STATE OF INDIANA

INDIANA UTILITY REGULATORY COMMISSION

PETITION OF AQUA INDIANA, INC. PURSUANT TO IC 8-1-2-42.7 AND 170 IAC 1-5 FOR AUTHORITY TO INCREASE THE MONTHLY RECURRING RATES AND CHARGES CURRENTLY CHARGED AND COLLECTED BY ITS ABOITE WASTEWATER DIVISION FOR WASTEWATER UTILITY SERVICES PROVIDED IN PORTIONS OF ALLEN, HUNTINGTON AND WHITLEY COUNTIES; ESTABLISH A NON-RECURRING SYSTEM DEVELOPMENT CHARGE TO BE CHARGED AND COLLECTED BY THE ABOITE WASTEWATER DIVISION AND IMPLEMENT NEW RATE SCHEDULES REFLECTING THE RATES AND CHARGES APPROVED IN THIS CAUSE	)	**CAUSE NO. 44752**

TESTIMONY OF

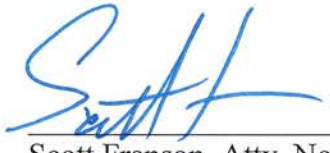
EDWARD R. KAUFMAN – PUBLIC'S EXHIBIT NO. 5

ON BEHALF OF THE

INDIANA OFFICE OF UTILITY CONSUMER COUNSELOR

JUNE 24, 2016

Respectfully submitted,



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TESTIMONY OF EDWARD R. KAUFMAN, CRRA
CAUSE NO. 44752
AQUA-INDIANA, INC. – ABOITE WASTEWATER DIVISION

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TESTIMONY OF EDWARD R. KAUFMAN, CRRA
CAUSE NO. 44752
AQUA INDIANA, INC. – ABOITE WASTEWATER DIVISION

I. INTRODUCTION

Q: Please state your name and business address.

A: My name is Edward R. Kaufman, and my business address is 115 West Washington Street, Suite 1500 South, Indianapolis, Indiana 46204. I am employed by the Indiana Office of Utility Consumer Counselor (OUCC) as a Chief Technical Advisor with the Water-Wastewater Division. A description of my qualifications and experience is described in Appendix A.

Q: What is the purpose of your testimony?

A: I explain how Aqua Indiana, Inc. – Aboite Wastewater Division's ("Petitioner" or "Aqua") proposed cost of debt is overstated, and I recommend a 4.57% cost of debt for use in Petitioner's weighted cost of capital. I explain how the recent enactment of SB 383 can reduce the volatility of utility earnings and reduce risk. I identify problems with Mr. D'Ascendis' proposed cost of equity analyses. Finally, while OUCC Analyst Crystal Thacker provides testimony that estimates Petitioner's cost of equity, I identify several studies that support the reasonableness of the OUCC's proposed cost of equity.

Q: What did you do to prepare your testimony?

A: I reviewed Aqua's Petition, testimony, and exhibits. I wrote discovery questions and reviewed Petitioner's responses. My preparations included a review of numerous financial articles that discuss anticipated market returns. I reviewed the

Commission's Final Order in Petitioner's last rate case (Cause No. 43874). I attended the Commission's field hearing, which took place on May 17th.

Q: Do you have any schedules or attachments?

A: Yes. Appendix B to my testimony lists my schedules and attachments.

II. COST OF DEBT

Q: What cost of debt does Petitioner use in its capital structure to estimate its weighted cost of capital?

A: Petitioner uses a 5.08% cost of debt. Petitioner's calculation was provided in its Schedule D-3 (Attachment ERK-11).

Q: How does Petitioner's proposed cost of debt compare to Aqua America's cost of debt?

A: According to the fact sheet provided on Aqua America's web site, Aqua America has an average cost of debt of 4.57% (Attachment ERK 12).

Q: Why doesn't Petitioner uses its Parent Company's overall average cost of debt to calculate its weighted cost of capital.

A: The OUCC conducted discovery to understand this discrepancy. In response to OUCC data request question 3.4 (Attachment ERK-13), Petitioner indicated the calculation is based on debt allocated to Aqua Indiana:

> The 4.57% weighted average cost of long-term debt as of December 31, 2015 represents the consolidated average cost of debt issued by Aqua America (parent) as well as six operating subsidiaries which have issued external debt. Only debt issued by the parent is allocated to Aqua Indiana and other subsidiaries. The proposed 5.08% is an average (including issuance expense) of the specific parent level loans allocated to Indiana.

Q: Do you agree Petitioner's explanation justifies its debt calculation?

A: No. Unless debt infusions can be tied to specific capital additions, it is more appropriate to use the Aqua America's overall weighted cost of debt in Petitioner's capital structure. If the parent company cost of debt is used across all of its

subsidiaries, Aqua America will recover their true cost of debt. But, without reviewing the amount of debt and the subsequent weighted cost of debt that Aqua America allocates to each of its state jurisdictions, determining whether Aqua America is fairly allocating its cost of debt to each subsidiary is not possible.

Q: Do you have other concerns regarding Petitioner's weighted cost of debt?

A: Yes. Even if the company's method for allocating debt should be used, Petitioner has overstated its weighted cost of debt. According to Petitioner's response to OUCC data request question 3.6(c) (Attachment ERK-13) Aqua America has allocated an additional $3.66 million from its 3.57% $50.0 million note. Allocating the additional $3.66 million to Petitioner's weighted cost of debt would reduce Aqua Indiana's weighted cost of debt to 4.88% (Attachment ERK-14).

III. INDIANA SENATE BILL 383

Q: Has any legislation in Indiana been enacted since Petitioner's last rate case that may be considered to affect Petitioner's risk?

A: Yes. In 2016, the Indiana General Assembly enacted Senate Bill 383 (System Integrity Charge). In its fiscal impact statement, Indiana Legislature Services summarized SB 383.

> **Summary of Legislation:** This bill provides that an eligible water or wastewater utility may petition the Utility Regulatory Commission (IURC) to charge a system integrity adjustment to recover or credit an adjustment amount based on the eligible utility's revenues. It provides that the IURC, after a hearing, shall approve a properly calculated system integrity adjustment. It provides that a utility may collect a system integrity adjustment until the earlier of: (1) 48 months after the date on which the utility is allowed to begin collecting the system integrity adjustment; or (2) the date on which the IURC issues an order in the utility's next general rate case proceeding. It requires the IURC to adopt rules concerning system integrity adjustment proceedings. The bill also makes a technical correction.

Q: How will SB 383 influence a utility's revenues and its earnings?

A: Senate Bill 383 enhances a utility's ability to collect its authorized revenues. By increasing the ability to collect authorized revenues, a utility will similarly have an improved opportunity to earn its authorized cost of capital. The bill effectively reduces the volatility of both a utility's revenues and its earnings. This reduced volatility should translate into a reduced risk and a lower cost of equity.

Q: Did the OUCC make an explicit adjustment to its proposed cost of equity to recognize the reduced risk to Indiana utilities that will take place due to Senate Bill 383.

A: No. Senate Bill can reduce the volatility of a utility's revenues and its earnings. In the absence of a quantifiable reduction to Aqua's cost of equity, the Commission should consider the risk reduction benefits of SB 383, when it determines Petitioner's authorized cost of equity as a whole.

IV. PETITIONER'S COST OF EQUITY ANALYSIS

Q: Please summarize Mr. D'Ascendis' cost of equity analysis.

A: Mr. D'Ascendis estimated Petitioner's cost of equity to be 10.15% – 10.70%. Prior to adjusting for Petitioner's company specific risks, Mr. D'Ascendis' analysis uses a DCF model (8.35%), a Risk Premium model (10.41%), and a Capital Asset Pricing Model (10.08%). He also applied his models to a proxy group of "Comparable Risk," Non-Price regulated companies (11.49%). Mr. D'Ascendis then added a 40 basis point sized adjustment and a 14 basis point flotation cost adjustment to the results of his models to derive his indicated cost of equity of 10.69%. Petitioner then recommends a cost of equity of 10.35%.

Q: How does the OUCC's proposed cost of equity differ from Petitioner's proposed cost of equity?

A: The OUCC's estimate of Aqua's cost of equity of 9.00% is 135 basis points lower than Petitioner's proposed cost of equity.

Q: Are there any factors that explain the majority of the difference between Petitioner's and the OUCC's proposed cost of equity?

A: No. There is no single factor or adjustment of Mr. D'Ascendis' analysis that accounts for a large portion of our 135 basis point difference. Instead there are many differences in our methodologies and each difference by itself makes a relatively small contribution to the overall difference. Mr. D'Ascendis' cost of equity analysis uses several models and the models rely on numerous inputs. Schedule ERK-1 provides a flow chart of Mr. D'Ascendis' models and the components and sub-components of each model. Because several of the sub-components are repeated in his various models, it is more difficult to identify how each assumption influences his cost of equity.

Q: What are the methodological differences that have a greater influence on your COE differences?

A: Mr. D'Ascendis' use of a Non-Price regulated proxy group produces an estimated cost of equity (11.49%) that is more than 100 basis points greater than his next highest estimate (Risk Premium Model 10.41%). His use of Non-Price regulated proxy group increases his unadjusted proposed cost of equity by approximately 30 basis points (9.83% vs. 10.15%). Next, in several of his sub-components, Mr. D'Ascendis estimates a "Risk Premium Based on the S&P 500". To derive his risk premiums he estimates a total market return of 13.68%. An estimated market return this high is well above the average historical market return and drastically

overstates his estimated market risk premium. Removing the risk premiums based on Mr. D'Ascendis estimated market return of 13.68% reduces his unadjusted estimated cost of equity by 20 basis points to 9.98%. Similarly, removing the components and sub components that rely on Mr. D'Ascendis' Predictive Risk Premium Model (PRPM^{TM}) reduces his unadjusted estimated cost of equity to 9.97%. Finally, excluding the Non-Price regulated proxy group, the PRPM and "Risk Premium Based on the S&P 500" would reduce Mr. D'Ascendis' estimated cost of equity to 9.27% (Schedules ERK-2 and ERK-3). Thus, after these three adjustments, our proposed costs of equities differ by only 27 basis points. Thus, some of the more traditional disagreements regarding estimated cost of equity presented in prior cases, such as estimated growth rates in the DCF model or the arithmetic/geometric mean debate, are not the key drivers that explain differences in our estimated costs of equity

Mr. D'Ascendis also added 40 basis points to his proxy group's cost of equity to account for Petitioner's smaller size and added 14 basis points to account for flotation costs. Mr. D'Ascendis' company specific adjustment is overstated, and his flotation cost adjustment is unnecessary.

V. MR. D'ASCENDIS' DCF ANALYSIS

Q: Why do you disagree with Mr. D'Ascendis' DCF analysis?

A: Mr. D'Ascendis' DCF analysis relies solely on forecasted growth rates in earnings per share ("EPS") excluding historical growth rates and excluding growth in dividends per share ("DPS") and book value per share ("BVPS"). Analysts tend to be optimistic when forecasting growth in earnings per share. In Appendix C & D,

I discuss the potential bias in analyst forecasts. Reliance on *both* historical and forecasted growth rates in EPS, DPS and BVPS produces more balanced results.

Q: Does Mr. D'Ascendis' DCF model produce a similar estimated cost of equity for his water company proxy group?

A: Yes. Even though Mr. D'Ascendis relies exclusively on forecasted growth rates, his DCF model produces an estimated cost of equity that is similar to the OUCC's analysis. As shown on his Schedule 3, his DCF analysis produces a median estimated cost of equity of 8.34% and an average cost of equity 8.35%.

Q: Despite producing similar results for the water industry, does Mr. D'Ascendis' sole reliance on forecasted earnings per share overstate his estimated cost of equity?

A: Yes. Mr. D'Ascendis uses a DCF analysis in his Non-Price Regulated Companies analysis. Many of the estimated growth rates exceed 10.0%, which are not sustainable over the long run and, therefore, overstate cost of equity. Next, in both his CAPM analyses and his Risk Premium analyses, Mr. D'Ascendis uses the DCF model to estimate a return on the S&P 500 and subsequent risk premium. Based on his DCF analysis, he estimates a return for the S&P 500 of 13.68%. This estimated market return is based on 3-5 year analyst growth estimates. These analyst growth estimates tend to be overly optimistic and are not long term growth estimates. See Appendix C (Potential Basis in Analyst Forecasts) and Appendix D (General Problems with Analyst Forecasts) for more detailed explanation of my concerns with analyst growth forecasts.

Q: Can you provide a specific example of an optimistic growth rate and explain how it overstates the estimated market return?

A: Yes. In his S&P market return analysis, Mr. D'Ascendis uses forecasted growth rates in EPS as high as 63.25% (Amazon.com). While a 3-5 year growth rate in

EPS of 63.25% may be anticipated over the next 3-5 years, it is not appropriate to use as a perpetual growth rate and should not therefore be used exclusively to estimate Amazon's cost of equity.[1]

A similar overstatement exists in Mr. D'Ascendis' Comparable Risk, Non-Price Regulated Companies analysis. His DCF result (based solely on 3-5 year forecasted growth in EPS) produces a 12.20% estimated cost of equity. Mr. D'Ascendis sole reliance on forecasted growth in EPS overstates his estimated costs of equity in these models.

Q: Explain why the exclusive reliance on forecasted growth rates can be problematic in a DCF analysis?

A: The relatively short investment horizons associated with analysts' forecasts is not consistent with the DCF model. The equation used for the DCF model assumes an infinite time frame. Forecasted EPS estimates are not long-term (perpetual) estimates. The so-called "long-term" estimates of EPS provided by companies that make such estimates are typically limited to only three to five years. In particular, Mr. D'Ascendis uses a single stage DCF Model, and the mechanics of a single stage DCF model depend on the use of a growth rate that is *sustainable* over the long run. Though some investors have a short-term perspective on their investments, this does not change the mathematics of the DCF model.

[1] As explained in greater detail below, simply removing Amazon from Mr. D'Ascendis' S&P analysis reduces his estimated market return for the entire S&P 500 almost 80 basis points to 12.86%. One company should not have such an influence over an estimated market return that includes 500 companies.

Q: Why can't a five year growth rate be used and assume that the stock will be sold after five years?

A: To derive an estimated stock price at the end of the fifth year requires estimated growth in EPS, BVPS and DPS that will take place subsequent to the fifth year. Therefore, using a five year time frame in a DCF analysis cannot ignore the need to use a growth rate in dividends that recognizes investor expectations beyond the fifth year. Regardless of the investor's investment horizon, the DCF model requires a long-term or perpetual growth rate that a five year forecasted growth rate does not provide.

Q: Do you have any support that intermediate term growth estimates from analysts may not reflect long-term investor expectations in a DCF type model?

A: Yes. The Abstract of an article titled Do Analyst Conflicts Matter? Evidence from Stock Recommendations by Anup Agrawal and Mark Chen (Journal of Law and Economics, 2008, V 51), includes the following statement:

> However, evidence from the response of stock prices and trading volumes to upgrades and downgrades suggests that the market recognizes analyst conflicts and properly discounts analyst options.

Concerns over the optimism of analyst growth forecasts were also an issue in Petitioner's last rate case. Ms. Ahern quoted from this article in her rebuttal testimony in Utility Center, Cause No. 43874. On page 21 of its Final Order in Cause No. 43874 (dated April 13, 2011), this Commission responded to Ms. Ahern's reliance on this quote:

> The parties also disagreed over the potential upward bias in analysts' forecasts. In support of her position, Ms. Ahern's rebuttal refers to language from an article by Anup Agrawal and Mark Chen titled: Do Analyst Conflicts Matter?
>
> > Overall, our empirical findings suggest that while analysts do respond to IN [investment bank] and brokerage conflicts by inflating

> their stock recommendations, the markets discount these recommendations after taking analysts' conflicts into account.
>
> Ahern Rebuttal at 52. While the Agrawal and Chen article states that investors discount analyst recommendations, our review of Ms. Ahern's testimony and exhibits reveals no comparable discount when she includes analysts' recommendations in her cost of equity estimate. Using unadjusted analyst recommendations would increase the probability that Ms. Ahern's DCF results are overstated. (Emphasis added)

Likewise, a review of Mr. D'Ascendis' testimony and exhibits reveals that he does not have a comparable discount when he uses analyst recommendations in his cost of equity estimates. In my opinion, Mr. D'Ascendis' unadjusted use of analyst recommendations similarly increases the probability that his various DCF results are overstated.

Q: So what data should the Commission use to estimate growth (g) in a DCF analysis?

A: As it has done in other cases (e.g. Indiana American, Cause No. 43860), the Commission considered and gave weight to both historical and forecasted growth rates in EPS, DPS and BVPS. If the Commission decides that a 2-Stage DCF analysis provided meaningful insight, it could also give weight to the long-term sustainable economic growth rate of the US economy.

Q: When estimating the growth component of the DCF calculation (g), in addition to earnings per share data, has the Commission supported the use of dividend per share data and book value per share data?

A: Yes. The Commission consistently considers growth in EPS, DPS and BVPS. In Cause No. 42029, the Commission stated: "In the past, the Commission has consistently sanctioned the use of both historical and forecasted per share data." The Commission added that it continue[s] "to believe that both historical and forecasted earnings, dividends and book value per share data are useful when

employing the DCF model." *Indiana-American Water Co.*, Cause No. 42029, p. 32 (Ind. Util. Regulatory Comm'n Nov. 6, 2002). More recently, the Commission affirmed its position to consider multiple estimators of growth:

> The Commission expects the parties to exercise sound judgment when deciding which inputs to include as part of their analysis. We have concerns regarding Mr. Moul's sole reliance on analysts' intermediate-term forecasts in his DCF model. The Commission believes that both historical and forecasted earnings and dividends and book value per share data are useful when employing the DCF Model. Although Mr. Gorman agreed with Mr. Moul's forecasted growth rates, Mr. Gorman recommended adjustments that modify Mr. Moul's outcomes to be much more in line with Mr. Kaufman's and Mr. Gorman's results. We agree with Mr. Kaufman that Mr. Moul's reliance on intermediate-term forecasts result in a growth rate that is unrealistically high.
>
> We also agree with Mr. Gorman that the constant growth DCF return used by Mr. Moul for the Water Proxy Group is not reasonable and represents an inflated return for Indiana-American at this time. The constant growth DCF results for the Water Proxy Group are based on growth rates of 7.29% (Mr. Gorman) and 7.5% (Mr. Moul). The Commission finds these growth rates to be unsustainable for the long-term, which is required by the constant growth model.

Indiana-American Water Co., Cause No. 43680, p. 47 (Ind. Util. Regulatory Comm'n Apr. 30, 2010).

Q: Summarize your comments on Mr. D'Ascendis' estimates of growth (g).

A: The goal in estimating growth (g) in the DCF model is to derive a reasonable long-term or sustainable estimate of growth in dividends. By relying only on forecasted growth rates in EPS, Mr. D'Ascendis' growth rates may be overly optimistic and overstate the results in his DCF analyses. Moreover, Mr. D'Ascendis' DCF analyses rely heavily on intermediate term forecasts in EPS to estimate the growth in his DCF model. Even if there is no upward bias in analyst estimates, the estimates used by Mr. D'Ascendis are not long-term forecasts, and, therefore, such forecasts may not be sustained over the long-term.

As part of his analysis, (Schedule 7, page 2) Mr. D'Ascendis completes a DCF analysis (using only forecasted growth in EPS) on a proxy group of Non-Price regulated companies. The concerns I expressed above that the sole reliance on forecasted EPS growth can overstate cost of equity particularly apply to his DCF analysis for his Non-Price regulated proxy group. Several of the companies in Mr. D'Ascendis' Non-Price regulated proxy group have forecasted growth rates in EPS above 10.0%. Such high growth rates drastically exceed the forecasted growth rate of the US economy, are not sustainable and should not be used in isolation in a DCF analysis to estimate cost of equity. Finally, Mr. D'Ascendis DCF analysis for his Non-Price regulated proxy group of companies produces a cost of equity that is approximately 380 basis points higher than it is for his water proxy group.

VI. MR. D'ASCENDIS' RISK PREMIUM ANALYSIS

Q: Please describe Mr. D'Ascendis' Risk Premium model.

A: Mr. D'Ascendis' unadjusted Risk Premium models produce an estimated cost of equity of 10.41% (D'Ascendis Schedule 4). To derive this estimate, Mr. D'Ascendis used two risk premium models. First he used a Predicative Risk Premium Model™ that produced a 10.77% estimated cost of equity (D'Ascendis Schedule 4, page 2). Next, he used a "Risk Premium Model Using an Adjusted Total Market Approach," which produced a 10.05% estimated cost of equity (D'Ascendis Schedule 4, page 3). Mr. D'Ascendis gave equal weight to his PRPM™ and his Risk Premium Model Using an Adjusted Total Market Approach to derive his 10.41% average.

A. Predicative Risk Premium Model (PRPM™)

Q: What premises underlay Mr. D'Ascendis' Predictive Risk Premium Model™ (PRPM™)?

A: The PRPM™ is a form of the Risk Premium model. Risk premium models typically assume a generally stable risk premium over time. Thus, a risk premium generated by historical data and applied to current data can be used to estimate cost of equity. However, as discussed in Mr. D'Ascendis' testimony (page 17), the PRPM™ is based on the premise that: Volatility changes over time and that the volatility in prices and returns also clusters over time and is therefore highly predictable.

Q: How did Mr. D'Ascendis apply the PRPM™ to estimate his risk premiums and cost of equity?

A: Mr. D'Ascendis used a statistical software package (Eviews©) to calculate projected risk premiums. Mr. D'Ascendis used a GARCH coefficient (Generalized Autoregressive Conditional Heteroscedasticity) to estimate a forecasted risk premium. More specifically, Mr. D'Ascendis applied the PRPM™ to each company in his water proxy group to estimate that company's cost of equity.[2]

To estimate cost of equity using a PRPM™, Mr. D'Ascendis estimated an average monthly forecasted variance. In this context, the data used to estimate "variances" is the difference between monthly returns on common shares of each company in his proxy group minus the historical monthly yield on long-term U.S. Treasury Securities. Each company's estimated variance starts with the available trading information for that water company through December 2015. Each

[2] Later in his testimony Mr. D'Ascendis also uses a PRPM™ to estimate various market risk premiums.

company's average monthly variance can be seen on Mr. D'Ascendis', Schedule 4, page 2. For example, American States Water has an average monthly forecasted variance of 0.37% [rounded, average of long term and spot variance] (or .0037). Mr. D'Ascendis multiplied the average monthly variance figure by his estimated GARCH coefficient. He then annualized that monthly figure (raises it to the 12^{th} power and subtracts 1) to obtain an estimated PRPM™ derived risk premium. According to Mr. D'Ascendis, American States Water has a GARCH coefficient of 1.70391. When American States Water's GARCH coefficient of 1.703901 is multiplied by its average monthly forecasted variance of .0037, it equals approximately 0.006304434. This figure can be annualized by adding one (1.0) to it (1.006304434) and raising it to the 12^{th} power ($(1.006304434)^{12} = 1.0783$). After subtracting one (1.0) this creates a PRPM™ risk premium of 7.83%. Adding his forecasted risk free rate of 3.75% to his estimated risk premium (American States Water) leads to an estimated cost of equity for American States Water of 11.58%.

Q: Please discuss your concerns with the PRPM™.

A: As a tool to estimate cost of equity, the PRPM™ is still a new model. In fact, I have only seen this model used by an Indiana utility to estimate cost of equity in a handful of cases. Thus, we have not identified all of the shortcomings of the model. Nonetheless, I have several concerns with Mr. D'Ascendis' PRPM™ analysis and its results.

First, Mr. D'Ascendis' estimated variances rely exclusively on arithmetic mean calculations. This Commission has consistently concluded that a risk premium in a CAPM analysis should rely on *both* the arithmetic *and* the geometric

mean risk premium. Reliance solely on an arithmetic mean would necessarily result in higher risk premiums overstating the cost of equity. Because the sole reliance on an arithmetic mean overstates the risk premium, the concerns and directives this Commission has expressed with respect to the CAPM should likewise apply to the PRPM™.

Second, for the income component of his risk premium, Mr. D'Ascendis does not use total returns but rather uses "historical monthly yields." ("Total returns" refer to income returns plus change in the price of the bond.) Unless investors hold a bond to maturity, they cannot simply earn income returns and are subject to total returns. In Indiana-American Water Company Inc.'s Cause No. 42520, the Commission agreed with the testimony of Intervenor witness Michael Gorman, that total returns and not income returns should be used to estimate an historical risk premium. Page 59 of the final order states as follows:

> Another area of disagreement in the CAPM analysis is whether the model should use total returns or income returns. We find Mr. Gorman's analysis in this area to be the most persuasive. The income return on Treasury bonds, is simply the average of Treasury bond yield quotes over the historical period, and this yield quote does not measure the actual return investors earn by making investments in Treasury bonds. Investors simply cannot invest only in Treasury bond income returns. Rather, investors must take the risk of variations in bond prices before they invest in treasury bonds. Therefore the actual return experienced by investors in Treasury securities is measured by total return, not simply the income return.

Because Mr. D'Ascendis PRPM™ used income returns and did not use total returns in his analyses, his analysis suffers from the same concerns expressed by the Commission in its final order in Cause No. 42520.

Third, Mr. D'Ascendis' estimated costs of equity are also based on *forecasted* interest rates and not current interest rates. In his PRPM^{TM} he uses a forecasted risk free rate of 3.75%. As of the close of business on June 10, 2016, the current yield on 30-year U.S. Treasury securities was only 2.4548% (Attachment ERK 10).

Finally, the PRPM^{TM} was developed by AUS Consultants/Sussex Economic Advisors and to the best of my knowledge no other consulting companies that estimate cost of equity use the PRPM^{TM}.

Q: Does Mr. D'Ascendis calculate risk premiums based on a PRPM^{TM} throughout his cost of equity analysis?

A: Yes. In addition to directly estimating cost of equity based on the PRPM^{TM} for each company in his water proxy group, Mr. D'Ascendis used a PRPM^{TM} to estimate a risk premium on five additional instances within his testimony (twice in his Risk Premium model, once in his CAPM analysis and twice in his Non-Price regulated company analysis). Schedule ERK 1, page 1, provides a flow chart of Mr. D'Ascendis' cost of equity analysis. The boxes highlighted in red (with dashed lines) rely on a PRPM^{TM} to estimate a risk premium. Mr. D'Ascendis used a PRPM^{TM} analysis to estimate a risk premium for:

1: Large company common stocks less income returns on long-term U.S. Government bonds of 8.78% [Schedule 5, page 1, Measure 3] ,

2: Large company common stocks less Moody's Aaa and Aa corporate bond yields of 7.79% [Schedule 4, page 8, line 2] and

3: S&P Utility Index less yields on Moody's A rated public utility bonds 3.96% [Schedule 4, page 11, line 4].

Q: How do the risk premiums that Mr. D'Ascendis estimated and used from his PRPM^{TM} compare to the historical earned risk premiums?

A: While below the risk premiums he devised from his S&P 500 forecasted returns, the risk premiums Mr. D'Ascendis estimated from his PRPM^{TM} consistently exceed the historical earned risk premiums (See ERK Schedule 2).

Q: What else about Petitioner's PRPM^{TM} raises concerns with you?

A: The GARCH coefficients are not published by independent sources. Sussex Economic Advisors estimates its GARCH coefficients. Thus, it is difficult to verify if their calculations are accurate and reasonable. Conversely, there are multiple sources of published betas that can be scrutinized.

Also, by definition the market has a beta of 1.0 and inferences can be made about a company's risk based on its beta. The market does not have a similar GARCH coefficient, and no such inference can be made with regards to a GARCH coefficient.

Moreover, the company specific GARCH coefficients do not by themselves provide an investor with information about risk and required return. For example, Mr. D'Ascendis estimated California Water Services has a GARCH of 1.82. But that does not provide investors information about California Water Services' risk. California Water Services has an average beta of 0.73 and an investor is able to assess risk based on its beta. Because the GARCH coefficient does not provide similar information, it makes the model and its results less transparent. It is also more difficult to determine whether an estimated GARCH should be considered an outlier. Conversely, if the published beta for a water company suddenly increased to 1.5 and did so without explanation, that change can be investigated and a

determination can be made whether the beta is truly representative. No similar investigation or determination can be made for GARCH coefficients.

Q: Are you aware of any regulatory jurisdictions that have commented on the PRPM™?

A: Yes. On page 11 of its Final Order in Maine Water Company-Camden & Rockland Division, Docket No. 2013-00362 (Order dated March 25, 2014), the Maine Public Service Commission stated as follows:

> We are not convinced that we should accept results based on a newly derived analytical model that has not yet been rigorously vetted. As acknowledged by Ms. Ahern, the PRPM™ model is one that was developed by her consulting firm Associated Utility Services (AUS) and has been used only by AUS cost of equity consultants since 2012. January 14, 2014 Tr. at 37. To the best of Ms. Ahern's knowledge, no other utility cost of capital consultants uses the PRPM™ methodology and no state commission has adopted it. January 14, 2014 Tr. at 39-40. As stated by Mr. Hill, the model does not easily lend itself to analysis and independent verification of accuracy. At this point, we are not prepared to incorporate the results of the analysis using the PRPM™ inputs into our determination of an appropriate ROE in this case. This does not however preclude us from future reliance once the model is fully vetted by academia and other regulatory bodies.

I generally agree with the Maine Commission's finding on the PRPM™ methodology, and the PRPM™ should not be used in this case either.

B. Risk Premium using Adjusted Total Market Approach

1. Introduction

Q: Please discuss Mr. D'Ascendis' Risk Premium model using an Adjusted Total Market Approach.

A: Based on his "Adjusted Total Market Approach," Mr. D'Ascendis estimates a 10.05% cost of equity. His 10.05% cost of equity is based on a 5.39% "Adjusted Prospective Bond Yield" and an equity risk premium of 4.66% (5.39% + 4.66% =

10.05%). Mr. D'Ascendis' estimated a risk premium of 4.66% is described on his Schedule 4, page 3. Mr. D'Ascendis uses two approaches (D'Ascendis, Schedule 4, page 7) to estimate his 4.66% risk premium. He estimates a "[T]total market return using the Beta Approach" of 5.35% (D'Ascendis Schedule 4, page 8) and a "Mean equity risk premium based on a study using the holding period returns of public utilities" of 3.97% (D'Ascendis, Schedule 4, page 11).

2. Beta Adjusted Equity Risk Premium

Q: How does Mr. D'Ascendis estimate his "Beta Adjusted Equity Risk Premium" of 5.35%?

A: Mr. D'Ascendis uses four methodologies to derive his "[B]eta Adjusted Equity Risk Premium."

1) is based on data from Ibbotson and produces a 5.89% risk premium.
2) is based on a PRPM™ and produces a risk premium of 7.79%.
3) is based on Value Line's Summary Index (produces a risk premium of 7.19%).
4) is based on companies in the S&P 500 and produces a risk premium of 8.85%.

Q: What are your concerns with Mr. D'Ascendis' Ibbotson Equity Risk premium of 5.89%?

A: Mr. D'Ascendis' Ibbotson Equity Risk premium of 5.89% is based entirely on an arithmetic mean, which overstates the equity risk premium. As Mr. D'Ascendis noted in footnote (1) on his Schedule 4, page 8, this risk premium is based on the arithmetic mean historical monthly returns on large company common stocks from Ibbotson® SBBI® 2015 Market Report minus the arithmetic mean monthly yield of Moody's Aaa and Aa corporate bonds from 1928-2014. (12.07% - 6.18% = 5.89%). As explained previously in my testimony, sole reliance on an arithmetic mean calculation has been consistently rejected by this Commission. This risk

premium is further overstated because it is based on income returns and not total returns.

Q: What are your concerns with Mr. D'Ascendis' Ibbotson risk premium that is based on a PRPM^{TM} and produces a risk premium of 7.79%?

A: To estimate a risk premium for large company stocks above Aaa bonds of 7.79%, Mr. D'Ascendis assumes an anticipated market return for large company stocks that exceeds the historical arithmetic mean return by 62 basis points. Using Mr. D'Ascendis' "Prospective Yield on Aaa Rated Corporate Bonds" of 4.83% (D'Ascendis Schedule 4, page 3, Line 1), his estimated risk premium would produce an anticipated market return of 12.62%. An anticipated market return of 12.62% exceeds the average historical return on large company stocks. As noted above, the arithmetic mean return on large company stocks is 12.00%. It is unreasonable to assume an anticipated market return for large company stocks that exceeds the historical arithmetic mean return by 62 basis points. Moreover, the arithmetic mean return on large company stocks is itself overstated, exceeds investor expectations and exceeds the geometric mean return of 10.00% (2015 data) by approximately 200 basis points.

Q: What are your concerns with Mr. D'Ascendis' risk premium based on Value Line's Summary Index and produces a risk premium of 7.19%.

A: The Value Line projected "Median Price Appreciation" relied on by Mr. D'Ascendis is not a reliable estimate of market expectations. My concerns with Mr. D'Ascendis' Value Line derived equity risk premium are more thoroughly described below in my discussion of his CAPM analyses.

Q: What are your concerns with Mr. D'Ascendis' equity risk premium based on the S&P 500 companies of 8.85%.

A: Mr. D'Ascendis used data from the Bloomberg Professional Service for the S&P 500, and estimated total return of 13.68% based upon expected dividend yields and long-term growth estimates as a proxy for capital appreciation. Mr. D'Ascendis' estimated risk premium has several flaws. First, his expected market return of 13.68% far exceeds any reasonable expected return for the S&P 500. Second, Bloomberg estimates "long-term" growth rates in excess of 10.00% for more than 200 companies in the S&P 500. These are not truly long-term growth rates as they are based on 3 to 5 year forecasts. As I explained above, the DCF model requires a growth rate that can be used in perpetuity. Thus, DCF model requires a reasonable long term growth rate and growth rates that exceed the overall growth rate of the US economy (approximately 6.0%) are not reasonable long term growth rates. The flaw of using 3-5 year growth rates is best exemplified in Bloomberg's estimated growth rate of 63.252% for Amazon.com. While a 63.25% estimated growth rate for Amazon.com may be reasonable for the next 3-5 years, it is not reasonable as a long term growth rate. No company could sustain that growth rate in perpetuity. According to Mr. D'Ascendis' analysis, Amazon.com has a 63.25% estimated cost of equity (Amazon.com pays no dividends so its growth rate equals its cost of equity). Moreover, simply removing Amazon.com from Mr. D'Ascendis' S&P analysis materially reduces his estimated market return for the S&P 500 to 12.86% (82 basis points). No single company should have that large an influence on the

estimated market return. If a reasonable long term growth was used for Amazon.com it would not have this distorted influence.

3. Average of Historical, PRPM™, Projected Total Return on the S&P Utilities Index Equity Risk Premium

Q: How does Mr. D'Ascendis estimate his "Average of Historical, PRPM™ and Projected Total Return on the S&P Utilities Index Equity Risk Premium" of 3.97%?

A: Mr. D'Ascendis averages his estimates a historical equity risk premium of 3.85%, his equity risk premium based on a PRPM™ of 3.96% and his forecasted equity risk premium based on total return of the S&P Utilities Index of 4.11% to derive his 3.85% average risk premium.

Q: What are your concerns with Mr. D'Ascendis' historical risk premium of 3.85%?

A: As noted above, D'Ascendis' calculated return for the S&P Utility Index is based entirely on an arithmetic mean calculation and ignores the geometric mean. The arithmetic mean return for the S&P Public utilities index was 10.49%, but geometric mean was only 8.46% over the same time period. Mr. D'Ascendis also uses income returns (yields) on Moody's A-Rated Public Utility bonds, and not total returns. Investors in utility bonds earn total returns, not just income returns. A risk premium should use total returns for both indexes and not mix total equity returns with bond income returns. Commission orders from prior Indiana-American rate cases support the use of total returns over income returns to estimate a risk premium, see *infra*.

Q: Briefly discuss your concerns with Mr. D'Ascendis' "Forecasted Equity Risk Premium Based on PRPM™" of 3.96%.

A: My previously stated concerns regarding the PRPM™ - that the estimated risk premium relies exclusively on an arithmetic mean calculation and on income returns - also apply here.

Q: Briefly discuss your concerns with Mr. D'Ascendis' "Forecasted Equity Risk Premium Based on Projected Total Returns on the S&P Utilities Index" of 4.11%.

A: Mr. D'Ascendis uses a DCF model to estimate cost of equity for each company in S&P's Public Utility Index. According to his analysis, NRG Energy has an estimated cost of equity of 33.20%. NRG Energy is an outlier and should be excluded from Mr. D'Ascendis' analysis. Doing so reduces the estimated cost of equity for the S&P Public Utilities Index to 9.16%. According to the March 25, 2016 Value Line Report, NRG Energy has a beta of 1.10 (well above the water industry average of 0.71), further demonstrating NRG Energy has a higher risk and that it is inappropriate to use to estimate Petitioner's cost of equity.

4. General Concerns with Adjusted Total Market Approach

Q: Please state your concerns that affect Mr. D'Ascendis' Adjusted Total Market Approach risk premium that is not specific to the sub models.

A: Line 1, of his Schedule 4, page 3 shows that D'Ascendis' used a "Prospective Yield on Aaa Rated Corporate Bonds" of 4.83%. Mr. D'Ascendis' testimony (Schedule 4, page 9) also illustrated that the current yield on Aaa rated bonds was only 3.95% (updated June 1, 2016 to 3.65%). Mr. D'Ascendis' use of projected bond yields compared to current bond yields overstates estimated cost of equity. It is more appropriate to use current interest rates to estimate cost of equity than forecasted interest rates because the current yield on long term debt is already a forward

looking yield over the investment horizon. When long-term debt is purchased, the purchaser is making a forecast. The purchaser anticipates factors such as inflation over the life of the debt and uses those factors to determine the appropriate purchase price and subsequent yield of his or her investment. The purchase price produces a yield that the investor is willing to accept over the life of the debt. Also forecasting an increase to bond yields includes an unstated, yet crucial assumption that the bond's price will decrease. The only way for a bond's yield to increase is for the bond price to decrease. A better indication of what investors think interest rates will do is how they spend current dollars. Investors do not purchase bonds assuming they will decrease in value. The current purchase price is a statement with real dollars as to what the investor believes will happen over the investment horizon.

Moreover, even if it is reasonable to use forecasted interest rates to estimate cost of equity, the forecast should be limited to no more than the next 12-18 months. Any interest rate forecast beyond 12-18 months is per speculation. Mr. D'Ascendis' analysis includes interest rate forecast for 30 year bonds that will not be issued until 2022-2026. An estimate of what long term interest rates might be 6-10 years from now does not provide meaningful insight into investor expectations today and should not be used to estimate cost of equity.

Finally, another problem with Mr. D'Ascendis estimated risk premium is that he further adjusts (increases) his prospective bond yield by 20 basis points (Schedule 4, page 3, line 4) to account for the bond rating difference on "A rated" utility bonds vs. the "lower" bond rating for the Water utility proxy group. To

derive this adjustment, Mr. D'Ascendis relies on a Moody's average rating of A2/A3 (6.5 numeric rating (A3 on Moody's equals A- for S&P). However, based on S&P's bond ratings his Water proxy group has a bond rating of A (5.8 numeric rating – slightly above A). In this case, I would give greater weight to the S&P average rating because it is based on the ratings of all 8 companies in his Water proxy, while the Moody's average bond rating is based on only 2 companies. Thus, Mr. D'Ascendis' 20 basis point adjustment is unnecessary and overstates his estimated cost of equity. In fact, because the average rating based on S&P ratings is slightly above "A," a small *downward* adjustment may be justified.

VII. MR. D'ASCENDIS' CAPM ANALYSIS

Q: Please summarize your disagreements with Mr. D'Ascendis' CAPM analysis.

A: Mr. D'Ascendis uses both a traditional CAPM and an Empirical or ECAPM analysis to produce an unadjusted estimated cost of equity of 10.08% (D'Ascendis Schedule 5, page 1). I disagree with Mr. D'Ascendis' estimated risk premium, his use of the Empirical or ECAPM formula, and his use of forecasted interest rates.

A. Market Risk Premium

Q: D'Ascendis' CAPM analysis relies on an estimated market risk premium of 8.46%. Please discuss how Mr. D'Ascendis estimated his 8.46% market risk premium (D'Ascendis Schedule 5, page 1).

A: Mr. D'Ascendis used four methodologies to estimate a market risk premium. His first methodology relied on Value Line's median price appreciation potential to produce an estimated market risk premium of 8.27%. His second methodology derived an arithmetic mean from Ibbotson based on total market returns and income returns on long-term U.S. Treasury Securities to produce an estimated risk premium

of 6.84%. His third methodology used Petitioner's PRPM^{TM} on large company stocks vs. income returns of long-term US Government Securities to produce an estimated risk premium of 8.78%. His fourth methodology is based on his estimated return for the S&P 500 to produce an estimated risk premium of 9.93%.

Q: Do you agree with Mr. D'Ascendis' methodologies to estimate a risk premium?

A: No. Each of these methodologies contains flaws and overstates cost of equity.

1. Value Line Methodology

Q: Please Discuss Mr. D'Ascendis' Value Line Methodology.

A: Mr. D'Ascendis' Value Line analysis produces an anticipated market return of 12.02%. This analysis relied on Value Line's 3-5 year Median Price Appreciation Potential (MPAP) of 45% and an Estimated Median Dividend Yield of 2.29%. While an anticipated market return of 12.02% is only somewhat high, Value Line's estimated MPAP can be quite volatile and is an unreliable measure to forecast either current or long-term market expectations. For example, during the 13 weeks (October 23, 2015 – January 15, 2016) that Mr. D'Ascendis used to calculate his average MPAP, Value Line's MPAPs ranged from 40% to 50%. Using a four year return as Mr. D'Ascendis does, a change in the MPAP of 10% (50% - 40% = 10%) would change the estimated market risk premium by more than 240 basis points ($1.10^{\wedge 0.25}$ - 1 = 2.41%). Absent highly unusual circumstances, the estimated market risk premium should not change so dramatically over such a short period of time. Moreover, Value Line's forecast is an intermediate term forecast and is not intended to be a long term forecast.

Next, Mr. D'Ascendis' use of Value Line's 2.2% Estimated Median Dividend Yield is inappropriate because it includes only yields from dividend paying stocks. The estimated MPAP includes *both* dividend and non-dividend paying stocks. Mr. D'Ascendis did not explain in his testimony why it is appropriate to use a dividend yield for the market that excludes non-dividend paying stocks. Excluding non-dividend paying stocks (all with zero yields), results in a Value Line Median Estimated Dividend Yield that is higher than it would otherwise be if all of the stocks in the Value Line Universe were included. Because the Value Median Price Appreciation Potential and the Median Estimated Dividend Yield come from two different groups of stocks it is inappropriate to combine them to create an estimated market return.

2. Ibbotson Arithmetic Mean

Q: Please discuss Mr. D'Ascendis' Ibbotson Arithmetic Mean methodology.

A: Mr. D'Ascendis relies on the arithmetic mean total market return of 12.02% less the arithmetic mean of income returns on long-term U.S. Treasury Securities of 5.23% to produce an estimated risk premium of 6.84%. The Commission has consistently rejected risk premiums based solely on an arithmetic mean calculation and as explained above has also rejected the use of income returns.

3. PRPM™

Q: Please discuss Mr. D'Ascendis' PRPM™ methodology.

A: Mr. D'Ascendis estimated risk premium uses arithmetic mean monthly market returns. As explained above, this Commission has consistently rejected risk premium estimations based exclusively on an arithmetic mean return calculation.

Additionally, his calculation uses "income returns" and not total returns. Using income returns is inappropriate because, investors are subject to total returns.

4. Bloomberg Total Return

Q: Please discuss Mr. D'Ascendis' Bloomberg Total Return Methodology

A: As discussed above Mr. D'Ascendis used a DCF model along with Bloomberg 3-5 year growth estimates to estimated cost of equity for each company in the S&P 500. Mr. D'Ascendis then used a market weighted approach to estimate the cost of equity for the S&P 500. Based on his analysis, Mr. D'Ascendis estimated a 13.68% return for the market and estimated risk premium of 9.93%. Given current market conditions an estimated return for the market of 13.68% is unrealistically high. Intermediate term forecasts are not long-term forecasts as required by the DCF model. Moreover, his estimated cost of equity (for the S&P 500) relies solely on intermediate-term forecasted growth in EPS, while ignoring historical and forecasted growth in dividends per share (DPS) and book value per share (BVPS). Mr. D'Ascendis' error in relying exclusively on 3-5 year forecasted earnings per share is exemplified in his use of Amozon.com who has a 3-5 year forecasted growth in EPS of more than 60.0% and an estimated cost of equity in excess of 60.0%. Despite being only one of approximately 500 companies, Mr. D'Ascendis' inclusion of Amazon.com increases his estimated cost of equity for the S&P 500 by approximately 80 basis points.

B. Empirical Capital Asset Pricing Model (ECAPM)

Q: Does Mr. D'Ascendis' CAPM analysis rely on both the traditional and ECAPM analysis?

A: Yes. Mr. D'Ascendis' traditional CAPM analysis estimates a 9.78% cost of equity for the water industry, while his ECAPM produces a 10.38% cost of equity for the water industry.

Q: Do you agree with Mr. D'Ascendis' use of the ECAPM?

A: No. The ECAPM modification to the traditional CAPM is based on the premise that the results of a CAPM analysis are biased downward for companies with a beta of less than 1.0 and biased upward for companies with a beta that is greater than 1.0. The use of adjusted beta increases the beta for companies with a beta below 1.0 and decreases beta for companies with a beta that is above 1.0. Mr. D'Ascendis' CAPM and ECAPM analyses uses Value Line betas. Value Line adjusts their raw beta to adjusted beta through the following formula: Adjusted beta = 0.35 + 0.67* raw beta. Because Mr. D'Ascendis already used adjusted beta, his use of the ECAPM with an adjusted beta is a redundant adjustment skewing the results.

Q: Did the Commission accept the results of an ECAPM analysis in Cause No. 42359 PSI Energy?

A: No, it did not. In its final Order, the Commission stated as follows:

> With respect to the ECAPM analysis performed by Dr. Morin we note that the Commission rejected this model in Cause No. 40003, and found that the Empirical CAPM is not sufficiently reliable for ratemaking purposes. Cause No. 40003 at 32. We went on to conclude that the ECAPM...would adjust, in essence, future expectations with regard to investor perceptions of relative risks for further change which may occur years hence. The Commission concluded that...we do not believe exercises in approximating future cost of capital are conducive to such precise estimation as the Empirical CAPM would suggest. *Id.* We find that nothing presented in this Cause has changed our prior determination that ECAPM is

not sufficiently reliable for ratemaking purposes and hereby reject the model in this proceeding.

In re PSI Energy, Cause No. 42359, p. 48 (Ind. Util. Regulatory Comm'n May 18, 2004).

C. Forecasted interest rates

Q: Mr. D'Ascendis' CAPM analysis uses a forecasted interest rate of long-term US Treasury bonds of 3.75% instead of a current yield 2.45% (D'Ascendis schedule 5, page 1). Do you agree with his use of forecasted interest rates?

A: No. As explained earlier in my testimony, current interest rates require a forecast about future inflation, and using forecasted interest rates in a CAPM analysis does not provide meaningful insight to estimate Petitioner's cost of equity.

VIII. MR. D'ASCENDIS' NON-PRICE REGULATED PROXY GROUP

Q: Please describe Mr. D'Ascendis' Non-Price Regulated cost of equity analysis.

A: Mr. D'Ascendis completes a cost of equity analysis on a proxy group of 16 companies that he asserts are comparable in total risk to his regulated water utility proxy group. His analysis on Non-Price regulated companies produce an unadjusted estimated cost of equity of 11.49%. Mr. D'Ascendis' Non-Price regulated analysis produces an estimated cost of equity that is significantly higher than any of his other models. To derive his 11.49% estimated cost of equity Mr. D'Ascendis completed a DCF model (12.20%), a Risk Premium analysis (11.52%) and CAPM analysis (10.66%).

Q: Do you agree with Mr. D'Ascendis' use of a non-utility proxy group?

A: No. Mr. D'Ascendis' proxy group of Non-Price regulated companies is riskier than the water industry and should not be used to estimate Petitioner's cost of equity.

Q: Please explain why you believe his Non-Price regulated proxy group of companies is riskier than his water utility proxy group.

A: Mr. D'Ascendis' analysis (Schedule 4, page 5 vs. Schedule 7, page 4) illustrates that his Non-Price regulated proxy group of companies has a lower average bond rating. Mr. D'Ascendis' Non-Price regulated proxy group has an average credit rating of Baa1 (Moody's) and A- (S&P). Using S&P's numeric rating method (D'Ascendis Schedule 4, page 7), the Non-Price regulated proxy group has a numeric bond ratings of 7.8 (Moody's) and 7.3 (S&P). In contrast, Mr. D'Ascendis' water proxy group has a Moody's bond rating of A2/A3 (6.5) and an S&P bond rating of A (5.8). Thus, Mr. D'Ascendis' water proxy group has an average bond rating that is approximately half a letter grade higher than his Non-Price regulated proxy group.

The lower risk of the water proxy group is further demonstrated by comparing the results of his Risk Premium Analysis "Using an Adjusted Total Market Approach." Mr. D'Ascendis conducts a similar risk premium analysis for both his water proxy group (Schedule 4, page 3) and for his proxy group of Non-Price Regulated companies. Yet for his water company proxy his analysis produces an estimated cost of equity of 10.05%, while non-price regulated proxy group produces an estimated cost of equity of 11.52%. If the two proxy groups have similar risk, they should produce similar results.

Mr. D'Ascendis, Non-price regulated proxy group also has a higher beta (0.79)[3], than his water proxy group (0.72).[4] The higher average beta demonstrates

[3] D'Ascendis Schedule 7, page 6.
[4] D'Ascendis Schedule 5, page 1.

that his Non-Price regulated proxy group is riskier than his water proxy group. The higher beta increases the results of his CAPM analysis from 10.08% to 10.66%. The higher beta also increases the results of his risk premium analysis by similar amount.

Q: Putting aside your concerns about whether Mr. D'Ascendis' Non-Price regulated proxy group is comparable to the water industry, do you have other concerns regarding Non-Price regulated company cost of equity analysis?

A: Yes. Mr. D'Ascendis uses the same cost of equity models for the Non-Price regulated proxy group as he does for the water industry. All of the concerns I expressed earlier in my testimony regarding the cost of equity analysis for his water company proxy (such as the exclusive use of arithmetic means) also apply to his Non-Price regulated company proxy.

IX. COMPANY SPECIFIC ADJUSTMENTS

Q: Please discuss Mr. D'Ascendis company-specific adjustments.

A: Mr. D'Ascendis proposes a 40 basis point size adjustment and a 14 basis point adjustment for flotation costs.

Q: Do you agree with Mr. D'Ascendis' proposed company specific risk adjustment?

A: Based on Mr. D'Ascendis' analysis, Petitioner has an estimated market value of approximately $56.0 million. Petitioner is owned by one of the largest publically traded water utility in the United States. Petitioner's affiliation with Aqua America improves its access to capital and minimizes the negative effect of Petitioner's smaller size. Moreover, Petitioner is a regulated utility and does not have the same risks as a similarly sized non-price regulated business. While, a small company

specific risk adjustment may be warranted, Mr. D'Ascendis' 40 basis point adjustment is overstated.

Q: What would be an appropriately sized adjustment?

A: OUCC witness Crystal Thacker has recommended a cost of equity that is approximately 35 basis points above the high end of her recommended range, thus recognizing the need to make some adjust to recognize current economic conditions and Petitioner's company specific risks.

Q: Mr. D'Ascendis adds 14 basis points to the results of his estimated cost of equity for flotation costs. Is this adjustment appropriate?

A: No. Petitioner (nor its parent company) has not recently incurred any flotation costs. Petitioner has not incurred or been allocated any flotation costs from its parent or any other affiliate since August 2006 (D'Ascendis Schedule 9) There is no indication in Petitioner's case that Aqua Indiana needs to issue new stock in the near-term. Under these circumstances the Commission should not include a flotation cost adjustment to Petitioner's cost of equity. The Commission has previously denied at least one request for an adjustment to cost of equity for flotation costs:

> Although this Commission has recognized the need to adjust the cost of equity to reflect the costs associated with equity issuances, it has heretofore authorized such adjustments only when there was a projected near-term need to issue new stock
>
> (Final Order, p. 30, September 27, 1996, Cause No. 40003 PSI) (Emphasis added)

Absent a need to issue new stock, we recommend the Commission deny Petitioner's request to include a flotation cost adjustment in its proposed cost of equity.

X. COST OF EQUITY CONCLUSIONS

Q: Do you have any final comments about Mr. D'Ascendis' analysis?

A: Yes. To the extent that I have not commented on Mr. D'Ascendis' analysis, my silence should not be viewed as an acceptance of his analysis or position.

Q: Please review the most significant differences between the OUCC's estimated cost of equity and Mr. D'Ascendis' cost of equity.

A: Our cost equity estimates differ by 135 basis points (9.0% vs. 10.35%). Most of our differences can be explained by the following factors:

1. Mr. D'Ascendis' proxy group of Non-Price regulated companies has a measurably higher bond rating, is riskier than his water proxy group and should not be considered to estimate Petitioner's cost of equity.

2. Mr. D'Ascendis estimates a cost of equity of 13.68% for the S&P 500. This figure exceeds a reasonable estimate of expected returns for the market and inflates several of his models.

3. Other than his DCF analysis, Mr. D'Ascendis' PRPM^{TM} permeates his entire analysis. As explained above Mr. D'Ascendis either directly or indirectly uses a risk premium based on a PRPM^{TM} in six different portions of his analysis to estimate cost of equity.

4. Mr. D'Ascendis adjusts (increases) the results of his models by 54 basis points. He makes a 40 basis point company specific risk adjustment and a he makes a 14 basis point adjustment for flotation costs. The company specific risk adjustment is overstated and the flotation cost adjustment should not be included in Petitioner's authorized cost of equity.

5. Mr. D'Ascendis exclusively uses arithmetic mean calculations in numerous models throughout his analyses and his estimated risk premiums are inflated.

XI. SUPPORT OF OUCC'S PROPOSED COST OF EQUITY

Q: Please summarize the OUCC's cost of equity testimony.

A: Using both a Discounted Cash Flow ("DCF") Analysis and a Capital Asset Pricing Model ("CAPM"), OUCC witness Crystal Thacker estimated Petitioner's cost of equity to be 9.00%.

Q: In today's market is a 9.00% cost of equity reasonable?

A: Yes. An important component of cost of equity analyses is inflation rates. Lower inflation rates generally translate into lower capital costs. This holds true for both the cost of debt and the cost of equity. Over the last 20 years (1996-2015), inflation has not been greater than 4.1% and has averaged 2.2%[5] (Attachment ERK 1). Moreover, forecasted inflation is expected to remain similarly low. According to the June 1, 2016 Blue Chip Financial Forecasts, over the next ten years the Consumer Price Index for inflation is expected to average between 2.2% - 2.3% (Attachment ERK 2).

Q: Do you have additional support that the OUCC's proposed cost of equity is reasonable?

A: Yes. In its First Quarter 2016 Survey, Duke University surveyed the CFOs with each company in the S&P 500 for their estimated average annual return for the S&P 500 over the next ten years. The average result was 6.32%. The 322 CFOs who responded to the survey believed, on average, there is only a 10% chance the S&P 500's average annual return during the next 10 years will exceed 10.04% (Attachment ERK 3).

The First Quarter 2014 Survey of Professional Forecasters (The Federal Reserve Bank of Philadelphia) forecasts a 10 year return for the S&P 500 of 5.37% (Attachment ERK 4).

The Duff & Phelps article: "Duff & Phelps Increases U.S. Equity risk Premium to 5.5%, cited by Crystal Thacker estimates a total market return of 9.5%.

[5] http://www.usinflationcalculator.com/inflation/consumer-price-index-and-annual-percent-changes-from-1913-to-2008/

An article by J.P. Morgan Asset Management titled: 2016 Long-Term Capital Market Return Assumptions forecasts expected 10-15 year annualized compounded returns for U.S. Large Cap equities of 7.0% as of September 30, 2015 (Attachment ERK 5).

Voya Investment Management published an article titled 2016 Long-Term Capital Market Forecasts (January 2016; Attachment ERK 6). In this article, Voya forecasts a long-term (ten years) geometric return for the S&P 500 of 5.1% and an arithmetic return of 6.4%.

KPMG's "Equity Market Risk Premium – Research Summary (April 12, 2016) estimates a market risk premium for the S&P 500 of 5.75%. When combined with a 3.0% yield on long term government bonds, this produces an implied equity return of approximately 8.75% (Attachment ERK 7).

The studies described above produce a range of forecasted market returns of 5.4% to 9.5% for the overall market. With an average beta of 0.713, the water industry is less risky than the overall market, and it should, therefore, have a lower expected rate of return than the market. The OUCC's proposed cost of equity of 9.0% is consistent with the forecasts made by the sources described above.

Q: Do you have any utility specific information that supports the reasonableness of the OUCC's proposed cost of equity.

A: Yes. Using data from Bloomberg Professional Services, Mr. D'Ascendis conducted a DCF analysis to estimate an expected return for the S&P Public

Utilities Index of 9.30%.[6] However, this estimate includes an outlier and is overstated.

Q: Please identify the Outlier.

A: According to Bloomberg, NRG Energy has an estimated growth rate of 26.6% and an estimated cost of equity of 33.2%.

Q: How does the outlier affect the conclusion?

A: When the outlier is removed from Mr. D'Ascendis' analysis, instead of cost of equity of 9.30%, the S&P Public Utilities Index would have an estimated cost of equity of 9.16% (Attachment ERK 8), which is only 16 basis points higher than the OUCC's proposed return of 9.00%.

Q: Do you have any additional support to illustrate that the water industry is less risky than the market?

A: Yes. According to Ibbotson's SBBI 2016 Valuation Handbook (Guide to Cost of Capital), by Duff & Phelps, the Industry Premiums for the Water Supply industry ranges from -3.28% to -4.53% (Attachment ERK 9). A negative risk premium of this magnitude further demonstrates that the water industry has a lower risk than the overall market.

Q: Please re-cap key elements illustrating the reasonableness of your proposed 9.0% cost of equity.

A: The OUCC's models incorporate inputs and methodologies explicitly approved by this Commission in countless previous cases. An article by J.P. Morgan Asset Management titled: Long-term Capital Market Return Assumptions forecasts an expected 10-15 year annualized compounded returns for U.S. Large Cap equities of 7.0% as of September 30, 2015. The Duff & Phelps article cited by Crystal

[6] See footnote 4 on D'Ascendis' Schedule 4, page 11.

Thacker forecasts a return of 9.5% for the market. The average earned return of the S&P Public Utility Index from 1928 – 2015 was 8.46%.[7] Mr. D'Ascendis' forecasted return for the S&P Public Utilities Index, (after excluding NRG) is 9.16%. These sources produce a range of long-term forecasted returns for the market (or the utility market) of 7.0% to 9.5% with a midpoint of 8.25%. Because Petitioner and the water industry are less risky than the market a proposed cost of equity of 9.0% is reasonable and should be approved by this Commission.

XII. RECOMMENDATIONS

Q: Please summarize your recommendations.

A: The OUCC's proposed cost of equity of 9.0% is reasonable. The OUCC proposes the Commission use a 4.57% cost of debt to calculate Petitioner's weighted cost of capital.

Q: Does this conclude your testimony?

A: Yes.

[7] Calculation based on data provided in (Excel Spreadsheet "Attachment A to Petitioner's Exhibit 3, PRPM WP3").

XIII. APPENDIX A

Qualifications

Q: Please describe your educational background and experience.

A: I graduated from Bentley College in Waltham, Massachusetts with a Bachelor degree in Economics/Finance and an Associate degree in Accounting. Before attending graduate school, I worked as an escheatable property accountant at State Street Bank and Trust Company in Boston, Massachusetts. I was awarded a graduate fellowship to attend Purdue University where I earned a Masters of Science degree in Management with a concentration in finance.

I was hired as a Utility Analyst in the Economics and Finance Division of the OUCC in October 1990. My primary areas of responsibility have been in utility finance, utility cost of capital, and regulatory policy. I was promoted to Principal Utility Analyst in August 1993 and to Assistant Chief of Economics and Finance in July 1994. As part of an agency wide reorganization in July 1999, my position was reclassified as Lead Financial Analyst within the Rates/Water/Sewer Division. In October, 2005 I was promoted to Assistant Director of the Water/Wastewater Division. In October 2012, I was promoted to Chief Technical Advisor. I have participated in numerous conferences and seminars regarding utility regulation and financial issues. I was awarded the professional designation of Certified Rate of Return Analyst (CRRA) by the Society of Utility and Regulatory Financial Analysts (SURFA). This designation is awarded based upon experience and the

successful completion of a written examination. In April 2012, I was elected to SURFA's Board of Directors.

Q: Have you previously testified before the Indiana Utility Regulatory Commission (Commission)?

A: Yes. I have testified before the Commission in a number of different cases and issues. I have testified in water, wastewater, natural gas, telecommunication and electric utility cases. While my primary areas of responsibility have been in cost of equity, utility financing, fair value, utility valuation and regulatory policy, I have also provided testimony on trackers, guaranteed performance contracts, declining consumption adjustments, and other issues.

XIV. APPENDIX B

List of Schedules and Attachments

Schedule ERK-1 Provides a flow chart of Petitioner's cost of equity models

Schedule ERK-2 Summary of Petitioner's Cost of Equity Models.

Schedule ERK-3 Adjusted Summary of Petitioner's Cost of Equity Models.

Attachment ERK 1 Provides annual inflation rates for 1913 – 2015.

Attachment ERK 2 Selected pages from Blue Chips Financial Forecasts (December 2015, January 2016 and June 2016.

Attachment ERK 3 is page 49 from Duke CFO Magazine Global Business Outlook Survey U.S. – First Quarter 2016.

Attachment ERK 4 is a copy of the First Quarter Survey of Professional Forecasters, Federal Reserve Bank of Philadelphia Release (February 14, 2016).

Attachment ERK 5 is a copy of an article by J.P. Morgan Asset Management titled: Long-term Capital Market Return Assumptions. (2016 Edition).

Attachment ERK 6 is a copy of an article by Voya Investment Management titled 2016 Long-Term Capital Market Forecasts (January, 2016).

Attachment ERK 7 is a copy of an article from KPMG titled Equity Market Risk Premium – Research Summary, dated April 12, 2016.

Attachment ERK 8 is copy of a worksheet from Petitioner's Excel workpapers. Attachment A to Petitioner's Exhibit 3, Tab titled "Sch 4 WP1"

Attachment ERK 9 Industry Risk Premiums from Ibbotson's SBBI 2016 Valuation Handbook – Guide to Cost of Capital.

Attachment ERK 10 provides current interest rates on US Treasury bonds as of June 12, 2016.

Attachment ERK 11 is an unadjusted copy of Schedule D-3 from, Mr. Estep's testimony.

Attachment ERK 12 Fact Sheet from Aqua America's Web page.

Attachment ERK 13 contains Petitioner's responses to various OUCC discovery related to Petitioner's cost of debt.

Attachment ERK 14 is a copy of Schedule D-3 from, Mr. Estep's testimony that has been adjusted to account for additional debt allocated to Petitioner.

XV. APPENDIX C

Potential Bias in Analyst Forecasts

An article published in the National Regulatory Research Institute (NRRI) Journal of Applied Regulation supports both of my concerns about using unreasonably high growth rates in a DCF analysis with the following:[8]

> Financial research has made it clear that no company, especially a utility, can sustain a growth rate over the long run that exceeds the growth rate of the economy.[15] Since 1959 the long-term sustainable real growth rate in the economy has been about 3.5%.[16] If long-term inflation is expected to be about 2.5%, the maximum long-term sustainable nominal growth for any company today is about 6.0%. Since utilities are amongst the slowest growing firms in the economy, a utility today would be expected to have a long-term sustainable growth rate that is significantly below 6%.

The article also noted a tendency toward upside bias in analyst forecasts:

> The other problem with using analyst forecasts as the long-term growth rate in the DCF model is such forecasts are biased to the upside. The evidence on this issue is overwhelming.[17] The forecast bias persists year after year in large part due to the incentive structures in place at many Wall Street firms that tend to reward more optimistic projections and to discourage the incorporation of potentially negative views in analysts' forecasts.[18]

Emphasis added, (Citations included at the end of my testimony).

The concern regarding bias in intermediate term analyst forecasts (such as those relied upon by Mr. D'Ascendis) is also mentioned in The real cost of equity by Marc H. Goedhart, Timothy M. Koller and Zane D. Williams (McKinsey Quarterly Autumn 2002):

> Some theorists have attempted to meet this challenge by surveying equity analysts, but since we know that analyst projections almost

8. How improper risk assessment leads to overstated required returns for utility stocks by Steven G. Kihm NRRI Journal of Applied regulation-Volume 1, June 2003, p. 98.

> always overstate the long-term growth of earnings or dividends,[2] analyst objectivity is hardly beyond question.

(Citations included at the end of my testimony).

In a more recent article; Equity analysts: Still too bullish by Marc H. Goedhart, Rishi Raj and Abhishek Saxena (McKinsey Quarterly – April 2010) the authors reiterated the concern regarding analyst forecast bias:

> No executive would dispute that analysts' forecasts serve as an important benchmark of the current and future health of companies. To better understand their accuracy, we undertook research nearly a decade ago that produced sobering results. Analysts, we found, were typical overoptimistic, slow to revise their forecasts to reflect new economic conditions, and prone to making increasingly inaccurate forecasts when economic growth declined.[1]
>
> Alas, a recently completed update of our work only reinforces this view - despite a series of rules and regulations, dating to the last decade, that were intended to improve the quality of the analysts' long-term earnings forecasts, restore investor confidence in them, and prevent conflicts of interest.[2] For executives, many of whom go to great lengths to satisfy Wall Street's expectations in their financial reporting and long-term strategic moves, this is a cautionary tale worth remembering.

(Citations included at the end of my testimony).

Also, the Abstract of an Article titled, Do Analyst Conflicts Matter? Evidence from Stock Recommendations by Anup Agrawal and Mark Chen (Journal of Law and Economics, 2008, V 51), includes the following statement:

> However, evidence from the response of stock prices and trading volumes to upgrades and downgrades suggests that the market recognizes analyst conflicts and properly discounts analyst options.

Both Equity analysts: Still too bullish article by Goedhart, Raj and Saxena and Do Analyst Conflicts Matter? Evidence from Stock Recommendations by Agrawal support my opinion that concerns about analyst optimism still exist.

When using analyst forecasts of EPS to estimate growth (g) in a DCF analysis, both the potential for analyst bias and the intermediate term nature of the forecasts may make these estimates unreliable. Even assuming no analyst bias, unsustainable growth rates should be adjusted or given reduced weight.

XVI. APPENDIX D

General Problems with Analyst Forecasts

On page 106 of his book The Equity Risk Premium – The Long Run future of the Stock Market, Bradford Cornell states as follows:

> The practical problem raised by relying on analysts' forecasts is that such forecasts typically have short horizons. Services that aggregate such forecasts, including those by IBES and Zack's Investment Research, do not provide forecasts beyond 5 years. From the standpoint of the DCF model, which extends into perpetuity, this horizon is too short.

Emphasis added

Mr. Cornell goes on to discuss the problems with assuming that the forecasted growth rate can be maintained in perpetuity.

> In most cases, the IBES forecasts are greater than the long-run economic growth rates. Such growth rates clearly cannot be maintained forever. Although it is possible that a company's dividends can grow significantly faster than the general economy for 5 years, if such a growth rate were maintained indefinitely, the company would eventually engulf the entire economy.

Also the Cost of Capital – Estimation and Application 2nd edition by Shannon Pratt makes the following assertions about using analyst forecasts to estimate cost of equity:

> It is theoretically impossible for the sustainable perpetual growth rate for a company to significantly exceed the growth rate in the economy. Anything over a 6-7% perpetual growth rate should be questioned carefully.
>
> A common approach to deriving a perpetual growth rate is to obtain stock analysts' estimates of earnings growth rates. The advantage of using these growth estimates is that they are prepared by people who follow these companies on an ongoing basis. These professional stock analysts develop a great deal more insight on

these companies than a causal investor or valuation analyst not specializing in the industry is likely to achieve.

There are however, three caveats when using this information:

1. These earnings growth estimates typically are for only the next two to five years; they are not perpetual. Therefore, any use of these forecasts in a single-stage DCF model must be tempered with a longer-term forecast.

2. Most published analysts' estimates come from "sell-side" stock analysts who work for firms that are in the business to sell stocks. Thus, although their earnings forecasts fall within the range of "reasonable" possibilities, they may be on the high end of the range.

3. Usually these estimates are obtained from firms that provide consensus earnings forecasts; that is, they aggregate forecasts from a number of analysts and report certain summary statistics (mean, median, etc.) on these forecasts. For a small publically traded firm, there may be only one or even no analyst following the company. The potential for forecasting errors is greater when the forecasts are obtained from a very small number of analysts. These services typically report the number of analysts who have provided earnings estimates, which should be considered in determining how much reliance to place on forecasts of this type.

Many of the problems inherent in using a single-stage model to estimate cost of capital are addressed by using a multistage model.

XVII. APPENDIX E

Sources Supporting the Use of the Geometric Mean

In VALUATION Measuring and Managing the Value of Companies (Second Edition) by Tom Copeland, Tim Koller and Jack Murrin on pages 260 – 261 the text specifically advocates the use of the geometric mean over the arithmetic mean to estimate cost of equity in a CAPM analysis:

> We recommend using a 5 to 6 percent market risk premium for U.S. companies. This is based on the long-run geometric average risk premium for the return on the S&P 500 versus the return in long term government bonds from 1926-1992.[4] Since this is a contentious area that can have a significant impact on valuations, we elaborate our reasoning in detail here.
>
> We use a very long time frame to measure the premium rather than a short time frame to eliminate the effects of short-term anomalies in the measurement. The 1926-1992 time frame reflects wars, depressions and booms. Shorter time periods do not reflect as diverse a set of economic circumstances.
>
> We use a geometric average of rates of return because arithmetic averages are biased by the measurement period. An arithmetic average estimates the rates of return by taking a simple average of the single period rates of return. Suppose you buy a share of nondividend-paying stock for $50.00. After one year the stock is worth $100. After two years the stock falls to $50 once again. The first period return is 100 percent; the second period return is -50 percent. The arithmetic average return is 25 percent [(100 percent – 50 percent) / 2]. The geometric average is zero. (The geometric average is the compound rate of return that equates the beginning and ending value.) (sic) We believe the geometric average represents a better estimate of investors' expected return over long periods of time.

> Finally, we calculate the premium over *long-term* government bond returns to be consistent with the risk free rate we use to calculate the cost of equity.

(See Table of Citations at end of my testimony). Italics emphasis in original, underlined emphases added.

At page 263, the text notes other weaknesses of relying on an arithmetic return:

> Note that the arithmetic return is always higher than the geometric return and that the difference between them becomes greater as a function of the variance of returns. Also the arithmetic average depends upon the interval chosen. For example, an average of monthly returns will be higher than an average of annual returns. The geometric average, being a single estimate for the entire time interval, is invariant to the choice of interval. Finally, empirical research by Fama-French (1988), Lo and MacKinlay (1988), and Poterba and Summers (1988) indicates that a significant long-term negative autocorrelation exists in stock returns.[5] Hence, historical observations are not independent draws from a stationary distribution.

(See Table of Citations at end of my testimony)

On pages 259-260 of the text, the authors recommend using the 10-year Treasury bond rate.[9]

The text Analysis of Equity Investments: Valuation also supports the use of the geometric mean to estimate the market risk premium. On page 50, the authors state that geometric means produce estimates of the equity risk premium that are more consistent with economic theory:

9. Note, in the chart displayed on page 261, the text shows risk premiums based on the arithmetic average and the geometric average. Although not explicitly stated in the text, both calculations are based on total bond returns and not income returns. This is relevant because Ms. Ahern argues that one should use income returns vs. total returns to estimate the risk premium.

> Although the debate is inconclusive, this book uses the geometric means, not only for the previously given reasons but also because geometric means produce estimates of the equity risk premium that are more consistent with the predictions of economic theory.[14]

(See Table of Citations at end of my testimony)

Analysis of Equity Investments: Valuation is written by the Association for Investment Management and Research and is produced as a study guide for the Chartered Financial Analyst (CFA) program.

In an article titled Equity Risk Premiums (ERP): Determinants, Estimations and Implications – The 2016 Edition (p. 33) by Dr. Aswath Damodaran, Dr. Damodaran supports the use of a geometric mean risk premium:

> The final sticking point when it comes to estimating historical premiums relates to how the average returns on stocks, treasury bonds and bills are computed. The arithmetic average return measures the simple mean of the series of annual returns, whereas the geometric average looks at the compounded return[60]. Many estimation services and academics argue for the arithmetic average as the best estimate of the equity risk premium. In fact, if annual returns are uncorrelated over time, and our objective was to estimate the risk premium for the next year, the arithmetic average is the best and most unbiased estimate of the premium. There are, however, strong arguments that can be made for the use of geometric averages. First, empirical studies seem to indicate that returns on stocks are negatively correlated[61] over time. Consequently, the arithmetic average return is likely to [overstate] the premium.

Emphases added

(See Table of Citations at end of my testimony)

XVIII. TABLE OF CITATIONS

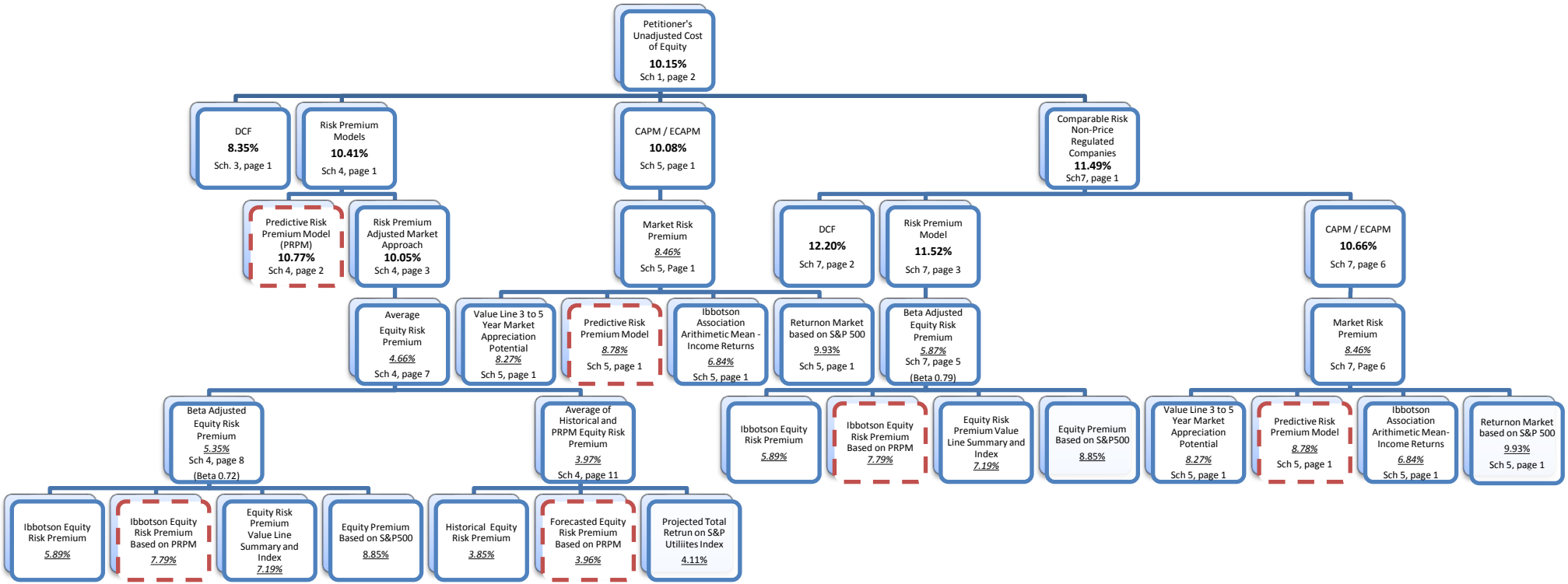
Page 44	Footnote 15: Robert D. Arnott and Peter L. Bernstein "What Risk Premium is Normal? Financial Analysts Journal, 58 (2) March/April 2002): 64-85.
	Footnote 16: Source Council of Economic Advisors, Economic Report of the President, 2002.
	Footnote 17: See for example, Vijay Kumar Chopra, "Why So Much Error in analysts' Earnings Forecasts?" Financial Analysts Journal, 54(6) November/December 1998): 35-42.
	Footnote 18: See Masakao N. Darrough and Thomas Russal, "A Positive Model of Earnings Forecasts: Top Down Versus Bottom Up." Journal of Business, 75(1) (January 2002) 127-52.
Page 45	Footnote 2: See Marc H. Goedhart, Brendan Russel and Zane Williams, "Prophets and profits?" McKinsey on Finance, Number 2, Autumn 2001.
	Footnote 1: See Marc H. Goedhart, Brendan Russel and Zane Williams, "Prophets and profits?" McKinsey on Finance, Number 2, Autumn 2001.
Page 49	Footnote 4 of the text cites to Ibbotson Associates, Stocks, Bonds, Bills and Inflation 1993 *Yearbook* (Chicago, 1993).
Page 50	Footnote 5 of the text cites A. Lo and C. MacKinlay, "Stock market Prices Do Not Follow Random Walks: Evidence from a Simple Specification Test," *Review of Financial Studies* (Spring 1988): 41-66; E. Fama and K. French, "Dividend Yields and Expected Stock Returns, "*Journal of Financial Economics* (October 1988): 3-25; J. Poterba and L. Summers, "Mean reversions in Stock Prices: Evidence and Implications, "*Journal of Financial Economics* (October 1988): 27-59.
Page 51	Footnote 14 of the text cites Mehra and Presscot (1985). The relatively large size of the historical U.S. equity premium relative to that predicted by theory, given estimates of investors' risk aversion, is known as the "equity premium puzzle" The geometric mean was also the choice of Dimson, Marsh, and Staunton (2000) in their authoritative survey of world equity markets.
	Footnote 60 The compounded return is computed by taking the value of the investment at the start of the period ($Value_{[0]}$) and the value at the end ($Value_{[N]}$), and then computing the following:
	Geometric Average = $(Value_{[N]} / Value_{[0]})^{1/n} - 1$

Footnote 61: In other words, good years are more likely to be followed by poor years, and vice versa. The evidence on negative serial correlation in stock market returns over time is extensive, and can be found in Fama and French (1988). While they find that one-year correlations are low, the five-year serial correlations are strongly negative for all size classes. Fama, E. F. and K.R. French. 1992, The Cross-Section of Expected Returns, Journal of Finance, Vol 47, 427-466.

Flow Chart

Illustrating Dylan D'Ascendis Cost of Equity Analyses

Before adjusting for Company Specific Risks and Flotation Costs



Estimated Costs of Equity are enlarged and **bolded**

Risk Premiums are in *italics and underlined*

Results based on Predictive Risk Premium Model (PRPM™) are outlined in red/dashed

Summary of
Petitioner's Cost of Equity Models

Remove S&P 500 (1)	
Remove PRPM (1)	
Remove CE Model (1)	

DCF	8.35%	
RPM	10.41%	
CAPM	10.06%	Petitioner's use of medians cause a 2-3 bp difference
Comparable Earnings	11.46%	Petitioner's use of medians cause a 2-3 bp difference
Mean	10.07%	
Median	10.24%	
Recommended	10.15%	

DCF 8.35%

Risk Premium 10.41%

PRPM	10.77%
Risk Premium Adjusted Market	10.05%

Risk Premium	4.66%		
Prospective Bond Yield	5.39%		
		Sch 4.8	Sch 4.11
Beta Adjusted		5.35%	
Historical and PRPM			3.97%
Ibbotson RP		5.89%	
Ibbotson based on PRPM		7.79%	
Value Line		7.19%	
S&P 500		8.85%	
beta	0.72		
Forecasted RP		5.35%	
Historical Risk Premium			3.85%
Forecasted RP based on PRPM			3.96%
Forecasted RP based on S&P Utilities Index			4.11%
Average			3.97%

Summary of
Petitioner's Cost of Equity Models (cont.)

CAPM 10.06%

Traditional CAPM	9.75%		
Empirical CAPM	10.37%		
Average Risk Premium		8.46%	
Risk Free Rate		3.75%	
Beta		0.71	
			Sch 5
MRP VL Summary & Index			8.27%
Ibbotson 1926 - 2014			6.84%
Ibbotson PRPM			8.78%
S&P 500			9.93%
Average			8.46%

Comparable Earnings 11.46%

DCF 12.20%

RP 11.52%

Risk Premium		5.87%	
Adjusted Bond Yield		5.65%	
			Sch 7.5
Ibbotson RP			5.89%
Ibbotson based on PRPM			7.79%
Value Line			7.19%
S&P 500			8.85%
beta		0.79	
Forecasted RP			5.87%

CAPM 10.65%

Traditional CAPM	10.43%		
Empirical CAPM	10.87%		
Average Risk Premium		8.46%	
Risk Free Rate		3.75%	
Beta		0.79	
			Sch 5
MRP VL Summary & Index			8.27%
Ibbotson 1926 - 2014			6.84%
Ibbotson PRPM			8.78%
S&P 500			9.93%
Average			8.46%

Summary of
Petitioner's Cost of Equity Models

Remove S&P 500 (1)	1
Remove PRPM (1)	
Remove CE Model (1)	

DCF	8.35%	
RPM	10.33%	
CAPM	9.69%	Petitioner's use of medians cause a 2-3 bp difference
Comparable Earnings	11.46%	Petitioner's use of medians cause a 2-3 bp difference
Mean	9.96%	
Median	10.01%	
Recommended	9.98%	

DCF 8.35%

Risk Premium 10.33%

PRPM	10.77%
Risk Premium Adjusted Market	9.88%

Risk Premium	4.49%		
Prospective Bond Yield	5.39%		
		Sch 4.8	Sch 4.11
Beta Adjusted		5.01%	
Historical and PRPM			3.97%
Ibbotson RP		5.89%	
Ibbotson based on PRPM		7.79%	
Value Line		7.19%	
S&P 500		na	
beta	0.72		
Forecasted RP		5.01%	
Historical Risk Premium			3.85%
Forecasted RP based on PRPM			3.96%
Forecasted RP based on S&P Utilities Index			4.11%
Average			3.97%

Summary of
Petitioner's Cost of Equity Models (cont.)

CAPM	9.69%				
Traditional CAPM		9.40%			
Empirical CAPM		9.98%			
Average Risk Premium			7.96%		
Risk Free Rate			3.75%		
Beta			0.71		
				Sch 5	
	MRP VL Summary & Index			8.27%	
	Ibbotson 1926 - 2014			6.84%	
	Ibbotson PRPM			8.78%	
	S&P 500			na	
	Average			7.96%	
Comparable Earnings	11.20%				
	DCF			12.20%	
	RP			11.15%	
		Risk Premium		5.50%	
		Adjusted Bond Yield		5.65%	
					Sch 7.5
		Ibbotson RP			5.89%
		Ibbotson based on PRPM			7.79%
		Value Line			7.19%
		S&P 500			na
		beta		0.79	
		Forecasted RP			5.50%
	CAPM			10.25%	
		Traditional CAPM		10.04%	
		Empirical CAPM		10.46%	
		Average Risk Premium			7.96%
		Risk Free Rate			3.75%
		Beta			0.79
					Sch 5
		MRP VL Summary & Index			8.27%
		Ibbotson 1926 - 2014			6.84%
		Ibbotson PRPM			8.78%
		S&P 500			na
		Average			7.96%

Summary of
Petitioner's Cost of Equity Models

Remove S&P 500 (1)	
Remove PRPM (1)	1
Remove CE Model (1)	

DCF	8.35%	
RPM	10.01%	
CAPM	9.98%	Petitioner's use of medians cause a 2-3 bp difference
Comparable Earnings	11.46%	Petitioner's use of medians cause a 2-3 bp difference
Mean	9.95%	
Median	10.00%	
Recommended	9.97%	

DCF 8.35%

Risk Premium 10.01%

PRPM	na
Risk Premium Adjusted Market	10.01%

Risk Premium	4.62%		
Prospective Bond Yield	5.39%		
		Sch 4.8	Sch 4.11
Beta Adjusted		5.26%	
Historical and PRPM			3.98%
Ibbotson RP		5.89%	
Ibbotson based on PRPM		na	
Value Line		7.19%	
S&P 500		8.85%	
beta	0.72		
Forecasted RP		5.26%	
Historical Risk Premium			3.85%
Forecasted RP based on PRPM			na
Forecasted RP based on S&P Utilities Index			4.11%
Average			3.98%

Summary of
Petitioner's Cost of Equity Models (cont.)

CAPM 9.98%

Traditional CAPM	9.68%			
Empirical CAPM	10.28%			
Average Risk Premium		8.35%		
Risk Free Rate		3.75%		
Beta		0.71		
			Sch 5	
MRP VL Summary & Index			8.27%	
Ibbotson 1926 - 2014			6.84%	
Ibbotson PRPM			na	
S&P 500			9.93%	
Average			8.35%	

Comparable Earnings 11.40%

DCF 12.20%

RP 11.42%

Risk Premium	5.77%		
Adjusted Bond Yield	5.65%		
		Sch 7.5	
Ibbotson RP		5.89%	
Ibbotson based on PRPM		na	
Value Line		7.19%	
S&P 500		8.85%	
beta	0.79		
Forecasted RP		5.77%	

CAPM 10.56%

Traditional CAPM	10.34%		
Empirical CAPM	10.78%		
Average Risk Premium		8.35%	
Risk Free Rate		3.75%	
Beta		0.79	
			Sch 5
MRP VL Summary & Index			8.27%
Ibbotson 1926 - 2014			6.84%
Ibbotson PRPM			na
S&P 500			9.93%
Average			8.35%

Summary of
Petitioner's Cost of Equity Models

Remove S&P 500 (1)	
Remove PRPM (1)	
Remove CE Model (1)	1

DCF	8.35%	
RPM	10.41%	
CAPM	10.06%	Petitioner's use of medians cause a 2-3 bp difference
Comparable Earnings	na	Petitioner's use of medians cause a 2-3 bp difference
Mean	9.61%	
Median	10.06%	
Recommended	9.83%	

DCF 8.35%

Risk Premium 10.41%

PRPM	10.77%
Risk Premium Adjusted Market	10.05%

Risk Premium	4.66%		
Prospective Bond Yield	5.39%		
		Sch 4.8	Sch 4.11
Beta Adjusted		5.35%	
Historical and PRPM			3.97%
Ibbotson RP		5.89%	
Ibbotson based on PRPM		7.79%	
Value Line		7.19%	
S&P 500		8.85%	
beta	0.72		
Forecasted RP		5.35%	
Historical Risk Premium			3.85%
Forecasted RP based on PRPM			3.96%
Forecasted RP based on S&P Utilities Index			4.11%
Average			3.97%

Summary of
Petitioner's Cost of Equity Models (cont.)

CAPM	10.06%				
Traditional CAPM		9.75%			
Empirical CAPM		10.37%			
Average Risk Premium			8.46%		
Risk Free Rate			3.75%		
Beta			0.71		
				Sch 5	
	MRP VL Summary & Index			8.27%	
	Ibbotson 1926 - 2014			6.84%	
	Ibbotson PRPM			8.78%	
	S&P 500			9.93%	
	Average			8.46%	
Comparable Earnings	11.46%				
	DCF			12.20%	
	RP			11.52%	
		Risk Premium		5.87%	
		Adjusted Bond Yield		5.65%	
					Sch 7.5
		Ibbotson RP			5.89%
		Ibbotson based on PRPM			7.79%
		Value Line			7.19%
		S&P 500			8.85%
		beta		0.79	
		Forecasted RP			5.87%
	CAPM			10.65%	
		Traditional CAPM		10.43%	
		Empirical CAPM		10.87%	
		Average Risk Premium			8.46%
		Risk Free Rate			3.75%
		Beta			0.79
					Sch 5
		MRP VL Summary & Index			8.27%
		Ibbotson 1926 - 2014			6.84%
		Ibbotson PRPM			8.78%
		S&P 500			9.93%
		Average			8.46%

Summary of
Petitioner's Cost of Equity Models

Remove S&P 500 (1)	1
Remove PRPM (1)	1
Remove CE Model (1)	1

DCF	8.35%	
RPM	9.73%	
CAPM	9.39%	Petitioner's use of medians cause a 2-3 bp difference
Comparable Earnings	na	Petitioner's use of medians cause a 2-3 bp difference
Mean	9.16%	
Median	9.39%	
Recommended	9.27%	

DCF 8.35%

Risk Premium 9.73%

PRPM	na
Risk Premium Adjusted Market	9.73%

Risk Premium	4.34%		
Prospective Bond Yield	5.39%		
		Sch 4.8	Sch 4.11
Beta Adjusted		4.71%	
Historical and PRPM			3.98%
Ibbotson RP		5.89%	
Ibbotson based on PRPM		na	
Value Line		7.19%	
S&P 500		na	
beta	0.72		
Forecasted RP		4.71%	
Historical Risk Premium			3.85%
Forecasted RP based on PRPM			na
Forecasted RP based on S&P Utilities Index			4.11%
Average			3.98%

Summary of
Petitioner's Cost of Equity Models (cont.)

CAPM	9.39%				
Traditional CAPM		9.11%			
Empirical CAPM		9.66%			
Average Risk Premium			7.56%		
Risk Free Rate			3.75%		
Beta			0.71		
				Sch 5	
	MRP VL Summary & Index			8.27%	
	Ibbotson 1926 - 2014			6.84%	
	Ibbotson PRPM			na	
	S&P 500			na	
	Average			7.56%	
Comparable Earnings	10.98%				
	DCF			12.20%	
	RP			10.82%	
		Risk Premium		5.17%	
		Adjusted Bond Yield		5.65%	
					Sch 7.5
		Ibbotson RP			5.89%
		Ibbotson based on PRPM			na
		Value Line			7.19%
		S&P 500			na
		beta		0.79	
		Forecasted RP			5.17%
	CAPM			9.92%	
		Traditional CAPM		9.72%	
		Empirical CAPM		10.12%	
		Average Risk Premium			7.56%
		Risk Free Rate			3.75%
		Beta			0.79
					Sch 5
		MRP VL Summary & Index			8.27%
		Ibbotson 1926 - 2014			6.84%
		Ibbotson PRPM			na
		S&P 500			na
		Average			7.56%

Consumer Price Index Data from 1913 to 2016

Consumer Price Index (CPI-U) data is provided by the U.S. Department of Labor Bureau of Labor Statistic. This monthly pipelined data is the gas powering the always-current Inflation Calculator. The following CPI data was last updated by the government agency on May 17, 2016 and covers up through April 2016. The next inflation update for May has a scheduled release date of June 16, 2016.

What is the CPI? Before jumping into the data, if you want to learn about the Consumer Price Index and how it is used to calculate inflation, read this CPI article.

All Urban Consumers – (CPI-U) 1913-2016*

													Annual	Percent Change	
Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Avg	Dec-Dec	Avg-Avg
1913	9.8	9.8	9.8	9.8	9.7	9.8	9.9	9.9	10.0	10.0	10.1	10.0	9.9	--	--
1914	10.0	9.9	9.9	9.8	9.9	9.9	10.0	10.2	10.2	10.1	10.2	10.1	10.0	1.0	1.0
1915	10.1	10.0	9.9	10.0	10.1	10.1	10.1	10.1	10.1	10.2	10.3	10.3	10.1	2.0	1.0
1916	10.4	10.4	10.5	10.6	10.7	10.8	10.8	10.9	11.1	11.3	11.5	11.6	10.9	12.6	7.9
1917	11.7	12.0	12.0	12.6	12.8	13.0	12.8	13.0	13.3	13.5	13.5	13.7	12.8	18.1	17.4
1918	14.0	14.1	14.0	14.2	14.5	14.7	15.1	15.4	15.7	16.0	16.3	16.5	15.1	20.4	18.0
1919	16.5	16.2	16.4	16.7	16.9	16.9	17.4	17.7	17.8	18.1	18.5	18.9	17.3	14.5	14.6
1920	19.3	19.5	19.7	20.3	20.6	20.9	20.8	20.3	20.0	19.9	19.8	19.4	20.0	2.6	15.6
1921	19.0	18.4	18.3	18.1	17.7	17.6	17.7	17.7	17.5	17.5	17.4	17.3	17.9	-10.8	-10.5
1922	16.9	16.9	16.7	16.7	16.7	16.7	16.8	16.6	16.6	16.7	16.8	16.9	16.8	-2.3	-6.1
1923	16.8	16.8	16.8	16.9	16.9	17.0	17.2	17.1	17.2	17.3	17.3	17.3	17.1	2.4	1.8
1924	17.3	17.2	17.1	17.0	17.0	17.0	17.1	17.0	17.1	17.2	17.2	17.3	17.1	0.0	0.0
1925	17.3	17.2	17.3	17.2	17.3	17.5	17.7	17.7	17.7	17.7	18.0	17.9	17.5	3.5	2.3
1926	17.9	17.9	17.8	17.9	17.8	17.7	17.5	17.4	17.5	17.6	17.7	17.7	17.7	-1.1	1.1
1927	17.5	17.4	17.3	17.3	17.4	17.6	17.3	17.2	17.3	17.4	17.3	17.3	17.4	-2.3	-1.7
1928	17.3	17.1	17.1	17.1	17.2	17.1	17.1	17.1	17.3	17.2	17.2	17.1	17.1	-1.2	-1.7
1929	17.1	17.1	17.0	16.9	17.0	17.1	17.3	17.3	17.3	17.3	17.3	17.2	17.1	0.6	0.0
1930	17.1	17.0	16.9	17.0	16.9	16.8	16.6	16.5	16.6	16.5	16.4	16.1	16.7	-6.4	-2.3
1931	15.9	15.7	15.6	15.5	15.3	15.1	15.1	15.1	15.0	14.9	14.7	14.6	15.2	-9.3	-9.0
1932	14.3	14.1	14.0	13.9	13.7	13.6	13.6	13.5	13.4	13.3	13.2	13.1	13.7	-10.3	-9.9
1933	12.9	12.7	12.6	12.6	12.6	12.7	13.1	13.2	13.2	13.2	13.2	13.2	13.0	0.8	-5.1
1934	13.2	13.3	13.3	13.3	13.3	13.4	13.4	13.4	13.6	13.5	13.5	13.4	13.4	1.5	3.1

1935	13.6	13.7	13.7	13.8	13.8	13.7	13.7	13.7	13.7	13.7	13.8	13.8	13.7	3.0	2.2
1936	13.8	13.8	13.7	13.7	13.7	13.8	13.9	14.0	14.0	14.0	14.0	14.0	13.9	1.4	1.5
1937	14.1	14.1	14.2	14.3	14.4	14.4	14.5	14.5	14.6	14.6	14.5	14.4	14.4	2.9	3.6
1938	14.2	14.1	14.1	14.2	14.1	14.1	14.1	14.1	14.1	14.0	14.0	14.0	14.1	-2.8	-2.1
1939	14.0	13.9	13.9	13.8	13.8	13.8	13.8	13.8	14.1	14.0	14.0	14.0	13.9	0.0	-1.4
1940	13.9	14.0	14.0	14.0	14.0	14.1	14.0	14.0	14.0	14.0	14.0	14.1	14.0	0.7	0.7
1941	14.1	14.1	14.2	14.3	14.4	14.7	14.7	14.9	15.1	15.3	15.4	15.5	14.7	9.9	5.0
1942	15.7	15.8	16.0	16.1	16.3	16.3	16.4	16.5	16.5	16.7	16.8	16.9	16.3	9.0	10.9
1943	16.9	16.9	17.2	17.4	17.5	17.5	17.4	17.3	17.4	17.4	17.4	17.4	17.3	3.0	6.1
1944	17.4	17.4	17.4	17.5	17.5	17.6	17.7	17.7	17.7	17.7	17.7	17.8	17.6	2.3	1.7
1945	17.8	17.8	17.8	17.8	17.9	18.1	18.1	18.1	18.1	18.1	18.1	18.2	18.0	2.2	2.3
1946	18.2	18.1	18.3	18.4	18.5	18.7	19.8	20.2	20.4	20.8	21.3	21.5	19.5	18.1	8.3
1947	21.5	21.5	21.9	21.9	21.9	22.0	22.2	22.5	23.0	23.0	23.1	23.4	22.3	8.8	14.4
1948	23.7	23.5	23.4	23.8	23.9	24.1	24.4	24.5	24.5	24.4	24.2	24.1	24.1	3.0	8.1
1949	24.0	23.8	23.8	23.9	23.8	23.9	23.7	23.8	23.9	23.7	23.8	23.6	23.8	-2.1	-1.2
1950	23.5	23.5	23.6	23.6	23.7	23.8	24.1	24.3	24.4	24.6	24.7	25.0	24.1	5.9	1.3
1951	25.4	25.7	25.8	25.8	25.9	25.9	25.9	25.9	26.1	26.2	26.4	26.5	26.0	6.0	7.9
1952	26.5	26.3	26.3	26.4	26.4	26.5	26.7	26.7	26.7	26.7	26.7	26.7	26.5	0.8	1.9
1953	26.6	26.5	26.6	26.6	26.7	26.8	26.8	26.9	26.9	27.0	26.9	26.9	26.7	0.7	0.8
1954	26.9	26.9	26.9	26.8	26.9	26.9	26.9	26.9	26.8	26.8	26.8	26.7	26.9	-0.7	0.7
1955	26.7	26.7	26.7	26.7	26.7	26.7	26.8	26.8	26.9	26.9	26.9	26.8	26.8	0.4	-0.4
1956	26.8	26.8	26.8	26.9	27.0	27.2	27.4	27.3	27.4	27.5	27.5	27.6	27.2	3.0	1.5
1957	27.6	27.7	27.8	27.9	28.0	28.1	28.3	28.3	28.3	28.3	28.4	28.4	28.1	2.9	3.3
1958	28.6	28.6	28.8	28.9	28.9	28.9	29.0	28.9	28.9	28.9	29.0	28.9	28.9	1.8	2.8
1959	29.0	28.9	28.9	29.0	29.0	29.1	29.2	29.2	29.3	29.4	29.4	29.4	29.1	1.7	0.7
1960	29.3	29.4	29.4	29.5	29.5	29.6	29.6	29.6	29.6	29.8	29.8	29.8	29.6	1.4	1.7
1961	29.8	29.8	29.8	29.8	29.8	29.8	30.0	29.9	30.0	30.0	30.0	30.0	29.9	0.7	1.0
1962	30.0	30.1	30.1	30.2	30.2	30.2	30.3	30.3	30.4	30.4	30.4	30.4	30.2	1.3	1.0
1963	30.4	30.4	30.5	30.5	30.5	30.6	30.7	30.7	30.7	30.8	30.8	30.9	30.6	1.6	1.3
1964	30.9	30.9	30.9	30.9	30.9	31.0	31.1	31.0	31.1	31.1	31.2	31.2	31.0	1.0	1.3
1965	31.2	31.2	31.3	31.4	31.4	31.6	31.6	31.6	31.6	31.7	31.7	31.8	31.5	1.9	1.6
1966	31.8	32.0	32.1	32.3	32.3	32.4	32.5	32.7	32.7	32.9	32.9	32.9	32.4	3.5	2.9
1967	32.9	32.9	33.0	33.1	33.2	33.3	33.4	33.5	33.6	33.7	33.8	33.9	33.4	3.0	3.1
1968	34.1	34.2	34.3	34.4	34.5	34.7	34.9	35.0	35.1	35.3	35.4	35.5	34.8	4.7	4.2
1969	35.6	35.8	36.1	36.3	36.4	36.6	36.8	37.0	37.1	37.3	37.5	37.7	36.7	6.2	5.5
1970	37.8	38.0	38.2	38.5	38.6	38.8	39.0	39.0	39.2	39.4	39.6	39.8	38.8	5.6	5.7
1971	39.8	39.9	40.0	40.1	40.3	40.6	40.7	40.8	40.8	40.9	40.9	41.1	40.5	3.3	4.4
1972	41.1	41.3	41.4	41.5	41.6	41.7	41.9	42.0	42.1	42.3	42.4	42.5	41.8	3.4	3.2
1973	42.6	42.9	43.3	43.6	43.9	44.2	44.3	45.1	45.2	45.6	45.9	46.2	44.4	8.7	6.2

1974	46.6	47.2	47.8	48.0	48.6	49.0	49.4	50.0	50.6	51.1	51.5	51.9	49.3	12.3	11.0
1975	52.1	52.5	52.7	52.9	53.2	53.6	54.2	54.3	54.6	54.9	55.3	55.5	53.8	6.9	9.1
1976	55.6	55.8	55.9	56.1	56.5	56.8	57.1	57.4	57.6	57.9	58.0	58.2	56.9	4.9	5.8
1977	58.5	59.1	59.5	60.0	60.3	60.7	61.0	61.2	61.4	61.6	61.9	62.1	60.6	6.7	6.5
1978	62.5	62.9	63.4	63.9	64.5	65.2	65.7	66.0	66.5	67.1	67.4	67.7	65.2	9.0	7.6
1979	68.3	69.1	69.8	70.6	71.5	72.3	73.1	73.8	74.6	75.2	75.9	76.7	72.6	13.3	11.3
1980	77.8	78.9	80.1	81.0	81.8	82.7	82.7	83.3	84.0	84.8	85.5	86.3	82.4	12.5	13.5
1981	87.0	87.9	88.5	89.1	89.8	90.6	91.6	92.3	93.2	93.4	93.7	94.0	90.9	8.9	10.3
1982	94.3	94.6	94.5	94.9	95.8	97.0	97.5	97.7	97.9	98.2	98.0	97.6	96.5	3.8	6.2
1983	97.8	97.9	97.9	98.6	99.2	99.5	99.9	100.2	100.7	101.0	101.2	101.3	99.6	3.8	3.2
1984	101.9	102.4	102.6	103.1	103.4	103.7	104.1	104.5	105.0	105.3	105.3	105.3	103.9	3.9	4.3
1985	105.5	106.0	106.4	106.9	107.3	107.6	107.8	108.0	108.3	108.7	109.0	109.3	107.6	3.8	3.6
1986	109.6	109.3	108.8	108.6	108.9	109.5	109.5	109.7	110.2	110.3	110.4	110.5	109.6	1.1	1.9
1987	111.2	111.6	112.1	112.7	113.1	113.5	113.8	114.4	115.0	115.3	115.4	115.4	113.6	4.4	3.6
1988	115.7	116.0	116.5	117.1	117.5	118.0	118.5	119.0	119.8	120.2	120.3	120.5	118.3	4.4	4.1
1989	121.1	121.6	122.3	123.1	123.8	124.1	124.4	124.6	125.0	125.6	125.9	126.1	124.0	4.6	4.8
1990	127.4	128.0	128.7	128.9	129.2	129.9	130.4	131.6	132.7	133.5	133.8	133.8	130.7	6.1	5.4
1991	134.6	134.8	135.0	135.2	135.6	136.0	136.2	136.6	137.2	137.4	137.8	137.9	136.2	3.1	4.2
1992	138.1	138.6	139.3	139.5	139.7	140.2	140.5	140.9	141.3	141.8	142.0	141.9	140.3	2.9	3.0
1993	142.6	143.1	143.6	144.0	144.2	144.4	144.4	144.8	145.1	145.7	145.8	145.8	144.5	2.7	3.0
1994	146.2	146.7	147.2	147.4	147.5	148.0	148.4	149.0	149.4	149.5	149.7	149.7	148.2	2.7	2.6
1995	150.3	150.9	151.4	151.9	152.2	152.5	152.5	152.9	153.2	153.7	153.6	153.5	152.4	2.5	2.8
1996	154.4	154.9	155.7	156.3	156.6	156.7	157.0	157.3	157.8	158.3	158.6	158.6	156.9	3.3	3.0
1997	159.1	159.6	160.0	160.2	160.1	160.3	160.5	160.8	161.2	161.6	161.5	161.3	160.5	1.7	2.3
1998	161.6	161.9	162.2	162.5	162.8	163.0	163.2	163.4	163.6	164.0	164.0	163.9	163.0	1.6	1.6
1999	164.3	164.5	165.0	166.2	166.2	166.2	166.7	167.1	167.9	168.2	168.3	168.3	166.6	2.7	2.2
2000	168.8	169.8	171.2	171.3	171.5	172.4	172.8	172.8	173.7	174.0	174.1	174.0	172.2	3.4	3.4
2001	175.1	175.8	176.2	176.9	177.7	178.0	177.5	177.5	178.3	177.7	177.4	176.7	177.1	1.6	2.8
2002	177.1	177.8	178.8	179.8	179.8	179.9	180.1	180.7	181.0	181.3	181.3	180.9	179.9	2.4	1.6
2003	181.7	183.1	184.2	183.8	183.5	183.7	183.9	184.6	185.2	185.0	184.5	184.3	184.0	1.9	2.3
2004	185.2	186.2	187.4	188.0	189.1	189.7	189.4	189.5	189.9	190.9	191.0	190.3	188.9	3.3	2.7
2005	190.7	191.8	193.3	194.6	194.4	194.5	195.4	196.4	198.8	199.2	197.6	196.8	195.3	3.4	3.4
2006	198.3	198.7	199.8	201.5	202.5	202.9	203.5	203.9	202.9	201.8	201.5	201.8	201.6	2.5	3.2
2007	202.4	203.5	205.4	206.7	207.9	208.4	208.3	207.9	208.5	208.9	210.2	210.0	207.3	4.1	2.8
2008	211.1	211.7	213.5	214.8	216.6	218.8	219.964	219.086	218.783	216.573	212.425	210.228	215.303	0.1	3.8
2009	211.143	212.193	212.709	213.240	213.856	215.693	215.351	215.834	215.969	216.177	216.330	215.949	214.537	2.7	-0.4
2010	216.687	216.741	217.631	218.009	218.178	217.965	218.011	218.312	218.439	218.711	218.803	219.179	218.056	1.5	1.6
2011	220.223	221.309	223.467	224.906	225.964	225.722	225.922	226.545	226.889	226.421	226.230	225.672	224.939	3.0	3.2
2012	226.655	227.663	229.392	230.085	229.815	229.478	229.104	230.379	231.407	231.317	230.221	229.601	229.594	1.7	2.1

2013	230.280	232.166	232.773	232.531	232.945	233.504	233.596	233.877	234.149	233.546	233.069	233.049	232.957	1.5	1.5
2014	233.916	234.781	236.293	237.072	237.900	238.343	238.250	237.852	238.031	237.433	236.151	234.812	236.736	0.8	1.6
2015	233.707	234.722	236.119	236.599	237.805	238.638	238.654	238.316	237.945	237.838	237.336	236.525	237.017	0.7	0.1
2016	236.916	237.111	238.132	239.261											

*Base year is chained; 1982-1984 = 100. This table of CPI data is based upon a 1982 base of 100. What does this mean? A CPI of 195.3, as an example from 2005, indicates 95.3% inflation since 1982.

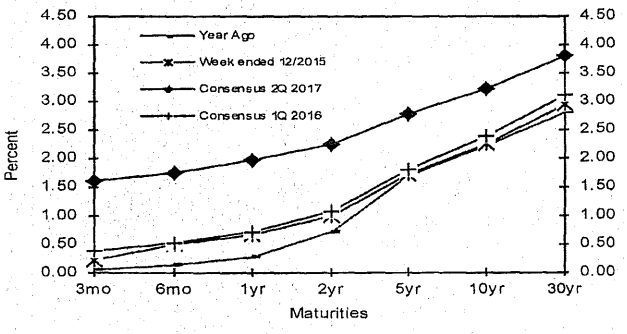
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

	History: Average For Week Ending				History: Average For Month			Latest Q*	Consensus Forecasts-Quarterly Avg.					
Interest Rates	Dec. 25	Dec. 18	Dec. 11	Dec. 4	Nov.	Oct.	Sep.	4Q 2015	1Q 2016	2Q 2016	3Q 2016	4Q 2016	1Q 2017	2Q 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					
Key Assumptions	1Q 2014	2Q 2014	3Q 2014	4Q 2014	1Q 2015	2Q 2015	3Q 2015	*4Q** 2015	**1Q 2016**	**2Q 2016**	**3Q 2016**	**4Q 2016**	**1Q 2017**	**2Q 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). *[1]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.*

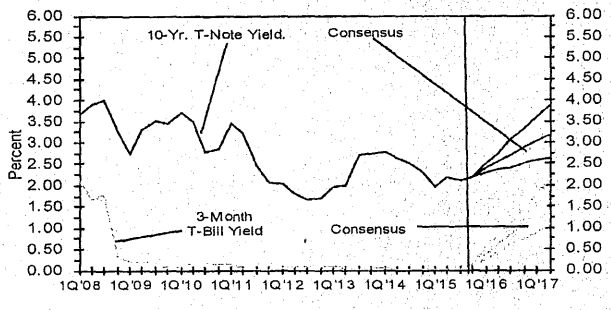
U.S. Treasury Yield Curve

Week ended December 25, 2015 and Year Ago vs. 1Q 2016 and 2Q 2017 Consensus Forecasts



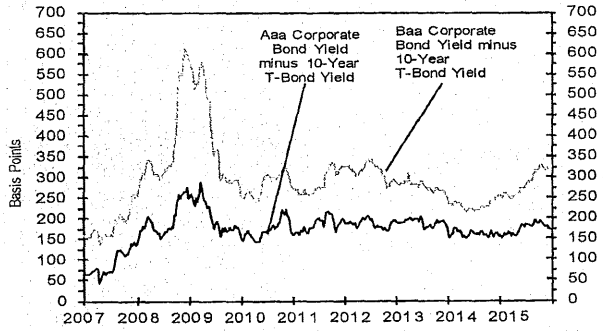
U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield

(Quarterly Average) Forecast



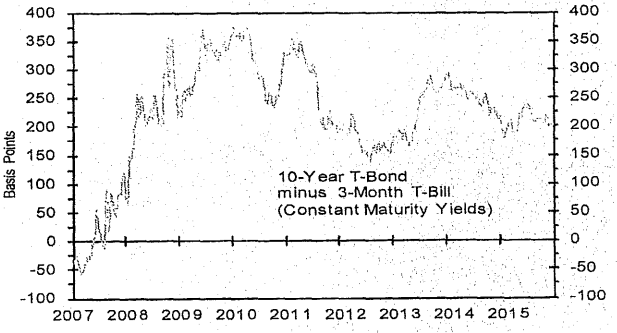
Corporate Bond Spreads

As of week ended December 25, 2015



U.S. Treasury Yield Curve

As of week ended December 25, 2015



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

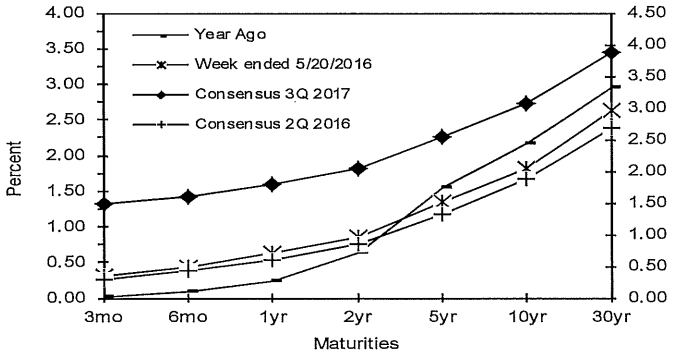
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

	History				History				Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Qtr	2Q	3Q	4Q	1Q	2Q	3Q
Interest Rates	May 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).

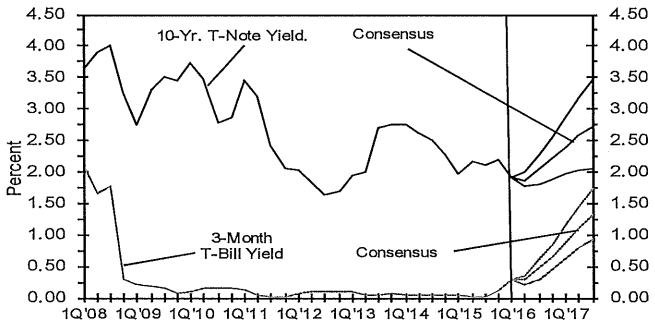
U.S. Treasury Yield Curve

Week ended May 20, 2016 and Year Ago vs.
2Q 2016 and 3Q 2017 Consensus Forecasts



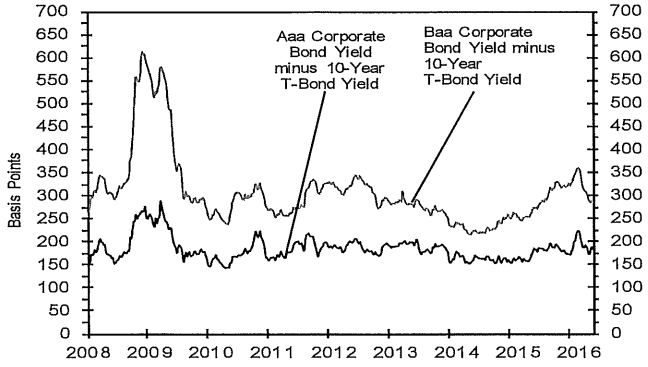
U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield

(Quarterly Average)



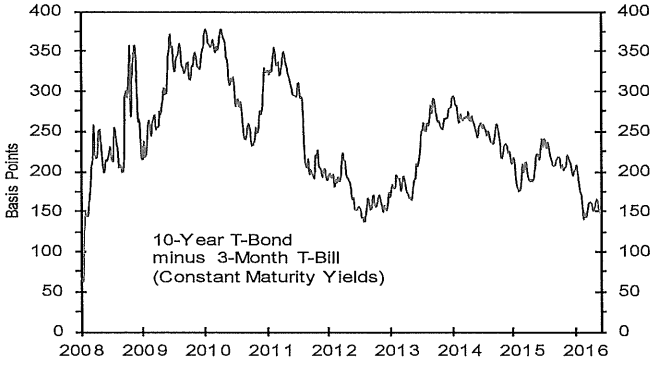
Corporate Bond Spreads

As of week ended May 20, 2016



U.S. Treasury Yield Curve

As of week May 20, 2016



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

Duke CFO magazine Global Business Outlook survey - U.S. - First Quarter, 2016

10. On February 15, 2016 the annual yield on 10-yr treasury bonds was 1.7%. Please complete the following:

	Mean	SD	95% CI	Median	Minimum	Maximum	Total
Over the next 10 years, I expect the average annual S&P 500 return will be: There is a 1-in-10 chance it will be less than:	1.90	8.34	1.21 - 2.60	2	-50	125	558
Over the next 10 years, I expect the average annual S&P 500 return will be: Expected return:	6.32	7.95	5.67 - 6.98	5	-20	100	568
Over the next 10 years, I expect the average annual S&P 500 return will be: There is a 1-in-10 chance it will be greater than:	10.04	13.28	8.94 - 11.15	8	-5	164	557
Over the next year, I expect the average annual S&P 500 return will be: There is a 1-in-10 chance it will be less than:	-3.79	9.73	-4.60 - -2.98	0	-50	50	557
Over the next year, I expect the average annual S&P 500 return will be: Expected return:	3.13	6.04	2.64 - 3.63	3	-30	90	566
Over the next year, I expect the average annual S&P 500 return will be: There is a 1-in-10 chance it will be greater than:	7.15	5.56	6.69 - 7.61	6	-5	50	554

FEDERAL RESERVE BANK OF PHILADELPHIA

First Quarter 2016 Survey of Professional Forecasters

Release Date: February 12, 2016

Forecasters Predict Lower Growth over the Next Three Years

The economy looks weaker now than it did three months ago, according to 40 forecasters surveyed by the Federal Reserve Bank of Philadelphia. The forecasters predict real GDP will grow at an annual rate of 2.0 percent this quarter and 2.5 percent next quarter. On an annual-average over annual-average basis, real GDP will grow 2.1 percent in 2016, down 0.5 percentage point from the previous estimate. The forecasters predict real GDP will grow 2.4 percent in 2017 and 2.7 percent in 2018, both down 0.1 percentage point from the estimates of three months ago. For 2019, real GDP is estimated to grow at 2.3 percent.

A slightly positive outlook for the labor market accompanies the outlook for weaker output growth. The forecasters predict that the unemployment rate will average 4.8 percent in 2016, before falling to 4.6 percent in 2017, 4.6 percent in 2018, and 4.7 percent in 2019. The projections for 2017 and 2018 are slightly below those of the last survey.

The panelists also predict a small improvement on the employment front. They have revised upward their estimates for job gains in 2016. The forecasters see nonfarm payroll employment growing at a rate of 195,000 jobs per month this quarter, 183,200 jobs per month next quarter, 195,900 jobs per month in the third quarter of 2016, and 152,600 jobs per month in the fourth quarter of 2016. The forecasters' projections for the annual-average level of nonfarm payroll employment suggest job gains at a monthly rate of 204,300 in 2016 and 165,000 in 2017, as the table below shows. (These annual-average estimates are computed as the year-to-year change in the annual-average level of nonfarm payroll employment, converted to a monthly rate.)

Median Forecasts for Selected Variables in the Current and Previous Surveys

	Real GDP (%)		Unemployment Rate (%)		Payrolls (000s/month)	
	Previous	New	Previous	New	Previous	New
Quarterly data:						
2016:Q1	2.5	2.0	4.9	4.9	188.2	195.0
2016:Q2	2.6	2.5	4.8	4.8	193.5	183.2
2016:Q3	2.9	2.3	4.8	4.7	192.0	195.9
2016:Q4	2.4	2.5	4.7	4.6	181.2	152.6
2017:Q1	N.A.	2.4	N.A.	4.6	N.A.	177.1
Annual data (projections are based on annual-average levels):						
2016	2.6	2.1	4.8	4.8	197.0	204.3
2017	2.5	2.4	4.7	4.6	N.A.	165.0
2018	2.8	2.7	4.7	4.6	N.A.	N.A.
2019	N.A.	2.3	N.A.	4.7	N.A.	N.A.

The charts below provide some insight into the degree of uncertainty the forecasters have about their projections for the rate of growth in the annual-average level of real GDP. Each chart (except the one for 2019) presents the forecasters' previous and current estimates of the probability that growth will fall into each of 11 ranges. The charts show the forecasters have revised upward their estimates of the probability that real GDP growth will fall below 2.0 percent in 2016, 2017, and 2018.

- Mean Probabilities for Real GDP Growth in 2016 (chart)
- Mean Probabilities for Real GDP Growth in 2017 (chart)
- Mean Probabilities for Real GDP Growth in 2018 (chart)
- Mean Probabilities for Real GDP Growth in 2019 (chart)

The forecasters' density projections for unemployment, shown below, shed light on uncertainty about the labor market over the next four years. Each chart presents the forecasters' current estimates of the probability that unemployment will fall into each of 10 ranges. The charts show the panelists are raising their density estimates over the next three years at the lower levels of unemployment outcomes.

- Mean Probabilities for Unemployment Rate in 2016 (chart)
- Mean Probabilities for Unemployment Rate in 2017 (chart)
- Mean Probabilities for Unemployment Rate in 2018 (chart)
- Mean Probabilities for Unemployment Rate in 2019 (chart)

First Quarter 2015 Survey of Professional Forecasters - Philadelphia Fed

Forecasters Predict Lower Headline Inflation over the Next Two Years

The forecasters expect lower headline CPI inflation in 2016 and 2017 than they predicted three months ago. Measured on a fourth-quarter over fourth-quarter basis, headline CPI inflation is expected to average 1.5 percent in 2016 and 2.2 percent in 2017, down from 2.0 percent and 2.3 percent, respectively, in the last survey. The forecasters have also revised downward their projections for headline PCE inflation in 2016 to 1.3 percent, down from 1.8 percent in the survey of three months ago.

Over the next 10 years, 2016 to 2025, the forecasters expect headline CPI inflation to average 2.12 percent at an annual rate. The corresponding estimate for 10-year annual-average PCE inflation is 1.97 percent.

Median Short-Run and Long-Run Projections for Inflation (Annualized Percentage Points)

	Headline CPI		Core CPI		Headline PCE		Core PCE	
	Previous	Current	Previous	Current	Previous	Current	Previous	Current
Quarterly								
2016:Q1	1.8	0.4	1.9	1.8	1.6	0.4	1.5	1.4
2016:Q2	2.1	1.6	2.0	2.0	1.8	1.6	1.6	1.5
2016:Q3	2.1	2.1	2.0	2.0	1.8	1.8	1.7	1.7
2016:Q4	2.2	2.1	2.0	2.0	1.9	1.8	1.7	1.7
2017:Q1	N.A.	2.1	N.A.	2.0	N.A.	1.8	N.A.	1.7
Q4/Q4 Annual Averages								
2016	2.0	1.5	2.0	2.0	1.8	1.3	1.6	1.6
2017	2.3	2.2	2.1	2.1	1.9	1.9	1.8	1.8
2018	N.A.	2.3	N.A.	2.1	N.A.	2.0	N.A.	1.9
Long-Term Annual Averages								
2015-2019	1.90	N.A.	N.A.	N.A.	1.65	N.A.	N.A.	N.A.
2016-2020	N.A.	2.08	N.A.	N.A.	N.A.	1.88	N.A.	N.A.
2015-2024	2.15	N.A.	N.A.	N.A.	1.90	N.A.	N.A.	N.A.
2016-2025	N.A.	2.12	N.A.	N.A.	N.A.	1.97	N.A.	N.A.

The charts below show the median projections (the red line) and the associated interquartile ranges (the gray areas around the red line) for the projections for 10-year annual-average CPI and PCE inflation. The top panel shows a slightly lower level of the long-term projection for CPI inflation, at 2.12 percent. The bottom panel shows the slightly higher 10-year forecast for PCE inflation, at 1.97 percent.

- Projections for the 10-Year Annual-Average Rate of CPI Inflation (chart)
- Projections for the 10-Year Annual-Average Rate of PCE Inflation (chart)

The figures below show the probabilities that the forecasters are assigning to the possibility that fourth-quarter over fourth-quarter core PCE inflation in 2016 and 2017 will fall into each of 10 ranges. For 2016, the forecasters have increased the probability that core PCE inflation will be below 1.5 percent, compared with their estimates in the survey of three months ago.

- Mean Probabilities for Core PCE Inflation in 2016 (chart)
- Mean Probabilities for Core PCE Inflation in 2017 (chart)

Higher Risk of a Negative Quarter

For the current quarter, the forecasters predict a 14.4 percent chance of negative growth in real GDP. As the table below shows, the forecasters have also increased their risk estimates for a downturn in the following quarters, compared with their previous estimates.

Risk of a Negative Quarter (%)
Survey Means

Quarterly data:	Previous	New
2016:Q1	13.0	14.4
2016:Q2	12.6	14.7
2016:Q3	13.7	15.8
2016:Q4	14.7	17.0
2017:Q1	N.A.	18.8

First Quarter 2015 Survey of Professional Forecasters - Philadelphia Fed

Forecasters State Their Views on Home Price Growth over the Next Two Years

In this survey, a special question asked panelists to provide their forecasts for fourth-quarter over fourth-quarter growth in house prices, as measured by a number of alternative indices. The panelists were allowed to choose their measure from a list of indices or to write in their own index. For each index of their choosing, the panelists provided forecasts for growth in 2016 and 2017.

Eighteen panelists answered the special question. Some panelists provided projections for more than one index. The table below provides a summary of the forecasters' responses. The number of responses (N) is low for each index. The median estimates for the seven house-price indices listed in the table below range from 2.9 percent to 5.0 percent in 2016 and from 2.5 percent to 4.4 percent in 2017.

Projections for Growth in Various Indices of House Prices
Q4/Q4, Percentage Points

	2016 (Q4/Q4 Percent Change)			2017 (Q4/Q4 Percent Change)		
Index	N	Mean	Median	N	Mean	Median
S&P/Case-Shiller: U.S. National	2	4.6	4.6	2	4.0	4.0
S&P/Case-Shiller: Composite 10	1	4.5	4.5	1	4.4	4.4
S&P/Case-Shiller: Composite 20	4	2.7	2.9	4	2.4	2.5
FHFA: U.S. Total	3	4.9	5.0	3	3.9	4.0
FHFA: Purchase Only	6	4.3	4.7	6	3.5	3.8
CoreLogic: National HPI, incl. Distressed Sales (Single Family Combined)	3	4.9	4.9	2	3.7	3.7
NAR Median: Total Existing	2	3.4	3.4	2	3.2	3.2

Forecasters Predict Lower Long-Run Growth in Output and Productivity and in Returns to Financial Assets

In our first-quarter surveys, the forecasters provide their long-run projections for an expanded set of variables, including growth in output and productivity, as well as returns on financial assets.

As the table below shows, the forecasters have reduced their estimates for the annual-average rate of growth in real GDP over the next 10 years. Currently, the forecasters expect real GDP to grow at an annual-average rate of 2.28 percent over the next 10 years, down from their projection of 2.50 percent in the first-quarter survey of 2015. Productivity growth is now expected to average 1.40 percent, down from 1.70 percent.

Downward revisions to the return on the financial assets accompany the current outlook. The forecasters see the S&P 500 returning an annual-average 5.37 percent per year over the next 10 years, down slightly from 5.45 percent in last year's first-quarter survey. The forecasters expect the rate on 10-year Treasuries to average 3.39 percent over the next 10 years, down from 3.98 percent in last year's first-quarter survey. Three-month Treasury bills will return an annual-average 2.50 percent per year over the next 10 years, down from 2.67 percent.

Median Long-Term (10-Year) Forecasts (%)

	First Quarter 2015	Current Survey
Real GDP Growth	2.50	2.28
Productivity Growth	1.70	1.40
Stock Returns (S&P 500)	5.45	5.37
Rate on 10-Year Treasury Bonds	3.98	3.39
Bill Returns (3-Month)	2.67	2.50

The Federal Reserve Bank of Philadelphia thanks the following forecasters for their participation in recent surveys:

Lewis **Alexander**, Nomura Securities; **Scott Anderson**, Bank of the West (BNP Paribas Group); **Robert J. Barbera**, Johns Hopkins University Center for Financial Economics; **Peter Bernstein**, RCF Economic and Financial Consulting, Inc.; **Christine Chmura**, **Ph.D.**, and **Xiaobing Shuai**, **Ph.D.**, Chmura Economics & Analytics; **Gary Ciminero**, **CFA**, GLC Financial Economics; **Nathaniel Curtis**, Navigant Consulting; **Gregory Daco**, Oxford Economics USA, Inc.; Rajeev **Dhawan**, Georgia State University; **Michael R. Englund**, Action Economics, LLC; **Michael Gapen**, Barclays Capital; **James Glassman**, JPMorgan Chase & Co.; **Matthew Hall**, **Daniil Manaenkov**, and **Ben Meiselman**, RSQE, University of Michigan; **Jan Hatzius**, Goldman Sachs; **Keith Hembre**, Nuveen Asset Management; **Peter Hooper**, Deutsche Bank Securities, Inc.; **IHS Global Insight**; **Fred Joutz**, Benchmark Forecasts and Research Program on Forecasting, George Washington University; **Sam Kahan**, Kahan Consulting Ltd. (ACT Research LLC); **N. Karp**, BBVA Research USA; **Walter Kemmsies**, Moffatt & Nichol; **Jack Kleinhenz**, Kleinhenz & Associates, Inc.; **Thomas Lam**, RHB Securities Singapore Pte. Ltd.; **L. Douglas Lee**, Economics from Washington; **John Lonski**, Moody's Capital Markets Group; **Macroeconomic Advisers**, **LLC**; **R. Anthony Metz**, Pareto Optimal Economics; **Michael Moran**, Daiwa Capital Markets America; **Joel L. Naroff**, Naroff Economic Advisors; **Mark Nielson**, **Ph.D.**, MacroEcon Global Advisors; **Luca Noto**, Anima Sgr; Brendon **Ogmundson**, BC Real Estate Association; **Tom Porcelli**, RBC Capital Markets; **Arun Raha** and **Maira Trimble**, Eaton Corporation; **Martin A. Regalia**, U.S. Chamber of Commerce; **Philip Rothman**, East Carolina University; **Chris Rupkey**, Bank of Tokyo-Mitsubishi UFJ; **John Silvia**, Wells Fargo; **Allen Sinai**, Decision Economics, Inc.; **Sean M. Snaith**, **Ph.D.**, University of Central Florida; **Constantine G. Soras**, **Ph.D.**, CGS Economic Consulting; **Stephen Stanley**, Amherst Pierpont Securities; **Charles Steindel**, Ramapo College of New Jersey; **Susan M. Sterne**, Economic Analysis Associates, Inc.; **James Sweeney**, Credit Suisse; **Thomas Kevin Swift**, American Chemistry Council; **Richard Yamarone**, Bloomberg, LP; **Mark Zandi**, Moody's Analytics; **Ellen Zentner**, Morgan Stanley.

First Quarter 2015 Survey of Professional Forecasters - Philadelphia Fed

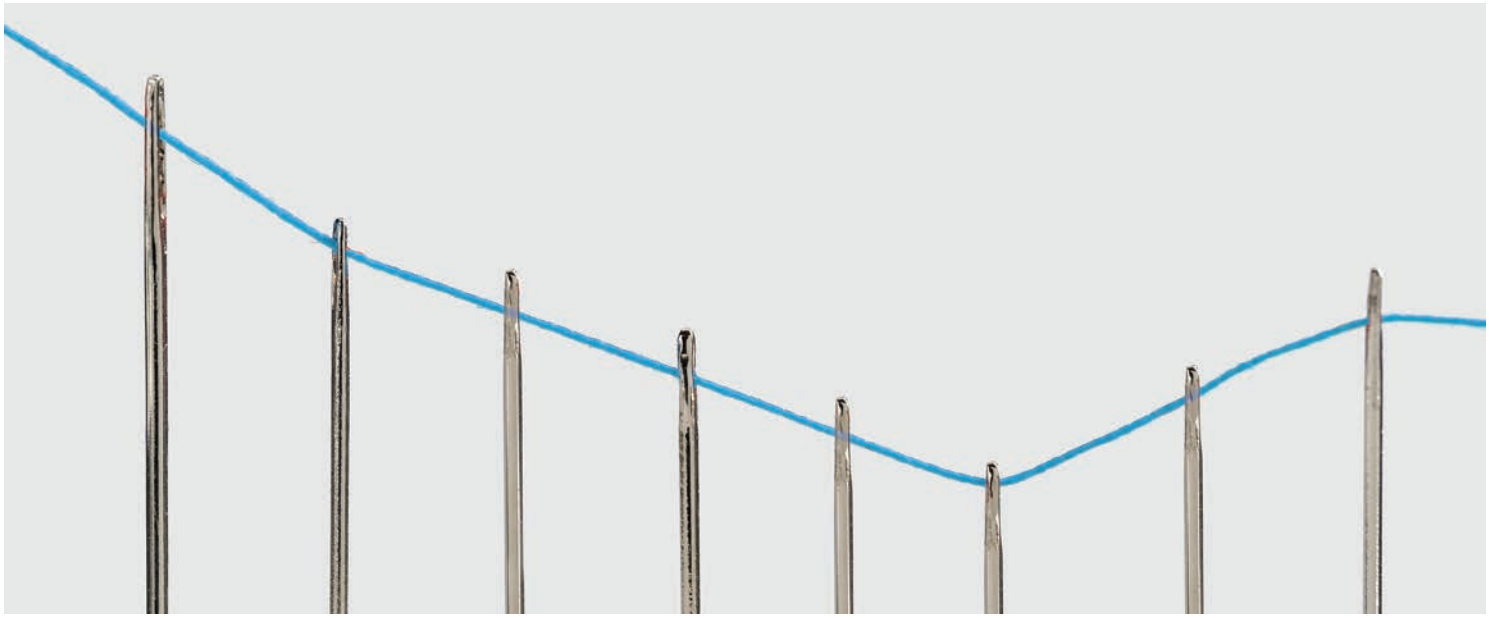
This is a partial list of participants. We also thank those who wish to remain anonymous.

Return to the main page for the Survey of Professional Forecasters.

2016 Long-Term Capital Market Assumptions

20th ANNIVERSARY EDITION

Executive summary



IN BRIEF

This Executive Summary is designed to provide a broad view of our 2016 Long-Term Capital Market Assumptions (LTCMAs) and concludes with an assessment of how our assumptions have fared over the last 20 years:

- **Macro overview**: The backdrop for this year's LTCMAs is best described as an environment of steady inflation and subdued long-term growth in the face of very divergent cyclical starting points across economies globally.
- **Major asset class assumptions**: Changes to our assumptions year-over-year are nuanced and include: a deteriorating outlook for U.S. Treasury returns; improving but, in nominal return terms, still uninspiring public and private equity market return expectations; and relatively more attractive assumptions for credit, value-added real estate and infrastructure.
- **Implications**: Based on a synthesis of results across our full data set of over 50 asset classes, we find that the outlook for the 60% equity/40% fixed income investor has improved slightly in terms of risk-adjusted returns. At the same time, the efficient frontier has rotated counterclockwise, in a way that suggests the expected return for relatively safer assets has fallen further, while the expected return for riskier assets has improved relative to last year.

J.P.Morgan
Asset Management

MACRO OVERVIEW—SUBDUED BUT STEADY GROWTH

The 2016 LTCMAs begin with our baseline expectation for moderate growth and generally stable inflation in coming years (**Exhibit 1**). For most developed market (DM) economies, growth forecasts lie below their 25-year historical averages, primarily reflecting slower population and labor force expansion. Still, we expect several DM countries to grow more strongly than during the past 10 years, as they leave behind the Great Recession and the subsequent period of private sector deleveraging. Indeed, although our projections for GDP growth have edged lower this year for four of the seven DM economies covered, these changes owe more to continued population aging and the successful absorption of cyclical slack than to any broader worsening in the environment.

By contrast, we continue to lower our fundamental sights on the emerging economies, which are adjusting to a less friendly global environment while also confronting various homegrown challenges. In particular, following a lengthy domestic credit boom, we expect many emerging market countries to enter deleveraging periods of their own, with this retrenchment likely to weigh on growth for several years to come. Among our sample of EM economies, we see India leading the way in growth terms, partly reflecting its ample room for convergence with DM living standards. Although we do not expect a collapse in Chinese growth, the gradual deceleration evident since 2011 will likely continue.

These contrasting dynamics imply considerable growth desynchronization in the next several years. Policy divergence will likely follow as the U.S. Federal Reserve begins to raise interest rates while other DM central banks consider additional easing measures. Varying local conditions will likely prevent a unified global business cycle from appearing, and overall global growth will likely remain fairly close to our long-term assumption.

Despite enormously easy monetary policy stances across DM economies in recent years, inflation has generally run below central bank targets. As economic slack diminishes, we expect gradual inflation acceleration. Given well-anchored inflation expectations and independent, mandate-focused central banks, we do not envision significant or persistent overshooting. That said, risks exist on either side of this benign view. On the one hand, political or social pressure for higher inflation could mount. On the other hand, although the Japanese descent into deflation remains poorly understood, many DM economies will be following in Japan's footsteps in some ways. For EM economies, we expect inflation to run somewhat above official targets but to remain in single-digit territory. Despite disappointing growth and occasional political stress, very few EM governments have shown any sign of abandoning the commitment to broadly sustainable financial policies adopted in recent decades.

Our 2016 assumptions call for moderate growth overall, with real growth expectations mostly flat to slightly down and inflation generally stable

EXHIBIT 1: MACROECONOMIC ASSUMPTIONS

	2015 assumptions		2016 assumptions		Change (percentage points)	
	Real GDP (%)	Core inflation (%)	Real GDP (%)	Core inflation (%)	Real GDP (%)	Core inflation (%)
Developed markets	**2.00**	**2.00**	**1.75**	**2.00**	**-0.25**	**0.00**
U.S.	2.50	2.25	2.25	2.25	-0.25	0.00
Eurozone	1.50	1.75	1.50	1.50	0.00	-0.25
UK	2.00	2.25	1.50	2.25	-0.50	0.00
Japan	1.00	1.25	0.50	1.50	-0.50	0.25
Australia	2.00	2.50	2.00	2.50	0.00	0.00
Canada	2.25	2.00	1.75	2.00	-0.50	0.00
Switzerland	1.75	0.75	1.75	0.75	0.00	0.00
Emerging markets	**5.00**	**4.00**	**5.00**	**3.75**	**0.00**	**-0.25**
Brazil	3.25	4.75	3.00	5.25	-0.25	0.50
China	6.25	3.00	6.00	3.00	-0.25	0.00
India	7.00	7.00	7.25	5.00	0.25	-2.00
Russia	3.00	5.50	2.75	5.50	-0.25	0.00

Source: J.P. Morgan Asset Management; estimates as of September 30, 2014 and September 30, 2015.

2016 LONG-TERM CAPITAL MARKET ASSUMPTIONS—MAJOR ASSET CLASSES

This year's assumptions, as did last year's, reflect an environment with more-moderate global growth cycles and lower inflation than in the past. Developed economies are enjoying a cyclical uplift in the face of increasingly apparent demographic drag on potential economic growth rates, while emerging economies are only beginning to rebalance their economies, in order to capitalize again on their superior demographic trends over the outer years of our assumptions time frame.

Over the last year, the starting point has moved for a number of asset classes, with commodity prices now fully discounting a lower growth trajectory and foreign exchange markets realigning significantly to reflect the incipient policy divergence. The U.S. equity markets, however, have moved sideways, as lower energy prices fed into lower current earnings and a less sanguine growth outlook dampened expectations for near-term earnings growth. The U.S. bond market has slowly begun to prepare for a life after the end of the zero interest rate policy with somewhat higher rates at the front end, but low inflation expectations have kept long-term interest rates well anchored.

Given this backdrop, nominal return expectations improve for equities and high yield bonds, are little changed for cash and deteriorate for Treasuries and investment grade debt (**Exhibit 2A**). Premiums for credit and equity risk improve significantly, primarily driven by a reduction in the duration premium, while small cap and private equity premiums remain unchanged year-over-year (**Exhibit 2B**).

Fixed income—A staggered liftoff

The asynchronous pattern of global growth will begin to materialize in diverging monetary policy rates across developed markets. Short-term rates will begin to rise in the near term in the U.S. and UK, while easing will not only continue but is likely to expand further in the eurozone and Japan. A lack of inflation and a more benign growth outlook will put downward pressure on short- and long-term equilibrium yields and returns globally, further aggravated by easy monetary conditions in the near term. In this environment, returns on cash will struggle to exceed the rate of inflation, while longer-duration government debt should be able to overcome near-term mark-to-market losses from the limited rise in yields and earn a moderate premium over cash. Corporate credit returns will remain relatively more attractive, supported by ongoing demand for yield and limited credit losses during a long but shallow economic cycle. Emerging market debt (EMD) yields are already reflecting weaker economic fundamentals and rising credit risks, but value will only begin to emerge slowly as the rebalancing process progresses.

Attractive equity and credit risk premiums drive improvements in nominal performance prospects

EXHIBIT 2A: SELECTED LTCMA RETURNS (%)

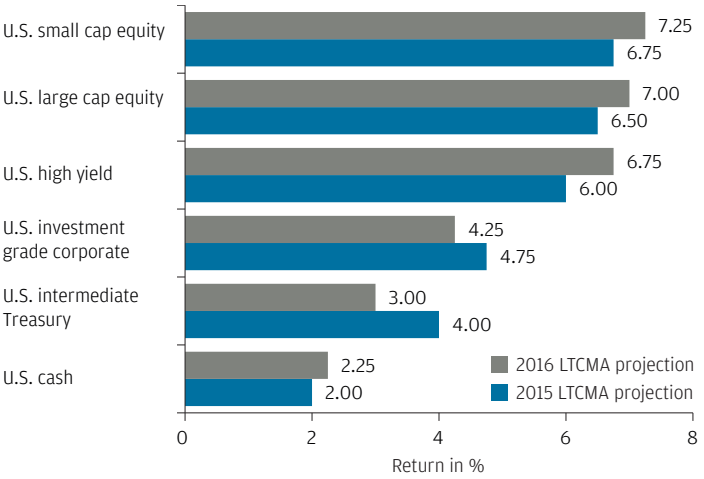
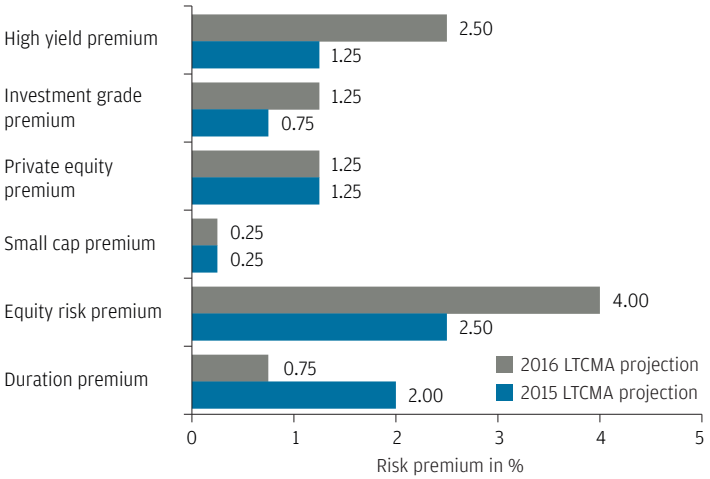


EXHIBIT 2B: SELECTED LTCMA RISK PREMIUMS (%)



Source: J.P. Morgan Asset Management; estimates as of September 30, 2014, and September 30, 2015.

Equity—Still subdued

Similar to fixed income, equity return assumptions again paint a slightly disappointing picture relative to history. Developed market returns in particular remain constrained as earnings growth is dampened by a modest economic growth environment and starting valuations remain elevated. We continue to expect payouts to shareholders rather than earnings growth to be the main component of total returns. Our emerging market equity return assumption ticks up marginally in local currency terms compared with last year due to more attractive valuations. In U.S. dollar terms, our assumptions rise more significantly, reflecting a substantial realignment in currency exchange rates over the last year.

Alternatives—Outlook varies across strategy classes; manager choice is key

Our assumptions for private equity increase marginally, benefiting from a moderate rise in our public market return assumptions for U.S. mid cap and European equities, while the return assumptions for real assets decline, reflecting rising valuations and a slowly aging economic cycle. Sluggish global economic growth, especially in China, will weaken the rate at which the demand for commodities grows and suppress prices in the near term. While still in the early innings of the demand/supply adjustment process, prices will ultimately have to rise to provide sufficient incentive for supply to keep up with long-term demand. Demand for infrastructure investments remains strong among liability-driven investors and those seeking income-generating assets. Midmarket, non-trophy assets should benefit from this trend and provide attractive investment returns.

Our hedge fund composite return assumptions are driven by public market beta exposures, the dominant source of risk taking for most strategies. The environment for alpha generation for traditional hedge funds and liquid alternative strategies remains challenging in the near term. Over the full assumptions period, however, we expect conditions for generating alpha to improve as rates rise, volatility increases and inter-asset-class and intra-sector relationships revert toward their means.

As in prior years, our assumptions for private equity, infrastructure and hedge funds represent composite returns at the industry level, across managers with widely divergent skill sets. Therefore, manager selection remains the critical determinant of success when investing in alternatives.

Foreign exchange—Further away from long-term equilibriums

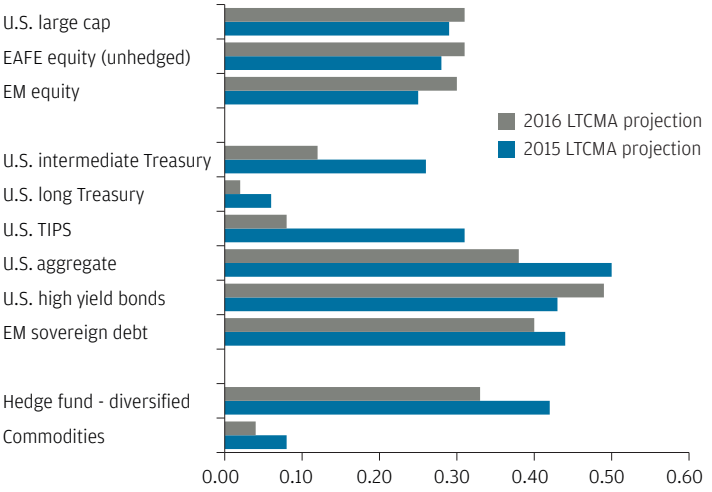
Policy divergences and further economic rebalancing have led to an increase in currency volatility over the last year, driving exchange rates significantly away from their long-term equilibriums. The move away from fair value in developed market currencies has been short and sharp, and at this stage the realignment of foreign exchange rates to a diverging economic and monetary policy environment appears already well advanced. We expect, however, that given the ongoing need for easy monetary policy in much of the developed world, it will take several years for this trend to reverse and the U.S. dollar (USD) to weaken back toward long-term equilibrium levels. In emerging market and commodity-related economies, currencies appear to have rebalanced from overvalued to close to fairly valued levels. Given the ongoing cyclical slowdown in these countries, we expect further currency weakening relative to the USD before these currencies rise more gradually back to fair value in the later years of our assumptions time frame.

A RISK-ADJUSTED RETURN PERSPECTIVE

Low starting yields and a reduced duration premium lead to significant declines in the expected risk-adjusted returns for Treasuries and Treasury Inflation Protected Securities (TIPS). The more diversified U.S. Aggregate Bond Index, emerging market debt and diversified hedge fund strategies, as well as commodities, are expected to experience a smaller decline, driven by a higher risk-free rate. The risk-adjusted returns for the riskiest assets—equities and high yield—improve slightly year-over-year, benefiting from an improvement in their return outlook in excess of the rise in the expected cash return (**Exhibit 3**).

The most significant improvements in return per unit of risk appear to be for U.S. high yield bonds and equities

EXHIBIT 3: RISK-ADJUSTED RETURN ASSUMPTIONS ACROSS ASSET CLASSES–SHARPE RATIOS



Source: J.P. Morgan Asset Management; estimates as of September 30, 2014 and September 30, 2015.

OPPORTUNITIES FOR INVESTORS

While still uninspiring, the outlook has improved a little for the 60/40 portfolio investor, given this year's and last year's LTCMAs. As **Exhibit 4** shows, the 2016 portfolio plots a little up and to the left of the 2015 point in risk/return space, suggesting that both nominal return expectations and the risk profile are improving somewhat.

Another way to look at it is that the entire efficient frontier has rotated counterclockwise, almost exactly around a 35/65 reference point. This counterclockwise rotation implies that the expected return on relatively safer assets has fallen further, while the expected return for riskier assets has improved relative to last year.

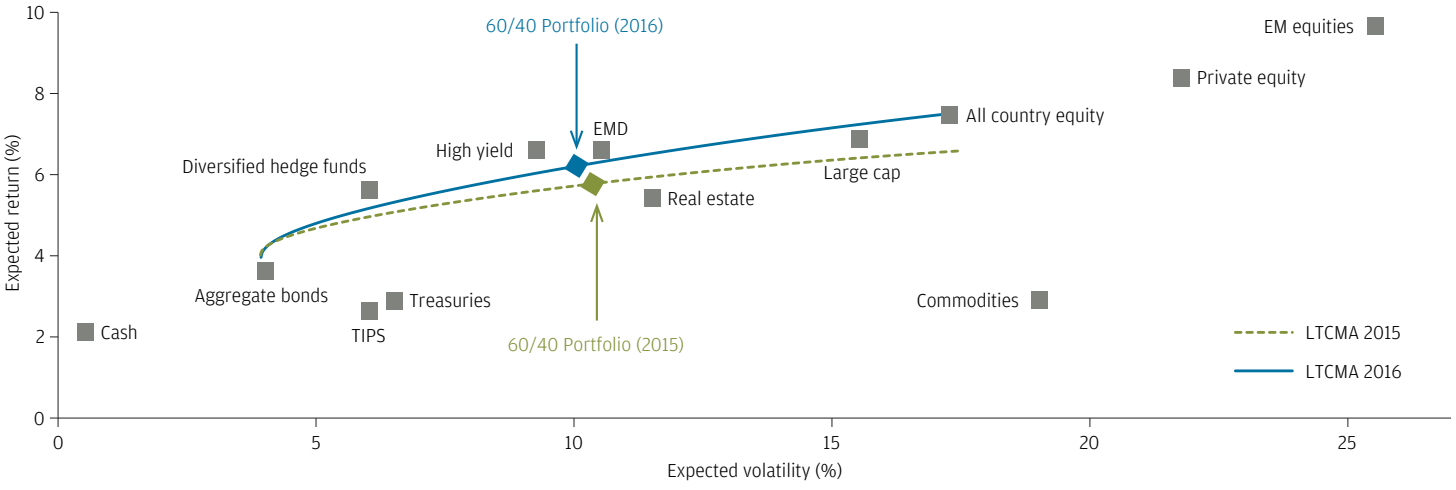
Starting at the lower end of the risk spectrum, Treasuries and TIPS are likely to generate only a small premium over cash. Skill-based strategies—such as diversified hedge funds as well as, but somewhat less significantly, liquid alternatives—should achieve superior returns with a similar level of risk relative to Treasuries and TIPS, albeit at the expense of a reduced level of liquidity.

Investors with the flexibility and wherewithal to tolerate higher levels of volatility can position their portfolios to capture these increased equity and credit risk premiums by stepping further out on the risk curve. High yield and, to a lesser degree, emerging market debt appear attractive, offering close to equity-like returns with superior risk characteristics. For investors who can be flexible and withstand higher volatility, and have low liquidity requirements and the research capabilities to identify above-median managers, private equity markets offer expected returns north of 8%—an elusive barrier in recent years.

Finally, after multiple years of relative underperformance, improving valuations and significant currency realignment relative to the U.S. dollar, international equities—and emerging market equities in particular—are increasingly attractive, with the pickup in expected returns offering a more adequate compensation for the incremental risk taken than it has in the recent past.

Our 2016 vs. 2015 assumptions suggest that long-term investors willing to step out on the risk curve can expect to be better compensated for that incremental risk

EXHIBIT 4: EFFICIENT FRONTIERS AND 60/40 PORTFOLIOS, BASED ON 2016 VS. 2015 LTCMAS FOR RISK AND RETURN



Source: J.P. Morgan Asset Management; estimates as of September 30, 2014, and September 30, 2015

LONG-TERM CAPITAL MARKET ASSUMPTIONS: A TIME-TESTED PROCESS

J.P. Morgan Asset Management has produced its Long-Term Capital Market Assumptions in a broadly unchanged format since 2004. With an assumption horizon of 10-15 years, it seems reasonable to assess how a portfolio would have actually fared compared with our expectations in 2004 and 2005, respectively.

Each bar in the chart in **Exhibit 5** shows the return expectation for a reference portfolio* based on the LTCMAs of that year, shown as a white horizontal line. The surrounding shaded area reflects the range in which actual outcomes may fall within a certain confidence interval. The range shrinks as the time horizon lengthens.

The blue triangles depict the actual return that the reference portfolio would have achieved from the time of the publication of the LTCMAs until the end of 2014. The closer the blue triangle to the horizontal line, the more reliable the assumptions of that year have turned out to be.

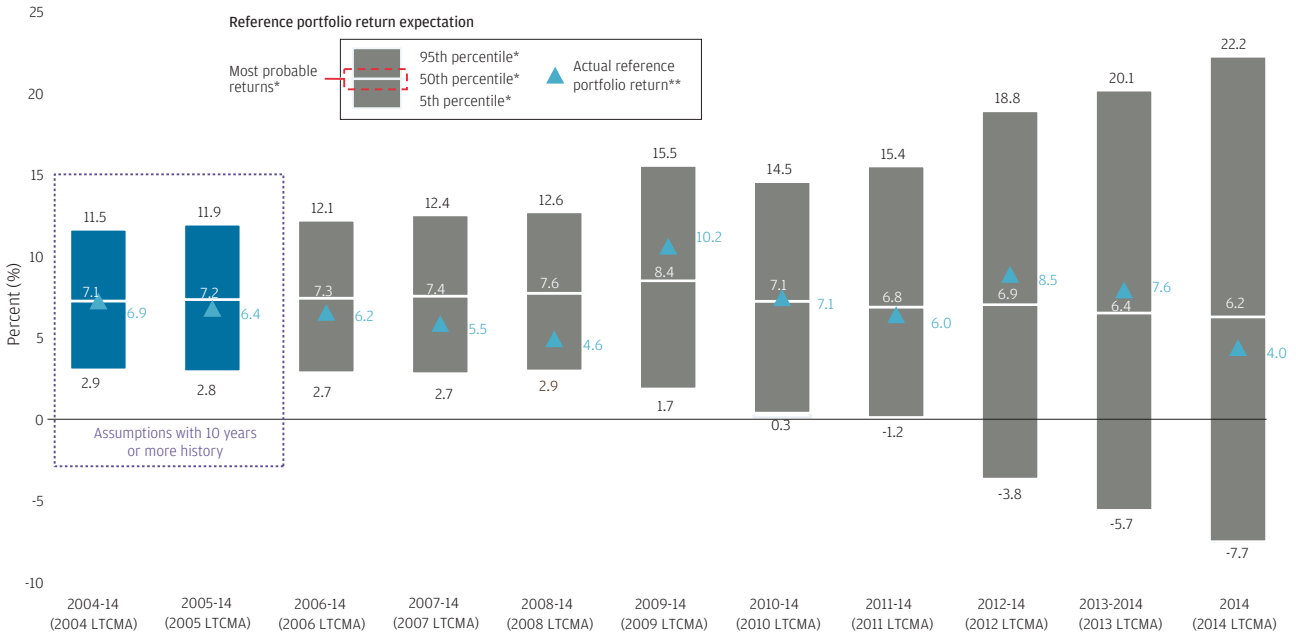
For example:

In 2004, using our long-term projections for that year, we estimated the reference portfolio would achieve a compound annual return of 7.1% over our assumptions time frame. The actual compound annual return of the reference portfolio over the subsequent 11 years, from 2004 to 2014, was 6.9%.

While this is certainly too small a sample to draw statistically significant conclusions, we are pleased to see how well the assumptions have stood the test of time in one of the most volatile investment environments in a generation.

* The asset allocation of the reference portfolio reflects JP Morgan Private Bank's default Balanced Portfolio asset allocation mix of the respective year, with a risk profile equivalent to that of a portfolio with a 55/45 equity/bond mix.

EXHIBIT 5: EXPECTED PORTFOLIO RETURN BASED ON LONG-TERM CAPITAL MARKET ASSUMPTIONS RELATIVE TO ACTUAL PERFORMANCE



Source: J.P. Morgan Asset Management; data as of September 30, 2014. **Note:** This is a projection used for illustrative purposes only and does not represent investment in any particular vehicle. References to future asset values are not promises or even estimates of actual returns you may experience. Past performance is no guarantee of future results. It is not possible to invest directly in an index. * "Most probable returns," denoted by the darkly shaded area, indicates the range around the 50th percentile. The "50th percentile" indicates the middle wealth value of the entire range of probable asset values. The "95th percentile" wealth value indicates that 95% of the probable asset values will be equal to or below that number; the "5th percentile" wealth value indicates that 5% of the probable asset values will be equal to or below that number. ** Asset allocation assumes annual rebalancing, no taxes, and no cash flows. All returns are based on index data and include no manager alpha. Indices used: Barclays Capital Global & US Aggregate Bond Indices, S&P 500, Russell 1000 Value, Russell Midcap , Russell 2000, MSCI EAFE, MSCI Japan, MSCI Asia ex-Japan, MSCI Emerging Markets, HFRI Fund of Funds Diversified , HFRI Event Driven , HFRI Equity Hedge, HFRI Relative Macro, HFRI Macro, Venture Economics US Buyouts, NCREIF Property TR, DJUBS Commodity.

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J.P. MORGAN ASSET MANAGEMENT LONG-TERM CAPITAL MARKET RETURN ASSUMPTIONS are developed each year by our Assumptions Committee, a multi-asset class team of senior investors from across the firm. The Committee relies on the input and expertise of a range of portfolio managers and product specialists, striving to ensure that the analysis is consistent across asset classes. The final step in the process is a rigorous review of the proposed assumptions and their underlying rationale with the senior management of J.P. Morgan Asset Management.

Our capital market assumptions are used by a wide range of investors to ensure that investment policies and decisions are based on real-world, consistent views and can be tested under a variety of market scenarios.

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J.P.Morgan
Asset Management

2016 Long-Term Capital Market Forecasts

White Paper | January 2016

By
The Multi-Asset Strategies and Solutions Team

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Introduction

Our long-term capital market forecasts provide our estimates of expected returns, volatilities and correlations among major U.S. and global asset classes over a ten-year horizon. These estimates guide strategic asset allocations for our multi-asset portfolios and provide a context for shorter-term economic and financial forecasting.

As has been the case for the past six years, our forecast models an explicit process of convergence to a steady-state equilibrium for global economies and financial markets through 2025. We make this explicit forecast in recognition of the ongoing effects of the 2007–09 financial crisis and recession, the European debt crisis, and the fiscal and monetary policy responses to these events. Although the world economy is several years past its most acute point of crisis in 2008 and the U.S. economy has been recovering from the Great Recession for more than six years, a number of economic and financial variables remain far from levels consistent with the steady state. In particular, short-term interest rates remain near zero in most developed economies, long-term interest rates have declined substantially, and government debt-to-GDP ratios remain elevated. Figure 1 shows the 2025 values from this forecast, which is consistent with our estimates of longer-term steady-state values for key U.S. economic variables.

Figure 1. U.S. Economic and Financial Variables

	2025 Forecast (%)
GDP Growth	2.0
Inflation (CPI-U)	2.2
Federal Funds Rate	3.6
Ten-Year Treasury Yield	4.4
S&P 500 Earnings Growth	3.5

Source: Voya Investment Management, Macroeconomic Advisers

In our modeling process we have again worked with Macroeconomic Advisers for the United States and utilize input from Oxford Economics for non-U.S. economies. We believe that cyclical fluctuations are an inevitable aspect of market economies and therefore recognize that the steady-state equilibrium incorporated as the terminal point of our forecast is unlikely ever to be fully attained under real world conditions. Nonetheless, we believe that this is a useful theoretical construct for anchoring the forecast. As a result, the forecast does not assume a further recession or contraction over its ten-year horizon.

As expected we find that cyclically sensitive assets like equities and the riskiest credit instruments are likely to provide risk-adjusted returns superior to those of most fixed income assets, particularly government bonds, over the ten-year horizon. Nevertheless the relative attractiveness of risky versus less-risky assets, as measured by their respective Sharpe ratios, is becoming more balanced than it was a year ago. This results from the modest performance of U.S. equity categories in 2015 and from the decrease in GDP growth expectations and associated terminal sovereign bond yields. More modest growth expectations also contribute to the lowest Sharpe ratios since the onset of the post-crisis recovery.

Risk-adjusted returns for other developed market assets are in most cases less than those for comparable U.S. assets. For example, we forecast an arithmetic mean return of 6.4% for the S&P 500 Index but 5.0% for the MSCI EAFE Index, and we expect an arithmetic mean return of 2.8% for the Barclays U.S. Aggregate Bond Index but just 0.1% for the Barclays Global Aggregate excluding U.S. fixed income assets. This partially reflects our expectation that the U.S. dollar will appreciate over the ten-year horizon versus other developed market currencies as the U.S. current account deficit shrinks as a share of GDP. However, it also reflects lower expected domestic currency returns for these markets. Returns from large-capitalization European equities are likely to be somewhat lower than U.S. returns over the period because slower trend economic growth should translate into slower earnings growth. Other developed country bond returns are expected to be lower than U.S. fixed income returns as the process of interest rate normalization should prove slower in Europe and Japan than in the U.S. Quantitative easing (QE) programs promised by European and Japanese central banks should be more significant, and government bond yields in both locations are starting the period from lower levels than U.S. Treasury yields.

By contrast returns for emerging market equities and debt are in line with or higher than those for comparable U.S. assets, even after adjusting for their greater volatility. This return forecast assumes that political reform in the emerging world remains successful on balance, so that GDP growth in these countries remains higher than in the developed world over the forecast horizon and that one or more emerging markets is able to transition successfully into a middle-income country. It also assumes that emerging market currencies appreciate on average over the interval as a result of faster productivity growth.

Base Case and Alternative Scenario

We continue to believe that return forecasts resulting from the combination of a base case forecast with an alternative scenario capture the most important risks facing the world economy and markets over the ten-year interval. As is our practice, the base case forecast assumes gradual convergence to steady-state values for variables such as GDP and its components, inflation and interest rates. In steady-state equilibrium, real GDP grows broadly in line with its potential growth rate, driven by productivity and labor-force growth, inflation consistent with central bank targets and real long-term interest rates consistent with GDP growth. As Figure 1 illustrates, we expect that convergence to equilibrium will be fully complete by 2020, assuming that Federal Reserve policy by then will have returned to historical relationships fully compatible with a long-run economic equilibrium. That is, by 2020 short- and long-term U.S. interest rates should have returned to steady-state values, setting the stage for real GDP growth trending around 2.0% per annum.

The alternative scenario posits that at least one of the fundamental drivers of the U.S. economy's potential growth returns to longer-run equilibrium levels. We assume that productivity growth, which has been below its long run average of about 2% over the past five years, reverts to the mean going forward. We project the impact of higher productivity to increase trend growth by about 0.3%. Another feature of our alternative scenario is stronger aggregate demand supported by higher equity wealth and generally more favorable financial conditions. Returns to risky assets, interest rates and inflation are higher in the alternative scenario as well. We assign a probability of 70% to the base case and 30% to the alternative scenario. The higher probability for the base scenario reflects our concerns that recent trends toward an aging labor force, reduced labor-force participation and more restrictive immigration could continue and result in a sustained downward step in the U.S. growth rate.

Methodology

We derive return forecasts for asset classes from the blend of base case and alternative economic scenarios. For U.S. bonds, we use the blended scenario interest rate expectations to calculate expected returns for bonds of various durations. Bond expected returns are modeled as the sum of current yield and a capital gain (or loss) based on duration and expected change in yields. For non-U.S. bonds, the process is similar and includes an adjustment for currency movements. Return expectations also reflect spreads, expected default and recovery experience.

For U.S. equities, we estimate earnings and dividends for the S&P 500 Index using the above macroeconomic assumptions. Earnings growth is constrained by the neoclassical assumption that profits as a share of GDP cannot increase without limit, but must rather converge to a long-run equilibrium determined by productivity. We then use a dividend discount model to determine fair value for the index each year during the forecast period. Returns for other U.S. equity indices, including REITs, are derived from the S&P 500 forecast. These other equity classes are modeled on the basis of a single-index factor model in which beta sensitivities of each asset class with respect to the market portfolio are derived from our forward-looking covariance matrix estimation described below. Each equity asset class return is the sum of the risk-free interest rate and a specific risk premium determined from our estimate of beta sensitivity and market risk premium forecasts.

Expected returns for non-U.S. equities are produced from the same process but are also adjusted for expected currency movements. As noted above, we expect the U.S. dollar to appreciate modestly relative to other developed market currencies over the forecast horizon but expect emerging market currencies on balance to appreciate modestly. Our return estimates for commodities assume a positive real spot return above the real risk-free rate, partially offset by a modest penalty for a negative expected roll yield on front-month futures contracts.

Covariance and Correlation Matrices

Our approach in estimating the covariance matrix is regime-based. In developing a covariance matrix between asset classes, we start with the empirical fact that risk parameters are unstable because the underlying return distributions change depending on the underlying economic regime, and that correlation and volatility are positively related. Our long-term equilibrium risk forecasts take that instability into account and are based on a forward-looking covariance matrix model. We reduce parameter instability by imposing structure in the covariance matrix estimation.

Our process starts by identifying turbulent market regimes (i.e., periods of market stress) and by estimating a covariance matrix covering those periods of market turbulence alone. The identification of turbulent market regimes makes use of the concept of multivariate outliers in a return distribution, which takes into account not only the deviation of a particular asset class's return from the average but also the asset class's own volatility and correlation with other asset classes.

We give an example in Figure 2 on the next page. The turbulence threshold is an ellipse centered in the average returns of the two asset classes. Return pairs that fall outside the ellipse are considered turbulent. Note that there are certain points just outside the boundary that are closer to the center than some points inside the boundary; these are considered turbulent because, for example, the observed correlation between the two assets is of the opposite sign of what it normally is.[1] The boundary that separates normal from turbulent states takes the form of an ellipse rather than a circle because it also takes into account the covariance of the assets involved. The threshold

[1] Our measure of turbulence is based on the Mahalanobis distance measure defined as follows:

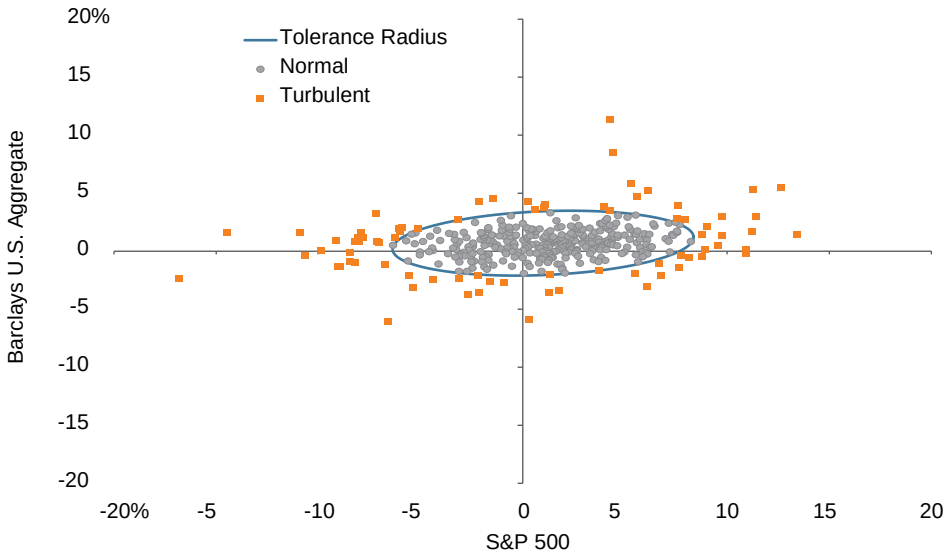
$$d_t = \sqrt{(y_t - \mu)\Sigma^{-1}(y_t - \mu)'}$$

where y is the return vector at time t, μ is the mean vector and Σ is the covariance matrix.

is not static in time but rather is dynamic and is the outcome of a Markov model. We model the underlying state of the market, turbulent or normal, as a Markov process illustrated in Figure 3. Our Markov model performs better in classifying regimes than arbitrary thresholds because such thresholds fail to capture the persistence of regimes and shifts in volatility.

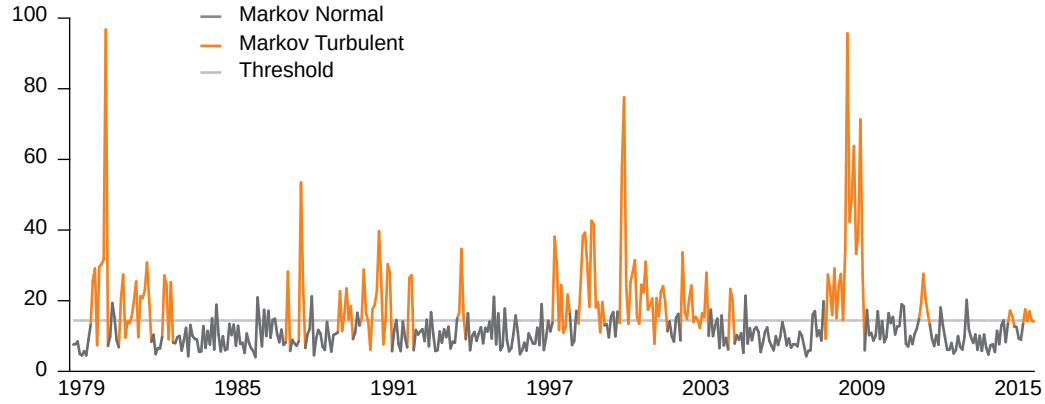
We subsequently estimate a covariance matrix based on periods of normal market performance, and finally we use a procedure to blend these two covariance matrices using weights that allow us to express both views about the likelihood of each regime and differential risk attitudes toward each. The weights we use are 60% "normal" and 40% turbulent, different from the probabilities assigned to the base case and alternative scenario described above. We overweight the turbulent state from its empirical frequency of 30–40%. From this blended covariance matrix, we then extract the implied correlation matrix and volatilities for each asset class embedded in the covariance matrix.

Figure 2. Normal and Turbulent Regimes in Two-Asset Space



Source: Voya Investment Management

Figure 3. Markov 12-Asset Normal and Turbulent Regimes Over Time



Source: Voya Investment Management

Return Estimates

Figure 4 shows estimated arithmetic and geometric mean returns, volatilities and the resulting Sharpe ratios for major U.S. and global asset classes. Returns are shown in U.S. dollar terms. Figure 5 provides a correlation matrix for the time period.

Figure 4. Voya Investment Management Ten-Year Returns Forecast

	Expected Returns					
	Geometric Mean Return (%)	Arithmetic Mean Return (%)	Volatility (%)	Skewness	Kurtosis	Sharpe Ratio
Equity Index						
Russell Top 200	4.7	6.0	16.5	-0.45	0.9	0.19
S&P 500	5.1	6.4	16.7	-0.48	1.0	0.21
S&P 500 Growth	5.2	6.5	17.3	-0.41	0.6	0.21
S&P 500 Value	4.8	6.2	17.2	-0.51	1.2	0.19
Russell 1000	5.3	6.7	16.8	-0.50	1.0	0.22
Russell 1000 Growth	4.3	6.1	19.0	-0.44	0.6	0.17
Russell 1000 Value	6.1	7.2	16.2	-0.53	1.3	0.27
MSCI U.S. Minimum Volatility	4.9	5.5	11.9	-0.62	1.6	0.22
Russell 3000	5.3	6.7	17.1	-0.54	1.1	0.22
Russell Midcap	6.7	8.3	18.7	-0.53	1.1	0.29
Russell Midcap Growth	5.5	7.9	22.3	-0.39	0.7	0.23
Russell Midcap Value	7.3	8.7	17.6	-0.47	1.4	0.32
S&P 400	7.3	9.1	19.9	-0.50	1.0	0.30
Russell 2500	5.9	8.0	20.9	-0.57	1.2	0.24
S&P 600	4.3	6.9	22.8	-0.57	1.2	0.18
Russell 2000	3.9	6.7	23.3	-0.56	1.2	0.16
Russell 2000 Growth	1.6	5.3	26.9	-0.40	0.8	0.09
Russell 2000 Value	5.9	8.0	21.0	-0.72	2.0	0.24
MSCI EAFE	3.0	4.9	19.5	-0.29	0.2	0.11
MSCI EAFE Growth	1.9	3.9	20.0	-0.19	0.3	0.05
MSCI EAFE Value	4.1	6.0	19.8	-0.30	0.2	0.16
MSCI EAFE Small Cap	3.8	5.9	20.6	-0.36	0.6	0.15
MSCI World ex U.S.	3.9	5.9	20.1	-0.43	0.3	0.15
MSCI World ex U.S. Small Cap	4.5	6.7	21.5	-0.46	0.7	0.18
MSCI World	4.7	6.0	16.4	-0.58	0.9	0.19
MSCI EM	5.8	9.6	27.6	-0.49	0.7	0.24
MSCI EM Small Cap	5.1	9.5	29.8	-0.34	0.4	0.22
MSCI ACWI ex U.S.	3.9	5.9	20.1	-0.43	0.3	0.15
MSCI ACWI ex U.S. IMI	4.0	6.0	20.1	-0.44	0.4	0.16
MSCI ACWI ex U.S. Small Cap	4.5	6.7	21.5	-0.46	0.7	0.18
MSCI ACWI	4.9	6.3	17.0	-0.60	1.0	0.20
MSCI ACWI IMI	4.9	6.3	17.3	-0.63	1.1	0.20
MSCI ACWI Small Cap	4.6	6.7	20.4	-0.65	1.3	0.19

Chart continues on the next page.

	Expected Returns					
	Geometric Mean Return (%)	Arithmetic Mean Return (%)	Volatility (%)	Skewness	Kurtosis	Sharpe Ratio
Alternative Assets Index						
Bloomberg Commodity	2.5	3.7	15.9	-0.43	1.5	0.06
CBOE Buy-write	5.1	5.8	12.5	-0.91	2.9	0.23
FTSE EPRA/NAREIT Developed ex U.S.	3.2	5.8	22.9	-0.18	0.6	0.13
FTSE EPRA/NAREIT Developed	4.9	7.2	22.0	-0.33	1.4	0.20
MSCI U.S. REIT	6.0	8.5	22.7	-0.37	3.0	0.24
NCREIF ODCE Private Real Estate	4.0	6.5	21.2	-2.25	18.2	0.16
SLB Real Estate Blend	5.2	7.0	18.3	-2.40	21.5	0.20
U.S. Inflation (CPI)	2.1	2.1	2.4	-0.48	2.2	-0.30
Fixed Income Index						
Barclays U.S. Aggregate	2.6	2.8	7.1	0.55	4.5	0.00
Barclays U.S. Universal	3.1	3.3	7.0	0.52	4.3	0.07
Barclays U.S. Government Long	0.3	1.1	12.4	0.24	0.7	-0.14
Barclays U.S. Gov/MBS	2.3	2.5	6.5	0.63	4.1	-0.05
Barclays U.S. MBS	2.4	2.7	8.1	1.03	9.7	-0.01
Barclays U.S. Municipal	2.0	2.3	7.5	-0.18	5.0	-0.07
Barclays U.S. Aggregate Corporate	3.3	3.7	9.4	0.26	3.4	0.09
Barclays U.S. Corporate Long	3.4	4.1	12.1	0.14	1.7	0.11
Barclays U.S. Liability Benchmark	2.7	3.3	11.8	0.15	1.8	0.04
Barclays U.S. High Yield	6.1	6.7	12.4	-0.25	3.4	0.31
Credit Suisse Leveraged Loan	6.7	6.9	8.8	-0.79	15.2	0.37
S&P/LSTA Leveraged Loan	6.8	7.0	9.3	-0.38	13.2	0.39
Barclays Global Aggregate ex U.S.	-0.5	0.1	10.6	0.17	0.5	-0.25
Barclays Global Aggregate	0.9	1.2	8.5	0.36	1.8	-0.18
JPMorgan EMBI+	5.7	6.4	13.2	-1.70	11.4	0.24
JPMorgan CEMBI Diversified	5.7	6.4	12.9	-0.22	5.5	0.27
JPMorgan GBI-EM Global Diversified	7.0	7.5	12.0	-0.57	1.1	0.38
Barclays U.S. TIPS	2.5	2.9	9.4	0.31	3.4	0.01
Barclays 1-3 Yr Aggregate	2.9	2.9	4.0	1.39	11.8	0.03
Barclays 1-3 Yr Gov/Credit	2.8	2.9	4.1	1.39	11.7	0.02
Barclays Long Gov/Credit	1.9	2.6	11.7	0.19	1.1	-0.02
U.S. Treasury Bill 3-Month	2.8	2.8	1.1	0.61	0.0	0.00
U.S. Treasury 2-Year	2.6	2.6	4.2	1.34	10.4	-0.05
U.S. Treasury 5-Year	2.1	2.3	7.1	0.49	3.0	-0.07
U.S. Treasury 10-Year	1.5	2.0	9.5	0.21	0.4	-0.09
U.S. Treasury 30-Year	-0.3	0.8	15.0	0.20	1.3	-0.13
Barclays 2-Year Swap	2.8	2.9	4.4	1.32	10.2	0.01
Barclays 5-Year Swap	2.2	2.4	7.3	0.45	3.1	-0.06
Barclays 10-Year Swap	1.3	1.8	10.0	0.20	0.9	-0.10
Barclays 30-Year Swap	-2.0	-0.5	17.5	0.52	2.6	-0.18

Source: Voya Investment Management

Figure 5. Correlation Matrix

	S&P 500	S&P 400	S&P 600	MSCI EAFE	MSCI Emerging Markets	Barclays U.S. Aggregate	Barclays 1-3 Yr Gov/Credit	Barclays U.S. Government Long	Barclays U.S. TIPS	Barclays U.S. Municipal	Barclays U.S. Agg Corporate	Barclays U.S. Corporate Long	Barclays U.S. High Yield	S&P/LSTA Leveraged Loan	Barclays Global Aggregate	**JPMorgan GBI-EM Global Diversified**	U.S. Treasury Bill 3 Month	Bloomberg Commodity	FTSE EPRA NAREIT Developed
S&P 500	1.00	0.92	0.84	0.67	0.71	0.21	0.13	0.09	0.23	0.23	0.30	0.30	0.62	0.45	0.23	0.65	0.05	0.25	0.61
S&P 400	0.92	1.00	0.94	0.65	0.72	0.21	0.13	0.08	0.24	0.24	0.31	0.31	0.65	0.49	0.24	0.67	0.04	0.31	0.64
S&P 600	0.84	0.94	1.00	0.61	0.69	0.15	0.08	0.03	0.17	0.20	0.25	0.26	0.65	0.45	0.18	0.65	0.01	0.29	0.60
MSCI EAFE	0.67	0.65	0.61	1.00	0.74	0.18	0.15	0.05	0.21	0.17	0.28	0.28	0.51	0.35	0.34	0.70	0.05	0.32	0.83
MSCI Emerging Markets	0.71	0.72	0.69	0.74	1.00	0.14	0.11	0.00	0.20	0.16	0.27	0.28	0.59	0.39	0.22	0.91	0.03	0.37	0.71
Barclays U.S. Aggregate	0.21	0.21	0.15	0.18	0.14	1.00	0.91	0.89	0.93	0.76	0.95	0.89	0.29	0.19	0.86	0.19	0.15	-0.02	0.22
Barclays 1-3 Yr Gov/Credit	0.13	0.13	0.08	0.15	0.11	0.91	1.00	0.70	0.84	0.69	0.83	0.71	0.19	0.13	0.80	0.14	0.32	-0.02	0.16
Barclays U.S. Government Long	0.09	0.08	0.03	0.05	0.00	0.89	0.70	1.00	0.82	0.63	0.81	0.83	0.14	0.02	0.74	0.08	0.05	-0.10	0.11
Barclays U.S. TIPS	0.23	0.24	0.17	0.21	0.20	0.93	0.84	0.82	1.00	0.72	0.89	0.83	0.34	0.26	0.84	0.25	0.13	0.10	0.27
Barclays U.S. Municipal	0.23	0.24	0.20	0.17	0.16	0.76	0.69	0.63	0.72	1.00	0.75	0.68	0.31	0.29	0.65	0.17	0.03	-0.01	0.23
Barclays U.S. Agg Corporate	0.30	0.31	0.25	0.28	0.27	0.95	0.83	0.81	0.89	0.75	1.00	0.97	0.47	0.36	0.82	0.30	0.09	0.07	0.31
Barclays U.S. Corporate Long	0.30	0.31	0.26	0.28	0.28	0.89	0.71	0.83	0.83	0.68	0.97	1.00	0.50	0.35	0.77	0.33	0.05	0.06	0.32
Barclays U.S. High Yield	0.62	0.65	0.65	0.51	0.59	0.29	0.19	0.14	0.34	0.31	0.47	0.50	1.00	0.76	0.28	0.59	0.01	0.26	0.53
S&P/LSTA Leveraged Loan	0.45	0.49	0.45	0.35	0.39	0.19	0.13	0.02	0.26	0.29	0.36	0.35	0.76	1.00	0.16	0.33	0.00	0.22	0.38
Barclays Global Aggregate	0.23	0.24	0.18	0.34	0.22	0.86	0.80	0.74	0.84	0.65	0.82	0.77	0.28	0.16	1.00	0.30	0.13	0.13	0.35
JPMorgan GBI-EM **Global Diversified**	0.65	0.67	0.65	0.70	0.91	0.19	0.14	0.08	0.25	0.17	0.30	0.33	0.59	0.33	0.30	1.00	0.03	0.36	0.71
U.S. Treasury Bill 3 Month	0.05	0.04	0.01	0.05	0.03	0.15	0.32	0.05	0.13	0.03	0.09	0.05	0.01	0.00	0.13	0.03	1.00	0.01	0.02
Bloomberg Commodity	0.25	0.31	0.29	0.32	0.37	-0.02	-0.02	-0.10	0.10	-0.01	0.07	0.06	0.26	0.22	0.13	0.36	0.01	1.00	0.30
FTSE EPRA NAREIT Developed	0.61	0.64	0.60	0.83	0.71	0.22	0.16	0.11	0.27	0.23	0.31	0.32	0.53	0.38	0.35	0.71	0.02	0.30	1.00

Source: Voya Investment Management

Appendix: A Note on the Time Dependency of Asset Returns and Its Impact on Risk Estimation

Recent research documents suggest that expected asset returns change over time in somewhat predictable ways and that these changes tend to persist over long periods of time. Thus changes in investment opportunities — all possible combinations of risk and return — are found to be persistent. This note will set out the economic reasons for return predictability, its consequences for strategic asset allocation and the adjustments we have made to control for it in our estimation process.

In our view, the common source of predictability in financial asset returns is the business cycle. The business cycle itself is persistent, and this makes real economic growth to some extent predictable. The fundamental reason for the business cycle's persistence is that its components are persistent. Consumers, for example, have a tendency to smooth consumption since they dislike large swings in consumption. The permanent income and lifecycle consumption theories provide the theoretical basis for consumers' desire for a stable consumption path. Thus when income is affected by transitory shocks, consumption should not change since consumers can use savings or borrowing to adjust consumption in well-functioning capital markets. Robert Hall has formalized the above ideas by showing that consumers will optimally choose to keep a stable path of consumption equal to a fraction of their present discounted value of human and financial wealth.[2] Investment, the second component of GDP, is sticky, as corporate investment in projects is usually long term in nature. Finally, government expenditures have a low level of variability as well. Over a medium-term horizon, negative serial correlation sets in as the growth phase of the cycle is followed by a contraction and then as that contraction is followed by renewed growth.[3]

How does this predictability of economic variables affect the predictability of asset returns? Consider equities as an example. The value of equities is determined as the present discounted value of future cash flows and thus depends on four factors: expected cash flows, the expected market risk premium, expected market risk exposure and the term structure of interest rates. Cash flows and corporate earnings tend to move with the business cycle. The market risk premium is high at business cycle troughs, when people trying to smooth consumption are less willing to take risks with their income (risk aversion is high), and low at business cycle peaks, when people are more willing to take risks (risk aversion is low). The market risk premium is a component of the discount rate in the present value calculation of the dividend discount model. A firm's risk exposure (beta), another component of the discount rate, changes through time and is a function of the firm's capital structure. Thus a firm's risk increases with leverage, and leverage is related to the business cycle. The last component of the discount rate is the risk-free rate, determined by the term structure of interest rates. The term structure reflects expectations of real interest rates, real economic activity and inflation all connected to the business cycle. Thus equity returns, and financial asset returns in general, are to a certain extent predictable. Expected returns of all assets tend to be high in bad macroeconomic times and low in good times.

This predictability of returns manifests itself statistically through autocorrelation. Autocorrelation (serial correlation) in time series of returns describes the correlation between values of a return process at different points in time. Autocorrelation can be positive when high (low) returns tend to be followed by high (low) returns, implying momentum in the market. Conversely, negative autocorrelation occurs when high (low) returns tend to be followed by low (high) returns, implying mean reversion. In either case autocorrelation induces dependence in returns over time.

Traditional mean-variance analysis focusing on short-term expected return and risk assumes returns do not exhibit time dependence and prices follow a random walk. Expected returns in a random walk are constant, exhibiting

[2] Hall, R. (1978), "Stochastic Implications of the Life-Cycle-Permanent Income Hypothesis: Theory and Evidence", *Journal of Political Economy*, vol. 86, pp. 971–988.

[3] Poterba, J. and Summers, L. (1988), "Mean Reversion in Stock Prices: Evidence and Implications", *Journal of Financial Economics*, 22, pp. 27–60.

zero autocorrelation; realized returns are not predictable. Volatilities and cross correlations among assets are independent of the investment horizon. Thus the annualized volatility estimated from monthly return data scaled by the square root of 12 should be equal to the volatility estimated from quarterly return data scaled by the square root of four. In the presence of autocorrelation, the square root of time scaling rule described above is not valid, since the sample standard deviation estimator is biased and the sign of serial correlation matters for its impact on volatility and correlations. Positive (negative) autocorrelation leads to an underestimation (overestimation) of true volatility. A similar result holds for the cross-correlation matrix bias when returns exhibit autocorrelation. So for long investment horizons, the risk/return tradeoff can be very different than that for short investment horizons.

In a multi-asset portfolio, in which different asset classes display varying degrees of autocorrelation, failure to correct for the bias on volatilities and correlations will lead to suboptimal mean variance optimized portfolios in which asset classes that appear to have low volatilities receive excessive allocations. Such asset classes include hedge funds, emerging market equities and private market assets such as private equity or private real estate, among others.

There are at least two ways to correct for serial correlation: 1) a direct method that adjusts the sample estimators of volatility, correlation and all higher moments; and 2) an indirect method that cleans the data first, allowing us to subsequently estimate the moments of the distribution using standard estimators. Given that the direct methods become quite complex beyond the first two moments, our choice is to follow the second method and clean the return data of serial correlation. Before we do that we estimate and test the statistical significance of serial correlation in our data series.

We estimate first-order serial correlation as the regression slope of a first-order autoregressive process. We use monthly return data for the period 1979–2014. We subsequently test the statistical significance of the estimated parameter using the Ljung-Box Q-statistic.[4] The Q-statistic is a statistical test for serial correlation at any number of lags. It is distributed as a chi-square with k degrees of freedom, where k is the number of lags. Here we test for first order serial correlation, thus k = 1. About 80% of our return series exhibit positive and statistically significant first-order serial correlation based on associated p-values at the 10% level of significance.[5] Khandani and Lo provide empirical evidence that positive return autocorrelation is a measure of illiquidity exhibited among a broad set of financial assets including small cap stocks, corporate bonds, mortgage-backed securities and emerging markets investments.[6] The theoretical basis is that in a frictionless market, any predictability in asset returns can be immediately exploited, thus eliminating such predictability. While other measures of illiquidity exist, autocorrelation is the only measure that applies to both publicly traded and private securities and requires only returns to compute.

Since the vast majority of the return series we estimate exhibit serial correlation, we subsequently apply the Geltner unsmoothing process to all series. This process corrects the return series for first-order serial correlation by subtracting the product of the autocorrelation coefficient (rho) and previous period's return from the current period's return and dividing by 1-rho. This transformation has no impact on the arithmetic return, but the geometric mean is impacted since it depends on volatility. This correction is thus important for long-horizon asset allocation problems.

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[4] Ljung, G.M. and Box, G.E.P. (1978), "On a Measure of Lack of Fit in Time Series Models", *Biometrika*, 65, pp. 297–303.

[5] The p-value is the probability of rejecting the null hypothesis of no serial correlation when it is true (i.e., concluding that there is serial correlation in the data when in fact serial correlation does not exist). We set critical values at 10% and thus reject the null hypothesis of no serial correlation for p-values <10%.

[6] Khandani, A.E. and Lo, A. (2011), "Illiquidity Premia in Asset Returns: An Empirical Analysis of Hedge Funds, Mutual Funds, and U.S. Equity Portfolios", *Quarterly Journal of Finance*, vol. 1, pp. 205–264.

Figure 6 shows the impact autocorrelation can have on estimated asset returns: When adjusted for autocorrelation and after applying the two-state covariance process described above, the geometric mean return for the S&P 400 Index falls from 8.1% to 7.4%.

Figure 6. Expected Return Autocorrelation Adjustments of S&P 400, MSCI Emerging Markets and Barclays High Yield Indexes

	No Correction for Autocorrelation	Correcting for Autocorrelation Alone	Correcting for Autocorrelation and Applying the Two-State Covariance Process
S&P 400 (Mid Cap)			
Arithmetic Return	9.2%	9.2%	9.2%
Standard Deviation	16.2%	17.5%	19.9%
Skewness	-0.76	-0.65	-0.51
Kurtosis	2.62	2.40	1.05
Geometric Return	8.1%	7.9%	7.4%
MSCI Emerging Markets			
Arithmetic Return	9.8%	9.8%	9.8%
Standard Deviation	21.9%	26.0%	27.7%
Skewness	-0.67	-0.61	-0.50
Kurtosis	2.06	1.78	0.72
Geometric Return	7.6%	6.5%	6.0%
Barclays High Yield			
Arithmetic Return	6.3%	6.3%	6.3%
Standard Deviation	8.2%	11.3%	12.4%
Skewness	-0.93	-0.34	-0.25
Kurtosis	8.80	6.54	3.54
Geometric Return	6.1%	5.8%	5.7%

Source: Voya Investment Management

Past performance does not guarantee future results.

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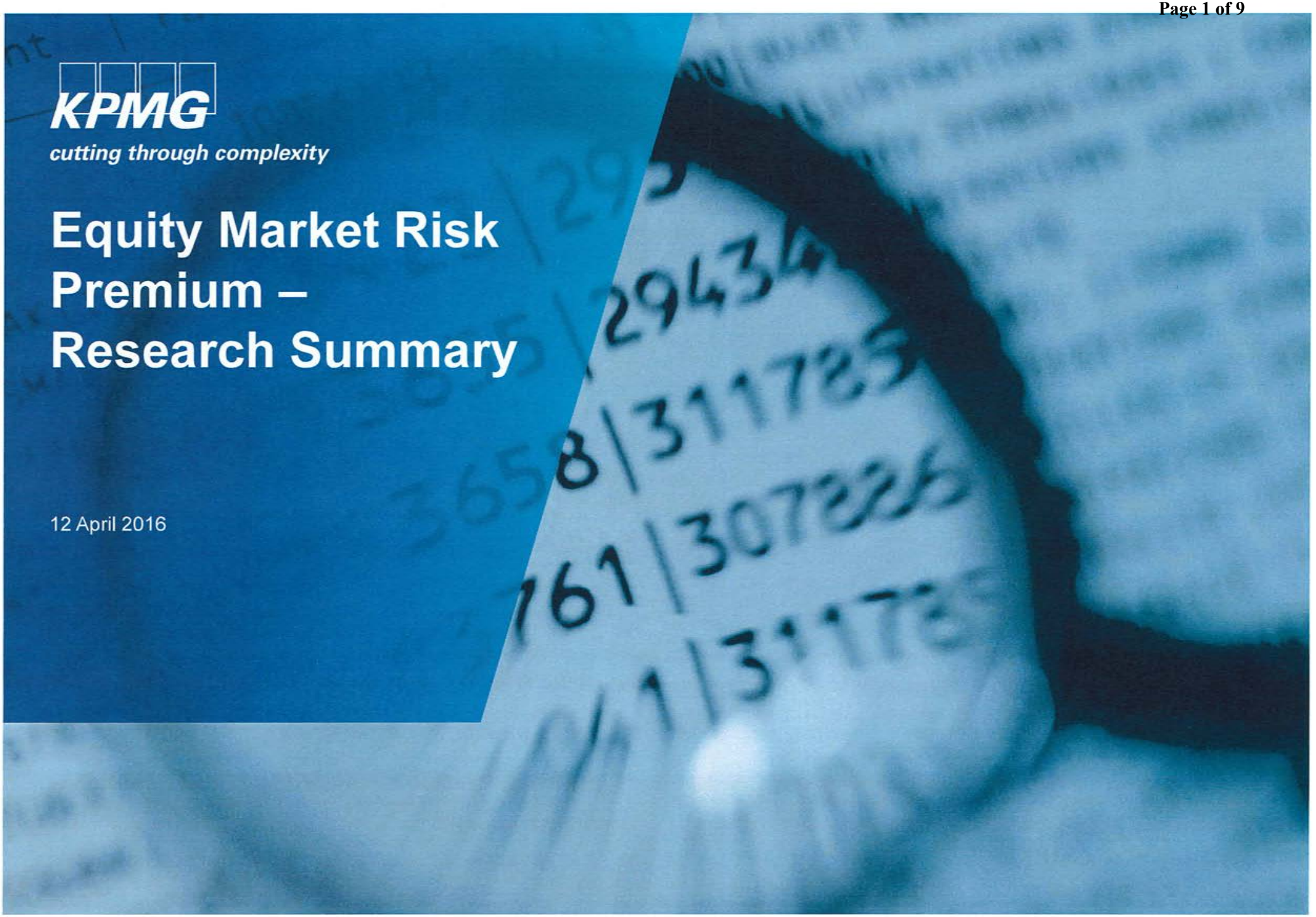
KPMG

cutting through complexity

Equity Market Risk Premium – Research Summary

12 April 2016



MRP research summary

Introduction – welcome

If you are reading this, it is likely that you are in regular contact with KPMG on the topic of valuations. The goal of this document is to provide a summary to our business partners about our recent observations and conclusions regarding one of the key valuation parameters, the equity market risk premium.

Based on the analysis conducted, we recommend to use an **equity market risk premium of 5.75%** as per 31 March 2016.

Please note that this is a summary document only. Should you require more detailed information on the exact methodologies used to derive the equity market risk premium, please do not hesitate to contact us directly at any time.

With regards,

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MRP research summary

Introduction – valuation and discount rates

Introduction

The discount rate is an important input parameter to any valuation based on the discounted cash flow methodology ("DCF").

A general DCF model can be expressed by the following formula:

$$\text{Present value} = \frac{CF_1}{(1+k)^1} + \frac{CF_2}{(1+k)^2} + \frac{CF_3}{(1+k)^3} + \ldots = \sum_{t=1}^{\infty} \frac{CF_t}{(1+k)^t}$$

Where

Present value	=	value of the analysed asset (e.g. a company)
CF_t	=	cash flow that the asset will generate in period t
k	=	asset-specific discount rate

It is generally true that, all else equal, a higher discount rate will lead to a lower asset value and vice versa.

In this document, we will specifically focus on the derivation of the cost of equity for company valuations. This discount rate can either be directly applied to equity cash flow forecasts of a company or it can be used in conjunction with the cost of debt and a certain financing structure to derive the weighted average cost of capital ("WACC").

Discount rate derivation

While there are several ways to derive discount rates, the most commonly applied methodology is the 'build-up methodology' based on the Capital Asset Pricing Model ("CAPM"). This methodology builds up the discount rate by summation of several asset-related risk components in order to derive a return at which investors are willing to invest in this asset (e.g. a company).

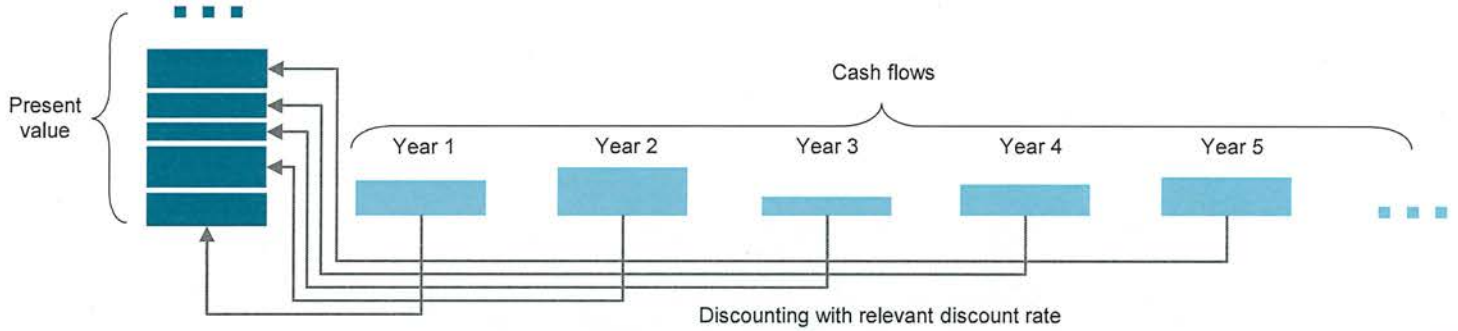
The build-up of the cost of equity ("k") of a company can be expressed as:

$$k = rfr + \beta \times MRP + \alpha$$

Where

k	=	required return on equity
rfr	=	risk-free rate
β	=	a company's systematic risk
MRP	=	market or equity risk premium
α	=	asset-specific risk factors

The function and derivation of the individual discount rate parameters are briefly discussed on the following slide.



MRP research summary

Introduction – discount rate parameters

Risk-free rate

The risk-free rate forms the basis for any discount rate estimation using the build-up methodology. As the name implies, this rate should not take into account any risk factors. Thus, it should only include two general components:

- The time value of money; and
- Inflation.

Since there are no investments that are truly risk-free, the risk-free rate is commonly approximated by reference to the yield on long-term debt instruments issued by presumably financially healthy governments (e.g. AAA-rated government bonds with a maturity of 30 years).

Beta

Beta measures how the returns of a certain company behave in relation to the returns of the relevant market benchmark.

- A beta greater than 1.0 means that the share price of a company is more volatile than the general market and therefore investors will require a higher return as compensation for this volatility; and
- A beta smaller than 1.0 means that the share price of a company is less volatile than the general market and therefore investors will require a lower return.

It is important to note that for the overall market, beta will by definition always be 1.0, since the sum of all returns of individual stocks equals the overall return of the market, and therefore, the two are perfectly correlated.

Alpha

Alpha is an asset-specific adjustment factor that may need to be applied for a number of different reasons. If a financial forecast does not account for certain operational risks, it may be appropriate to include a forecast risk premium. Other examples of alpha adjustments are size premia, illiquidity premia, etc.

Equity market risk premium

The equity market risk premium ("MRP") is the average return that investors require over the risk-free rate for accepting the higher variability in returns that are common for equity investments.

As previously discussed, the beta of the overall market is 1.0. Since alpha only relates to company-specific adjustments, it can be omitted if considering the overall market. As such, the general formula for the cost of equity is simplified if the overall market is considered:

$$k = rfr + \beta \times MRP + \alpha$$

$$k = rfr + 1.0 \times MRP + 0.0$$

$$k = rfr + MRP$$

As the final formula shows, the required return for the overall market is defined entirely by the risk-free rate and the equity market risk premium.

The remainder of this document will focus on movements in the equity market risk premium as a result of the financial crisis and the appropriate adjustments to derive valuation outcomes that are in line with other valuation-relevant market observations.

MRP research summary

Development of discount rates

Recent developments

As stated earlier, the equity market risk premium can be seen as the difference between the implied equity returns and the risk-free rate.

In the upper graph the interest rate movements for a number of highly developed markets are displayed. As can be observed, the interest rates have decreased significantly last quarter, resulting in yields just above the yields as from 31 March 2015.

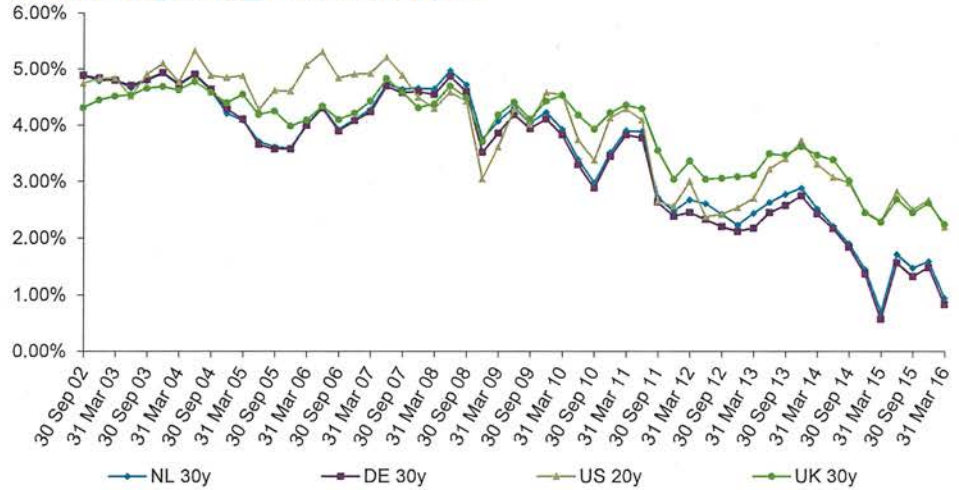
The lower graph shows the movement in the implied equity returns for a number of major equity markets over time. As can be seen, implied equity returns continued their decrease from the previous quarter, with further decrease in growth expectations putting additional pressure on implied returns.

Comparison to pre-crisis levels

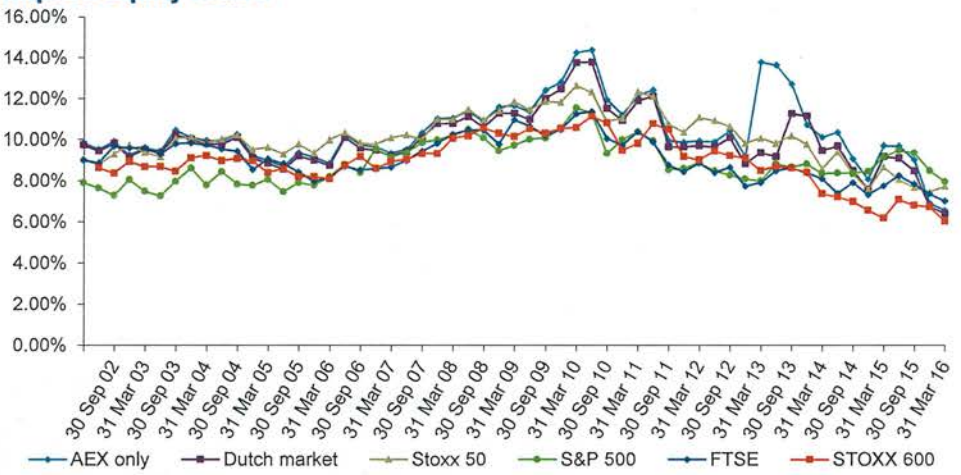
The spread between the implied equity returns and the risk-free rates was comparatively lower in the period before the crisis as compared to more recent times. A possible explanation is that before the crisis the perceived market risk was lower, as demonstrated by relatively more stable expected equity returns and higher government bond yields.

Other evidence for a higher equity market risk premium compared to pre-crisis levels can be found in yields on government bonds having been lower than expected inflation rates at certain points in time. This implies that the risk aversion of investors has increased ('flight to safety'), accepting zero or negative real returns in order to protect against significant capital loss.

Yield on long-term government bonds



Implied equity return



MRP research summary

Measurement of the equity market risk premium – methodologies

Quantification

In order to quantify the change in the equity market risk premium, a number of methodologies can be applied.

Historical observation methodology

This methodology assumes that the expected equity market risk premium can be derived by studying historical equity returns.

While this methodology is well established and theoretically sound, it does not allow for the incorporation of the most recent market developments:

- Depending on the methodology, annual short-term swings (e.g. 1-3 years) may be insignificant in the long-term (e.g. 30 years); and
- If the expected equity market risk premium increases because investors require a higher return, market data will show lower realised returns, and thus a lower historical equity market risk premium would be derived. For this reason, short-term observations based on historical data only are not conclusive.

So while historical research can be important to derive reasonable equity market risk premium ranges, historical observation is not necessarily a robust methodology to determine changes in the equity market risk premium as a result of the financial crisis started in 2008.

Implied equity market risk premium methodology

This methodology derives the equity market risk premium by assessing current income, growth expectations and current prices. The general DCF formula discussed earlier can then be used to solve for the implied discount rate that reconciles these parameters.

Deducting the risk-free rate from this implied discount rate will yield an implied equity market risk premium.

This methodology is also well established and theoretically sound, and it does allow for the incorporation of the most recent market developments.

The implied equity market risk premium methodology is to some extent sensitive to input assumptions and careful consideration must be given to:

- The selection of income proxies (e.g. dividends, buy-backs, cash flow);
- The basis of expected growth rates (e.g. macroeconomic considerations, analyst forecasts); and
- The trade-off between outcome stability and current relevance with regards to certain historical inputs (e.g. dividend yield normalisations, payout ratios).

Other methodologies

There are a number of other prominent methodologies which may lead to additional insights, the most common being:

- The multi-factor model;
- The yield spread build-up; and
- The survey approach.

While each of these methodologies offers some unique advantages, the application of these methodologies involves similar tradeoffs as the ones between the historical and the implied equity market risk premium methodology.

Methodology KPMG

We deem the implied equity market risk premium methodology the most appropriate methodology in order to derive changes in the equity market risk premium as a result of the financial crisis, because it incorporates recent market developments, expectations, and it can be logically deduced from observable market data.

On the following page we present our findings based on the application of the implied equity market risk premium methodology.

MRP research summary

Equity market risk premium: 5.75%

Findings

Based on the application of the implied equity risk premium methodology, we have derived market risk premia for several developed markets for the last 14 years.

Since markets fluctuate on a daily basis and there are some differences between market risk premia in different regions, it is difficult to mathematically derive one single point estimate for a universal equity market risk premium for all developed markets.

Similar to the determination of the input parameters, interpretation of the outcomes of the implied equity market risk premium methodology does require an element of professional judgement.

During the past six months, we have seen a decreasing trend in the equity market risk premium. This decrease has been largely caused by a further decrease in growth expectations.

Equity market risk premium KPMG NL

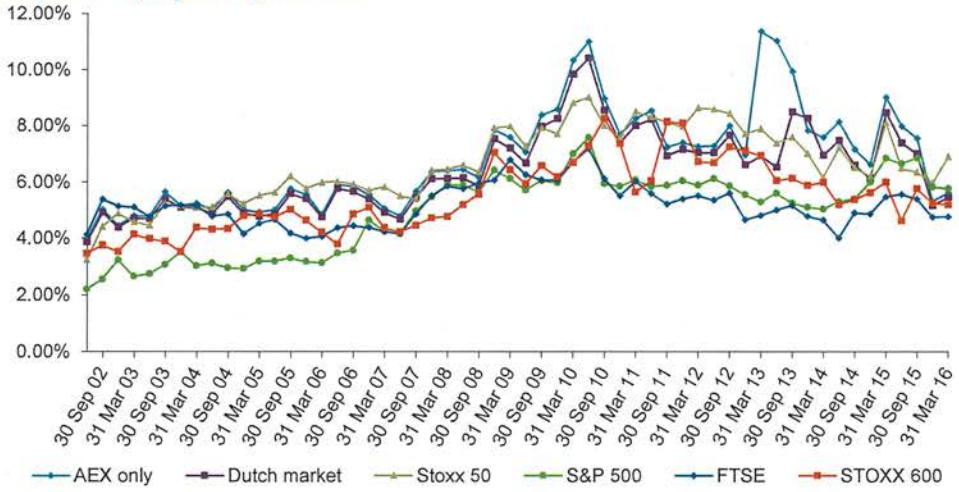
Based on the analyses set out in this report, KPMG Netherlands recommends to use an **equity market risk premium of 5.75%** as per 31 March 2016 (decrease of 0.25% from the previous quarter).

We note that our estimation is based on information available as at 31 March 2016. Developments in the financial markets after 31 March 2016 can have an impact on the perceived market risk which is not reflected in the MRP estimate as at 31 March 2016. For instance, the currently observed changes in return expectations may lead to further changes in the perceived risk in the market.

As a general comment, we would like to point out that individual input parameters for a discount rate calculation should never be assessed in isolation.

Furthermore, as mentioned the decrease in equity market risk premium is mainly caused by a decrease in growth expectations, which should also be taken into account in the value analysis.

Implied equity risk premium



Cross check

In order to assess the reasonableness of the outcomes of our implied equity market risk premium study, we have considered various other methodologies as previously described. To the extent that these methodologies are valid to derive insights about the current level of the equity market risk premium, these methodologies have confirmed our findings.

The valuation outcomes based on the DCF methodology and a equity market risk premium of 5.75% are in line with outcomes of alternative valuation indicators, such as market and transaction multiples as at 31 March 2016.

MRP research summary

Appendix

KPMG NL - Historic MRP														
	31 Mar 16	31 Dec 15	30 Sep 15	30 Jun 15	31 Mar 15	31 Dec 14	30 Sep 14	30 Jun 14	31 Mar 14	31 Dec 13	30 Sep 13	30 Jun 13	31 Mar 13	31 Dec 12
KPMG NL MRP estimate	5.75%	6.00%	6.25%	6.25%	6.25%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	6.50%	6.50%	6.50%

Today: 1/12/2016

	NAME	TICKER	CUR_MKT_CAP	EQY_DVD_YLD_EST	BEST_EST_LONG_TERM_GROWTH	EQY_SH_OUT	PX_LAST
AEE UN Equity	AMEREN CORPORATION	AEE	10513365797	3.831063928	7.1	242.6348	43.33
AEP UN Equity	AMERICAN ELECTRIC POWER	AEP	28521399230	3.710204784	4.576	490.8174	58.11
AES UN Equity	AES CORP	AES	5948101503	4.524886878	4.35	672.8622	8.84
CMS UN Equity	CMS ENERGY CORP	CMS	9978658088	3.230297967	6.25	277.8796	35.91
CNP UN Equity	CENTERPOINT ENERGY INC	CNP	7490864745	5.686387134	4.5	430.2622	17.41
D UN Equity	DOMINION RESOURCES INC/VA	D	41018485729	3.759071118	6.5	595.3336	68.9
DTE UN Equity	DTE ENERGY COMPANY	DTE	14230622306	3.579265986	5.04	179.4756	79.29
DUK UN Equity	DUKE ENERGY CORP	DUK	48995641026	4.606631076	4.088	688.3344	71.18
ED UN Equity	CONSOLIDATED EDISON INC	ED	19277390964	3.954372624	3.08	293.1923	65.75
EIX UN Equity	EDISON INTERNATIONAL	EIX	19343411300	2.841502442	4.583	325.8112	59.37
ES UN Equity	EVERSOURCE ENERGY	ES	16151378399	3.285545954	6.6	317.1912	50.92
ETR UN Equity	ENTERGY CORP	ETR	12082137964	4.94020375	1.56	178.3868	67.73
EXC UN Equity	EXELON CORP	EXC	25655846202	4.448028674	4.878	919.5644	27.9
FE UN Equity	FIRSTENERGY CORP	FE	13507724099	4.50986533	2.64	423.0418	31.93
GAS UN Equity	AGL RESOURCES INC	GAS	7634033410	3.213104426	7	120.2399	63.49
NEE UN Equity	NEXTERA ENERGY INC	NEE	48554300570	2.921369629	6.72	460.5359	105.43
NI UN Equity	NISOURCE INC	NI	6245957088	4.234693878	4	318.6713	19.6
NRG UN Equity	NRG ENERGY INC	NRG	3144905043	5.824175824	26.6	314.1763	10.01
PCG UN Equity	P G & E CORP	PCG	25483982358	3.512317167	6.325	490.4539	51.96
PEG UN Equity	PUBLIC SERVICE ENTERPRISE GP	PEG	19347981373	4.079497908	3.804	505.9619	38.24
PNW UN Equity	PINNACLE WEST CAPITAL	PNW	7005704326	3.813291139	4.968	110.8498	63.2
POM UN Equity	PEPCO HOLDINGS INC	POM	6639698060	4.125286478	6	253.6172	26.18
PPL UN Equity	PPL CORP	PPL	22580697799	4.472586412	4.69	672.8456	33.56
SCG UN Equity	SCANA CORP	SCG	8685061046	3.587296363	5.55	142.9169	60.77
SO UN Equity	SOUTHERN CO/THE	SO	42265659734	4.647311828	3.929	908.9389	46.5
SRE UN Equity	SEMPRA ENERGY	SRE	22214835186	3.12849162	9	248.2104	89.5
TE UN Equity	TECO ENERGY INC	TE	6318298214	3.350707372	5.5	235.2308	26.86
WEC UN Equity	WEC ENERGY GROUP INC	WEC	16241965004	3.484936832	6.1	315.6845	51.45
XEL UN Equity	XCEL ENERGY INC	XEL	18366315634	3.503730312	4.667	507.497	36.19

	Market Capitalization	Weight in Index	Estimated Dividend Yield	Long-Term Growth Est.	DCF Result	Weighted DCF Result
AEE UN Equity	10,513.37	1.98%	3.83%	7.10%	11.07%	0.2194%
AEP UN Equity	28,521.40	5.38%	3.71%	4.58%	8.37%	0.4502%
AES UN Equity	5,948.10	1.12%	4.52%	4.35%	8.97%	0.1006%
CMS UN Equity	9,978.66	1.88%	3.23%	6.25%	9.58%	0.1803%
CNP UN Equity	7,490.86	1.41%	5.69%	4.50%	10.31%	0.1457%
D UN Equity	41,018.49	7.73%	3.76%	6.50%	10.38%	0.8030%
DTE UN Equity	14,230.62	2.68%	3.58%	5.04%	8.71%	0.2337%
DUK UN Equity	48,995.64	9.24%	4.61%	4.09%	8.79%	0.8120%
ED UN Equity	19,277.39	3.64%	3.95%	3.08%	7.10%	0.2579%
EIX UN Equity	19,343.41	3.65%	2.84%	4.58%	7.49%	0.2732%
ES UN Equity	16,151.38	3.05%	3.29%	6.60%	9.99%	0.3044%
ETR UN Equity	12,082.14	2.28%	4.94%	1.56%	6.54%	0.1490%
EXC UN Equity	25,655.85	4.84%	4.45%	4.88%	9.43%	0.4564%
FE UN Equity	13,507.72	2.55%	4.51%	2.64%	7.21%	0.1836%
GAS UN Equity	7,634.03	1.44%	3.21%	7.00%	10.33%	0.1486%
NEE UN Equity	48,554.30	9.16%	2.92%	6.72%	9.74%	0.8918%
NI UN Equity	6,245.96	1.18%	4.23%	4.00%	8.32%	0.0980%
NRG UN Equity	-	0.00%	5.82%	26.60%	33.20%	0.0000%
PCG UN Equity	25,483.98	4.81%	3.51%	6.33%	9.95%	0.4781%
PEG UN Equity	19,347.98	3.65%	4.08%	3.80%	7.96%	0.2905%
PNW UN Equity	7,005.70	1.32%	3.81%	4.97%	8.88%	0.1173%
POM UN Equity	6,639.70	1.25%	4.13%	6.00%	10.25%	0.1283%
PPL UN Equity	22,580.70	4.26%	4.47%	4.69%	9.27%	0.3946%
SCG UN Equity	8,685.06	1.64%	3.59%	5.55%	9.24%	0.1513%
SO UN Equity	42,265.66	7.97%	4.65%	3.93%	8.67%	0.6908%
SRE UN Equity	22,214.84	4.19%	3.13%	9.00%	12.27%	0.5140%
TE UN Equity	6,318.30	1.19%	3.35%	5.50%	8.94%	0.1066%
WEC UN Equity	16,241.97	3.06%	3.48%	6.10%	9.69%	0.2968%
XEL UN Equity	18,366.32	3.46%	3.50%	4.67%	8.25%	0.2858%
	530,299.52				S&P 500 Est. Required Market Re	9.16%

SIC Code	Short Description	Number of Companies*	Full-Information Beta (FIB)	Industry Risk Premia (%) using: Long-term Historical ERP (6.90%)	Long-term Supply-Side ERP (6.03%)	Duff & Phelps Recommended ERP (5.00%)†
	Transportation, Communications, Electric, Gas, and Sanitary Services (continued)					
4922	Natural Gas Transmission	34	0.97	-0.19	-0.16	-0.14
4923	Natural Gas Transmission and Distribution	15	1.47	3.23	2.83	2.34
4924	Natural Gas Distribution	30	0.41	-4.04	-3.53	-2.93
494	Water Supply	12	0.34	-4.53	-3.96	-3.28
495	Sanitary Services	22	0.49	-3.55	-3.11	-2.57
	Wholesale Trade					
50	Wholesale Trade-durable Goods	98	1.08	0.58	0.51	0.42
504	Professional and Commercial Equipment and Supplies	20	1.02	0.12	0.11	0.09
5045	Computers and Computer Peripheral Equipment and Software	14	0.98	-0.12	-0.11	-0.09
505	Metals and Minerals, Except Petroleum	13	1.54	3.70	3.23	2.68
5051	Metals Service Centers and Offices	11	1.53	3.67	3.21	2.66
506	Electrical Goods	20	1.71	4.88	4.26	3.53
5063	Electrical Apparatus and Equipment Wiring Supplies, and Construction Materials	10	1.03	0.17	0.15	0.13
5065	Electronic Parts and Equipment, Not Elsewhere Classified	11	1.73	5.05	4.41	3.65
508	Machinery, Equipment, and Supplies	23	0.73	-1.89	-1.65	-1.37
51	Wholesale Trade-non-durable Goods	84	0.86	-0.99	-0.86	-0.71
512	Drugs, Drug Proprietaries, and Druggists' Sundries	13	0.88	-0.85	-0.74	-0.61
514	Groceries and Related Products	12	0.63	-2.59	-2.26	-1.87
517	Petroleum and Petroleum Products	36	0.98	-0.13	-0.11	-0.09
5171	Petroleum Bulk stations and Terminals	19	0.94	-0.41	-0.36	-0.30
5172	Petroleum and Petroleum Products Wholesalers, Except Bulk Stations and Terminals	21	1.05	0.37	0.32	0.27
	Retail Trade					
53	General Merchandise Stores	18	0.43	-3.95	-3.45	-2.86
533	Variety Stores	10	0.35	-4.47	-3.91	-3.24
54	Food Stores	19	0.81	-1.34	-1.17	-0.97
541	Grocery Stores	13	0.81	-1.32	-1.16	-0.96
5411	Grocery Stores	11	0.79	-1.46	-1.27	-1.06
55	Automotive Dealers and Gasoline Service Stations	23	0.82	-1.21	-1.06	-0.88
56	Apparel and Accessory Stores	43	0.88	-0.86	-0.75	-0.62
565	Family Clothing Stores	14	0.92	-0.57	-0.50	-0.41
566	Shoe Stores	10	0.76	-1.64	-1.43	-1.19
57	Home Furniture, Furnishings, and Equipment Stores	18	0.90	-0.69	-0.60	-0.50
571	Home Furniture and Furnishings Stores	10	0.68	-2.18	-1.90	-1.58
58	Eating and Drinking Places	51	0.64	-2.49	-2.18	-1.80
59	Miscellaneous Retail	79	0.98	-0.16	-0.14	-0.11
591	Drug Stores and Proprietary Stores	12	1.02	0.12	0.11	0.09
594	Miscellaneous Shopping Goods Stores	15	1.70	4.87	4.25	3.52
596	Nonstore Retailers	33	0.96	-0.31	-0.27	-0.22
5961	Catalog and Mail-Order Houses	31	0.97	-0.19	-0.17	-0.14
598	Fuel Dealers	11	0.72	-1.94	-1.69	-1.40
599	Retail Stores, Not Elsewhere Classified	10	0.75	-1.69	-1.48	-1.23
	Finance, Insurance, and Real Estate					
60	Depository Institutions	487	1.18	1.26	1.10	0.91
602	Commercial Banks	353	1.26	1.82	1.59	1.32
603	Savings Institutions	123	0.75	-1.69	-1.48	-1.23
6036	Savings Institutions, Not Federally Chartered	31	0.78	-1.55	-1.35	-1.12
609	Functions Related To Depository Banking	11	0.88	-0.86	-0.75	-0.62
61	Non-depository Credit Institutions	85	1.49	3.41	2.98	2.47
614	Personal Credit Institutions	21	1.25	1.73	1.51	1.26
615	Business Credit Institutions	32	1.08	0.55	0.48	0.40
6153	Short-Term Business Credit Institutions, Except Agricultural	16	1.10	0.68	0.59	0.49
6159	Miscellaneous business Credit Institutions	16	0.80	-1.38	-1.21	-1.00

* To view the full list of companies, download the Industry Risk Premia Company List Report at www.DuffandPhelps.com/CostofCapital
† The Duff & Phelps recommended ERP as of December 31, 2015 (5.0%) was developed in relation to a 4.0% "normalized" risk-free rate. The Duff &-Phelps recommended ERP should be used with the risk-free rate that it was developed in relation to, per the schedule provided in Exhibit 3.15

MARKETS | BONDS

TREASURYS | U.K. | GERMANY | ITALY | FRANCE | JAPAN | AUSTRALIA | CANADA | BRAZIL

U.S. Treasurys

Symbol	Yield		Change
US 3-MO	0.2562	---	UNCH
US 2-YR	0.7345	---	UNCH
US 5-YR	1.1687	---	UNCH
US 10-YR	1.6438	---	UNCH
US 30-YR	2.4548	---	UNCH

U.K. Government Bonds (GILT)

Symbol	Yield		Change
UK 2-YR	0.416	▲	0.014
UK 5-YR	0.754	▼	-0.004
UK 10-YR	1.241	▲	0.006
UK 30-YR	2.07	▲	0.008

German Government Bonds (BUND)

Symbol	Yield		Change
Bund 10-Yr	0.019	▼	-0.002
GER 20-YR	0.4224	▼	-0.003
GER 30-YR	0.5875	---	UNCH

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SUBMIT

MOST POPULAR

AQUA INDIANA, INC.
Aboite Wastewater Division

Schedule D - 3
Page 1 of 1
170 IAC 1 - 5 Section 13-1,3,6,7

Test Year Period: 9/30/15
Actual 9/30/15 Rate Base Plus Major Projects; Customer Period 9/30/16

Long Term Debt Detail

Line	Aqua America Inc. Notes	Interest Rate	Issue Date	Maturity Date	Outstanding w/o Current	Current Maturities	Balance @ 09/30/15	Debt Push-Down To Aqua Indiana, Inc.	Debt Push-Down %	Annualized Interest Exp.
1	Senior Unsecured Notes	4.87%	07/31/03	07/31/16	0	10,800,000	10,800,000	3,375,428	31.25%	164,383
2	Senior Unsecured Notes	4.87%	07/31/03	07/31/17	10,800,000	0	10,800,000	3,262,298	30.21%	158,874
3	Senior Unsecured Notes	4.87%	07/31/03	07/31/18	10,800,000	0	10,800,000	2,008,065	18.59%	97,793
4	Senior Unsecured Notes	4.87%	07/31/03	07/31/20	16,200,000	0	16,200,000	3,012,097	18.59%	146,689
5	Senior Unsecured Notes	4.87%	07/31/03	07/31/23	10,800,000	0	10,800,000	1,169,065	10.82%	56,933
6					48,600,000	10,800,000	59,400,000	12,826,953		
7										
8	Unsecured Note - Series B	5.20%	02/03/05	02/03/20	12,000,000	0	12,000,000	-	0.00%	-
9					12,000,000	0	12,000,000	0		
10										
11	Unsecured Notes	5.63%	02/28/07	02/28/22	15,000,000	0	15,000,000	3,701,986	24.68%	208,422
12	Unsecured Notes	5.83%	02/28/07	02/28/37	15,000,000	0	15,000,000	4,530,969	30.21%	264,155
13					30,000,000	0	30,000,000	8,232,955		
14										
15	Unsecured Notes	5.54%	12/27/06	12/31/17	10,000,000	0	10,000,000	-	0.00%	-
16	Unsecured Notes	5.54%	12/27/06	12/31/18	10,000,000	0	10,000,000	-	0.00%	-
17					20,000,000	0	20,000,000	0		
18										
19	Unsecured Notes	2.00%	05/20/08	05/20/16	0	5,250,000	5,250,000	-	0.00%	-
20	Unsecured Notes	2.00%	05/20/08	05/20/17	5,250,000	0	5,250,000	-	0.00%	-
21	Unsecured Notes	2.00%	05/20/08	05/20/21	2,250,000	0	2,250,000	-	0.00%	-
22	Unsecured Notes	2.00%	05/20/08	05/20/22	2,250,000	0	2,250,000	-	0.00%	-
23					9,750,000	5,250,000	15,000,000	0		
24										
25	Senior Unsecured Notes	4.62%	06/24/10	06/24/21	15,000,000	0	15,000,000	0		-
26	Senior Unsecured Notes	4.83%	06/24/10	06/24/24	20,000,000	0	20,000,000	0		-
27	Senior Unsecured Notes	5.22%	06/24/10	06/24/28	35,000,000	0	35,000,000	0		-
28					70,000,000	0	70,000,000	0		
29										
30	Senior Unsecured Notes	4.72%	12/17/09	12/17/19	50,000,000	0	50,000,000	760,000		35,872
31										
32	Senior Unsecured Notes	3.57%	06/14/12	06/14/27	50,000,000	0	50,000,000	2,219,008		79,219
33										
34	Senior Unsecured Notes	3.59%	05/20/15	05/20/30	70,000,000	0	70,000,000	0		-
35										
36										
37	Sub-total - per Aqua Indiana GL (Push Down Debt)						376,400,000	24,038,916	6.39%	
38										-
39										
40	**Total "Push Down" Debt**				360,350,000	16,050,000	376,400,000	24,038,916	6.39%	Pro Forma Push Down Interest Exp **1,212,341**
41										
42	Other Aqua Indiana Inc. Long-term financing:							-		Other LTD Interest Exp. 0
43	Pro Forma Long-term Debt							24,038,916		Pro Forma Total Interest Expense 1,212,341
44						Push Down Unamort.Debt Iss		44,972 (1)		Issuance Expense Amortization (1) 6,396
45	Aqua Indiana Inc. Push Down Debt at 9/30/15			24,038,916		Carrying Value		$ 23,993,944		Pro Forma All-In Interest Exp. 1,218,737
46	Percentage of Total Push Down Debt:			6.3865%						**Embedded Cost Rate of LTD** **5.0794%**

(1) $(4,702) Push Down Unamort. Debt Issuance per books adjusted by $49,674 in Dec. 2015. Associated amortization becomes $6,396

AQUA | 130 YEARS

NYSE: **WTR**

Corporate Overview

Founded in 1886, Aqua America, Inc. is the publicly traded holding company for regulated water and wastewater utilities that serve approximately 3 million people in Pennsylvania, Ohio, Texas, Illinois, North Carolina, New Jersey, Indiana and Virginia. Aqua has a long history of returning value to its shareholders, and most recently, the company increased its dividend for the 25th time in 24 years, effective as of September 1, 2015. The company has paid quarterly dividends for 71 consecutive years. Aqua America is listed on the New York Stock Exchange under the ticker symbol WTR.

Our Business

Aqua's mission is to protect and provide earth's most essential resource. Water is the only utility business charged with delivering a product that is ingested. The core business of our regulated subsidiaries is to treat this essential natural resource to a quality meeting required drinking water standards to sustain a healthy life, but our commitment does not end there. Aqua recognizes that as stewards of Earth's most recycled natural resource, we have a responsibility to take equal care in preparing fresh water for drinking as well as treating wastewater for its return to Earth.

Water and Wastewater Industry Overview

The water and wastewater industry is the nation's most fragmented utility industry. The great majority of the U.S. population is served by municipal drinking water and wastewater systems. Approximately 53,000 water systems and more than 16,000 wastewater systems exist in the country. Even though roughly half of the drinking water systems are privately owned, they serve only about 15 percent of the population. Approximately 20 percent of the wastewater systems are privately owned, but they serve only about 3 percent of the population. More stringent regulations from federal and state environmental regulators, and the capital needed to meet such standards on the part of many system owners, as well as the monetizing of public assets to support the financial condition of municipalities, are among the factors that might drive consolidation. The U.S. Environmental Protection Agency has estimated that an investment of $335 billion is needed for required improvements to the nation's aging water infrastructure over the next 20 years. The American Society of Civil Engineers has estimated that $298 billion is needed to improve the nation's wastewater infrastructure. Aqua America has the expertise and financial strength to play a role in making these infrastructure improvements.

Growth Strategy

Aqua America's growth strategy is focused on investing the needed capital to rehabilitate the infrastructure serving our communities, growing its customer base through prudent acquisitions of private and municipal water and wastewater systems, and developing our market-based activities. Our long-term growth strategy is to invest needed capital into utility systems, investing in the infrastructure required to provide clean water and wastewater services. This strategy directly and positively impacts the communities we serve. In 2015, Aqua invested approximately $365 million to improve its infrastructure systems, and expects to invest more than $350 million in 2016 and more than $1.1 billion through 2018. The company has completed more than 200 acquisitions of utility systems in the last 10 years. In 2015, Aqua's growth-through-acquisition strategy yielded the largest customer growth rate seen since 2008. The company expects its customer base to increase by 1.5 to 2 percent in 2016. Aqua continues to refine and develop its market-based activities which complement the company's regulated operations.

Financial Highlights (in thousands, except per share amounts)	2015	2014
Operating revenues	$814,204	$779,903
Income from continuing operations	$201,790	$213,884
Exclude: joint venture impairment charge net of taxes	$21,433	$0
Adjusted income from continuing* (Non-GAAP financial measurement)	$223,223	$213,884
Adjusted income from continuing operations per share* (Non-GAAP financial measurement)	$1.26	$1.20
Average common shares outstanding (diluted)	177,517	177,763

*The GAAP financial measure is income from continuing operations. Please see our investor relations page of AquaAmerica.com for a reconciliation of the GAAP to non-GAAP financial measures.

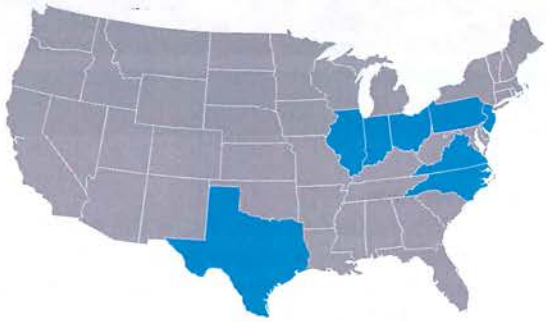
Market Information

- 12/31/15 closing price: $29.80
- Market capitalization: $5.3 billion
- 52 Week High: $31.09
- 52 Week Low: $24.40
- Annualized dividend yield: 2.4%
- Annualized dividend: $0.712
- Average daily volume (TTM): 666k

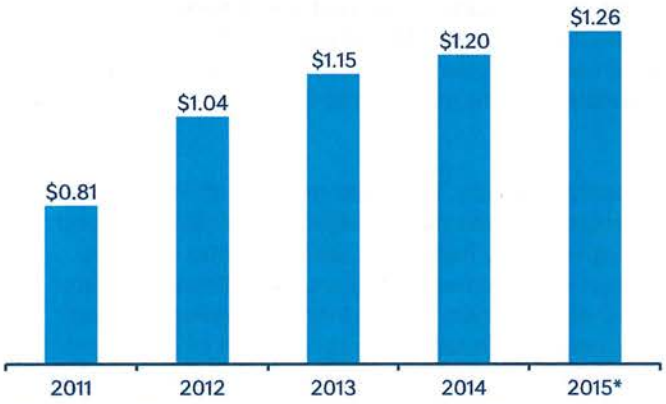
Dividend Highlights

- Increased cash dividend by 7.9 percent to $0.712 on an annualized basis as of Sept. 1, 2015
- 25 cash dividend increases in the last 24 years
- 2016 marks the 71st consecutive year of paying a quarterly dividend

Service Territory

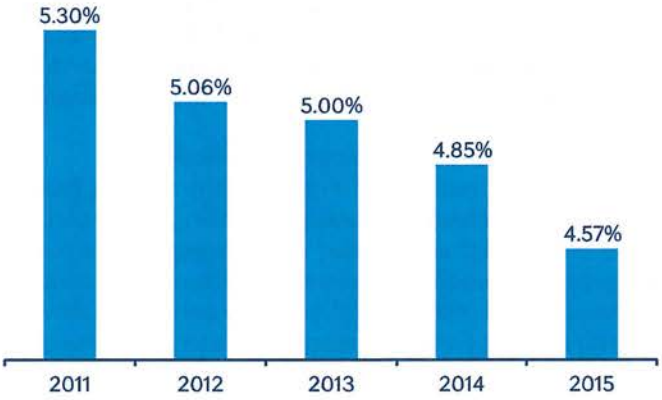


Income from Continuing Operations per Share

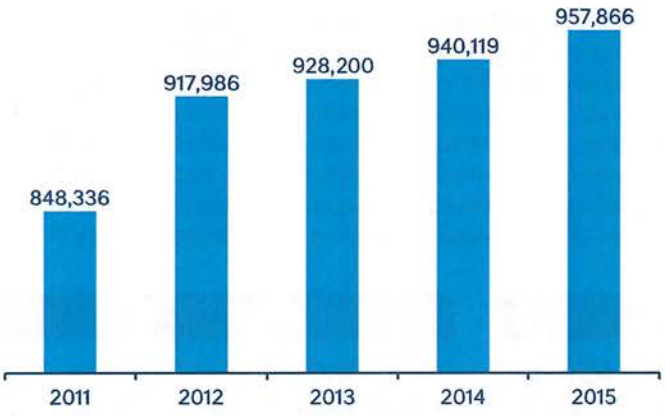


*2015: Income from continuing operations adjusted for joint venture impairment charge (a non-GAAP financial measure). 2015 income from continuing operations per share was $1.14

Weighted Average Cost of Long-term Fixed-rate • ebt



Utility Customer Connections (continuing operations)



Dividend per Share (annualized)

For more information, contact:
Alexander Whitelam
Investor Relations
ASWhitelam@AquaAmerica.com
610.645.1196

AquaAmerica.com

Q 3.3. Please provide the total debt and total equity for Petitioner's Indiana parent company, Aqua Indiana, Inc., for each of the months during the period January 2014 through December 2015.

Response: Petitioner objects to this Request on the grounds that it is potentially confusing and it should not have to guess at its meaning. Contrary to the statement made in the Request, "Aqua Indiana, Inc." is not Petitioner's "Indiana parent company". Aqua Indiana is the Petitioner in this Cause and, as such, is seeking authority to implement new rates and charges to be collected by its Aboite Wastewater Division". The Aboite Wastewater Division is not a separate legal entity, but an operating division of Aqua Indiana.

Subject to and without waiving is objection, Aqua Indiana states that its total debt and total equity for Aqua Indiana, Inc., for each of the months during the period January 2014 through December 2015 is attached.

Witness: Dylan D'Ascendis /Bobby D. Estep

Aboite Wastewater Division
Cause No. 44752
Q 3.3

5/9/2016

Aqua Indiana, Inc. Total Debt and Total Equity

Month Ending	Total Debt	Total Equity
Jan-14	$ 38,878,916.00	$ 38,557,497.31
Feb-14	$ 38,878,916.00	$ 38,035,062.52
Mar-14	$ 29,878,916.00	$ 46,800,943.80
Apr-14	$ 29,878,916.00	$ 46,293,400.97
May-14	$ 29,878,916.00	$ 46,751,110.11
Jun-14	$ 29,878,916.00	$ 49,705,304.28
Jul-14	$ 29,878,916.00	$ 49,731,028.67
Aug-14	$ 29,878,916.00	$ 50,051,207.15
Sep-14	$ 29,878,916.00	$ 49,824,939.19
Oct-14	$ 29,878,916.00	$ 49,717,001.73
Nov-14	$ 29,878,916.00	$ 49,783,670.88
Dec-14	$ 29,878,916.00	$ 21,363,317.78
Jan-15	$ 22,878,916.00	$ 22,988,439.43
Feb-15	$ 22,878,916.00	$ 22,824,594.39
Mar-15	$ 22,878,916.00	$ 22,896,554.12
Apr-15	$ 22,878,916.00	$ 23,272,762.12
May-15	$ 22,878,916.00	$ 23,915,579.99
Jun-15	$ 22,878,916.00	$ 24,011,576.94
Jul-15	$ 22,878,916.00	$ 23,770,540.90
Aug-15	$ 22,878,916.00	$ 24,139,650.94
Sep-15	$ 24,038,916.00	$ 24,051,644.62
Oct-15	$ 24,038,916.00	$ 24,903,429.38
Nov-15	$ 24,038,916.00	$ 27,879,340.02
Dec-15	$ 24,038,916.00	$ 30,714,588.88

Q 3.4. The fact sheet from Aqua America's web page reflects a weighted average cost of long-term fixed rate debt of 4.57%. Please explain why this differs from Petitioner's proposed 5.08%.

Response: The 4.57% weighted average cost of long-term debt as of December 31,2015 represents the consolidated average cost of debt issued by Aqua America (parent) as well as six operating subsidiaries which have issued external debt. Only debt issued by the parent is allocated to Aqua Indiana and other subsidiaries. The proposed 5.08% is an average (including issuance expense) of the specific parent level loans allocated to Indiana.

Witness: Dylan D'Ascendis/ Bobby D. Estep

Q 3.5. In response to OUCC Data Request No. 2.22, Petitioner asserted "Allocations of pushdown debt are made to subsidiaries on an as-needed basis, with effort made to allocate available note maturities on a ratable basis." Please specifically describe how Aqua America decides on the allocation of pushdown debt to Aqua Indiana.

Response: Aqua Indiana's financials are reviewed periodically to maintain a targeted capital structure based upon their most recent rate filing. If the actual capitalization ratios are out of alignment with the target, Aqua America will either add or reduce allocated debt to Aqua Indiana. The assignment of specific debt instruments is guided by the availability of unallocated loan balances as well as maturity dates and interest rates.

Witness: Bobby D. Estep

Q 3.6. The following questions relate to Mr. Estep's Schedule D-3 "Long Term Debt Detail":

a) Line 30 lists a $50.0 million note with an interest rate of 4.72%. Why was only $760,000 of this long-term note allocated to Aqua Indiana?

b) Please list all other state jurisdictions to which the note described in part (a) was allocated.

c) Line 32 lists a $50.0 million note with an interest rate of 3.5%. Why was only $2,219,008 of this long-term note allocated to Aqua Indiana?

d) Please list all other state jurisdictions to which the note described in part (c) was allocated.

e) Line 34 lists a $70.0 million note with an interest rate of 3.59%. Why was none of this long-term note allocated to Aqua Indiana?

f) Please list all state jurisdictions to which the note described in part (e) was allocated.

g) Lines 19-22 list four notes totaling $15.0 million with an interest rate of 2.00%. Why were none of these long-term notes allocated to Aqua Indiana?

h) Please list all state jurisdictions to which the notes described in part (g) were allocated.

Response:

a) Aqua Indiana had higher amounts of this note allocated to them in prior periods. Following the December 2014 sale of the Aboite water system, the Company needed to rebalance its cap structure by reducing overall debt, including a portion of this specific allocation, and reduced it to the current level of $760,000.

b) Portions of the 4.72% note issued by Aqua America have been allocated to Aqua Infrastructure, Aqua Texas, Inc, Aqua North Carolina, Inc., Aqua Ohio, Inc. and Aqua Virginia, Inc.

c) Aqua America allocates its debt to a number of its subsidiaries and the 3.57% note is the lowest cost debt currently outstanding. As of 9/30/15, 94% of the total $50 million issuance amount was allocated. Since then, Aqua Indiana was allocated an additional $3.66 million of the 3.57% note. To allocate this note disproportionately to any one subsidiary would unfairly raise the weighted average cost of long-term debt at the other subsidiaries. Aqua America makes its best efforts to allocate its debt to its subsidiaries in a balanced manner.

d) Portions of the 3.57% note issued by Aqua America have been allocated to Aqua Infrastructure, Aqua Texas, Inc. Aqua North Carolina, Inc, Aqua Virginia, Inc., Aqua Illinois, Inc. and Aqua New Jersey, Inc.

e) As a result of the sale of the Aboite water system in December 2014, Aqua Indiana's allocated debt has been decreasing. The $70 million 3.59% note was issued in May 2015 which was subsequent to the sale of the Aboite water system.

f) As of 9/30/15, a portion of this note was allocated to Aqua Illinois.

g) There was a typo in the original schedule D-3. The interest rate on the four notes listed in lines 19-22 is 5.40%, not 2.00%. These notes were fully allocated to other state jurisdictions shortly after the 2008 issuance.

h) Portions of the 5.40% notes issued by Aqua America have been allocated to Aqua Infrastructure, Aqua North Carolina, Inc, Aqua Virginia, Inc., and Aqua New Jersey, Inc.

Witness: Bobby D. Estep

AQUA INDIANA, INC.
Aboite Wastewater Division

Schedule D - 3
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170 IAC 1 - 5 Section 13-1,3,6,7

Test Year Period: 9/30/15
Actual 9/30/15 Rate Base Plus Major Projects; Customer Period 9/30/16

Long Term Debt Detail

Line	Aqua America Inc. Notes	Interest Rate	Issue Date	Maturity Date	Outstanding w/o Current	Current Maturities	Balance @ 09/30/15	Debt Push-Down To Aqua Indiana, Inc.	Debt Push-Down %		Annualized Interest Exp.
1	Senior Unsecured Notes	4.87%	07/31/03	07/31/16	0	10,800,000	10,800,000	3,375,428	31.25%		164,383
2	Senior Unsecured Notes	4.87%	07/31/03	07/31/17	10,800,000	0	10,800,000	3,262,298	30.21%		158,874
3	Senior Unsecured Notes	4.87%	07/31/03	07/31/18	10,800,000	0	10,800,000	2,008,065	18.59%		97,793
4	Senior Unsecured Notes	4.87%	07/31/03	07/31/20	16,200,000	0	16,200,000	3,012,097	18.59%		146,689
5	Senior Unsecured Notes	4.87%	07/31/03	07/31/23	10,800,000	0	10,800,000	1,169,065	10.82%		56,933
6					48,600,000	10,800,000	59,400,000	12,826,953			
7											
8	Unsecured Note - Series B	5.20%	02/03/05	02/03/20	12,000,000	0	12,000,000	-	0.00%		-
9					12,000,000	0	12,000,000	0			
10											
11	Unsecured Notes	5.63%	02/28/07	02/28/22	15,000,000	0	15,000,000	3,701,986	24.68%		208,422
12	Unsecured Notes	5.83%	02/28/07	02/28/37	15,000,000	0	15,000,000	4,530,969	30.21%		264,155
13					30,000,000	0	30,000,000	8,232,955			
14											
15	Unsecured Notes	5.54%	12/27/06	12/31/17	10,000,000	0	10,000,000	-	0.00%		-
16	Unsecured Notes	5.54%	12/27/06	12/31/18	10,000,000	0	10,000,000	-	0.00%		-
17					20,000,000	0	20,000,000	0			
18											
19	Unsecured Notes	2.00%	05/20/08	05/20/16	0	5,250,000	5,250,000	-	0.00%		-
20	Unsecured Notes	2.00%	05/20/08	05/20/17	5,250,000	0	5,250,000	-	0.00%		-
21	Unsecured Notes	2.00%	05/20/08	05/20/21	2,250,000	0	2,250,000	-	0.00%		-
22	Unsecured Notes	2.00%	05/20/08	05/20/22	2,250,000	0	2,250,000	-	0.00%		-
23					9,750,000	5,250,000	15,000,000	0			
24											
25	Senior Unsecured Notes	4.62%	06/24/10	06/24/21	15,000,000	0	15,000,000	0			-
26	Senior Unsecured Notes	4.83%	06/24/10	06/24/24	20,000,000	0	20,000,000	0			-
27	Senior Unsecured Notes	5.22%	06/24/10	06/24/28	35,000,000	0	35,000,000	0			-
28					70,000,000	0	70,000,000	0			
29											
30	Senior Unsecured Notes	4.72%	12/17/09	12/17/19	50,000,000	0	50,000,000	760,000			35,872
31											
32	Senior Unsecured Notes	3.57%	06/14/12	06/14/27	50,000,000	0	50,000,000	5,879,008			209,881
33											
34	Senior Unsecured Notes	3.59%	05/20/15	05/20/30	70,000,000	0	70,000,000	0			-
35											
36											
37	Sub-total - per Aqua Indiana GL (Push Down Debt)						376,400,000	27,698,916	7.36%		
38											-
39											
40	**Total "Push Down" Debt**				360,350,000	16,050,000	376,400,000	27,698,916	7.36%	Pro Forma Push Down Interest Exp	1,343,003
41											
42	Other Aqua Indiana Inc. Long-term financing:							-		Other LTD Interest Exp.	0
43	Pro Forma Long-term Debt							27,698,916		Pro Forma Total Interest Expense	1,343,003
44						Push Down Unamort.Debt Iss		44,972	(1)	Issuance Expense Amortization (1)	6,396
45	Aqua Indiana Inc. Push Down Debt at 9/30/15			27,698,916		Carrying Value		$ 27,653,944		Pro Forma All-In Interest Exp.	1,349,399
46	Percentage of Total Push Down Debt:			7.3589%						**Embedded Cost Rate of LTD**	**4.8796%**

(1) $(4,702) Push Down Unamort. Debt Issuance per books adjusted by $49,674 in Dec. 2015. Associated amortization becomes $6,396

AFFIRMATION

I affirm, under the penalties for perjury, that the foregoing representations are true.

Edward R. Kaufman
Indiana Office of Utility Consumer Counselor

June 24, 2016
Date

Cause No. 44752
Aqua Indiana, Inc.
Aboite Wastewater Division

CERTIFICATE OF SERVICE

This is to certify that a copy of the foregoing ***OUCC Testimony of Edward R. Kaufman: Public's Exhibit No. 5*** has been served upon the following counsel of record in the captioned proceeding by electronic service on June 24, 2016.

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