**BEFORE THE DELAWARE PUBLIC SERVICE COMMISSION**

**OF THE STATE OF DELAWARE**

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| **IN THE MATTER OF** | **)** | |
| **THE APPLICATION OF** | **)** | |
| **ARTESIAN WATER COMPANY** | **)** | **DOCKET NO. PCS 14-132** |
| **COMPANY TO INCREASE** | **)** | |
| **ITS WATER SERVICE RATES** | **)** | |

# DIRECT TESTIMONY

**OF**

**J. RANDALL WOOLRIDGE, Ph.D.**

**September 24, 2014**

# ARTESIAN WATER COMPANY
**Docket No. 14-132**

**Direct Testimony of**
**J. Randall Woolridge, Ph.D.**

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## LIST OF EXHIBITS

**Q. PLEASE STATE YOUR FULL NAME, ADDRESS, AND OCCUPATION.**

A. My name is J. Randall Woolridge. My business address is 120 Haymaker Circle, State College, PA 16801. I am a Professor of Finance and the Goldman, Sachs & Co. and Frank P. Smeal Endowed University Fellow in Business Administration at the University Park Campus of the Pennsylvania State University. I am also the Director of the Smeal College Trading Room and President of the Nittany Lion Fund, LLC. A summary of my educational background, research, and related business experience is provided in Appendix A.

## I. SUBJECT OF TESTIMONY AND SUMMARY OF RECOMMENDATIONS

**Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?**

A. I have been asked by the Delaware Division of Public Advocate ("DPA") to provide an opinion as to the overall fair rate of return or cost of capital for the Artesian Water Company ("Artesian" or "Company") and to evaluate Artesian's rate of return testimony in this proceeding.

**Q. HOW IS YOUR TESTIMONY ORGANIZED?**

A. First I will review my cost of capital recommendation for Artesian, and detail the

primary areas of contention between Artesian's rate of return position and the DPA's. Second, I provide an assessment of capital costs in today's capital markets. Third, I discuss my proxy groups of water utility and gas distribution companies for estimating the cost of capital for Artesian. Fourth, I present my recommendations for the Company's capital structure and debt cost rate. Fifth, I discuss the concept of the cost of equity capital and then estimate the equity cost rate for Artesian. Finally, I critique the Company's rate of return analysis and testimony. I have included a table of contents which provides a more detailed outline.

**Q. PLEASE REVIEW YOUR RECOMMENDATIONS REGARDING THE APPROPRIATE RATE OF RETURN FOR ARTESIAN.**

A. I have accepted Artesian's proposed capital structure and long-term debt cost rate. I have applied the Discounted Cash Flow Model ("DCF") and the Capital Asset Pricing Model ("CAPM") to two proxy groups of publicly-held water utility ("Water Proxy Group") and gas distribution companies ("Gas Proxy Group"). My analysis indicates an equity cost rate in the range of 7.50% to 8.80%. Within this range, I have used 8.75% as an equity cost rate for Artesian. Using my capital structure and debt and equity cost rates, I am recommending an overall rate of return of 7.31% for Artesian. These findings are summarized in Exhibit JRW-1.

**Q. PLEASE SUMMARIZE THE PRIMARY ISSUES REGARDING RATE OF RETURN IN THIS PROCEEDING**.

A. The Company's rate of return testimony is offered by Ms. Pauline M. Ahern. She provides a recommended capital structure, long-term debt cost rate, and common equity cost rate. Ms. Ahern provides an overall rate of return recommendation of 8.40%. The Company's proposed rate of return is inflated primarily due to an overstated equity cost rate.

Ms. Ahern's estimated common equity cost rate is 10.90%. We have both used DCF and CAPM approaches in estimating an equity cost rate for the Company. Ms. Ahern has also used a Risk Premium ("RP") approach to estimate an equity cost rate for Artesian. Ms. Ahern has applied these approaches to a proxy group of water utility companies as well as to a proxy group of non-regulated companies. She has also included business risk and flotation cost adjustments in her 10.90% equity cost rate recommendation.

As indicated, Ms. Ahern applies her equity cost rate approaches to two proxy groups – a group of water companies and a group of non-price-regulated companies. I demonstrate that the group of non-regulated companies is not appropriate for Artesian. In terms of the DCF approach, the primary area of disagreement is the estimation of the expected growth rate. For a DCF growth rate, Ms. Ahern has relied exclusively on the forecasted earnings per share ("EPS") growth rates of Wall Street analysts and *Value Line*. I provide empirical evidence that the long-term earnings growth rates of Wall Street analysts are overly optimistic and upwardly biased. I also show that the estimated long-term EPS growth rates of *Value Line* are overstated. Consequently, in developing a DCF growth rate, I have used both historic and

projected growth rate measures and have evaluated growth in dividends, book value, and earnings per share.

The RP and CAPM approaches require an estimate of the base interest rate and the market risk premium ("MRP"). The major area of disagreement involves our significantly different views on the alternative approaches to measuring the MRP as well as the magnitude of the MRP. Ms. Ahern's MRPs are excessive and do not reflect current market fundamentals. As I highlight in my testimony, there are three procedures for estimating a MRP – historic returns, surveys, and expected return models. Ms. Ahern uses several historical MRPs which are based on historic stock and bond returns. She also calculates an expected MRP based on a projected market return using data from *Value Line*. I provide evidence that risk premiums based on historic stock and bond returns are subject to empirical errors which result in upwardly biased measures of expected MRPs. Ms. Ahern also applies DCF, RP, and CAPM approaches to a non-price regulated group. I indicate that these results are not applicable to Artesian.

Ms. Ahern also includes a business risk adjustment of 0.25% and a flotation cost adjustment of 0.20% in her 10.90% return on equity recommendation. I show that Artesian is not riskier than other water companies and that there is no need for a flotation cost adjustment.

**Q. PLEASE SUMMARIZE THE PRIMARY ISSUES WITH RESPECT TO THE COMPANY'S COST OF CAPITAL POSITION.**

A. The primary areas of disagreement in measuring Artesian's cost of capital are: (1) the proxy group used to estimate an equity cost rate for Artesian; (2) the expected growth rate used in the DCF model; (3) the base interest rates and MRPs used in the CAPM and RPM approaches; and (4) Ms. Ahern's business risk and flotation cost adjustments.

## II. CAPITAL COSTS IN TODAY'S MARKETS

**Q. PLEASE DISCUSS CAPITAL COSTS IN U.S. MARKETS.**

A. Long-term capital cost rates for U.S. corporations are a function of the required returns on risk-free securities plus a risk premium. The risk-free rate of interest is the yield on long-term U.S Treasury bonds. The yields on 10-year U.S. Treasury bonds from 1953 to the present are provided on Panel A of Exhibit JRW-2. These yields peaked in the early 1980s and have generally declined since that time. These yields have fallen to historically low levels in recent years due to the financial crisis of 2007-2008. In 2008, Treasury yields declined to below 3.00% as a result of the mortgage and subprime market credit crisis, the turmoil in the financial sector, the monetary stimulus provided by the Federal Reserve, and the slowdown in the economy. From 2008 until 2011, these rates fluctuated between 2.50% and 3.50%. In 2012, the yields on 10-year Treasuries declined from 2.50% to 1.50% as the Federal Reserve continued to support a low interest rate environment and economic uncertainties persisted. These yields increased from mid-2012 to about 3.00%

as of December of 2013 on speculation of a tapering the Federal Reserve's aggressive monetary policy. After the Federal Reserve's December 18, 2013 announcement that it was indeed tapering its bond buying program,[1] these yields began to decline and were about 2.55% as of September 12, 2014.

Panel B on Exhibit JRW-2 shows the differences in yields between ten-year Treasuries and Moody's Baa-rated bonds since the year 2000. This differential primarily reflects the additional risk required by bond investors for the risk associated with investing in corporate bonds as opposed to obligations of the U.S. Treasury. The difference also reflects, to some degree, yield curve changes over time. The Baa rating is the lowest of the investment grade bond ratings for corporate bonds. The yield differential hovered in the 2.00% to 3.50% range until 2005, declined to 1.50% until late 2007, and then increased significantly in response to the financial crisis. This differential peaked at 6.0% at the height of the financial crisis in early 2009 due to tightening in credit markets, which increased corporate bond yields, and the "flight to quality," which decreased Treasury yields. The differential subsequently declined, and has been in the 2.50% to 3.50% range over the past four years.

The risk premium is the return premium required by investors to purchase riskier securities. The risk premium required by investors to buy corporate bonds is observable based on yield differentials in the markets. The market risk premium is the return premium required to purchase stocks as opposed to bonds. In contrast to bond risk premiums, the market or MRP is

[1] http://www.federalreserve.gov/newsevents/press/monetary/20131218a.htm

not readily observable in the markets since expected stock market returns are not readily observable. As a result, MRPs must be estimated using market data. There are alternative methodologies to estimate the MRP, and these alternative approaches and MRP results are subject to much debate. One way to estimate the MRP is to compare the mean returns on bonds and stocks over long historical periods. Measured in this manner, the MRP has been in the 5.00% to 7.00% range. However, studies by leading academics indicate that the forward-looking MRP is actually in the 4.00% to 6.00% range. These lower MRP results are in line with the findings of MRP surveys of CFOs, academics, analysts, companies, and financial forecasters.

**Q. PLEASE DISCUSS INTEREST RATES ON LONG-TERM UTILITY BONDS.**

A. Panel A of Exhibit JRW-3 provides the yields on A-rated public utility bonds. These yields peaked in November 2008 at 7.75% and henceforth declined significantly. These yields declined to below 4.00% in mid-2013, and then increased with interest rates in general to the 4.85% range as of late 2013. They have since declined to about 4.25%.

Panel B of Exhibit JRW-3 provides the yield spreads between long-term A-rated public utility bonds relative to the yields on 20-year Treasury bonds. These yield spreads increased dramatically in the third quarter of 2008 during the peak of the financial crisis and have decreased significantly since that time. For example, the yield spreads between 20-year U.S. Treasury

bonds and A-rated utility bonds peaked at 3.40% in November 2008, declined to about 1.50% in the summer of 2012, and have since remained in that range.

**Q. PLEASE DISCUSS THE FEDERAL RESERVE'S MONETARY POLICY AND INTEREST RATES.**

A. On September 13, 2012, the Federal Reserve released its policy statement relating to Quantitative Easing III ("QEIII").[2] In the statement, the Federal Reserve announced that it intended to expand and extend its purchasing of long-term securities to about $85 billion per month.[3] The Federal Open Market Committee ("FOMC")[4] also indicated that it intends to keep the target rate for the federal funds rate[5] between 0 to 1/4 percent through at least mid-

[2] To carry out QE central banks create money by buying securities, such as government bonds, from banks, with electronic cash that did not exist before. The new money swells the size of bank reserves in the economy by the quantity of assets purchased—hence "quantitative" easing. Like lowering interest rates, QE is supposed to stimulate the economy by encouraging banks to make more loans. The idea is that banks take the new money and buy assets to replace the ones they have sold to the central bank. That raises stock prices and lowers interest rates, which in turn boosts investment.

[3] Board of Governors of the Federal Reserve System, "Statement Regarding Transactions in Agency Mortgage-Backed Securities and Treasury Securities," September 13, 2012. http://www.federalreserve.gov/newsevents/press/monetary/20120913a.htm

[4] "The FOMC schedules eight meetings per year . . . The FOMC issues a policy statement following each regular meeting that summarizes the Committee's economic outlook and the policy decision at that meeting. Four times per year the Chairman holds a press briefing after the FOMC meeting to present the FOMC's current economic projections and to provide additional context for the FOMC's policy decisions . . . By law, the Federal Reserve conducts monetary policy to achieve its macroeconomic objectives of maximum employment and stable prices. Usually, the FOMC conducts policy by adjusting the level of short-term interest rates in response to changes in the economic outlook. Since 2008, the FOMC has also used large-scale purchases of Treasury securities and securities that were issued or guaranteed by federal agencies as a policy tool in an effort to lower longer-term interest rates and thereby improve financial conditions and so support the economic recovery." http://www.federalreserve.gov/faqs/about_12844.htm

[5] The federal funds rate is "the interest rate" at which depository institutions actively trade balances held at the Federal Reserve, called federal funds, with each other, usually overnight, on an uncollateralized basis. Institutions with surplus balances in their accounts lend those balances to institutions in need of larger balances.

2015. In subsequent meetings over the next year, the Federal Reserve reiterated its continuation of its bond buying program and tied future monetary policy moves to unemployment rates and the level of interest rates. Specifically, the FOMC kept the target range for the federal funds rate at 0 to 1/4 percent and reiterated its opinion that this exceptionally low range for the federal funds rate will be appropriate at least as long as the unemployment rate remains above 6.50%.[6] Beginning in May of 2013, the speculation in the markets was that the Federal Reserve's bond buying program would be tapered or scaled back. This speculation was fueled by more positive economic data on jobs and the economy, as well as by statements from FOMC members indicating that QEIII could be reduced later this calendar year. The speculation led to an increase in interest rates, with the ten-year Treasury yield increasing to about 3.00% as of December, 2013.

In response to continuing positive economic data, the Federal Reserve did decide to taper QEIII at its December 18, 2013 meeting. The Federal Reserve voted to reduce its purchases of mortgage-back securities and Treasuries by $5 billion per month beginning in January of 2014. However, this tapering did not involve monetary tightening by the Fed. Indeed, the Federal Reserve extended its commitment to keep short-term interest rates "exceptionally low" until either the unemployment rate falls to around 6.50%

[6] Board of Governors of the Federal Reserve System, FOMC Statement," December 12, 2012. http://www.federalreserve.gov/newsevents/press/monetary/20121212a.htm

or the inflation rate exceeds 2.50% a year.[7] Despite the announcement of the QEIII tapering, the markets reacted positively to the news due to the clarity provided by the FOMC on the future of the monetary stimulus, interest rates, and economic activity. At the time of the December 18 FOMC announcement, the yield on the ten-year Treasury yield was 2.90%.

**Q. PLEASE DISCUSS THE FEDERAL RESERVE'S ACTIONS IN 2014 AND INTEREST RATES.**

A. The January 29, 2014 FOMC meeting was historic as Janet Yellen took over for Ben Bernanke as Federal Reserve Chairman. The FOMC also tapered its bond buying program by another $5B per month beginning in February.[8] In subsequent monthly meetings in 2014, the FOMC has continued to taper its bond buying program and reaffirmed its view that a "highly accommodative" monetary policy is appropriate. Furthermore, the Committee has noted improvement in the economy including the recovery of the job market, inflation rate, and economic growth rate. However, the Federal Reserve has indicated some concerns as well, including the slow improvement in the housing market and the "significant" slack and under-utilization of labor resources.[9]

[7] Board of Governors of the Federal Reserve System, FOMC Press Release, December 18, 2013. http://www.federalreserve.gov/newsevents/press/monetary/20131218a.htm

[8] Board of Governors of the Federal Reserve System, FOMC Press Release, January 29, 2014. http://www.federalreserve.gov/newsevents/press/monetary/20140129a.htm

[9] Board of Governors of the Federal Reserve System, FOMC Press Release, July 30, 2014. http://www.federalreserve.gov/newsevents/press/monetary/20140730a.htm.

**Q. PLEASE DISCUSSS THE FOMC'S SEPTEMBER 2014 MEETING.**

A. At the end of the September 16-17 meeting, the FOMC press release included the following:[10]

> The Committee currently judges that there is sufficient underlying strength in the broader economy to support ongoing improvement in labor market conditions. In light of the cumulative progress toward maximum employment and the improvement in the outlook for labor market conditions since the inception of the current asset purchase program, the Committee decided to make a further measured reduction in the pace of its asset purchases. Beginning in October, the Committee will add to its holdings of agency mortgage-backed securities at a pace of $5 billion per month rather than $10 billion per month, and will add to its holdings of longer-term Treasury securities at a pace of $10 billion per month rather than $15 billion per month. The Committee is maintaining its existing policy of reinvesting principal payments from its holdings of agency debt and agency mortgage-backed securities in agency mortgage-backed securities and of rolling over maturing Treasury securities at auction. The Committee's sizable and still-increasing holdings of longer-term securities should maintain downward pressure on longer-term interest rates, support mortgage markets, and help to make broader financial conditions more accommodative, which in turn should promote a stronger economic recovery and help to ensure that inflation, over time, is at the rate most consistent with the Committee's dual mandate.

The key issues coming out of the meeting were: (1) with the additional tapering, the bond buying program is expected to end after the October meeting; (2) the Federal Funds rate would be kept near zero percent for a "considerable time" after QE III is over; and (3) the Federal Reserve has reduced its GDP growth rate forecast for 2015 to 2.60%

[10]Board of Governors of the Federal Reserve System, FOMC Press Release, September 17, 2014. http://www.federalreserve.gov/newsevents/press/monetary/20140917a.htm.

**Q. HOW HAVE THE MARKETS REACTED TO THE FEDERAL RESERVE'S SCALE BACK OF QEIII AND UPDATED CLARITY ON MONETARY POLICY?**

A. The yield on the ten-year Treasury note was 3.00% as of January 2, 2014. This yield trended down in January and was at 2.72% after the January FOMC meeting. Since that time, the ten-year Treasury yield has traded in the 2.50% to 2.80% range, and is currently at the lower end of this range. After the September FOMC meeting, the yield on the ten-year Treasury was 2.63%.

**Q. BASED ON THIS DISCUSSION, WHAT IS YOUR CONCLUSION CONCERNING CAPITAL COSTS IN TODAY'S MARKETS?**

A. Capital costs remain at historically low levels. The increase in interest rates that was anticipated to occur when the Federal Reserve began tapering its bond buying program has not occurred. In fact, interest rates have declined since the beginning of the tapering program in January of 2014.

## III. PROXY GROUP SELECTION

**Q. PLEASE DESCRIBE YOUR APPROACH TO DEVELOPING A FAIR RATE OF RETURN RECOMMENDATION FOR ARTESIAN.**

A. To develop a fair rate of return recommendation for Artesian, I have evaluated the return requirements of investors on the common stock of a proxy group of publicly-held water utility companies ("Water Proxy Group") and a proxy group of publicly-held gas distribution companies ("Gas Proxy Group").

**Q. WHY HAVE YOU EMPLOYED THE RESULTS FOR A PROXY GROUP OF GAS DISTRIBUTION COMPANIES IN YOUR TESTIMONY?**

A. I have included these results for two reasons. First, the financial data needed to perform a DCF analysis for the Water Proxy Group is limited. Analysts' coverage of water companies is sparse, but there is better data available for the Gas Proxy Group to perform a DCF equity cost rate study. Second, the return requirements of investors for gas companies should be similar to that of water companies. Both industries are capital intensive, heavily regulated, and distribute and deliver an essential commodity whose service rates and rates of return are set by state regulatory commissions.

**Q. PLEASE DESCRIBE YOUR TWO PROXY GROUPS.**

A. My Water Proxy Group consists of nine water utility companies that are covered by the *Value Line Investment Survey* and *AUS Utility Reports*. These companies include American States Water Company, American Water Works Company, Aqua American, Inc., Artesian Resources Corporation, California Water Service Group, Connecticut Water Service, Inc., Middlesex Water Company, SJW Corporation, and York Water Company. A summary of financial statistics for the companies in this group are listed in Exhibit JRW-4. The median operating revenues and net plant for the Water Proxy Group are $281.3M and $983.9M,

respectively.[11] The group receives 95% of revenues from regulated water operations, has an 'A' bond rating, a common equity ratio of 52.7%, and an earned return on common equity of 8.8%.

My Gas Proxy Group consists of eight natural gas distribution companies. These companies meet the following selection criteria: (1) listed as a Natural Gas Distribution, Transmission, and/or Integrated Gas Company in *AUS Utility Reports*; (2) listed as a Natural Gas Utility in the Standard Edition of the *Value Line Investment Survey*; and (3) an investment grade bond rating by Moody's and Standard & Poor's. As shown on page 1 of Exhibit JRW-4, the companies meeting these criteria include AGL Resources, Atmos Energy Corporation, Laclede Group, Northwest Natural Gas Company, Piedmont Natural Gas Company, South Jersey Industries, Southwest Gas, and WGL Holdings. The only companies that met these criteria and were not included in the group were New Jersey Resources and UGI. These companies were excluded due to their low percentage of revenues from regulated gas operations. Summary financial statistics for the proxy group are listed on page 1 of Exhibit JRW-4. The median operating revenues and net plant for the Gas Proxy Group are $1,714.3M and $3,254.5M, respectively. The group receives 69% of revenues from regulated gas operations, has an 'A2/A3' Moody's bond rating and an 'A/A-' bond rating from Standard & Poor's, a current common equity ratio of 51.0%, and an earned return on common equity of 9.60%.

[11] In my testimony, I present financial results using both mean and medians as measures of central tendency. However, due to outliers, I have used the median as a measure of central tendency.

With respect to the relative risk of the Water and Gas Groups, the bond ratings provided on page 1 of Exhibit JRW-4 suggest that the two groups are similar in terms of risk. In addition, on page 2 of Exhibit JRW-4, I have assessed the riskiness of the two groups using five different risk measures published by *Value Line*. These measures include beta, Safety, Financial Strength, Earnings Predictability, and Stock Price Stability. Whereas the average beta for the gas companies (0.78) is higher than the average beta for the water companies (0.69), the four other risk measures suggest that the Gas Proxy Group is a little less risky than the Water Proxy Group. However, the magnitude of the differences in the risk metrics is not large. Hence, there does not appear to be a significant risk difference between the Water and Gas Proxy Groups.

With respect to Artesian, since Artesian does not have bond ratings, I am evaluating the riskiness of the Company by assessing the *Value Line* risk metrics of its parent company, Artesian Resources ("ARTNA"), relative to the Water Proxy Group. These data are provided on page 2 of Exhibit JRW-4. ARTNA's beta (0.55), suggests that the Company is a little less risky than the Water Proxy Group (0.69) while ARTNA's Financial Strength (B) indicates that the Company is a little more risky that the Water Proxy Group (B+). The other three risk indicators all suggest that ARTNA and the Water Proxy Group are similar in risk – safety (3 vs. 3), earnings predictability (85 vs. 81) and price stability (90 vs 92). Given these results, I believe that the risk measures suggest the riskiness of the Company is in line with the Water Proxy Group

and hence the equity cost rate results from the Water Proxy Group are appropriate for Artesian.

## IV. CAPITAL STRUCTURE RATIOS AND DEBT COST RATES

**Q. WHAT CAPITAL STRUCTURE RATIOS AND COST OF LONG-TERM DEBT HAVE THE COMPANY PROPOSED?**

A. As shown in Panel A of page 1 of Exhibit JRW-5, this capital structure consists of 49.46% long-term debt and 50.54% common equity. Artesian employs a long-term debt cost rate of 5.84%.

**Q. IS THIS A REASONABLE CAPITAL STRUCTURE FOR ARTESIAN?**

A. Yes, I believe that it is. To assess the proposed capital structure, I have reviewed: (1) the capital structures of the companies in the Water Proxy Group; and (2) the capital structure of Artesian's parent company, ARTNA. As shown on page 1 of Exhibit JRW-4, the mean common equity ratio for the Water Proxy Group is 52.7%. In addition, Panel B of page 1 of Exhibit JRW-5 shows ARTNA's average quarterly capital structure ratios over the past year. The average common equity ratio over the past year is 48.66%. Since the Company's proposed capital structure includes a common equity ratio (50.54%) that is similar to the common equity ratios of the Water Proxy

Group (52.7%) and ARTNA (48.66%), I believe that the Company's proposed capital structure is reasonable.

**Q. ARE YOU ALSO USING ARTESIAN'S PROPOSED DEBT COST RATE?**

A. Yes, I will use the Company's proposed long-term debt cost rate of 5.84%.

## V. THE COST OF COMMON EQUITY CAPITAL

### A. Overview

**Q. WHY MUST AN OVERALL COST OF CAPITAL OR FAIR RATE OF RETURN BE ESTABLISHED FOR A PUBLIC UTILITY?**

A. In a competitive industry, the return on a firm's common equity capital is determined through the competitive market for its goods and services. Due to the capital requirements needed to provide utility services and to the economic benefit to society from avoiding duplication of these services, some public utilities are monopolies. It is not appropriate to permit monopoly utilities to set their own prices because of the lack of competition and the essential nature of the services. Thus, regulation seeks to establish prices that are fair to consumers and, at the same time, are sufficient to meet the operating and capital costs of the utility (i.e., provide an adequate return on capital to attract investors).

**Q. PLEASE PROVIDE AN OVERVIEW OF THE COST OF CAPITAL IN THE CONTEXT OF THE THEORY OF THE FIRM.**

A. The total cost of operating a business includes the cost of capital. The cost of common equity capital is the expected return on a firm's common stock that the marginal investor would deem sufficient to compensate for risk and the time value of money. In equilibrium, the expected and required rates of return on a company's common stock are equal.

Normative economic models of the firm, developed under very restrictive assumptions, provide insight into the relationship between firm performance or profitability, capital costs, and the value of the firm. Under the economist's ideal model of perfect competition (where entry and exit is costless, products are undifferentiated, and there are increasing marginal costs of production), firms produce up to the point where price equals marginal cost. Over time, a long-run equilibrium is established where price equals average cost, including the firm's capital costs. In equilibrium, total revenues equal total costs, and because capital costs represent investors' required return on the firm's capital, actual returns equal required returns, and the market value and the book value of the firm's securities must be equal.

In the real world, firms can achieve competitive advantage due to product market imperfections. Most notably, companies can gain competitive advantage through product differentiation (adding real or perceived value to products) and by achieving economies of scale (decreasing marginal costs of production). Competitive advantage allows firms to price products above

average cost and thereby earn accounting profits greater than those required to cover capital costs. When these profits are in excess of that required by investors, or when a firm earns a return on equity in excess of its cost of equity, investors respond by valuing the firm's equity in excess of its book value.

James M. McTaggart, founder of the international management consulting firm Marakon Associates, has described this essential relationship between the return on equity, the cost of equity, and the market-to-book ratio in the following manner:[12]

> Fundamentally, the value of a company is determined by the cash flow it generates over time for its owners, and the minimum acceptable rate of return required by capital investors. This "cost of equity capital" is used to discount the expected equity cash flow, converting it to a present value. The cash flow is, in turn, produced by the interaction of a company's return on equity and the annual rate of equity growth. High return on equity (ROE) companies in low-growth markets, such as Kellogg, are prodigious generators of cash flow, while low ROE companies in high-growth markets, such as Texas Instruments, barely generate enough cash flow to finance growth.
>
> A company's ROE over time, relative to its cost of equity, also determines whether it is worth more or less than its book value. If its ROE is consistently greater than the cost of equity capital (the investor's minimum acceptable return), the business is economically profitable and its market value will exceed book value. If, however, the business earns an ROE consistently less than its cost of equity, it is economically unprofitable and its market value will be less than book value.

[12] James M. McTaggart, "The Ultimate Poison Pill: Closing the Value Gap," *Commentary* (Spring 1988), p. 2.

As such, the relationship between a firm's return on equity, cost of equity, and market-to-book ratio is relatively straightforward. A firm that earns a return on equity above its cost of equity will see its common stock sell at a price above its book value. Conversely, a firm that earns a return on equity below its cost of equity will see its common stock sell at a price below its book value.

**Q. PLEASE PROVIDE ADDITIONAL INSIGHTS INTO THE RELATIONSHIP BETWEEN RETURN ON EQUITY AND MARKET-TO-BOOK RATIOS.**

A. This relationship is discussed in a classic Harvard Business School case study entitled "A Note on Value Drivers." On page 2 of that case study, the author describes the relationship very succinctly:[13]

> For a given industry, more profitable firms – those able to generate higher returns per dollar of equity – should have higher market-to-book ratios. Conversely, firms which are unable to generate returns in excess of their cost of equity should sell for less than book value.

| *Profitability* | *Value* |
|---|---|
| *If ROE > K* | *then Market/Book > 1* |
| *If ROE = K* | *then Market/Book =1* |
| *If ROE < K* | *then Market/Book < 1* |

To assess the relationship by industry, as suggested above, I have performed a regression study between estimated return on equity and market-to-book ratios using natural gas distribution, electric utility and water utility

[13] Benjamin Esty, "A Note on Value Drivers," Harvard Business School, Case No. 9-297-082, April 7, 1997.

companies. I used all companies in these three industries that are covered by *Value Line* and have estimated return on equity and market-to-book ratio data. The results are presented in Panels A-C of Exhibit JRW-6. The average R-squares for the electric, gas, and water companies are 0.52, 0.71, and 0.77, respectively.[14] This demonstrates the strong positive relationship between ROEs and market-to-book ratios for public utilities.

**Q. PLEASE REVIEW THE EQUITY COST INDICATORS FOR UTILITIES.**

A. Exhibit JRW-7 provides indicators of public utility equity cost rates over the past decade. Page 1 shows the yields on long-term A-rated rated public utility bonds. These yields peaked in the early 2000s at over 8.00%, declined to about 5.50% in 2005, and rose to 6.00% in 2006 and 2007. They stayed in that 6.00% range until the third quarter of 2008 when they spiked to almost 7.50% during the financial crisis. They declined to the 4.00% range in 2012, increased to the 4.85% range in 2013, and have since declined to about 4.25%.

Page 2 provides the dividend yields for the Water and Gas Proxy Groups over the past decade. The dividend yields for both groups have declined slightly over the decade. The Water Proxy Group yields bottomed out at 2.70% in 2006, increased to 3.60% in 2009, and have since declined to

[14] R-square measures the percent of variation in one variable (e.g., market-to-book ratios) explained by another variable (e.g., expected return on equity). R-squares vary between zero and 1.0, with values closer to 1.0 indicating a higher relationship between two variables.

2.80%. The Gas Proxy Group yields bottomed out at 3.80% in 2007, increased to over 4.0% in 2009, and have since declined to 3.80%.

Average earned returns on common equity and market-to-book ratios for the two groups are on page 3 of Exhibit JRW-7. For the Water Proxy Group, earned returns on common equity peaked early in the decade at over 10.00%. Over the past five years, they have been in the 8.00% to 9.00% range. As of 2013, the median ROE for the group was 9.00%. The market-to-book ratios for this group have ranged from 1.6X to 2.3X, and as of 2013, the median market-to-book ratio was 1.96X. For the Gas Proxy Group, earned returns on common equity have been in the 10.00% to 12.00% range. The average ROE as of 2013 was 9.10%. Over the past decade, the market-to-book ratios for this group have ranged from 1.55X to 1.85X.

**Q. WHAT FACTORS DETERMINE INVESTORS' EXPECTED OR REQUIRED RATE OF RETURN ON EQUITY?**

A. The expected or required rate of return on common stock is a function of market-wide as well as company-specific factors. The most important market factor is the time value of money as indicated by the level of interest rates in the economy. Common stock investor requirements generally increase and decrease with like changes in interest rates. The perceived risk of a firm is the predominant factor that influences investor return requirements on a company-specific basis. A firm's investment risk is often separated into business and financial risk. Business risk encompasses all factors that affect a

firm's operating revenues and expenses. Financial risk results from incurring fixed obligations in the form of debt in financing its assets.

**Q. HOW DOES THE INVESTMENT RISK OF UTILITIES COMPARE WITH THAT OF OTHER INDUSTRIES?**

A. Due to the essential nature of their service as well as their regulated status, public utilities are exposed to a lesser degree of business risk than other, non-regulated businesses. The relatively low level of business risk allows public utilities to meet much of their capital requirements through borrowing in the financial markets, thereby incurring greater than average financial risk. Nonetheless, the overall investment risk of public utilities is below most other industries.

Exhibit JRW-8 provides an assessment of investment risk for 97 industries as measured by beta, which according to modern capital market theory, is the only relevant measure of investment risk. These betas come from the *Value Line Investment Survey*. The study shows that the investment risk of utilities is very low. The average betas for electric, water, and gas utility companies are 0.72, 0.71, and 0.73, respectively. As such, the cost of equity for utilities is among the lowest of all industries in the U.S.

**Q. HOW CAN THE EXPECTED OR REQUIRED RATE OF RETURN ON COMMON EQUITY CAPITAL BE DETERMINED?**

A. The costs of debt and preferred stock are normally based on historical or book values and can be determined with a great degree of accuracy. The cost of

common equity capital, however, cannot be determined precisely and must instead be estimated from market data and informed judgment. This return to the stockholder should be commensurate with returns on investments in other enterprises having comparable risks.

According to valuation principles, the present value of an asset equals the discounted value of its expected future cash flows. Investors discount these expected cash flows at their required rate of return that, as noted above, reflects the time value of money and the perceived riskiness of the expected future cash flows. As such, the cost of common equity is the rate at which investors discount expected cash flows associated with common stock ownership.

Models have been developed to ascertain the cost of common equity capital for a firm. Each model, however, has been developed using restrictive economic assumptions. Consequently, judgment is required in selecting appropriate financial valuation models to estimate a firm's cost of common equity capital, in determining the data inputs for these models, and in interpreting the models' results. All of these decisions must take into consideration the firm involved as well as current conditions in the economy and the financial markets.

**Q. HOW DO YOU PLAN TO ESTIMATE THE COST OF EQUITY CAPITAL FOR THE COMPANY?**

A. I rely primarily on the DCF model to estimate the cost of equity capital. Given the investment valuation process and the relative stability of the utility business, I believe that the DCF model provides the best measure of equity cost rates for public utilities. I have been advised that the Delaware Commission relies primarily on the DCF to establish the cost of capital for utilities subject to its jurisdiction, and it is my experience that most public utility commissions have traditionally relied on the DCF method. I have also performed a CAPM study, but I give these results less weight because I believe that risk premium studies, of which the CAPM is one form, provide a less reliable indication of equity cost rates for public utilities. This is because of the large divergence of opinion regarding the measurement and magnitude of the MRP.

**B. Discounted Cash Flow Analysis**

**Q. DESCRIBE THE THEORY BEHIND THE TRADITIONAL DCF MODEL.**

A. According to the DCF model, the current stock price is equal to the discounted value of all future dividends that investors expect to receive from investment in the firm. As such, stockholders' returns ultimately result from current as well as future dividends. As owners of a corporation, common stockholders are entitled to a *pro rata* share of the firm's earnings. The DCF model presumes that earnings that are not paid out in the form of dividends are reinvested in the firm so as to provide for future growth in earnings and

dividends. The rate at which investors discount future dividends, which reflects the timing and riskiness of the expected cash flows, is interpreted as the market's expected or required return on the common stock. Therefore, this discount rate represents the cost of common equity. Algebraically, the DCF model can be expressed as:

$$P = \frac{D_1}{(1+k)^1} + \frac{D_2}{(1+k)^2} + \ldots \frac{D_n}{(1+k)^n}$$

where P is the current stock price, $D_n$ is the dividend in year n, and k is the cost of common equity.

**Q. IS THE DCF MODEL CONSISTENT WITH VALUATION TECHNIQUES EMPLOYED BY INVESTMENT FIRMS?**

A. Yes. Virtually all investment firms use some form of the DCF model as a valuation technique. One common application for investment firms is called the three-stage DCF or dividend discount model ("DDM"). The stages in a three-stage DCF model are presented in Exhibit JRW-9. This model presumes that a company's dividend payout progresses initially through a growth stage, then proceeds through a transition stage, and finally assumes a steady-state stage. The dividend-payment stage of a firm depends on the profitability of its internal investments, which, in turn, is largely a function of the life cycle of the product or service.

1. Growth stage: Characterized by rapidly expanding sales, high profit margins, and abnormally high growth in earnings per share. Because of

highly profitable expected investment opportunities, the payout ratio is low. Competitors are attracted by the unusually high earnings, leading to a decline in the growth rate.

2. Transition stage: In later years increased competition reduces profit margins and earnings growth slows. With fewer new investment opportunities, the company begins to pay out a larger percentage of earnings.

3. Maturity (steady-state) stage: Eventually the company reaches a position where its new investment opportunities offer, on average, only slightly attractive returns on equity. At that time its earnings growth rate, payout ratio, and return on equity stabilize for the remainder of its life. The constant-growth DCF model is appropriate when a firm is in the maturity stage of the life cycle.

In using this model to estimate a firm's cost of equity capital, dividends are projected into the future using the different growth rates in the alternative stages, and then the equity cost rate is the discount rate that equates the present value of the future dividends to the current stock price.

**Q. HOW DO YOU ESTIMATE STOCKHOLDERS' EXPECTED OR REQUIRED RATE OF RETURN USING THE DCF MODEL?**

A. Under certain assumptions, including a constant and infinite expected growth rate, and constant dividend/earnings and price/earnings ratios, the DCF model can be simplified to the following:

$$P = \frac{D_1}{\text{---------}}$$

$$k - g$$

where $D_1$ represents the expected dividend over the coming year and g is the expected growth rate of dividends. This is known as the constant-growth version of the DCF model. To use the constant-growth DCF model to estimate a firm's cost of equity, one solves for k in the above expression to obtain the following:

$$k = \frac{D_1}{P} + g$$

**Q. IN YOUR OPINION, IS THE CONSTANT-GROWTH DCF MODEL APPROPRIATE FOR PUBLIC UTILITIES?**

A. Yes. The economics of the public utility business indicate that the industry is in the steady-state or constant-growth stage of a three-stage DCF. The economics include the relative stability of the utility business, the maturity of the demand for public utility services, and the regulated status of public utilities (especially the fact that their returns on investment are effectively set through the ratemaking process). The DCF valuation procedure for companies in this stage is the constant-growth DCF. In the constant-growth version of the DCF model, the current dividend payment and stock price are directly observable. However, the primary problem and controversy in applying the DCF model to estimate an equity cost rate is estimating investors' expected dividend growth rate.

**Q. WHAT FACTORS SHOULD ONE CONSIDER WHEN APPLYING THE DCF METHODOLOGY?**

A. One should be sensitive to several factors when using the DCF model to estimate a firm's cost of equity capital. In general, one must recognize the assumptions under which the DCF model was developed in estimating its components (the dividend yield and expected growth rate). The dividend yield can be measured precisely at any point in time, but tends to vary somewhat over time. Estimation of expected growth is considerably more difficult. One must consider recent firm performance, in conjunction with current economic developments and other information available to investors, to accurately estimate investors' expectations.

**Q. DOES EXHIBIT JRW-10 CONTAIN YOUR DCF ANALYSIS?**

A. Yes, my DCF analysis is provided in Exhibit JRW-10. The DCF summary is on page 1 of this Exhibit, and the supporting data and analyses for the dividend yield and expected growth rate are provided on the following pages of the Exhibit.

**Q. WHAT DIVIDEND YIELDS DID YOU USE?**

A. I have calculated the dividend yields for the companies in the two proxy groups using the current annual dividend and the 30-day, 90-day, and 180-day average stock prices. These dividend yields are provided on page 2 of Exhibit JRW-10 for the Water and Gas Proxy Groups, respectively. For the Water

Proxy Group, the mean and median dividend yields using the 30-day, 90-day, and 180-day average stock prices range from 2.80% to 3.00%. Given this range, I use 2.90% as the dividend yield for the Water Proxy Group. For the Gas Proxy Group, provided in Panel B of page 2 of Exhibit JRW-10, the mean and median dividend yields range from 3.60% to 3.80% using the 30-day, 90-day, and 180-day average stock prices. Given this range, I use a dividend yield of 3.70% for the Gas Proxy Group.

**Q. PLEASE DISCUSS THE APPROPRIATE ADJUSTMENT TO THE SPOT DIVIDEND YIELD.**

A. According to the traditional DCF model, the dividend yield term relates to the dividend yield over the coming period. As indicated by Professor Myron Gordon, who is commonly associated with the development of the DCF model for popular use, this is obtained by: (1) multiplying the expected dividend over the coming quarter by 4, and (2) dividing this dividend by the current stock price to determine the appropriate dividend yield for a firm that pays dividends on a quarterly basis.[15]

In applying the DCF model, some analysts adjust the current dividend for growth over the coming year as opposed to the coming quarter. This can be complicated because firms tend to announce changes in dividends at different times during the year. As such, the dividend yield computed based on presumed growth over the coming quarter as opposed to the coming year

[15] *Petition for Modification of Prescribed Rate of Return*, Federal Communications Commission, Docket No. 79-05, Direct Testimony of Myron J. Gordon and Lawrence I. Gould at 62 (April 1980).

can be quite different. Consequently, it is common for analysts to adjust the dividend yield by some fraction of the long-term expected growth rate.

**Q. GIVEN THIS DISCUSSION, WHAT ADJUSTMENT FACTOR WILL YOU USE FOR YOUR DIVIDEND YIELD?**

A. I will adjust the dividend yield by one-half (1/2) the expected growth so as to reflect growth over the coming year. This is the approach employed by the Federal Energy Regulatory Commission ("FERC").[16] The DCF equity cost rate ("K") is computed as:

$$K = [ (D/P) * (1 + 0.5g) ] + g$$

**Q. PLEASE DISCUSS THE GROWTH RATE COMPONENT OF THE DCF MODEL.**

A. There is much debate as to the proper methodology to employ in estimating the growth component of the DCF model. By definition, this component is investors' expectation of the long-term dividend growth rate. Presumably, investors use some combination of historical and/or projected growth rates for earnings and dividends per share and for internal or book value growth (all of which are available to investors) to assess long-term potential.

[16] Opinion No. 414-A, *Transcontinental Gas Pipe Line Corp.*, 84 FERC ¶61,084 (1998).

**Q. WHAT GROWTH DATA HAVE YOU REVIEWED FOR THE PROXY GROUPS?**

A. I have analyzed a number of measures of growth for companies in the proxy groups. I reviewed *Value Line's* historical and projected growth rate estimates for earnings per share ("EPS"), dividends per share ("DPS"), and book value per share ("BVPS"). In addition, I utilized the average EPS growth rate forecasts of Wall Street analysts as provided by Yahoo, Reuters and Zacks. These services solicit five-year earnings growth rate projections from securities analysts and compile and publish the means and medians of these forecasts. Finally, I also assessed prospective growth as measured by prospective earnings retention rates and earned returns on common equity.

**Q. PLEASE DISCUSS HISTORICAL GROWTH IN EARNINGS AND DIVIDENDS AS WELL AS INTERNAL GROWTH.**

A. Historical growth rates for EPS, DPS, and BVPS are readily available to investors and are presumably an important ingredient in forming expectations concerning future growth. However, one must use historical growth numbers as measures of investors' expectations with caution. First, in some cases, past growth may not reflect future growth potential. Second, employing a single growth rate number (for example, for five or ten years), is unlikely to accurately measure investors' expectations due to the sensitivity of a single growth rate figure to fluctuations in individual firm performance as well as overall economic fluctuations (i.e., business cycles). Third, one must appraise

the context in which the growth rate is being employed. According to the conventional DCF model, the expected return on a security is equal to the sum of the dividend yield and the expected long-term growth in dividends. Therefore, to best estimate the cost of common equity capital using the conventional DCF model, one must look to long-term growth rate expectations.

Internally generated growth is a function of the percentage of earnings retained within the firm (the earnings retention rate) and the rate of return earned on those earnings (the return on equity). The internal growth rate is computed as the retention rate times the return on equity. Internal growth is significant in determining long-run earnings and, therefore, dividends. Investors recognize the importance of internally generated growth and pay premiums for stocks of companies that retain earnings and earn high returns on internal investments.

**Q. PLEASE DISCUSS THE SERVICES THAT PROIVDE ANALYSTS' EPS FORECASTS.**

A. Analysts' EPS forecasts for companies are collected and published by a number of different investment information services, including Institutional Brokers Estimate System ("I/B/E/S"), Bloomberg, FactSet, Zacks, First Call and Reuters, among others. Thompson Reuters publishes analysts' EPS forecasts under different product names, including I/B/E/S, First Call, and Reuters. Bloomberg, FactSet, and Zacks publish their own set of analysts' EPS forecasts for

companies. These services do not reveal: (1) the analysts who are solicited for forecasts; or (2) the actual analysts who provide the EPS forecasts that are used in the compilations published by the services. I/B/E/S, Bloomberg, FactSet, and First Call are fee-based services. These services usually provide detailed reports and other data in addition to analysts' EPS forecasts. Thompson Reuters and Zacks do provide limited EPS forecasts data free of charge on the internet. Yahoo finance (http://finance.yahoo.com) lists Thompson Reuters as the source of its summary EPS forecasts. The Reuters website (www.reuters.com) also publishes more detailed EPS forecasts from Thompson Reuters. Zacks (www.zacks.com) publishes its summary forecasts on its website, and its estimates are also available on other websites, such as msn.money (http://money.msn.com).

**Q. PLEASE PROVIDE AN EXAMPLE OF THESE EPS FORECASTS.**

A. The following example provides the EPS forecasts compiled by Reuters for Aqua America, Inc. (stock symbol "WTR"). The figures are provided on page 2 of Exhibit JRW-9. The top line shows that four analysts have provided EPS estimates for the quarter ending September 30, 2014. The mean, high, and low estimates are $.038, $.039, and $.024, respectively. The second line shows the quarterly EPS estimates for the quarter ending December 31, 2014 of $0.28 (mean), $0.29 (high), and $0.26 (low). Lines three and four show the annual EPS estimates for the fiscal years ending December 2014 ($1.13 (mean), $1.21 (high), and $0.75 (low)) and December 2015 (($1.27 (mean),

$1.30 (high), and $1.25 (low)). The quarterly and annual EPS forecasts in lines 1-4 are expressed in dollars and cents. As in the WTR case shown here, it is common for more analysts to provide estimates of annual EPS as opposed to quarterly EPS. The bottom line shows the projected long-term EPS growth rate, which is expressed as a percentage. For WTR, twelve analysts have provided long-term EPS growth rate forecasts, with mean, high, and low growth rates of 5.67%, 9.00%, and 4.00%, respectively.

**Q. WHICH OF THESE EPS FORECASTS IS USED IN DEVELOPING A DCF GROWTH RATE?**

A. The DCF growth rate is the long-term projected growth rate in EPS, DPS, and BVPS. Therefore, in developing an equity cost rate using the DCF model, the projected long-term growth rate is the projection used in the DCF model.

**Q. WHY ARE YOU NOT RELYING EXCLUSIVELY ON THE EPS FORECASTS OF WALL STREET ANALYSTS IN ARRIVING AT A DCF GROWTH RATE FOR THE PROXY GROUPS?**

A. There are several issues with using the EPS growth rate forecasts of Wall Street analysts as DCF growth rates. First, the appropriate growth rate in the DCF model is the dividend growth rate, not the earnings growth rate. Nonetheless, over the very long-term, dividend and earnings will have to grow at a similar growth rate. Therefore, consideration must be given to other indicators of growth, including prospective dividend growth, internal growth,

as well as projected earnings growth. Second, a recent study by Lacina, Lee, and Xu (2011) has shown that analysts' long-term earnings growth rate forecasts are no more accurate at forecasting future earnings than naïve random walk forecasts of future earnings.[17] Employing data over a twenty year period, these authors demonstrate that using the most recent year's EPS figure to forecast EPS in the next 3-5 years proved to be just as accurate as using the EPS estimates from analysts' long-term earnings growth rate forecasts. In the authors' opinion, these results indicate that analysts' long-term earnings growth rate forecasts should be used with caution as inputs for valuation and cost of capital purposes. Finally, and most significantly, it is well-known that the long-term EPS growth rate forecasts of Wall Street securities analysts are overly optimistic and upwardly biased. This has been demonstrated in a number of academic studies over the years. This issue is discussed at length in Appendix B of this testimony. Hence, using these growth rates as a DCF growth rate will overstate the required cost of equity. On this issue, a study by Easton and Sommers (2007) found that optimism in analysts' earnings growth rate forecasts leads to an upward bias in estimates of the cost of equity capital of almost 3.0 percentage points.[18]

[17] M. Lacina, B. Lee & Z. Xu, *Advances in Business and Management Forecasting (Vol. 8),* Kenneth D. Lawrence, Ronald K. Klimberg (ed.), Emerald Group Publishing Limited, pp.77-101.

[18] Peter D. Easton & Gregory A. Sommers, *Effect of Analysts' Optimism on Estimates of the Expected Rate of Return Implied by Earnings Forecasts*, 45 J. ACCT. RES. 983–1015 (2007).

**Q. IS IT YOUR OPINION THAT STOCK PRICES REFLECT THE UPWARD BIAS IN THE EPS GROWTH RATE FORECASTS?**

A. Yes, I do believe that investors are well aware of the bias in analysts' EPS growth rate forecasts, and therefore, stock prices reflect the upward bias.

**Q. HOW DOES THAT AFFECT THE USE OF THESE FORECASTS IN A DCF EQUITY COST RATE STUDY?**

A. According to the DCF model, the equity cost rate is a function of the dividend yield and expected growth rate. Since stock prices reflect the bias, it would affect the dividend yield. In addition, the DCF growth rate needs to be adjusted downward from the projected EPS growth rate to reflect the upward bias.

**Q. PLEASE DISCUSS THE HISTORICAL GROWTH OF THE COMPANIES IN THE PROXY GROUPS AS PROVIDED BY *VALUE LINE*.**

A. Page 3 of Exhibit JRW-10 provides the 5- and 10- year historical growth rates for the companies in the groups, as published in the *Value Line Investment Survey*. The historical growth measures in EPS, DPS, and BVPS for the Water Proxy Group, as measured by the medians, range from 3.00% to 5.50%, with an average of 4.50%. For the Gas Proxy Group, the historical growth measures in EPS, DPS, and BVPS, as measured by the medians, range from 2.80% to 5.50%, with an average of 4.10%.

**Q. PLEASE SUMMARIZE *VALUE LINE'S* PROJECTED GROWTH RATES FOR THE COMPANIES IN THE PROXY GROUPS.**

A. *Value Line's* projections of EPS, DPS and BVPS growth for the companies in the proxy groups are shown on page 4 of Exhibit JRW-10. As previously indicated, due to the presence of outliers, the medians are used in the analysis. For the Water Proxy Group, the medians range from 4.50% to 7.00%, with an average of 5.90%. For the Gas Proxy Group, the medians range from 4.00% to 7.00%, with an average of 5.30%.

Also provided on page 4 of Exhibit JRW-10 is prospective sustainable growth for the proxy groups as measured by *Value Line*'s average projected retention rate and return on shareholders' equity. As noted above, sustainable growth is significant and a primary driver of long-run earnings growth. For the Water Proxy Group, the median prospective sustainable growth rate is 3.80%. The median prospective sustainable growth rate for the Gas Proxy Group is 4.60%.

**Q. PLEASE ASSESS GROWTH FOR THE PROXY GROUPS AS MEASURED BY ANALYSTS' FORECASTS OF EXPECTED 5-YEAR EPS GROWTH.**

A. Yahoo, Zacks, and Reuters collect, summarize, and publish Wall Street analysts' long-term EPS growth rate forecasts for the companies in the proxy groups. These forecasts are provided for the companies in the proxy groups

on page 5 of Exhibit JRW-10.[19] Because of the disparity in some of the projected EPS growth rates, I have reported both the mean and median growth rates for the two groups. The mean/median of analysts' projected EPS growth rates for the Water and Gas Proxy Groups are 5.80%/5.00% and 4.70%/4.50%.

**Q. PLEASE SUMMARIZE YOUR ANALYSIS OF THE HISTORICAL AND PROSPECTIVE GROWTH OF THE PROXY GROUPS.**

A. Page 6 of Exhibit JRW-10 shows the summary DCF growth rate indicators for the proxy groups.

The historical growth rate indicators for the Water Proxy Group imply a baseline growth rate in the range of 4.50%. The average of the projected EPS, DPS, and BVPS growth rates from *Value Line* is 5.90%, and *Value Line*'s projected sustainable growth rate is 3.80%. The projected EPS growth rates of Wall Street analysts for the group are 5.80% and 5.00% as measured by the mean and median growth rates. The overall range for the projected growth rate indicators is 3.80% to 5.80%. Giving more weight to the projected growth rate measures projected growth rate measures from analysts *Value Line*, I believe that a growth rate in the range of 5.50% is appropriate.[20]

[19] Since there is considerable overlap in analyst coverage between the three services, and not all of the companies have forecasts from the different services, I have averaged the expected five-year EPS growth rates from the three services for each company to arrive at an expected EPS growth rate by company.

[20] Despite the research that indicates analysts' long-term EPS growth rates are overly optimistic and upwardly biased, I do believe that they are a superior measure of expected growth. Nonetheless, I do not believe that they should be used as the sole measure of expected growth.

This growth rate figure is clearly in the upper end of the range of historic and projected growth rates for the Water Proxy Group.

The historical growth rate indicators for the Gas Proxy Group indicate a growth rate of 4.10%. *Value Line*'s average projected EPS, DPS, and BVPS growth rate for the group is 5.30%, and *Value Line*'s projected sustainable growth rate is 4.60%. The mean/median projected EPS growth rates of Wall Street analysts for the group are 4.70% and 4.50%, respectively. The range for the projected growth rate indicators is 4.10% to 5.30%. Giving more weight to the projected growth rate measures (analysts' EPS growth rate forecasts and *Value Line*'s), I use 5.00% as the DCF growth rate for the Gas Proxy Group. As with the Water Proxy Group, this growth rate figure is in the upper end of the range of historic and projected growth rates.

**Q. BASED ON THE ABOVE ANALYSIS, WHAT ARE YOUR INDICATED COMMON EQUITY COST RATES FROM THE DCF MODEL FOR THE GROUPS?**

A. My DCF-derived equity cost rates for the groups are summarized on page 1 of Exhibit JRW-10.

$$\text{DCF Equity Cost Rate (k)} = \frac{D}{P} + g$$

| | Dividend Yield | 1 + ½ Growth Adjustment | DCF Growth Rate | Equity Cost Rate |
|---|---|---|---|---|
| **Water Proxy Group** | **2.90%** | **1.02750** | **5.50%** | **8.50%** |
| **Gas Proxy Group** | **3.70%** | **1.02500** | **5.00%** | **8.80%** |

## C. Capital Asset Pricing Model Results

**Q. PLEASE DISCUSS THE CAPITAL ASSET PRICING MODEL ("CAPM").**

A. The CAPM is a risk premium approach to gauging a firm's cost of equity capital. According to the risk premium approach, the cost of equity is the sum of the interest rate on a risk-free bond ($R_f$) and a risk premium (RP), as in the following:

$$k = R_f + RP$$

The yield on long-term Treasury securities is normally used as $R_f$. Risk premiums are measured in different ways.

The CAPM is a variant of risk premium theory involving the risk and expected returns of common stocks. In the CAPM, two types of risk are associated with a stock: firm-specific (or unsystematic) risk, and market (or systematic) risk, which is measured by a firm's beta. The only risk that investors receive a return for bearing is systematic risk.

According to the CAPM, the expected return on a company's stock, which is also the equity cost rate (K), is equal to:

$$K = (R_f) + ß * [E(R_m) - (R_f)]$$

Where:

- $K$ represents the estimated rate of return on the stock;
- $E(R_m)$ represents the expected return on the overall stock market. (Frequently, the 'market' refers to the S&P 500);
- ($R_f$) represents the risk-free rate of interest;
- $[E(R_m) - (R_f)]$ represents the expected equity or market risk premium—the excess return that an investor expects to receive above the risk-free rate for investing in risky stocks; and
- *Beta*—(ß) is a measure of the systematic risk of an asset.

Estimating the required return or cost of equity using the CAPM requires three inputs: the risk-free rate of interest ($R_f$), the beta (ß), and the expected equity or market risk premium $[E(R_m) - (R_f)]$. $R_f$ is the easiest of the inputs to measure – it is represented by the yield on long-term Treasury bonds. ß, the measure of systematic risk, is a little more difficult to measure because there are different opinions about what adjustments, if any, should be made to historical betas due to their tendency to regress to 1.0 over time. And finally, an even more difficult input to measure is the expected equity or market risk premium ($E(R_m) - (R_f)$). I will discuss each of these inputs below.

**Q. WHAT DOES EXHIBIT JRW-11 DEMONSTRATE?**

A. Exhibit JRW-11 provides the summary results for my CAPM study. Page 1 shows the results, and the following pages contain the supporting data.

**Q. PLEASE DISCUSS THE RISK-FREE INTEREST RATE.**

A. The yield on long-term U.S. Treasury bonds has usually been viewed as the risk-free rate of interest in the CAPM. This yield is usually considered to be the yield on U.S. Treasury bonds with 30-year maturities.

**Q. WHAT RISK-FREE INTEREST RATE ARE YOU USING IN YOUR CAPM?**

A. The yield on 30-year Treasury bonds has been in the 2.50% to 4.00% range over the 2011 – 2013 time period. These rates are currently in the 3.25% range. Given the recent range of yields, and the prospect of higher rates in the future, I will use 4.00% as the risk-free rate, or $R_f$, in my CAPM.

**Q. WHAT BETAS ARE YOU EMPLOYING IN YOUR CAPM?**

A. Beta (ß) is a measure of the systematic risk of a stock. The market, usually taken to be the S&P 500, has a beta of 1.0. The beta of a stock with the same price movement as the market also has a beta of 1.0. A stock whose price movement is greater than that of the market, such as a technology stock, is riskier than the market and has a beta greater than 1.0. A stock with below average price movement, such as that of a regulated public utility, is less risky than the market and has a beta less than 1.0. Estimating a stock's beta involves running a linear regression of a stock's return on the market return.

As shown on page 3 of Exhibit JRW-11, the slope of the regression line is the stock's ß. A steeper line indicates the stock is more sensitive to the

return on the overall market. This means that the stock has a higher ß and greater than average market risk. A less steep line indicates a lower ß and less market risk.

Several online investment information services, such as Yahoo and Reuters, provide estimates of stock betas. Usually these services report different betas for the same stock. The differences are usually due to: (1) the time period over which the ß is measured; and (2) any adjustments that are made to reflect the fact that betas tend to regress to 1.0 over time. In estimating an equity cost rate for the proxy group, I am using the betas for the companies as provided in the *Value Line Investment Survey*. As shown on page 3 of Exhibit JRW-11, the median beta for the companies in the Water and Gas Proxy Groups are 0.70 and 0.80, respectively.

**Q. PLEASE DISCUSS THE ALTERNATIVE VIEWS REGARDING THE MARKET RISK PREMIUM ("MRP").**

A. The MRP - $(E(R_m) - R_f)$ - is equal to the expected return on the stock market (e.g., the expected return on the S&P 500, $E(R_m)$) minus the risk-free rate of interest ($R_f$)). The MRP is the difference in the expected total return between investing in equities and investing in "safe" fixed-income assets, such as long-term government bonds. However, while the MRP is easy to define conceptually, it is difficult to measure because it requires an estimate of the expected return on the market.

**Q. PLEASE DISCUSS THE ALTERNATIVE APPROACHES TO ESTIMATING THE MRP.**

A. Page 4 of Exhibit JRW-11 highlights the primary approaches to, and issues in, estimating the expected MRP. The traditional way to measure the MRP was to use the difference between historical average stock and bond returns. In this case, historical stock and bond returns (also called *ex post* returns) were used as the measures of the market's expected return (known as the *ex ante* or forward-looking expected return). This type of historical evaluation of stock and bond returns is often called the "Ibbotson approach" after Professor Roger Ibbotson, who popularized this method of using historical financial market returns as measures of expected returns. Most historical assessments of the MRP suggest an MRP range of 5% to 7% above the rate on long-term U.S. Treasury bonds. However, this can be a problem because: (1) *ex post* returns are not the same as *ex ante* expectations; (2) market risk premiums can change over time, increasing when investors become more risk-averse and decreasing when investors become less risk-averse; and (3) market conditions can change such that *ex post* historical returns are poor estimates of *ex ante* expectations.

Numerous academic studies have criticized the use of historical returns as market expectations, as discussed later in my testimony. The general theme of these studies is that the large MRP discovered in historical stock and bond returns cannot be justified by the fundamental data. These studies, which fall under the category "*Ex Ante* Models and Market Data," compute *ex ante* expected returns using market data to arrive at an expected MRP. These

studies have also been called "Puzzle Research" after the famous study by Mehra and Prescott in which the authors first questioned the magnitude of historical MRPs relative to fundamentals.[21]

In addition, there are a number of surveys of financial professionals and academics regarding the MRP. *CFO Magazine* conducts a quarterly survey of Chief Financial Officers (CFOs), which includes questions regarding their views on the current expected returns on stocks and bonds. Typically, over 350 CFOs participate in the survey.[22] Questions regarding expected stock and bond returns are also included in the Federal Reserve Bank of Philadelphia's annual survey of financial forecasters, which is published as the *Survey of Professional Forecasters*.[23] This survey of professional economists has been published for almost 50 years. In addition, Pablo Fernandez conducts occasional surveys of financial analysts and companies regarding the MRPs they use in their investment and financial decision-making.[24]

[21] Rajnish Mehra & Edward C. Prescott, *The Equity Premium: A Puzzle*, J. MONETARY ECON. 15(1985).

[22] *See* www.cfosurvey.org.

[23] Federal Reserve Bank of Philadelphia, *Survey of Professional Forecasters* (February 14, 2014). The *Survey of Professional Forecasters* was formerly conducted by the American Statistical Association ("ASA") and the National Bureau of Economic Research ("NBER") and was known as the ASA/NBER survey. The survey, which began in 1968, is conducted each quarter. The Federal Reserve Bank of Philadelphia, in cooperation with the NBER, assumed responsibility for the survey in June 1990.

[24] Pablo Fernandez, Pablo Linares and Isabel Fernandez Acín, "Market Risk Premium used for 88 countries in 2014: a survey with 8,228 answers," June 20, 2014.

**Q. PLEASE PROVIDE A SUMMARY OF THE MRP STUDIES.**

A. Derrig and Orr (2003), Fernandez (2007), and Song (2007) have completed the most comprehensive reviews to date of the research on the MRP.[25] Derrig and Orr's study evaluated the various approaches to estimating MRPs, as well as the issues with the alternative approaches and summarized the findings of the published research on the MRP. Fernandez examined four alternative measures of the MRP – historical, expected, required, and implied. He also reviewed the major studies of the MRP and presented the summary MRP results. Song provides an annotated bibliography and highlights the alternative approaches to estimating the equity risk summary.

Page 5 of Exhibit JRW-11 provides a summary of the results of the primary risk premium studies reviewed by Derrig and Orr, Fernandez, and Song, as well as other more recent studies of the MRP. In developing page 5 of Exhibit JRW-11, I have categorized the studies as discussed on page 4 of Exhibit JRW-11. These include the results of: (1) the various studies of the historical risk premium; (2) *ex ante* MRP studies; (3) MRP surveys of CFOs, Financial Forecasters, analysts, companies and academics; and (4) the Building Block approaches to the MRP. In the "Building Blocks" results I have included a study I performed, which is presented in Appendix C of this testimony. The Building Blocks approach is a hybrid approach employing

[25] *See* Richard Derrig & Elisha Orr, "MRP: Expectations Great and Small," Working Paper (version 3.0), Automobile Insurers Bureau of Massachusetts, (August 28, 2003); Pablo Fernandez, "Equity Premium: Historical, Expected, Required, and Implied," IESE Business School Working Paper, (2007); Zhiyi Song, "The MRP: An Annotated Bibliography," CFA Institute, (2007).

elements of both historical and *ex ante* models. The median MRP from the results of more than 30 studies is 4.40%.

**Q. PLEASE HIGHLIGHT THE RESULTS OF THE MORE RECENT RISK PREMIUM STUDIES AND SURVEYS.**

A. The studies cited on page 5 of Exhibit JRW-11 include all MRP studies and surveys I could identify that were published over the past decade and that provided an MRP estimate. Most of these studies were published prior to the financial crisis. In addition, some of these studies were published in the early 2000s at the market peak. It should be noted that many of these studies (as indicated) used data over long periods of time (as long as fifty years of data) and so were not estimating an MRP as of a specific point in time (e.g., the year 2001). To assess the effect of the earlier studies on the MRP, I have reconstructed page 5 of Exhibit JRW-11 on page 6 of Exhibit JRW-11; however, I have eliminated all studies dated before January 2, 2010. The median MRP for this subset of studies is 4.90%.

**Q. GIVEN THESE RESULTS, WHAT MARKET OR MRP ARE YOU USING IN YOUR CAPM?**

A. Much of the data indicates that the market risk premium is in the 4.00% to 6.00% range. I use the midpoint of this range, 5.00%, as the market or MRP.

**Q. IS YOUR *EX ANTE* MRP CONSISTENT WITH THE MARKET RISK PREMIUMS USED BY CFOS?**

A. Actually my *ex ante* MRP is above the expected MRP of CFOs surveyed by *CFO Magazine*. In the June 2014 CFO survey conducted by *CFO Magazine* and Duke University, the expected 10-year MRP was 4.10%.

**Q. IS YOUR *EX ANTE* MRP CONSISTENT WITH THE MRPS OF PROFESSIONAL FORECASTERS?**

A. Again, my *ex ante* MRP is above the expected MRP of financial forecasters surveyed by the Federal Reserve Bank of Philadelphia. The financial forecasters in this survey project both stock and bond returns. In the February 2014 survey, the median long-term expected stock and bond returns were 6.43% and 4.25%, respectively. This provides an *ex ante* MRP of 2.18% (6.43%-4.25%).

**Q. IS YOUR *EX ANTE* MRP CONSISTENT WITH THE MRPS OF FINANCIAL ANALYSTS AND COMPANIES?**

A. Yes. Pablo Fernandez recently published the results of a 2014 survey of academics, financial analysts and companies.[26] This survey included over 8,000 responses. The median MRP employed by U.S. analysts and companies was 5.00%.

[26] Pablo Fernandez, Javier Auirreamalloa, and Javier Corres, "Market Risk Premium Used in 51 Countries in 2013: A survey with 6,237 Answers," June 26, 2013.

**Q. WHAT EQUITY COST RATE IS INDICATED BY YOUR CAPM ANALYSIS?**

A. The results of my CAPM study for the proxy groups are provided below:

$$K = (R_f) + ß * [E(R_m) - (R_f)]$$

| | Risk-Free Rate | Beta | MRP | Equity Cost Rate |
|---|---|---|---|---|
| **Water Proxy Group** | **4.00%** | **0.70** | **5.00%** | **7.50%** |
| **Gas Proxy Group** | **4.00%** | **0.80** | **5.00%** | **8.00%** |

These results are summarized on page 1 of Exhibit JRW-11.

## D. Equity Cost Rate Summary

**Q. PLEASE SUMMARIZE YOUR EQUITY COST RATE STUDY.**

A. The results for my DCF and CAPM analyses for the proxy group of gas distribution are indicated below:

| | DCF | CAPM |
|---|---|---|
| **Water Proxy Group** | **8.50%** | **7.50%** |
| **Gas Proxy Group** | **8.80%** | **8.00%** |

**Q. GIVEN THESE RESULTS, WHAT IS YOUR ESTIMATED EQUITY COST RATE FOR THE GROUPS?**

A. Given these results, I conclude that the appropriate equity cost rate for the Water and Gas Proxy Groups is in the 7.50% to 8.80% range. However, I give greater weight to the DCF model, and I believe that the results for the Gas Proxy Group are relevant here due to the data limitations for water companies. Hence, I believe relevant equity cost rate range is 8.50% to

8.80%. As a current estimate of an equity cost rate for a water company, I will use 8.75%, which is clearly in the upper end of the range of equity cost estimates for the water and gas companies.

**Q. WHY DO YOU BELIEVE THAT THE DCF RESULTS FOR THE GAS PROXY GROUP PROVIDE A BENCHMARK AS TO THE TO THE EQUITY COST RATE FOR WATER COMPANIES?**

A. I do believe that the equity cost rate results for gas companies provide an indicator as to the appropriate equity cost rate for water companies. As noted above, the data for the Water Proxy Group are limited. In particular, there are very few analysts who cover the water companies. Also, the projected EPS growth rates for the companies in the Water Proxy Group are variable and questionable in some cases. In addition, as I highlight in my testimony, it is well known that the long-term projected EPS growth rates of Wall Street analysts are overly optimistic and upwardly biased. As a result, the DCF equity cost rate for the Water Proxy Group is dependent on the projected EPS growth rates of a few Wall Street analysts who have a tendency to be optimistic in their forecasts.

**Q. ARE YOU MAKING ANY RISK ADJUSTMENT FOR ARTESIAN AS MS. AHERN HAS DONE?**

A. No. I previously discussed my risk assessment of Artesian in Exhibit JRW-4. Also, later in my testimony I discuss the flaws in Ms. Ahern's risk assessment

of Artesian. In addition, I have used an equity cost rate for Artesian which is in the high end of the range of equity cost rates for water and gas companies. Hence, I have implicitly taken into account that Artesian's risk level could be at the high end of the companies in the water and gas groups.

**Q. DO YOU HAVE ANY OTHER THOUGHTS ON WHY AN 8.75% RETURN ON EQUITY IS APPROPRIATE AT THIS TIME?**

A. Yes. There are several reasons why an 8.75% return on equity is appropriate for Artesian in this case. First, as shown on in Exhibit JRW-8, the water utility is one of the lowest risk industry as ranked by beta in *Value Line*. As such, the equity cost rate according to the CAPM is among the lowest of any industry in the U.S. Second, as shown in Exhibit JRW-3, capital costs for utilities, as indicated by long-term bond yields, have declined to historically low levels. The current yield on 30-year, A-rated utility bonds is about 4.25%. Finally, financial markets still indicate that capital costs are low. While the economy has improved, unemployment is still at 6.2%. The slow growth of the economy has resulted in extremely low inflation and interest rates. As a result, the expected returns on financial assets – from savings accounts to Treasury Bonds to common stocks – are low. Therefore, in my opinion, an 8.75% return is a very fair and reasonable for a regulated water utility company.

**Q. DO YOU BELIEVE THAT YOUR 8.75% RECOMMENDATION IS CONSISTENT WITH THE AUTHORIZED RETURNS ON EQUITY FOR WATER COMPANIES?**

A. Yes. Page 1 of Exhibit JRW-12 provides the most recent authorized ROEs for the publicly-traded water companies as reported by *AUS Utilities Reports*. The range of the authorized ROEs is 9.62% to 10.29%, and the average is 9.97%. Given that a number of these reported authorized ROEs are dated, and adjusting for the lower capital costs indicated by the lower yields on utility bonds, I believe that my 8.75% ROE recommendation is consistent with the reported authorized ROEs for water companies.[27]

**Q. PLEASE DISCUSS YOUR STUDY OF EARNED VERSUS AUTHORIZED ROEs FOR WATER COMPANIES.**

A. Page 2 of Exhibit JRW-12 provides the results of my study of the authorized and earned ROEs for publicly-traded water utility companies and their associated market-to-book ratios over the past decade. Panel A provides the annual data, and the data are presented graphically on Panel B. The median authorized ROE was 10.45% in 2002, and has consistently declined over the past ten years. As of 2013, the median figure was 9.99%. Earned ROEs have also declined over the decade, and have been below authorized ROEs for nine of the past ten years. Overall, earned ROEs have been about 100 basis points below authorized ROEs. As of 2013, the median earned ROE was 9.00%.

[27] The published authorized ROEs are dated in that the dates are only listed for five of the nine water companies, and the most recent date provided is November, 2011.

**Q. HAVE THESE RETURNS BEEN ADEQUATE TO MEET INVESTORS' RETURN REQUIREMENTS?**

A. Yes. I have also provided the average market-to-book ratios for publicly-traded water utility companies as well as the authorized and earned ROEs on page 2 of Exhibit JRW-12. The annual market-to-book ratios have declined over the decade, but with considerable variability. The peak was 2.36X in 2004. In the past four years, the market-to-book ratios for publicly-traded water utility companies have been in the 1.70X to 2.0X range. Overall, the market-to-book ratios for publicly-traded water utility companies indicate that the earned ROEs have been more than adequate to meet investors' return requirements. It is also noteworthy that the market-to-book ratios for publicly-traded water utility companies have been above the market-to-book ratios for gas distribution and electric utility companies.

## VI. CRITIQUE OF ARTESIAN'S RATE OF RETURN TESTIMONY

**Q. PLEASE SUMMARIZE ARTESIAN'S OVERALL RATE OF RETURN RECOMMENDATION.**

A. Artesian's cost of capital recommendation is provided on page 1 of Exhibit JRW-13. The Company is requesting a capital structure consisting of 49.46% long-term debt and 50.54% common equity. The Company uses a long-term debt cost rate of 5.84% and an equity cost rate of 10.90%.

**Q. PLEASE PROVIDE A REVIEW OF MS. AHERN'S RETURN ON EQUITY RECOMMENDATION.**

A. Ms. Ahern's return on equity is summarized in Panel A of page 2 of Exhibit JRW-13. Ms. Ahern uses a proxy group of nine water utility companies and a proxy group of twenty-eight non-price regulated companies. Ms. Ahern has employed DCF, CAPM, and RP approaches in estimating an equity cost rate. These approaches provide equity cost rate estimates of 8.58%, 11.26%, and 9.92% when applied to the water utility group and of 11.88%, 10.79%, and 10.27% when applied to the non-price regulated group. She estimates an equity cost rate of 10.45% for the two groups. She then adds a credit risk premium of 0.20% and a business risk premium of 0.25% to get an adjusted equity cost rate of 10.90% for Artesian.

**Q. WHAT ISSUES DO YOU HAVE WITH THE COMPANY'S COST OF CAPITAL POSITION?**

A. The primary areas of disagreement in measuring Artesian's cost of capital are: (1) the proxy groups used to estimate an equity cost rate for Artesian; (2) the expected growth rate used in the DCF model; (3) the base interest rates and MRPs used in the CAPM and RP approaches; and (4) Ms. Ahern's business risk and flotation cost adjustments.

## A. Proxy Groups

**Q. PLEASE DISCUSS MS. AHERN'S PROXY GROUPS.**

A. Ms. Ahern has used two proxy groups to estimate an equity cost rate for Artesian. They are: (1) a Water Group comprised of nine water utility companies; and (2) a Non-Price Regulated Group comprised of twenty-eight unregulated companies.

**Q. WHAT ARE THE ISSUES WITH MS. AHERN'S GROUP OF WATER COMPANIES?**

A. Ms. Ahern's group of water companies is identical to my Water Proxy Group. However, as previously indicated, the financial data needed to perform a DCF analysis for the Water Proxy Group is limited because analysts' coverage of the water companies is sparse. For example, four of the nine companies have no long-term EPS growth rate projection listed at Reuters and Zacks. In addition, only three of the nine companies are covered by more than one equity analyst, according to www.reuters.com. Because of these data limitations, I have included an analysis of the results for the Gas Proxy Group in my testimony. The return requirements of investors on gas companies should be similar to that of water companies because both industries are capital intensive, heavily regulated, and distribute and deliver an essential commodity whose service rates and rates of return are set by state regulatory commissions.

**Q. PLEASE DISCUSS THE PROBLEM WITH MS. AHERN'S NON-UTILITY PROXY GROUP.**

A. Ms. Ahern has estimated an equity cost rate for Artesian using a proxy group of non-price regulated companies. These companies are listed in Ms. Ahern's Schedule 10. This group includes such companies as Baxter Intl., Kroger, McKesson, Sherwin Williams, J. M. Smucker Company, and Weis Markets. While many of these companies are large and successful, their lines of business are vastly different from the water utility business and they do not operate in a highly regulated environment. In addition, as discussed in Appendix B, the upward bias in the EPS growth rate forecasts of Wall Street analysts is particularly severe for non-regulated companies and therefore the DCF equity cost rate estimates for this group are particularly overstated. As such, the non-utility group is not an appropriate proxy for Artesian, and therefore the equity cost rate results for this group should be ignored.

## B. DCF Approach

**Q. PLEASE SUMMARIZE MS. AHERN'S DCF ESTIMATES.**

A. On pages 22-37 of her testimony and in Schedule PMA-6, Ms. Ahern develops an equity cost rate by applying a DCF model to her water group. In the traditional DCF approach, the equity cost rate is the sum of the dividend yield and expected growth rate. For the DCF growth rate, Ms. Ahern uses four measures of projected EPS growth – the projected EPS growth of Wall Street

analysts as compiled by Reuters, Yahoo, and Zacks, and *Value Line's* projected EPS growth rate. Ms. Ahern's DCF results are summarized in Panel B of page 2 of Exhibit JRW-13. The median of the DCF results is 8.58% for the group.

**Q. PLEASE EXPRESS YOUR CONCERNS WITH MS. AHERN'S DCF STUDY.**

A. I have several issues with Ms. Ahern's DCF equity cost rate: (1) the reliance on the water utility and non-utility groups to estimate an equity cost rate for Artesian; and (2) the excessive reliance on the EPS growth rate forecasts of Wall Street analysts and *Value Line* as a DCF growth rate. The issues with the water and non-utility proxy groups were discussed above.

1. Reliance of Wall Street Analysts' EPS Growth Rate Forecasts

**Q. PLEASE DISCUSS MS. AHERN'S RELIANCE ON THE PROJECTED GROWTH RATES OF WALL STREET ANALYSTS AND *VALUE LINE*.**

A. It seems highly unlikely that investors today would rely excessively on the EPS growth rate forecasts of Wall Street analysts and ignore other growth rate measures in arriving at their expected growth rates for equity investments. As I previously indicated, the appropriate growth rate in the DCF model is the dividend growth rate, not the earnings growth rate. Hence, consideration must be given to other indicators of growth, including historical prospective

dividend growth, internal growth, and projected earnings growth. Also as discussed previously, the Lacina, Lee, and Xu study (2011) has shown that analysts' long-term earnings growth rate forecasts are no more accurate at forecasting future earnings than naïve random walk forecasts of future earnings.[28] As such, the weight give to analysts' projected EPS growth rates should be limited. Finally, and most significantly, it is well-known that the long-term EPS growth rate forecasts of Wall Street securities analysts are overly optimistic and upwardly biased. Hence, using these growth rates as a DCF growth rate produces an overstated equity cost rate. A recent study by Easton and Sommers (2007) found that optimism in analysts' earnings growth rate forecasts leads to an upward bias in estimates of the cost of equity capital of almost three percentage points.[29] These issues are addressed in more detail in Appendix B.

### C. Risk Premium Approach

**Q. PLEASE DISCUSS MS. AHERN'S RISK PREMIUM ("RP") APPROACH.**

A. On pages 37-47 of her testimony and in Schedule PMA-8, Ms. Ahern develops a MRP by using the RP model. Ms. Ahern reports a RP equity cost rate of 11.26%. This figure is the average of her two risk premium models: (1) a

[28] M. Lacina, B. Lee and Z. Xu, *Advances in Business and Management Forecasting (Vol. 8)*, Kenneth D. Lawrence, Ronald K. Klimberg (ed.), Emerald Group Publishing Limited, pp.77-101

[29] Easton, P., & Sommers, G. (2007). Effect of analysts' optimism on estimates of the expected rate of return implied by earnings forecasts. *Journal of Accounting Research*, 45(5), 983–1015.

Predictive Risk Premium Model ("PRPM") result of 11.67%; and (2) an Adjusted Total Market Model ("ATMM") result of 10.03% The PRPM uses a risk-free rate of 4.40% and a risk premium of 11.26%. The ATMM uses an Aaa-rated projected utility bond yield of 5.14%, credit risk adjustments of 0.16% and -0.04%, and an MRP of 4.76%. The MRP of 4.76% is the average of 4.54% and 4.97% derived from the risk premium studies summarized on pages 8 and 11 of Schedule PMA-8.

The 4.54% MRP is computed by multiplying a beta by the average of (1) 5.60% - the difference between the mean returns on SBBI stocks and Moody's Aaa- and AA-rated corporate bonds; (2) 9.26% - from Ms. Ahern's own PRPM; and (3) 3.81% - *Value Line*'s projected market return minus the rate on Aaa-rated corporate bonds. The average of these MRPs is 6.98%. Using a beta for water companies of 0.65, the resulting risk premium is 4.54%.

The 4.97% MRP is computed as the average of: (1) 4.61% - the arithmetic mean difference between historic utility stock and bonds returns over the 1926-2012 time period; and (2) 5.24% - a forecasted MRP using the PRPM.

**Q. WHAT ARE THE ERRORS IN MS. AHERN'S RPM ANALYSIS?**

A. There are several flaws in Ms. Ahern's RP analysis, but the primary ones are: (1) the projected base yield; and (2) the various risk premiums which are based on historical and projected market returns.

1. Base Yield

**Q. PLEASE DISCUSS MS. AHERN'S BASE YIELD IN HER RP ANALYSIS?**

A. Ms. Ahern's base yield is the projected yield on long-term A-rated public utility bonds. This yield is excessive because the base yield (the rate on A-rated utility bonds) is subject to credit risk. With credit risk, the expected return on the bond is below the yield-to-maturity. Hence, the yield-to-maturity of the bond exceeds the return that investors expect. In addition, Ms. Ahern's projected return on AAA-rated corporate bonds is about 100 basis points above current market rates.

2. Risk Premiums

**Q. PLEASE CRITIQUE MS. AHERN'S PRPM.**

A. Ms. Ahern's PRPM (which is a proprietary model that she and others at AUS Consultants developed) estimates a risk premium based on historic stock and bond returns and the prediction of volatility. The inputs to the model are the historical returns on the common shares of each company in the proxy group minus the historical monthly yield on long-term U.S. Treasury securities through January 2014. Using a generalized form of ARCH, known as GARCH, each water company's projected MRP was determined using statistical software. Her PRPM results for each company are provided in her

Schedule PMA-8, page 2. The results indicate equity cost rates that ranging from 10.59% for Connecticut Water Service, Inc. to 22.02% for American Water Works. The mean and median estimates for Artesian are 13.72% and 11.67%.

**Q. PLEASE ADDRESS THE PROBLEMS WITH MS. AHERN'S PRPM.**

A. There are two primary issues with Ms. Ahern's PRPM.

First, it is based on the historical relationship between stock and bond returns. The errors associated with computing an expected MRP using historical stock and bond returns are addressed in Appendix D of this testimony. In short, there are a myriad of empirical problems, which result in historical market returns producing inflated estimates of expected risk premiums. Among the errors are the U.S. stock market survivorship bias (the 'Peso Problem'), the company survivorship bias (only successful companies survive – poor companies do not survive), and unattainable return bias (the Ibbotson procedure presumes monthly portfolio rebalancing).

Second, the PRPM model produces very high and variable equity cost rate estimates. For example, American Water Works ("AWK") has a beta of 0.70, which indicates it is much less volatile than the overall stock market. Yet, according to Ms. Ahern's PRPM, the indicated equity cost rate for AWK is 22.02%. The results do not make economic sense and hence do not provide reliable estimates of equity cost rates.

Third, Ms. Ahern's PRPP model has not been adopted by any

regulatory commissions. In response to DPA-COC-13, Ms. Ahern has proposed her approach in over thirty rate proceedings, but no regulatory body has specifically adopted it in any of those cases. Therefore, this approach, which produces highly variable results and has not been adopted by any regulatory commissions, should not be used in determining a cost of equity capital for Artesian.

**Q. PLEASE DISCUSS MS. AHERN'S ATMM APPROACH.**

A. Ms. Ahern's ATMM approach uses several difference measures of the market risk premium. These include three measures using historic stock and bond returns: (1) the PRPM; (2) the difference between the mean returns on SBBI stocks and Moody's Aaa- and AA-rated corporate bonds; and (3) the arithmetic mean difference between historic utility stock and bonds returns over the 1926-2012 time period. She also computes a market risk premium using *Value Line*'s projected market return minus the rate on Aaa-rated corporate bonds. The issues with Ms. Ahern's PRPM and the use of historical stock and bond returns to compute a market risk premium were discussed above.

**D. CAPM Approach**

**Q. PLEASE DISCUSS MS. AHERN'S CAPM.**

A. On pages 47-51 of her testimony and in Schedule PMA-9, Ms. Ahern develops an equity cost rate by using the CAPM. Ms. Ahern uses both the CAPM and

the empirical CAPM approaches ("ECAPM"). The CAPM and ECAPM results provide a CAPM equity cost rate of 9.92%. She uses a projected rate of 4.40% for the long-term Treasury bond and a median beta of 0.65 for the water companies. She uses a MRP of 7.96%, which is the average of 4.55%, 10.36%, and 6.55%. The MRP is the average of: (1) 4.55%, which is from *Value Line*'s projected market return; (2) 10.36%, which is from Ms. Ahern's own PRPM; and (3) 6.55%, which is the difference between the mean returns on SBBI stocks and SBBI long-term government bond income return.

**Q. WHAT ARE THE ERRORS IN MS. AHERN'S CAPM ANALYSIS?**

A. There are two primary flaws with Ms. Ahern's CAPM analysis: (1) the use of the so-called empirical CAPM ("ECAPM"); and (2) the MRP of 7.96%.

1. ECAPM

**Q. WHAT ISSUES DO YOU HAVE WITH MS. AHERN ECAPM?**

A. Ms. Ahern has employed a variation of the CAPM which she calls the 'ECAPM.' The ECAPM attempts to model the well-known finding of tests of the CAPM that have indicated the Security Market Line ("SML") is not as steep as predicted by the CAPM. As such, the ECAPM is nothing more than an ad hoc version of the CAPM and has not been theoretically or empirically validated in refereed journals. The ECAPM provides for weights which are used to adjust the risk-free rate and market risk premium in applying the

ECAPM. Ms. Ahern uses 0.25 and 0.75 factors to boost the MRP measure, but provides no empirical justification for those figures.

Beyond the lack of any theoretical or empirical validation of the ECAPM, there are two errors in Ms. Ahern's ECAPM. First, I am not aware of any tests of the CAPM that use adjusted betas such as those used by Ms. Ahern. Adjusted betas address the empirical issues with the CAPM by increasing the expected returns for low beta stocks and decreasing the returns for high beta stocks. Second, a SML with a slope coefficient which is not as steep as predicted by the CAPM is also consistent with a declining MRP.

**Q. PLEASE PROVIDE A SUMMARY ASSESSMENT OF MS. AHERN'S MRPs IN HER RP AND CAPM APPROACHES.**

A. The errors in Ms. Ahern's estimates of the MRP for her CAPM have previously been discussed. In short, the MRPs used in her RP and CAPM studies are inflated due to errors and bias in her studies. Investment banks, consulting firms, and CFOs use the MRP concept every day in making financing, investment, and valuation decisions. On this issue, the opinions of CFOs and financial forecasters are especially relevant. CFOs deal with capital markets on an ongoing basis since they must continually assess and evaluate capital costs for their companies. They are well aware of the historical stock and bond return studies of Ibbotson. The CFOs in the June 2014 *CFO Magazine* – Duke University Survey of over almost 350 CFOs shows a MRP of 4.10% over the next ten years. The median MRP for the companies,

analysts, and academics surveyed by Fernandez was 5.00% for 2014. In addition, the financial forecasters in the February 2014 Federal Reserve Bank of Philadelphia survey expect an annual MRP of 2.18% over the next ten years. As such, with a more realistic equity or market risk premium, the appropriate equity cost rate for a public utility should be in the 8.00% to 9.00% range, not in the 11.00% range.

**Q. PLEASE DISCUSS THE GROWTH OF THE ECONOMY AND THE PROSPECTIVE MARKET RETURNS AND RISK PREMIUMS.**

A. Historical GDP growth rates for 10, 20, 30, 40 and 50 years are presented in Panel A of page 1 of Exhibit JRW-14. Whereas long-term growth is 6.00%, the trends clearly indicate that nominal economic growth has slowed in the U.S. to the 4.00%-5.00% range.

**Q. WHAT LEVEL OF GDP GROWTH IS FORECASTED BY ECONOMISTS AND VARIOUS GOVERNMENT AGENCIES?**

A. As previously discussed, there are several forecasts of annual GDP growth that are available from economists and government agencies. These are listed in Panel B of page 1 of Exhibit JRW-14. The mean 10-year nominal GDP growth forecast (as of February 2014) by economists in the recent *Survey of Professional Forecasters* is 4.90%. The Energy Information Administration (EIA), in its projections used in preparing *Annual Energy Outlook,* forecasts long-term nominal GDP growth of 4.50% for the period 2011-2040. The

Congressional Budget Office, in its forecasts for the period 2014 to 2024, projects a nominal GDP growth rate of 4.80%.

**Q. PLEASE HIGHLIGHT THE RECENT RESEARCH ON THE LINK BETWEEN ECONOMIC AND EARNINGS GROWTH AND EQUITY RETURNS.**

A. Brad Cornell of the California Institute of Technology recently published a study on GDP growth, earnings growth, and equity returns. He finds that long-term EPS growth in the U.S. is directly related to GDP growth, with GDP growth providing an upward limit on EPS growth. In addition, he finds that long-term stock returns are determined by long-term earnings growth. He concludes with the following observations:[30]

> The long-run performance of equity investments is fundamentally linked to growth in earnings. Earnings growth, in turn, depends on growth in real GDP. This article demonstrates that both theoretical research and empirical research in development economics suggest relatively strict limits on future growth. In particular, real GDP growth in excess of 3 percent in the long run is highly unlikely in the developed world. In light of ongoing dilution in earnings per share, this finding implies that investors should anticipate real returns on U.S. common stocks to average no more than about 4–5 percent in real terms.

Given current inflation in the 3% range, the results imply nominal expected stock market returns in the 7% to 8% range. Ms. Ahern's expected stock market returns and MRPs are not indicative of the realities of the U.S.

[30] Bradford Cornell, "Economic Growth and Equity Investing," *Financial Analysts Journal* (January- February, 2010), p. 63.

economy and stock market. As such, her equity cost rate recommendation for Artesian is overstated.

### E. Adjustments for Size and Flotation Costs

**Q. PLEASE MS. AHERN'S ADJUSTMENT FOR THE SIZE OF ARTESIAN.**

A. Ms. Ahern includes a business risk adjustment of 0.25% in her 10.90% equity cost recommendation, which she attributes to Artesian's small size. In Schedule PMA-12, she compares the estimated market capitalization of Artesian to her group of water companies. On pages 60-62 of her testimony, she then justifies her business risk adjustment based on the historic stock returns provided by SBBI. As discussed in Appendix D, there are numerous errors in using historical market returns to compute risk premiums. These errors provide inflated estimates of expected risk premiums. Among the errors are survivorship bias (only successful companies survive – poor companies do not survive) and unattainable return bias (the Ibbotson procedure presumes monthly portfolio rebalancing). For example, Richard Roll (1983) found that one-half of the historic return premium for small companies disappears once biases are eliminated and historic returns are properly computed. The error arises from the assumption of monthly portfolio rebalancing and the serial correlation in historic small firm returns.[31] The net result is that Ibbotson's

[31] *See* Richard Roll, "On Computing Mean Returns and the Small Firm Premium," *Journal of Financial*

size premiums are poor measures for risk adjustment to account for the size of the Utility.

In addition, Professor Annie Wong has tested for a size premium in utilities and concluded that, unlike industrial stocks, utility stocks do not exhibit a significant size premium.[32] As explained by Professor Wong, there are several reasons why such a size premium would not be attributable to utilities. First, utilities are regulated closely by state and federal agencies and commissions, and hence, their financial performance is monitored on an ongoing basis by both the state and federal governments. In addition, public utilities must gain approval from government entities for common financial transactions such as the sale of securities. Furthermore, unlike their industrial counterparts, accounting standards and reporting are fairly standardized for public utilities. Finally, a company's earnings are predetermined to a certain degree through the ratemaking process in which performance is reviewed by state commissions and other interested parties. Overall, in terms of regulation, government oversight, performance review, accounting standards, and information disclosure, utilities are much different than industrials, which could account for the lack of a size premium.

*Economics*, pp. 371-86, (1983).

[32] Annie Wong, "Utility Stocks and the Size Effect: An Empirical Analysis," *Journal of the Midwest Finance Association*, pp. 95-101, (1993).

**Q. PLEASE DISCUSS OTHER RESEARCH ON THE SIZE PREMIUM IN ESTIMATING THE EQUITY COST RATE.**

A. Ching-Chih Lu (2009) estimated the size premium over the long run. Lu acknowledges that many studies have demonstrated that smaller companies have historically earned higher stock market returns. However, Lu highlights that these studies rebalance the size portfolios on an annual basis. This means that at the end of each year, the stocks are sorted based on size, split into deciles, and the returns are computed over the next year for each stock decile. This annual rebalancing creates the problem. Using a size premium in estimating a CAPM equity cost rate requires that a firm carry the extra size premium in its discount factor for an extended period of time, not just for one year, which is the presumption with annual rebalancing. Through an analysis of small firm stock returns for longer time periods (and without annual rebalancing), Lu finds that the size premium disappears within two years. Lu's conclusion with respect to the size premium is:[33]

> However, an analysis of the evolution of the size premium will show that it is inappropriate to attach a fixed amount of premium to the cost of equity of a firm simply because of its current market capitalization. For a small stock portfolio which does not rebalance since the day it was constructed, its annual return and the size premium are all declining over years instead of staying at a relatively stable level. This confirms that a small firm should not be expected to have a higher size premium going forward sheerly because it is small now.

[33] Ching-Chih Lu, "The Size Premium in the Long Run," 2009 Working Paper, SSRN abstract no. 1368705.

**Q. WHAT DOES STANDARD & POOR'S HAVE TO SAY ABOUT THIS ISSUE?**

A. Standard & Poor's released a report that addressed the issue of water company size and risk. The Standard & Poor's publication indicated the following.[34]

> Our criteria revision reflects our view that for general obligation ratings, a small and/or rural issuer does not necessarily have what we consider weaker credit quality than a larger or more-urban issuer. Although we assess these factors in our credit analysis for some revenue bond ratings, we believe many municipal systems still exhibit, in our view, strong and stable credit quality despite size or location constraints. While we believe that smaller or rural utility systems may not necessarily benefit from the economies of scale that can lead to more-efficient operations or lower costs, in our view, they can still have affordable rates, even in places with less-than-favorable household income and wealth levels.

**Q. FINALLY, PLEASE DISCUSS MS. AHERN'S ADJUSTMENT FOR FLOTATION COSTS.**

A. Ms. Ahern has also included a 0.20% upward adjustment to the equity cost rate for flotation costs. This adjustment factor is erroneous for several reasons. First, the Delaware Commission has expressly rejected a flotation cost adjustment in prior utility cases.

Second, Ms. Ahern has not identified any test-year flotation costs for the Company. Therefore, Artesian is requesting annual revenues in the form of a higher return on equity for flotation costs that have not been identified.

[34] Standard & Poor's, "26 Waste Water and Sewer Issuers are Upgraded on Revised Criteria," January 12, 2009.

Third, it is commonly argued that a flotation cost adjustment (such as that proposed by the Company) is necessary to prevent the dilution of the existing shareholders. This is often justified by referring to bonds and the manner in which issuance costs are recovered by including the amortization of bond flotation costs in annual financing costs. This is incorrect for several reasons:

(1) If an equity flotation cost adjustment is similar to a debt flotation cost adjustment, the fact that the market-to-book ratios for water utility companies are over 1.75X actually suggests that there should be a flotation cost *reduction* (and not an increase) to the equity cost rate. This is because when (a) a bond is issued at a price in excess of face or book value, and (b) the difference between market price and the book value is greater than the flotation or issuance costs, the cost of that debt is lower than the coupon rate of the debt. The amount by which market values of water utility companies are in excess of book values is much greater than flotation costs. Hence, if common stock flotation costs were exactly like bond flotation costs, and one was making an explicit flotation cost adjustment to the cost of common equity, the adjustment would be downward;

(2) If a flotation cost adjustment is needed to prevent dilution of existing stockholders' investment, then the reduction of the book value of stockholder investment associated with flotation costs can occur only when a company's stock is selling at a market price at/or below its book value. As noted above, water utility companies are selling at market prices well in

excess of book value. Hence, when new shares are sold, existing shareholders realize an *increase* in the book value per share of their investment, not a decrease;

(3) Flotation costs consist primarily of the underwriting spread or fee and not out-of-pocket expenses. On a per-share basis, the underwriting spread is the difference between the price the investment banker receives from investors and the price the investment banker pays to the company. Therefore, these are not expenses that must be recovered through the regulatory process. Furthermore, the underwriting spread is known to the investors who are buying the new issue of stock, and who are well aware of the difference between the price they are paying to buy the stock and the price that the company is receiving. The offering price they pay is what matters when investors decide to buy a stock based on its expected return and risk prospects. Therefore, the company is not entitled to an adjustment to the allowed return to account for those costs; and

(4) Flotation costs, in the form of the underwriting spread, are a form of a transaction cost in the market. They represent the difference between the price paid by investors and the amount received by the issuing company. Whereas the Company believes that it should be compensated for these transaction costs, it has not accounted for other market transaction costs in determining its cost of equity. Most notably, brokerage fees that investors pay when they buy shares in the open market are another market transaction cost. Brokerage fees increase the effective stock price paid by investors to

buy shares. If the Company had included these brokerage fees or transaction costs in its DCF analysis, the higher effective stock prices paid for stocks would lead to lower dividend yields and equity cost rates. This would result in a downward adjustment to their DCF equity cost rate.

**Q DOES THIS CONCLUDE YOUR TESTIMONY?**

A. Yes, it does.

Appendix A
Educational Background, Research, and Related Business Experience
J. Randall Woolridge

J. Randall Woolridge is a Professor of Finance and the Goldman, Sachs & Co. and Frank P. Smeal Endowed Faculty Fellow in Business Administration in the College of Business Administration of the Pennsylvania State University in University Park, PA. In addition, Professor Woolridge is Director of the Smeal College Trading Room and President and CEO of the Nittany Lion Fund, LLC.

Professor Woolridge received a Bachelor of Arts degree in Economics from the University of North Carolina, a Master of Business Administration degree from the Pennsylvania State University, and a Doctor of Philosophy degree in Business Administration (major area-finance, minor area-statistics) from the University of Iowa. He has taught Finance courses including corporation finance, commercial and investment banking, and investments at the undergraduate, graduate, and executive MBA levels.

Professor Woolridge's research has centered on empirical issues in corporation finance and financial markets. He has published over 35 articles in the best academic and professional journals in the field, including the *Journal of Finance*, the *Journal of Financial Economics*, and the *Harvard Business Review*. His research has been cited extensively in the business press. His work has been featured in the *New York Times*, *Forbes*, *Fortune*, *The Economist*, *Barron's*, *Wall Street Journal*, *Business Week*, *Investors' Business Daily*, *USA Today*, and other publications. In addition, Dr. Woolridge has appeared as a guest to discuss the implications of his research on CNN's *Money Line*, CNBC's *Morning Call* and *Business Today*, and Bloomberg's *Morning Call*.

Professor Woolridge's stock valuation book, *The StreetSmart Guide to Valuing a Stock* (McGraw-Hill, 2003), was released in its second edition. He has also co-authored *Spinoffs and Equity Carve-Outs: Achieving Faster Growth and Better Performance* (Financial Executives Research Foundation, 1999) as well as a textbook entitled *Basic Principles of Finance* (Kendall Hunt, 2011).

Professor Woolridge has also consulted with corporations, financial institutions, and government agencies. In addition, he has directed and participated in university- and company-sponsored professional development programs for executives in 25 countries in North and South America, Europe, Asia, and Africa.

Over the past twenty-five years Dr. Woolridge has prepared testimony and/or provided consultation services in regulatory rate cases in the rate of return area in following states: Alaska, Arizona, California, Colorado, Connecticut, Delaware, Florida, Hawaii, Indiana, Kansas, Kentucky, Massachusetts, Missouri, Nebraska, New Jersey, New York, Ohio, Oklahoma, Pennsylvania, South Carolina, Texas, Utah, Vermont, Washington, and Washington, D.C. He has also prepared testimony which was submitted to the Federal Energy Regulatory Commission.

**J. Randall Woolridge**

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814-238-9428

## Academic Experience

**Professor of Finance**, the Smeal College of Business Administration, the Pennsylvania State University (July 1, 1990 to the present).

**President, Nittany Lion Fund LLC,** (January 1, 2005 to the present)

**Director, the Smeal College Trading Room** (January 1, 2001 to the present)

**Goldman, Sachs & Co. and Frank P. Smeal Endowed University Fellow in Business Administration** (July 1, 1987 to the present).

**Associate Professor of Finance**, College of Business Administration, the Pennsylvania State University (July 1, 1984 to June 30, 1990).

**Assistant Professor of Finance**, College of Business Administration, the Pennsylvania State University (September, 1979 to June 30, 1984).

## Education

**Doctor of Philosophy in Business Administration**, the University of Iowa (December, 1979). Major field: Finance.

**Master of Business Administration**, the Pennsylvania State University (December, 1975).

**Bachelor of Arts**, the University of North Carolina (May, 1973) Major field: Economics.

## Books

James A. Miles and J. Randall Woolridge, *Spinoffs and Equity Carve-Outs: Achieving Faster Growth and Better Performance* (Financial Executives Research Foundation), 1999

Patrick Cusatis, Gary Gray, and J. Randall Woolridge, *The StreetSmart Guide to Valuing a Stock* (2nd Edition, McGraw-Hill), 2003.

J. Randall Woolridge and Gary Gray, *The New Corporate Finance, Capital Markets, and Valuation: An Introductory Text* (Kendall Hunt, 2003).

## Research

Dr. Woolridge has published over 35 articles in the best academic and professional journals in the field, including the *Journal of Finance,* the *Journal of Financial Economics,* and the *Harvard Business Review*.

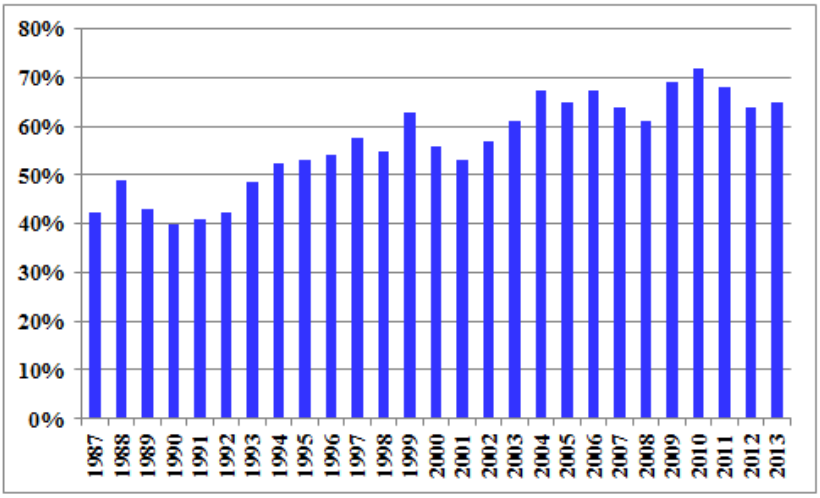
Appendix B
The Research on Analysts' Long-Term EPS Growth Rate Forecasts

Most of the attention given to the accuracy of analysts' EPS forecasts comes from media coverage of companies' quarterly earnings announcements. When companies' announced earnings beat Wall Street's EPS estimates ("a positive surprise"), their stock prices usually go up. When a company's EPS figure misses or is below Wall Street's forecasted EPS ("a negative surprise"), their stock price usually declines, sometimes precipitously so. Wall Street's estimate is the consensus forecast for quarterly EPS made by analysts who follow the stock as of the announcement date. And so Wall Street's so-called "estimate" is analysts' consensus quarterly EPS forecast made in the days leading up to the EPS announcement.

In recent years, it has become more common for companies to beat Wall Street's quarterly EPS estimate. A *Wall Street Journal* article summarized the results for the first quarter of 2012: "While this "positive surprise ratio" of 70% is above the 20 year average of 58% and also higher than last quarter's tally, it is just middling since the current bull market began in 2009. In the past decade, the ratio only dipped below 60% during the financial crisis. Look before 2002, though, and 70% would have been literally off the chart. From 1993 through 2001, about half of companies had positive surprises."[1] Figure 1 below provides the record for companies beating Wall Street's EPS estimate on an annual basis over the past twenty-five years.

[1] Spencer Jakab, "Earnings Surprises Lose Punch," *Wall Street Journal* (May 7, 2012), p. C1.

**Figure 1**
**Percent of Companies Beating Wall Street's Quarterly Estimates**




## A. RESEARCH ON THE ACCURACY OF ANALYSTS' NEAR-TERM EPS ESTIMATES

There is a long history of studies that evaluate how well analysts forecast near-term EPS estimates and long-term EPS growth rates. Most of these studies have evaluated the accuracy of earnings forecasts for the current quarter or year. Many of the early studies indicated that analysts make overly optimistic EPS earnings forecasts for quarter-to-quarter EPS (Stickel (1990); Brown (1997); Chopra (1998)).[2] More recent studies have shown that the optimistic bias tends to be larger for longer-term forecasts and smaller for forecasts made nearer to the EPS announcement date. Richardson, Teoh, and Wysocki (2004) report that the

[2] S. Stickel, "Predicting Individual Analyst Earnings Forecasts," *Journal of Accounting Research*, Vol. 28, 409-417, 1990. Brown, L.D., "Analyst Forecasting Errors: Additional Evidence," *Financial Analysts Journal*, Vol. 53, 81-88, 1997, and Chopra, V.K., "Why So Much Error in Analysts' Earnings Forecasts?" *Financial Analysts Journal*, Vol. 54, 30-37 (1998).

upward bias in earnings growth rates declines in the quarters leading up to the earnings announcement date.[3] They call this result the "walk-down to beatable analyst forecasts." They hypothesize that the walk-down might be driven by the "earning-guidance game," in which analysts give optimistic forecasts at the start of a fiscal year, then revise their estimates downwards until the firm can beat the forecasts at the earnings announcement date.

However, two regulatory developments over the past decade have potentially impacted analysts' EPS growth rate estimates. First, Regulation Fair Disclosure ("Reg FD") was introduced by the Securities and Exchange Commission ("SEC") in October of 2000. Reg FD prohibits private communication between analysts and management so as to level the information playing field in the markets. With Reg FD, analysts are less dependent on gaining access to management to obtain information and, therefore, are not as likely to make optimistic forecasts to gain access to management. Second, the conflict of interest within investment firms with investment banking and analyst operations was addressed in the Global Analysts Research Settlements ("GARS"). GARS, as agreed upon on April 23, 2003, between the SEC, NASD, NYSE and ten of the largest U.S. investment firms, includes a number of regulations that were introduced to prevent investment bankers from pressuring analysts to provide favorable projections.

[3] S. Richardson, S. Teoh, and P. Wysocki, "The Walk-Down to Beatable Analyst Forecasts: The Role of Equity Issuance and Insider Trading Incentives," *Contemporary Accounting Research*, pp. 885−924, (2004).

The previously cited *Wall Street Journal* article acknowledged the impact of the new regulatory rules in explaining the recent results:[4] "What changed? One potential reason is the tightening of rules governing analyst contacts with management. Analysts now must rely on publicly available guidance or, gasp, figure things out by themselves. That puts companies, with an incentive to set the bar low so that earnings are received positively, in the driver's seat. While that makes managers look good short-term, there is no lasting benefit for buy-and-hold investors."

These comments on the impact of regulatory developments on the accuracy of short-term EPS estimates was addressed in a study by Hovakimian and Saenyasiri (2010).[5] The authors investigate analysts' forecasts of annual earnings for the following time periods: (1) the time prior to Reg FD (1984-2000); (2) the time period after Reg FD but prior to GARS (2000-2002);[6] and (3) the time period after GARS (2002-2006). For the pre-Reg FD period, Hovakimian and Saenyasiri find that analysts generally make overly optimistic forecasts of annual earnings. The forecast bias is higher for early forecasts and steadily declines in the months leading up to the earnings announcement. The results are similar for the time period after Reg FD but prior to GARS. However, the bias is lower in the later forecasts (the forecasts made just prior to the announcement).

[4] Spencer Jakab, "Earnings Surprises Lose Punch," *Wall Street Journal* (May 7, 2012), p. C1.

[5] A. Hovakimian and E. Saenyasiri, "Conflicts of Interest and Analysts Behavior: Evidence from Recent Changes in Regulation," *Financial Analysts* Journal (July-August, 2010), pp. 96-107.

[6] Whereas the GARS settlement was signed in 2003, rules addressing analysts' conflict of interest by separating the research and investment banking activities of analysts went into effect with the passage of NYSE and NASD rules in July of 2002.

For the time period after GARS, the average forecasts declined significantly, but a positive bias remains. In sum, Hovakimian and Saenyasiri find that: (1) analysts make overly optimistic short-term forecasts of annual earnings; (2) Reg FD had no effect on this bias; and (3) GARS did result in a significant reduction in the bias, but analysts' short-term forecasts of annual earnings still have a small positive bias.

## B. RESEARCH ON THE ACCURACY OF ANALYSTS' LONG-TERM EPS GROWTH RATE FORECASTS

There have been very few studies regarding the accuracy of analysts' long-term EPS growth rate forecasts. Cragg and Malkiel (1968) studied analysts' long-term EPS growth rate forecasts made in 1962 and 1963 by five brokerage houses for 185 firms. They concluded that analysts' long-term earnings growth forecasts are on the whole no more accurate than naive forecasts based on past earnings growth. Harris (1999) evaluated the accuracy of analysts' long-term EPS forecasts over the 1982-1997 time period using a sample of 7,002 firm-year observations.[7] He concluded the following: (1) the accuracy of analysts' long-term EPS forecasts is very low; (2) a superior long-run method to forecast long-term EPS growth is to assume that all companies will have an earnings growth rate equal to historic GDP growth; and (3) analysts' long-term EPS forecasts are significantly upwardly biased, with forecasted earnings growth exceeding actual earnings growth by seven percent per annum. Subsequent studies by DeChow, P., A. Hutton, and R. Sloan (2000), and Chan, Karceski, and Lakonishok (2003) also

[7] R.D. Harris, "The Accuracy, Bias, and Efficiency of Analysts' Long Run Earnings Growth Forecasts," *Journal of Business Finance & Accounting*, pp. 725-55 (June/July 1999).

conclude that analysts' long-term EPS growth rate forecasts are overly optimistic and upwardly biased.[8] The Chan, Karceski, and Lakonishok (2003) study evaluated the accuracy of analysts' long-term EPS growth rate forecasts over the 1982-98 time period. They reported a median IBES growth forecast of 14.5%, versus a median realized five-year growth rate of about 9%. They also found the IBES forecasts of EPS beyond two years are not accurate. They concluded the following: "Over long horizons, however, there is little forecastability in earnings, and analysts' estimates tend to be overly optimistic."

Lacina, Lee, and Xu (2011) evaluated the accuracy of analysts' long-term earnings growth rate forecasts over the 1983-2003 time period.[9] The study included 27,081 firm year observations, and compared the accuracy of analysts' EPS forecasts to those produced by two naïve forecasting models: (1) a random walk model ("RW") where the long-term EPS (t+5) is simply equal to last year's EPS figure (t-1); and (2) a RW model with drift ("RWGDP"), where the drift or growth rate is GDP growth for period t-1. In this model, long-term EPS (t+5) is simply equal to last year's EPS figure (t-1) times (1 + GDP growth (t-1)). The authors conclude that that using the RW model to forecast EPS in the next 3-5 years proved to be just as accurate as using the EPS estimates from analysts' long-term earnings growth rate forecasts. They find that the RWGDP model performs

[8] P. DeChow, A. Hutton, and R. Sloan, "The Relation Between Analysts' Forecasts of Long-Term Earnings Growth and Stock Price Performance Following Equity Offerings," *Contemporary Accounting Research (2000)* and K. Chan, L., Karceski, J., & Lakonishok, J., "The Level and Persistence of Growth Rates," *Journal of Finance* pp. 643−684, (2003).

[9] M. Lacina, B. Lee and Z. Xu, *Advances in Business and Management Forecasting (Vol. 8),* Kenneth D. Lawrence, Ronald K. Klimberg (ed.), Emerald Group Publishing Limited, pp.77-101

better than the pure RW model, and that both models perform as well as analysts in forecasting long-term EPS. They also discover an optimistic bias in analysts' long-term EPS forecasts. In the authors' opinion, these results indicate that analysts' long-term earnings growth rate forecasts should be used with caution as inputs for valuation and cost of capital purposes.

## C. ISSUES REGARDING THE SUPERIORITY OF ANALYSTS' EPS FORECASTS OVER HISTORIC AND TIME-SERIES ESTIMATES OF LONG-TERM EPS GROWTH

As highlighted by the classic study by Brown and Rozeff (1976) and the other studies that followed, analysts' forecasts of quarterly earnings estimates are superior to the estimates derived from historic and time-series analyses.[10] This is often attributed to the information and timing advantage that analysts have over historic and time-series analyses. These studies relate to analysts' forecasts of quarterly and/or annual forecasts, and not to long-term EPS growth rate forecasts. The previously cited studies by Harris (1999), Chan, Karceski, and Lakonishok (2003), and Lacina, Lee, and Xu (2011) all conclude that analysts' forecasts are no better than time-series models and historic growth rates in forecasting long-term EPS. Harris (1999) and Lacina, Lee, and Xu (2011) concluded that historic GDP growth was superior to analysts' forecasts for long run earnings growth. These overall results are similar to the findings by Bradshaw, Drake, Myers, and Myers (2009) that discovered that time-series estimates of annual earnings are more accurate over longer horizons than analysts' forecasts of earnings. As the

[10] L. Brown and M. Rozeff, "The Superiority of Analyst Forecasts as Measures of Expectations: Evidence from Earnings," *The Journal of Finance* 33 (1): pp. 1-16 (1976).

authors state, "These findings suggest an incomplete and misleading generalization about the superiority of analysts' forecasts over even simple time-series-based earnings forecasts."[11]

## D. STUDY OF THE ACCURACY OF ANALYSTS' LONG-TERM EARNINGS GROWTH RATES

To evaluate the accuracy of analysts' EPS forecasts, I have compared actual 3-5 year EPS growth rates with forecasted EPS growth rates on a quarterly basis over the past 20 years for all companies covered by the I/B/E/S data base. In Panel A of page 1 of Exhibit JRW-B1, I show the average analysts' forecasted 3-5 year EPS growth rate with the average actual 3-5 year EPS growth rate for the past twenty years.

The following example shows how the results can be interpreted. For the 3-5 year period prior to the first quarter of 1999, analysts had projected an EPS growth rate of 15.13%, but companies only generated an average annual EPS growth rate over the 3-5 years of 9.37%. This projected EPS growth rate figure represented the average projected growth rate for over 1,510 companies, with an average of 4.88 analysts' forecasts per company. For the entire twenty-year period of the study, for each quarter there were on average 5.6 analysts' EPS projections for 1,281 companies. Overall, my findings indicate that forecast errors for long-term estimates are predominantly positive, which indicates an upward bias in growth rate estimates. The mean and median forecast errors over the observation period are 143.06% and 75.08%, respectively. The forecasting errors

[11] M. Bradshaw, M. Drake, J. Myers, and L. Myers, "A Re-examination of Analysts' Superiority Over Time-Series Forecasts," Workings paper, (1999), http://ssrn.com/abstract=1528987.

are negative for only eleven of the eighty quarterly time periods: five consecutive quarters starting at the end of 1995 and six consecutive quarters starting in 2006. As shown in Panel A of page 1 of Exhibit JRW-B1, the quarters with negative forecast errors were for the 3-5 year periods following earnings declines associated with the 1991 and 2001 economic recessions in the U.S. Thus, there is evidence of a persistent upward bias in long-term EPS growth forecasts.

The average 3-5 year EPS growth rate projections for all companies provided in the I/B/E/S database on a quarterly basis from 1988 to 2008 are shown in Panel B of page 1 of Exhibit JRW-B1. In this graph, no comparison to actual EPS growth rates is made, and hence, there is no follow-up period. Therefore, since companies are not lost from the sample due to a lack of follow-up EPS data, these results are for a larger sample of firms. The average projected growth rate increased to the 18.0% range in 2006, and has since decreased to about 14.0%.

The upward bias in analysts' long-term EPS growth rate forecasts appears to be known in the markets. Page 2 of Exhibit JRW-B1 provides an article published in the *Wall Street Journal*, dated March 21, 2008, that discusses the upward bias in analysts' EPS growth rate forecasts.[12] In addition, a recent *Bloomberg Businessweek* article also highlighted the upward bias in analysts' EPS forecasts, citing a study by

[12] Andrew Edwards, "Study Suggests Bias in Analysts' Rosy Forecasts," *Wall Street Journal* (March 21, 2008), p. C6.

McKinsey Associates. This article is provided on pages 3 and 4 of Exhibit JRW-B1. The article concludes with the following:[13]

***The bottom line:*** *Despite reforms intended to improve Wall Street research, stock analysts seem to be promoting an overly rosy view of profit prospects.*

## E. REGULATORY DEVELOPMENTS AND THE ACCURACY OF ANALYSTS' LONG-TERM EARNINGS GROWTH RATES FORECASTS

Whereas Hovakimian and Saenyasiri evaluated the impact of regulations on analysts' short-term EPS estimates, there is little research on the impact of Reg FD and GARS on the long-term EPS forecasts of Wall Street analysts. My study with Patrick Cusatis did find that the long-term EPS growth rate forecasts of analysts did not decline significantly and have continued to be overly optimistic in the post-Reg FD and GARS period.[14] Analysts' long-term EPS growth rate forecasts before and after GARS are about two times the level of historic GDP growth. These observations are supported by a *Wall Street Journal* article entitled "Analysts Still Coming Up Rosy – Over-Optimism on Growth Rates is Rampant – and the Estimates Help to Buoy the Market's Valuation." The following quote provides insight into the continuing bias in analysts' forecasts:

> Hope springs eternal, says Mark Donovan, who manages Boston Partners Large Cap Value Fund. "You would have thought that, given what happened in the last three years, people would have given up the ghost. But in large measure they have not.

[13] Roben Farzad, 'For Analysts, Things are Always Looking Up,' *Bloomberg Businessweek* (June 14, 2010), pp. 39-40.

[14] P. Cusatis and J. R. Woolridge, "The Accuracy of Analysts' Long-Term EPS Growth Rate Forecasts," Working Paper (July 2008).

> These overly optimistic growth estimates also show that, even with all the regulatory focus on too-bullish analysts allegedly influenced by their firms' investment-banking relationships, a lot of things haven't changed. Research remains rosy and many believe it always will.[15]

These observations are echoed in a recent McKinsey study entitled "Equity Analysts: Still too Bullish" which involved a study of the accuracy on analysts long-term EPS growth rate forecasts. The authors conclude that after a decade of stricter regulation, analysts' long-term earnings forecasts continue to be excessively optimistic. They made the following observation (emphasis added): [16]

> 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. 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. This pattern confirms our earlier findings that analysts typically lag behind events in revising their forecasts to reflect new economic conditions. When economic growth accelerates, the size of the forecast error declines; when economic growth slows, it increases. So as economic growth cycles up and down, the actual earnings S&P 500 companies report occasionally coincide with the analysts' forecasts, as they did, for example, in 1988, from 1994 to 1997, and from 2003 to 2006. Moreover, analysts have been persistently overoptimistic for the past 25 years, with estimates ranging from 10 to 12 percent a year, compared with actual earnings growth of 6 percent. Over this time frame, actual earnings growth surpassed forecasts in only two instances, both during the earnings recovery following a recession. On average, analysts' forecasts have been almost 100 percent too high.

## F. ANALYSTS' LONG-TERM EPS GROWTH RATE FORECASTS FOR UTILITY COMPANIES

[15] Ken Brown, "Analysts Still Coming Up Rosy – Over-Optimism on Growth Rates is Rampant – and the Estimates Help to Buoy the Market's Valuation," *Wall Street Journal*, p. C1, (January 27, 2003).
[16] Marc H. Goedhart, Rishi Raj, and Abhishek Saxena, "Equity Analysts, Still Too Bullish," *McKinsey on Finance*, pp. 14-17, (Spring 2010).

To evaluate whether analysts' EPS growth rate forecasts are upwardly biased for utility companies, I conducted a study similar to the one described above using a group of electric utility and gas distribution companies. The results are shown on Panels A and B of page 5 of Exhibit JRW-B1. The projected EPS growth rates for electric utilities have been in the 4% to 6% range over the last twenty years, with the recent figures at approximately 5%. As shown, the achieved EPS growth rates have been volatile and, on average, below the projected growth rates. Over the entire period, the average quarterly 3-5 year projected and actual EPS growth rates are 4.59% and 2.90%, respectively.

For gas distribution companies, the projected EPS growth rates have declined from about 6% in the 1990s to about 5% in the 2000s. The achieved EPS growth rates have been volatile. Over the entire period, the average quarterly 3-5 year projected and actual EPS growth rates are 5.15% and 4.53%, respectively.

Overall, the upward bias in EPS growth rate projections for electric utility and gas distribution companies is not as pronounced as it is for all companies. Nonetheless, the results here are consistent with the results for companies in general -- analysts' projected EPS growth rate forecasts are upwardly biased for utility companies.

## G. *VALUE LINE*'S LONG-TERM EPS GROWTH RATE FORECASTS

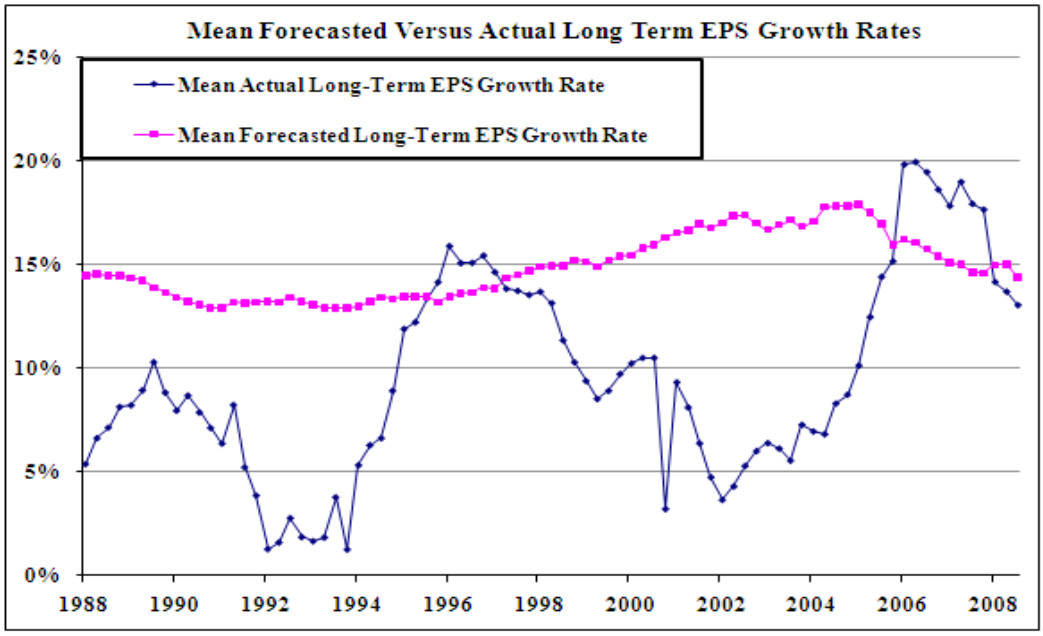
To assess *Value Line*'s earnings growth rate forecasts, I used the *Value Line Investment Analyzer*. The results are summarized in Panel A of Page 6 of Exhibit JRW-B1. I initially filtered the database and found that *Value Line* has 3-

5 year EPS growth rate forecasts for 2,333 firms. The average projected EPS growth rate was 14.70%. This is high given that the average historical EPS growth rate in the U.S. is about 7%. A major factor seems to be that *Value Line* only predicts negative EPS growth for 43 companies. This is less than two percent of the companies covered by *Value Line*. Given the ups and downs of corporate earnings, this is unreasonable.

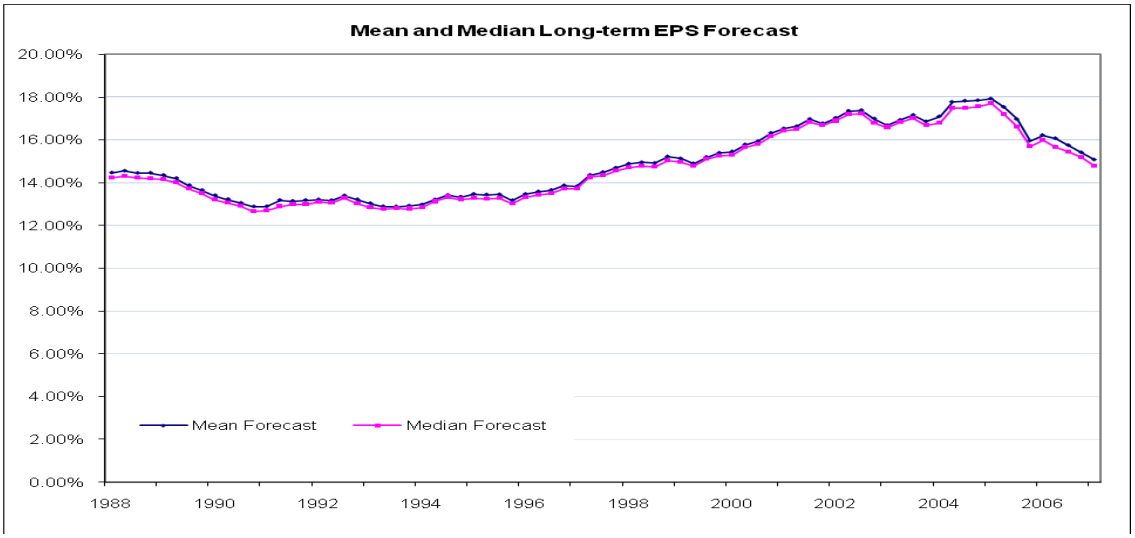
To put this figure in perspective, I screened the *Value Line* companies to see what percent of companies covered by *Value Line* had experienced negative EPS growth rates over the past five years. *Value Line* reported a five-year historic growth rate for 2,219 companies. The results are shown in Panel B of page 6 of Exhibit JRW-B1 and indicate that the average 5-year historic growth rate was 3.90%, and *Value Line* reported negative historic growth for 844 firms which represents 38.0% of these companies.

These results indicate that *Value Line*'s EPS forecasts are excessive and unrealistic. It appears that the analysts at *Value Line* are similar to their Wall Street brethren in that they are reluctant to forecast negative earnings growth.

**Panel A**
**Long-Term Forecasted Versus Actual EPS Growth Rates**
**1988-2009**




**Panel B**
**Long-Term Forecasted EPS Growth Rates**
**1988-2007**




Source: Patrick J. Cusatis and J. Randall Woolridge, "The Accuracy of Analysts' Long-Term Earnings Per Share Growth Rate Forecasts," (July, 2008).

THE WALL STREET JOURNAL.

# Study Suggests Bias in Analysts' Rosy Forecasts

**By ANDREW EDWARDS**
*March 21, 2008; Page C6*

Despite an economy teetering on the brink of a recession -- if not already in one -- analysts are still painting a rosy picture of earnings growth, according to a study done by Penn State's Smeal College of Business.

The report questions analysts' impartiality five years after then-New York Attorney General Eliot Spitzer forced analysts to pay $1.5 billion in damages after finding evidence of bias.

"Wall Street analysts basically do two things: recommend stocks to buy and forecast earnings," said J. Randall Woolridge, professor of finance. "Previous studies suggest their stock recommendations do not perform well, and now we show that their long-term earnings-per-share growth-rate forecasts are excessive and upwardly biased."

The report, which examined analysts' long-term (three to five years) and one-year per-share earnings expectations from 1984 through 2006 found that companies' long-term earnings growth surpassed analysts' expectations in only two instances, and those came right after recessions.

Over the entire time period, analysts' long-term forecast earnings-per-share growth averaged 14.7%, compared with actual growth of 9.1%. One-year per-share earnings expectations were slightly more accurate: The average forecast was for 13.8% growth and the average actual growth rate was 9.8%.

"A significant factor in the upward bias in long-term earnings-rate forecasts is the reluctance of analysts to forecast" profit declines, Mr. Woolridge said. The study found that nearly one-third of all companies experienced profit drops over successive three-to-five-year periods, but analysts projected drops less than 1% of the time.

The study's authors said, "Analysts are rewarded for biased forecasts by their employers, who want them to hype stocks so that the brokerage house can garner trading commissions and win underwriting deals."

They also concluded that analysts are under pressure to hype stocks to generate trading commissions, and they often don't follow stocks they don't like.

**Write to** Andrew Edwards at andrew.edwards@dowjones.com

Markets & Finance June 10, 2010, 5:00PM EST

Bloomberg Businessweek

# For Analysts, Things Are Always Looking Up

## They're raising earnings estimates for U.S. companies at a record pace

By Roben Farzad

For years, the rap on Wall Street securities analysts was that they were shills, reflexively producing upbeat research on companies they cover to help their employers win investment banking business. The dynamic was well understood: Let my bank take your company public, or advise it on this acquisition, and—wink, wink—I will recommend your stock through thick or thin. After the Internet bubble burst, that was supposed to change. In April 2003 the Securities & Exchange Commission reached a settlement with 10 Wall Street firms in which they agreed, among other things, to separate research from investment banking.

Seven years on, Wall Street analysts remain a decidedly optimistic lot. Some economists look at the global economy and see troubles—the European debt crisis, persistently high unemployment worldwide, and housing woes in the U.S. Stock analysts as a group seem unfazed. Projected 2010 profit growth for companies in the Standard & Poor's 500-stock index has climbed seven percentage points this quarter, to 34 percent, data compiled by Bloomberg show. According to Sanford C. Bernstein (AB), that's the fastest pace since 1980, when the Dow Jones industrial average was quoted in the hundreds and Nancy Reagan was getting ready to order new window treatments for the Oval Office.

Among the companies analysts expect to excel: Intel (INTL) is projected to post an increase in net income of 142 percent this year. Caterpillar, a multinational that gets much of its revenue abroad, is expected to boost its net income by 47 percent this year. Analysts have also hiked their S&P 500 profit estimate for 2011 to $95.53 a share, up from $92.45 at the beginning of January, according to Bloomberg data. That would be a record, surpassing the previous high reached in 2007.

With such prospects, it's not surprising that more than half of S&P 500-listed stocks boast overall buy ratings. It is telling that the proportion has essentially held constant at both the market's October 2007 high and March 2009 low, bookends of a period that saw stocks fall by more than half. If the analysts are correct, the market would appear to be attractively priced right now. Using the $95.53 per share figure, the price-to-earnings ratio of the S&P 500 is a modest 11 as of June 9. If, however, analysts end up being too high by, say, 20 percent, the P/E would jump to almost 14.

If history is any guide, chances are good that the analysts are wrong. According to a recent McKinsey report by Marc Goedhart, Rishi Raj, and Abhishek Saxena, "Analysts have been persistently over-optimistic for 25 years," a stretch that saw them peg earnings growth at 10 percent to 12 percent a year when the actual number was ultimately 6 percent. "On average," the researchers note, "analysts' forecasts have been almost 100 percent too high," even after regulations were enacted to weed out conflicts and improve the rigor of their calculations. As the chart below shows, in most years analysts have been forced to lower their estimates after it became apparent they had set them too high.

While a few analysts, like Meredith Whitney, have made their names on bearish calls, most are chronically bullish. Part of the problem is that despite all the reforms they remain too aligned with the companies they cover. "Analysts still need to get the bulk of their information from companies, which have an incentive to be over-optimistic," says Stephen Bainbridge, a professor at UCLA Law School who specializes in the securities industry. "Meanwhile, analysts don't want to threaten that ongoing access by being too negative." Bainbridge says that with the era of the overpaid, superstar analyst long over, today's job description calls for resisting the urge to be an iconoclast. "It's a matter of herd behavior," he says.

So what's a more plausible estimate of companies' earning power? Looking at factors including the strengthening dollar, which hurts exports, and higher corporate borrowing costs, David Rosenberg, chief economist at Toronto-based investment shop Gluskin Sheff + Associates, says "disappointment looms." Bernstein's Adam Parker says every 10 percent drop in the value of the euro knocks U.S. corporate earnings down by 2.5 percent to 3 percent. He sees the S&P 500 earning $86 a share next year.

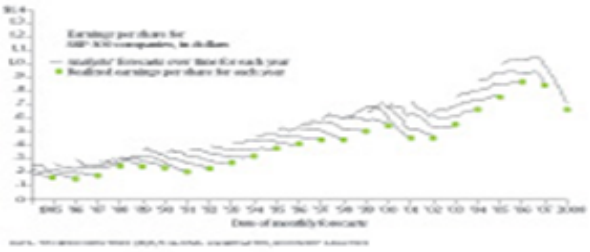
As realities hit home, "It's only natural that analysts will have to revise down their views," says Todd Salamone, senior vice-president at Schaeffer's Investment Research. The market may be making its own downward adjustment, as the S&P 500 has already fallen 14 percent from its high in April. If precedent holds, analysts are bound to curb their enthusiasm belatedly, telling us next year what we really needed to know this year.

***The bottom line:*** *Despite reforms intended to improve Wall Street research, stock analysts seem to be promoting an overly rosy view of profit prospects.*

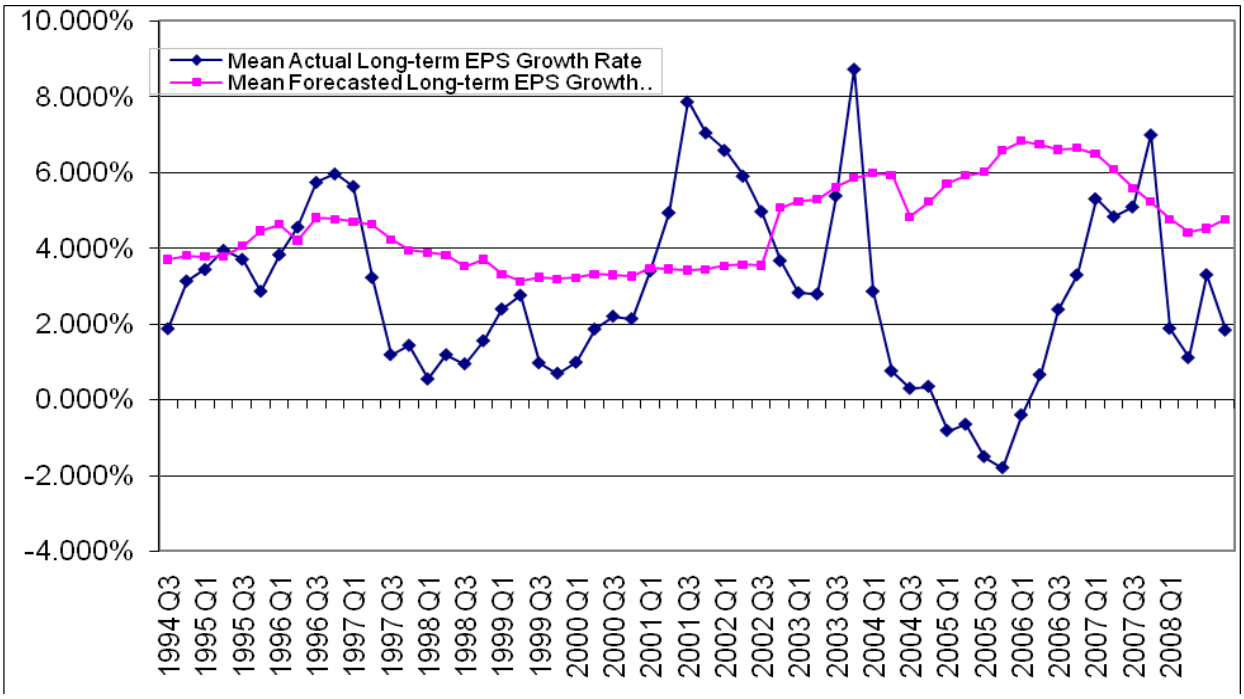
*Bloomberg Businessweek* Senior Writer Farzad covers Wall Street and international finance.

**The Earnings Roller Coaster**

Analysts have a long history of overestimating future profits. As this chart from McKinsey shows, analysts on average tend to start high and ratchet their numbers down as the companies get closer to releasing their results. Initial estimates proved to be too low in only a few cases.

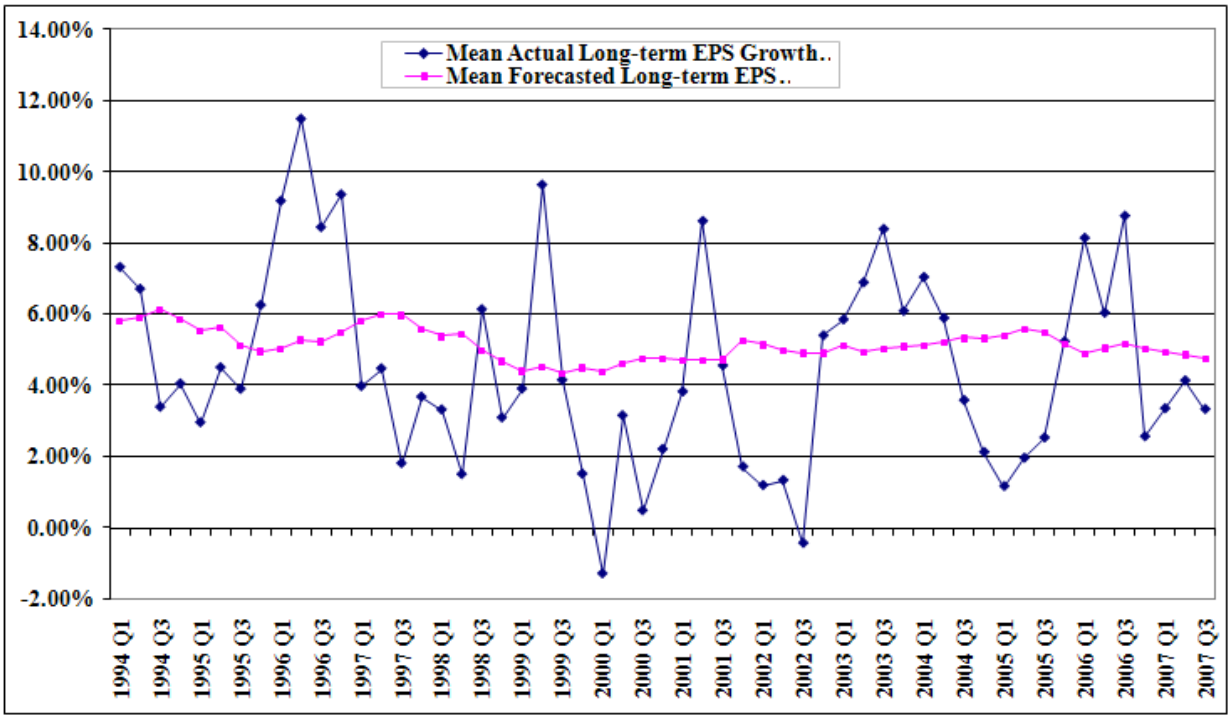


**Panel A**
**Long-Term Forecasted Versus Actual EPS Growth Rates**
**Electric Utility Companies**
**1988-2008**




Data Source: IBES

**Panel B**
**Long-Term Forecasted Versus Actual EPS Growth Rates**
**Gas Distribution Companies**



**Panel A**
**Value Line 3-5 year EPS Growth Rate Forecasts**

| | Average Projected EPS Growth rate | Number of Negative EPS Growth Projections | Percent of Negative EPS Growth Projections |
|---|---|---|---|
| **2,333 Companies** | **14.70%** | **43** | **1.80%** |

*Value Line Investment Survey* , June, 2012

**Panel B**
**Historical Five-Year EPS Growth Rates for Value Line Companies**

| | Average Historical EPS Growth rate | Number with Negative Historical EPS Growth | Percent with Negative Historical EPS Growth |
|---|---|---|---|
| **2,219 Companies** | **3.90%** | **844** | **38.00%** |

*Value Line Investment Survey* , June, 2012

## A. THE BUILDING BLOCKS MODEL

Ibbotson and Chen (2003) evaluate the ex post historical mean stock and bond returns in what is called the Building Blocks approach.[1] They use 75 years of data and relate the compounded historical returns to the different fundamental variables employed by different researchers in building ex ante expected equity risk premiums. Among the variables included were inflation, real EPS and DPS growth, ROE and book value growth, and price-earnings ("P/E") ratios. By relating the fundamental factors to the ex post historical returns, the methodology bridges the gap between the ex post and ex ante equity risk premiums. Ilmanen (2003) illustrates this approach using the geometric returns and five fundamental variables – inflation ("CPI"), dividend yield ("D/P"), real earnings growth ("RG"), repricing gains ("PEGAIN"), and return interaction/reinvestment ("INT").[2] This is shown on page 1 of Exhibit JRW-C1. The first column breaks down the 1926-2000 geometric mean stock return of 10.7% into the different return components demanded by investors: the historical U.S. Treasury bond return (5.2%), the excess equity return (5.2%), and a small interaction term (0.3%). This 10.7% annual stock return over the 1926-2000 period can then be broken down into the following fundamental elements: inflation (3.1%), dividend yield (4.3%), real earnings growth (1.8%), repricing gains (1.3%) associated with higher P/E ratios, and a small interaction term (0.2%).

[1] Roger Ibbotson and Peng Chen, "Long Run Returns: Participating in the Real Economy," *Financial Analysts Journal*, (January 2003).

[2] Antti Ilmanen, Expected Returns on Stocks and Bonds," *Journal of Portfolio Management*, (Winter 2003), p. 11.

The third column in the graph on page 1 of Exhibit JRW-C1 shows current inputs to estimate an ex ante expected market return. These inputs include the following:

CPI – To assess expected inflation, I have employed expectations of the short-term and long-term inflation rate. Long-term inflation forecasts are available in the Federal Reserve Bank of Philadelphia's publication entitled *Survey of Professional Forecasters*. While this survey is published quarterly, only the first quarter survey includes long-term forecasts of gross domestic product ("GDP") growth, inflation, and market returns. In the first quarter 2014 survey, published on February 15, 2014, the median long-term (10-year) expected inflation rate as measured by the CPI was 2.30% (see Panel A of page 2 of Exhibit JRW-C1).

The University of Michigan's Survey Research Center surveys consumers on their short-term (one-year) inflation expectations on a monthly basis. As shown on page 3 of Exhibit JRW-C1, the current short-term expected inflation rate is 3.3%.

As a measure of expected inflation, I will use the average of the long-term (2.3%) and short-term (3.3%) inflation rate measures, or 2.80%.

D/P – As shown on page 4 of Exhibit JRW-C1, the dividend yield on the S&P 500 has fluctuated from 1.0% to almost 3.5% from 2000-2010. Ibbotson and Chen (2003) report that the long-term average dividend yield of the S&P 500 is 4.3%. As of September 2014, the indicated S&P 500 dividend yield was 2.0%. I will use this figure in my ex ante risk premium analysis.

RG – To measure expected real growth in earnings, I use the historical real earnings growth rate S&P 500 and the expected real GDP growth rate. The S&P 500 was created in 1960 and includes 500 companies which come from ten different sectors of the economy. On page 5 of Exhibit JRW-C1, real EPS growth is computed using the CPI as a measure of inflation. The real growth figure over 1960-2011 period for the S&P 500 is 2.8%.

The second input for expected real earnings growth is expected real GDP growth. The rationale is that over the long-term, corporate profits have averaged 5.50% of U.S. GDP.[3] Expected real GDP growth, according to the Federal Reserve Bank of Philadelphia's *Survey of Professional Forecasters,* is 2.6% (see Panel B of page 2 of Exhibit JRW-C1).

Given these results, I will use 2.75%, for real earnings growth.

PEGAIN – PEGAIN is the repricing gain associated with an increase in the P/E ratio. It accounted for 1.3% of the 10.7% annual stock return in the 1926-2000 period. In estimating an ex ante expected stock market return, one issue is whether investors expect P/E ratios to increase from their current levels. The P/E ratios for the S&P 500 over the past 25 years are shown on page 4 of Exhibit JRW-C1. The run-up and eventual peak in P/Es in the year 1999 is very evident in the chart. The average P/E declined until late 2006, and then increased to higher high levels, primarily due to the decline in EPS as a result of the financial crisis and the recession. As of September, 2014, the average P/E for the S&P 500 was 16.75X, which is above the historic average. Since the current figure is

[3]Marc. H. Goedhart, et al, "The Real Cost of Equity," *McKinsey on Finance* (Autumn 2002), p.14.

above the historic average, a PEGAIN would not be appropriate in estimating an ex ante expected stock market return.

Expected Return formBuilding Blocks Approach - The current expected market return is represented by the last column on the right in the graph entitled "Decomposing Equity Market Returns: The Building Blocks Methodology" set forth on page 1 of Exhibit JRW-C1. As shown, the expected market return of 7.55% is composed of 2.80% expected inflation, 2.0% dividend yield, and 2.75% real earnings growth rate.

This expected return of 7.55% is consistent with other expected return forecasts.

1. In the first quarter 2014 *Survey of Financial Forecasters*, published on February 15, 2014 by the Federal Reserve Bank of Philadelphia, the median long-term expected return on the S&P 500 was 6.43% (see Panel D of page 2 of Exhibit JRW-C1).
2. John Graham and Campbell Harvey of Duke University conduct a quarterly survey of corporate CFOs. The survey is a joint project of Duke University and *CFO Magazine.* In the June 2014 survey, the mean expected return on the S&P 500 over the next ten years was 6.6%.[4]

## B. THE BUILDING BLOCKS EQUITY RISK PREMIUM

[4] The survey results are available at www.cfosurvey.org.

The current 30-year U.S. Treasury yield is about 3.25%. This ex ante equity risk premium is simply the expected market return from the Building Blocks methodology minus this risk-free rate:

Ex Ante Equity Risk Premium = 7.55% - 3.25% = 4.3%

This is only one estimate of the equity risk premium. As shown on page 6 of Exhibit JRW-11, I am also using the results of many other studies and surveys to determine an equity risk premium for my CAPM.

**Exhibit JRW-C1**

**Decomposing Equity Market Returns**
**The Building Blocks Methodology**

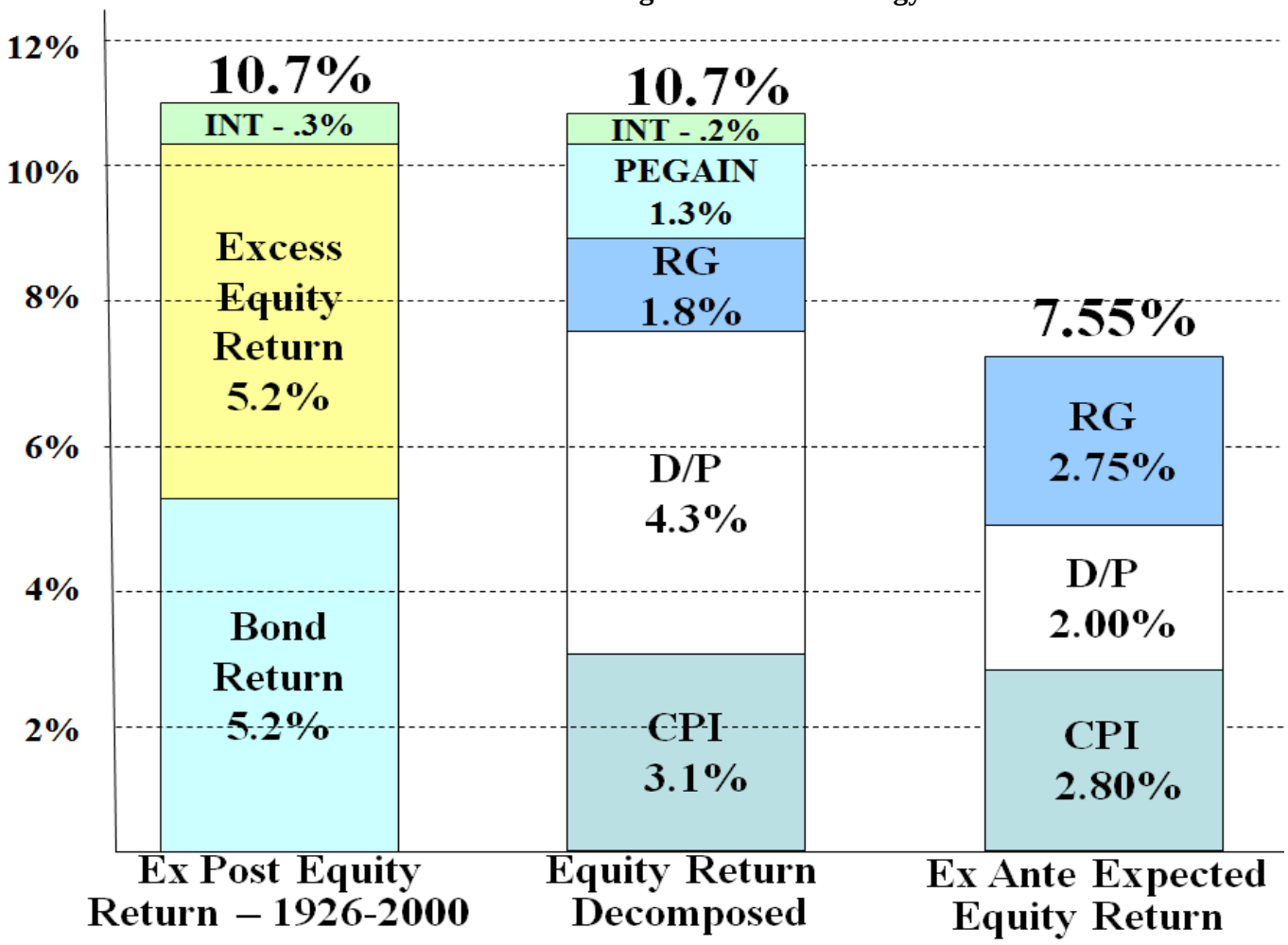


**Exhibit JRW-C1**

**2014 Survey of Professional Forecasters**
**Philadelphia Federal Reserve Bank**
**Long-Term Forecasts**

Table Seven
LONG-TERM (10 YEAR) FORECASTS

Panel A

| SERIES: CPI INFLATION RATE | |
|---|---|
| STATISTIC | |
| MINIMUM | 1.21 |
| LOWER QUARTILE | 2.05 |
| MEDIAN | 2.30 |
| UPPER QUARTILE | 2.50 |
| MAXIMUM | 3.40 |
| | |
| MEAN | 2.29 |
| STD. DEV. | 0.39 |
| N | 40 |
| MISSING | 5 |

Panel B

| SERIES: REAL GDP GROWTH RATE | |
|---|---|
| STATISTIC | |
| MINIMUM | 1.75 |
| LOWER QUARTILE | 2.40 |
| MEDIAN | 2.60 |
| UPPER QUARTILE | 2.80 |
| MAXIMUM | 3.50 |
| | |
| MEAN | 2.57 |
| STD. DEV. | 0.39 |
| N | 38 |
| MISSING | 7 |

Panel C

| SERIES: PRODUCTIVITY GROWTH | |
|---|---|
| STATISTIC | |
| MINIMUM | 1.00 |
| LOWER QUARTILE | 1.50 |
| MEDIAN | 1.80 |
| UPPER QUARTILE | 2.00 |
| MAXIMUM | 2.40 |
| | |
| MEAN | 1.76 |
| STD. DEV. | 0.37 |
| N | 29 |
| MISSING | 16 |

Panel D

| SERIES: STOCK RETURNS (S&P 500) | |
|---|---|
| STATISTIC | |
| MINIMUM | 2.70 |
| LOWER QUARTILE | 5.00 |
| MEDIAN | 6.00 |
| UPPER QUARTILE | 7.20 |
| MAXIMUM | 12.00 |
| | |
| MEAN | 6.43 |
| STD. DEV. | 2.07 |
| N | 27 |
| MISSING | 18 |

Panel E

| SERIES: BOND RETURNS (10-YEAR) | |
|---|---|
| STATISTIC | |
| MINIMUM | 2.70 |
| LOWER QUARTILE | 4.00 |
| MEDIAN | 4.35 |
| UPPER QUARTILE | 4.70 |
| MAXIMUM | 5.30 |
| | |
| MEAN | 4.25 |
| STD. DEV. | 0.64 |
| N | 33 |
| MISSING | 12 |

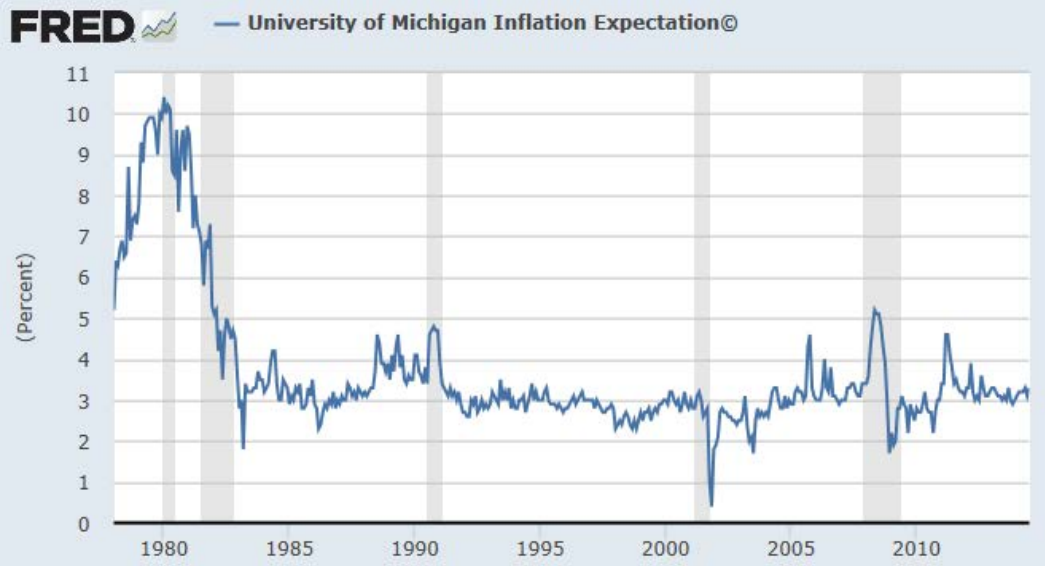
Panel F

| SERIES: BILL RETURNS (3-MONTH) | |
|---|---|
| STATISTIC | |
| MINIMUM | 0.10 |
| LOWER QUARTILE | 1.92 |
| MEDIAN | 2.50 |
| UPPER QUARTILE | 2.88 |
| MAXIMUM | 4.20 |
| | |
| MEAN | 2.37 |
| STD. DEV. | 0.85 |
| N | 32 |
| MISSING | 13 |

Source: Philadelphia Federal Researve Bank, Survey of Professional Forecasters, February 15, 2014.

## Exhibit JRW-C1

### University of Michigan Survey Research Center
### Expected Short-Term Inflation Rate

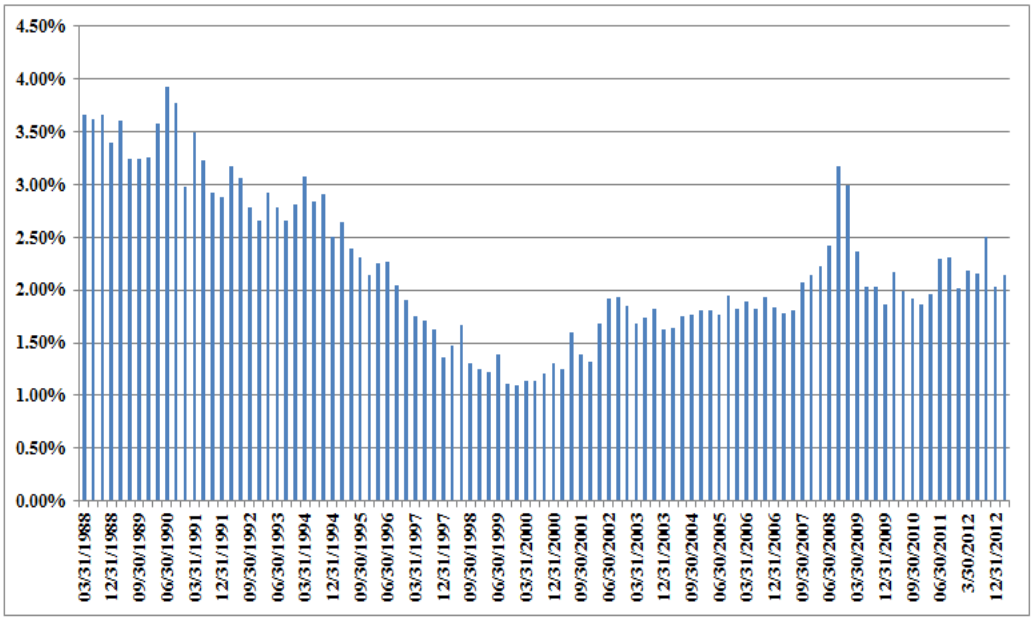



Data Source: http://research.stlouisfed.org/fred2/series/MICH?cid=98

# Exhibit JRW-C1

## Decomposing Equity Market Returns
## The Building Blocks Methodology

### S&P 500 Dividend Yield




### S&P 500 P/E Ratio

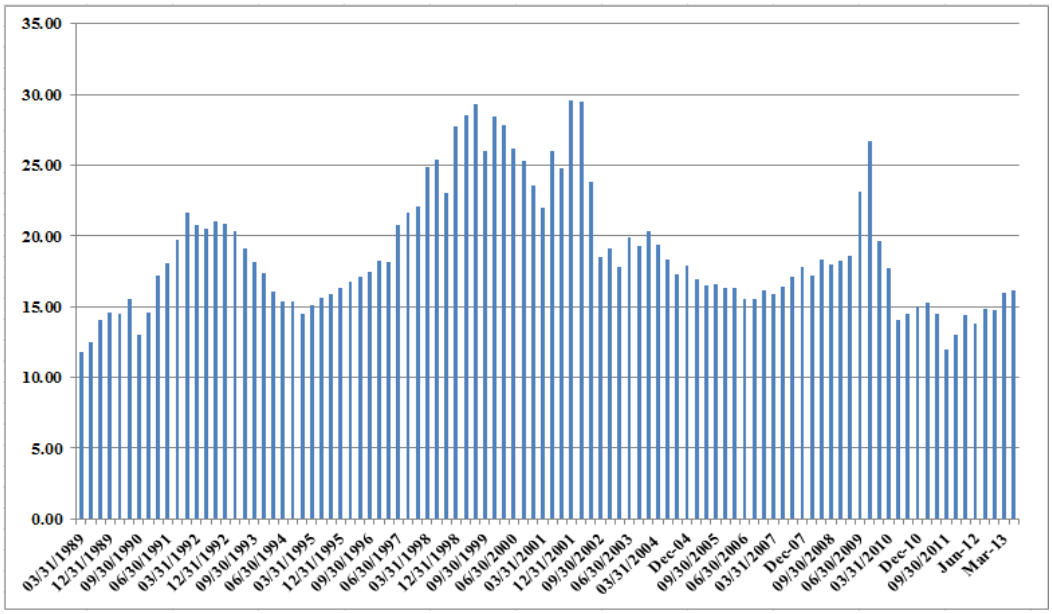


**Exhibit JRW-C1**

**Real S&P 500 EPS Growth Rate**

| Year | S&P 500 EPS | Annual Inflation CPI | Inflation Adjustment Factor | Real S&P 500 EPS | |
|---|---|---|---|---|---|
| 1960 | 3.10 | 1.48% | 1.00 | 3.10 | |
| 1961 | 3.37 | 0.67% | 1.01 | 3.35 | |
| 1962 | 3.67 | 1.22% | 1.02 | 3.60 | |
| 1963 | 4.13 | 1.65% | 1.04 | 3.99 | |
| 1964 | 4.76 | 1.19% | 1.05 | 4.54 | |
| 1965 | 5.30 | 1.92% | 1.07 | 4.96 | |
| 1966 | 5.41 | 3.35% | 1.10 | 4.90 | |
| 1967 | 5.46 | 3.04% | 1.14 | 4.80 | |
| 1968 | 5.72 | 4.72% | 1.19 | 4.80 | |
| 1969 | 6.10 | 6.11% | 1.26 | 4.83 | |
| 1970 | 5.51 | 5.49% | 1.33 | 4.13 | 10-Year |
| 1971 | 5.57 | 3.36% | 1.38 | 4.04 | 2.91% |
| 1972 | 6.17 | 3.41% | 1.43 | 4.33 | |
| 1973 | 7.96 | 8.80% | 1.55 | 5.13 | |
| 1974 | 9.35 | 12.20% | 1.74 | 5.37 | |
| 1975 | 7.71 | 7.01% | 1.86 | 4.14 | |
| 1976 | 9.75 | 4.81% | 1.95 | 4.99 | |
| 1977 | 10.87 | 6.77% | 2.08 | 5.22 | |
| 1978 | 11.64 | 9.03% | 2.27 | 5.12 | |
| 1979 | 14.55 | 13.31% | 2.57 | 5.65 | |
| 1980 | 14.99 | 12.40% | 2.89 | 5.18 | 10-Year |
| 1981 | 15.18 | 8.94% | 3.15 | 4.82 | 2.29% |
| 1982 | 13.82 | 3.87% | 3.27 | 4.22 | |
| 1983 | 13.29 | 3.80% | 3.40 | 3.91 | |
| 1984 | 16.84 | 3.95% | 3.53 | 4.77 | |
| 1985 | 15.68 | 3.77% | 3.67 | 4.28 | |
| 1986 | 14.43 | 1.13% | 3.71 | 3.89 | |
| 1987 | 16.04 | 4.41% | 3.87 | 4.14 | |
| 1988 | 24.12 | 4.42% | 4.04 | 5.97 | |
| 1989 | 24.32 | 4.65% | 4.23 | 5.75 | |
| 1990 | 22.65 | 6.11% | 4.49 | 5.05 | 10-Year |
| 1991 | 19.30 | 3.06% | 4.63 | 4.17 | -0.26% |
| 1992 | 20.87 | 2.90% | 4.76 | 4.38 | |
| 1993 | 26.90 | 2.75% | 4.89 | 5.50 | |
| 1994 | 31.75 | 2.67% | 5.02 | 6.32 | |
| 1995 | 37.70 | 2.54% | 5.15 | 7.32 | |
| 1996 | 40.63 | 3.32% | 5.32 | 7.64 | |
| 1997 | 44.09 | 1.70% | 5.41 | 8.15 | |
| 1998 | 44.27 | 1.61% | 5.50 | 8.05 | |
| 1999 | 51.68 | 2.68% | 5.64 | 9.16 | |
| 2000 | 56.13 | 3.39% | 5.84 | 9.62 | 10-Year |
| 2001 | 38.85 | 1.55% | 5.93 | 6.56 | 6.66% |
| 2002 | 46.04 | 2.38% | 6.07 | 7.59 | |
| 2003 | 54.69 | 1.88% | 6.18 | 8.85 | |
| 2004 | 67.68 | 3.26% | 6.38 | 10.60 | |
| 2005 | 76.45 | 3.52% | 6.61 | 11.57 | |
| 2006 | 87.72 | 2.03% | 6.74 | 13.01 | |
| 2007 | 82.54 | 4.08% | 7.02 | 11.76 | |
| 2008 | 65.39 | 0.90% | 7.08 | 9.24 | |
| 2009 | 59.65 | 2.72% | 7.27 | 8.20 | |
| 2010 | 83.66 | 1.50% | 7.38 | 11.33 | 10-Year |
| 2011 | 97.05 | 2.96% | 7.60 | 12.77 | 1.65% |
| 2012 | 102.47 | 1.74% | 7.73 | 13.25 | |
| 2013 | 107.45 | **0.015** | 7.85 | 13.69 | |
| Data Source: http://pages.stern.nyu.edu/~adamodar/ | | | | Real EPS Growth | **2.8%** |

Appendix D

The Use of Historical Returns to Measure an Expected Risk Premium

It is quite common for analysts to estimate an equity or market risk premium as the difference between historical stock and bond returns. However, using the historical relationship between stock and bond returns to measure an ex ante equity risk premium can produce an inflated measure of the true market or equity risk premium. The equity risk premium is based on expectations of the future. When past market conditions vary significantly from the present, historic data does not provide a realistic or accurate barometer of expectations of the future. More significantly, there are a number of empirical issues that can result in historical returns being poor measures of the expected risk premium.

There are a number of issues in using historic returns over long time periods to estimate expected equity risk premiums. These issues include:

(A) Biased historical bond returns

(B) Use of the arithmetic versus the geometric mean return

(C) The large error in measuring the equity risk premium using historical returns

(D) Unattainable and biased historical stock returns

(E) Company Survivorship bias

(F) The "Peso Problem" - U.S. stock market survivorship bias

These issues will be addressed in order.

## A. Biased Historical Bond Returns

An essential assumption of this approach is that over long periods of time,

investors' expectations are realized. However, the experienced returns of bondholders in the past invalidate this critical assumption. Historic bond returns are biased downward as a measure of expectancy because of capital losses suffered by bondholders in the past. As such, risk premiums derived from this data are biased upwards.

## B. The Arithmetic versus the Geometric Mean Return

The measure of investment return has a significant effect on the interpretation of the risk premium results. When analyzing a single security price series over time (i.e., a time series), the best measure of investment performance is the geometric mean return. Using the arithmetic mean overstates the return experienced by investors. In a study entitled "Risk and Return on Equity: The Use and Misuse of Historical Estimates," Carleton and Lakonishok make the following observation: "The geometric mean measures the changes in wealth over more than one period on a buy and hold (with dividends invested) strategy."[1] When a historic stock and bond return study covers more than one period (and he assumes that dividends are reinvested), he should be employing the geometric mean and not the arithmetic mean.

To demonstrate the upward bias of the arithmetic mean, consider the following example. Assume that you have a stock (that pays no dividend) that is

[1] Willard T. Carleton and Josef Lakonishok, "Risk and Return on Equity: The Use and Misuse of Historical Estimates," *Financial Analysts Journal*, pp. 38-47, (January-February, 1985).

selling for $100 today, increases to $200 in one year, and then falls back to $100 in two years. The table below shows the prices and returns.

| Time Period | Stock Price | Annual Return |
|---|---|---|
| 0 | $100 | |
| 1 | $200 | 100% |
| 2 | $100 | -50% |

The arithmetic mean return is simply (100% + (-50%))/2 = 25% per year. The geometric mean return is $((2 * .50)^{(1/2)}) - 1 = 0\%$ per year. Therefore, the arithmetic mean return suggests that your stock has appreciated at an annual rate of 25%, while the geometric mean return indicates an annual return of 0%. Since after two years, your stock is still only worth $100, the geometric mean return is the appropriate return measure. For this reason, when stock returns and earnings growth rates are reported in the financial press, they are generally reported using the geometric mean. This is because of the upward bias of the arithmetic mean. As further evidence of the appropriate mean return measure, the SEC requires equity mutual funds to report historic return performance using geometric mean and not arithmetic mean returns.[2] Therefore, the historic arithmetic mean return measures are biased and should be disregarded.

Nonetheless, in measuring historic returns to develop an expected equity risk premium, finance texts will often recommend the use of an arithmetic mean return as a measure of central tendency. A common justification for using the arithmetic mean return is that since annual stock returns are not serially correlated, the best measure of a return for next year is the arithmetic mean of past

[2] SEC, Form N-1A.

returns. On the other hand, Damodaran suggests that such an estimate is not appropriate in estimating an equity risk premium:[3]

> "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 over long periods of time. Consequently, the arithmetic average return is likely to overstate the premium. Second, while asset pricing models may be single period models, the use of these models to get expected returns over long periods (such as five or ten years) suggests that the estimation period may be much longer than a year. In this context, the argument for geometric average premiums becomes stronger."

C. The Error in Measuring Equity Risk Premiums with Historic Data

Measuring the equity risk premium using historical stock and bond returns is subject to a substantial forecasting error. For example, the arithmetic mean long-term equity risk premium of approximately 6.5% has a standard deviation of over 20.0%. This may be interpreted in the following way with respect to the historical distribution of the long-term equity risk premium using a standard normal distribution and a 95%, +/- 2 standard deviation confidence interval: We can say, with a 95% degree of confidence, that the true equity risk premium is between -34.7% and +47.7%. As such, the historical equity risk premium is measured with a substantial amount of error.

D. Unattainable and Biased Historic Stock Returns

Returns developed using Ibbotson's methodology are computed on stock indexes and therefore: (1) cannot be reflective of expectations because these returns

[3] Aswath. Damodaran, "Equity Risk Premiums (ERP): Determinants, Estimation and Implications – The 2013 Edition" NYU Working Paper, 2013, p. 27.

are unattainable to investors and (2) produce biased results. This methodology assumes: (1) monthly portfolio rebalancing and (2) reinvestment of interest and dividends. Monthly portfolio rebalancing presumes that investors rebalance their portfolios at the end of each month in order to have an equal dollar amount invested in each security at the beginning of each month. The assumption generates high transaction costs and thereby renders these returns unattainable to investors. In addition, an academic study demonstrates that the monthly portfolio rebalancing assumption produces biased estimates of stock returns.[4]

Transaction costs themselves provide another bias in historic versus expected returns. In the past, the observed stock returns were not the realized returns of investors, due to the much higher transaction costs of previous decades. These higher transaction costs are reflected through the higher commissions on stock trades and the lack of low cost mutual funds like index funds.

### E. Company Survivorship Bias

Using historic data to estimate an equity risk premium suffers from company survivorship bias. Company survivorship bias results when using returns from indexes like the S&P 500. The S&P 500 includes only companies that have survived. The fact that returns of firms that did not perform well were dropped from these indexes is not reflected. Therefore, these stock returns are

[4] See Richard Roll, "On Computing Mean Returns and the Small Firm Premium," *Journal of Financial Economics*, pp. 371-86, (1983).

upwardly biased because they only reflect the returns from more successful companies.

## F. The "Peso Problem" - U.S. Stock Market Survivorship Bias

The use of historic return data also suffers from the so-called "Peso Problem," which is also known as U.S. stock market survivorship bias. The "peso problem" issue was first highlighted by the Nobel laureate, Milton Friedman, and gets its name from conditions related to the Mexican peso market in the early 1970s. This issue involves the fact that past stock market returns were higher than were expected at the time because despite war, depression and other social, political, and economic events, the U.S. economy survived and did not suffer hyperinflation, invasion and/or the calamities of other countries. As such, highly improbable events, which may or may not occur in the future, are factored into stock prices, leading to seemingly low valuations. Higher than expected stock returns are then earned when these events do not subsequently occur. Therefore, the "peso problem" indicates that historic stock returns are overstated as measures of expected returns because the U.S. markets have not experienced the disruptions of other major markets around the world.

## F. One of the Biggest Mistakes in Teaching Finance

Jay Ritter, a Professor of Finance at the University of Florida, identified the use of historical stock and bond return data to estimate a forward-looking

equity risk premium as one of the "Biggest Mistakes" taught by the finance profession.[5] His argument is based on the theory behind the equity risk premium, the excessive results produced by historical returns, and the previously-discussed errors such as survivorship bias in historical data.

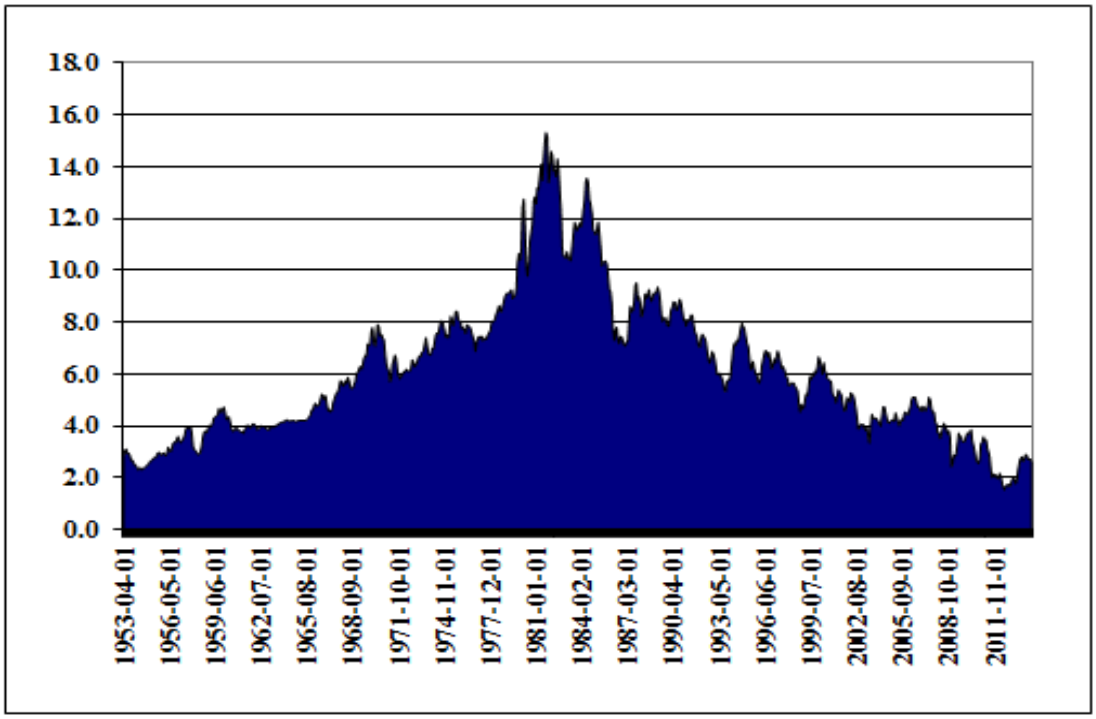
[5] Jay Ritter, "The Biggest Mistakes We Teach," *Journal of Financial Research* (Summer 2002).

**Exhibit JRW-1**
**Artesian Water Company, Inc.**
**Recommended Cost of Capital**

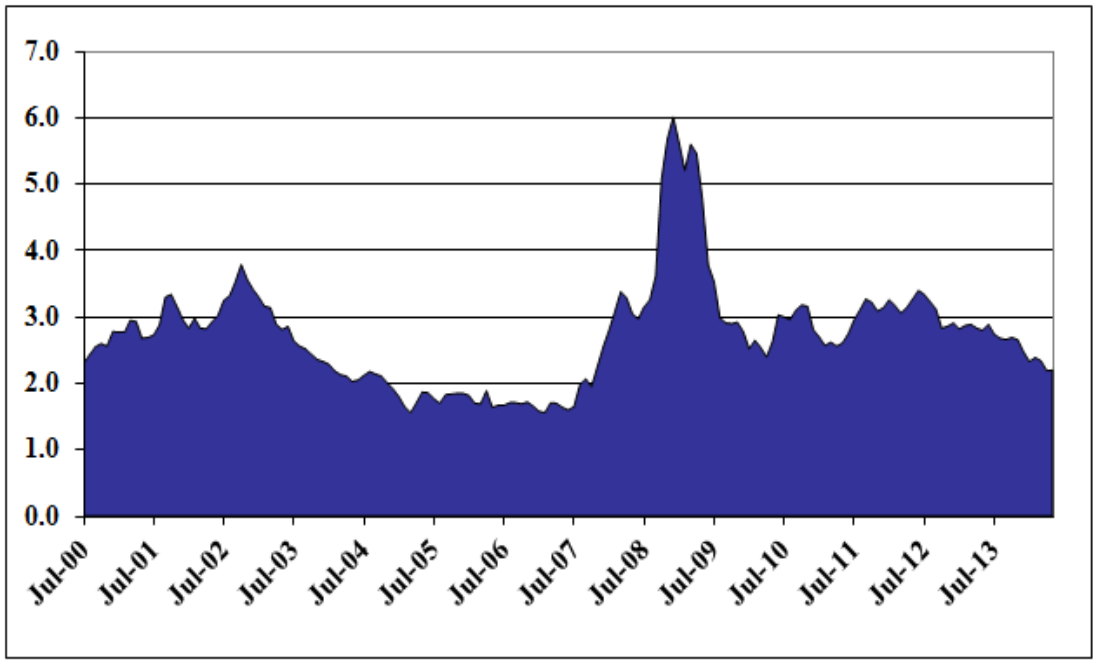
| Capital Source | Capitalization Ratio | Cost Rate | Weighted Cost Rate |
|---|---|---|---|
| **Long-Term Debt** | **49.46%** | **5.84%** | **2.89%** |
| **Common Equity** | **50.54%** | **8.75%** | **4.42%** |
| **Total** | **100.00%** | | **7.31%** |

**Exhibit JRW-2**

**Panel A**
**Ten-Year Treasury Yields**
**1953-Present**

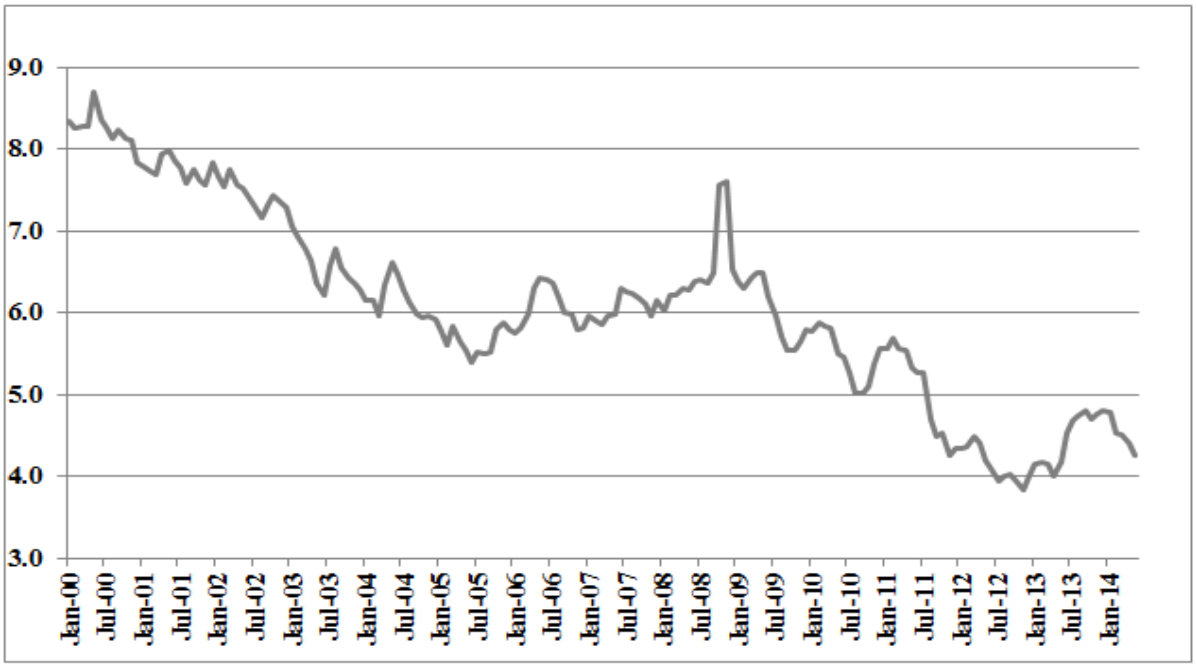



**Panel B**
**Long-Term Moody's Baa Yields Minus Ten-Year Treasury Yields**
**2000-Present**

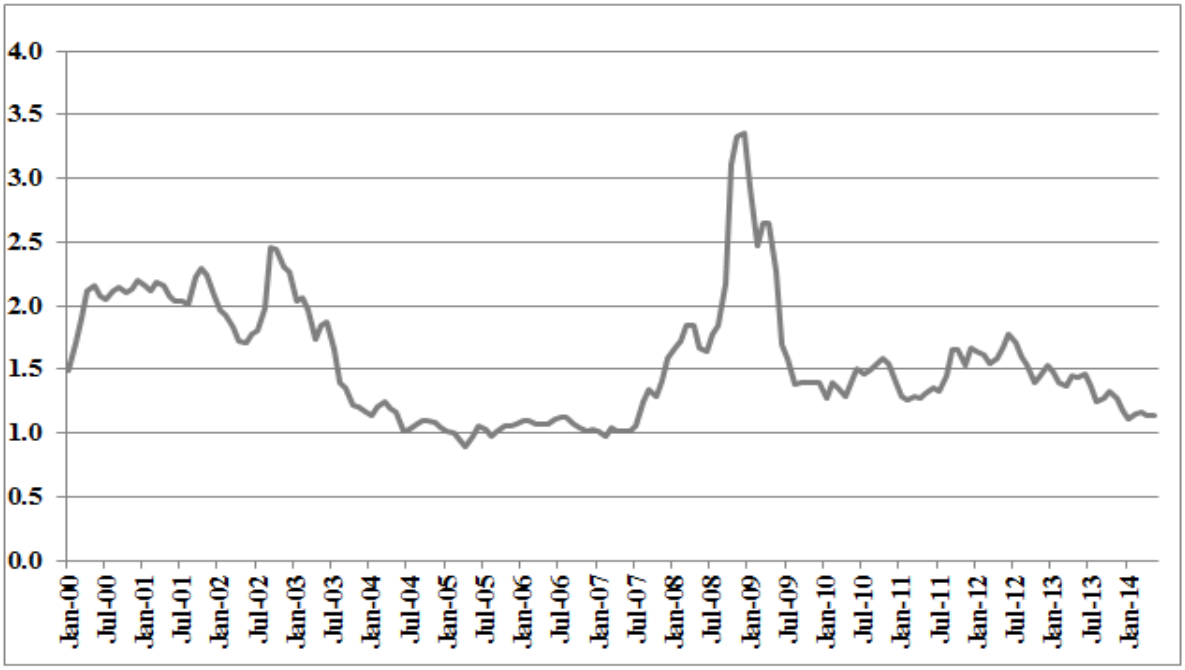



Source: Federal Reserve Bank of St. Louis, FRED Database.

**Exhibit JRW-3**
**Panel A**
**Long-Term, A-Rated Public Utility Yields**




**Panel B**
**Long-Term, A-Rated Public Utility Yields minus -Twenty-Year Treasury Yields**




Source: Mergent Bond Record

**Exhibit JRW-4**
**Artesian Water Company, Inc.**
**Summary Financial Statistics**

**Panel A**
**Water Proxy Group**

| Company | Operating Revenue ($mil) | Percent Water Revenue | Net Plant ($mil) | S&P Bond Rating | Moody's Bond Rating | Pre-Tax Interest Coverage | Primary Service Area | Common Equity Ratio* | Return on Equity | Market to Book Ratio |
|---|---|---|---|---|---|---|---|---|---|---|
| American States Water Co. (NYSE-AWR) | 463.5 | 69 | 983.9 | A+ | A2 | 5.4 | CA, AZ | 58.2 | 12.6 | 2.46 |
| American Water Works Co., Inc. (NYSE-AWK) | 2,947.7 | 89 | 12,328.4 | A+ | A1 | 3.0 | 30 States | 45.0 | 8.2 | 1.82 |
| Aqua America, Inc. (NYSE-WTR) | 771.3 | 98 | 4,159.5 | AA- | NR | 3.9 | 13 States | 48.9 | 14.6 | 2.83 |
| Artesian Resources Corp. (NDQ-ARTNA) | 69.6 | 94 | 379.3 | NR | NR | NA | DE,MD,PA | 51.5 | 7.2 | 1.41 |
| California Water Service Group Inc. (NDQ-CWT) | 583.2 | 100 | 1,523.1 | AA- | NR | 3.2 | CA,WA,NM | 54.1 | 7.4 | 1.90 |
| Connecticut Water Service, Inc. (NDQ-CTWS) | 92.0 | 100 | 473.7 | A/A- | NR | 4.4 | CT | 52.7 | 9.6 | 1.80 |
| Middlesex Water Company (NDQ-MSEX) | 115.0 | 88 | 448.0 | A | NR | 6.0 | NJ, DE | 53.5 | 8.8 | 1.74 |
| SJW Corporation (NYSE-SJW) | 281.3 | 95 | 1,321.5 | A | NR | 2.9 | CA,TX | 46.2 | 7.4 | 1.74 |
| York Water Company (NDQ-YORW) | 42.9 | 100 | 245.0 | A- | NR | 4.0 | PA | 55.0 | 9.4 | 2.44 |
| Mean | 596.3 | 92.6 | 2429.2 | A | NR | 4.1 | | 51.7 | 9.5 | 2.02 |
| Median | 281.3 | 95.0 | 983.9 | A | NR | 4.0 | | 52.7 | 8.8 | 1.82 |

Data Source: AUS *Utility Reports* , August, 2014; Pre-Tax Interest Coverage and Primary Service Territory are from *Value Line Investment Survey* , 2014.

**Panel B**
**Gas Proxy Group**

| Company | Operating Revenue ($mil) | Percent Gas Revenue | Net Plant ($mil) | S&P Bond Rating | Moody's Bond Rating | Pre-Tax Interest Coverage | Primary Service Area | Common Equity Ratio | Return on Equity | Market to Book Ratio |
|---|---|---|---|---|---|---|---|---|---|---|
| AGL Resources Inc. (NYSE-GAS) | 5,471.0 | 69 | 8,823.0 | A-/BBB+ | A2/A3 | 3.8 | GA,TN,VA,NJ,FL,MD,IL | 45.7 | 12.1 | 1.68 |
| Atmos Energy Corporation (NYSE-ATO) | 4,762.6 | 68 | 6,270.0 | A- | A2 | 3.9 | LA,KY,TX,MS,CO,KS,KY | 56.0 | 9.5 | 1.64 |
| Laclede Group, Inc. (NYSE-LG) | 1,475.5 | 89 | 1,803.0 | A+ | A3 | 8.2 | MO | 56.0 | 9.7 | 1.44 |
| Northwest Natural Gas Co. (NYSE-NWN) | 724.0 | 96 | 2,071.5 | AA- | A1 | 6.5 | OR,WA | 50.2 | 7.9 | 1.61 |
| Piedmont Natural Gas Co., Inc. (NYSE-PNY) | 1,482.9 | 100 | 3,827.8 | A | A2 | 3.4 | NC,SC,TN | 46.8 | 11.8 | 2.07 |
| South Jersey Industries, Inc. (NYSE-SJI) | 826.0 | 58 | 1,885.2 | A | A2 | 4.2 | NJ | 45.0 | 10.5 | 2.16 |
| Southwest Gas Corporation (NYSE-SWX) | 1,945.7 | 66 | 3,512.7 | A- | A3 | 4.2 | AZ,NV,CA | 51.7 | 9.5 | 1.64 |
| WGL Holdings, Inc. (NYSE-WGL) | 2,742.6 | 53 | 2,996.3 | A+ | A1 | 5.7 | DC,MD,VA | 57.5 | 1.4 | 1.62 |
| Mean | 2,428.8 | 75 | 3,898.7 | A/A- | A2/A3 | 5.0 | | 51.1 | 9.1 | 1.73 |
| Median | 1,714.3 | 69 | 3,254.5 | A/A- | A2/A3 | 4.2 | | 51.0 | 9.6 | 1.64 |

Data Source: AUS *Utility Reports* , August, 2014; Pre-Tax Interest Coverage and Primary Service Territory are from *Value Line Investment Survey* , 2014.

**Exhibit JRW-4**

**Artesian Water Company, Inc.**
***Value Line* Risk Metrics**

**Panel A**
**Water Proxy Group**

| Company | Beta | Safety Rank | Financial Strength | Earnings Predictability | Price Stability |
|---|---|---|---|---|---|
| American States Water Co. (NYSE-AWR) | 0.70 | 2 | A | 90 | 90 |
| American Water Works Co., Inc. (NYSE-AWK) | 0.70 | 3 | B+ | 20 | 100 |
| Aqua America, Inc. (NYSE-WTR) | 0.70 | 2 | B++ | 95 | 100 |
| Artesian Resources Corp. (NDQ-ARTNA) | 0.55 | 3 | B | 85 | 90 |
| California Water Service Group (NYSE-CWT) | 0.70 | 3 | B++ | 90 | 100 |
| Connecticut Water Service, Inc. (NDQ-CTWS) | 0.65 | 3 | B+ | 85 | 90 |
| Middlesex Water Company (NDQ-MSEX) | 0.70 | 2 | B++ | 80 | 90 |
| SJW Corporation (NYSE-SJW) | 0.80 | 3 | B+ | 80 | 85 |
| York Water Company (NDQ-YORW) | 0.75 | 2 | B+ | 100 | 85 |
| Mean | 0.69 | 3 | B+ | 81 | 92 |

Data Source: *Value Line Investment Survey* , 2014.

| | | | | | |
|---|---|---|---|---|---|
| Artesian Resources Corp. (NDQ-ARTNA) | 0.55 | 3 | B | 85 | 90 |

**Panel B**
**Gas Proxy Group**

| Company | Beta | Safety Rank | Financial Strength | Earnings Predictability | Price Stability |
|---|---|---|---|---|---|
| AGL Resources Inc. (NYSE-GAS) | 0.80 | 1 | A | 85 | 100 |
| Atmos Energy Corporation (NYSE-ATO) | 0.80 | 1 | A | 90 | 95 |
| Laclede Group, Inc. (NYSE-LG) | 0.70 | 2 | B++ | 85 | 100 |
| Northwest Natural Gas Co. (NYSE-NWN) | 0.70 | 1 | A | 95 | 100 |
| Piedmont Natural Gas Co., Inc. (NYSE-PNY) | 0.80 | 2 | B++ | 95 | 95 |
| South Jersey Industries, Inc. (NYSE-SJI) | 0.80 | 2 | A | 95 | 95 |
| Southwest Gas Corporation (NYSE-SWX) | 0.85 | 3 | B++ | 75 | 95 |
| WGL Holdings, Inc. (NYSE-WGL) | 0.75 | 1 | A | 85 | 95 |
| Mean | 0.78 | 2 | B++ | 88 | 97 |

Data Source: *Value Line Investment Survey* , 2014.

**Exhibit JRW-5**
**Artesian Water Company, Inc.**
**Capital Structure Ratios and Debt Cost Rates**

**Panel A -Artesian Water Company, Inc.'s Proposed Capitalization Ratios and Deb**

| Capital Source | Capitalization Ratio | Cost Rate |
|---|---|---|
| Long-Term Debt | 49.46% | 5.84% |
| Common Equity | 50.54% | |
| Total | 100.00% | |

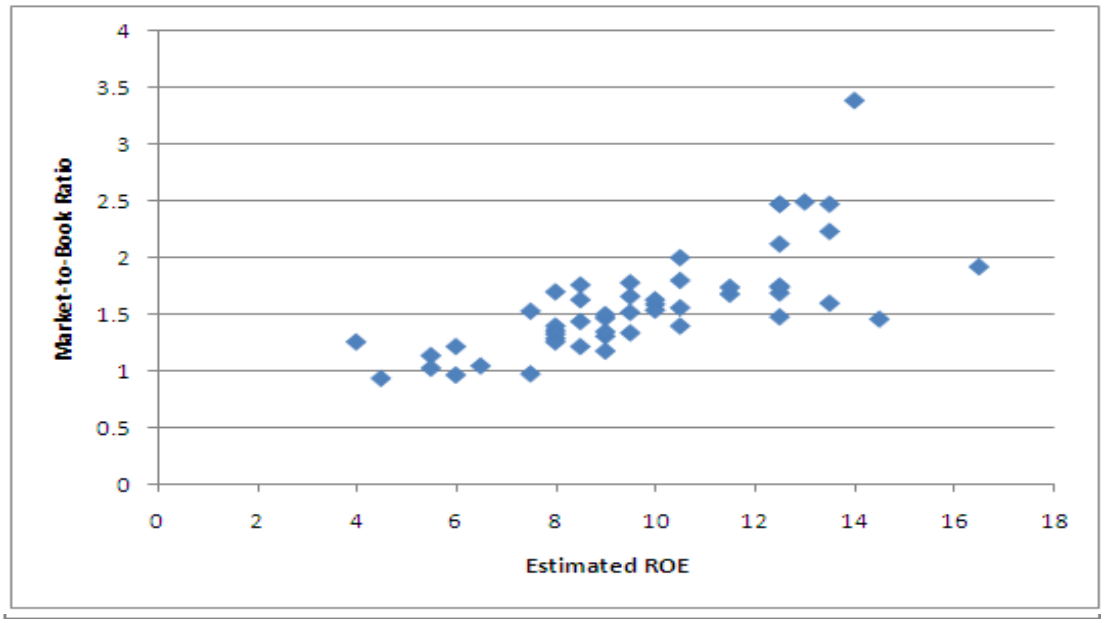
**Panel B -Artesian Resources Corporation's Quarterly Capitalization Ratios**

| | 3/31/14 | 12/31/13 | 9/30/13 | 6/30/13 |
|---|---|---|---|---|
| Short Term Debt | 8,909 | 11,464 | 10,804 | 9,821 |
| Long-Term Debt | 116,633 | 116,937 | 117,928 | 118,618 |
| Common Equity | 122,775 | 121,836 | 119,496 | 120,244 |
| Total | 248,317 | 250,237 | 248,228 | 248,683 |
| | 3/31/14 | 12/31/13 | 9/30/13 | 6/30/13 |
| Short Term Debt | 3.59% | 4.58% | 4.35% | 3.95% |
| Long-Term Debt | 46.97% | 46.73% | 47.51% | 47.70% |
| Common Equity | 49.44% | 48.69% | 48.14% | 48.35% |
| Total | 100.00% | 100.00% | 100.00% | 100.00% |

**Panel B -DPA's Proposed Capitalization Ratios and Cost Rates**

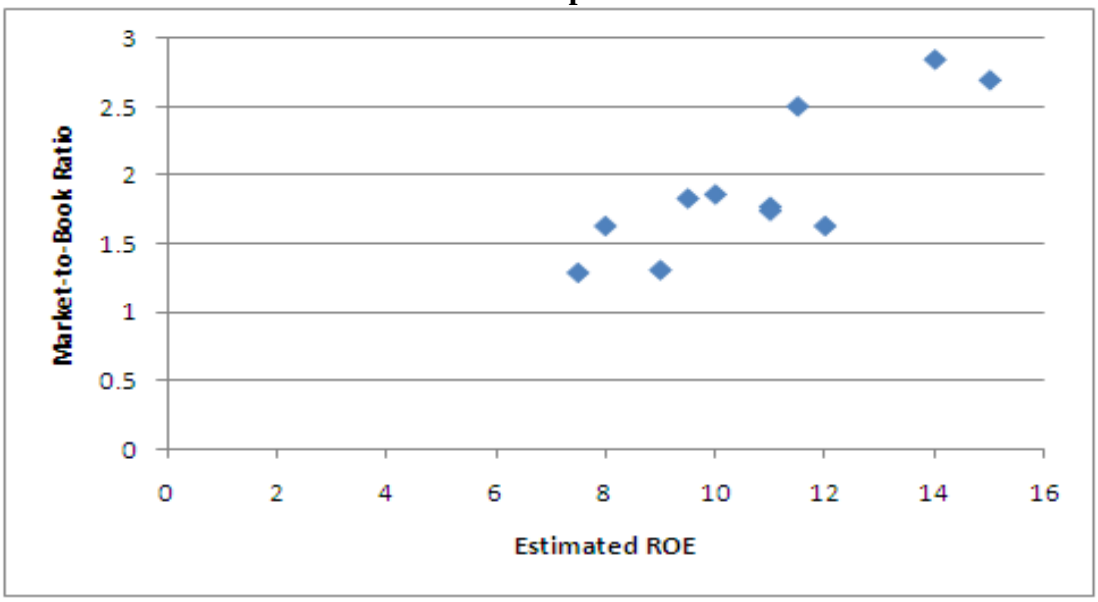
| Capital Source | Capitalization Ratio | Cost Rate |
|---|---|---|
| Long-Term Debt | 49.46% | 5.84% |
| Common Equity | 50.54% | |
| Total | 100.00% | |

**Exhibit JRW-6**
**Electric Utilities**
**Panel A**



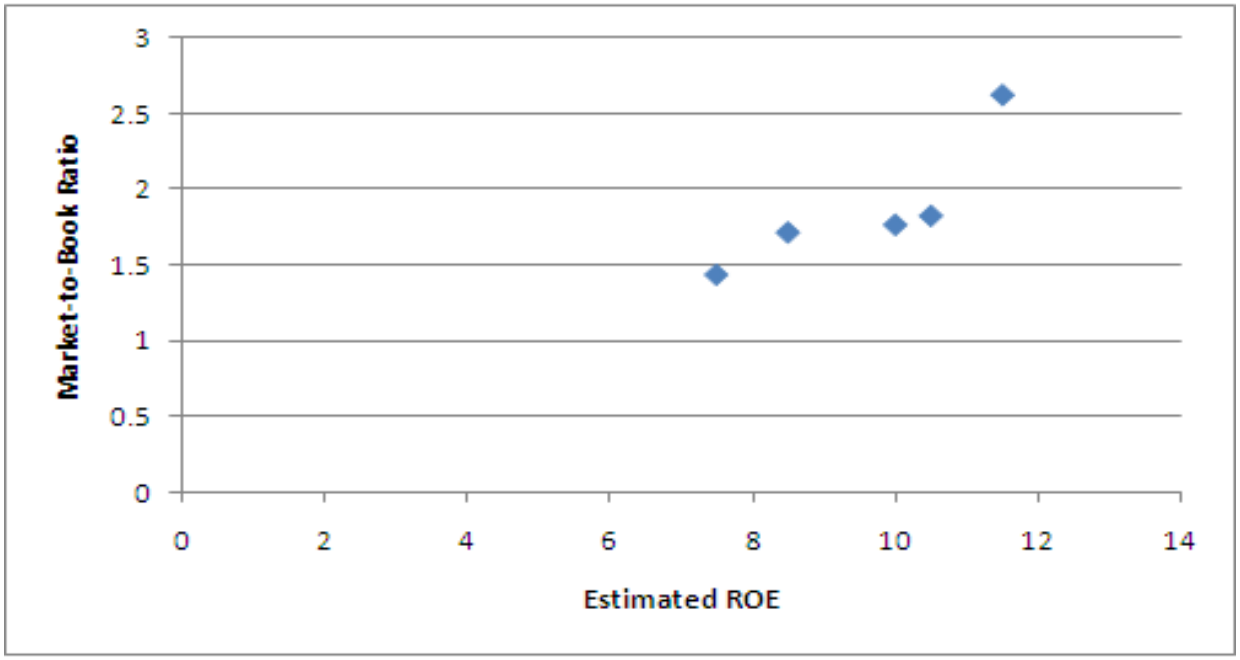

**R-Square = .52, N=51.**

**Panel B**
**Gas Companies**



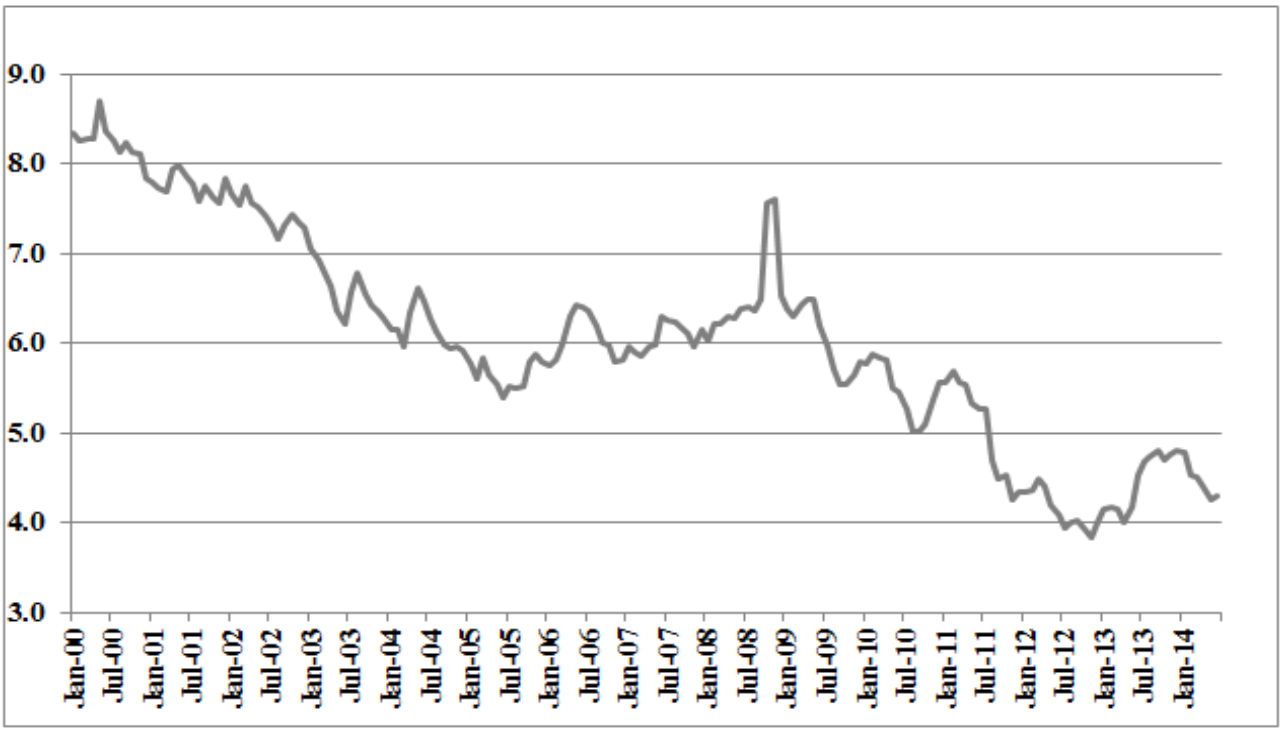

**R-Square = .71, N=11.**

**Exhibit JRW-6**
**Water Companies**
**Panel C**



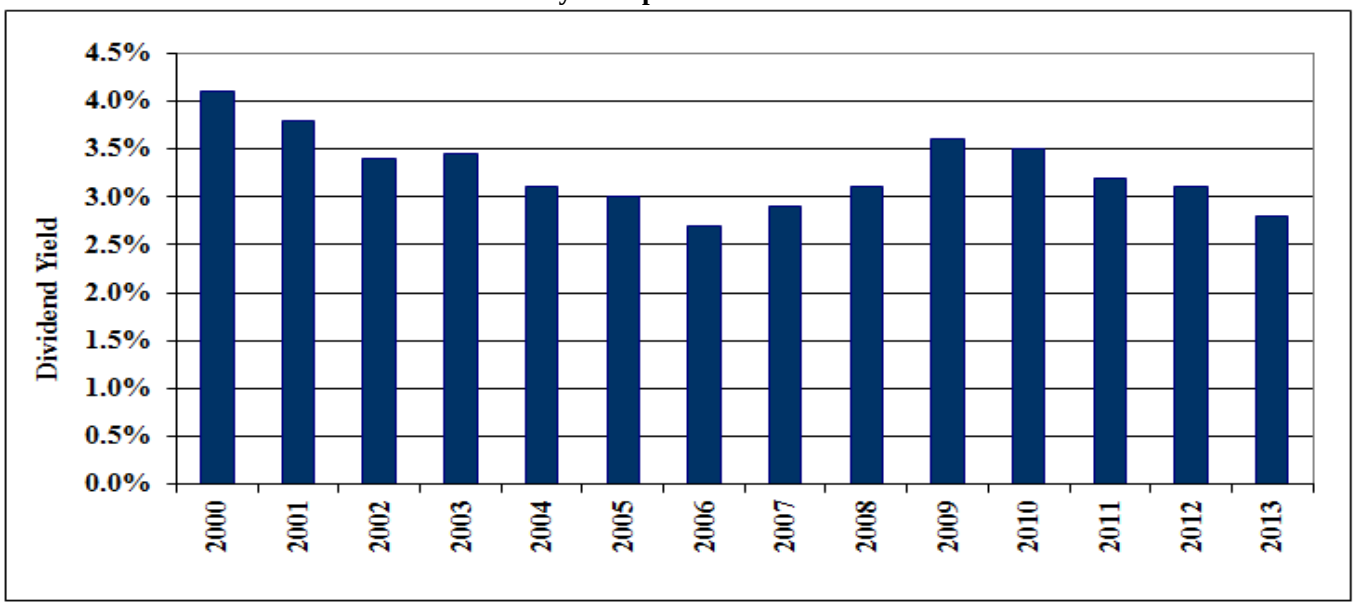

**R-Square = .77, N=5.**

**Exhibit JRW-7**
**Long-Term 'A' Rated Public Utility Bonds**

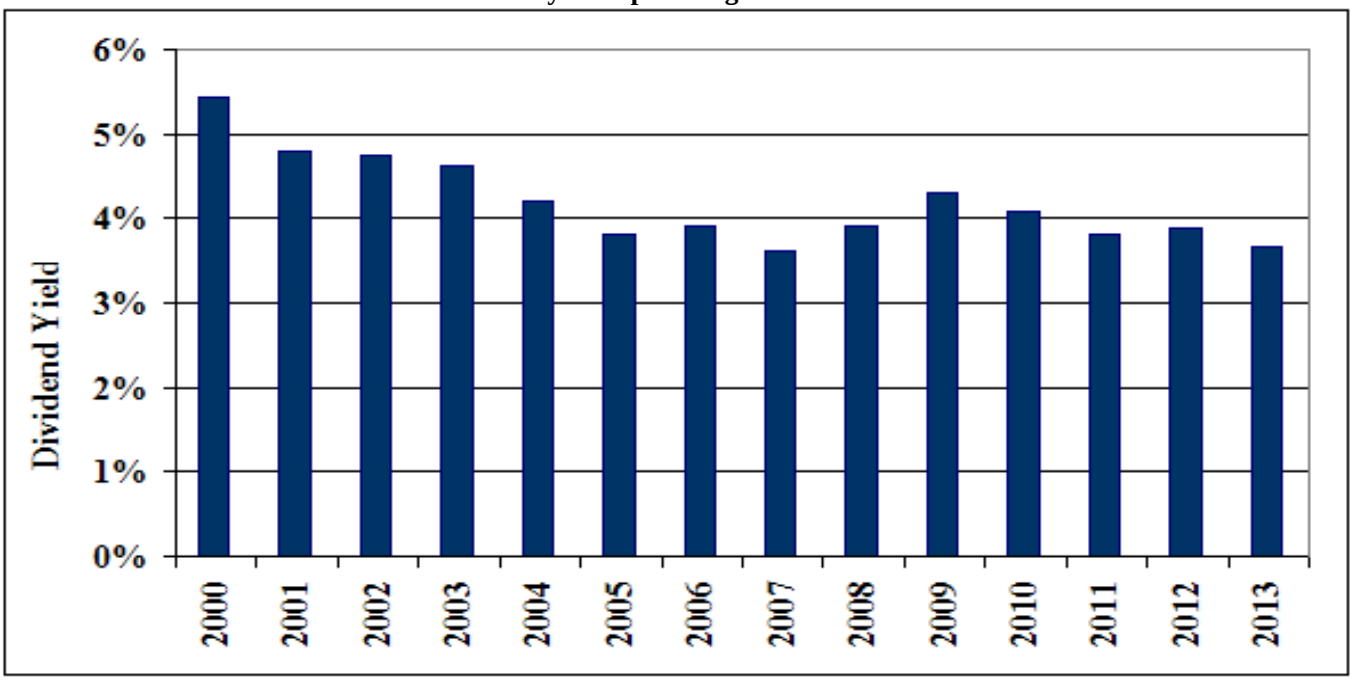



**Data Source: Mergent Bond Record**

**Exhibit JRW-7**
**Panel A**
**Water Proxy Group Median Dividend Yield**



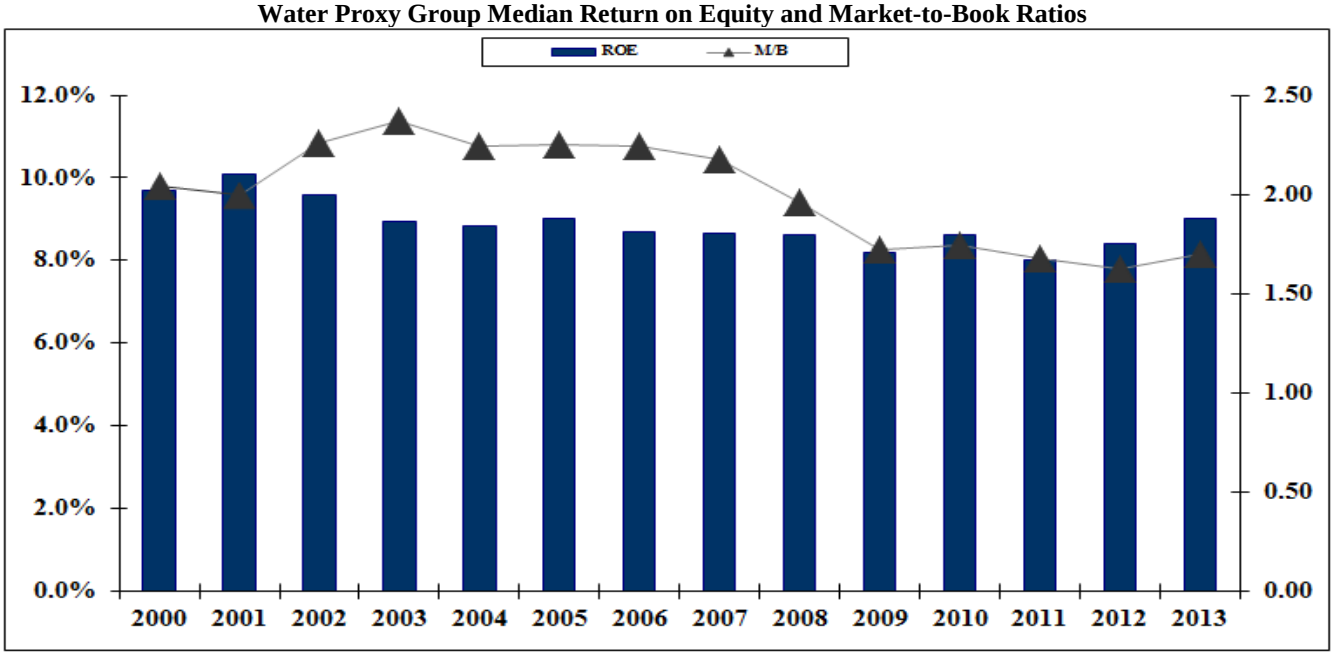

**Panel B**
**Gas Proxy Group Average Median Yield**



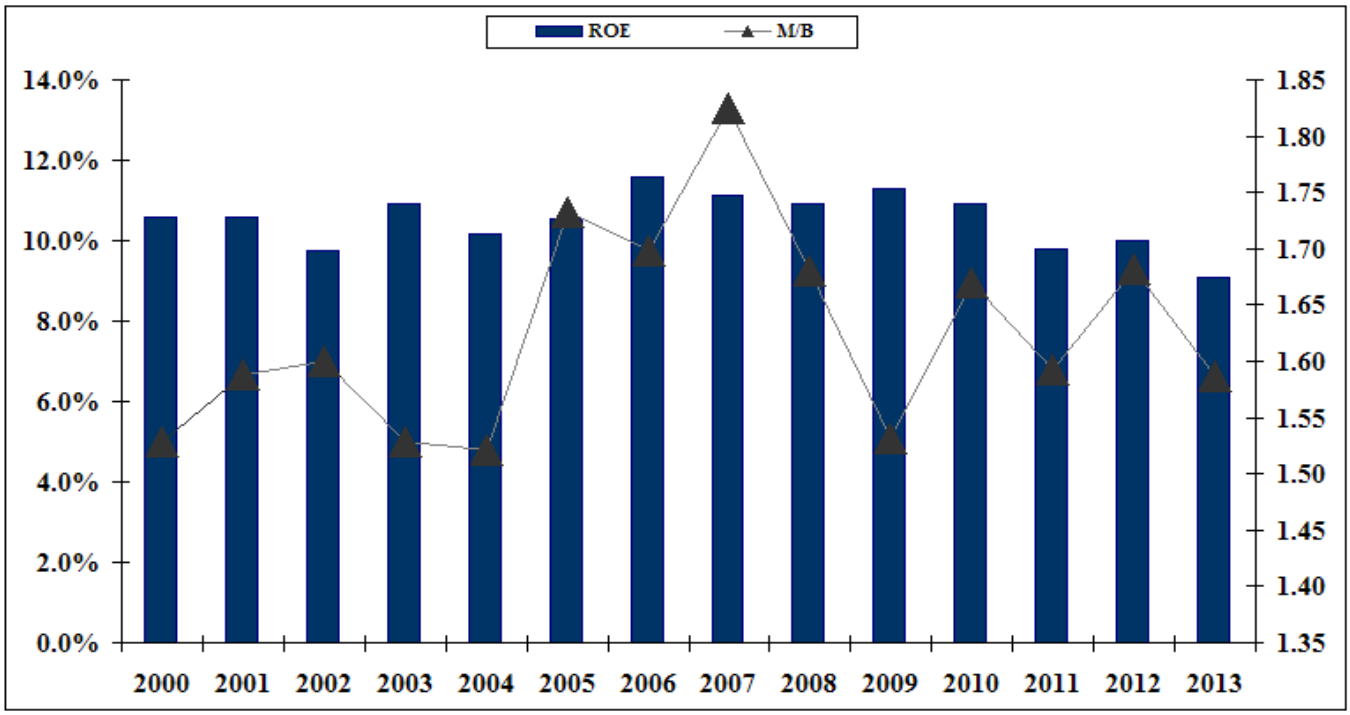

Data Source: *Value Line Investment Survey.*

**Exhibit JRW-7**

**Panel A**
**Water Proxy Group Median Return on Equity and Market-to-Book Ratios**




**Panel B**
**Gas Proxy Group Median Return on Equity and Market-to-Book Ratios**




Data Source: *Value Line Investment Survey.*

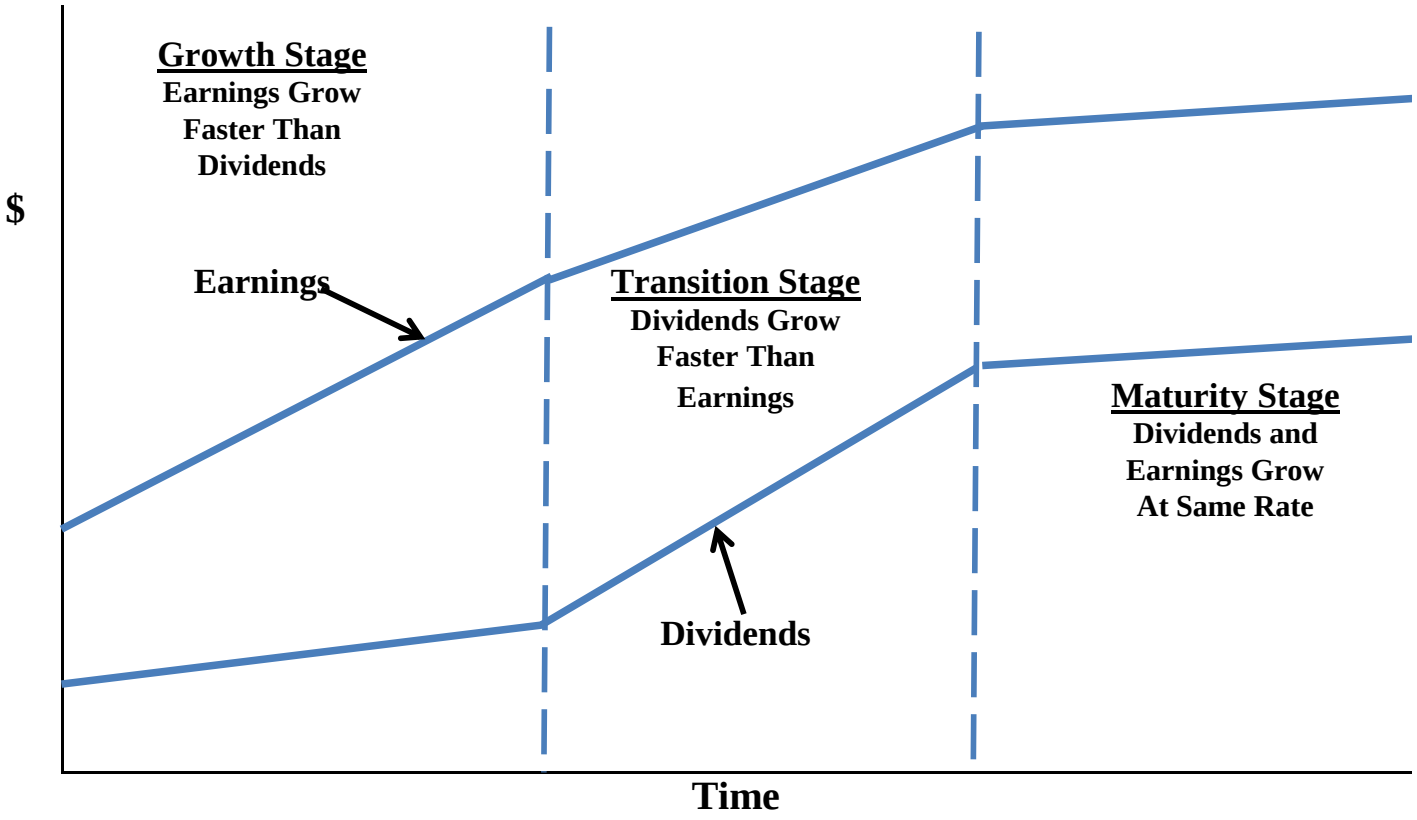
**Exhibit JRW-8**

**Industry Average Betas**

| Industry Name | Beta | Industry Name | Beta | Industry Name | Beta |
|---|---|---|---|---|---|
| COAL | 1.36 | HOTELGAM | 1.01 | SOFTWARE | 0.89 |
| MINING | 1.34 | WIRELESS | 1.01 | FUNL SVC | 0.89 |
| HEAVYTRK | 1.31 | METALFAB | 1.01 | ELECTRNX | 0.88 |
| SEMI-EQP | 1.30 | ENTRTAIN | 1.00 | RESTRNT | 0.88 |
| HOMEBILD | 1.30 | RETAILHL | 1.00 | OILGAS | 0.88 |
| GASDIVRS | 1.27 | RECREATE | 0.99 | MEDICNON | 0.88 |
| STEEL | 1.25 | INSTRMNT | 0.99 | ITSERV | 0.87 |
| NWSPAPER | 1.25 | BIOTECH | 0.99 | CABLETV | 0.87 |
| OILFIELD | 1.25 | B2B | 0.99 | SHOE | 0.86 |
| OILINTEG | 1.24 | REIT | 0.99 | HOUSEPRD | 0.85 |
| MARITIME | 1.22 | MACHINE | 0.98 | MEDICINV | 0.85 |
| AUTOPRTS | 1.20 | PACKAGE | 0.98 | MEDSERV | 0.84 |
| OILPROD | 1.16 | CHEMSPEC | 0.98 | INTERNET | 0.84 |
| ENGCON | 1.16 | INFOSER | 0.97 | REINSUR | 0.84 |
| CHEMDIV | 1.15 | EDUC | 0.97 | TELESERV | 0.83 |
| CHEMICAL | 1.15 | PUBLISH | 0.97 | PIPEMLP | 0.82 |
| BUILDING | 1.15 | TELUTIL | 0.96 | ENVIRONM | 0.82 |
| PPEQ | 1.15 | ELECFGN | 0.96 | DRUGSTOR | 0.82 |
| SEMICOND | 1.14 | AIRTRANS | 0.95 | GROCERY | 0.82 |
| RAILROAD | 1.14 | RETAUTO | 0.95 | FOODPROC | 0.81 |
| TRUCKING | 1.12 | TELEQUIP | 0.95 | INSPRPTY | 0.80 |
| POWER | 1.11 | FINSERV | 0.95 | TOBACCO | 0.76 |
| PAPER | 1.10 | INDUSRV | 0.94 | BANKMID | 0.75 |
| HUMAN | 1.08 | APPAREL | 0.94 | UTILWEST | 0.74 |
| GOLDSILV | 1.08 | DIVERSIF | 0.94 | UTILCENT | 0.74 |
| BROKERS | 1.06 | ADVERT | 0.94 | BEVERAGE | 0.73 |
| INSLIFE | 1.06 | COMPUTER | 0.94 | GASDISTR | 0.73 |
| AUTO | 1.06 | ENTTECH | 0.93 | WATER | 0.71 |
| RETAILSL | 1.04 | RETAIL | 0.92 | UTILEAST | 0.69 |
| OFFICE | 1.04 | COSMETIC | 0.91 | BANK | 0.68 |
| ELECEQ | 1.03 | HLTHSYS | 0.90 | THRIFT | 0.60 |
| BUILDSUP | 1.02 | DEFENSE | 0.90 | | |
| FURNITUR | 1.02 | DRUG | 0.89 | | |

Source: ValueLine Investment Survey, July, 2014.

**Exhibit JRW-9**
**DCF Model**




Source: William F. Sharpe, Gordon J. Alexander, and Jeffrey V. Bailey, Investments (Prentice-Hall, 1995), pp. 590-91.

**Exhibit JRW-9**
**DCF Model**
**Consensus Earnings Estimates**
**Aqua America, Inc. ("WTR")**
www.reuters.com
**8/15/2014**

| | # of Estimates | Mean | High | Low |
|---|---|---|---|---|
| **Earnings (per share)** | | | | |
| Quarter Ending Sep-14 | 8 | 0.38 | 0.39 | 0.36 |
| Quarter Ending Dec-14 | 8 | 0.28 | 0.29 | 0.26 |
| Year Ending Dec-14 | 12 | 1.13 | 1.21 | 0.75 |
| Year Ending Dec-15 | 12 | 1.27 | 1.30 | 1.25 |
| LT Growth Rate (%) | 3 | 5.67 | 9.00 | 4.00 |

Data Source: www.reuters.com

**Exhibit JRW-10**

**Artesian Water Company**
**Discounted Cash Flow Analysis**

**Panel A**
**Water Proxy Group**

| | |
|---|---|
| **Dividend Yield*** | **2.90%** |
| **Adjustment Factor (1 + 1/2g** | **1.0275** |
| **Adjusted Dividend Yield** | **2.98%** |
| **Growth Rate**** | **5.50%** |
| **Equity Cost Rate** | **8.5%** |

* Page 2 of Exhibit JRW-10.
** Based on data provided on pages 3, 4, 5, and 6 of Exhibit JRW-10

**Panel B**
**Gas Proxy Group**

| | |
|---|---|
| **Dividend Yield*** | **3.70%** |
| **Adjustment Factor (1 + 1/2g** | **1.025** |
| **Adjusted Dividend Yield** | **3.79%** |
| **Growth Rate**** | **5.00%** |
| **Equity Cost Rate** | **8.8%** |

* Page 2 of Exhibit JRW-10.
** Based on data provided on pages 3, 4, 5, and 6 of Exhibit JRW-10

**Exhibit JRW-10**
**Artesian Water Company, Inc.**
**Monthly Dividend Yields**

**Panel A**
**Water Proxy Group**

| Company | SMBL | Annual Dividend | Dividend Yield 30 Day | Dividend Yield 90 Day | Dividend Yield 180 Day |
|---|---|---|---|---|---|
| American States Water Co. (NYSE-AWR) | AWR | $ 0.85 | 2.7% | 2.8% | 2.9% |
| American Water Works Co., Inc. (NYSE-AWK) | AWK | $ 1.24 | 2.5% | 2.5% | 2.6% |
| Aqua America, Inc. (NYSE-WTR) | WTR | $ 0.61 | 2.5% | 2.5% | 2.5% |
| Artesian Resources Corp. (NDQ-ARTNA) | ARTNA | $ 0.85 | 4.0% | 3.9% | 3.9% |
| California Water Service Group (NYSE-CWT) | CWT | $ 0.65 | 2.8% | 2.9% | 2.9% |
| Connecticut Water Service, Inc. (NDQ-CTWS) | CTWS | $ 0.99 | 3.1% | 3.1% | 3.0% |
| Middlesex Water Company (NDQ-MSEX) | MSEX | $ 0.76 | 3.7% | 3.7% | 3.7% |
| SJW Corporation (NYSE-SJW) | SJW | $ 0.75 | 2.8% | 2.8% | 2.7% |
| York Water Company (NDQ-YORW) | YORW | $ 0.57 | 2.9% | 2.9% | 2.8% |
| Mean | | | 3.0% | 3.0% | 3.0% |
| Median | | | 2.8% | 2.9% | 2.9% |

Data Source: Yahoo, August 15, 2014

**Panel B**
**Gas Proxy Group**

| Company | SMBL | Annual Dividend | Dividend Yield 30 Day | Dividend Yield 90 Day | Dividend Yield 180 Day |
|---|---|---|---|---|---|
| AGL Resources Inc. (NYSE-GAS) | GAS | $ 1.96 | 3.7% | 3.7% | 4.0% |
| Atmos Energy Corporation (NYSE-ATO) | ATO | $ 1.48 | 3.0% | 2.9% | 3.1% |
| Laclede Group, Inc. (NYSE-LG) | LG | $ 1.76 | 3.7% | 3.8% | 3.8% |
| Northwest Natural Gas Co. (NYSE-NWN) | NWN | $ 1.84 | 4.1% | 4.1% | 4.3% |
| Piedmont Natural Gas Co., Inc. (NYSE-PNY) | PNY | $ 1.28 | 3.6% | 3.6% | 3.7% |
| South Jersey Industries, Inc. (NYSE-SJI) | SJI | $ 1.89 | 3.4% | 3.3% | 3.4% |
| Southwest Gas Corporation (NYSE-SWX) | SWX | $ 1.46 | 2.9% | 2.8% | 2.8% |
| WGL Holdings, Inc. (NYSE-WGL) | WGL | $ 1.76 | 4.3% | 4.4% | 4.5% |
| Mean | | | 3.6% | 3.6% | 3.7% |
| Median | | | 3.6% | 3.7% | 3.8% |

Data Source: Yahoo, August 15, 2014

**Exhibit JRW-10**

**Artesian Water Company, Inc.**
**DCF Equity Cost Growth Rate Measures**
***Value Line* Historic Growth Rates**

**Panel A**
**Water Proxy Group**

| Company | *Value Line* Historic Growth | | | | | |
|---|---|---|---|---|---|---|
| | Past 10 Years | | | Past 5 Years | | |
| | Earnings | Dividends | Book Value | Earnings | Dividends | Book Value |
| American States Water Co. (NYSE-AWR) | 9.0% | 4.0% | 5.5% | 13.0% | 6.5% | 6.5% |
| American Water Works Co., Inc. (NYSE-AWK) | | | | | | -0.5% |
| Aqua America, Inc. (NYSE-WTR) | 8.5% | 7.5% | 8.0% | 11.0% | 7.0% | 6.0% |
| Artesian Resources Corp. (NDQ-ARTNA) | | | | 1.0% | 3.5% | 4.0% |
| California Water Service Group (NYSE-CWT) | 5.5% | 1.0% | 5.5% | 4.0% | 1.5% | 4.5% |
| Connecticut Water Service, Inc. (NDQ-CTWS) | 2.5% | 1.5% | 6.0% | 8.0% | 2.0% | 8.0% |
| Middlesex Water Company (NDQ-MSEX) | 3.5% | 1.5% | 4.5% | 1.5% | 1.5% | 3.0% |
| SJW Corporation (NYSE-SJW) | 3.5% | 4.5% | 5.5% | 0.5% | 3.5% | 2.5% |
| York Water Company (NDQ-YORW) | 5.5% | 4.5% | 7.0% | 5.0% | 2.5% | 5.0% |
| Mean | 5.4% | 3.5% | 6.0% | 5.5% | 3.5% | 4.3% |
| Median | 5.5% | 4.0% | 5.5% | 4.5% | 3.0% | 4.5% |
| Data Source: *Value Line Investment Survey, 2014.* | Average of Median Figures = | | | 4.5% | | |

**Panel B**
**Gas Proxy Group**

| Company | *Value Line* Historic Growth | | | | | |
|---|---|---|---|---|---|---|
| | Past 10 Years | | | Past 5 Years | | |
| | Earnings | Dividends | Book Value | Earnings | Dividends | Book Value |
| AGL Resources Inc. (NYSE-GAS) | 2.5% | 5.5% | 8.5% | -3.0% | 3.0% | 6.5% |
| Atmos Energy Corporation (NYSE-ATO) | 4.0% | 1.5% | 6.0% | 3.0% | 1.5% | 4.0% |
| Laclede Group, Inc. (NYSE-LG) | 5.0% | 2.0% | 6.0% | 1.0% | 2.5% | 7.0% |
| Northwest Natural Gas Co. (NYSE-NWN) | 2.5% | 3.5% | 3.5% | -2.5% | 4.5% | 3.5% |
| Piedmont Natural Gas Co., Inc. (NYSE-PNY) | 5.0% | 5.0% | 5.0% | 3.5% | 5.5% | 3.0% |
| South Jersey Industries, Inc. (NYSE-SJI) | 9.0% | 8.0% | 9.0% | 5.5% | 10.0% | 7.5% |
| Southwest Gas Corporation (NYSE-SWX) | 9.5% | 4.0% | 5.0% | 9.5% | 6.5% | 4.5% |
| WGL Holdings, Inc. (NYSE-WGL) | 3.0% | 2.5% | 4.0% | 2.5% | 3.0% | 4.0% |
| Mean | 5.1% | 4.0% | 5.9% | 2.4% | 4.6% | 5.0% |
| Median | 4.5% | 3.8% | 5.5% | 2.8% | 3.8% | 4.3% |
| Data Source: *Value Line Investment Survey, 2014.* | Average of Median Figures = | | | 4.1% | | |

**Exhibit JRW-10**

**Artesian Water Company, Inc.**
**DCF Equity Cost Growth Rate Measures**
***Value Line* Projected Growth Rates**

**Panel A**
**Water Proxy Group**

| Company | *Value Line* Projected Growth Est'd. '11-'13 to '17-'19 | | | *Value Line* Sustainable Growth | | |
|---|---|---|---|---|---|---|
| | Earnings | Dividends | Book Value | Return on Equity | Retention Rate | Sustainable Growth |
| American States Water Co. (NYSE-AWR) | 6.0% | 9.0% | 4.5% | 12.5% | 44.0% | 5.5% |
| American Water Works Co., Inc. (NYSE-AWK) | 7.5% | 7.5% | 2.0% | 10.5% | 50.0% | 5.3% |
| Aqua America, Inc. (NYSE-WTR) | 8.5% | 9.0% | 5.5% | 14.0% | 42.0% | 5.9% |
| Artesian Resources Corp. (NDQ-ARTNA) | | | | | | |
| California Water Service Group (NYSE-CWT) | 7.5% | 7.0% | 4.5% | 10.0% | 37.0% | 3.7% |
| Connecticut Water Service, Inc. (NDQ-CTWS) | 5.0% | 3.0% | 5.5% | 8.5% | 41.0% | 3.5% |
| Middlesex Water Company (NDQ-MSEX) | 4.5% | 2.0% | 2.5% | 9.0% | 31.0% | 2.8% |
| SJW Corporation (NYSE-SJW) | 7.0% | 5.0% | 6.0% | 8.0% | 45.0% | 3.6% |
| York Water Company (NDQ-YORW) | 7.0% | 5.5% | 2.5% | 12.0% | 33.0% | 4.0% |
| Mean | 6.6% | 6.0% | 4.1% | 10.6% | 40.4% | 4.3% |
| Median | 7.0% | 6.3% | 4.5% | 10.3% | 41.5% | 3.8% |
| Average of Median Figures = | | 5.9% | | | Median = | 3.8% |

Data Source: *Value Line Investment Survey, 2014.*

**Panel B**
**Gas Proxy Group**

| Company | *Value Line* Projected Growth Est'd. '11-'13 to '17-'19 | | | *Value Line* Sustainable Growth | | |
|---|---|---|---|---|---|---|
| | Earnings | Dividends | Book Value | Return on Equity | Retention Rate | Internal Growth |
| AGL Resources Inc. (NYSE-GAS) | 10.5% | 4.5% | 4.0% | 12.0% | 44.0% | 5.3% |
| Atmos Energy Corporation (NYSE-ATO) | 7.5% | 3.5% | 6.5% | 9.0% | 51.0% | 4.6% |
| Laclede Group, Inc. (NYSE-LG) | 8.0% | 5.0% | 6.5% | 10.0% | 46.0% | 4.6% |
| Northwest Natural Gas Co. (NYSE-NWN) | 6.5% | 2.5% | 4.0% | 9.5% | 36.0% | 3.4% |
| Piedmont Natural Gas Co., Inc. (NYSE-PNY) | 4.0% | 3.0% | 5.0% | 11.0% | 32.0% | 3.5% |
| South Jersey Industries, Inc. (NYSE-SJI) | 8.0% | 8.0% | 6.5% | 14.5% | 46.0% | 6.7% |
| Southwest Gas Corporation (NYSE-SWX) | 6.0% | 7.0% | 4.5% | 11.0% | 55.0% | 6.1% |
| WGL Holdings, Inc. (NYSE-WGL) | 4.0% | 2.5% | 3.0% | 10.5% | 40.0% | 4.2% |
| Mean | 6.8% | 4.5% | 5.0% | 10.9% | 43.8% | 4.8% |
| Median | 7.0% | 4.0% | 4.8% | 10.8% | 45.0% | 4.6% |
| Average of Median Figures = | | 5.3% | | | Median = | 4.6% |

Data Source: *Value Line Investment Survey, 2014.*

**Exhibit JRW-10**

**Artesian Water Company, Inc.**
**DCF Equity Cost Growth Rate Measures**
**Analysts Projected EPS Growth Rate Estimates**

**Panel A**
**Water Proxy Group**

| Company | Yahoo | Zack's | Reuters | Average |
|---|---|---|---|---|
| American States Water Co. (NYSE-AWR) | 1.0% | 1.0% | 1.0% | 1.0% |
| American Water Works Co., Inc. (NYSE-AWK) | 9.2% | 8.4% | 10.5% | 9.3% |
| Aqua America, Inc. (NYSE-WTR) | 4.0% | 5.3% | 5.7% | 5.0% |
| Artesian Resources Corp. (NDQ-ARTNA) | 4.0% | n/a | n/a | 4.0% |
| California Water Service Group (NYSE-CWT) | 6.0% | 6.0% | 6.0% | 6.0% |
| Connecticut Water Service, Inc. (NDQ-CTWS) | 5.0% | 5.0% | 5.0% | 5.0% |
| Middlesex Water Company (NDQ-MSEX) | 2.7% | n/a | n/a | 2.7% |
| SJW Corporation (NYSE-SJW) | 14.0% | n/a | n/a | 14.0% |
| York Water Company (NDQ-YORW) | 4.9% | n/a | n/a | 4.9% |
| Mean | 5.6% | 5.1% | 5.6% | 5.8% |
| Median | 4.9% | 5.3% | 5.7% | 5.0% |

Data Sources: www.reuters.com, www.zacks.com, http://quote.yahoo.com, August 15, 2014

**Panel B**
**Gas Proxy Group**

| Company | Yahoo | Zack's | Reuters | Average |
|---|---|---|---|---|
| AGL Resources Inc. (NYSE-GAS) | n/a | 4.0% | 4.5% | 4.3% |
| Atmos Energy Corporation (NYSE-ATO) | 7.0% | 7.0% | 7.0% | 7.0% |
| Laclede Group, Inc. (NYSE-LG) | 4.8% | 4.8% | 4.8% | 4.8% |
| Northwest Natural Gas Co. (NYSE-NWN) | 3.5% | 3.7% | 3.5% | 3.6% |
| Piedmont Natural Gas Co., Inc. (NYSE-PNY) | 3.7% | 4.0% | 3.7% | 3.8% |
| South Jersey Industries, Inc. (NYSE-SJI) | 6.0% | 6.0% | n/a | 6.0% |
| Southwest Gas Corporation (NYSE-SWX) | 2.4% | 4.5% | 2.4% | 3.1% |
| WGL Holdings, Inc. (NYSE-WGL) | 4.9% | 4.9% | 4.9% | 4.9% |
| Mean | 4.6% | 4.9% | 4.4% | 4.7% |
| Median | 4.8% | 4.7% | 4.5% | 4.5% |

Data Sources: www.reuters.com, www.zacks.com, http://quote.yahoo.com, August 15, 2014

**Exhibit JRW-10**

**Artesian Water Company, Inc.**
**DCF Growth Rate Indicators**

**Water and Gas Proxy Groups**

**Summary Growth Rates**

| Growth Rate Indicator | Water Proxy Group | Gas Proxy Group |
|---|---|---|
| Historic *Value Line* Growth in EPS, DPS, and BVPS | 4.5% | 4.1% |
| Projected *Value Line* Growth in EPS, DPS, and BVPS | 5.9% | 5.3% |
| Sustainable Growth ROE * Retention Rate | 3.8% | 4.6% |
| Projected EPS Growth from Yahoo, Zacks, and Reuters | 5.8%/5.0% | 4.7%/4.5% |

**Exhibit JRW-11**

**Artesian Water Company, Inc.**
**Capital Asset Pricing Model**

**Panel A**
**Water Proxy Group**

| | |
|---|---|
| **Risk-Free Interest Rate** | **4.00%** |
| **Beta*** | **0.70** |
| **Ex Ante Equity Risk Premium**** | **5.00%** |
| **CAPM Cost of Equity** | **7.5%** |

* See page 3 of Exhibit JRW-11
** See pages 5 and 6 of Exhibit JRW-11

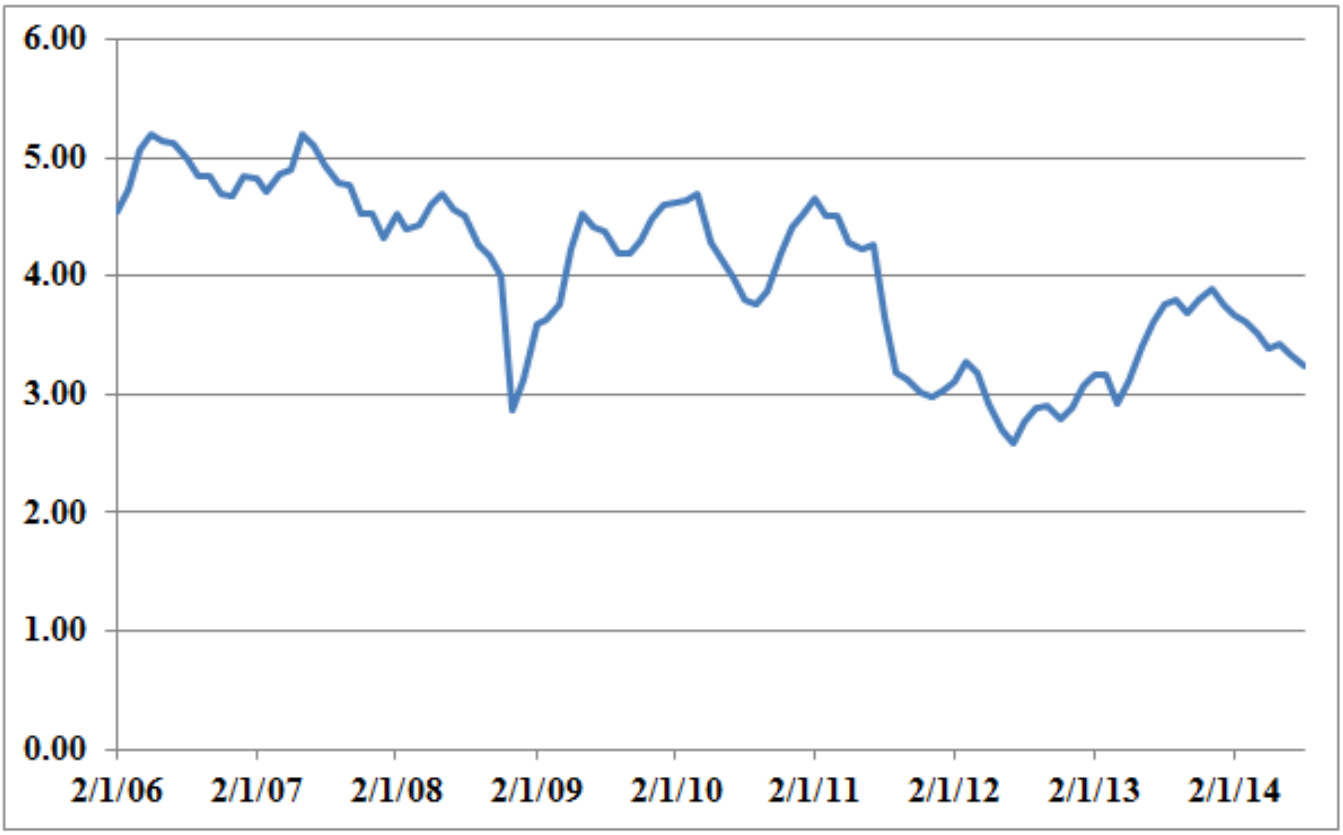
**Panel B**
**Gas Proxy Group**

| | |
|---|---|
| **Risk-Free Interest Rate** | **4.00%** |
| **Beta*** | **0.80** |
| **Ex Ante Equity Risk Premium**** | **5.00%** |
| **CAPM Cost of Equity** | **8.0%** |

* See page 3 of Exhibit JRW-11
** See pages 5 and 6 of Exhibit JRW-11

**Exhibit JRW-11**

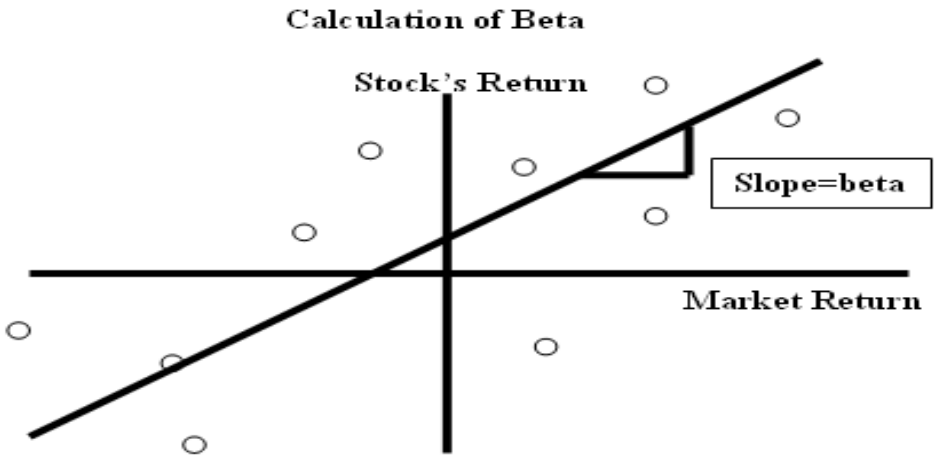
**Thirty-Year U.S. Treasury Yields**
**January 2006-Present**




Source: Federal Reserve Bank of St. Louis, FRED Database.

**Exhibit JRW-11**

**Panel A**
**Betas**




**Water Proxy Group**

| Company | Beta |
|---|---|
| American States Water Co. (NYSE-AWR) | 0.70 |
| American Water Works Co., Inc. (NYSE-AWK) | 0.70 |
| Aqua America, Inc. (NYSE-WTR) | 0.70 |
| Artesian Resources Corp. (NDQ-ARTNA) | 0.55 |
| California Water Service Group (NYSE-CWT) | 0.70 |
| Connecticut Water Service, Inc. (NDQ-CTWS) | 0.65 |
| Middlesex Water Company (NDQ-MSEX) | 0.70 |
| SJW Corporation (NYSE-SJW) | 0.80 |
| York Water Company (NDQ-YORW) | 0.75 |
| Mean | 0.69 |
| Median | 0.70 |

Data Source: *Value Line Investment Survey, 2014.*

**Gas Proxy Group**

| Company | Beta |
|---|---|
| AGL Resources Inc. (NYSE-GAS) | 0.80 |
| Atmos Energy Corporation (NYSE-ATO) | 0.80 |
| Laclede Group, Inc. (NYSE-LG) | 0.70 |
| Northwest Natural Gas Co. (NYSE-NWN) | 0.70 |
| Piedmont Natural Gas Co., Inc. (NYSE-PNY) | 0.80 |
| South Jersey Industries, Inc. (NYSE-SJI) | 0.80 |
| Southwest Gas Corporation (NYSE-SWX) | 0.85 |
| WGL Holdings, Inc. (NYSE-WGL) | 0.75 |
| Mean | 0.78 |
| Median | 0.80 |

Data Source: *Value Line Investment Survey, 2014.*

**Exhibit JRW-11**
**Risk Premium Approaches**

| | **Historical Ex Post Returns** | **Surveys** | **Expected Return Models and Market Data** |
|---|---|---|---|
| **Means of Assessing The Market Risk Premium** | Historical Average Stock Minus Bond Returns | Surveys of CFOs, Financial Forecasters, Companies, Analysts on Expected Returns and Market Risk Premiums | Use Market Prices and Market Fundamentals (such as Growth Rates) to Compute Expected Returns and Market Risk Premiums |
| **Problems/Debated Issues** | Time Variation in Required Returns, Measurement and Time Period Issues, and Biases such as Market and Company Survivorship Bias | Questions Regarding Survey Histories, Responses, and Representativeness<br><br>Surveys may be Subject to Biases, such as Extrapolation | Assumptions Regarding Expectations, Especially Growth |

Source: Adapted from Antti Ilmanen, Expected Returns on Stocks and Bonds," *Journal of Portfolio Management* , (Winter 2003).

**Exhibit JRW-11**

**Artesian Water Company, Inc.**
**Capital Asset Pricing Model**
**Equity Risk Premium**

| Category | Study Authors | Publication Date | Time Period Of Study | Methodology | Return Measure | Range Low | Range High | Midpoint of Range | Mean | Median |
|---|---|---|---|---|---|---|---|---|---|---|
| **Historical Risk Premium** | | | | | | | | | | |
| | Ibbotson | 2014 | 1926-2012 | Historical Stock Returns - Bond Returns | Arithmetic | | | | 6.20% | |
| | | | | | Geometric | | | | 4.60% | |
| | Damodaran | 2014 | 1928-2012 | Historical Stock Returns - Bond Returns | Arithmetic | | | | 6.29% | |
| | | | | | Geometric | | | | 4.62% | |
| | Dimson, Marsh, Staunton | 2014 | 1900-2013 | Historical Stock Returns - Bond Returns | Arithmetic | | | | | |
| | | | | | Geometric | | | | 4.50% | |
| | Bate | 2008 | 1900-2007 | Historical Stock Returns - Bond Returns | Geometric | | | | 4.50% | |
| | Shiller | 2006 | 1926-2005 | Historical Stock Returns - Bond Returns | Arithmetic | | | | 7.00% | |
| | | | | | Geometric | | | | 5.50% | |
| | Siegel | 2005 | 1926-2005 | Historical Stock Returns - Bond Returns | Arithmetic | | | | 6.10% | |
| | | | | | Geometric | | | | 4.60% | |
| | Dimson, Marsh, and Staunton | 2006 | 1900-2005 | Historical Stock Returns - Bond Returns | Arithmetic | | | | 5.50% | |
| | Goyal & Welch | 2006 | 1872-2004 | Historical Stock Returns - Bond Returns | | | | | 4.77% | |
| | Median | | | | | | | | | 5.14% |
| **Ex Ante Models (Puzzle Research)** | | | | | | | | | | |
| | Claus Thomas | 2001 | 1985-1998 | Abnormal Earnings Model | | | | | 3.00% | |
| | Arnott and Bernstein | 2002 | 1810-2001 | Fundamentals - Div Yld + Growth | | | | | 2.40% | |
| | Constantinides | 2002 | 1872-2000 | Historical Returns & Fundamentals - P/D & P/E | | | | | 6.90% | |
| | Cornell | 1999 | 1926-1997 | Historical Returns & Fundamental GDP/Earnings | | 3.50% | 5.50% | 4.50% | 4.50% | |
| | Easton, Taylor, et al | 2002 | 1981-1998 | Residual Income Model | | | | | 5.30% | |
| | Fama French | 2002 | 1951-2000 | Fundamental DCF with EPS and DPS Growth | | 2.55% | 4.32% | | 3.44% | |
| | Harris & Marston | 2001 | 1982-1998 | Fundamental DCF with Analysts' EPS Growth | | | | | 7.14% | |
| | Best & Byrne | 2001 | | | | | | | | |
| | McKinsey | 2002 | 1962-2002 | Fundamental (P/E, D/P, & Earnings Growth) | | 3.50% | 4.00% | | 3.75% | |
| | Siegel | 2005 | 1802-2001 | Historical Earnings Yield | Geometric | | | | 2.50% | |
| | Grabowski | 2006 | 1926-2005 | Historical and Projected | | 3.50% | 6.00% | 4.75% | 4.75% | |
| | Maheu & McCurdy | 2006 | 1885-2003 | Historical Excess Returns, Structural Breaks, | | 4.02% | 5.10% | 4.56% | 4.56% | |
| | Bostock | 2004 | 1960-2002 | Bond Yields, Credit Risk, and Income Volatility | | 3.90% | 1.30% | 2.60% | 2.60% | |
| | Bakshi & Chen | 2005 | 1982-1998 | Fundamentals - Interest Rates | | | | | 7.31% | |
| | Donaldson, Kamstra, & Kramer | 2006 | 1952-2004 | Fundamental, Dividend yld., Returns,, & Volatility | | 3.00% | 4.00% | 3.50% | 3.50% | |
| | Campbell | 2008 | 1982-2007 | Historical & Projections (D/P & Earnings Growth) | | 4.10% | 5.40% | | 4.75% | |
| | Best & Byrne | 2001 | Projection | Fundamentals - Div Yld + Growth | | | | | 2.00% | |
| | Fernandez | 2007 | Projection | Required Equity Risk Premium | | | | | 4.00% | |
| | DeLong & Magin | 2008 | Projection | Earnings Yield - TIPS | | | | | 3.22% | |
| | Siegel - Rethink ERP | 2011 | Projection | Real Stock Returns and Components | | | | | 5.50% | |
| | American Appraisal Quarterly ERP | 2014 | Projection | Fundamental Economic and Market Factors | | | | | 6.00% | |
| | Duarte & Rosa - NY Fed | 2013 | projection | Projections from 29 Models | | | | | 5.40% | |
| | Duff & Phelps | 2014 | Projection | Normalized with 4.0% Long-Term Treasury Yield | | | | | 5.00% | |
| | Mschchowski - VL - 2014 | 2014 | Projection | Fundamentals - Expected Return Minus 10-Year Treasury Rate | | | | | 5.50% | |
| | Damodaran | 2014 | Projection | Fundamentals - Implied from FCF to Equity Model | | | | | 5.45% | |
| | **Social Security** | | | | | | | | | |
| | Office of Chief Actuary | | 1900-1995 | | | | | | | |
| | John Campbell | 2001 | 1860-2000 | Historical & Projections (D/P & Earnings Growth) | Arithmetic | 3.00% | 4.00% | 3.50% | 3.50% | |
| | | | Projected for 75 Years | | Geometric | 1.50% | 2.50% | 2.00% | 2.00% | |
| | Peter Diamond | 2001 | Projected for 75 Years | Fundamentals (D/P, GDP Growth) | | 3.00% | 4.80% | 3.90% | 3.90% | |
| | John Shoven | 2001 | Projected for 75 Years | Fundamentals (D/P, P/E, GDP Growth) | | 3.00% | 3.50% | 3.25% | 3.25% | |
| | Median | | | | | | | | | 4.25% |
| **Surveys** | | | | | | | | | | |
| | New York Fed | 2013 | Five-Year | Survey of Wall Street Firms | | | | | 5.20% | |
| | Survey of Financial Forecasters | 2014 | 10-Year Projection | About 50 Financial Forecastsers | | | | | 2.18% | |
| | Duke - CFO Magazine Survey | 2014 | 10-Year Projection | Approximately 350 CFOs | | | | | 4.10% | |
| | Welch - Academics | 2008 | 30-Year Projection | Random Academics | | 5.00% | 5.74% | 5.37% | 5.37% | |
| | Fernandez - Academics, Analysts, and Compan | 2014 | Long-Term | Survey of Academics, Analysts, and Companies | | | | | 5.00% | |
| | Median | | | | | | | | | 4.55% |
| **Building Block** | | | | | | | | | | |
| | Ibbotson and Chen | 2014 | Projection | Historical Supply Model (D/P & Earnings Growth) | Arithmetic | | | 6.12% | 5.10% | |
| | | | | | Geometric | | | 4.08% | | |
| | Chen - Rethink ERP | 2010 | 20-Year Projection | Combination Supply Model (Historic and Projection) | Geometric | | | | 4.00% | |
| | Ilmanen - Rethink ERP | 2010 | Projection | Current Supply Model (D/P & Earnings Growth) | Geometric | | | | 3.00% | |
| | Grinold, Kroner, Siegel - Rethink ERP | 2011 | Projection | Current Supply Model (D/P & Earnings Growth) | Arithmetic | | | 4.63% | 4.12% | |
| | | | | | Geometric | | | 3.60% | | |
| | Woolridge | | 2014 | Current Supply Model (D/P & Earnings Growth) | | | | | 4.30% | |
| | Median | | | | | | | | | 4.12% |
| **Mean** | | | | | | | | | | **4.51%** |

**Exhibit JRW-11**

**Artesian Water Company, Inc.**
**Capital Asset Pricing Model**
**Equity Risk Premium**

**Summary of 2010-14 Equity Risk Premium Studies**

| Category | Study Authors | Publication Date | Time Period Of Study | Methodology | Return Measure | Range Low | Range High | Midpoint of Range | Mean | Average |
|---|---|---|---|---|---|---|---|---|---|---|
| **Historical Risk Premium** | | | | | | | | | | |
| | Ibbotson | 2014 | 1926-2013 | Historical Stock Returns - Bond Returns | Arithmetic | | | | 6.20% | |
| | | | | | Geometric | | | | 4.60% | |
| | Damodaran | 2014 | 1928-2013 | Historical Stock Returns - Bond Returns | Arithmetic | | | | 6.29% | |
| | | | | | Geometric | | | | 4.62% | |
| | Dimson, Marsh, Staunton | 2014 | 1900-2013 | Historical Stock Returns - Bond Returns | Arithmetic | | | | | |
| | | | | | Geometric | | | | 4.50% | |
| | Median | | | | | | | | | 5.24% |
| **Ex Ante Models (Puzzle Research)** | | | | | | | | | | |
| | Siegel - Rethink ERP | 2011 | Projection | Real Stock Returns and Components | | | | | 5.50% | |
| | American Appraisal Quarterly ERP | 2014 | Projection | Fundamental Economic and Market Factors | | | | | 6.00% | |
| | Duarte & Rosa - NY Fed | 2013 | Projection | Projections from 29 Models | | | | | 5.40% | |
| | Duff & Phelps | 2014 | Projection | Normalized with 4.0% Long-Term Treasury Yield | | | | | 5.00% | |
| | Mschchowski - VL - 2014 | 2014 | Projection | Fundamentals - Expected Return Minus 10-Year Treasury Rate | | | | | 5.50% | |
| | Damodaran | 2014 | Projection | Fundamentals - Implied from FCF to Equity Model | | | | | 5.45% | |
| | Median | | | | | | | | | 5.48% |
| **Surveys** | | | | | | | | | | |
| | New York Fed | 2013 | Five-Year | Survey of Wall Street Firms | | | | | 5.20% | |
| | Survey of Financial Forecasters | 2014 | 10-Year Projection | About 50 Financial Forecastsers | | | | | 2.18% | |
| | Duke - CFO Magazine Survey | 2014 | 10-Year Projection | Approximately 350 CFOs | | | | | 4.10% | |
| | Fernandez - Academics, Analysts, and Companies | 2014 | Long-Term | Survey of Academics, Analysts, and Companies | | | | | 5.00% | |
| | Median | | | | | | | | | 4.55% |
| **Building Block** | | | | | | | | | | |
| | Ibbotson and Chen | 2014 | Projection | Historical Supply Model (D/P & Earnings Growth) | Arithmetic | | | 6.12% | 5.10% | |
| | | | | | Geometric | | | 4.08% | | |
| | Chen - Rethink ERP | 2010 | 20-Year Projection | Combination Supply Model (Historic and Projection) | Geometric | | | | 4.00% | |
| | Ilmanen - Rethink ERP | 2010 | Projection | Current Supply Model (D/P & Earnings Growth) | Geometric | | | | 3.00% | |
| | Grinold, Kroner, Siegel - Rethink ERP | 2011 | Projection | Current Supply Model (D/P & Earnings Growth) | Arithmetic | | | 4.63% | 4.12% | |
| | | | | | Geometric | | | 3.60% | | |
| | Woolridge | 2014 | Projection | Current Supply Model (D/P & Earnings Growth) | Geometric | | | | 4.30% | |
| | Median | | | | | | | | | 4.12% |
| **Mean** | | | | | | | | | | **4.85%** |

## Authorized ROEs for Publicly-Held Water Companies

| | Authorized ROE | Date |
|---|---|---|
| **American States Water** | **9.99%** | **Nov-11** |
| **American Water Works** | **9.62%** | |
| **Aqua America, Inc.** | **10.29%** | |
| **Artesian Resources Corp.** | **10.00%** | **Sep-09** |
| **California Water Service Group** | **9.99%** | **Nov-11** |
| **Connecticut Water Services, Inc.** | **9.75%** | **Jul-10** |
| **Middlesex Water Company** | **10.15%** | |
| **SJW Corp.** | **9.99%** | **Nov-11** |
| **York Water Company** | **NA** | |
| **Average** | **9.97%** | |

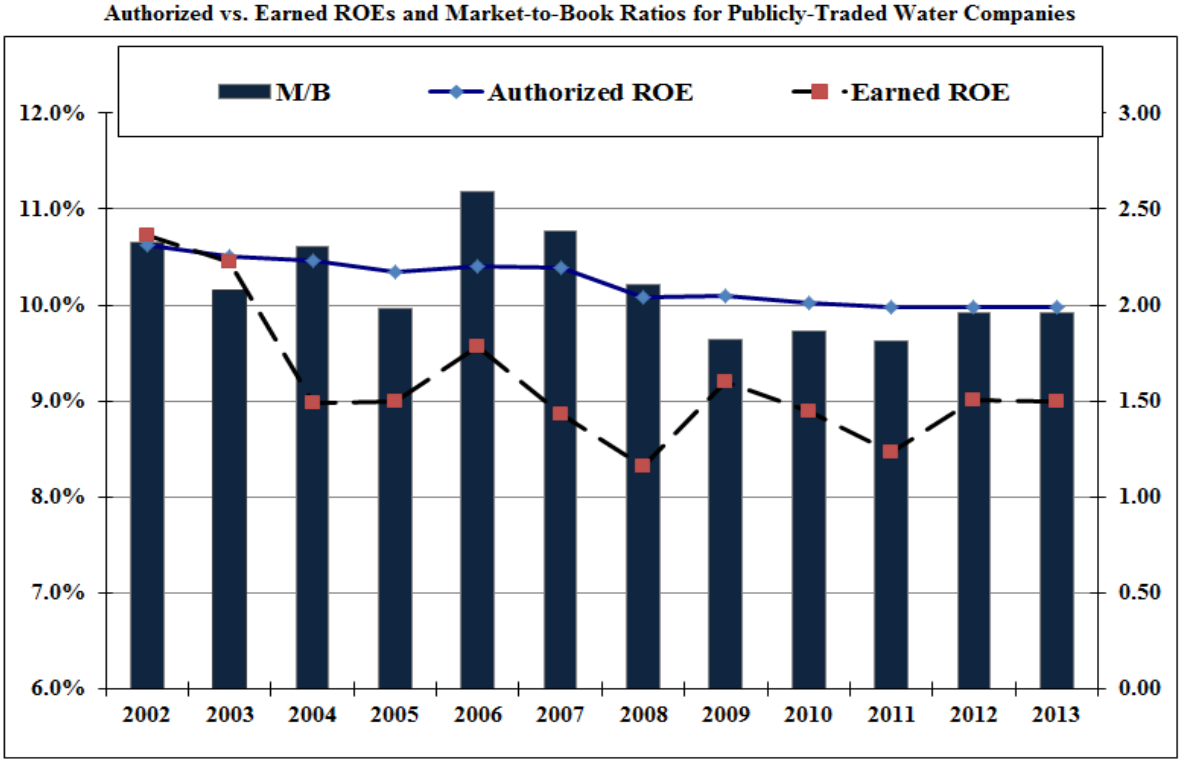
Data Source: *AUS Utility Reports, August, 2014.*

**Panel A**
**Authorized and Earned ROEs and M/B Ratios for Publicly-Held Water Companies**

| Year | Authorized ROE | Earned ROE | M/B |
|---|---|---|---|
| 2002 | 10.63% | 10.72% | 2.33 |
| 2003 | 10.50% | 10.44% | 2.07 |
| 2004 | 10.46% | 8.98% | 2.31 |
| 2005 | 10.35% | 9.00% | 1.98 |
| 2006 | 10.40% | 9.57% | 2.59 |
| 2007 | 10.39% | 8.86% | 2.39 |
| 2008 | 10.08% | 8.33% | 2.11 |
| 2009 | 10.09% | 9.20% | 1.82 |
| 2010 | 10.02% | 8.89% | 1.87 |
| 2011 | 9.98% | 8.47% | 1.82 |
| 2012 | 9.98% | 9.01% | 1.96 |
| 2013 | 9.97% | 9.00% | 1.96 |

* Median Values
Data Source: *AUS Utilities Report, Value Line Investment Survey*

**Panel B**
**Summary of Authorized ROEs and M/B Ratios for Publicly-Held Water Companies**




Data Source: *AUS Utilities Report, Value Line Investment Survey*

**Exhibit JRW-13**

**Artesian Water Company, Inc.**
**Company's Proposed Cost of Capital**

| Capital Source | Capitalization Ratio | Cost Rate | Weighted Cost Rate |
|---|---|---|---|
| Long-Term Debt | 49.46% | 5.84% | 2.89% |
| Common Equity | 50.54% | 10.90% | 5.51% |
| Total | 100.00% | | 8.40% |

**Panel A**
**Summary of Ms. Ahern's Equity Cost Rate Approaches and Results**

| Approach | Result |
|---|---|
| DCF | 8.58% |
| Risk Premium | 11.26% |
| CAPM | 9.92% |
| Market Models Applied to Non-Regulated Group | 10.98% |
| Indicated Equity Cost Rate Range | 10.45% |
| + Flotation Cost Adjustment | 0.20% |
| + Business Risk Premium | 0.25% |
| Indicated Adjusted Equity Cost Rate Range | 10.90% |
| Recommended Equity Cost Rate | 10.90% |

**Panel B**
**Summary of Ms. Ahern's DCF Results**

| | |
|---|---|
| Average Adjusted Dividend Yield | 3.10% |
| Growth* | 5.48% |
| DCF Result | 8.58% |

* Expected EPS Growth from *Value Line* , Reuters, Zacks, and Yahoo.

**Panel C**
**Summary of Ms. Ahern's Risk Premium Results**

**Summary of Ms. Ahern's Predictive Risk Premium Results**

| | |
|---|---|
| Risk-Free Rate | 4.40% |
| GARCH Coefficient | 0.46% |
| Risk Premium | 11.26% |
| Risk Premium Equity Cost Rate | 11.67% |

**Summary of Ms. Ahern's Adjusted Market Risk Premium Results**

| | |
|---|---|
| Projected Aaa Corporate Rate | 5.14% |
| Yield Differential | 0.16% |
| Prospective Bond Yield | 5.30% |
| + Credit Risk Premium | -0.04% |
| Risk Premium | 4.76% |
| Risk Premium Equity Cost Rate | 10.03% |

**Panel D**
**Summary of Ms. Ahern's CAPM Results**

| | |
|---|---|
| Risk-Free Rate | 4.40% |
| Beta | 0.68 |
| Market Risk Premium | 7.96% |
| CAPM Result | 9.57% |
| ECAPM Result | 10.27% |
| CAPM-ECAPM Equity Cost Rate | 9.92% |

**Panel E**
**Summary of Ms. Ahern's Market Models Applied to Non-Regulated Group**

| Approach | Result |
|---|---|
| DCF | 11.88% |
| Risk Premium | 10.79% |
| CAPM | 10.27% |
| Market Models Applied to Non-Regulated Group | 10.98% |

**Panel A**
**Historic GDP Growth Rates**

| | |
|---|---|
| **10-Year Average** | **3.9%** |
| **20-Year Average** | **4.6%** |
| **30-Year Average** | **5.2%** |
| **40-Year Average** | **6.4%** |
| **50-Year Average** | **6.8%** |

**Calculated from Page 1 of Exhibit JRW-14**

**Panel B**
**Projected GDP Growth Rates**

| | Time Frame | Projected Nominal GDP Growth Rate |
|---|---|---|
| **Congressional Budget Office** | **2014-2024** | **4.8%** |
| **Survey of Financial Forecasters** | **Ten Year** | **4.9%** |
| **Energy Information Administration** | **2011-2040** | **4.5%** |

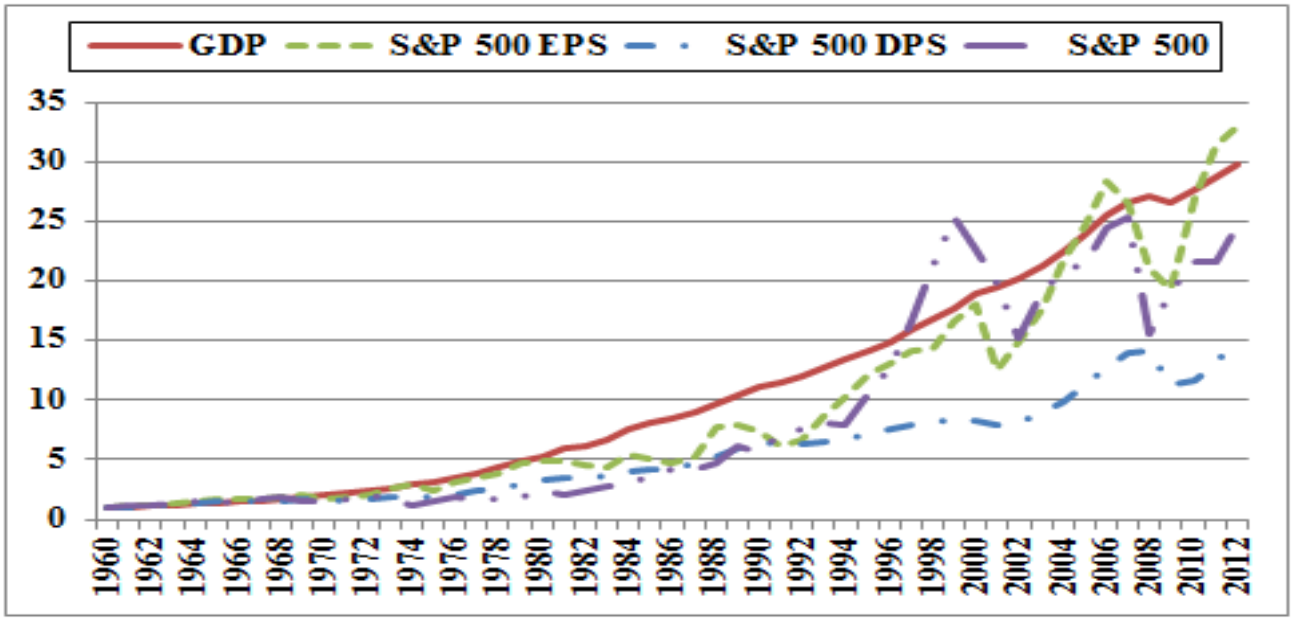
**Sources:**
http://www.cbo.gov/topics/budget/budget-and-economic-outlook
http://www.eia.gov/forecasts/aeo/tables_ref.cfm Table 20
http://www.philadelphiafed.org/research-and-data/real-time-center/survey-of-professional-forecasters/2014/survq114.cfm

**Growth Rates**
**GDP, S&P 500 Price, EPS, and DPS**

| | GDP | S&P 500 | Earnings | Dividends | |
|---|---|---|---|---|---|
| 1960 | 543.3 | 58.11 | 3.10 | 1.98 | |
| 1961 | 563.3 | 71.55 | 3.37 | 2.04 | |
| 1962 | 605.1 | 63.10 | 3.67 | 2.15 | |
| 1963 | 638.6 | 75.02 | 4.13 | 2.35 | |
| 1964 | 685.8 | 84.75 | 4.76 | 2.58 | |
| 1965 | 743.7 | 92.43 | 5.30 | 2.83 | |
| 1966 | 815.0 | 80.33 | 5.41 | 2.88 | |
| 1967 | 861.7 | 96.47 | 5.46 | 2.98 | |
| 1968 | 942.5 | 103.86 | 5.72 | 3.04 | |
| 1969 | 1019.9 | 92.06 | 6.10 | 3.24 | |
| 1970 | 1075.9 | 92.15 | 5.51 | 3.19 | |
| 1971 | 1167.8 | 102.09 | 5.57 | 3.16 | |
| 1972 | 1282.4 | 118.05 | 6.17 | 3.19 | |
| 1973 | 1428.5 | 97.55 | 7.96 | 3.61 | |
| 1974 | 1548.8 | 68.56 | 9.35 | 3.72 | |
| 1975 | 1688.9 | 90.19 | 7.71 | 3.73 | |
| 1976 | 1877.6 | 107.46 | 9.75 | 4.22 | |
| 1977 | 2086.0 | 95.10 | 10.87 | 4.86 | |
| 1978 | 2356.6 | 96.11 | 11.64 | 5.18 | |
| 1979 | 2632.1 | 107.94 | 14.55 | 5.97 | |
| 1980 | 2862.5 | 135.76 | 14.99 | 6.44 | |
| 1981 | 3210.9 | 122.55 | 15.18 | 6.83 | |
| 1982 | 3345.0 | 140.64 | 13.82 | 6.93 | |
| 1983 | 3638.1 | 164.93 | 13.29 | 7.12 | |
| 1984 | 4040.7 | 167.24 | 16.84 | 7.83 | |
| 1985 | 4346.7 | 211.28 | 15.68 | 8.20 | |
| 1986 | 4590.1 | 242.17 | 14.43 | 8.19 | |
| 1987 | 4870.2 | 247.08 | 16.04 | 9.17 | |
| 1988 | 5252.6 | 277.72 | 24.12 | 10.22 | |
| 1989 | 5657.7 | 353.40 | 24.32 | 11.73 | |
| 1990 | 5979.6 | 330.22 | 22.65 | 12.35 | |
| 1991 | 6174.0 | 417.09 | 19.30 | 12.97 | |
| 1992 | 6539.3 | 435.71 | 20.87 | 12.64 | |
| 1993 | 6878.7 | 466.45 | 26.90 | 12.69 | |
| 1994 | 7308.7 | 459.27 | 31.75 | 13.36 | |
| 1995 | 7664.0 | 615.93 | 37.70 | 14.17 | |
| 1996 | 8100.2 | 740.74 | 40.63 | 14.89 | |
| 1997 | 8608.5 | 970.43 | 44.09 | 15.52 | |
| 1998 | 9089.1 | 1229.23 | 44.27 | 16.20 | |
| 1999 | 9665.7 | 1469.25 | 51.68 | 16.71 | |
| 2000 | 10289.7 | 1320.28 | 56.13 | 16.27 | |
| 2001 | 10625.3 | 1148.09 | 38.85 | 15.74 | |
| 2002 | 10980.2 | 879.82 | 46.04 | 16.08 | |
| 2003 | 11512.2 | 1111.91 | 54.69 | 17.88 | |
| 2004 | 12277.0 | 1211.92 | 67.68 | 19.41 | |
| 2005 | 13095.4 | 1248.29 | 76.45 | 22.38 | |
| 2006 | 13857.9 | 1418.30 | 87.72 | 25.05 | |
| 2007 | 14480.3 | 1468.36 | 82.54 | 27.73 | |
| 2008 | 14720.3 | 903.25 | 65.39 | 28.05 | |
| 2009 | 14417.9 | 1115.10 | 59.65 | 22.31 | |
| 2010 | 14958.3 | 1257.64 | 83.66 | 23.12 | |
| 2011 | 15533.8 | 1257.60 | 97.05 | 26.02 | **Average** |
| 2012 | 16244.6 | 1426.19 | 102.47 | 30.44 | |
| 2013 | 16803.0 | 1848.36 | 107.45 | 36.28 | |
| **Growth Rates** | **6.69** | **6.75** | **6.92** | **5.64** | **6.50** |

Data Sources: GDPA -http://research.stlouisfed.org/fred2/series/GDPA/downloaddata
S&P 500, EPS and DPS - http://pages.stern.nyu.edu/~adamodar/

**Long-Term Growth of GDP, S&P 500, S&P 500 EPS, and S&P 500 DPS**




| | GDP | S&P 500 | S&P 500 EPS | S&P 500 DPS |
|---|---|---|---|---|
| Growth Rates | 6.69% | 6.75% | 6.92% | 5.64% |