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State Corporation Commission
of Kansas

BEFORE THE CORPORATION COMMISSION

OF THE STATE OF KANSAS

IN THE MATTER OF THE APPLICATION OF KANSAS GAS SERVICE, A DIVISION OF ONE GAS, INC. FOR ADJUSTMENT OF ITS NATURAL GAS RATES IN THE STATE OF KANSAS	**)**	**DOCKET NO. 18-KGSG-560-RTS**

DIRECT TESTIMONY AND EXHIBITS OF

DR. J. RANDALL WOOLRIDGE

RE: COST OF CAPITAL
AND
RATE OF RETURN

ON BEHALF OF

THE CITIZENS' UTILITY RATEPAYER BOARD

OCTOBER 29, 2018

Kansas Gas Service Company
Docket No. 18-KGSG-560-RTS

Direct Testimony of
Dr. J. Randall Woolridge

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

A. My name is J. Randall Woolridge, and 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 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 SCOPE AND PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. I have been asked by the Citizens' Utility Ratepayer Board ("CURB") to provide an opinion as to the overall fair rate of return or cost of capital for the regulated gas distribution services of Kansas Gas Services ("KGS") and to evaluate KGS's rate of return testimony in this proceeding.

Q. HOW IS YOUR TESTIMONY ORGANIZED?

A. First, I review my cost of equity recommendation for KGS and discuss the primary

areas of contention between KGS's rate of return position and my position. Second, I discuss the selection of a proxy group of gas distribution companies for estimating the market cost of equity for KGS. Third, I present my recommendations for the Company's capital structure and debt cost rates. Fourth, I provide an overview of the concept of the cost of equity capital and then estimate the equity cost rate for KGS. Finally, I critique the Company's rate of return analysis and testimony. I have attached three appendices. In Appendix A, I provide a summary of my educational and professional background. In Appendix B, I provide an assessment of capital costs in today's capital markets. And in Appendix C, I discuss the concept of the cost of equity capital.

A. Overview

Q. WHAT COMPRISES A UTILITY'S "RATE OF RETURN?"

A. A company's overall rate of return consists of three main categories: (1) capital structure (i.e., ratios of short-term debt, long-term debt, preferred stock and common equity); (2) cost rates for short-term debt, long-term debt, and preferred stock; and (3) common equity cost, otherwise known as ROE.

Q. WHAT IS A UTILITY'S ROE INTENDED TO REFLECT?

A. An ROE is most simply described as the allowed rate of profit for a regulated company. In a competitive market, a company's profit level is determined by a variety of factors, including the state of the economy, the degree of

competition a company faces, the ease of entry into its markets, the existence of substitute or complementary products/services, the company's cost structure, the impact of technological changes, and the supply and demand for its services and/or products. For a regulated monopoly, the regulator determines the level of profit available to the utility. The United States Supreme Court established the guiding principles for establishing an appropriate level of profitability for regulated public utilities in two cases: (1) *Bluefield*[1] and (2) *Hope*.[2] In those cases, the Court recognized that the fair rate of return on equity should be: (1) comparable to returns investors expect to earn on investments with similar risk; (2) sufficient to assure confidence in the company's financial integrity; and (3) adequate to maintain the company's credit and to attract capital.

Thus, the appropriate ROE for a regulated utility requires determining the market-based cost of capital. The market-based cost of capital for a regulated firm represents the return investors could expect from other investments, while assuming no more and no less risk. The purpose of all of the economic models and formulas in cost of capital testimony (including those presented later in my testimony) is to estimate, using the market data of similar-risk firms, the rate of return equity investors require for that risk-class of firms in order to set an appropriate ROE for a regulated firm.

[1] *Bluefield Water Works and Improvement Co. v. Public Service Commission of West Virginia*, 262 U.S. 679, 43 S. Ct. 675, 67 L. Ed. 1176 (1923) ("Bluefield").
[2] *Federal Power Commission v. Hope Natural Gas Co*., 320 U.S. 591, 64 S. Ct. 281, 88 L. Ed. 333 (1944) ("Hope").

B. Summary of Positions

Q. PLEASE REVIEW THE COMPANY'S PROPOSED RATE OF RETURN.

A. KGS proposes a capital structure consisting of 37.22% long-term debt and 62.78% common equity. KGS has proposed a long-term debt cost rate of 3.9354%. Mr. Bruce Fairchild has recommended a common equity cost rate, or ROE, of 10.0% for KGS. The Company's overall rate of return recommendation is 7.743%.

Q. PLEASE REVIEW YOUR RECOMMENDATIONS REGARDING THE APPROPRIATE MARKET-BASED RATE OF RETURN FOR KGS.

A. My rate of return recommendation is provided in Exhibit JRW-1.

I show that the Company's proposed capital structure includes a higher common equity ratio and lower financial risk than other gas distribution companies. Therefore, I have imputed a capital structure consisting of 45.0% debt and 55.0% common equity. I have employed the Company's proposed long-term debt cost rate.

To determine an appropriate ROE for KGS, I have applied the Discounted Cash Flow ("DCF") model and the Capital Asset Pricing Model ("CAPM") to a proxy group of publicly-held gas distribution companies ("Gas Proxy Group"). My analyses indicate a market-determined cost of equity capital in the range of 7.70% to 9.05%. Given that I give primary weight to the DCF approach, and the recent increase in interest rates, I am using an equity cost rate

of 9.0% for the Company. Using my capital structure and debt and equity cost rates, my overall rate of return recommendation is 7.00%.

C. Rate of Return Issues

Q. WHAT ARE THE PRIMARY AREAS OF DISAGREEMENT IN ESTIMATING THE RATE OF RETURN OR COST OF CAPITAL IN THIS PROCEEDING?

A. The primary areas of disagreement are: (1) our opposing views regarding the state of the markets and capital costs; (2) the Company's proposed capital structure; (3) Mr. Fairchild has employed a overstated growth rate in his DCF analysis; (4) the base interest rate and market or equity risk premium in Mr. Fairchild's Risk Premium ("RP") model and CAPM approaches; (5) Mr. Fairchild's non-traditional equity cost rate approach – the Comparable Earnings approach; and (6) Mr. Fairchild's equity cost rate adjustment for company size.

Q. PLEASE INITIALLY REVIEW THE DIFFERENCES IN OPINION REGARDING THE CURRENT STATE OF THE CAPITAL MARKETS AND CAPITAL COSTS.

A. Mr. Fairchild and I have different opinions regarding capital market conditions. Mr. Fairchild's analyses and ROE results and recommendations reflect the assumption of higher interest rates and capital costs. In Appendix B, I review current market conditions and conclude that, despite the recent upturn in interest

rates, capital costs are at historically low levels and are likely to remain low for some time. On this issue, I show that economists' forecasts of higher interest rates and capital costs, which are used by Mr. Fairchild, have been consistently wrong for a decade.

Q. PLEASE REVIEW THE FEDERAL RESERVE'S DECISIONS TO RAISE THE FEDERAL FUNDS RATE IN RECENT YEARS.

A. On December 16, 2015, the Federal Reserve increased its target rate for federal funds from 0.25 to 0.50 percent.[3] This increase came after the rate was kept in the 0.00 to 0.25 percent range for over five years in order to spur economic growth in the wake of the financial crisis associated with the Great Recession. As the economy has improved, with lower unemployment, steady but slow GDP growth, improving consumer confidence, and a better housing market, the Federal Reserve has increased the target federal funds rate on six additional occasions: December 2016, March, June and December of 2017, and March, June, and September of 2018.

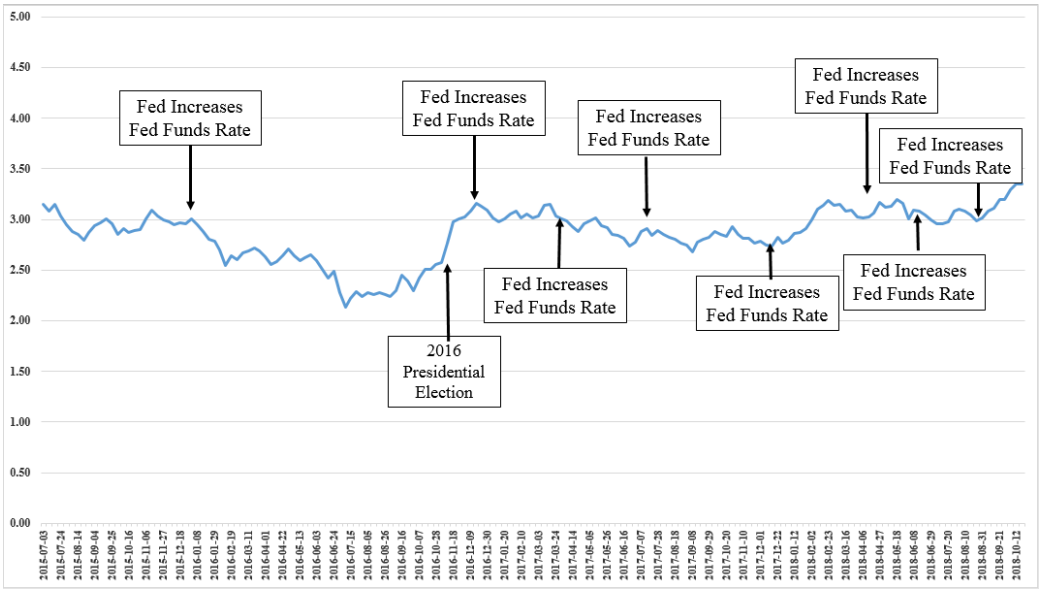
Q. HOW HAVE LONG-TERM RATES RESPONDED TO THE ACTIONS OF THE FEDERAL RESERVE?

A. Figure 1 shows the yield on 30-year Treasury bonds over the 2015-2018 time period. I have highlighted the dates in which the Federal Reserve increased the

[3] The federal funds rate is set by the Federal Reserve and is the borrowing rate applicable to the most creditworthy financial institutions when they borrow and lend funds overnight to each other.

federal funds rate. The 30-year Treasury yield bottomed out in the summer of 2016 and subsequently increased with improvements in the economy. Then came November 8, 2016, and financial markets moved significantly in the wake of the results in the U.S. presidential election. The stock market gained more than 10% and the 30-year Treasury yield increased about 50 basis points to 3.2% by year-end 2016. Over the past two years, even as the Federal Reserve has increased the federal funds rate, the yield on thirty-year bonds has remained in the 2.8% to 3.3% range.

Figure 1
Thirty-Year Treasury Yield and Federal Reserve Fed Funds Rate Increases 2015-2018

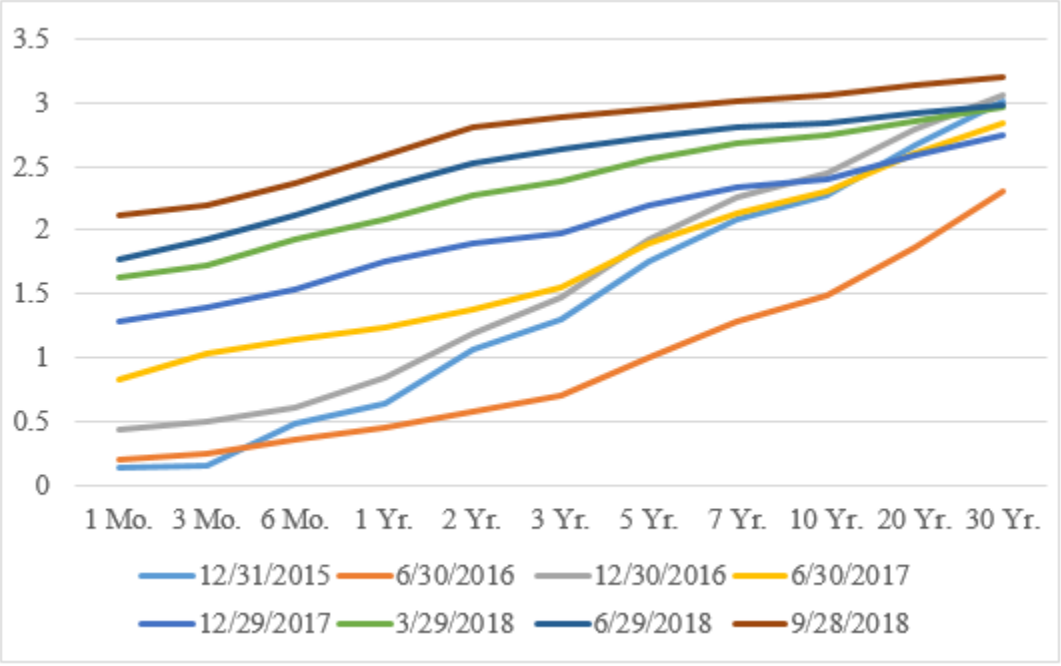


Q. WHY HAVE LONG-TERM TREASURY YIELDS REMAINED IN THE 3.0% RANGE DESPITE THE FEDERAL RESERVE INCREASING SHORT-TERM RATES?

A. Whereas the Federal Reserve can directly affect short-term rates by adjusting to the federal funds rate, long-term rates are primarily driven by expected

economic growth and inflation. The relationship between short- and long-term rates is normally evaluated using the yield curve. The yield curve depicts the relationship between the yield-to-maturity and the time-to-maturity for U.S. Treasury bills, notes, and bonds. Figure 2 shows the yield curve on a semi-annual basis since the Federal Reserve started increasing the federal funds rate at the end of 2015. It shows that, with the exception of mid-year 2016 when interest rates dipped to very low levels, the thirty-year Treasury yield has remained in the 2.8%-3.3% range despite the fact that short-term rates have increased from near 0.0% to about 2.00%. As such, long-term interest rates and capital costs have not increased in any meaningful way even with the Federal Reserve's actions and the increase in short-term rates.

Figure 2
Semi-Annual Yield Curves
2015-2018



Q. WHAT DO YOU RECOMMEND THE COMMISSION DO REGARDING THE FORECASTS OF HIGHER INTEREST RATES AND CAPITAL COSTS?

A. I suggest that the Commission set an equity cost rate based on current market cost rate indicators and not speculate on the future direction of interest rates. As the studies cited in Appendix B indicate, economists always predict that interest rates are going up, yet they are almost always wrong. Obviously, investors are well aware of the consistently wrong forecasts of higher interest rates, and therefore place little weight on such forecasts. Investors would not be buying long-term Treasury bonds or utility stocks at their current yields if they expected interest rates to suddenly increase, thereby producing higher yields and negative returns. For example, consider a utility that pays a dividend of $2.00 with a stock price of $50.00. The current dividend yield is 4.0%. If, as Mr. Fairchild suggests, interest rates and required utility yields increase, the price of the utility stock would decline. In the example above, if higher return requirements led the dividend yield to increase from 4.0% to 5.0% in the next year, the stock price would have to decline to $40, which would be a -20% return on the stock. Obviously, investors would not buy the utility stock with an expected return of -20% due to higher dividend yield requirements.

In sum, it is practically impossible to accurately forecast rates and prices of investments that are determined in financial markets, such as interest rates and prices for stocks and commodities. For interest rates, I have never seen a study that suggests one forecasting service is consistently better than others or that

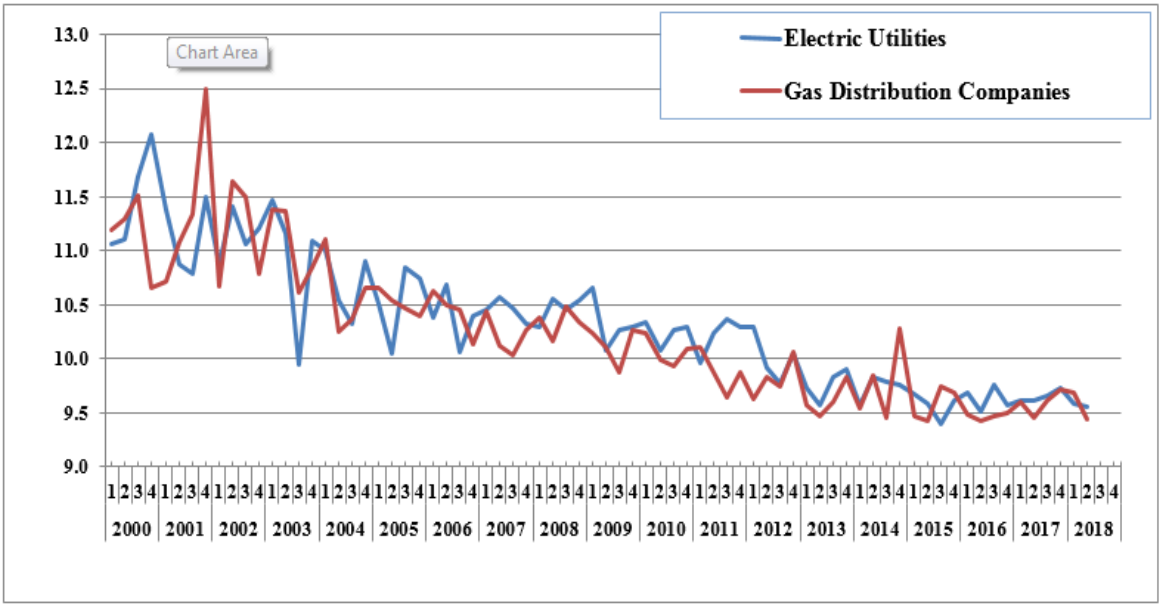
interest rate forecasts are consistently better than just assuming the current interest rate will be the rate in the future. As discussed above, investors would not be buying long-term Treasury bonds or utility stocks at their current yields if they expected interest rates to suddenly increase, thereby producing higher yields and negative returns.

Q. PLEASE DISCUSS THE TREND IN AUTHORIZED ROES FOR ELECTRIC AND GAS COMPANIES.

A. Over the past five years, a period during which we have witnessed historically low interest rates, authorized ROEs for electric utility and gas distribution companies have slowly declined to reflect the low capital cost environment. In Figure 3, I have graphed the quarterly authorized ROEs for electric and gas companies from 2000 to 2017. There is a clear downward trend in the data. The authorized ROEs for gas distribution companies have declined from 9.94% in 2012, to 9.68% in 2013, 9.78% in 2014, 9.60% in 2015, 9.50% in 2016, 9.63% in 2017, and 9.62% in the first three quarters of 2018.[4]

[4] *Id*.

Figure 3
Authorized ROEs for Electric Utility and Gas Distribution Companies
2000-2018



Q. HAVE YOU USED THE COMPANY'S PROPOSED CAPITAL STRUCTURE?

A. No. The Company's proposed capital structure includes a higher common equity ratio and lower financial risk than other gas distribution companies. Therefore, I have used a capital structure consisting of 45.0% debt and 55.0% common equity. A capital structure with a common equity ratio is more in line with the capitalizations of other gas distribution companies as well as the capital structures authorized for gas distribution companies by state regulatory commissions.

Q. BEYOND THE DIFFERENCES IN OPINION REGARDING CAPITAL MARKET CONDITIONS, WHAT ARE THE PRIMARY ISSUES WITH RESPECT TO MEASURING THE COST OF EQUITY CAPITAL IN THIS PROCEEDING?

A. In my opinion, there are errors in Mr. Fairchild's equity cost rate models, including his DCF, CAPM, and RP approaches, which result in an overstated ROE for KGS. In addition, Mr. Fairchild has used a non-traditional method – his Comparable Earnings ("CE") – which is erroneous and does not provide an appropriate equity cost rate for KGS.

Q. WHAT ARE THE DIFFERENCES BETWEEN YOUR DCF MODEL AND MR. FAIRCHILD'S DCF MODEL?

A. Mr. Fairchild has employed the traditional constant-growth DCF model. Mr. Fairchild reports a DCF equity cost rate range of 8.50% to 9.50%. There are two primary errors in Mr. Fairchild's DCF analyses. First, Mr. Fairchild's DCF growth rate range of 6.25% to 7.25% is overstated, in part because he has subjectively eliminated low-end DCF growth rates. Second, even with those eliminations and low growth rate range, he has given his DCF results very little weight in arriving at his 10.0% ROE recommendation.

I have also used a traditional constant-growth DCF model. In developing a growth rate for my DCF model, I have reviewed thirteen growth rate measures including historic and projected growth rate measures and have evaluated

growth in dividends, book value, and earnings per share. I give primary weight to analysts' projected earnings per share ("EPS") growth rates.

Q. PLEASE DISCUSS THE DIFFERENCES BETWEEN YOUR APPLICATION OF THE CAPM AND THAT OF MR. FAIRCHILD.

A. The CAPM approach requires an estimate of the risk-free interest rate, beta, and the market or equity risk premium. The major area of disagreement involves the measurement and magnitude of the market or equity risk premium. Mr. Fairchild uses a historic risk premium of 7.10% and a projected market risk premium of 9.60%. Mr. Fairchild's market risk premium estimates are excessive and do not reflect current market fundamentals. As I discuss in my testimony, there are a number of empirical issues with using historical stock and bond returns to estimate an expected market risk premium. Mr. Fairchild's projected equity risk premium uses analysts' EPS growth rate projections to compute an expected market return and market risk premium. These EPS growth rate projections and the resulting expected market returns and risk premiums include unrealistic assumptions regarding future economic and earnings growth and stock returns. Mr. Fairchild has also employed a size premium in his CAPM equity cost rate.

As I highlight in my testimony, there are three procedures for estimating a market or equity risk premium – historic returns, surveys, and expected return models. In my CAPM, I have used an equity risk premium of 5.5%, which: (1) factors in all three approaches to estimating an equity premium; and (2)

employs the results of many studies of the equity risk premium. As I note, my market risk premium reflects the market risk premiums: (1) determined in recent academic studies by leading finance scholars; (2) employed by leading investment banks and management consulting firms; and (3) found in surveys of companies, financial forecasters, financial analysts, and corporate CFOs.

Q. WHAT ARE THE ERRORS WITH MR. FAIRCHILD'S RP MODEL?

A. Mr. Fairchild also uses an RP model to support his DCF and CAPM analyses. His risk premium is based on the historical relationship between the long-term utility yields and authorized ROEs for gas distribution companies. There are several problems with this approach. First and foremost, this approach is a gauge of commission behavior and not investor behavior. Capital costs are determined in the market place through the financial decisions of investors and are reflected in such fundamental factors as dividend yields, expected growth rates, interest rates, and investors' assessment of the risk and expected return of different investments. Regulatory commissions evaluate capital market data in setting authorized ROEs, but also take into account other utility- and rate case-specific information. As such, Mr. Fairchild's RP approach and results reflect other factors used by utility commissions in authorizing ROEs in addition to capital costs. This may especially be true when the authorized ROE data includes the results of rate cases that are settled and not fully litigated. Second, the methodology produces an inflated measure of the risk premium because the approach uses historic authorized ROEs and utility yields, and the resulting risk

premium is applied to projected bond yields. Finally, the risk premium is inflated as a measure of an investor's required risk premium since gas distribution companies have been selling at market-to-book ratios in excess of 1.0. This indicates that the authorized rates of return have been greater than the return that investors require. In other words, customers have been paying too much for too long.

Q. PLEASE ADDRESS MR. FAIRCHILD'S CE APPROACH?

A. Mr. Fairchild has also used a CE approach in which he averages *Value Line*'s projected ROE for his proxy gas companies. I show that this approach, which is not market-based, does not provide a reliable estimate of KGS' cost of equity capital.

Q. PLEASE SUMMARIZE THE PRIMARY DIFFERENCES IN POSITIONS REGARDING THE COMPANY'S COST OF CAPITAL.

A. The most significant areas of disagreement in measuring KGS's cost of capital are:

1. The Company's proposed capital structure has more equity and less financial risk than other gas companies. As a result, I have used a capital structure consisting of 45% long-term debt and 55% common equity;

2. Mr. Fairchild assessment of capital market conditions is flawed. In providing guidance on capital costs and in estimating KGS's ROE, he has relied upon economists' interest rate forecasts. Despite dire and unfounded predictions of

rising interest rates over the past decade, long-term interest rates and capital costs are still at historically low levels;

3. Mr. Fairchild's DCF equity cost rate estimates are biased and are not reflected in his 10.0% ROE recommendation. In particular, his DCF growth rate range of 6.25% to 7.25% is overstated; and (2) even despite these eliminations and his overstated growth rate range, he has given his DCF results very little weight in arriving at his 10.0% ROE recommendation;

4. The historic and projected market or equity risk premiums in Mr. Fairchild's CAPM approach are not empirically sound and are not reflective of current market conditions and prospective earnings and economic growth; and

5. Mr. Fairchild's CE approach does not provide market-based estimate of KGS' cost on common equity capital.

II. GAS PROXY GROUP SELECTION

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

A. To develop a fair rate of return recommendation for the Company (market cost of equity), I have evaluated the return requirements of investors on the common stock of a proxy group of publicly-held gas distribution companies.

Q. PLEASE DESCRIBE YOUR PROXY GROUP OF GAS DISTRIBUTION COMPANIES.

A. I am using the proxy group of eight gas distribution companies developed by Mr. Fairchild. This Gas Proxy Group consists of nine natural gas distribution companies. The companies are Atmos Energy, Chesapeake Utilities, Inc. New Jersey Resources, Northwest Natural Gas Company, One Gas, Inc., South Jersey Industries, Southwest Gas, and Spire, Inc.

Summary financial statistics for the Gas Proxy Group are listed on page 1 of Exhibit JRW-4. The median operating revenues and net plant among members of the Gas Proxy Group are $1,640.2 million and $3,182.7 million, respectively. On average, the group receives 69 percent of revenues from regulated gas operations, has an "A-" average issuer credit rating from S&P, a median common equity ratio of 47.1%, and a median earned return on common equity of 9.7%.

Q. HOW DOES THE INVESTMENT RISK KGS COMPARE TO THE GAS PROXY GROUP?

A. I believe that credit ratings provide a good assessment of investment risk. KGS' parent, One Gas, has a S&P long-term credit rating of A. The average for the Gas Proxy Group, is A-. Therefore, I believe that the investment risk of KGS is slightly below that of the Gas Proxy Group.

Q. PLEASE DISCUSS THE INVESTMENT RISK OF THE GAS PROXY GROUP AS MEASURED BY THE RISK METRICS PUBLISHED BY *VALUE LINE*?

A. On page 2 of Exhibit JRW-4, I show the riskiness of the Gas Proxy Group using five different risk measures from *Value Line*. These measures include Beta, Financial Strength, Safety, Earnings Predictability, and Stock Price Stability.[5] The comparisons of the risk measures include Beta (0.68), Financial Strength (A), Safety (1.8), Earnings Predictability (69), and Stock Price Stability (87). In my opinion, these risk measures indicate that the group's investment risk is relatively low.

III. CAPITAL STRUCTURE RATIOS AND DEBT COST RATES

Q. PLEASE DESCRIBE KGS'S PROPOSED CAPITAL STRUCTURE AND SENIOR CAPITAL COST RATES.

A. KGS has proposed a capital structure consisting of 37.22% long-term debt and 62.78% common equity and a long-term debt cost rate of 3.9354%.

Q. HOW DO KGS'S PROPOSED CAPITAL STRUCTURE RATIOS COMPARE TO THE AVERAGE CAPITALIZATION RATIOS FOR COMPANIES IN THE GAS PROXY GROUP?

[5] These metrics are defined on page 3 of Exhibit JRW-4.

A. KGS's proposed capital structure ratios include a common equity ratio of 62.78% and which excludes short-term debt. As shown in Panel B of Exhibit JRW-5, the average common equity ratio for the Gas Proxy Group (excepting One Gas) for the four quarters ending June 30, 2018 and including short-term debt is 49.46%. As shown in Panel C of Exhibit JRW-5, the comparable average common equity ratio for One Gas for the four quarters ending June 30, 2018, and including short-term debt, is 57.91%. As such, One Gas uses much more common equity in financing its gas operations than the average of the Gas Proxy Group. In fact, One Gas' average common equity ratio is the highest of any of the proxy group companies.

Q. PLEASE DISCUSS THE SIGNIFICANCE OF THE AMOUNT OF EQUITY THAT IS INCLUDED IN A UTILITY'S CAPITAL STRUCTURE.

A. A utility's decision as to the amount of equity capital it will incorporate into its capital structure involves fundamental trade-offs relating to the amount of financial risk the firm carries, the overall revenue requirements its customers are required to bear through the rates they pay, and the return on equity that investors will require.

Q. PLEASE DISCUSS A UTILITY'S DECISION TO USE DEBT VERSUS EQUITY TO MEET ITS CAPITAL NEEDS.

A. Utilities satisfy their capital needs through a mix of equity and debt. Because

equity capital is more expensive than debt, the issuance of debt enables a utility to raise more capital for a given commitment of dollars than it could raise with just equity. Debt is, therefore, a means of "leveraging" capital dollars. However, as the amount of debt in the capital structure increases, financial risk increases and the risk of the utility, as perceived by equity investors also increases. Significantly for this case, the converse is also true. As the amount of debt in the capital structure decreases, the financial risk decreases. The required return on equity capital is a function of the amount of overall risk that investors perceive, including financial risk in the form of debt.

Q. WHY IS THIS RELATIONSHIP IMPORTANT TO THE UTILITY'S CUSTOMERS?

A. Just as there is a direct correlation between the utility's authorized return on equity and the utility's revenue requirements (the higher the return, the greater the revenue requirement), there is a direct correlation between the amount of equity in the capital structure and the revenue requirements that customers are called on to bear. Again, equity capital is more expensive than debt. Not only does equity command a higher cost rate, it also adds more to the income tax burden that ratepayers are required to pay through rates. As the equity ratio increases, the utility's revenue requirements increase and the rates paid by customers increase. If the proportion of equity is too high, rates will be higher than they need to be. For this reason, the utility's management should pursue a capital acquisition strategy that results in the proper balance in the capital

structure.

Q. HOW HAVE UTILITIES TYPICALLY STRUCK THIS BALANCE?

A. Due to regulation and the essential nature of its output, a regulated utility is exposed to less business risk than other companies that are not regulated. This means that a utility can reasonably carry relatively more debt in its capital structure than can most unregulated companies. Thus, a utility should take appropriate advantage of its lower business risk to employ cheaper debt capital at a level that will benefit its customers through lower revenue requirements.

Q. GIVEN THAT KGS HAS PROPOSED AN EQUITY RATIO THAT IS HIGHER THAN THAT OF THE GAS PROXY GROUP, WHAT SHOULD THE AUTHORITY DO IN THIS RATEMAKING PROCEEDING?

A. When a regulated utility's actual capital structure contains a high equity ratio, the options are: (1) to impute a more reasonable capital structure and to reflect the imputed capital structure in revenue requirements; or (2) to recognize the downward impact that an unusually high equity ratio will have on the financial risk of a utility and authorize a lower common equity cost rate.

Q. PLEASE ELABORATE ON THIS "DOWNWARD IMPACT."

A. As I stated earlier, there is a direct correlation between the amount of debt in a utility's capital structure and the financial risk that an equity investor will

associate with that utility. A relatively lower proportion of debt translates into a lower required return on equity, all other things being equal. Stated differently, a utility cannot expect to "have it both ways." Specifically, a utility cannot maintain an unusually high equity ratio and not expect to have the resulting lower risk reflected in its authorized return on equity. The fundamental relationship between lower risk and the appropriate authorized return should not be ignored.

Q. HOW DO YOU PLAN TO ACCOUNT FOR THE DIFFERENCE IN THE CAPITAL STRUCTURE?

A. I am using a capital structure with an imputed common equity ratio of 55.0%. In other words, as shown in Panel D of Exhibit JRW-5, I lower the common equity ratio from 62.78% to 55.00%, and I make a proportional increase in the ratios for long-term debt to represent 45.00% to total capital.

Q. IS YOUR PROPOSED CAPITAL STRUCTURE MORE REFLECTIVE OF THE CAPITAL STRUCTURES APPROVED BY STATE REGULATORY COMMISSIONS FOR GAS DISTRIBUTION COMPANIES?

A. Yes. According to Regulatory Research Associates, the average authorized common equity ratio for gas distribution companies in calendar year 2017 was 49.88% and for the first three quarters of 2018 was 49.61%.[6]

Q. WHAT SENIOR CAPITAL COST RATES ARE YOU USING FOR KGS?

A. I am using the Company's proposed cost rate for long-term debt.

IV. THE COST OF COMMON EQUITY CAPITAL

A. Discounted Cash Flow Analysis

Q. PLEASE 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

[6] *Regulatory Focus*, Regulatory Research Associates, (January and October, 2018).

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:

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

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, Page 1 of 2. This model presumes that a company's dividend payout initially progresses through a growth stage, then proceeds through a transition stage, and finally assumes a maturity (or 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 an abnormally high growth in earnings per share. Because of highly profitable expected investment opportunities, the

payout ratio is low. Competitors are attracted by 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 ROEs. At that time, its earnings growth rate, payout ratio, and ROE 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:

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

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 VERSION OF THE DCF MODEL APPROPRIATE FOR PUBLIC UTILITIES?

A. Yes. The economics of the public utility business indicate that the industry is in the maturity 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 appropriate DCF valuation procedure for companies in the maturity 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 equity cost rates entails 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 the expected growth rate). The dividend yield can be precisely measured at any point in time; however, it 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. WHAT DIVIDEND YIELDS HAVE YOU REVIEWED?

A. I have calculated the dividend yields for the companies in the Gas Proxy Group using the current annual dividend and 30-day, 90-day, and 180-day average stock prices. These dividend yields are provided in page 2 of Exhibit JRW-10. For the Gas Proxy Group, the median dividend yields using the 30-day, 90-day, and 180-day average stock prices range from 2.5% to 2.8. As a result, I am using the 2.7% as the dividend yield 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.[7]

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 that is computed based upon presumed growth over the coming quarter as opposed to the coming year 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 DO YOU USE FOR YOUR DIVIDEND YIELD?

A. I adjust the dividend yield by one-half (1/2) of the expected growth so as to reflect growth over the coming year. The DCF equity cost rate ("K") is computed as:

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

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

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

A. There is 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 to assess long-term potential.

Q. WHAT GROWTH DATA HAVE YOU REVIEWED FOR THE GAS PROXY GROUP?

A. I have analyzed a number of measures of growth for companies in the Gas Proxy Group. 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 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. In some cases, past growth may not reflect future growth potential. Also, 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). However, 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-term 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 PROVIDE 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 identity of the analysts who actually 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 forecast 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 EPS forecasts from Thompson Reuters, but with more detail. Zacks (www.zacks.com) publishes its summary forecasts on its website. Zacks 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 Atmos Energy Corp. (stock symbol "ATO"). The figures are provided on page 2 of Exhibit JRW-9. Line one shows six analysts' EPS estimates for the quarter ending September 30, 2019. The mean, high, and low estimates are $0.35, $0.38, and $0.30, respectively. The second line shows three analysts' quarterly EPS estimates for the quarter ending March 31, 2019 of $1.70 (mean), $1.78 (high), and $1.60 (low). Line three shows seven analysts' annual EPS estimates for the fiscal year ending December 2018: $3.95 (mean), $4.05 (high), and $3.90 (low). Line four shows eight analysts' annual EPS estimates for the fiscal year ending September 30, 2019: $4.26 (mean), $4.32 (high), and $4.17 (low). The quarterly and annual EPS forecasts in lines one through four are expressed in dollars and cents. As in the ATO 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 ATO, two analysts have provided a long-term EPS growth rate forecast, with mean, high, and low growth rates of 6.95%, 7.90%, and 6.00%, 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 DO YOU NOT RELY EXCLUSIVELY ON THE EPS FORECASTS OF WALL STREET ANALYSTS IN ARRIVING AT A DCF GROWTH RATE FOR THE GAS PROXY GROUP?

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, dividends 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 2011 study by Lacina, Lee, and Xu has shown that analysts' long-term earnings growth rate forecasts are not more accurate at forecasting future earnings than naïve random walk forecasts of future earnings.[8] Employing data over a 20 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.

[8] 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.

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.[9] Hence, using these growth rates as a DCF growth rate will provide an overstated equity cost rate. On this issue, a study by Easton and Sommers (2007) found that optimism in analysts' growth rate forecasts leads to an upward bias in estimates of the cost of equity capital of almost 3.0 percentage points.[10]

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 stock prices therefore 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

[9]The studies that demonstrate analysts' long-term EPS forecasts are overly-optimistic and upwardly biased include: 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); 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); K. Chan, L., Karceski, J., & Lakonishok, J., "The Level and Persistence of Growth Rates," *Journal of Finance* pp. 643−684, (2003); 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; and Marc H. Goedhart, Rishi Raj, and Abhishek Saxena, "Equity Analysts, Still Too Bullish," *McKinsey on Finance*, pp. 14-17, (Spring 2010).

[10] 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).

yield and expected growth rate. Because 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 GAS PROXY GROUP, AS PROVIDED BY *VALUE LINE*.

A. Page 3 of Exhibit JRW-10 provides the 5- and 10-year historical growth rates for EPS, DPS, and BVPS for the companies in the Gas Proxy Group, as published in the *Value Line Investment Survey*. The median historical growth measures for EPS, DPS, and BVPS for the Gas Proxy Group, as provided in Panel A, range from 4.5% to 8.0%, with an average of the medians of 6.0%.

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

A. *Value Line's* projections of EPS, DPS, and BVPS growth for the companies in the Gas Proxy Group are shown on page 4 of Exhibit JRW-10. As stated above, due to the presence of outliers, the medians are used in the analysis. For the Gas Proxy Group, as shown in Panel A of page 4 of Exhibit JRW-10, the medians range from 5.3% to 9.3%, with an average of the medians of 6.9%.

Also provided on page 4 of Exhibit JRW-10 are the prospective sustainable growth rates for the companies in the Gas Proxy Group as measured by *Value Line*'s average projected return on shareholders' equity and retention rate. As noted above, sustainable growth is a significant and a primary driver

of long-run earnings growth. For the Gas Proxy Group, the median prospective sustainable growth rate is 5.2%.

Q. PLEASE ASSESS GROWTH FOR THE GAS PROXY GROUP 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 Gas Proxy Group. These forecasts are provided for the companies in the Gas Proxy Group on page 5 of Exhibit JRW-10. I have reported both the mean and median growth rates for the group. 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 for each company. The mean/median of analysts' projected EPS growth rates for the gas group 6.2% and 5.8%, respectively.[11]

Q. PLEASE SUMMARIZE YOUR ANALYSIS OF THE HISTORICAL AND PROSPECTIVE GROWTH OF THE GAS PROXY GROUP.

A. Page 6 of Exhibit JRW-10 shows the summary DCF growth rate indicators for the Gas Proxy Group.

[11] Given the variation in the measures of central tendency of analysts' projected EPS growth rates for the proxy group, I have considered both the means and medians figures in the growth rate analysis.

The historical growth rate indicators for the Gas Proxy Group imply a baseline growth rate of 6.0%. The average of the projected EPS, DPS, and BVPS growth rates from *Value Line* is 6.9%, and *Value Line*'s projected sustainable growth rate is 5.2%. The projected EPS growth rates of Wall Street analysts for the Gas Proxy Group are 6.2% and 5.8% as measured by the mean and median growth rates. The overall range for the projected growth rate indicators (ignoring historical growth) is 5.2% to 6.9%. Giving primary weight to the projected EPS growth rate of Wall Street analysts, I believe that the appropriate growth rate for the Gas Proxy Group is in the 6.0% to 6.5% range. I will use the midpoint of this range, 6.25%, as the DCF growth rate.

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

A. My DCF-derived equity cost rates for the gas group is summarized on page 1 of Exhibit JRW-10 and in Table 1 below.

Table 1
DCF-derived Equity Cost Rate/ROE

	Dividend Yield	1 + ½ Growth Adjustment	DCF Growth Rate	Equity Cost Rate
Gas Proxy Group	**2.7%**	**1.03125**	**6.25%**	**9.05%**

The calculation for the Gas Proxy Group is the 2.70% dividend yield, times the one and one-half growth adjustment of 1.03125, and a DCF growth rate of 6.25%, which results in an equity cost rate of 9.05%.

B. Capital Asset Pricing Model

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 U.S. Treasury securities is normally used as R_f. Risk premiums are measured in different ways. The CAPM is a theory of the risk and expected returns of common stocks. In the CAPM, two types of risk are associated with a stock: firm-specific risk 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 S&P 500 is used as a proxy for the "market";
- (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.

To estimate 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 U.S. Treasury bonds. ß, the measure of systematic risk, is more difficult to measure, as 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. PLEASE DISCUSS EXHIBIT JRW-11.

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. The yield on long-term U.S. Treasury bonds, in turn, has been 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. As shown on page 2 of Exhibit JRW-11, the yield on 30-year U.S. Treasury bonds has been in the 2.5% to 4.0% range over the 2013–2018 time period. The current 30-year Treasury yield is in the middle of this range. Given the recent range of yields and the possibility of higher interest rates, I use the higher end 4.0% as the risk-free rate, or R_f, in my CAPM.

Q. DOES YOUR 4.0% RISK-FREE INTEREST RATE TAKE INTO CONSIDERATION FORECASTS OF HIGHER INTEREST RATES?

A. No, it does not. As I stated before, forecasts of higher interest rates have been notoriously wrong for a decade. My 4.0% risk-free interest rate takes into account the range of interest rates in the past and effectively synchronizes the risk-free rate with the market risk premium ("MRP"). The risk-free rate and the MRP are interrelated in that the MRP is developed in relation to the risk-free rate. As discussed below, my MRP is based on the results of many studies and surveys that have been published over time. Therefore, my risk-free interest rate of 4.0% is effectively a normalized risk-free rate of interest.

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 that 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: the time period over which ß is measured and 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 Gas 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 Gas Proxy Group is 0.68.

Q. PLEASE DISCUSS THE MARKET RISK PREMIUM.

A. The Market Risk Premium ("MRP") 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 - $E(R_m)$. As is discussed below, there are different ways to measure $E(R_m)$ and studies have come up with significantly different magnitudes for $E(R_m)$. As Merton Miller, the 1990 Nobel Prize winner in economics indicated, $E(R_m)$ is very difficult to measure and is one of the great mysteries in finance.[12]

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

A. Page 4 of Exhibit JRW-11 highlights the primary approaches to, and issues with, 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 equity risk premium suggest an equity risk premium 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

[12] Merton Miller, "The History of Finance: An Eyewitness Account," *Journal of Applied Corporate Finance*, p. 3 (2000).

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.

The use of historical returns as market expectations has been criticized in numerous academic studies, as discussed later in my testimony. The general theme of these studies is that the large equity risk premium 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 equity risk premium. 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 equity risk premiums relative to fundamentals.[13]

In addition, there are a number of surveys of financial professionals regarding the MRP. There have also been several published surveys of academics on the equity risk premium. *CFO Magazine* conducts a quarterly survey of CFOs, which includes questions regarding their views on the current expected returns on stocks and bonds. Usually, over 300 CFOs participate in the survey.[14] Questions regarding expected stock and bond returns are also

[13] Rajnish Mehra & Edward C. Prescott, "The Equity Premium: A Puzzle," *Journal of Monetary Economics*, p. 145 (1985).
[14] *See* DUKE/CFO Magazine Global Business Outlook Survey, https://www.cfosurvey.org/past-results-2018.html, (June 2018).

included in the Federal Reserve Bank of Philadelphia's annual survey of financial forecasters, which is published as the *Survey of Professional Forecasters*.[15] This survey of professional economists has been published for almost 50 years. In addition, Pablo Fernandez conducts annual surveys of financial analysts and companies regarding the equity risk premiums they use in their investment and financial decision-making.[16]

Q. PLEASE PROVIDE A SUMMARY OF THE MRP STUDIES.

A. Derrig and Orr (2003), Fernandez (2007), and Song (2007) completed the most comprehensive review of the research on the MRP.[17] 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 of MRP results. Song provides

[15] Federal Reserve Bank of Philadelphia, *Survey of Professional Forecasters* (Feb. 9, 2018), https://www.philadelphiafed.org/-/media/research-and-data/real-time-center/survey-of-professional-forecasters/2018/spfq118.pdf?la=en. 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.

[16] Pablo Fernandez, Vitaly Pershin and Isabel Fernandez Acín, "Market Risk Premium and Risk-Free Rate used for 59 countries in 2018: a survey," *IESE Business School,* (Apr. 2018), available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3155709.

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

an annotated bibliography and highlights the alternative approaches to estimating the MRP.

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. I have also included the results of studies of the "Building Blocks" approach to estimating the equity risk premium. The Building Blocks approach is a hybrid approach employing elements of both historical and *ex ante* models.

Q. PLEASE DISCUSS PAGE 5 OF EXHIBIT JRW-11.

A. Page 5 of Exhibit JRW-11 provides a summary of the results of the MRP studies that I have reviewed. 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 Blocks approach to the MRP. There are results reported for over 40 studies and the median MRP is 4.63%.

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 every MRP study and survey I could identify that was published over the past decade and that

provided an MRP estimate. Most of these studies were published prior to the financial crisis that began in 2008. 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 50 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 for this subset of studies is 4.82%.

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

A. Much of the data indicates that the market risk premium is in the 4.0% to 6.0% range. Several recent studies (such as Damodaran, Fernandez, American Appraisers, Duarte and Rosa, and Duff & Phelps) have suggested an increase in the market risk premium. Therefore, I will use 5.5%, which is in the upper end of the range, as the market risk premium or MRP.

Q. IS YOUR *EX ANTE* MRP CONSISTENT WITH THE MRPs USED BY CFOs?

A. Yes. In the September 2018 CFO survey conducted by *CFO Magazine* and Duke University, which included approximately 200 responses, the expected

10-year MRP was 3.51%.[18] Thus, my 5.5% value is a conservatively high estimate of the MRP.

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

A. Yes. The financial forecasters in the previously referenced Federal Reserve Bank of Philadelphia survey projected both stock and bond returns. In the February 2018 survey, the mean long-term expected stock and bond returns were 5.48% and 3.57%, respectively. This provides an expected MRP of 1.91% (5.48%-3.57%).[19] This survey again, reinforces the fact that my 5.5% value is a conservatively high estimate of the MRP.

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

A. Yes. Pablo Fernandez published the results of his 2018 survey of academics, financial analysts, and companies.[20] This survey included over 4,000 responses. The median MRP employed by U.S. analysts and companies was 5.4%.

[18] *See* DUKE/CFO Magazine Global Business Outlook Survey, p. 42, (September,2018), https://www.cfosurvey.org/wp-content/uploads/2018/09/Q3-2018-US-Toplines.pdf.
[19] Federal Reserve Bank of Philadelphia, *Survey of Professional Forecasters* at 19, (Feb. 9, 2018), https://www.philadelphiafed.org/-/media/research-and-data/real-time-center/survey-of-professional-forecasters/2018/spfq118.pdf?la=en.
[20] Pablo Fernandez, Vitaly Pershin and Isabel Fernandez Acín, "Market Risk Premium and Risk-Free Rate used for 59 countries in 2018: a survey," *IESE Business School*, (April 2018), available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3155709.

Q. IS YOUR *EX ANTE* MRP CONSISTENT WITH THE MRPs OF FINANCIAL ADVISORS?

A. Yes. Duff & Phelps is a well-known valuation and corporate finance advisor that publishes extensively on the cost of capital. As of 2018, Duff & Phelps recommended using a 5.0% MRP for the U.S, with a normalized risk-free interest rate of 3.5%.[21]

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

A. The results of my CAPM study for the Gas Proxy Group are summarized on page 1 of Exhibit JRW-11 and in Table 2 below.

Table 2
CAPM-derived Equity Cost Rate/ROE
K = (R_f) + ß * [$E(R_m)$ - (R_f)]

	Risk-Free Rate	Beta	Equity Risk Premium	Equity Cost Rate
Gas Proxy Group	**4.0%**	**0.68**	**5.5%**	**7.7%**

For the Gas Proxy Group, the risk-free rate of 4.0% plus the product of the beta of 0.68 times the equity risk premium of 5.5% results in a 7.7% equity cost rate.

[21] Duff & Phelps, "U.S. Equity Risk Premium Recommendation Decreased from 5.5% to 5.0%, Effective September 5, 2017." *See* https://www.duffandphelps.com/insights/publications/cost-of-capital/us-equity-risk-premium-recommendation-2017.

C. Equity Cost Rate Summary

Q. PLEASE SUMMARIZE THE RESULTS OF YOUR EQUITY COST RATE STUDIES.

A. My DCF and CAPM analyses for the Gas Proxy Group indicate equity cost rates of 9.05% and 7.70%, respectively.

Table 3
ROEs Derived from DCF and CAPM Models

	DCF	CAPM
Gas Proxy Group	**9.05%**	**7.70%**

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

A. I conclude that the appropriate equity cost rate for companies in the Gas Proxy Group is in the 7.70% to 9.05% range. However, since I rely primarily on the DCF model, I am using the upper end of the range as the equity cost rate for the group. Therefore, I conclude that the appropriate equity cost rate for the group is in the 8.75% to 9.0% range.

Q. WHAT IS YOUR RECOMMENDED ROE FOR KGS?

A. Given these results, and in light of the recent higher interest rates, I conclude that the appropriate equity cost rate for KGS is 9.0%. This recommendation presumes that the Commission rejects the Company's proposed Revenue

Normalization Adjustment ("RNA"). CURB's position on the RNA is expressed by Ms. Andrea Crane:[22]

> I oppose the RNA for several reasons. First, the RNA is a significant and fundamental change in utility regulation. Second, the Company has not demonstrated that such a mechanism is necessary and it is already largely protected from revenue fluctuations through the WNA rider. Third, KGS's proposal would reduce risk to shareholders and increase costs to ratepayers. Although KGS's proposal will significantly decrease its overall business risk, the Company did not include any reduction in their claimed cost of equity to reflect this risk. Finally, revenue decoupling sends the wrong conservation signals to ratepayers.

Q. WHAT IS YOUR ROE RECOMMENDATION FOR KGS IF THE COMMISSION ACCEPTS THE PROPOSED RNA?

A. I recommend that the Commission use the bottom end of my ROE range, 8.75%, as the appropriate ROE for KGS.

Q. PLEASE INDICATE WHY A MARKET COST OF EQUITY RATE OF 9.0% IS APPROPRIATE FOR KGS.

A. There are a number of reasons why an equity cost rate of 9.0% is appropriate, reasonable, and fair for the Company in this case:

1. As shown in Exhibits JRW-2 and JRW-3, capital costs for utilities, as indicated by long-term bond yields, are still at historically low levels, despite the recent increase in interest rates. In addition, given low inflationary expectations and slow global economic growth, interest rates are likely to remain at low levels for some time;

[22] Testimony of Ms. Andrea Cotton, p. 69.

2. As shown in Exhibit JRW-8, the gas distribution industry is among the lowest risk industries in the U.S. as measured by beta. As such, the cost of equity capital for this industry is among the lowest in the U.S., according to the CAPM;

3. My 9.0% ROE recommendation is at the high end of the range of my DCF and CAPM results and is more reflective of the current economic environment;

4. KGS' investment risk is a little lower than the average of the Gas Proxy Group, as indicated by its S&P issuer credit rating of A versus an average of A- for the group;

5. The authorized ROEs for gas distribution companies have declined from 9.94% in 2012, to 9.68% in 2013, 9.78% in 2014, 9.60% in 2015, 9.50% in 2016, 9.63% in 2017, and 9.62% in the first three quarters of 2018.[23] In my opinion, authorized ROEs have lagged behind capital market cost rates, or in other words, authorized ROEs have been slow to reflect low capital market cost rates. However, the trend has been towards lower ROEs and the norm now is below 10%. Hence, I believe that my recommended ROE reflects our present historically low capital cost rates, and these low capital cost rates are finally being recognized as the norm by state utility regulatory commissions.

[23] *Id.*

Q. DO YOU BELIEVE THAT YOUR 9.0% ROE RECOMMENDATION MEETS *HOPE* AND *BLUEFIELD* STANDARDS?

A. Yes, I do. As previously noted, according to the *Hope* and *Bluefield* decisions, returns on capital should be: (1) comparable to returns investors expect to earn on other investments of similar risk; (2) sufficient to assure confidence in the company's financial integrity; and (3) adequate to maintain and support the company's credit and to attract capital.

The companies in the Gas Proxy Group have been earning ROEs, on average, of about 9.0% in recent years. As shown on page 1 of Exhibit JRW-4, the median earned ROE for the year 2017 for the companies in the Gas Proxy Group is 9.7%.

V. CRITIQUE OF KGS'S RATE OF RETURN TESTIMONY

Q. PLEASE REVIEW THE COMPANY'S PROPOSED RATE OF RETURN.

A. The Company has proposed a capital structure consisting of 37.22% long-term debt and 62.78% common equity. KGS has proposed a long-term debt cost rate of 3.9354% and a common equity cost rate, or ROE, of 10.0%. The Company's overall rate of return recommendation is 7.743%. This is summarized in Exhibit JRW-12.

1. Mr. Fairchild's assessment of capital market conditions is flawed. In providing guidance on capital costs and in estimating KGS's ROE, he has relied

upon economists' interest rate forecasts. Despite dire and unfounded predictions of rising interest rates over the past decade, long-term interest rates and capital costs are still at historically low levels. As I discuss below, there are strong indicators from my assessment study of global capital markets that long-term capital costs will remain low;

2. The Company's proposed capital structure has more equity and less financial risk than other gas companies. As a result, I have used a capital structure consisting of 45.0% long-term debt and 55.0% common equity;

3. Mr. Fairchild's DCF equity cost rate estimates are biased and are not reflected in his 10% ROE recommendation. In particular, his DCF growth rate range of 6.25% to 7.25% is overstated. This leads to an inflated DCF equity cost rate; and even despite these eliminations and his overstated growth rate range, he has given his DCF results very little weight in arriving at his 10.0% ROE recommendation;

4. The historic and projected market or equity risk premiums in Mr. Fairchild's CAPM and RP approaches are not empirically sound and are not reflective of current market conditions and prospective earnings and economic growth; and

5. Mr. Fairchild's CE approach does not provide market-based estimate of KGS' cost of common equity capital.

Q. PLEASE REVIEW MR. FAIRCHILD'S EQUITY COST RATE APPROACHES AND RESULTS.

A. Mr. Fairchild uses his eight-company gas distribution company proxy group and

employs DCF, CAPM, RP, and CE equity cost rate approaches. Mr. Fairchild's equity cost rate estimates for KGS are summarized in Exhibit JRW-13. Based on these figures, he concludes that the appropriate equity cost rate for the Company is 10.00%.

A. DCF Approach

Q. PLEASE SUMMARIZE MR. FAIRCHILD'S DCF ESTIMATES.

A. On pages 24-32 of his testimony and in KGS Schedule Nos. BHF-3 and BHF-6, Mr. Fairchild develops an equity cost rate by applying the DCF model to his gas group. Mr. Fairchild's DCF results are summarized in Exhibit JRW-12. In the traditional DCF approach, the equity cost rate is the sum of the dividend yield and expected growth. For the DCF growth rate, Mr. Fairchild uses six measures of projected EPS growth: the projected EPS growth of Wall Street analysts as compiled by IBES, Zack's, and *Value Line's* projected EPS projected growth rate; and a measure of sustainable growth as computed by the sum of internal ("*br*") and by external ("*sv*") growth.

Q. WHAT ARE THE ERRORS IN MR. FAIRCHILD'S DCF ANALYSES?

A. The primary issues in Mr. Fairchild's DCF analyses are: (1) His asymmetric elimination of low-end DCF results, and (2) The excessive use of the overly optimistic and upwardly-biased EPS growth rate forecasts of Wall Street analysts as the growth rate in his DCF model.

1. The Inflated DCF Growth Rate Range of 6.25% to 7.25%

Q. PLEASE ADDRESS MR. FAIRCHILD'S DCF GROWTH RATE RANGE OF 6.25% to 7.25%.

A. A significant error with Mr. Fairchild's constant- growth DCF equity cost rate analysis is his DCF growth rate range of 6.25% to 7.25%. He reports projected EPS growth rates of 8.4% from *Value Line*, 5.0% from I/B/E/S/, and 6.4% from Zacks. He also reports projected DPS and BVPS growth rates of 5.9% and 5.9% from *Value Line.* These projected growth rates suggest a DCF growth rate in the range of 6.0%. As such, his DCF growth rate range of 6.25% to 7.25% is not supported by the projected data for the proxy group. A projected DCF growth rate of 6.0%, with a resulting DCF equity cost rate below 9.0%, is more reflective of the data.

2. The Low Weight Give the DCF Results

Q. HOW MUCH WEIGHT HAS MR. FAIRCHILD GIVEN HIS DISTORTED DCF RESULTS?

A. Very little. A review of his equity cost rate results in Exhibit JRW-13 indicates that Mr. Fairchild must have given extremely high weight to his projected CAPM and CE results. However, as discussed below, these two approaches are based on faulty economic assumptions and therefore do not provide a reliable measure of KGS' cost of equity capital.

B. CAPM Approach

Q. PLEASE DISCUSS MR. FAIRCHILD'S CAPM.

A. On pages 32-37 of his testimony and Schedule Nos. BHF-7 – BHF-8, Mr. Fairchild estimates an equity cost rate by applying a CAPM model to his proxy group. The CAPM approach requires an estimate of the risk-free interest rate, beta, and the equity risk premium. Mr. Fairchild uses a current 30-Year Treasury bond yield of 3.13%, an average *Value Line* Beta of 0.74, and two market risk premium measures (a historical market risk premium of 7.10% and a projected market risk premium of 9.60%. He also adds a size premium of 1.36%. Mr. Fairchild's CAPM results are summarized in Panel B of page 1 of Exhibit JRW-13. Based on these figures, he finds a CAPM equity cost rate range from 9.74% to 11.59%.

Q. WHAT ARE THE ERRORS IN MR. FAIRCHILD'S CAPM ANALYSES?

A. The primary errors in Mr. Fairchild's CAPM analyses are: (1) the historical and projected market risk premiums; and (2) the size adjustment.

1. Historical Market Risk Premium

Q. PLEASE REIVEW MR. FAIRCHILD'S HISTORICAL MARKET RISK PREMIUM.

A. Mr. Fairchild's historical risk premium of 7.10% is computed as the difference

between the arithmetic mean stock return minus the long-term government bond return over the 1926-2017 time period as published by Duff & Phelps.

Q. PLEASE ADDRESS THE ISSUES INVOLVED IN USING HISTORICAL STOCK AND BOND RETURNS TO COMPUTE A FORWARD-LOOKING OR *EX ANTE* RISK PREMIUM.

A. As previously discussed, it is common to compute a market risk premium as the difference between historic stock and bond returns. But, it is well-known and well-studied that using historical returns to measure an *ex ante* equity risk premium is erroneous and overstates the true market or equity risk premium.[24] This approach produces differing results depending on several factors, including the measure of central tendency used, the time period evaluated, and the stock and bond market index employed. In addition, there are a myriad of empirical problems in the approach, 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), the measurement of central tendency (the arithmetic versus geometric mean), the historical time horizon used, the change in risk and required return

[24] These issues are addressed in a number of studies, including: Aswath. Damodaran, "Equity Risk Premiums (ERP): Determinants, Estimation and Implications – The 2015 Edition" NYU Working Paper, 2015, pp. 32-5; See Richard Roll, "On Computing Mean Returns and the Small Firm Premium," *Journal of Financial Economics*, pp. 371-86, (1983); Jay Ritter, "The Biggest Mistakes We Teach," *Journal of Financial Research* (Summer 2002); Bradford Cornell, *The Equity Risk Premium* (New York, John Wiley & Sons),1999, pp. 36-78; and J. P. Morgan, "The Most Important Number in Finance," p. 6.

over time, the downward bias in bond historical returns, and unattainable return bias (the Ibbotson procedure presumes monthly portfolio rebalancing).[25] The bottom line is that there are a number of empirical problems in using historical stock and bond returns to measure an expected equity risk premium.

Q. WHAT SOURCE DID MR. FAIRCHILD USE FOR HIS HISTORICAL STOCK MARKET RETURN OF 12.10%?

A. Mr. Fairchild employed the Duff & Phelps's historical market return as found in its 2017 *Cost of Capital Handbook*.

Q. IS DUFF & PHELPS A RESPECTED FINANCIAL FIRM?

A. Yes.

Q. WHAT IS DUFF & PHELPS OPINION REGARDING THE USE OF HISTORICAL STOCK MARKET RETURNS TO ESTIMATE AN EPR?

A. In its Client Update on the ERP, dated March 16, 2016, Duff & Phelps made the following statements regarding using historical returns to compute an ERP.[26]

[25] These issues are addressed in a number of studies, including: Aswath. Damodaran, "Equity Risk Premiums (ERP): Determinants, Estimation and Implications – The 2015 Edition" NYU Working Paper, 2015, pp. 32-5; See Richard Roll, "On Computing Mean Returns and the Small Firm Premium," *Journal of Financial Economics*, pp. 371-86, (1983); Jay Ritter, "The Biggest Mistakes We Teach," *Journal of Financial Research* (Summer 2002); Bradford Cornell, *The Equity Risk Premium* (New York, John Wiley & Sons),1999, pp. 36-78; and J. P. Morgan, "The Most Important Number in Finance," p. 6.

[26] Duff & Phelps, Client Alert, March 16, 2016, p. 38 (emphasis supplied). https://www.researchgate.net/publication/303933197_Duff_Phelps_Increases_US_Equity_Risk_Premium_Recommendation_to_55_Effective_January_31_2016/download.

> In estimating the conditional ERP, valuation analysts cannot simply use the long term historical ERP, without further analysis. A better alternative would be to examine approaches that are sensitive to the current economic conditions. As previously discussed, Duff & Phelps employs a multi-faceted analysis to estimate the conditional ERP that takes into account a broad range of economic information and multiple ERP estimation methodologies to arrive at its recommendation.

Q. DOES DUFF & PHELPS USE A HISTORIC STOCK MARKET RETURN FIGURE AS ITS RECOMMENDED EQUITY OR MARKET RISK PREMIUM?

A. No.

Q. WHAT DOES DUFF & PHELPS SAY ABOUT THE EXPECTED ERP AND HISTORICAL RETURNS?

A. Duff & Phelps provides details about its perspective on historical returns versus its estimation of the ERP (emphasis added):[27]

> ERP is a forward-looking concept. It is an expectation as of the valuation date for which no market quotes are directly observable. While an analyst can observe premiums realized over time by referring to historical data (i.e., realized return approach or ex post approach), such realized premium data do not represent the ERP expected in prior periods, nor do they represent the current ERP estimate. Rather, realized premiums represent, at best, only a sample from prior periods of what may have then been the expected ERP. To the extent that realized premiums on the average equate to expected premiums in prior periods, such samples may be representative of current expectations. But to the extent that prior events that are not expected to recur caused realized returns to differ from prior expectations, such samples should be adjusted to remove the effects of these nonrecurring events. Such adjustments are needed to improve the predictive power of the sample.

[27] *Id.*, p. 35 (emphasis supplied).

Q. DOES DUFF & PHELPS PUBLISH ITS RECOMMENDED ERP?

A. Yes. As shown in Exhibit JRW-14, Duff & Phelps currently uses an equity risk premium of 5.0%, in conjunction with a normalized risk-free interest rate of 3.5%. The results in an expected return on the stock market of 8.5% (3.5% + 5.0%).

2. Projected Market Risk Premium

Q. PLEASE ASSESS MR. FAIRCHILD'S MARKET RISK PREMIUM DERIVED FROM APPLYING THE DCF MODEL TO THE S&P 500.

A. Mr. Fairchild develops an expected market risk premium by: (1) applying the DCF model to the S&P 500 to get an expected market return; and (2) subtracting the risk-free rate of interest. Mr. Fairchild's estimated market return of 12.73% for the S&P 500 equals the sum of the dividend yield of 2.37% and expected EPS growth rate of 10.35%. The expected EPS growth rate is the average of the expected EPS growth rates from *Value Line*, I/B/E/S, and Zacks. The primary error in this approach is Mr. Fairchild's expected DCF growth rate. As previously discussed, the expected EPS growth rates of Wall Street analysts are upwardly biased. In addition, as explained below, the projected growth rate is inconsistent with economic and earnings growth in the U.S.

Q. BEYOND YOUR PREVIOUS DISCUSSION OF THE UPWARD BIAS IN WALL STREET ANALYSTS' EPS GROWTH RATE FORECASTS, IS

THERE OTHER EVIDENCE THAT INDICATES THAT MR. FAIRCHILD'S S&P 500 GROWTH RATE IS EXCESSIVE?

A. Yes. A long-term EPS growth rate of 10.35% is not consistent with historic as well as projected economic and earnings growth in the U.S for several reasons: (1) long-term EPS and economic growth, as measured by GDP, is about one-third lower than Mr. Fairchild's projected EPS growth rate of 10.35%; (2) more recent trends in GDP growth, as well as projections of GDP growth, suggest slower economic and earnings growth in the future; and (3) over time, EPS growth tends to lag behind GDP growth.

The long-term economic, earnings, and dividend growth rate in the U.S. has only been in the 5% to 7% range. I performed a study of the growth in nominal GDP, S&P 500 stock price appreciation, and S&P 500 EPS and DPS growth since 1960. The results are provided on page 1 of Exhibit JRW-15, and a summary is given in the Table 4.

Table 4
GDP, S&P 500 Stock Price, EPS, and DPS Growth
1960-Present

Nominal GDP	**6.47%**
S&P 500 Stock Price	**6.95%**
S&P 500 EPS	**6.70%**
S&P 500 DPS	**5.82%**
Average	**6.48%**

In sum, the historical long-run growth rates for GDP, S&P EPS, and S&P DPS are in the 5% to 7% range. By comparison, Mr. Fairchild's long-run growth rate projection of 10.35% is overstated. These estimates suggest that companies in the U.S. would be expected to: (1) increase their growth rate of

EPS by almost 50% in the future and (2) maintain that growth indefinitely in an economy that is expected to grow at about one-half of his projected growth rates.

Q. DO MORE RECENT DATA SUGGEST THAT THE U.S. ECONOMY'S GROWTH IS FASTER OR SLOWER THAN THE LONG-TERM DATA?

A. The more recent trends suggest lower future economic growth than the long-term historic GDP growth. The historic GDP growth rates for 10-, 20-, 30-, 40- and 50- years, is presented in Panel A of page 2 of Exhibit JRW-15 and in the table below.

Table 5
Historic GDP Growth Rates

10-Year Average	**2.79%**
20-Year Average	**3.86%**
30-Year Average	**4.45%**
40-Year Average	**5.41%**
50-Year Average	**6.23%**

These data clearly suggest that nominal GDP growth in recent decades has slowed to the 3.0% to 5.0% area.

Q. ARE THE LOWER GDP GROWTH RATES OF RECENT DECADES CONSISTENT WITH THE FORECASTS OF GDP GROWTH?

A. Yes. A lower range is also consistent with long-term GDP forecasts. There are several forecasts of annual GDP growth that are available from economists and

government agencies. These are listed in Panel B of on page 5 of Exhibit JRW-15. The mean 10-year nominal GDP growth forecast (as of February 2018) by economists in the recent *Survey of Financial Forecasters* is 4.7%. The Energy Information Administration ("EIA"), in its projections used in preparing *Annual Energy Outlook*, forecasts long-term GDP growth of 4.3% for the period 2017-2050.[28] The Congressional Budget Office ("CBO"), in its forecasts for the period 2018 to 2048, projects a nominal GDP growth rate of 4.0%.[29] Finally, the Social Security Administration ("SSA"), in its Annual OASDI Report, provides a projection of nominal GDP from 2018-2095.[30] SSA's projected growth GDP growth rate over this period is 4.4%.

Q. WHY IS GDP GROWTH RELEVANT IN YOUR CRITIQUE OF MR. FAIRCHILD'S USE OF THE LONG-TERM EPS GROWTH RATES IN DEVELOPING A MRP FOR HIS CAPM?

A. Because, as indicated in recent research, the long-term earnings growth rates of companies are limited to the growth rate in GDP.

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

[28]U.S. Energy Information Administration, *Annual Energy Outlook 2018*, Table: Macroeconomic Indicators, *https://www.eia.gov/outlooks/aeo/data/browser/#/?id=18-AEO2018&sourcekey=0.*
[29]Congressional Budget Office, The *2018 Long-Term Budget Outlook*, June 1, 2018. https://www.cbo.gov/system/files?file=2018-06/53919-2018ltbo.pdf
[30] Social Security Administration, *2018 Annual Report of the Board of Trustees of the Old-Age, Survivors, and Disability Insurance (OASDI) Program*, Table VI.G4, p. 211(June 15, 2018), https://www.ssa.gov/oact/tr/2018/lr6g4.html. The 4.4% represents the compounded growth rate in projected GDP from $20,307 trillion in 2018 to $548,108 trillion in 2095.

A. In 2010, Brad Cornell of the California Institute of Technology published a study on GDP growth, earnings growth, and equity returns. He found 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 found that long-term stock returns are determined by long-term earnings growth. He concludes with the following observations:[31]

> 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 2% to 3% range, the results imply nominal expected stock market returns in the 7% to 8% range. As such, Mr. Fairchild's projected earnings growth rates and implied expected stock market returns and equity risk premiums are not indicative of the realities of the U.S. economy and stock market. As such, his expected CAPM equity cost rate is significantly overstated.

[31] Bradford Cornell, "Economic Growth and Equity Investing," *Financial Analysts Journal*, p. 63 (Jan. - Feb. 2010).

Q. PLEASE PROVIDE A SUMMARY ASSESSMENT OF MR. FAIRCHILD'S PROJECTED EQUITY RISK PREMIUM DERIVED FROM EXPECTED MARKET RETURNS.

A. Mr. Fairchild's market risk premium derived from his DCF application to the S&P 500 is inflated due to errors and bias in his study. Investment banks, consulting firms, and CFOs use the equity risk premium 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. The CFOs in the September 2018 *CFO Magazine* – Duke University Survey of about 200 CFOs shows an expected return on the S&P 500 of 6.34% over the next ten years. In addition, the financial forecasters in the February 2018 Federal Reserve Bank of Philadelphia survey expect an annual nominal market return of 5.48% 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 8.0% to 9.0% range and not in the 10.0% to 11.0% range.

4. Size Adjustment

Q. PLEASE DISCUSS MR. FAIRCHILD'S SIZE ADJUSTMENT.

A. Mr. Fairchild includes a size adjustment in his CAPM approach for the size of the companies in the utility group. This adjustment is based on the historical

stock market returns studies as performed by Morningstar (formerly Ibbotson Associates). 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) and unattainable return bias (the Ibbotson procedure presumes monthly portfolio rebalancing). The net result is that Ibbotson's size premiums are poor measures for risk adjustment to account for the size of a 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. 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 utility'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,

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

performance review, accounting standards, and information disclosure, utilities are much different than industrials, which could account for the lack of a size premium.

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

A. As noted, there are errors in using historical market returns to compute risk premiums. With respect to the small firm premium, 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.[33]

In another paper, 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

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

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 that "a small firm should not be expected to have a higher size premium going forward sheerly because it is small now":[34]

> 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.

C. Risk Premium ("RP") Approach

Q. PLEASE DISCUSS MR. FAIRCHILD'S RP APPROACH.

A. At pages 37-40 of his testimony and in Schedule BHF-9, Mr. Fairchild estimates an equity cost rate ranging from 9.55% to 9.72% by applying the RP model to his gas group. Mr. Fairchild develops an equity cost rate by: (1) regressing the annual authorized returns on equity for gas distribution companies from the 1980 to 2018 time period Moody's long-term public utility bond yields;

[34] Ching-Chih Lu, "The Size Premium in the Long Run" (Dec. 25, 2009), available at: SSRN: https://ssrn.com/abstract=1368705 or http://dx.doi.org/10.2139/ssrn.1368705

and (2) adding the appropriate risk premiums established in (1) to current a Moody's long-term public utility bond yield of 4.17%.

Q. WHAT ARE THE ISSUES WITH MR. FAIRCHILD'S RP APPROACH?

A. The issues include the base yield as well as the measurement and magnitude of the risk premium.

1. Base Interest Rate

Q. PLEASE DISCUSS THE BASE YIELD OF MR. FAIRCHILD'S RP ANALYSIS.

A. The base yield in Mr. Fairchild's RP analyses is the prospective yield on long-term, 'Baa' rated public utility bonds. This is erroneous because using the yield on these securities inflates the required return on equity for the Company in two ways: (1) long-term bonds are subject to interest rate risk, a risk which does not affect common stockholders since dividend payments (unlike bond interest payments) are not fixed but tend to increase over time; and (2) the base yield in Mr. Fairchild's risk premium study is subject to credit risk since it is not default risk-free like an obligation of the U.S. Treasury. As a result, its yield-to-maturity includes a premium for default risk and therefore, is above its expected return. Hence, using a bond's yield-to-maturity as a base yield results in an overstatement of investors' return expectations.

2. Risk Premium

Q. WHAT ARE THE ISSUES WITH MR. FAIRCHILD'S RISK PREMIUM?

A. The most important issue is that Mr. Fairchild's risk premium is not necessarily applicable to measure utility investors' required rate of return. Mr. Fairchild's RP approach is a gauge of *commission* behavior, not *investor* behavior. Capital costs are determined in the market place through the financial decisions of investors and are reflected in such fundamental factors as dividend yields, expected growth rates, interest rates, and investors' assessment of the risk and expected return of different investments. Regulatory commissions evaluate capital market data in setting authorized ROEs, but also take into account other utility- and rate case-specific information in setting ROEs. As such, Mr. Fairchild's approach and results reflects other factors such as capital structure, credit ratings and other risk measures, service territory, capital expenditures, energy supply issues, rate design, investment and expense trackers, and other factors used by utility commissions in determining an appropriate ROE in addition to capital costs. This may be especially true when, due to the inherent compromises and trade-offs upon which settlements are made, the authorized ROE data includes the results of rate cases that are settled and not fully litigated.

Finally, Mr. Fairchild's methodology produces an inflated required rate of return since utilities have been selling at market-to-book ratios in excess of 1.0 for many years. This indicates that the authorized rates of return have been greater than the return that investors require. The relationship between ROE,

the equity cost rate, and market-to-book ratios was explained earlier in this testimony. In short, a market-to-book ratio above 1.0 indicates a company's ROE is above its equity cost rate. Therefore, the risk premium produced from the study is overstated as a measure of investor return requirements and has produced an inflated equity cost rate.

D. Comparable Earnings ("CE") Approach

Q. PLEASE DISCUSS MR. FAIRCHILD'S COMPARABLE EARNINGS ANALYSIS.

A. At pages 40-1 of his testimony and in Schedule BHF-10, Mr. Fairchild estimates an equity cost rate ranging from 10.7% to 11.3% for his gas group using the CE approach. His methodology simply involves using the projected ROE for the companies in the proxy group for the years 2018-2023 as estimated by *Value Line*. This approach is fundamentally flawed for several reasons. First, these ROE results include the profits associated with the unregulated operations of the utility proxy group. As shown in Exhibit JRW-4, the gas group only receives 69% of revenues from regulated operations. More importantly, since Mr. Fairchild has not evaluated the market-to-book ratios for these companies, they cannot indicate whether the past and projected returns on common equity are above or below investors' requirements. As shown in Exhibit JRW-4, the average market-to-book ratio for the gas group is 2.2X. This is a clear evidence

that these projected returns on common equity are above the returns that investors' require.

Q. PLEASE SUMMARIZE YOUR RATE OF RETURN RECOMMENDATION FOR KGS.

A. I show that the Company's proposed capital structure includes a higher common equity ratio and lower financial risk than other gas distribution companies. Therefore, I have imputed a capital structure consisting of 45.0% debt and 55.0% common equity. I have used the Company's proposed long-term debt cost rate. To determine an appropriate ROE for KGS, I have applied the DCF and the CAPM models to a proxy group of publicly-held gas distribution companies. My analyses indicate a cost of equity capital in the range of 7.70% to 9.05%. Since I give primary weight to the DCF approach, and the recent increase in interest rates, I determine that the equity cost rate of in the 8.75% to 9.0% range is appropriate for KGS. I conclude that the appropriate equity cost rate for KGS is 9.0%. Using my capital structure and debt and equity cost rates, my overall rate of return recommendation for KGS is 7.00%.[35]

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

[35] My 9.0% ROE recommendation presumes that the Commission rejects the Company's proposed RNA. If the Commission accepts the Company's proposed RNA, I recommend that the Commission use the bottom end of my ROE range, or 8.75% for KGS.

VERIFICATION

COMMONWEALTH OF PENNSYLVANIA)
)
COUNTY OF CENTRE) ss:

Dr. J. Randall Woolridge, being duly sworn upon his oath, deposes and states that he is a consultant for the Citizens' Utility Ratepayer Board, that he has read and is familiar with the foregoing Direct Testimony, and that the statements made herein are true and correct to the best of his knowledge, information, and belief.

Dr. J. Randall Woolridge

SUBSCRIBED AND SWORN to before me this 25 day of October, 2018.

Notary Public

My Commission expires: Nov-10-2019

COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
RONALD E FLEBOTTE
Notary Public
STATE COLLEGE BORO, CENTRE COUNTY
My Commission Expires Nov 10, 2019

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, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Hawaii, Indiana, Kansas, Kentucky, Maryland, Massachusetts, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Washington, D.C. He has also testified before the Federal Energy Regulatory Commission.

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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.

Assistant Professor of Finance, College of Business Administration, the Pennsylvania State University.

Education

Doctor of Philosophy in Business Administration, the University of Iowa. Major field: Finance.
Master of Business Administration, the Pennsylvania State University.
Bachelor of Arts, the University of North Carolina 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

CAPITAL COSTS IN TODAY'S MARKETS

Historic Interest Rates and Capital Costs

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. For a shorter-term perspective, Figure 1 shows the 10-year Treasury yield over the past five years. They hit lows of about 1.5% in early 2013 and mid-year 2016, primarily due to low economic growth and interest rates. Since 2016, these yields have moved up. The initial move was in response to the 2016 Presidential election. Since the beginning of 2018, the 10-year Treasury yield have increased with the increase in market volatility, the threat of a trade war, and the prospect to higher economic growth and higher inflation. Nonetheless, the current 10-year Treasury yield of about 3.2% is still at a historically low level.

Figure 1
Ten-Year Treasury Yield
2013-2018

Source: https://fred.stlouisfed.org/series/DGS10.

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 premium 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 2.0% to 3.5% range until 2005, declined to 1.5% 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. After declining abruptly in 2010, the differential has hovered in the 2.0% to 3.0% range, before declining to below 2.0% in the past six months.

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. The market or equity risk premium is not readily observable in the markets (like bond risk premiums) because expected stock market returns are not readily observable. As a result, equity risk premiums must be estimated using market data. There are alternative methodologies to estimate the equity risk premium, and these alternative approaches and equity risk premium results are subject to much debate. One way to estimate the equity risk premium is to compare the mean returns on bonds and stocks over long historical periods. Measured in this manner, the equity risk

premium has been in the 5% to 7% range.[1] However, studies by leading academics indicate that the forward-looking equity risk premium is actually in the 4.0% to 6.0% range. These lower equity risk premium results are in line with the findings of equity risk premium surveys of CFOs, academics, analysts, companies, and financial forecasters.

. 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 dropped below 4.0% on three occasions - in mid-2013, in the first quarter of 2015, and then again in the summer of 2016. These yields have increased to the above 4.0%, reflecting the upward movement in interest rates.

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 U.S. 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. The yield spreads between 20-year U.S. Treasury bonds and A-rated utility bonds peaked at 3.4% in November 2008, then declined to about 1.5% in the summer of 2012 as investor return requirements declined. The differential increased to almost in recent years, and is now close to 2.0%.

Capital Market Conditions and Outlook for Interest Rates

A company's rate of return is its overall cost of capital. Capital costs, including the cost of debt and equity financing, are established in capital markets and reflect investors' return requirements on alternative investments based on risk and capital market conditions.

[1] See Exhibit JRW-11, p. 5-6.

These capital market conditions are a function of investors' expectations concerning many factors, including economic growth, inflation, government monetary and fiscal policies, and international developments, among others. In the wake of the financial crisis, much of the focus in the capital markets has been on the interaction of economic growth, interest rates, and the actions of the Federal Reserve (the "Fed"). In addition, capital markets capital costs are impacted by global events.

Regarding interest rates, over the last decade, there have been continual forecasts of higher long-term interest rates. However, these forecasts have proven to be wrong. For example, after the announcement of the end of the QE III program in 2014, all the economists in Bloomberg's interest rate survey forecasted interest rates would increase in 2014, and 100% of the economists were wrong. According to the *Market Watch* article:[2]

> The survey of economists' yield projections is generally skewed toward rising rates — only a few times since early 2009 have a majority of respondents to the Bloomberg survey thought rates would fall. But the unanimity of the rising rate forecasts in the spring was a stark reminder of how one-sided market views can become. It also teaches us that economists can be universally wrong.

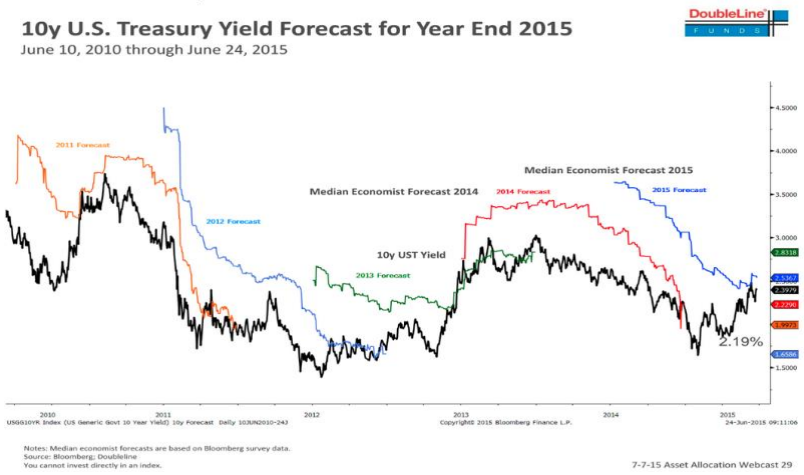
Two other financial publications have produced studies on how economists consistently predict higher interest rates, and yet they have been wrong. The first publication, entitled "How Interest Rates Keep Making People on Wall Street Look Like Fools," evaluated economists' forecasts for the yield on ten-year Treasury bonds at the beginning of the year

[2] Ben Eisen, "Yes, 100% of economists were dead wrong about yields, *Market Watch*," October 22, 2014. Perhaps reflecting this fact, *Bloomberg* reported that the Federal Reserve Bank of New York has stopped using the interest rate estimates of professional forecasters in the Bank's interest rate model due to the unreliability of those forecasters' interest rate forecasts. See Susanne Walker and Liz Capo McCormick, "Unstoppable $100 Trillion Bond Market Renders Models Useless," *Bloomberg.com* (June 2, 2014). http://www.bloomberg.com/news/2014-06-01/the-unstoppable-100-trillion-bond-market-renders-models-useless.html.

for the last ten years.[3] The results demonstrated that economists consistently predict that interest rates will go higher, and interest rates have not fulfilled those predictions.

The second study tracked economists' forecasts for the yield on ten-year Treasury bonds on an ongoing basis from 2010 until 2015.[4] The results of this study, which was entitled "Interest Rate Forecasters are Shockingly Wrong Almost All of the Time," are shown in Figure 1 and demonstrate how economists continually forecast that interest rates are going up, yet they do not. Indeed, as Bloomberg has reported, economists' continued failure in forecasting increasing interest rates has caused the Federal Reserve Bank of New York to stop using the interest rate estimates of professional forecasters in the Bank's interest rate model due to the unreliability of those forecasters' interest rate forecasts.[5]

Figure 2
Economists' Forecasts of the Ten-Year Treasury Yield
2010-2015



Source: Akin Oyedele, "Interest Rate Forecasters are Shockingly Wrong Almost All of the Time," *Business Insider*, July 18, 2015. .

[3] Joe Weisenthal, "How Interest Rates Keep Making People on Wall Street Look Like Fools," Bloomberg.com, March 16, 2015. http://www.bloomberg.com/news/articles/2015-03-16/how-interest-rates-keep-making-people-on-wall-street-look-like-fools.
[4] Akin Oyedele, "Interest Rate Forecasters are Shockingly Wrong Almost All of the Time," *Business Insider*, July 18, 2015. http://www.businessinsider.com/interest-rate-forecasts-are-wrong-most-of-the-time-2015-7.
[5] "*Market Watch*," October 22, 2014.

The Federal Reserve's Decision to Increase the Federal Fund Rate

On December 16, 2015, the Federal Reserve increased its target rate for federal funds to 0.25 – 0.50 percent.[6] This increase came after the rate was kept in the 0.0 to .25 percent range for over five years in order to spur economic growth in the wake of the financial crisis. As the economy has improved, with lower unemployment, steady but slow GDP growth, improving consumer confidence, and a better housing market, the Federal Reserve has increased the target federal funds rate on six additional occasions: December, 2016, March, 2017, June, 2017, December of 2017, March, 2018, June 2018, and September 2018.

Long-term interest rates in the U.S. bottomed out in August 2016 and have increased since that time with the outcome of the U.S. Presidential election and improvements in the economy. Long-term U.S. Treasury interest rates increased to over 3.0% in the wake of the 2016. U.S. presidential election, and then declined in 2017 despite the three increases in the federal funds rate. As noted, these rates have again increased in 2018 as the Federal Reserve has increased the federal funds rate three more times as the economy has improved.

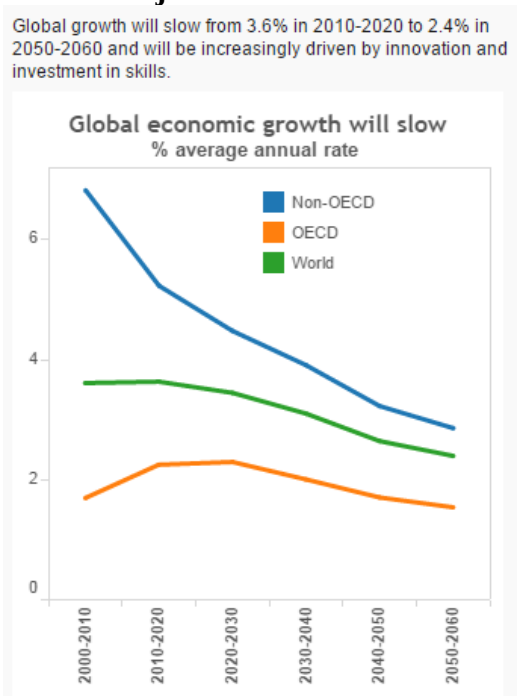
However, as indicated by market developments over the past three years, increases in the federal fund rate do not necessarily lead to an increase in long-term interest rates. As discussed below, the Federal Reserve does not directly determine long-term rates. Long-term rates are primarily driven by economic growth and inflation.

[6] The federal funds rate is set by the Federal Reserve and is the borrowing rate applicable to the most creditworthy financial institutions when they borrow and lend funds overnight to each other.

The Long-Term Driver's of GDP and Interest Rates

In the long term, the key drivers of economic growth measured in nominal dollars are population growth, productivity growth (the advancement and diffusion of science and technology), and currency inflation. Although the U.S. experienced rapid economic growth during the "post-war" period (the 63 years that separated the end of World War II and the 2008 financial crisis), the post-war period is not necessarily reflective of expected future growth. It was marked by a near-trebling of global population, from under 2.5 billion to approximately 6.7 billion. Over the next 50 years, according to United Nations projections, the global population will grow considerably more slowly, reaching approximately 10.3 billion in 2070. With population growth slowing, life expectancies lengthening, and post-war "baby boomers" reaching retirement age, median ages in developed-economy nations have risen and continue to rise. The postwar period was also marked by rapid catch-up growth as Europe, Japan, and China recovered from successive devastations and as regions such as India and China deployed and leapfrogged technologies that had been developed over a much longer period in earlier-industrialized nations. That period of rapid catch-up growth is coming to an end. For example, although China remains one of the world's fastest-growing regions, its growth is now widely expected to slow substantially. This convergence of projected growth in the former "second world" and "third world" towards the slower growth of the nations that have long been considered "first world" is illustrated in this "key findings" chart published by the Organization for Economic Co-operation and Development.

Figure 3
Projected Global Growth[7]



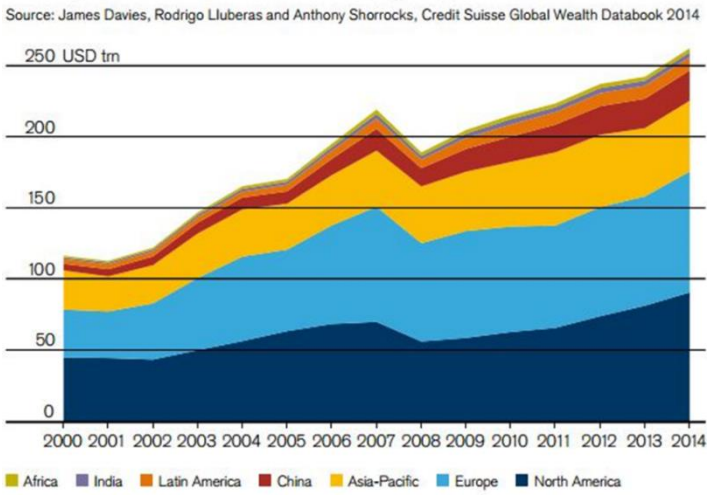
As to dollar inflation, it has declined to far below the level it reached in the 1970s. The Federal Reserve targets a 2% inflation rate. However, inflation has been below the Fed's target rate in recent years due to a number of factors, including slow global economic growth, slack in the economy, and declining energy and commodity prices. The slow pace of inflation is also reflected in the decline in forecasts of future inflation. The Energy Information Administration's annual Energy Outlook includes in its nominal GDP growth projection a long-term inflation component, which the EIA projects at 2.3% per year for its forecast period through 2050.[8]

All of this translates into slowed growth in annual economic production and income, even when measured in nominal rather than real dollars. Meanwhile, the stored

[7] See http://www.oecd.org/eco/outlook/lookingto2060.htm.
[8] See EIA Annual Energy Outlook 2018, Table 20 (available at http://www.eia.gov/forecasts/aeo/tables_ref.cfm).

wealth that is available to fund investments has continued to rise. According to the most recent release of the Credit Suisse global wealth report, global wealth has more than doubled since the turn of this century, notwithstanding the temporary setback following the 2008 financial crisis:

Figure 4
Global Wealth – 2000-2014



These long-term trends mean that overall, and relative to what had been the post-war norm, the world now has more wealth chasing fewer opportunities for investment rewards. Ben Bernanke, the former Chairman of the Federal Reserve, called this phenomenon a "global savings glut."[9] Like any other liquid market, capital markets are subject to the law of supply and demand. With a large supply of capital available for investment and relatively scarce demand for investment capital, it should be no surprise to see the cost of investment capital decline, keeping interest rates low.

Former Federal Reserve Chairman Benjamin Bernanke addressed the issue of the continuing low interest rates in his weekly Brookings Blog. He indicated that the focus

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

should be on real and not nominal interest rates and noted that, in the long term, these rates are *not* determined by the Federal Reserve:[10]

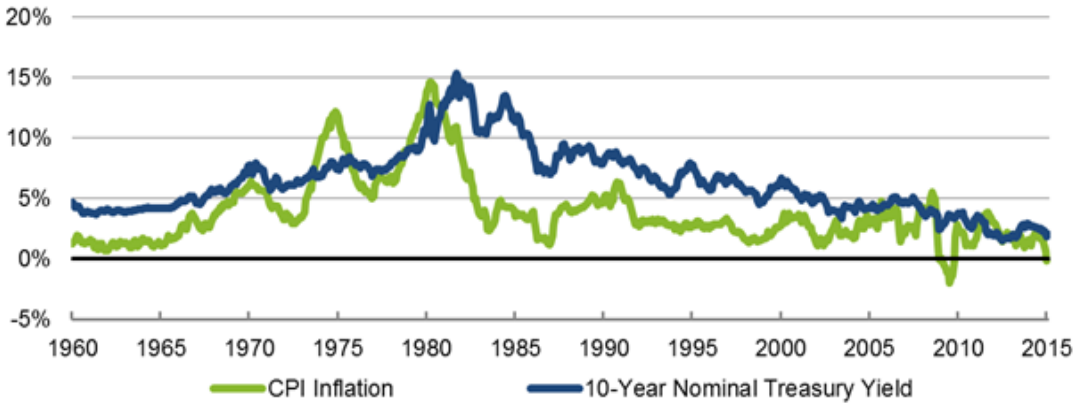
> If you asked the person in the street, "Why are interest rates so low?," he or she would likely answer that the Fed is keeping them low. That's true only in a very narrow sense. The Fed does, of course, set the benchmark nominal short-term interest rate. The Fed's policies are also the primary determinant of inflation and inflation expectations over the longer term, and inflation trends affect interest rates, as the figure above shows. But what matters most for the economy is the real, or inflation-adjusted, interest rate (the market, or nominal, interest rate minus the inflation rate). The real interest rate is most relevant for capital investment decisions, for example. The Fed's ability to affect real rates of return, especially longer-term real rates, is transitory and limited. Except in the short run, real interest rates are determined by a wide range of economic factors, including prospects for economic growth—not by the Fed.

Mr. Bernanke also addressed the issue about whether low-interest rates are a short-term aberration or a long-term trend:[11]

> Low interest rates are not a short-term aberration, but part of a long-term trend. As the figure below shows, ten-year government bond yields in the United States were relatively low in the 1960s, rose to a peak above 15 percent in 1981, and have been declining ever since. That pattern is partly explained by the rise and fall of inflation, also shown in the figure. All else equal, investors demand higher yields when inflation is high to compensate them for the declining purchasing power of the dollars with which they expect to be repaid. But yields on inflation-protected bonds are also very low today; the real or inflation-adjusted return on lending to the U.S. government for five years is currently about minus 0.1 percent.

[10] Ben S. Bernanke, "Why are Interest Rates So Low," Weekly Blog, Brookings, March 30, 2015. https://www.brookings.edu/blog/ben-bernanke/2015/03/30/why-are-interest-rates-so-low/.
[11] *Ibid.*

Figure 5
Interest Rates and Inflation
1960-2015



Source: Federal Reserve Board, BLS.

BROOKINGS

As far as the future outlook for interest rates and capital costs, first, the U.S. economy has been growing for over nine years, and, as noted above, the Federal Reserve sees continuing strength in the economy. The labor market has improved, with unemployment at low levels, below 4.0%, and the stock market is near an all-time high.

Second, interest rates remain at relatively low levels and are likely to remain low. There are two factors driving the continued lower interest rates: (1) inflationary expectations in the U.S. which remain low; and (2) global economic growth – including Europe and China, has been below historical levels. As a result, while the yields on long-term U.S. Treasury bonds are low by historical standards, these yields are well above the government bond yields in Germany, Japan, and the United Kingdom. Thus, U.S. Treasuries offer an attractive yield relative to those of other major governments around the world, thereby attracting capital to the U.S. and keeping U.S. interest rates down.

As the above studies indicate, economists are always predicting that interest rates are going up, and yet they are almost always wrong. Obviously, investors are well aware of the

consistently wrong forecasts of higher interest rates, and therefore place little weight on such forecasts. Moreover, investors would not be buying long-term Treasury bonds or utility stocks at their current yields if they expected interest rates to suddenly increase, thereby producing higher yields and negative returns. For example, consider a utility that pays a dividend of $2.00 with a stock price of $50.00. The current dividend yield is 4.0%. If higher return requirements led the dividend yield to increase from 4.0% to 5.0% in the next year, the stock price would have to decline to $40, which would be a negative 20% return on the stock.[12] Obviously, investors would not buy the utility stock with an expected return of negative 20% due to higher dividend yield requirements.

In sum, it appears to be impossible to accurately forecast prices and rates that are determined in the financial markets, such as interest rates, the stock market, and gold prices. For interest rates, I have never seen a study that suggests one forecasting service is consistently better than others or that interest rate forecasts are consistently better than just assuming that the current interest rate will be the rate in the future. Investors would not be buying long-term Treasury bonds or utility stocks at their current yields if they expected interest rates to suddenly increase, thereby producing higher yields and negative returns.

[12] In this example, for a stock with a $2.00 dividend, a 5.0% dividend yield would require a stock price of $40 ($2.00/$40 = 5.0%).

APPENDIX C

THE COST OF COMMON EQUITY CAPITAL

Determining the Costs of Capital or Fair Rate of Return for Public Utilities

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 the economic benefit to society from avoiding duplication of these services, some public utilities are monopolies. Because of the lack of competition and the essential nature of their services, it is not appropriate to permit monopoly utilities to set their own prices. Thus, regulation seeks to establish prices that are fair to consumers and, at the same time, sufficient to meet the operating and capital costs of the utility (i.e., provide an adequate return on capital to attract investors).

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 a company or 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 are 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 must equal the book value of the firm's securities.

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, described this essential relationship between the return on equity, the cost of equity, and the market-to-book ratio in the following manner:[1]

> 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

[1] James M. McTaggart, "The Ultimate Poison Pill: Closing the Value Gap," *Commentary* (Spring 1986), p.3.

> 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.

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.

This relationship between ROE and market-to-book ratios is discussed in a classic Harvard Business School case study entitled "Note on Value Drivers." On page 2 of that case study, the author describes the relationship very succinctly:[2]

> 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 performed a regression study between estimated ROE and market-to-book ratios using natural gas distribution, electric utility, and water utility companies. I used all companies in these three industries that are

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

covered by *Value Line* and have estimated ROE 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 0.49, 0.61, and 0.81, respectively.[3] This demonstrates the strong positive relationship between ROEs and market-to-book ratios for public utilities.

Economic Factors, Investor Expectations, and Investment Risk

Certain economic factors have affected the cost of equity captial for public utilities. 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 public utility bonds. These yields decreased from 2000 until 2003, and then hovered in the 5.50%-6.50% range from mid-2003 until mid-2008. These yields peaked in November 2008 at 7.75% during the Great Recession. Henceforth, these yields have generally declined since then, dropping below 4.0% on three occasions - in mid-2013, in the first quarter of 2015, and then again in the summer of 2016. These yields subsequently increased 4.25% in 2016, with much of the increase coming in the wake of the November 2016 U.S. presidential election. Despite multiple increases in the federal funds rate in 2017, utility bond yields decreased, before increasing to above 4.0% range in response to continued positive economic news.

Page 2 of JRW-7 provides the dividend yields for the gas group over the past decade. The dividend yields for this gas group have declined from the year 2000 to 2007, increased to 4.0% in 2009, and declined to below 3.0% in 2016 and remain in that range

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

Average earned returns on common equity and market-to-book ratios for the gas distribution group are on page 3 of Exhibit JRW-7. For the gas group, earned returns on common equity have peaked in 2009 at 11.75%, and declined to below 9.0% in 2016 and 2017. The average market-to-book ratios for this group were in the 1.50X to 1.70X range for many years, but have increase to over 2.0X as of 2017. This means that, for at least the last decade, returns on common equity have been greater than the cost of capital, or more than necessary to meet investors' required returns.

Regarding investors' expectations, 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.

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 0.74, 0.74, and 0.68, respectively. As such, the cost of equity for utilities is among the lowest of all industries in the U.S.

The Cost of Common Equity Capital and Determining the Required Rate of Return

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

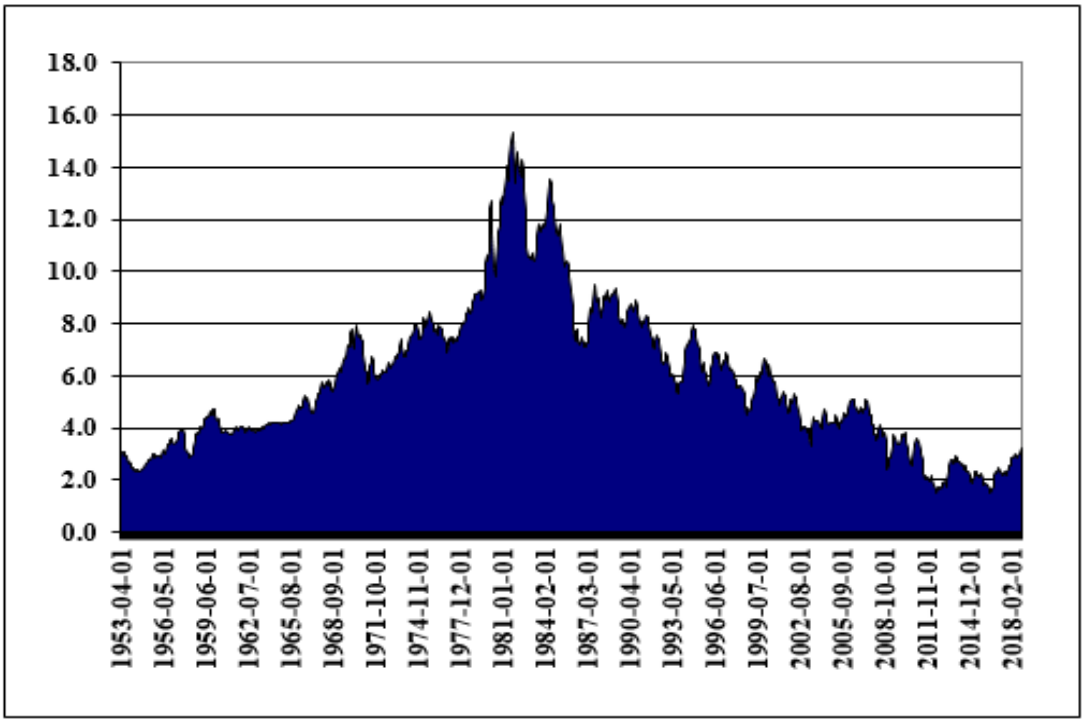
models, and in interpreting the models' results. All of these decisions must take into consideration the firm involved as well as current conditions in the economy and the financial markets.

Exhibit JRW-1

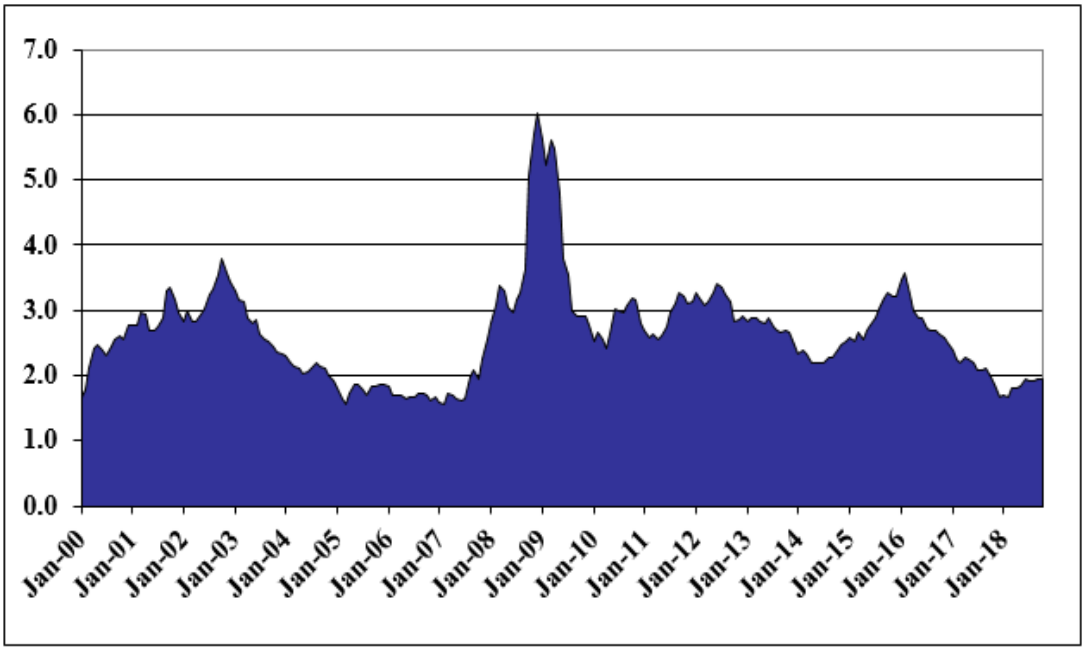
Kansas Gas Service
Recommended Cost of Capital

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

Exhibit JRW-4

Kansas Gas Service

Gas Proxy Group

Company	Operating Revenue ($mil)	Percent Elec Revenue	Percent Gas Revenue	Net Plant ($mil)	Market Cap ($mil)	S&P Issuer Credit Rating	Pre-Tax Interest Coverage	Primary Service Area	Common Equity Ratio	Return on Equity	Market to Book Ratio
Atmos Energy Corporation (NYSE-ATO)	$2,759.7	0%	96%	$9,259.2	$9.0	A	6.03	Ten States	52.6%	10.8%	2.32
Chesapeake Utilities (NYSE-CPK)	$617.58	4%	43%	$1,126.03	$1.2	NR	6.73	DE,MD,FL	51.5%	12.5%	2.54
New Jersey Resources Corp. (NYSE-NJR)	$2,268.6	0%	31%	$2,609.7	$3.0	A	4.04	NJ	46.4%	11.0%	2.96
Northwest Natural Gas Co. (NYSE-NWN)	$762.2	0%	96%	$2,255.0	$1.7	A+	(1.24)	OR,WA	47.1%	-7.0%	2.26
ONE Gas, Inc.(NYSE-OGS)	$1,539.6	0%	100%	$4,007.6	$3.8	A	6.56	OK,KS,TX	55.8%	8.5%	1.94
South Jersey Industries, Inc. (NYSE-SJI)	$1,243.1	0%	41%	$2,700.2	$2.5	BBB+	0.37	NJ	43.7%	-0.3%	2.06
Southwest Gas Corporation (NYSE-SWX)	$2,548.8	0%	51%	$4,523.7	$3.9	BBB+	4.32	AZ,NV,CA	47.1%	11.2%	2.14
Spire (NYSE-SR)	$1,740.7	0%	95%	$3,665.2	$3.2	A-	3.68	MO	43.6%	8.6%	1.61
Mean	$1,685.0	1%	69%	$3,768.3	$3.54	A-	3.81		48.5%	6.9%	2.23
Median	$1,640.2	0%	73%	$3,182.7	$3.10	A-	4.18		47.1%	9.7%	2.20

Data Source: Company 2017 SEC 10-K filings; *Value Line Investment Survey* , 2018.

Exhibit JRW-4

Kansas Gas Service
***Value Line* Risk Metrics**

Gas Proxy Group

Company	Beta	Financial Strength	Safety	Earnings Predictability	Stock Price Stability
Atmos Energy Corporation (NYSE-ATO)	**0.60**	**A+**	**1**	**95**	**100**
Chesapeake Utilities (NYSE-CPK)	**0.70**	**B++**	**2**	**90**	**75**
New Jersey Resources Corp. (NYSE-NJR)	**0.70**	**A+**	**1**	**50**	**80**
Northwest Natural Gas Co. (NYSE-NWN)	**0.65**	**A**	**1**	**15**	**95**
ONE Gas, Inc. (NYSE-OGS)	**0.65**	**A**	**2**	**NMF**	**90**
South Jersey Industries, Inc. (NYSE-SJI)	**0.75**	**A**	**2**	**70**	**80**
Southwest Gas Corporation (NYSE-SWX)	**0.75**	**B++**	**3**	**90**	**80**
Spire (NYSE-SR)	**0.65**	**B++**	**2**	**75**	**95**
Mean	**0.68**	**A**	**1.8**	**69**	**87**

Data Source: *Value Line Investment Survey* , 2018.

Value Line Risk Metrics

Beta

A relative measure of the historical sensitivity of a stock's price to overall fluctuations in the New York Stock Exchange Composite Index. A of 1.50 indicates a stock tends to rise (or fall) 50% more than the New York Stock Exchange Composite Index. The ''coefficient'' is derived from a regression analysis of the relationship between weekly percent-age changes in the price of a stock and weekly percentage changes in the NYSE Index over a period of five years. In the case of shorter price histories, a smaller time period is used, but two years is the minimum. Betas are adjusted for their long-term tendency to converge toward 1.00.

Financial Strength

A relative measure of of the companies reviewed by Value Line. The relative ratings range from A++ (strongest) down to C (weakest).

Safety Rank

A measurement of potential risk associated with individual common stocks. The Safety Rank is computed by averaging two other Value Line indexes the Price Stability Index and the Financial strength Rating. Safety Ranks range from 1 (Highest) to 5 (Lowest). Conservative investors should try to limit their purchases to equities ranked 1 (Highest) and 2 (Above Average) for Safety. .

Earnings Predictability

A measure of the reliability of an earnings forecast. Earnings Predictability is based upon the stability of year-to-year comparisons, with recent years being weighted more heavily that earlier ones. The most reliable forecasts tend to be those with the highest rating (100); the least reliable, the lowest (5). The earnings stability is derived from the standard deviation of percentage changes in quarterly earnbings over an eight-year period. Special adjustments are made for comparisons around zero and from plus to minus.

Stock Price Stability

A measure of the stability of a stock's price It includes sensitivity to the market (see Beta as well as the stock's inherent volatility. Value Line Stability ratings range from 1 (highest) to 5 (lowest).

Source: *Value Line Investment Analyzer* .

Exhibit JRW-5

Kansas Gas Service
Capital Structure Ratios and Debt Cost Rates

Panel A - KGS Proposed Capital Structure and Debt Cost Rates

	Percent of Total	Cost
Short-Term Debt	0.00%	
Long-Term Debt	37.22%	3.94%
Common Equity	62.78%	
Total Capital	100.00%	

Panel B - Proxy Group Average Capital Structure Ratios (except One Gas)*

	9/30/2017	12/31/2017	12/31/2017	6/30/2018	Mean
Short-Term Debt	10.8%	12.44%	10.99%	13.14%	11.83%
Long-Term Debt	40.6%	38.37%	37.27%	38.60%	38.71%
Common Equity	48.7%	49.19%	51.75%	48.26%	49.46%
Total Capital	100.0%	100.00%	100.00%	100.00%	100.00%

*** See page 2 of Exhibit JRW-5**

Panel C - OGS Capitalization Ratios

Capitalization Amoun	9/30/2017	12/31/2017	3/31/2018	6/30/2018	
Short-Term Debt	$ 174.0	$ 357.2	$ 582.6	$ 485.0	
Long-Term Debt	$ 1,193.1	$ 1,193.3	$ 893.5	$ 893.7	
Common Equity	$ 1,932.0	$ 1,960.2	$ 2,020.9	$ 2,022.3	
Total Capital	$ 3,299.1	$ 3,510.7	$ 3,497.0	$ 3,401.0	
Capitalization Ratios	**9/30/2017**	**12/31/2017**	**3/31/2018**	**6/30/2018**	**Mean**
Short-Term Debt	5.27%	10.17%	16.66%	14.26%	11.59%
Long-Term Debt	36.16%	33.99%	25.55%	26.28%	30.50%
Common Equity	58.56%	55.84%	57.79%	59.46%	57.91%
Totals	100.00%	100.00%	100.00%	100.00%	100.00%

Panel D - CURB Proposed Capital Structure Ratios and Debt Cost Rates

		Adjustment	CURB Propose	Cost
Short-Term Debt				
Long-Term Debt	37.22%	1.343364	45.00%	3.94%
Common Equity	62.78%	0.796432	55.00%	
Total Capital	100.00%		100.00%	

Exhibit JRW-5
Kansas Gas Services
Capital Structure Ratios
Gas Proxy Group

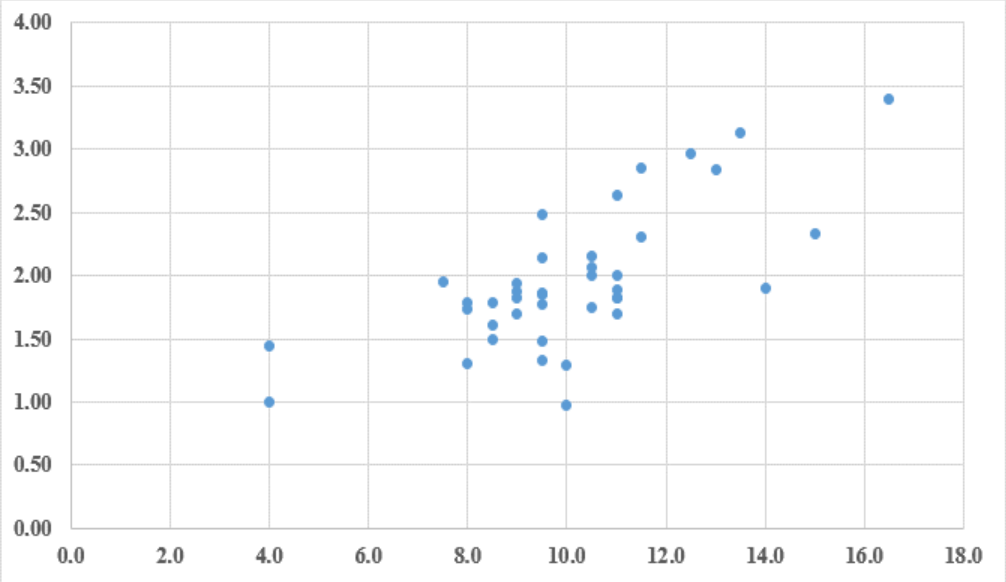
ATO		9/30/17	12/31/17	3/31/18	6/30/18	ATO		9/30/17	12/31/17	3/31/18	6/30/18
	Short Term Debt	447.70	336.80	579.60	694.80		Short Term Debt	6.04%	4.23%	7.32%	8.61%
	Long-Term Debt	3067.00	3067.50	2617.90	2618.30		Long-Term Debt	41.37%	38.50%	33.06%	32.43%
	Common Equity	3898.70	4563.60	4721.30	4759.60		Common Equity	52.59%	57.27%	59.62%	58.96%
	Total	7413.40	7967.90	7918.80	8072.70		Total	100.00%	100.00%	100.00%	100.00%
CPK						CPK					
	Short Term Debt	215.20	260.40	238.50	245.30		Short Term Debt	24.45%	27.58%	20.08%	24.66%
	Long-Term Debt	201.20	197.40	222.00	241.60		Long-Term Debt	22.86%	20.91%	18.69%	24.28%
	Common Equity	463.80	486.30	727.30	508.00		Common Equity	52.69%	51.51%	61.23%	51.06%
	Total	880.20	944.10	1187.80	994.90		Total	100.00%	100.00%	100.00%	100.00%
NJR						NJR					
	Short Term Debt	431.40	539.40	316.80	97.60		Short Term Debt	16.19%	18.67%	11.39%	3.53%
	Long-Term Debt	997.10	1001.20	997.90	1220.20		Long-Term Debt	37.41%	34.66%	35.87%	44.09%
	Common Equity	1236.60	1347.80	1467.40	1450.00		Common Equity	46.40%	46.66%	52.74%	52.39%
	Total	2665.10	2888.40	2782.10	2767.80		Total	100.00%	100.00%	100.00%	100.00%
NWN						NWN					
	Short Term Debt	22.00	150.90	124.80	121.90		Short Term Debt	1.35%	9.57%	7.90%	7.79%
	Long-Term Debt	757.40	683.20	683.50	683.90		Long-Term Debt	46.58%	43.33%	43.25%	43.69%
	Common Equity	846.70	742.80	772.20	759.50		Common Equity	52.07%	47.11%	48.86%	48.52%
	Total	1626.10	1576.90	1580.50	1565.30		Total	100.00%	100.00%	100.00%	100.00%
SJI						SJI					
	Short Term Debt	291.00	115.80	511.90	1705.20		Short Term Debt	10.81%	6.45%	18.49%	38.64%
	Long-Term Debt	1180.30	758.10	974.70	1403.80		Long-Term Debt	43.83%	42.23%	35.21%	31.81%
	Common Equity	1221.40	921.40	1281.50	1303.70		Common Equity	45.36%	51.32%	46.30%	29.54%
	Total	2692.70	1795.30	2768.10	4412.70		Total	100.00%	100.00%	100.00%	100.00%
SWX						SWX					
	Short Term Debt	139.00	239.80	47.40	54.40		Short Term Debt	3.88%	6.22%	1.21%	1.35%
	Long-Term Debt	1732.00	1798.60	1998.10	2037.70		Long-Term Debt	48.29%	46.68%	50.91%	50.62%
	Common Equity	1715.70	1814.80	1879.50	1933.00		Common Equity	47.84%	47.10%	47.89%	48.02%
	Total	3586.70	3853.20	3925.00	4025.10		Total	100.00%	100.00%	100.00%	100.00%
SR						SR					
	Short Term Debt	577.30	689.10	497.20	346.50		Short Term Debt	12.65%	14.36%	10.52%	7.41%
	Long-Term Debt	1995.00	2030.00	2073.90	2024.50		Long-Term Debt	43.72%	42.31%	43.90%	43.27%
	Common Equity	1991.30	2079.20	2153.50	2307.70		Common Equity	43.63%	43.33%	45.58%	49.32%
	Total	4563.60	4798.30	4724.60	4678.70		Total	100.00%	100.00%	100.00%	100.00%

Summary		9/30/2017	12/31/2017	12/31/2017	6/30/2018	Mean
Mean	Short Term Debt	10.77%	12.44%	10.99%	13.14%	11.83%
	Long-Term Debt	40.58%	38.37%	37.27%	38.60%	38.71%
	Common Equity	48.65%	49.19%	51.75%	48.26%	49.46%
	Total	100.00%	100.00%	100.00%	100.00%	100.00%

OGS		9/30/17	12/31/17	12/31/17	6/30/18	OGS					
	Short Term Debt	$ 174.0	$ 357.2	$ 582.6	$ 485.0		Short Term Debt	5.27%	10.17%	16.66%	14.26%
	Long-Term Debt	$ 1,193.1	$ 1,193.3	$ 893.5	$ 893.7		Long-Term Debt	36.16%	33.99%	25.55%	26.28%
	Common Equity	$ 1,932.0	$ 1,960.2	$ 2,020.9	$ 2,022.3		Common Equity	58.56%	55.84%	57.79%	59.46%
	Total	3,299	3,511	3,497	3,401		Total	100.00%	100.00%	100.00%	100.00%

Exhibit JRW-6
Electric Utilities
Panel A

Market-to-Book

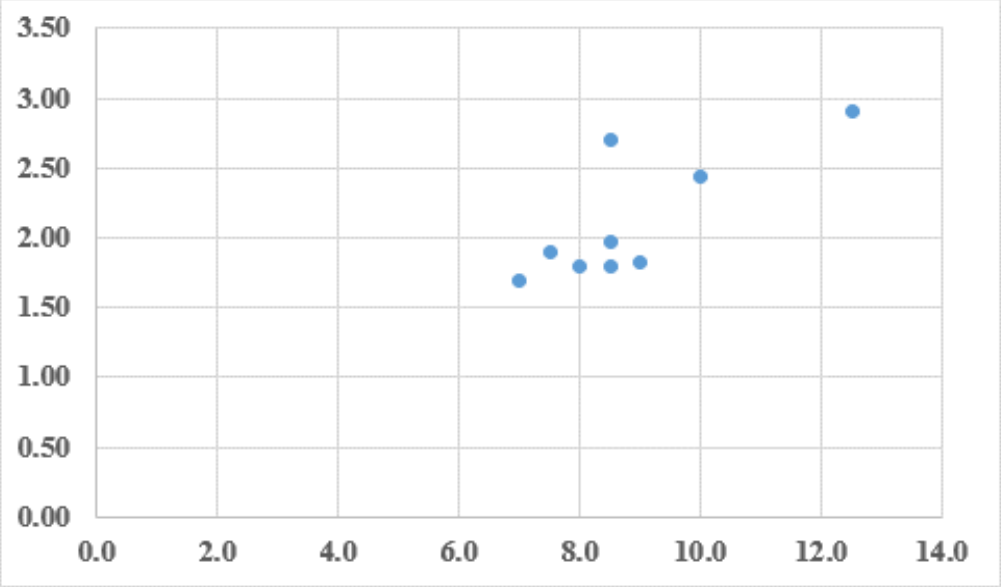


Expected Return on Equity
R-Square = .49, N=40

Source: *Value Line Investment Survey* , 2018.

Panel B
Gas Companies

Market-to-Book

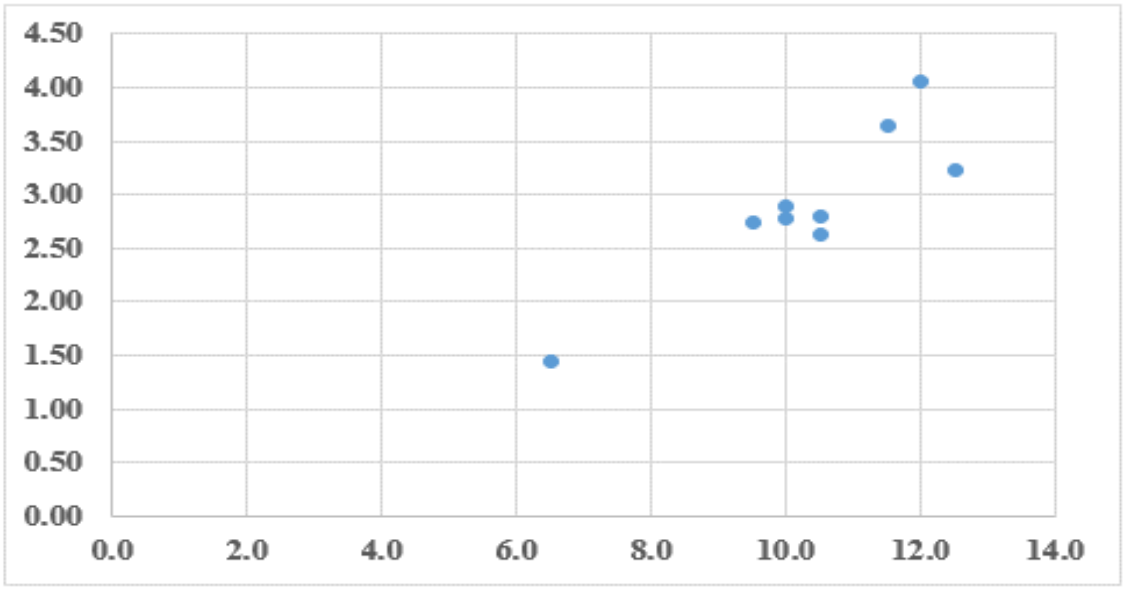


Expected Return on Equity
R-Square = .61, N=9

Source: *Value Line Investment Survey* , 2018.

Exhibit JRW-6
Water Companies
Panel C

Market-to-Book



Expected Return on Equity
R-Square = .81, N=9

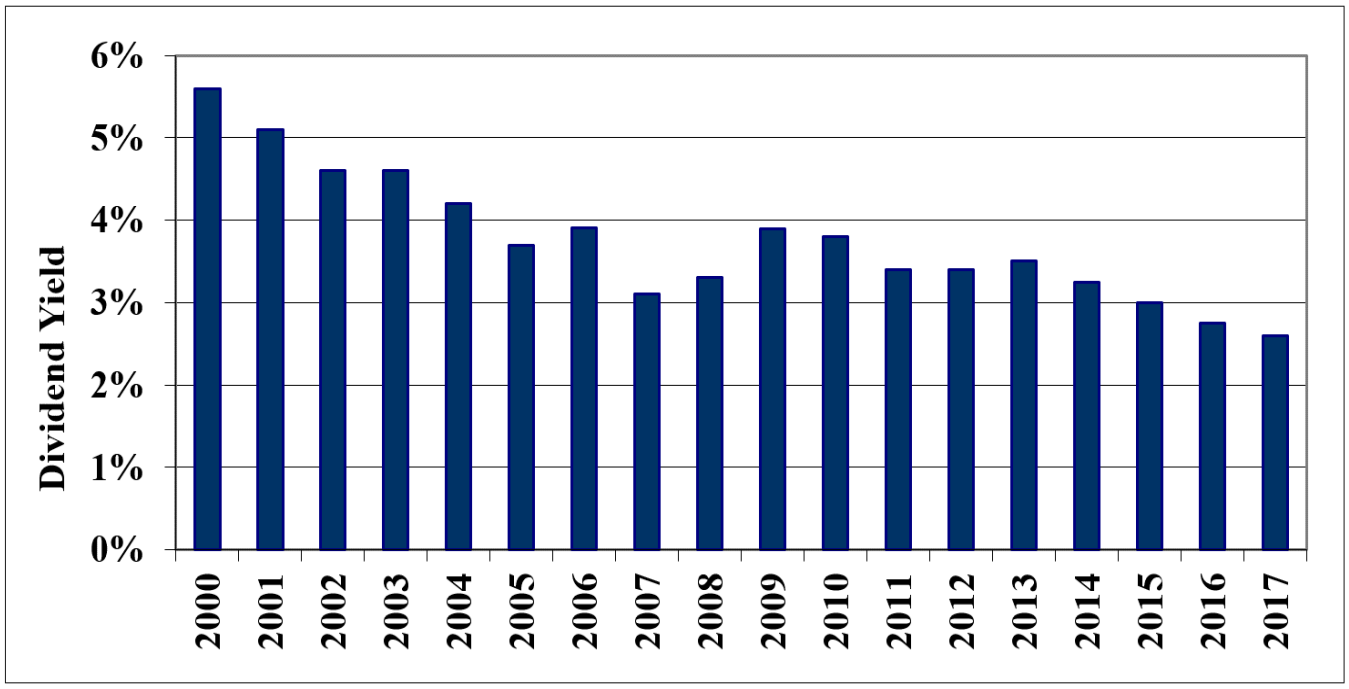
Source: *Value Line Investment Survey* , 2018.

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

Data Source: Mergent Bond Record

Exhibit JRW-7

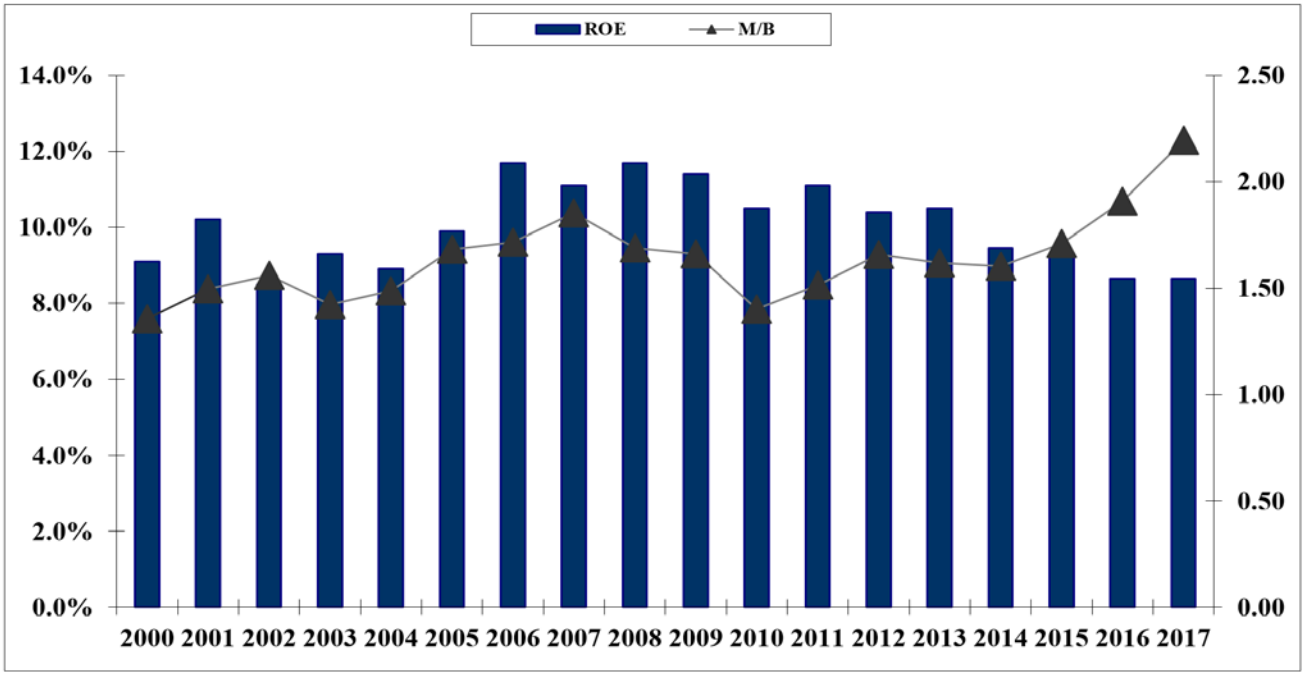
Gas Distribution Company Average Dividend Yield



Data Source: *Value Line Investment Survey.*

Exhibit JRW-7

Gas Distribution Company Average 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
Petroleum (Producing)	1.65	Financial Svcs. (Div.)	1.16	IT Services	1.01
Metals & Mining (Div.)	1.59	Trucking	1.16	Retail Store	1.01
Natural Gas (Div.)	1.57	Newspaper	1.16	Telecom. Services	1.00
Maritime	1.51	Machinery	1.16	Retail (Softlines)	1.00
Oilfield Svcs/Equip.	1.50	Publishing	1.15	Healthcare Information	0.99
Steel	1.49	Retail (Hardlines)	1.15	Funeral Services	0.99
Homebuilding	1.37	Entertainment Tech	1.14	Investment Co.(Foreign)	0.97
Oil/Gas Distribution	1.36	Chemical (Basic)	1.14	Information Services	0.97
Building Materials	1.34	Computer Software	1.14	Medical Services	0.97
Engineering & Const	1.33	Internet	1.13	Environmental	0.97
Metal Fabricating	1.31	Entertainment	1.13	Med Supp Non-Invasive	0.96
Heavy Truck & Equip	1.30	Furn/Home Furnishings	1.13	Med Supp Invasive	0.94
Railroad	1.30	Semiconductor Equip	1.12	Pharmacy Services	0.93
Chemical (Specialty)	1.28	Precision Instrument	1.12	Cable TV	0.92
Petroleum (Integrated)	1.28	Paper/Forest Products	1.11	Restaurant	0.92
Auto Parts	1.27	Wireless Networking	1.11	R.E.I.T.	0.91
Chemical (Diversified)	1.27	Computers/Peripherals	1.10	Thrift	0.90
Pipeline MLPs	1.26	Retail Building Supply	1.09	Beverage	0.89
Insurance (Life)	1.25	Educational Services	1.09	Reinsurance	0.89
Hotel/Gaming	1.24	Bank (Midwest)	1.09	Food Processing	0.87
Biotechnology	1.23	Foreign Electronics	1.08	Insurance (Prop/Cas.)	0.86
Electrical Equipment	1.21	Packaging & Container	1.08	Household Products	0.86
Human Resources	1.21	Shoe	1.08	Precious Metals	0.86
Semiconductor	1.20	Retail Automotive	1.07	Retail/Wholesale Food	0.85
Air Transport	1.20	Bank	1.07	Investment Co.	0.83
Telecom. Equipment	1.20	Industrial Services	1.07	Tobacco	0.79
Power	1.19	Apparel	1.06	Water Utility	0.74
Electronics	1.19	Recreation	1.04	Natural Gas Utility	0.74
Public/Private Equity	1.18	Advertising	1.04	Electric Util. (Central)	0.73
Automotive	1.18	Telecom. Utility	1.04	Electric Utility (West)	0.70
Office Equip/Supplies	1.18	Drug	1.03	Electric Utility (East)	0.63
Diversified Co.	1.17	Toiletries/Cosmetics	1.03		
E-Commerce	1.17	Aerospace/Defense	1.02		

Source: ValueLine Investment Survey, March, 2018.

Exhibit JRW-9
DCF Model

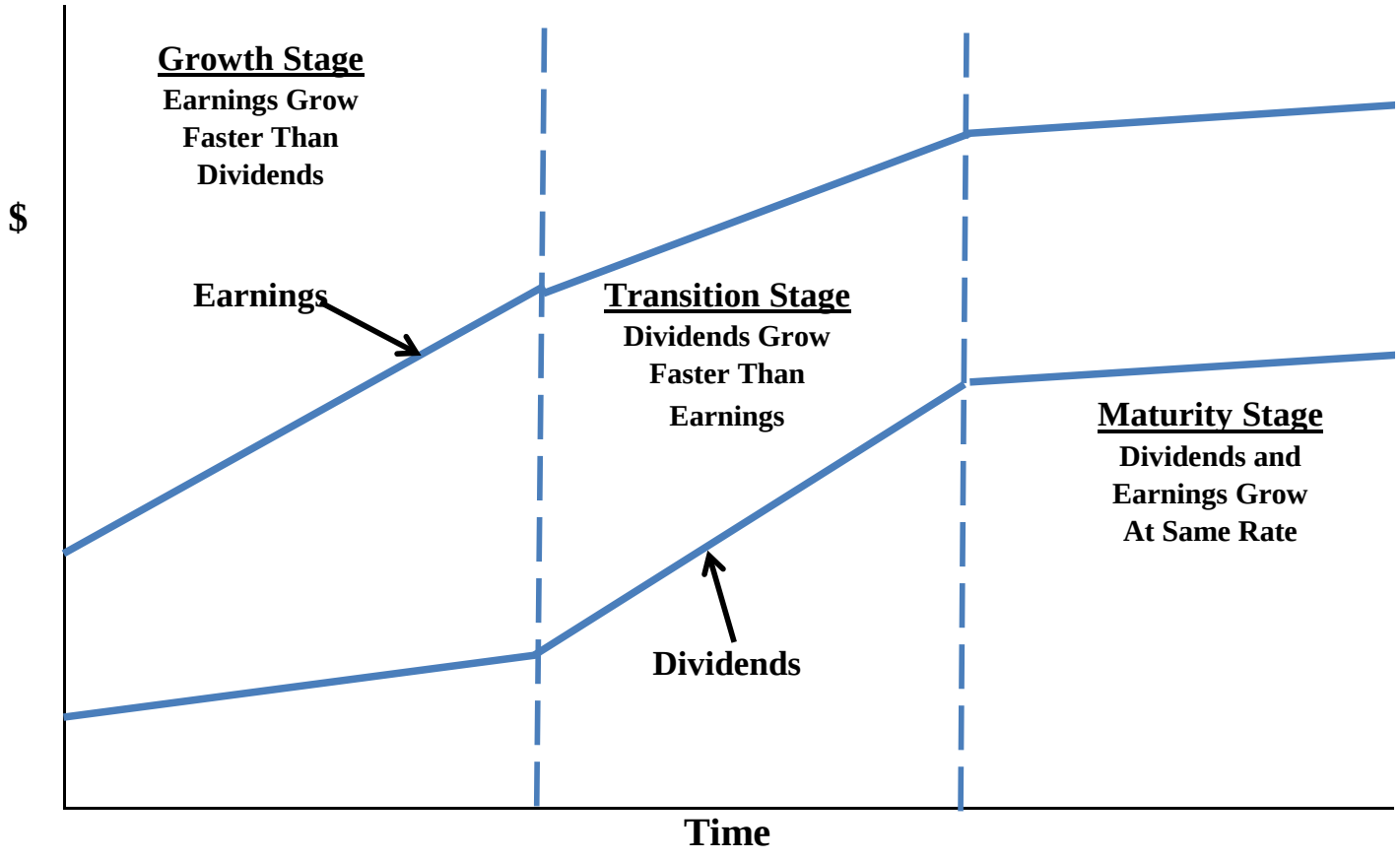


Exhibit JRW-9

DCF Model
Consensus Earnings Estimates
Atmos Energy Corporatrion (ATO)
www.reuters.com
10/9/18

Line	Date	# of Estimates	Mean	High	Low
1	Quarter Ending Sep-18	6	$0.35	$0.38	$0.30
2	Quarter Ending Mar-19	3	$1.70	$1.78	$1.60
3	Year Ending Sep-18	7	$3.95	$4.05	$3.90
4	Year Ending Sep-19	8	$4.26	$4.32	$4.17
5	LT Growth Rate (%)	2	6.95%	7.90%	6.00%

Exhibit JRW-10

Kansas Gas Service
Discounted Cash Flow Analysis

Gas Proxy Group

Dividend Yield*	**2.70%**
Adjustment Factor	**1.03125**
Adjusted Dividend Yield	**2.78%**
Growth Rate**	**6.25%**
Equity Cost Rate	**9.05%**

*** Page 2 of Exhibit JRW-10**

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

Exhibit JRW-10

Kansas Gas Service
Monthly Dividend Yields

Gas Proxy Group

Company	Annual Dividend	Dividend Yield 30 Day	Dividend Yield 90 Day	Dividend Yield 180 Day
Atmos Energy Corporation (NYSE-ATO)	**$1.94**	**2.1%**	**2.1%**	**2.2%**
Chesapeake Utilities (NYSE-CPK)	**$1.48**	**1.7%**	**1.8%**	**1.9%**
New Jersey Resources Corp. (NYSE-NJR)	**$1.17**	**2.5%**	**2.6%**	**2.7%**
Northwest Natural Gas Co. (NYSE-NWN)	**$1.90**	**2.8%**	**2.9%**	**3.1%**
One Gas, Inc. (NYSE-OGS)	**$1.84**	**2.3%**	**2.4%**	**2.5%**
South Jersey Industries, Inc. (NYSE-SJI)	**$1.12**	**3.2%**	**3.3%**	**3.6%**
Southwest Gas Corporation (NYSE-SWX)	**$2.08**	**2.6%**	**2.7%**	**2.8%**
Spire (NYSE-SR)	**$2.25**	**3.0%**	**3.1%**	**3.2%**
Mean		**2.5%**	**2.6%**	**2.8%**
Median		**2.6%**	**2.6%**	**2.8%**

Data Sources: http://quote.yahoo.com, October, 2018.

Exhibit JRW-10

Kansas Gas Service
DCF Equity Cost Growth Rate Measures
***Value Line* Historic Growth Rates**

Gas Proxy Group

Company	*Value Line* Historic Growth					
	Past 10 Years			Past 5 Years		
	Earnings	Dividends	Book Value	Earnings	Dividends	Book Value
Atmos Energy Corporation (NYSE-ATO)	6.0	3.0	5.0	9.0	4.5	6.0
Chesapeake Utilities (NYSE-CPK)	8.5	4.5	9.5	7.5	5.5	10.0
New Jersey Resources Corp. (NYSE-NJR)	7.0	7.5	7.0	5.5	6.5	8.0
Northwest Natural Gas Co. (NYSE-NWN)	-11.5	3.0	2.5	-22.0	1.5	1.0
ONE Gas, Inc. (NYSE-OGS)						
South Jersey Industries, Inc. (NYSE-SJI)	2.5	8.5	7.5	-1.5	7.0	8.0
Southwest Gas Corporation (NYSE-SWX)	6.5	8.0	5.5	5.0	11.0	5.5
Spire (NYSE-SR)	4.0	3.5	7.5	4.0	4.0	9.0
Mean	3.3	5.4	6.4	1.1	5.7	6.8
Median	6.0	4.5	7.0	5.0	5.5	8.0
	Average of Median Figures =			6.0		

Data Source: *Value Line Investment Survey.*

Exhibit JRW-10

Kansas Gas Service
DCF Equity Cost Growth Rate Measures
***Value Line* Projected Growth Rates**

Gas Proxy Group

Company	*Value Line* Projected Growth Est'd. '15-'17 to '21-'23			*Value Line* Sustainable Growth		
	Earnings	Dividends	Book Value	Return on Equity	Retention Rate	Internal Growth
Atmos Energy Corporation (NYSE-ATO)	7.5	7.0	5.5	11.0%	51.0%	5.6%
Chesapeake Utilities (NYSE-CPK)	8.5	9.0	9.0	10.0%	55.0%	5.5%
New Jersey Resources Corp. (NYSE-NJR)	9.5	4.0	9.0	13.0%	58.0%	7.5%
Northwest Natural Gas Co. (NYSE-NWN)	30.5	2.5	1.0	12.0%	37.0%	4.4%
ONE Gas, Inc. (NYSE-OGS)	10.5	10.0	3.0	11.0%	47.0%	5.2%
South Jersey Industries, Inc. (NYSE-SJI)	9.5	4.0	7.0	10.0%	39.0%	3.9%
Southwest Gas Corporation (NYSE-SWX)	9.0	6.5	7.0	10.0%	52.0%	5.2%
Spire (NYSE-SR)	7.5	4.0	3.5	10.5%	40.0%	4.2%
Mean	11.6	5.9	5.6	10.9%	47.4%	5.2%
Median	9.3	5.3	6.3	10.8%	49.0%	5.2%
Average of Median Figures =		6.9			Median =	5.2%

*** 'Est'd. '15-'17 to '21-'23' is the estimated growth rate from the base period 2015 to 2017 until the future period 2021 to 2023.**

Data Source: *Value Line Investment Survey.*

Exhibit JRW-10

Kansas Gas Service
DCF Equity Cost Growth Rate Measures
Analysts Projected EPS Growth Rate Estimates

Gas Proxy Group

Company	Yahoo	Reuters	Zacks	Mean
Atmos Energy Corporation (NYSE-ATO)	7.0%	7.0%	6.5%	6.8%
Chesapeake Utilities (NYSE-CPK)	6.0%	6.0%	6.0%	6.0%
New Jersey Resources Corp. (NYSE-NJR)	7.1%	7.1%	7.0%	7.1%
Northwest Natural Gas Co. (NYSE-NWN)	4.5%	4.5%	4.3%	4.4%
ONE Gas, Inc. (NYSE-OGS)	5.5%	5.5%	5.7%	5.6%
South Jersey Industries, Inc. (NYSE-SJI)	12.0%	NA	12.2%	12.1%
Southwest Gas Corporation (NYSE-SWX)	4.0%	4.0%	NA	4.0%
Spire (NYSE-SR)	3.5%	3.5%	4.0%	3.7%
Mean	6.2%	5.4%	6.5%	6.2%
Median	5.8%	5.5%	6.0%	5.8%

Data Sources: www.reuters.com, www.zacks.com, http://quote.yahoo.com, October, 2018.

Exhibit JRW-10

Kansas Gas Service
DCF Growth Rate Indicators

Gas Proxy Group

Growth Rate Indicator	Gas Proxy Group
Historic *Value Line* Growth in EPS, DPS, and BVPS	6.0%
Projected *Value Line* Growth in EPS, DPS, and BVPS	6.9%
Sustainable Growth ROE * Retention Rate	5.2%
Projected EPS Growth from Yahoo, Zacks, and Reuters - Mean/Median	6.2%/5.8%

Exhibit JRW-11

Kansas Gas Service
Capital Asset Pricing Model

Gas Proxy Group

Risk-Free Interest Rate	**4.00%**
Beta*	**0.68**
Ex Ante Equity Risk Premium**	**5.50%**
CAPM Cost of Equity	**7.7%**

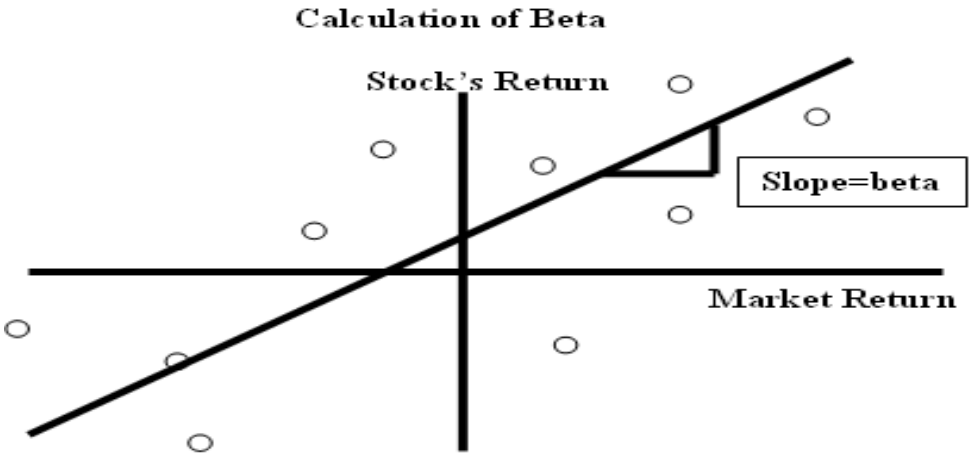
* See page 3 of Exhibit JRW-11

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

Exhibit JRW-11

Thirty-Year U.S. Treasury Yields
2013-2018

Source: Federal Reserve Bank of St. Louis, FRED Database: https://fred.stlouisfed.org/series/DGS30



Gas Proxy Group

Company	Beta
Atmos Energy Corporation (NYSE-ATO)	**0.60**
Chesapeake Utilities (NYSE-CPK)	**0.70**
New Jersey Resources Corp. (NYSE-NJR)	**0.70**
Northwest Natural Gas Co. (NYSE-NWN)	**0.65**
ONE Gas, Inc. (NYSE-OGS)	**0.65**
South Jersey Industries, Inc. (NYSE-SJI)	**0.75**
Southwest Gas Corporation (NYSE-SWX)	**0.75**
Spire (NYSE-SR)	**0.65**
Mean	**0.68**
Median	**0.68**

Data Source: *Value Line Investment Survey* , 2018.

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 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-8

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	2016	1928-2015	Historical Stock Returns - Bond Returns	Arithmetic				6.00%	
					Geometric				4.40%	
	Damodaran	2017	1928-2017	Historical Stock Returns - Bond Returns	Arithmetic				6.24%	
					Geometric				4.62%	
	Dimson, Marsh, Staunton	2015	1900-2014	Historical Stock Returns - Bond Returns	Arithmetic					
					Geometric				4.40%	
	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%	
	Duff & Phelps	2018	Projection	Normalized with 3.5% Long-Term Treasury Yield					5.00%	
	Mschchowski - VL - 2014	2014	Projection	Fundamentals - Expected Return Minus 10-Year Treasury Rate					5.50%	
	American Appraisal Quarterly ERP	2015	Projection	Fundamental Economic and Market Factors					6.00%	
	Damodaran	2017	Projection	Fundamentals - Implied from FCF to Equity Model (Net Cash Yield)					5.10%	
	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									4.00%
Surveys										
	New York Fed	2015	Five-Year	Survey of Wall Street Firms					5.70%	
	Survey of Financial Forecasters	2018	10-Year Projection	About 20 Financial Forecastsers					1.91%	
	Duke - CFO Magazine Survey	2018	10-Year Projection	Approximately 200 CFOs					3.51%	
	Welch - Academics	2008	30-Year Projection	Random Academics		5.00%	5.74%	5.37%	5.37%	
	Fernandez - Academics, Analysts, and Compan	2018	Long-Term	Survey of Academics, Analysts, and Companies					5.40%	
	Median									5.37%
Building Block										
	Ibbotson and Chen	2015	Projection	Historical Supply Model (D/P & Earnings Growth)	Arithmetic			6.22%	5.21%	
					Geometric			4.20%		
	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		2015	Current Supply Model (D/P & Earnings Growth)					4.50%	
	Median									4.12%
Mean										**4.66%**
Median										**4.63%**

Exhibit JRW-8

Capital Asset Pricing Model
Equity Risk Premium

Summary of 2010-16 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	2016	1928-2015	Historical Stock Returns - Bond Returns	Arithmetic				6.00%	
					Geometric				4.40%	
	Damodaran	2018	1928-2017	Historical Stock Returns - Bond Returns	Arithmetic				6.38%	
					Geometric				4.77%	
	Dimson, Marsh, Staunton	2015	1900-2014	Historical Stock Returns - Bond Returns	Arithmetic					
					Geometric				4.40%	
	Median									5.19%
Ex Ante Models (Puzzle Research)										
	Siegel - Rethink ERP	2011	Projection	Real Stock Returns and Components					5.50%	
	Duff & Phelps	2018	Projection	Normalized with 3.5% Long-Term Treasury Yield					5.00%	
	Mschchowski - VL - 2014	2014	Projection	Fundamentals - Expected Return Minus 10-Year Treasury Rate					5.50%	
	American Appraisal Quarterly ERP	2015	Projection	Fundamental Economic and Market Factors					6.00%	
	Damodaran	2017	Projection	Fundamentals - Implied from FCF to Equity Model (Net Cash Yield)					5.10%	
	Median									5.50%
Surveys										
	New York Fed	2015	Five-Year	Survey of Wall Street Firms					5.70%	
	Survey of Financial Forecasters	2018	10-Year Projection	About 20 Financial Forecastsers					1.91%	
	Duke - CFO Magazine Survey	2018	10-Year Projection	Approximately 200 CFOs					3.51%	
	Fernandez - Academics, Analysts, and Companies	2018	Long-Term	Survey of Academics, Analysts, and Companies					5.40%	
	Median									4.46%
Building Block										
	Ibbotson and Chen	2015	Projection	Historical Supply Model (D/P & Earnings Growth)	Arithmetic			6.22%	5.21%	
					Geometric			4.20%		
	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	2015	Projection	Current Supply Model (D/P & Earnings Growth)	Geometric				4.50%	
	Median									4.12%
Mean										**4.82%**
Median										**4.82%**

Exhibit JRW-12

Kansas Gas Service
Company's Proposed Cost of Capital

	Percent of Total	Cost	Weighted Cost Rate
Long-Term Debt	**37.22%**	**3.94%**	**1.46%**
Common Equity	**62.78%**	**10.00%**	**6.28%**
Total Capital	**100.00%**		**7.74%**

Summary of Dr. Fairchild's ROE Results

Panel A

Equity Cost Rate Approaches and Results

Approach	Equity Cost Rate
DCF	9.1% - 10.1%
CAPM	9.74% - 11.59%
RP	9.61% - 9.77%
ROE Recommendation	10.00%

Panel B
DCF Results

	DCF
Adjusted Dividend Yield	2.80%
Growth	6.25% - 7.25%
DCF Result	9.1% - 10.1%

Panel C
CAPM Results

	Historical CAPM	Projected CAPM
Risk-Free Rate	3.13%	3.13%
Beta	0.74	0.74
Market Risk Premium	7.10%	9.60%
CAPM Result	8.38%	10.23%
Size Adjustment	1.36%	1.36%
Adjusted CAPM Result	9.74%	11.59%

Panel D
Risk Premium Results

	Unadjusted RP	Adjusted RP
Base Yield	4.17%	4.17%
Risk Premium	5.38%	5.55%
RP Equity Cost Rate	9.55%	9.72%

Panel E
Comparable Earnings Results

	2018	2019	2021-23
LDC Average	11.30%	10.70%	11.10%

DUFF & PHELPS

Table: Equity Risk Premium & Risk-free Rates

September 5, 2017

For additional information, please visit
www.duffandphelps.com/CostofCapital

Duff & Phelps Recommended U.S. Equity Risk Premium (ERP) and Corresponding Risk-free Rates (R_f); January 2008–Present

Date	Risk-free Rate (R_f)	R_f (%)	Duff & Phelps Recommended ERP (%)	What Changed
Current Guidance: September 5, 2017 – UNTIL FURTHER NOTICE	**Normalized 20-year U.S. Treasury yield**	**3.50**	**5.00**	**ERP**
November 15, 2016 – September 4, 2017	Normalized 20-year U.S. Treasury yield	3.50	5.50	R_f
January 31, 2016 – November 14, 2016	Normalized 20-year U.S. Treasury yield	4.00	5.50	ERP
December 31, 2015	Normalized 20-year U.S. Treasury yield	4.00	5.00	
December 31, 2014	Normalized 20-year U.S. Treasury yield	4.00	5.00	
December 31, 2013	Normalized 20-year U.S. Treasury yield	4.00	5.00	
February 28, 2013 – January 30, 2016	Normalized 20-year U.S. Treasury yield	4.00	5.00	ERP
December 31, 2012	Normalized 20-year U.S. Treasury yield	4.00	5.50	
January 15, 2012 – February 27, 2013	Normalized 20-year U.S. Treasury yield	4.00	5.50	ERP
December 31, 2011	Normalized 20-year U.S. Treasury yield	4.00	6.00	
September 30, 2011 – January 14, 2012	Normalized 20-year U.S. Treasury yield	4.00	6.00	ERP
July 1 2011 – September 29, 2011	Normalized 20-year U.S. Treasury yield	4.00	5.50	R_f
June 1, 2011 – June 30, 2011	Spot 20-year U.S. Treasury yield	Spot	5.50	R_f
May 1, 2011 – May 31, 2011	Normalized 20-year U.S. Treasury yield	4.00	5.50	R_f
December 31, 2010	Spot 20-year U.S. Treasury yield	Spot	5.50	
December 1, 2010 – April 30, 2011	Spot 20-year U.S. Treasury yield	Spot	5.50	R_f
June 1, 2010 – November 30, 2010	Normalized 20-year U.S. Treasury yield	4.00	5.50	R_f
December 31, 2009	Spot 20-year U.S. Treasury yield	Spot	5.50	
December 1, 2009 – May 31, 2010	Spot 20-year U.S. Treasury yield	Spot	5.50	ERP
June 1, 2009 – November 30, 2009	Spot 20-year U.S. Treasury yield	Spot	6.00	R_f
December 31, 2008	Normalized 20-year U.S. Treasury yield	4.50	6.00	
November 1, 2008 – May 31, 2009	Normalized 20-year U.S. Treasury yield	4.50	6.00	R_f
October 27, 2008 – October 31, 2008	Spot 20-year U.S. Treasury yield	Spot	6.00	ERP
January 1, 2008 – October 26, 2008	Spot 20-year U.S. Treasury yield	Spot	5.00	Initialized

"Normalized" in this context means that in months where the risk-free rate is deemed to be abnormally low, a proxy for a longer-term sustainable risk-free rate is used.

To learn more about cost of capital issues, and to ensure that you are using the most recent Duff & Phelps Recommended ERP, visit www.duffandphelps.com/CostofCapital.
To learn more about/purchase Duff & Phelps valuation data resources published by John Wiley & Sons, visit: www.wiley.com/go/ValuationHandbooks.

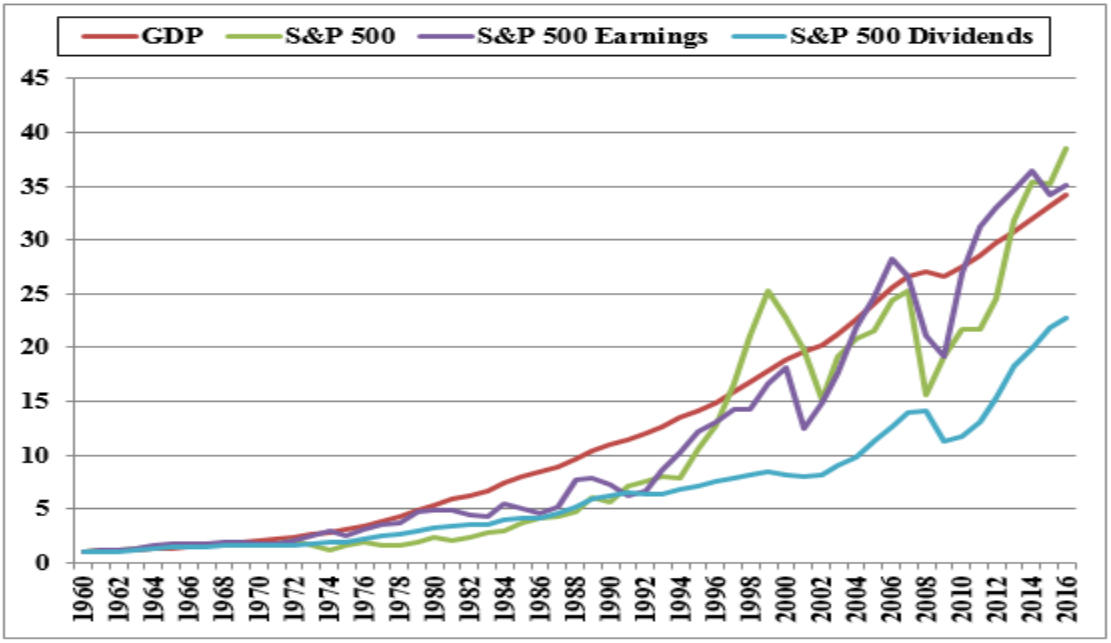
Source: https://www.duffandphelps.com/insights/publications/cost-of-capital/recommended-us-equity-risk-premium-and-corresponding-risk-free-rates

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

	GDP	S&P 500	S&P 500 EPS	S&P 500 DPS	
1960	543.28	58.11	3.10	1.98	
1961	563.30	71.55	3.37	2.04	
1962	605.12	63.10	3.67	2.15	
1963	638.58	75.02	4.13	2.35	
1964	685.79	84.75	4.76	2.58	
1965	743.73	92.43	5.30	2.83	
1966	815.04	80.33	5.41	2.88	
1967	861.73	96.47	5.46	2.98	
1968	942.48	103.86	5.72	3.04	
1969	1,019.88	92.06	6.10	3.24	
1970	1,075.88	92.15	5.51	3.19	
1971	1,167.77	102.09	5.57	3.16	
1972	1,282.45	118.05	6.17	3.19	
1973	1,428.55	97.55	7.96	3.61	
1974	1,548.83	68.56	9.35	3.72	
1975	1,688.92	90.19	7.71	3.73	
1976	1,877.59	107.46	9.75	4.22	
1977	2,085.95	95.10	10.87	4.86	
1978	2,356.57	96.11	11.64	5.18	
1979	2,632.14	107.94	14.56	5.97	
1980	2,862.51	135.76	14.99	6.44	
1981	3,210.96	122.55	15.18	6.83	
1982	3,344.99	140.64	13.82	6.93	
1983	3,638.14	164.93	13.29	7.12	
1984	4,040.69	167.24	16.84	7.83	
1985	4,346.73	211.28	15.68	8.20	
1986	4,590.16	242.17	14.43	8.19	
1987	4,870.22	247.08	16.04	9.17	
1988	5,252.63	277.72	24.12	10.22	
1989	5,657.69	353.40	24.32	11.73	
1990	5,979.59	330.22	22.65	12.35	
1991	6,174.04	417.09	19.30	12.97	
1992	6,539.30	435.71	20.87	12.64	
1993	6,878.72	466.45	26.90	12.69	
1994	7,308.76	459.27	31.75	13.36	
1995	7,664.06	615.93	37.70	14.17	
1996	8,100.20	740.74	40.63	14.89	
1997	8,608.52	970.43	44.09	15.52	
1998	9,089.17	1229.23	44.27	16.20	
1999	9,660.62	1469.25	51.68	16.71	
2000	10,284.78	1320.28	56.13	16.27	
2001	10,621.82	1148.09	38.85	15.74	
2002	10,977.51	879.82	46.04	16.08	
2003	11,510.67	1111.91	54.69	17.88	
2004	12,274.93	1211.92	67.68	19.41	
2005	13,093.73	1248.29	76.45	22.38	
2006	13,855.89	1418.30	87.72	25.05	
2007	14,477.64	1468.36	82.54	27.73	
2008	14,718.58	903.25	65.39	28.05	
2009	14,418.74	1115.10	59.65	22.31	
2010	14,964.37	1257.64	83.66	23.12	
2011	15,517.93	1257.60	97.05	26.02	
2012	16,155.26	1426.19	102.47	30.44	
2013	16,691.52	1848.36	107.45	36.28	
2014	17,427.61	2058.90	113.01	39.44	
2015	18,120.71	2043.94	106.32	43.16	
2016	18,624.48	2238.83	108.86	45.03	**Average**
2017	19,386.20	2673.61	124.94	49.73	
Growth Rates	**6.47**	**6.95**	**6.70**	**5.82**	**6.48**

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	6.47%	6.95%	6.70%	5.82%

Panel A
Historic Nominal GDP Growth Rates

10-Year Average	**2.79%**
20-Year Average	**3.86%**
30-Year Average	**4.45%**
40-Year Average	**5.41%**
50-Year Average	**6.23%**

Calculated using GDP data on Page 1 of Exhibit JRW-15.

Panel B
Projected GDP Growth Rates

	Time Frame	Projected Nominal GDP Growth Rate
Congressional Budget Office	**2018-2048**	**4.0%**
Survey of Financial Forecasters	**Ten Year**	**4.7%**
Social Security Administration	**2018-2095**	**4.4%**
Energy Information Administration	**2017-2050**	**4.3%**

Sources:

Congressional Budget Office,The *2018 Long-Term Budget Outlook* , June 1, 2018.
https://www.cbo.gov/system/files?file=2018-06/53919-2018ltbo.pdf

U.S. Energy Information Administration, *Annual Energy Outlook 2018* , Table: Macroeconomic Indicators, *https://www.eia.gov/outlooks/aeo/data/browser/#/?id=18-AEO2018&sourcekey=0.*

Social Security Administration, 2018 Annual Report of the Board of Trustees of the Old-Age, Survivors, and Disability Insurance (OASDI) Program, Table VI.G4, p. 211(June 15, 2018), https://www.ssa.gov/oact/tr/2018/lr6g4.html. The 4.4% represents the compounded growth rate

CERTIFICATE OF SERVICE

18-KGSG-560-RTS

I, the undersigned, hereby certify that a true and correct copy of the above and foregoing document was served by electronic service on this 29th day of October 2018, to the following:

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