.42	2.41	2.44	**2.5**	**2.4**	**2.5**	**2.5**	**2.5**	**2.4**
Treasury bill, 6-mo.	2.50	2.53	2.53	2.52	2.50	2.51	2.54	2.51	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**
Treasury bill, 1 yr.	2.48	2.52	2.53	2.55	2.55	2.58	2.66	2.56	**2.5**	**2.5**	**2.5**	**2.6**	**2.6**	**2.6**
Treasury note, 2 yr.	2.41	2.45	2.51	2.51	2.50	2.54	2.68	2.51	**2.5**	**2.5**	**2.6**	**2.6**	**2.6**	**2.6**
Treasury note, 5 yr.	2.35	2.42	2.48	2.50	2.49	2.54	2.68	2.49	**2.5**	**2.6**	**2.6**	**2.7**	**2.7**	**2.7**
Treasury note, 10 yr.	2.55	2.62	2.68	2.70	2.68	2.71	2.83	2.68	**2.7**	**2.7**	**2.8**	**2.8**	**2.8**	**2.8**
Treasury note, 30 yr.	2.97	3.02	3.05	3.07	3.02	3.04	3.10	3.03	**3.0**	**3.1**	**3.1**	**3.2**	**3.2**	**3.2**
Corporate Aaa bond	3.94	4.00	4.04	4.03	3.98	4.12	4.19	4.04	**3.9**	**4.0**	**4.1**	**4.1**	**4.2**	**4.2**
Corporate Baa bond	4.74	4.82	4.86	4.86	4.84	5.02	5.08	4.90	**4.9**	**5.0**	**5.1**	**5.1**	**5.2**	**5.2**
State & Local bonds	3.54	3.57	3.60	3.60	3.62	3.67	3.73	3.63	**3.7**	**3.7**	**3.8**	**3.9**	**4.0**	**3.9**
Home mortgage rate	4.28	4.31	4.41	4.35	4.37	4.46	4.64	4.40	**4.4**	**4.5**	**4.5**	**4.6**	**4.6**	**4.6**
	History								Consensus Forecasts-Quarterly					
	2Q	3Q	4Q	1Q	2Q	3Q	*4Q*	*1Q*	**2Q**	**3Q**	**4Q**	**1Q**	**2Q**	**3Q**
Key Assumptions	2017	2017	2017	2018	2018	2018	*2018*	*2019***	**2019**	**2019**	**2019**	**2020**	**2020**	**2020**
Fed's AFE $ Index	109.1	103.7	104.3	101.1	103.7	105.9	107.5	107.4	**108.3**	**108.4**	**108.4**	**108.0**	**107.4**	**107.0**
Real GDP	3.0	2.8	2.3	2.2	4.2	3.4	2.2	1.3	**2.6**	**2.2**	**2.0**	**1.7**	**1.7**	**1.6**
GDP Price Index	1.2	2.2	2.5	2.0	3.0	1.8	1.7	1.7	**2.2**	**2.1**	**2.1**	**2.1**	**2.2**	**2.1**
Consumer Price Index	0.4	2.2	3.1	3.2	2.1	2.0	1.5	1.1	**2.5**	**2.3**	**2.2**	**2.2**	**2.1**	**2.2**

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data are sourced from Haver Analytics. Historical data for Fed's Major Currency Index are from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS). **Interest rate data for 1Q 2019 based on historical data through the week ended March 22.* **Data for 1Q 2019 for the Fed's AFE $ Index based on data through week ended March 22.* *** Figures for 1Q 2019 Real GDP, GDP Chained Price Index and Consumer Price Index are consensus forecasts based on a special question asked of the panelists' this month.*









20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 38, No. 5, May 1, 2019

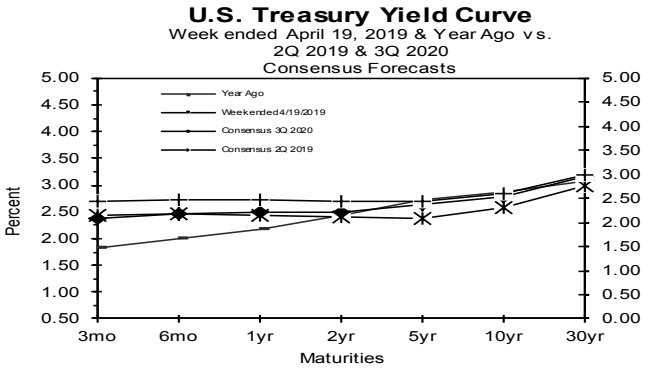
Wolters Kluwer

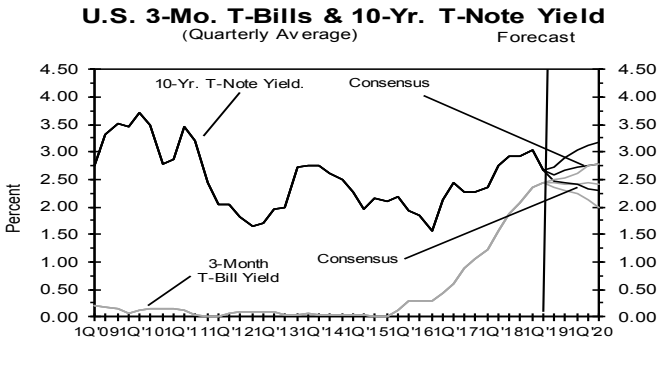
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

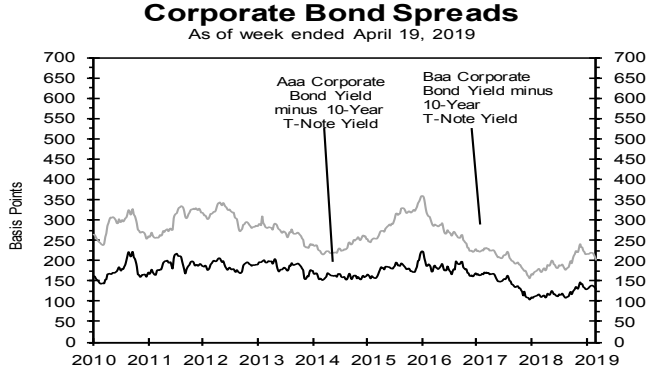
Consensus Forecasts of U.S. Interest Rates and Key Assumptions

	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			*Latest Qtr*	2Q	3Q	4Q	1Q	2Q	3Q
Interest Rates	Apr 19	Apr 12	Apr 5	Mar 29	Mar	Feb	Jan	Q1 2019	**2019**	**2019**	**2019**	**2020**	**2020**	**2020**
Federal Funds Rate	2.41	2.41	2.42	2.41	2.41	2.40	2.40	2.40	**2.4**	**2.4**	**2.4**	**2.4**	**2.4**	**2.4**
Prime Rate	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	**5.5**	**5.5**	**5.5**	**5.5**	**5.5**	**5.5**
LIBOR, 3-mo.	2.59	2.59	2.60	2.60	2.61	2.68	2.77	2.69	**2.6**	**2.7**	**2.7**	**2.7**	**2.7**	**2.7**
Commercial Paper, 1-mo.	2.45	2.43	2.46	2.46	2.44	2.43	2.48	2.45	**2.5**	**2.4**	**2.5**	**2.5**	**2.5**	**2.5**
Treasury bill, 3-mo.	2.43	2.43	2.43	2.44	2.45	2.44	2.42	2.44	**2.4**	**2.4**	**2.4**	**2.4**	**2.4**	**2.4**
Treasury bill, 6-mo.	2.47	2.47	2.46	2.46	2.51	2.50	2.51	2.51	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**
Treasury bill, 1 yr.	2.44	2.43	2.41	2.41	2.49	2.55	2.58	2.54	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**
Treasury note, 2 yr.	2.40	2.35	2.33	2.24	2.41	2.50	2.54	2.48	**2.4**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**
Treasury note, 5 yr.	2.39	2.32	2.31	2.20	2.37	2.49	2.54	2.47	**2.4**	**2.5**	**2.6**	**2.6**	**2.6**	**2.6**
Treasury note, 10 yr.	2.58	2.52	2.50	2.41	2.57	2.68	2.71	2.65	**2.6**	**2.7**	**2.7**	**2.8**	**2.8**	**2.8**
Treasury note, 30 yr.	2.98	2.93	2.91	2.84	2.98	3.02	3.04	3.01	**3.0**	**3.0**	**3.1**	**3.1**	**3.1**	**3.2**
Corporate Aaa bond	3.88	3.86	3.86	3.79	3.95	3.98	4.12	4.01	**3.8**	**3.9**	**4.0**	**4.0**	**4.1**	**4.1**
Corporate Baa bond	4.60	4.61	4.65	4.60	4.76	4.84	5.02	4.87	**4.8**	**4.9**	**4.9**	**5.0**	**5.1**	**5.1**
State & Local bonds	3.50	3.50	3.50	3.48	3.55	3.62	3.67	3.61	**3.6**	**3.7**	**3.8**	**3.8**	**3.9**	**3.9**
Home mortgage rate	4.17	4.12	4.08	4.06	4.27	4.37	4.46	4.37	**4.3**	**4.4**	**4.4**	**4.5**	**4.5**	**4.6**
	History								Consensus Forecasts-Quarterly					
	2Q	3Q	4Q	1Q	2Q	3Q	*4Q*	*1Q*	2Q	3Q	4Q	1Q	2Q	3Q
Key Assumptions	2017	2017	2017	2018	2018	2018	*2018*	*2019*	**2019**	**2019**	**2019**	**2020**	**2020**	**2020**
Fed's AFE $ Index	111.1	105.6	106.2	102.9	105.5	107.8	109.4	109.4	**108.7**	**108.8**	**108.8**	**108.5**	**108.2**	**107.9**
Real GDP	3.0	2.8	2.3	2.2	4.2	3.4	2.2	3.2	**2.5**	**2.1**	**2.0**	**1.7**	**1.7**	**1.7**
GDP Price Index	1.2	2.2	2.5	2.0	3.0	1.8	1.7	0.9	**2.3**	**2.1**	**2.1**	**2.1**	**2.1**	**2.1**
Consumer Price Index	0.4	2.2	3.1	3.2	2.1	2.0	1.5	0.9	**2.9**	**2.3**	**2.1**	**2.1**	**2.1**	**2.1**

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data are sourced from Haver Analytics. Historical data for Fed's Major Currency Index are from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).







20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 38, No. 6, June 1, 2019

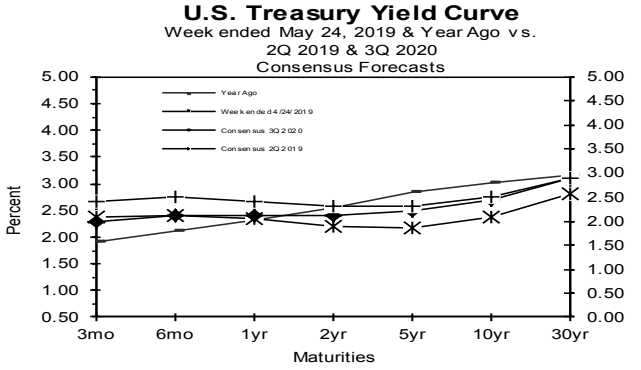
Wolters Kluwer

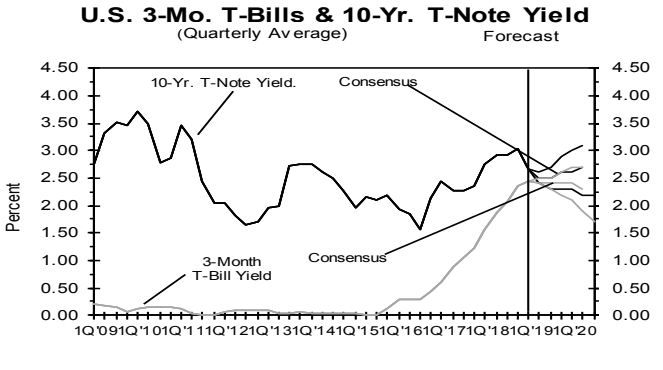
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

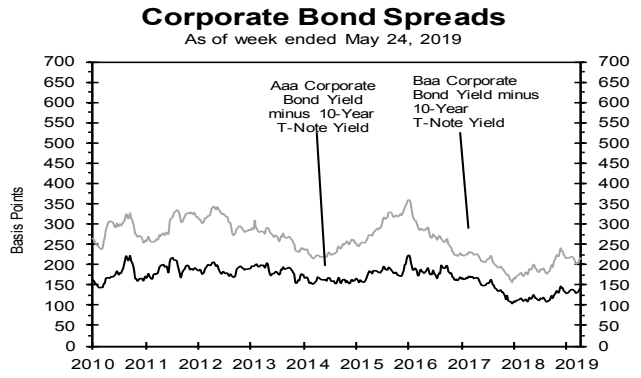
Consensus Forecasts of U.S. Interest Rates and Key Assumptions

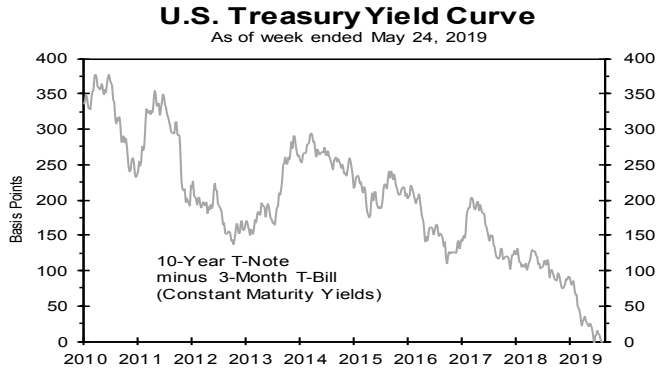
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			*Latest Qtr*	2Q	3Q	4Q	1Q	2Q	3Q
Interest Rates	May 24	May 17	May 10	May 3	Apr	Mar	Feb	Q1 2019	**2019**	**2019**	**2019**	**2020**	**2020**	**2020**
Federal Funds Rate	2.39	2.38	2.40	2.44	2.42	2.41	2.40	2.40	**2.4**	**2.4**	**2.4**	**2.4**	**2.4**	**2.3**
Prime Rate	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	**5.5**	**5.5**	**5.4**	**5.5**	**5.4**	**5.4**
LIBOR, 3-mo.	2.52	2.52	2.54	2.57	2.59	2.61	2.68	2.69	**2.6**	**2.6**	**2.6**	**2.7**	**2.7**	**2.6**
Commercial Paper, 1-mo.	2.41	2.42	2.42	2.42	2.44	2.44	2.43	2.45	**2.4**	**2.4**	**2.4**	**2.5**	**2.4**	**2.4**
Treasury bill, 3-mo.	2.38	2.41	2.43	2.44	2.43	2.45	2.44	2.44	**2.4**	**2.4**	**2.4**	**2.4**	**2.3**	**2.3**
Treasury bill, 6-mo.	2.41	2.43	2.46	2.46	2.46	2.51	2.50	2.51	**2.5**	**2.5**	**2.5**	**2.5**	**2.4**	**2.4**
Treasury bill, 1 yr.	2.34	2.32	2.37	2.40	2.42	2.49	2.55	2.54	**2.4**	**2.4**	**2.4**	**2.5**	**2.4**	**2.4**
Treasury note, 2 yr.	2.20	2.19	2.28	2.31	2.34	2.41	2.50	2.48	**2.3**	**2.4**	**2.4**	**2.4**	**2.4**	**2.4**
Treasury note, 5 yr.	2.17	2.18	2.27	2.32	2.33	2.37	2.49	2.47	**2.3**	**2.4**	**2.5**	**2.5**	**2.5**	**2.5**
Treasury note, 10 yr.	2.37	2.40	2.47	2.53	2.53	2.57	2.68	2.65	**2.5**	**2.5**	**2.6**	**2.6**	**2.7**	**2.7**
Treasury note, 30 yr.	2.80	2.83	2.88	2.94	2.94	2.98	3.02	3.01	**2.9**	**3.0**	**3.0**	**3.1**	**3.1**	**3.1**
Corporate Aaa bond	3.78	3.81	3.83	3.86	3.87	3.95	3.98	4.01	**3.8**	**3.8**	**3.9**	**4.0**	**4.0**	**4.0**
Corporate Baa bond	4.53	4.55	4.56	4.57	4.61	4.76	4.84	4.87	**4.7**	**4.8**	**4.8**	**4.9**	**5.0**	**5.0**
State & Local bonds	3.36	3.37	3.42	3.46	3.49	3.55	3.62	3.61	**3.6**	**3.6**	**3.6**	**3.7**	**3.7**	**3.7**
Home mortgage rate	4.06	4.07	4.10	4.14	4.14	4.27	4.37	4.37	**4.2**	**4.3**	**4.3**	**4.4**	**4.4**	**4.4**
	History								Consensus Forecasts-Quarterly					
	2Q	3Q	4Q	1Q	2Q	3Q	*4Q*	*1Q*	2Q	3Q	4Q	1Q	2Q	3Q
Key Assumptions	2017	2017	2017	2018	2018	2018	*2018*	*2019*	**2019**	**2019**	**2019**	**2020**	**2020**	**2020**
Fed's AFE $ Index	111.1	105.6	106.2	102.9	105.5	107.8	109.4	109.4	**109.0**	**109.0**	**109.1**	**108.3**	**108.0**	**107.7**
Real GDP	3.0	2.8	2.3	2.2	4.2	3.4	2.2	3.2	**2.0**	**2.1**	**2.0**	**1.9**	**1.7**	**1.7**
GDP Price Index	1.2	2.2	2.5	2.0	3.0	1.8	1.7	0.9	**2.4**	**2.1**	**2.1**	**2.1**	**2.1**	**2.1**
Consumer Price Index	0.4	2.2	3.1	3.2	2.1	2.0	1.5	0.9	**3.1**	**2.3**	**2.1**	**2.1**	**2.1**	**2.1**

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data are sourced from Haver Analytics. Historical data for Fed's Major Currency Index are from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).









20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Long-Range Survey:

The table below contains the results of our twice-annual long-range CONSENSUS survey. There are also Top 10 and Bottom 10 averages for each variable. Shown are consensus estimates for the years 2021 through 2025 and averages for the five-year periods 2021-2025 and 2026-2030. Apply these projections cautiously. Few if any economic, demographic and political forces can be evaluated accurately over such long time spans.

		Average For The Year					Five-Year Averages	
		2021	2022	2023	2024	2025	2021-2025	2026-2030
1. Federal Funds Rate	**CONSENSUS**	**2.4**	**2.4**	**2.6**	**2.7**	**2.8**	**2.6**	**2.8**
	Top 10 Average	3.1	3.2	3.4	3.4	3.4	3.3	3.4
	Bottom 10 Average	1.5	1.6	1.7	2.1	2.2	1.8	2.1
2. Prime Rate	**CONSENSUS**	**5.4**	**5.5**	**5.6**	**5.8**	**5.8**	**5.6**	**5.7**
	Top 10 Average	6.1	6.2	6.4	6.4	6.4	6.3	6.2
	Bottom 10 Average	4.6	4.7	4.8	5.1	5.3	4.9	5.1
3. LIBOR, 3-Mo.	**CONSENSUS**	**2.7**	**2.8**	**2.8**	**3.0**	**3.0**	**2.9**	**3.0**
	Top 10 Average	3.3	3.4	3.6	3.6	3.6	3.5	3.6
	Bottom 10 Average	2.1	2.1	2.0	2.4	2.5	2.2	2.5
4. Commercial Paper, 1-Mo.	**CONSENSUS**	**2.5**	**2.6**	**2.7**	**2.9**	**2.9**	**2.7**	**2.9**
	Top 10 Average	3.1	3.2	3.4	3.4	3.5	3.3	3.4
	Bottom 10 Average	2.0	2.0	2.0	2.4	2.4	2.2	2.4
5. Treasury Bill Yield, 3-Mo.	**CONSENSUS**	**2.4**	**2.4**	**2.5**	**2.7**	**2.8**	**2.6**	**2.8**
	Top 10 Average	3.1	3.2	3.4	3.4	3.4	3.3	3.4
	Bottom 10 Average	1.5	1.6	1.7	2.0	2.2	1.8	2.1
6. Treasury Bill Yield, 6-Mo.	**CONSENSUS**	**2.4**	**2.5**	**2.7**	**2.9**	**2.9**	**2.7**	**2.9**
	Top 10 Average	3.1	3.3	3.5	3.5	3.5	3.4	3.5
	Bottom 10 Average	1.7	1.7	1.8	2.2	2.4	2.0	2.3
7. Treasury Bill Yield, 1-Yr.	**CONSENSUS**	**2.5**	**2.6**	**2.8**	**3.0**	**3.0**	**2.8**	**3.0**
	Top 10 Average	3.3	3.4	3.6	3.6	3.7	3.5	3.7
	Bottom 10 Average	1.8	1.8	2.0	2.3	2.4	2.0	2.3
8. Treasury Note Yield, 2-Yr.	**CONSENSUS**	**2.6**	**2.7**	**2.9**	**3.0**	**3.1**	**2.9**	**3.1**
	Top 10 Average	3.3	3.5	3.7	3.8	3.8	3.6	3.8
	Bottom 10 Average	1.8	1.9	2.0	2.3	2.4	2.1	2.3
10. Treasury Note Yield, 5-Yr.	**CONSENSUS**	**2.8**	**2.9**	**3.1**	**3.2**	**3.3**	**3.0**	**3.3**
	Top 10 Average	3.5	3.7	4.0	4.0	4.0	3.8	4.1
	Bottom 10 Average	2.0	2.1	2.2	2.3	2.5	2.2	2.4
11. Treasury Note Yield, 10-Yr.	**CONSENSUS**	**3.0**	**3.1**	**3.3**	**3.3**	**3.4**	**3.2**	**3.4**
	Top 10 Average	3.6	3.9	4.2	4.2	4.2	4.0	4.4
	Bottom 10 Average	2.3	2.4	2.4	2.5	2.6	2.4	2.6
12. Treasury Bond Yield, 30-Yr.	**CONSENSUS**	**3.3**	**3.5**	**3.6**	**3.7**	**3.8**	**3.6**	**3.8**
	Top 10 Average	4.0	4.3	4.5	4.6	4.6	4.4	4.8
	Bottom 10 Average	2.7	2.7	2.8	2.9	2.9	2.8	2.9
13. Corporate Aaa Bond Yield	**CONSENSUS**	**4.4**	**4.6**	**4.7**	**4.7**	**4.8**	**4.6**	**4.8**
	Top 10 Average	5.0	5.2	5.5	5.5	5.5	5.3	5.6
	Bottom 10 Average	3.8	3.9	3.9	4.0	4.0	3.9	4.0
13. Corporate Baa Bond Yield	**CONSENSUS**	**5.3**	**5.6**	**5.7**	**5.7**	**5.7**	**5.6**	**5.8**
	Top 10 Average	6.0	6.3	6.6	6.6	6.7	6.5	6.8
	Bottom 10 Average	4.7	4.8	4.7	4.8	4.8	4.7	4.8
14. State & Local Bonds Yield	**CONSENSUS**	**4.1**	**4.2**	**4.3**	**4.3**	**4.3**	**4.2**	**4.4**
	Top 10 Average	4.6	4.9	5.0	5.0	5.0	4.9	5.1
	Bottom 10 Average	3.5	3.6	3.6	3.6	3.6	3.6	3.6
15. Home Mortgage Rate	**CONSENSUS**	**4.7**	**4.8**	**4.9**	**5.0**	**5.0**	**4.9**	**5.0**
	Top 10 Average	5.3	5.5	5.8	5.8	5.8	5.6	5.9
	Bottom 10 Average	4.0	4.0	4.0	4.2	4.2	4.1	4.2
A. Fed's AFE Nominal $ Index	**CONSENSUS**	**108.5**	**108.2**	**108.0**	**107.6**	**106.9**	**107.8**	**106.7**
	Top 10 Average	110.8	110.5	110.9	110.8	110.6	110.7	111.2
	Bottom 10 Average	106.6	105.8	104.9	104.6	103.6	105.1	102.9
		Year-Over-Year, % Change					Five-Year Averages	
		2021	2022	2023	2024	2025	2021-2025	2026-2030
B. Real GDP	**CONSENSUS**	**1.9**	**1.9**	**2.0**	**2.1**	**2.1**	**2.0**	**2.1**
	Top 10 Average	2.3	2.4	2.4	2.5	2.5	2.4	2.6
	Bottom 10 Average	1.5	1.4	1.6	1.8	1.8	1.6	1.8
C. GDP Chained Price Index	**CONSENSUS**	**2.1**	**2.1**	**2.0**	**2.0**	**2.0**	**2.1**	**2.0**
	Top 10 Average	2.4	2.4	2.2	2.2	2.2	2.3	2.2
	Bottom 10 Average	1.8	1.8	1.8	1.9	1.9	1.9	1.8
D. Consumer Price Index	**CONSENSUS**	**2.1**	**2.2**	**2.2**	**2.1**	**2.1**	**2.1**	**2.1**
	Top 10 Average	2.5	2.4	2.4	2.4	2.4	2.4	2.4
	Bottom 10 Average	1.7	1.8	1.9	1.9	1.9	1.8	1.8

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Blue Chip Financial Forecasts®

Top Analysts' Forecasts Of U.S. And Foreign Interest Rates, Currency Values And The Factors That Influence Them

Vol. 38, No. 7, July 1, 2019

Wolters Kluwer

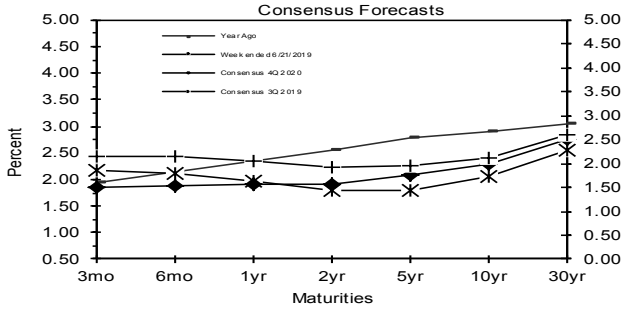
20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Consensus Forecasts of U.S. Interest Rates and Key Assumptions

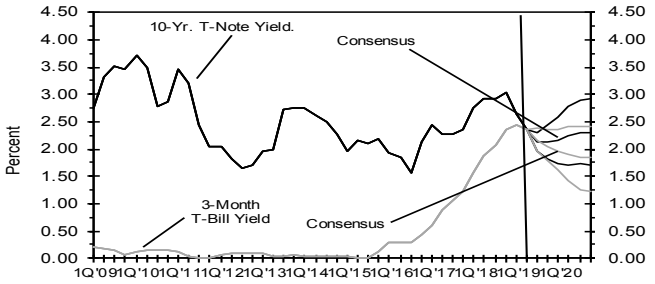
	History				History				Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			*Latest Qtr*	3Q	4Q	1Q	2Q	3Q	4Q
Interest Rates	Jun 21	Jun 14	Jun 7	May 31	May	Apr	Mar	2Q 2019*	**2019**	**2019**	**2020**	**2020**	**2020**	**2020**
Federal Funds Rate	2.37	2.37	2.39	2.38	2.39	2.42	2.41	2.40	**2.2**	**2.0**	**1.9**	**1.9**	**1.8**	**1.8**
Prime Rate	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	**5.3**	**5.2**	**5.1**	**5.0**	**5.0**	**4.9**
LIBOR, 3-mo.	2.38	2.43	2.47	2.52	2.53	2.59	2.61	2.52	**2.4**	**2.3**	**2.2**	**2.2**	**2.2**	**2.1**
Commercial Paper, 1-mo.	2.34	2.37	2.38	2.41	2.42	2.44	2.44	2.41	**2.3**	**2.1**	**2.0**	**2.0**	**2.0**	**1.9**
Treasury bill, 3-mo.	2.18	2.24	2.33	2.37	2.40	2.43	2.45	2.37	**2.2**	**2.0**	**2.0**	**1.9**	**1.9**	**1.8**
Treasury bill, 6-mo.	2.12	2.20	2.24	2.38	2.42	2.46	2.51	2.37	**2.2**	**2.1**	**2.0**	**2.0**	**1.9**	**1.9**
Treasury bill, 1 yr.	1.98	2.02	2.05	2.28	2.34	2.42	2.49	2.28	**2.1**	**2.0**	**2.0**	**2.0**	**1.9**	**1.9**
Treasury note, 2 yr.	1.79	1.88	1.85	2.06	2.21	2.34	2.41	2.15	**1.9**	**1.9**	**1.9**	**1.9**	**1.9**	**1.9**
Treasury note, 5 yr.	1.80	1.88	1.86	2.02	2.19	2.33	2.37	2.14	**1.9**	**1.9**	**2.0**	**2.0**	**2.1**	**2.1**
Treasury note, 10 yr.	2.05	2.12	2.10	2.22	2.40	2.53	2.57	2.35	**2.1**	**2.1**	**2.2**	**2.2**	**2.3**	**2.3**
Treasury note, 30 yr.	2.56	2.61	2.59	2.66	2.82	2.94	2.98	2.79	**2.6**	**2.6**	**2.7**	**2.7**	**2.8**	**2.8**
Corporate Aaa bond	3.53	3.62	3.64	3.69	3.79	3.87	3.95	3.76	**3.5**	**3.5**	**3.6**	**3.7**	**3.8**	**3.8**
Corporate Baa bond	4.30	4.40	4.43	4.47	4.53	4.61	4.76	4.51	**4.5**	**4.5**	**4.6**	**4.7**	**4.8**	**4.8**
State & Local bonds	3.29	3.30	3.30	3.33	3.38	3.49	3.55	3.40	**3.2**	**3.2**	**3.2**	**3.3**	**3.4**	**3.4**
Home mortgage rate	3.84	3.82	3.82	3.99	4.07	4.14	4.27	4.03	**3.9**	**3.9**	**3.9**	**4.0**	**4.0**	**4.0**
	History								Consensus Forecasts-Quarterly					
	3Q	4Q	1Q	2Q	3Q	4Q	*1Q*	*2Q*	**3Q**	**4Q**	**1Q**	**2Q**	**3Q**	**4Q**
Key Assumptions	2017	2017	2018	2018	2018	2018	*2019*	*2019***	**2019**	**2019**	**2020**	**2020**	**2020**	**2020**
Fed's AFE $ Index	105.6	106.2	102.9	105.5	107.8	109.4	109.4	110.4	**109.1**	**109.0**	**108.1**	**107.8**	**107.5**	**107.0**
Real GDP	2.8	2.3	2.2	4.2	3.4	2.2	3.1	1.8	**1.9**	**1.9**	**1.7**	**1.7**	**1.8**	**1.8**
GDP Price Index	2.2	2.5	2.0	3.0	1.8	1.7	0.8	2.3	**2.0**	**2.0**	**2.1**	**2.1**	**2.0**	**2.0**
Consumer Price Index	2.2	3.1	3.2	2.1	2.0	1.5	0.9	2.8	**2.0**	**2.1**	**2.1**	**2.1**	**2.0**	**2.0**

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data: Treasury rates from the Federal Reserve Board's H.15; AAA-AA and A-BBB corporate bond yields from Bank of America-Merrill Lynch and are 15+ years, yield to maturity; State and local bond yields from Bank of America-Merrill Lynch, A-rated, yield to maturity; Mortgage rates from Freddie Mac, 30-year, fixed; LIBOR quotes from Intercontinental Exchange. All interest rate data are sourced from Haver Analytics. Historical data for Fed's Major Currency Index are from FRSR H.10. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS). **Interest rate data for 2Q 2019 are based on historical data through the week ended June 21.* ***Data for 2Q 2019 for the Fed's AFE $ Index based on data through week ended June 21. Figures for 2Q 2019 Real GDP, GDP Chained Price Index and Consumer Price Index are consensus forecasts based on a special question asked of the panelists this month.*

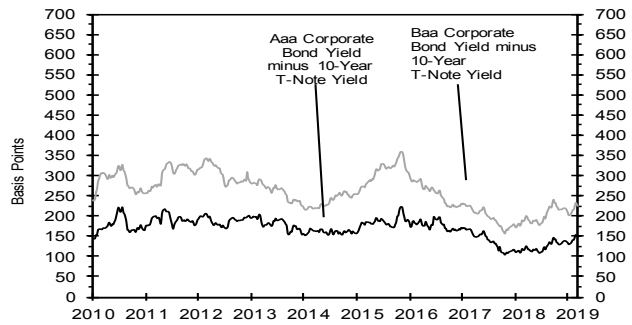
U.S. Treasury Yield Curve
Week ended June 21, 2019 & Year Ago vs. 3Q 2019 & 4Q 2020 Consensus Forecasts



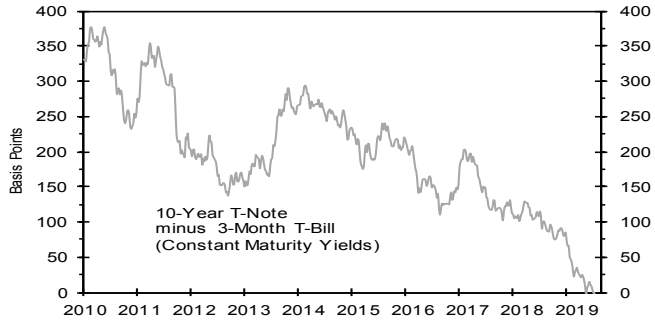
U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average) Forecast



Corporate Bond Spreads
As of week ended June 21, 2019



U.S. Treasury Yield Curve
As of week ended June 21, 2019



20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Inquiry Regarding the Commission's Policy for Determining Return on Equity	))	Docket No. PL19-4-000

Affidavit of Michael P. Gorman

SAINT LOUIS, MISSOURI ss:

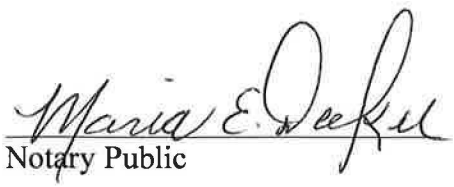
BEFORE ME, the undersigned authority, personally appeared Michael P. Gorman, who after being by me first duly sworn, deposes and says that the facts stated herein are true based on personal knowledge.

I hereby affirm that the foregoing is true and correct to the best of my knowledge and belief. If called to testify in this matter, I would testify as set forth herein.

Further affiant says not.

Michael P. Gorman
Affiant

Subscribed and sworn to before me by Mr. Michael P. Gorman, who is known to me this 25th day of July, 2019.



Notary Public

MARIA E. DECKER
Notary Public - Notary Seal
STATE OF MISSOURI
St. Louis City
My Commission Expires: May 5, 2021
Commission # 13706793

My Commission Expires: May 5, 2021

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Table 1.1.5. Gross Domestic Product

Downloaded 7/15/19

[Billions of dollars]

Bureau of Economic Analysis

Last Revised on: June 27, 2019 - Next Release Date July 26, 2019

Line		1929	1930	1931	1932	1933
1	**Gross domestic product**	104.6	92.2	77.4	59.5	57.2
			88.15%	83.95%	76.87%	96.13%

aggregate growth	195.93	CAGR
Years of growth	89	0.061094
Years of Data	90	0.061094

1934	1935	1936	1937	1938	1939	1940	1941	1942
66.8	74.2	84.8	93	87.4	93.4	102.9	129.3	166
116.78%	111.08%	114.29%	109.67%	93.98%	106.86%	110.17%	125.66%	128.38%

1943	1944	1945	1946	1947	1948	1949	1950	1951
203.1	224.4	228	227.5	249.6	274.5	272.5	299.8	346.9
122.35%	110.49%	101.60%	99.78%	109.71%	109.98%	99.27%	110.02%	115.71%

1952	1953	1954	1955	1956	1957	1958	1959	1960
367.3	389.2	390.5	425.5	449.4	474	481.2	521.7	542.4
105.88%	105.96%	100.33%	108.96%	105.62%	105.47%	101.52%	108.42%	103.97%

1961	1962	1963	1964	1965	1966	1967	1968	1969
562.2	603.9	637.5	684.5	742.3	813.4	860	940.7	1017.6
103.65%	107.42%	105.56%	107.37%	108.44%	109.58%	105.73%	109.38%	108.17%

1970	1971	1972	1973	1974	1975	1976	1977	1978
1073.3	1164.9	1279.1	1425.4	1545.2	1684.9	1873.4	2081.8	2351.6
105.47%	108.53%	109.80%	111.44%	108.40%	109.04%	111.19%	111.12%	112.96%

1979	1980	1981	1982	1983	1984	1985	1986	1987
2627.3	2857.3	3207	3343.8	3634	4037.6	4339	4579.6	4855.2
111.72%	108.75%	112.24%	104.27%	108.68%	111.11%	107.46%	105.55%	106.02%

1988	1989	1990	1991	1992	1993	1994	1995	1996
5236.4	5641.6	5963.1	6158.1	6520.3	6858.6	7287.2	7639.7	8073.1
107.85%	107.74%	105.70%	103.27%	105.88%	105.19%	106.25%	104.84%	105.67%

1997	1998	1999	2000	2001	2002	2003	2004	2005
8577.6	9062.8	9630.7	10252.3	10581.8	10936.4	11458.2	12213.7	13036.6
106.25%	105.66%	106.27%	106.45%	103.21%	103.35%	104.77%	106.59%	106.74%

2006	2007	2008	2009	2010	2011	2012	2013	2014
13814.6	14451.9	14712.8	14448.9	14992.1	15542.6	16197	16784.9	17521.7
105.97%	104.61%	101.81%	98.21%	103.76%	103.67%	104.21%	103.63%	104.39%

2015	2016	2017	2018
18219.3	18707.2	19485.4	20494.1
103.98%	102.68%	104.16%	105.18%

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

TABLE 1

Historical Growth: S&P 500 vs GDP

Description	Percent
Nominal GDP (1929-2018)[1]	6.1%
S&P 500 Capital Growth (1926 - 2018)[2]	5.8%

Sources:
[1]Bureau of Economic Analysis, downloaded 7/15/19.
[2]Duff & Phelps 2019 SBBI Yearbook at 6-17.

FERC NOI

Accuracy of Interest Rate Forecasts
(Long-Term Treasury Bond Yields - Projected Vs. Actual)

Line	Date	Publication Data: Prior Quarter Actual Yield (1)	Publication Data: Projected Yield (2)	Publication Data: Projected Quarter (3)	Actual Yield in Projected Quarter (4)	Projected Yield Higher (Lower) Than Actual Yield* (5)
1	Dec-00	5.8%	5.8%	1Q, 02	5.6%	0.2%
2	Mar-01	5.7%	5.6%	2Q, 02	5.8%	-0.2%
3	Jun-01	5.4%	5.8%	3Q, 02	5.2%	0.6%
4	Sep-01	5.7%	5.9%	4Q, 02	5.1%	0.8%
5	Dec-01	5.5%	5.7%	1Q, 03	5.0%	0.7%
6	Mar-02	5.3%	5.9%	2Q, 03	4.7%	1.2%
7	Jun-02	5.6%	6.2%	3Q, 03	5.2%	1.0%
8	Sep-02	5.8%	5.9%	4Q, 03	5.2%	0.7%
9	Dec-02	5.2%	5.7%	1Q, 04	4.9%	0.8%
10	Mar-03	5.1%	5.7%	2Q, 04	5.4%	0.3%
11	Jun-03	5.0%	5.4%	3Q, 04	5.1%	0.3%
12	Sep-03	4.7%	5.8%	4Q, 04	4.9%	0.9%
13	Dec-03	5.2%	5.9%	1Q, 05	4.8%	1.1%
14	Mar-04	5.2%	5.9%	2Q, 05	4.6%	1.4%
15	Jun-04	4.9%	6.2%	3Q, 05	4.5%	1.7%
16	Sep-04	5.4%	6.0%	4Q, 05	4.8%	1.2%
17	Dec-04	5.1%	5.8%	1Q, 06	4.6%	1.2%
18	Mar-05	4.9%	5.6%	2Q, 06	5.1%	0.5%
19	Jun-05	4.8%	5.5%	3Q, 06	5.0%	0.5%
20	Sep-05	4.6%	5.2%	4Q, 06	4.7%	0.5%
21	Dec-05	4.5%	5.3%	1Q, 07	4.8%	0.5%
22	Mar-06	4.8%	5.1%	2Q, 07	5.0%	0.1%
23	Jun-06	4.6%	5.3%	3Q, 07	4.9%	0.4%
24	Sep-06	5.1%	5.2%	4Q, 07	4.6%	0.6%
25	Dec-06	5.0%	5.0%	1Q, 08	4.4%	0.6%
26	Mar-07	4.7%	5.1%	2Q, 08	4.6%	0.5%
27	Jun-07	4.8%	5.1%	3Q, 08	4.5%	0.7%
28	Sep-07	5.0%	5.2%	4Q, 08	3.7%	1.5%
29	Dec-07	4.9%	4.8%	1Q, 09	3.5%	1.4%
30	Mar-08	4.6%	4.8%	2Q, 09	4.0%	0.8%
31	Jun-08	4.4%	4.9%	3Q, 09	4.3%	0.6%
32	Sep-08	4.6%	5.1%	4Q, 09	4.3%	0.8%
33	Dec-08	4.5%	4.6%	1Q, 10	4.6%	0.0%
34	Mar-09	3.7%	4.1%	2Q, 10	4.4%	-0.3%
35	Jun-09	3.5%	4.6%	3Q, 10	3.9%	0.8%
36	Sep-09	4.0%	5.0%	4Q, 10	4.2%	0.8%
37	Dec-09	4.3%	5.0%	1Q, 11	4.6%	0.4%
38	Mar-10	4.3%	5.2%	2Q, 11	4.3%	0.9%
39	Jun-10	4.6%	5.2%	3Q, 11	3.7%	1.5%
40	Sep-10	4.4%	4.7%	4Q, 11	3.0%	1.7%
41	Dec-10	3.9%	4.6%	1Q, 12	3.1%	1.5%
42	Mar-11	4.2%	5.1%	2Q, 12	2.9%	2.2%
43	Jun-11	4.6%	5.2%	3Q, 12	2.8%	2.5%
44	Sep-11	4.3%	4.2%	4Q, 12	2.9%	1.3%
45	Dec-11	3.7%	3.8%	1Q, 13	3.1%	0.7%
46	Mar-12	3.0%	3.8%	2Q, 13	3.2%	0.7%
47	Jun-12	3.1%	3.7%	3Q, 13	3.7%	0.0%
48	Sep-12	2.9%	3.4%	4Q, 13	3.8%	-0.4%
49	Dec-12	2.8%	3.4%	1Q, 14	3.7%	-0.3%
50	Mar-13	2.9%	3.6%	2Q, 14	3.4%	0.2%
51	Jun-13	3.1%	3.7%	3Q, 14	3.3%	0.4%
52	Sep-13	3.2%	4.2%	4Q, 14	3.0%	1.2%
53	Dec-13	3.7%	4.2%	1Q, 15	2.6%	1.7%
54	Mar-14	3.8%	4.4%	2Q 15	2.9%	1.5%
55	Jun-14	3.7%	4.3%	3Q 15	2.8%	1.5%
56	Sep-14	3.4%	4.3%	4Q 15	3.0%	1.3%
57	Dec-14	3.3%	4.0%	1Q 16	2.7%	1.3%
58	Mar-15	3.0%	3.7%	2Q 16	2.6%	1.1%
59	Jun-15	2.6%	3.7%	3Q 16	2.3%	1.4%
60	Sep-15	2.9%	3.8%	4Q 16	2.8%	1.0%
61	Dec-15	2.8%	3.7%	1Q 17	3.0%	0.7%
62	Mar-16	3.0%	3.5%	2Q 17	2.9%	0.6%
63	Jun-16	2.7%	3.4%	3Q 17	2.8%	0.6%
64	Sep-16	2.6%	3.1%	4Q 17	2.8%	0.3%
65	Dec-16	2.3%	3.4%	1Q 18	3.0%	0.4%
66	Mar-17	2.8%	3.7%	2Q 18	3.1%	0.6%
67	Jun-17	3.0%	3.7%	3Q 18	3.1%	0.6%
68	Sep-17	2.9%	3.6%	4Q 18	3.3%	0.3%
69	Dec-17	2.8%	3.6%	1Q 19	3.0%	0.6%
70	Mar-18	2.8%	3.7%	2Q 19		
71	Apr-18	3.0%	3.8%	3Q 19		
72	May-18	3.0%	3.8%	3Q 19		
73	Jun-18	3.0%	3.8%	3Q 19		
74	Jul-18	3.1%	3.8%	4Q 19		
75	Aug-18	3.1%	3.7%	4Q 19		
76	Sep-18	3.1%	3.7%	4Q 19		
77	Oct-18	3.1%	3.6%	1Q 20		
78	Nov-18	3.1%	3.7%	1Q 20		
79	Dec-18	3.1%	3.7%	1Q 20		
80	Jan-19	3.3%	3.6%	2Q 20		
81	Feb-19	3.3%	3.5%	2Q 20		
82	Mar-19	3.3%	3.4%	2Q 20		
83	Apr-19	3.0%	3.2%	3Q 20		
84	May-19	3.0%	3.2%	3Q 20		
85	Jun-19	3.0%	3.1%	3Q 20		
86	Jul-19	2.8%	2.8%	4Q 20		

Source:
Blue Chip Financial Forecasts, Various Dates.
* Col. 2 - Col. 4.

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

TABLE 2

Projected Return on the Market

Source	Term	Expected Return	
		Large Cap Equities	Nominal US GDP
BlackRock Capital Management[1]	25 Years	7.1%	N/A
JP Morgan Chase[2]	10 - 15 Years	5.25%	3.75%
Vanguard[3]	10 Years	3% - 5%	N/A
Research Affiliates[4]	10 Years	2.60%	3.51%
Morningstar[5]	10 Years	2.70%	N/A

Sources:

[1]BlackRock Investment Institute, April 2019 report, downloaded 7/23/2019.

[2]JP Morgan Chase, Long-Term Capital Market Assumptions, 2019 Report, provided as Exhibit No. A-10, pages 3-114.

[3]Vanguard Economic and Market Outlook for 2019: Down but not out, December 2018, provided as Exhibit No. A-10, pages 115-158.

[4]Research Affiliates, Asset Allocation Interactive, downloaded 7/24/2019.

[5]Morningstar Markets Observer Q2 2019 at 12, provided as Exhibit No. A-10, pages 159-210.

BlackRock asset class return, uncertainty, volatility and correlation expectations

April 2019 — BlackRock Capital Market Assumptions

Currency	Asset class	Asset	Index	Expected returns 5 year	7 year	10 year	15 year	20 year	25 year
USD	Equities	Europe large cap equities	MSCI Europe index	7.8%	7.9%	7.9%	8.1%	8.1%	8.2%
USD	Equities	US large cap equities	MSCI USA Index	5.4%	5.5%	5.9%	6.5%	6.9%	7.1%
USD	Equities	Emerging large cap equities	MSCI Emerging Markets Index	6.7%	6.7%	6.7%	6.6%	6.6%	6.6%
USD	Equities	Japan large cap equities	MSCI Japan Index	6.1%	6.1%	6.2%	6.3%	6.3%	6.3%
USD	Equities	US small cap equities	MSCI USA Small Cap Index	5.9%	6.0%	6.4%	6.9%	7.2%	7.4%
USD	Equities	Global ex-US large cap equities	MSCI World ex-US Index	8.4%	8.4%	8.3%	8.2%	8.1%	8.0%
USD	Fixed income	US aggregate bonds	Bloomberg Barclays U.S. Aggregate Inc	2.7%	2.7%	2.9%	3.0%	3.1%	3.2%
USD	Fixed income	US agency MBS	Bloomberg Barclays US MBS Index	2.8%	2.9%	2.9%	2.9%	3.0%	3.0%
USD	Fixed income	US credit (all maturities)	Bloomberg Barclays U.S. Credit Index	2.9%	3.0%	3.3%	3.7%	3.9%	4.1%
USD	Fixed income	US credit (10+ years)	ICE BofAML Corporate Investment Gra	2.6%	2.8%	3.4%	4.3%	4.9%	5.2%
USD	Fixed income	US government bonds (all maturitie	Bloomberg Barclays Government Index	2.4%	2.4%	2.5%	2.6%	2.6%	2.7%
USD	Fixed income	US government (10+ years)	Bloomberg Barclays Treasury 10+yr inc	0.9%	1.1%	1.3%	1.7%	2.0%	2.1%
USD	Fixed income	USD EM debt	JP Morgan EMBI Global Diversified Ind	3.8%	3.9%	4.2%	4.6%	4.8%	5.0%
USD	Fixed income	US high yield	Bloomberg Barclays U.S. High Yield Inc	5.2%	5.2%	5.3%	5.3%	5.4%	5.4%
USD	Fixed income	Local currency EM debt	JP Morgan GBI-EM Index	3.4%	3.4%	3.4%	3.5%	3.5%	3.5%
USD	Fixed income	US inflation-linked government bon	Bloomberg Barclays US Government In	2.2%	2.3%	2.4%	2.6%	2.7%	2.7%
USD	Fixed income	Global ex-US government bonds	Bloomberg Barclays Global Aggregate	2.1%	2.2%	2.3%	2.6%	2.7%	2.8%
USD	Fixed income	US bank loans	S&P/LSTA Leveraged Loan Index	4.3%	4.3%	4.5%	4.6%	4.7%	4.7%
USD	Fixed income	US cash	Citigroup 3-Month Treasury Bill Index	2.6%	2.6%	2.6%	2.7%	2.7%	2.7%

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Asset Allocation Interactive

Expected Returns (Core Assets)

Source: Research Affiliates, downloaded 7/

10 Year Projection

Asset Class	Index Name
US Large	S&P 500
US Small	Russell 2000
All country	MSCI ACWI
EAFE	MSCI EAFE
Emerging Markets	MSCI EM
US Aggregate	Barclays US Aggregate
US Treasury Intermediate	Barclays US Treasury Intermediate
US Treasury Long	Barclays US Treasury Long
US Treasury Short	Barclays US Treasury 1-3yr
Global Aggregate	Barclays Global Agg USD
Global Ex-US Treasury	Barclays Global Trsy Ex US
Emerging Market (Local)	J.P. Morgan GBI-EM
Emerging Market (Non-Local)	J.P. Morgan EMBI+
Global Ex-US Corporates	Barclays Global Corporate Ex-US
US Corporate Intermediate	Barclays US Intermediate Corporate
Bank Loans	J.P. Morgan Leveraged Loans
US High Yield	Barclays US Corporate High Yield
US Tips	Barclays US Treasury US TIPS
United States Cash	US 3M T-Bill
EM Cash	J.P. Morgan ELMI+
Commodities	Bloomberg Commodity Index
US Commercial Real Estate	NCREIF NPI
REITS	FTSE NAREIT All Equity REIT
Global DM Ex-US Long/Short Equity	EAFE Long/Short Simulation
US Long/Short Equity	US Long/Short Simulation
Europe LBO	Europe LBO Simulation
US LBO	US LBO Simulation
4.0% Volatility	4.0% Volatility
6.0% Volatility	6.0% Volatility
8.0% Volatility	8.0% Volatility
10.0% Volatility	10.0% Volatility
12.0% Volatility	12.0% Volatility
14.0% Volatility	14.0% Volatility
60/40	Sixty Forty
Advisor Average	Advisor Average
Defensive Position	Defensive Position
Global Market Cap	Global Market Cap
Growth Oriented	Growth Oriented

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

High Growth	High Growth
Income Focused	Income Focused
Liquid EW10	Liquid EW10
Long Term Liabilities	Long Term Liabilities
Public Pension	Public Pension
TDF + 20 Years	TDF + 20 Years

As of Date:	June, 2019
User Currency:	USD
Expected Returns Model:	Valuation Dependent

24/2019 https://interactive.researchaffiliates.com/asset-allocation.html#!/?categ

Expected Return (Nominal)	Expected Return (Real)	Average Net Yield	Capital Growth
2.6%	0.5%	1.9%	1.2%
3.5%	1.4%	1.5%	2.0%
5.0%	2.9%	2.6%	1.6%
7.4%	5.3%	3.5%	1.7%
9.1%	7.0%	3.0%	2.8%
1.9%	-0.2%	2.2%	-2.1%
2.0%	-0.1%	2.2%	-2.1%
1.4%	-0.7%	2.6%	-2.1%
1.7%	-0.4%	1.7%	-2.1%
2.0%	-0.1%	1.6%	-1.4%
1.7%	-0.4%	1.2%	-1.2%
6.2%	4.1%	5.9%	-2.2%
3.7%	1.5%	4.2%	-2.1%
1.8%	-0.3%	1.2%	-1.2%
2.3%	0.2%	2.6%	-2.1%
2.6%	0.4%	2.6%	-2.1%
2.3%	0.2%	2.5%	-2.1%
2.0%	-0.1%	-0.1%	0.0%
1.9%	-0.2%	1.9%	-2.1%
5.6%	3.5%	5.1%	-2.2%
3.8%	1.7%	-2.0%	-2.1%
4.2%	2.1%	5.2%	-2.0%
3.5%	1.4%	4.1%	-0.4%
5.4%	3.2%	1.2%	0.9%
3.0%	0.9%	0.7%	0.5%
8.8%	6.7%	4.6%	2.3%
2.2%	0.1%	2.2%	1.9%
3.7%	1.6%	2.9%	-1.6%
4.5%	2.4%	3.2%	-1.2%
5.2%	3.1%	3.4%	-0.8%
5.9%	3.8%	3.5%	-0.3%
6.6%	4.5%	3.6%	0.2%
7.2%	5.1%	3.6%	0.7%
2.5%	0.3%	2.1%	-0.1%
3.5%	1.4%	2.2%	0.1%
3.3%	1.2%	1.8%	-0.6%
3.7%	1.6%	2.1%	-0.2%
4.1%	2.0%	1.9%	0.1%

4.8%	2.7%	2.1%	0.6%
2.7%	0.6%	2.0%	-1.1%
4.2%	2.0%	2.4%	-0.9%
1.6%	-0.5%	2.5%	-2.1%
3.7%	1.6%	2.3%	-0.2%
4.1%	1.9%	2.3%	0.8%

ory=Developed+Markets&currency=USD&model=ER&scale=LINEAR&selected=1&terms=NOI

Valuation Change	Diversification Return	Residual	Volatility
-2.7%	0.0%	0.0%	14.3%
-2.2%	0.0%	0.0%	19.0%
-1.2%	0.0%	0.0%	15.6%
0.1%	0.0%	0.0%	17.1%
1.1%	0.0%	0.0%	21.5%
-0.4%	0.0%	0.0%	3.6%
-0.2%	0.0%	0.0%	3.4%
-1.2%	0.0%	0.0%	11.6%
0.0%	0.0%	0.0%	1.9%
-0.3%	0.0%	0.0%	6.3%
-0.5%	0.0%	0.0%	7.9%
0.5%	0.0%	0.0%	13.2%
-0.5%	0.0%	0.0%	8.5%
-0.3%	0.0%	0.0%	9.2%
-0.3%	0.0%	0.0%	4.5%
-0.1%	0.0%	0.0%	7.0%
-0.2%	0.0%	0.0%	9.2%
0.0%	0.0%	0.0%	5.7%
0.0%	0.0%	0.0%	1.3%
0.6%	0.0%	0.0%	7.7%
2.4%	3.3%	0.0%	16.2%
-1.1%	0.0%	0.0%	12.5%
-2.4%	0.0%	0.0%	23.0%
0.4%	0.0%	0.7%	11.8%
-0.9%	0.0%	0.7%	8.8%
-0.2%	0.0%	0.0%	29.2%
-4.0%	0.0%	0.0%	28.0%
-0.1%	0.3%	0.0%	4.0%
-0.1%	0.4%	0.0%	6.0%
0.0%	0.5%	0.0%	8.0%
0.1%	0.6%	0.0%	10.0%
0.2%	0.6%	0.0%	12.0%
0.3%	0.5%	0.0%	14.1%
-1.8%	0.1%	0.0%	8.6%
-1.3%	0.3%	0.1%	9.8%
-0.4%	0.4%	0.0%	7.2%
-0.6%	0.3%	0.0%	9.0%
-0.6%	0.5%	0.1%	10.0%

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

-0.7%	0.5%	0.1%	12.1%
-0.5%	0.1%	0.0%	4.9%
-0.1%	0.6%	0.0%	9.2%
-0.9%	0.0%	0.0%	9.1%
-0.9%	0.2%	0.0%	8.5%
-1.4%	0.2%	0.0%	12.1%

MINAL&type=Equities

Sharpe Ratio
0.05
0.08
0.20
0.32
0.34
0.01
0.05
-0.04
-0.14
0.02
-0.03
0.33
0.21
-0.01
0.11
0.09
0.05
0.03
0.00
0.47
0.12
0.18
0.07
0.29
0.13
0.24
0.01
0.44
0.43
0.41
0.40
0.39
0.38
0.07
0.17
0.20
0.20
0.23

0.24
0.17
0.25
-0.03
0.21
0.18

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

Asset Allocation Interactive

Market Expectations

Source: Research Affiliates, downloaded 7

10 Year Projection

Market	Inflation Expectation	Real GDP Growth
Australia Cash	2.0%	2.5%
Brazil Cash	4.2%	2.8%
Canada Cash	2.0%	2.2%
China Cash	2.0%	7.0%
Eurozone Cash	1.4%	1.3%
Hong Kong Cash	2.6%	3.2%
India Cash	3.8%	6.2%
Indonesia Cash	3.8%	5.7%
Japan Cash	0.7%	1.0%
Malaysia Cash	1.8%	5.1%
Mexico Cash	4.1%	3.5%
Poland Cash	2.0%	2.5%
Russia Cash	4.2%	4.2%
South Africa Cash	5.0%	3.3%
South Korea Cash	1.7%	3.5%
Sweden Cash	1.9%	1.7%
Switzerland Cash	0.9%	1.4%
Taiwan Cash	1.0%	3.2%
Thailand Cash	0.8%	3.0%
Turkey Cash	12.2%	4.3%
United Kingdom Cash	2.8%	1.4%
United States Cash	2.1%	1.4%

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

'/24/2019

Cash Rate Expectation
2.3%
5.7%
2.0%
4.2%
-0.3%
2.6%
7.1%
6.9%
-0.7%
4.5%
6.9%
1.3%
5.5%
6.7%
2.4%
0.8%
-0.2%
1.1%
1.3%
15.8%
1.8%
1.9%

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

20190726-5132 FERC PDF (Unofficial) 7/26/2019 3:33:47 PM

CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document upon each person designated on the official service lists compiled by the Secretary in these proceedings.

Dated at Arlington, Virginia, this 7th day of January, 2020.

/s/ John E. McCaffrey

John E. McCaffrey
2451 Crystal Drive
Suite 1000
Arlington, VA 22202
(202) 467-2900
jmccaffrey@publicpower.org