STATE OF NEW HAMPSHIRE
PUBLIC UTILITIES COMMISSION

DOCKET DG 17-070

IN THE MATTER OF: Northern Utilities, Inc.
Request for Change in Rates

DIRECT TESTIMONY

OF

J. RANDALL WOOLRIDGE
CONSULTANT TO STAFF

December 20, 2017

Northern Utilities, Inc.
Docket No. DG 17-070

Direct Testimony of
Dr. J. Randall Woolridge

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I. INTRODUCTION

Q. Please state your full name.

A. My name is J. Randall Woolridge.

Q. By whom are you employed and what is your business address?

A. 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.

Q. What is the purpose of your testimony in this proceeding?

A. I have been asked by the Staff of the New Hampshire Public Utilities Commission to provide an opinion as to the overall fair rate of return or cost of capital for the regulated gas distribution service of Northern Utilities, Inc. ("Northern" or the "Company") and to evaluate Northern's rate of return testimony in this proceeding.

Q. How is your testimony organized?

A. First, I review my cost of equity recommendation for Northern, and review the primary areas of contention between Northern'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 Northern. Third, I discuss the capital structure of the Company. Fourth, I estimate the equity cost rate for

Northern. Finally, I critique the Company's rate of return analysis and testimony. I have included three appendices. 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 Return on Equity ("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* and (2) *Hope*.[1] 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 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.

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 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.

Q. Please review the company's proposed rate of return.

A. The Company has proposed a capital structure of 48.30% long-term debt and 51.70% common equity. The Company has recommended a long-term debt cost rate of 6.16%. Northern witness Mr. Robert B. Hevert has recommended a common equity cost rate of 10.30% for the gas distribution operations of Northern. The Company's overall proposed rate of return is 8.30%.

[1] *Federal Power Commission v. Hope Natural Gas Co.*, 320 U.S. 591 (1944) ("*Hope*") and *Bluefield Water Works and Improvement Co. v. Public Service Commission of West Virginia*, 262 U.S. 679 (1923) ("*Bluefield*").

Q. What are your recommendations regarding the appropriate rate of return for Northern?

A. I have reviewed the Company's proposed capital structure and overall cost of capital. I am using the Company's capital structure of 48.30% long-term debt and 51.70% common equity as well as the Company's has recommended a long-term debt cost rate of 6.16%.

To estimate an equity cost rate for the Company, I have applied the Discounted Cash Flow Model ("DCF") and the Capital Asset Pricing Model ("CAPM") to my proxy group of gas distribution companies ("Gas Proxy Group"). I have also used Mr. Hevert's proxy group ("Hevert Proxy Group"). Mr. Hevert has also employed an alternative risk premium, which he calls a Bond Yield Risk Premium ("BYRP") approach. My recommendation is that the appropriate ROE for the Company is 8.55%. This figure is at the upper end of my equity cost rate range of 7.90% to 8.60%. Combined with my recommended capitalization ratios and senior capital cost rate, my overall rate of return or cost of capital for the Company is 7.40% as summarized in Exhibit JRW-1.

B. Primary Rate of Return Issues in this Case

Q. Please summarize the primary issues regarding rate of return in this proceeding.

A. The primary rate of return issue in this case is the appropriate ROE for the Company. As I discuss below, my equity cost rate recommendation is consistent with the current economic environment. A major point of contention in this case are the alternative assumptions regarding capital market conditions between Mr. Hevert and myself.

Q. Please initially review the differences in opinion regarding the state of the capital markets and capital costs.

A. Mr. Hevert and I have different opinions regarding capital market conditions. Mr. Hevert'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 interest rates and capital costs are at low levels and are likely to remain low for some time. On this issue, I show that the economists' forecasts of higher interest rates and capital costs, which are used by Mr. Hevert, have been consistently wrong for a decade.

Q. On this issue, please review the Federal Reserve's decision to raise the federal funds rate.

A. On December 16, 2015, the Federal Reserve increased its target rate for federal funds to 0.25 – 0.50 percent.[2] 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

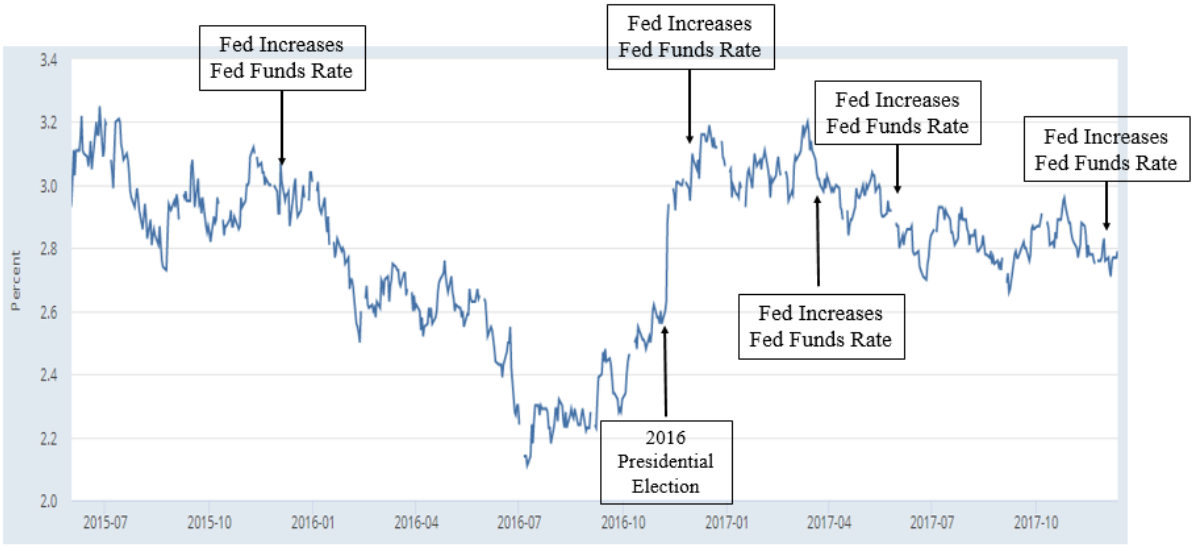
[2] The federal funds rate is set by the Federal Reserve and is the borrowing rate applicable to the most creditworthy financial institutions when they borrow and lend funds overnight to each other.

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 three occasions: December, 2016, March, 2017, June, 2017, and December of 2017.

Q. How have long-term rates responded to the actions of the Federal Reserve?

A. Figure 1 shows the yield on thirty-year Treasury bonds over the 2015-2017 time period. These rates bottomed out in August 2016 and subsequently increased with improvements in the economy. Then came November 8, 2016, and financial markets moved significantly in the wake of the unexpected 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. During 2017, even as the Federal Reserve increased the federal funds rate in March, June and December, the yield on thirty-year bonds decreased to below 3.0%. The bottom line is that despite increases in the short-term federal funds rate, long-term rates have not increased due to relatively slow economic growth and low inflation.

Figure 1
Thirty-Year Treasury Yield
2015-2017



Q. What are the differences between your DCF model and Mr. Hevert's DCF model?

A. I have employed the traditional constant-growth DCF model. Mr. Hevert has also used this model, as well as a multi-stage growth version of the model. There are several errors in Mr. Hevert's DCF analyses: (1) He has given little to no weight to his constant-growth and multi-stage DCF results; (2) In his constant-growth and multi-stage growth DCF analyses, he has relied exclusively on the overly optimistic and upwardly biased EPS growth rate forecasts of Wall Street analysts and *Value Line;* and (3) In his multi-stage DCF model, he has employed a terminal growth rate of 5.48% which is excessive for a number of reasons, especially the fact that it is not reflective of prospective economic growth in the U.S. and is about 100 basis points above the projected long-term growth in

U.S. Gross Domestic Product ("GDP"). On the other hand, when developing the DCF growth rate that I have used in my analysis, I have reviewed thirteen growth rate measures including historical and projected growth rate measures and have evaluated growth in dividends, book value, and earnings per share.

Q. Please discuss the differences between your application of the CAPM and that of Mr. Hevert.

A. The CAPM approach requires an estimate of the risk-free interest rate, beta, and the market or risk premium. The primary issues with Mr. Hevert's CAPM analyses are an inflated projected risk-free interest rate and an excessive market risk premium ("MRP"), both of which do not reflect current market fundamentals. He employs a near-term projected 30-Yreat Treasury rate that is more than 50 basis points above current market rates. With respect to the MRP, I highlight that there are three methods to estimate a MRP – historical returns, surveys, and expected return models. Mr. Hevert uses projected MRPs of 10.39% and 11.12%. Mr. Hevert's projected market risk premiums use 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. I have used a market risk premium of 5.5%, which: (1) employs three different approaches to estimating a market premium; and (2) uses the results of many studies of the market 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. Have you employed an alternative risk premium model?

A. No. The CAPM is a form of the risk premium model, so I believe that using another form of the risk premium model is unnecessary.

Q. Please discuss the errors with Mr. Hevert's alternative BYRP model.

A. Mr. Hevert estimates an equity cost rate using the BYRP model. His BYRP is based on the historical relationship between the yields on long-term Treasury yields and authorized returns on equity ("ROEs") for gas distribution companies. There are several issues with this approach. First, he uses near-term and long-term projected 30-year Treasury yields that are more than 50 and 150 basis points above current market rates. Second, Mr. Hevert's methodology produces an inflated measure of the risk premium because his approach uses historical authorized ROEs and Treasury yields, and the resulting risk premium is applied to projected Treasury yields. Third, Mr. Hevert's BYRP model 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 not only 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. Hevert's BYRP 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. Finally, the BYRP model is inflated as a measure of 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.

Q. Are these errors reflected in the differences between Mr. Hevert's BYRP results and the average state-level authorized roes for gas distribution companies nationwide?

A. Yes. Mr. Hevert's BYRP equity cost rate estimates for gas distribution companies range from 9.93% to 10.24%. These figures overstate actual state-level authorized ROEs. The authorized ROEs for gas distribution companies have declined over time. The annual averages were 9.94% in 2012, 9.68% in 2013, 9.78% in 2014, 9.60% in 2015, 9.50% in 2016, and 9.61% in the first three quarters of 2017, according to Regulatory Research Associates.[3]

[3] *Regulatory Focus*, Regulatory Research Associates, October, 2017. This calculation omits 11.88% ROE for an Alaskan utility, which RRA labels an "outlier."

Q. What are the other differences between your equity cost rate analyses and Mr. Hevert's?

A. There are two other issues.

Mr. Hevert's consideration of equity flotation costs and size in his determination of the appropriate ROE for Northern. With respect to an adjustment for flotation costs, Mr. Hevert has not cited any prospective equity issues by Northern's parent company. The Company should not be rewarded with a higher ROE that includes flotation costs that the Company does not expect to incur. Mr. Hevert's consideration of a size premium is also erroneous, since the size of the Company is a consideration in its credit ratings.

Q. Please summarize the primary differences between your position and the Company's position regarding the Company's cost of capital.

A. In the end, the most significant areas of disagreement in measuring the Company's cost of capital are:

(1) Mr. Hevert's analyses and ROE results and recommendations are based on the assumption of higher interest rates and capital costs. I review current market conditions and conclude that interest rates and capital costs are at low levels and are likely to remain low for some time;

(2) Mr. Hevert's DCF equity cost rate estimates, and in particular the fact that: (a) He has given very little weight if any to his DCF results; (b) In his constant-growth and multi-stage growth DCF analyses, he has relied exclusively on the overly optimistic and upwardly biased EPS growth rate forecasts of Wall Street

analysts and *Value Line*; and (c) In his multi-stage DCF model, he has employed a terminal growth rate of 5.48% which is about 100 basis points above the projected long-term growth in U.S. GDP;

(3) The projected interest rates and market or equity risk premiums in Mr. Hevert's CAPM and RP approaches are inflated and are not reflective of market realities or expectations;

(4) Mr. Hevert's conclusion with respect to the consideration of flotation costs and the size of the Company in arriving at a recommended ROE.

II. PROXY GROUP SELECTION

Q. Please describe your approach to developing a fair rate of return recommendation for Northern.

A. To develop a fair rate of return recommendation for the Company, 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 companies.

A. The Gas Proxy Group consists of seven natural gas distribution companies covered by the *Value Line Investment Survey*. The companies include Atmos Energy, 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 Panel A of page 1 of Exhibit JRW-4. The median operating revenues and net plant among members of the Gas Proxy Group are $1,537.3 million and $3,287.2 million, respectively. The group receives, on average, 74% of revenues from regulated gas operations, and has an 'A-' average issuer credit rating from S&P, a median common equity ratio of 50.9%, and a median earned return on common equity of 9.4%.

Q. Please describe your Hevert Proxy Group.

A. The Hevert Proxy Group consists of eight companies, including four natural gas distribution companies and four combination electric and gas companies, covered by the *Value Line Investment Survey*. The gas companies include Atmos Energy, Northwest Natural Gas Company, Southwest Gas, and Spire, Inc.The combination companies include Black Hills Corp., CenterPoint Energy, Sempra Energy, and Vectren.

Summary financial statistics for the Hevert Proxy Group are listed on Panel B of page 1 of Exhibit JRW-4. The median operating revenues and net plant among members of the Hevert Proxy Group are $2,451.5 million and $4,437.9 million, respectively. The group receives, on average, 43% of revenues from regulated gas operations, and has an 'A-' average issuer credit rating from S&P, a median common equity ratio of 47.6%, and a median earned return on common equity of 9.0%.

Q. How does the investment risk of the Company compare to that of the proxy groups?

A. I believe that bond ratings provide a good assessment of the investment risk of a company. Exhibit JRW-4 also shows S&P issuer credit ratings for the companies in the Gas and Hevert Proxy Groups. These average S&P issuer credit rating for both groups is A-. Northern is not rated by any rating agencies. Northern's parent, Unitil, is rated BBB+ by S&P. Therefore, Northern's with is at the high end of the range of the two proxy groups.

Q. How does the investment risk of the two groups compare based on the various risk metrics published by *Value Line*?

A. On page 2 of Exhibit JRW-4, I have assessed the riskiness of the two groups using five different risk measures – Beta, Financial Strength, Safety, Earnings Predictability, and Stock Price Stability. The risk measures comparisons are: Beta (0.75 vs. 0.78), Financial Strength (A vs. A) Safety (1.7 vs. 2.0), Earnings Predictability (81 vs. 81), and Stock Price Stability (89 vs. 91). Overall, these risk measures suggest that the investment risk of the two groups is low, and that there is not a large risk differential between the Gas and Hevert Proxy Groups.

III. CAPITAL STRUCTURE RATIOS AND DEBT COST RATES

Q. Please describe Northern's proposed capital structure and senior capital cost rate.

A. The Company has proposed a capital structure of 48.30% long-term debt and 51.70% common equity and long-term debt cost rate of 6.16%.

Q. What are your recommendations regarding the appropriate rate of return for Northern?

A. The Company's proposed capital structure includes a common equity ratio that is slightly higher than the averages of the Gas and Hevert Proxy Groups. Nonetheless, it is not out-of-line with these averages, and therefore I will use the proposed capital structure. I also will adopt the long-term debt cost rate of 6.16&.

IV. THE COST OF COMMON EQUITY CAPITAL

A. DCF 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 riskiness of the expected cash flows, is interpreted as the market's expected or required return on the common stock. Therefore, this discount rate represents the cost of common equity. Algebraically, the DCF model can be expressed as:

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

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

Q. Is the DCF model consistent with valuation techniques employed by investment firms?

A. Yes. Virtually all investment firms use some form of the DCF model as a valuation technique. One common application for investment firms is called the three-stage DCF or dividend discount model ("DDM"). The stages in a three-stage DCF model are presented in Exhibit JRW-9, Page 1 of 2. This model presumes that a company's dividend payout progresses initially through a growth stage, then proceeds through a transition stage, and finally assumes a 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 the unusually high earnings, leading to a decline in the growth rate.

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

3. Maturity (steady-state) stage: Eventually, the company reaches a position where its new investment opportunities offer, on average, only slightly attractive 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 DCF model appropriate for public utilities?

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

the primary problem and controversy in applying the DCF model to estimate 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 measured precisely 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 the 30-day, 90-day, and 180-day average stock prices. These dividend yields are provided on Panel A of 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 2.6%. I am using the average of the medians, 2.50%, as the dividend yield for the Gas Proxy Group.

The dividend yields for the Hevert Proxy Group are shown in Panel B of page 2 of Exhibit JRW-10. The median dividend yields range from 2.8% to 2.9% using the 30-day, 90-day, and 180-day average stock prices. I am using the average of the medians, 2.80%, as the dividend yield for the Hevert 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.[4]

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

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

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:

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

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 proxy group?

A. I have analyzed a number of measures of growth for companies in the 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 also

assessed prospective growth as measured by prospective earnings retention rates and earned returns on common equity.

Q. Please discuss historical growth in earnings and dividends as well as internal growth.

A. Historical growth rates for EPS, DPS, and BVPS are readily available to investors and are presumably an important ingredient in forming expectations concerning future growth. However, one must use historical growth numbers as measures of investors' expectations with caution. 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-run earnings and, therefore, dividends. Investors recognize the importance of internally generated growth and pay premiums for stocks of companies that retain earnings and earn high returns on internal investments.

Q. Please discuss the services that 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 Corporation (stock symbol "ATO"). The figures are provided on page 2 of Exhibit JRW-9. Line one shows that one analyst has provided EPS estimates for the quarter ending September 30, 2017. The mean, high and low estimates are $0.34, $0.37, and $0.32, respectively. The second line shows the quarterly EPS estimates for the quarter ending December 31, 2017 of $1.55 (mean), $1.59 (high), and $1.53 (low). Line three shows the annual EPS estimates for the fiscal year ending December 2017 ($3.61 (mean), $3.65 (high), and $3.57 (low). Line four shows the annual EPS estimates for the fiscal year ending December 2018 ($3.83 (mean), $3.99 (high), and $3.00 (low).The quarterly and annual EPS forecasts in lines 1-4 are expressed in dollars and cents. As in the ATO case shown here, it is more common for 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, one analysts has provided a long-term EPS growth rate forecast, with mean, high, and low growth rates of 6.70%, 6.70%, and 6.70%.

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 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, dividend and earnings will have to grow at a similar growth rate. Therefore, consideration must be given to other indicators of growth, including prospective dividend growth, internal growth, as well as projected earnings growth. Second, a recent study by Lacina, Lee, and Xu (2011) has shown that analysts' long-term earnings growth rate forecasts are not more accurate at forecasting future earnings than naïve random walk forecasts of future earnings.[5] [6] Employing data over a twenty-year period, these authors demonstrate that using the most recent year's EPS figure to forecast EPS in the next 3-5 years proved to be just as accurate as using the EPS estimates from analysts' long-term earnings growth rate forecasts. In the authors' opinion, these results indicate that analysts' long-term earnings growth rate forecasts should be used with caution as inputs for valuation and cost of capital purposes. Finally, and most significantly, it is well known that the long-term EPS growth rate forecasts of Wall Street securities analysts are overly optimistic and upwardly biased. This has been demonstrated in a number of academic studies over the

[5] If earning per share follow a random walk, then year-to-year changes in earnings per share are independent. As a result, there is no discernable trend in earnings per share, and the best estimate of next year's earnings per share is this year's earnings per share.

[6] 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.

years.[7] 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.[8]

Q. Is it your opinion that stock prices reflect the upward bias in the EPS growth rate forecasts?

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

Q. How does that affect the use of these forecasts in a DCF equity cost rate study?

A. According to the DCF model, the equity cost rate is a function of the dividend yield and expected growth rate. 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.

[7] 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).

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

Q. Please discuss the historical growth of the companies in the proxy groups, as provided by V*alue 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 proxy groups, as published in the *Value Line Investment Survey.* For the Gas Proxy Group, as shown in Panel A, the median historical growth measures for EPS, DPS, and BVPS for the Gas Proxy Group range from 5.3% to 6.5%, with an average of the medians of 5.8%. The range of the medians for the Hevert Proxy Group, shown in Panel B of page 3 of Exhibit JRW-10, is from 3.5% to 5.3%, with an average of the medians of 4.3%.

Q. Please summarize V*alue Line's* projected growth rates for the companies in the proxy group.

A. *Value Line's* projections of EPS, DPS, and BVPS growth for the companies in the 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 on Panel A of page 4 of Exhibit JRW-10, the medians range from 4.5% to 7.0%, with an average of the medians of 5.5%. The range of the medians for the Hevert Proxy Group, shown in Panel B of page 4 of Exhibit JRW-10, is from 4.0% to 7.0%, with an average of the medians of 5.3%.

Also provided on page 4 of Exhibit JRW-10 are the prospective sustainable growth rates for the companies in the two proxy groups as measured by *Value Line*'s average projected retention rate and return on shareholders' equity. As

noted above, sustainable growth is a significant and a primary driver of long-run earnings growth. For the Gas and Hevert Proxy Groups, the median prospective sustainable growth rates are 4.4% and 4.9%, respectively.

Q. Please assess growth for the 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 proxy group. These forecasts are provided for the companies in the proxy groups 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 and Hevert Proxy Groups are 5.7%/6.0% and 5.9%/5.5%%, respectively.[9]

Q. Please summarize your analysis of the historical and prospective growth of the proxy groups.

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

[9] Given variation in the measures of central tendency of analysts' projected EPS growth rates 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 5.8%. The average of the projected EPS, DPS, and BVPS growth rates from *Value Line* is 5.5%, and *Value Line*'s projected sustainable growth rate is 4.4%. The projected EPS growth rates of Wall Street analysts for the Gas Proxy Group are 5.7% and 6.0% as measured by the mean and median growth rates. The overall range for the projected growth rate indicators (ignoring historical growth) is 4.4% to 6.0%. Giving primary weight to the projected EPS growth rate of Wall Street analysts, I believe that the appropriate projected growth rate range is 5.85%. This growth rate figure is clearly in the upper end of the range of historic and projected growth rates for the Gas Proxy Group.

For the Hevert Proxy Group, the historical growth rate indicators indicate a growth rate of 4.3%. The average of the projected EPS, DPS, and BVPS growth rates from *Value Line* is 5.3%, and *Value Line*'s projected sustainable growth rate is 4.9%. The projected EPS growth rates of Wall Street analysts are 5.9% and 5.5% as measured by the mean and median growth rates. The overall range for the projected growth rate indicators is 5.3% to 5.9%. Giving primary weight to the projected EPS growth rate of Wall Street analysts, I believe that the appropriate projected growth rate is 5.7% for the Hevert Group. This growth rate figure is in the upper end of the range of historic and projected growth rates for the Hevert Proxy Group.

Q. What are the results from your application of the DCF model?

A. My DCF-derived equity cost rate for the group are 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	**2.50%**	**1.02925**	**5.85%**	**8.45%**
Hevert Proxy Group	**2.80%**	**1.02850**	**5.70%**	**8.60%**

The result for the Gas Proxy Group is the 2.50% dividend yield, times the one and one-half growth adjustment of 1.02925, plus the DCF growth rate of 5.85%, which results in an equity cost rate of 8.45%. The result for the Hevert Proxy Group is 8.60%, which includes a dividend yield of 2.80%, an adjustment factor of 1.0285, and a DCF growth rate of 5.70%.

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

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 a little more difficult to measure because there are different

opinions about what adjustments, if any, should be made to historical betas due to their tendency to regress to 1.0 over time. And finally, an even more difficult input to measure is the expected equity or market risk premium ($E(R_m) - (R_f)$). I will discuss each of these inputs below.

Q. 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 2013–2017 time period. The 30-year Treasury yield is currently in the middle of this range. Given the recent range of yields and the possibility of higher interest rates, I use 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. 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: (1) the time period over which ß is measured; and (2) any adjustments that are made to reflect the fact that betas tend to regress to 1.0 over time. In estimating an equity cost rate for the proxy group, I am using the betas for the companies as provided in the *Value Line Investment Survey*. As shown on page 3 of Exhibit JRW-11, the median betas for the companies in the Gas and Hevert Proxy Group are 0.70. and 0.78.

Q. Please discuss the market risk premium ("MRP").

A. The 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.[10]

[10] Merton Miller, "The History of Finance: An Eyewitness Account," *Journal of Applied Corporate Finance*, 2000, P. 3.

Q. Please discuss the alternative approaches to estimating the MRP.

A. Page 4 of Exhibit JRW-11 highlights the primary approaches to, and issues in, estimating the expected MRP. The traditional way to measure the MRP was to use the difference between historical average stock and bond returns. In this case, historical stock and bond returns, also called ex post returns, were used as the measures of the market's expected return (known as the *ex ante* or forward-looking expected return). This type of historical evaluation of stock and bond returns is often called the "Ibbotson approach" after Professor Roger Ibbotson, who popularized this method of using historical financial market returns as measures of expected returns. Most historical assessments of the 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 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.[11]

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.[12] Questions regarding expected stock and bond returns are also included in the Federal Reserve Bank of Philadelphia's annual survey of financial forecasters, which is published as the *Survey of Professional Forecasters*.[13] This survey of professional economists has been published for almost fifty 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.[14]

Q. Please provide a summary of the MRP studies.

[11] Rajnish Mehra & Edward C. Prescott, "The Equity Premium: A Puzzle," *Journal of Monetary Economics*, 145 (1985).
[12] *See* DUKE/CFO Magazine Global Business Outlook Survey, www.cfosurvey.org, September, 2017).
[13] Federal Reserve Bank of Philadelphia, *Survey of Professional Forecasters (Feb, 2017).* 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.
[14] Pablo Fernandez, Alberto Ortiz and Isabel Fernandez Acín, "Market Risk Premium used in 71 countries in 2017." April 2017.

A. Derrig and Orr (2003), Fernandez (2007), and Song (2007) have completed the most comprehensive reviews to date of the research on the MRP.[15] Derrig and Orr's study evaluated the various approaches to estimating MRPs, as well as the issues with the alternative approaches and summarized the findings of the published research on the MRP. Fernandez examined four alternative measures of the MRP – historical, expected, required, and implied. He also reviewed the major studies of the MRP and presented the summary MRP results. Song provides an annotated bibliography and highlights the alternative approaches to estimating the 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 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

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

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 thirty 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 fifty years of data) and so were not estimating an MRP as of a specific point in time (e.g., the year 2001). To assess the effect of the earlier studies on the MRP, I have reconstructed page 5 of Exhibit JRW-11 on page 6 of Exhibit JRW-11; however, I have eliminated all studies dated before January 2, 2010. The median for this subset of studies is 5.07%.

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 2017 CFO survey conducted by *CFO Magazine* and Duke University, which included approximately 300 responses, the expected 10-year MRP was 4.32%.[16] 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. The financial forecasters in the previously referenced Federal Reserve Bank of Philadelphia survey projected both stock and bond returns. In the February 2017 survey, the median long-term expected stock and bond returns were 5.60% and 3.68%, respectively. This provides an expected MRP of 1.92% (5.60%-3.68%). Again, 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 2017 survey of academics, financial analysts, and companies.[17] This survey included over 4,000 responses. The median MRP employed by U.S. analysts and companies was 5.7%.

[16] *Id*. p. 42.
[17] *Ibid.* p. 3.

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 2017, Duff & Phelps recommended using a 5.5% MRP for the U.S, with a normalized risk-free interest rate of 3.5%.[18]

Q. What equity cost rate is indicated by your CAPM analysis?

A. The results of my CAPM study for the 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%**	**0.70**	**5.5%**	**7.90%**
Hevert Proxy Group	**4.0%**	**0.78**	**5.5%**	**8.30%**

For the Gas Proxy Group, the risk-free rate of 4.0% plus the product of the beta of 0.70 times the equity risk premium of 5.5% results in a 7.90% equity cost rate. For the Hevert Proxy Group, the risk-free rate of 4.0% plus the product of the beta of 0.78 times the equity risk premium of 5.5% results in a 8.3% equity cost rate.

[18] *See* http://www.duffandphelps.com/insights/publications/cost-of-capital/index.

D. Equity Cost Rate Summary

Q. Please summarize the results of your equity cost rate studies.

A. My DCF analyses for the Gas and Hevert Proxy Groups indicate equity cost rates of 8.45% and 8.60%, respectively. The CAPM equity cost rates for both groups are 7.9% and 8.3%, respectively.

Table 3
ROEs Derived from DCF and CAPM Models

	DCF	CAPM
Gas Proxy Group	**8.45%**	**7.90%**
Hevert Proxy Group	**8.60%**	**8.30%**

Q. Given these results, what is your estimated equity cost rate for the group?

A. Given these results, I conclude that the appropriate equity cost rate for companies in the Gas Proxy group is in the 7.90% to 8.60% range. However, since I rely primarily on the DCF model, I am using the upper end of the range as the equity cost rate. In addition, given that Northern is in the upper end of the spectrum of the investment risk of the proxy group companies, I conclude that the appropriate equity cost rate for the Company is 8.55%.

Q. Please indicate why an equity cost rate of 8.55% is appropriate for the gas operations of Northern.

A. There are a number of reasons why an equity cost rate of 8.55% is appropriate 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 low levels. In addition, given low

inflationary expectations and slow global economic growth, interest rates are likely to remain at low levels for some time.

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 amongst the lowest in the U.S., according to the CAPM.

4. The investment risk of Northern, as indicated by the Company's S&P credit ratings, is at the upper end of the risk level of the two proxy group. Therefore, I have used the upper end of the equity cost rate range (8.55%).

5. These authorized ROEs for gas distribution companies have declined in recent years. The average authorized ROE was 10.01% in 2012, 9.8% in 2013, 9.76% in 2014, 9.58% in 2015, 9.54% in 2016, and 9.61% in 2017 according to Regulatory Research Associates.[19] In my opinion, these 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. Hence, I believe that my recommended ROE reflects our present low capital cost rates, and these low capital cost rates are now being recognized by state utility commissions.

Q. Please discuss your recommendation in light of a recent Moody's publication on the subject of utility company ROEs and credit quality.

A. Moody's recently published an article on utility ROEs and credit quality. In the article, Moody's recognizes that authorized ROEs for electric and gas companies

[19] *Regulatory Focus*, Regulatory Research Associates, October, 2017. This calculation omits 11.88% ROE for an Alaskan utility, which RRA labels an "outlier."

are declining due to lower interest rates. [20]

> The credit profiles of US regulated utilities will remain intact over the next few years despite our expectation that regulators will continue to trim the sector's profitability by lowering its authorized returns on equity (ROE). Persistently low interest rates and a comprehensive suite of cost recovery mechanisms ensure a low business risk profile for utilities, prompting regulators to scrutinize their profitability, which is defined as the ratio of net income to book equity. We view cash flow measures as a more important rating driver than authorized ROEs, and we note that regulators can lower authorized ROEs without hurting cash flow, for instance by targeting depreciation, or through special rate structures.

Moody's indicates that with the lower authorized ROEs, electric and gas companies are earning ROEs of 9.0% to 10.0%, but this is not impairing their credit profiles and is not deterring them from raising record amounts of capital. With respect to authorized ROEs, Moody's recognizes that utilities and regulatory commissions are having trouble justifying higher ROEs in the face of lower interest rates and cost recovery mechanisms.[21]

> Robust cost recovery mechanisms will help ensure that US regulated utilities' credit quality remains intact over the next few years. As a result, falling authorized ROEs are not a material credit driver at this time, but rather reflect regulators' struggle to justify the cost of capital gap between the industry's authorized ROEs and persistently low interest rates. We also see utilities struggling to defend this gap, while at the same time recovering the vast majority of their costs and investments through a variety of rate mechanisms.

Overall, this article further supports the prevailing/emerging belief that lower

[20] Moody's Investors Service, "Lower Authorized Equity Returns Will Not Hurt Near-Term Credit Profiles," March 10, 2015.
[21] Moody's Investors Service, "Lower Authorized Equity Returns Will Not Hurt Near-Term Credit Profiles," March 10, 2015.

authorized ROEs are unlikely to hurt the financial integrity of utilities or their ability to attract capital.

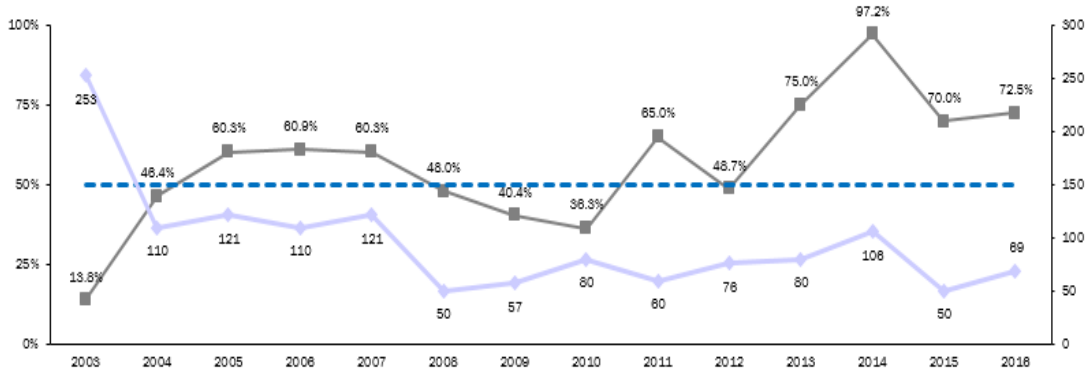
Q. Do you believe that your 8.55% ROE recommendation meets *Hope* and *Bluefield* standards?

A. Yes. 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.

Utilities have been earning ROEs of about 9.0% (on average) in recent years. As shown on page 1 of Exhibit JRW-4, the median earned ROE for the year 2016 for the companies in the Gas and Hevert Proxy Groups are 9.4% and 9.0%. Given this level of return, the credit ratings of utility companies are going up. Figure 2 shows the rating actions from 2003-2017.[22] The bottom line is the number of rating actions, and the top line is the percentage of upgrades. The percentage of upgrades have been at least 70% over the past four years. This provides direct evidence that the investment risk of utility companies is low and declining.

[22] http://www.eei.org/resourcesandmedia/industrydataanalysis/industryfinancialanalysis/QtrlyFinancialUpdates/Pages/default.aspx

Figure 2
Electric Utility Rating Actions and Percentage of Credit Upgrades
2003-2017



Source: Edison Electric Institute, 2017.

Q. Are utilities able to attract capital with the lower ROEs?

A. Moody's also highlights in the article that utilities are raising about $50 billion a year in debt capital, despite the lower ROEs.[23] Therefore, I believe that my ROE recommendation meets the criteria established in the *Hope* and *Bluefield* decisions.

Q. Have the lower ROEs hurt the stock performance of utility stocks?

A. No. Figure 3 shows the Dow Jones Utility Index ("DJU") versus the S&P 500 since January 1, 2017.[24] Both the DJU and the S&P 500 are near or have achieved record levels, and the DJU has performed right along with the S&P 500 over this time period. As a result, with high stock prices, utility dividend yields and DCF equity cost rates are low.

[23] *Ibid.*
[24] https://finance.yahoo.com/.

Figure 4
Dow Jones Utilities vs. S&P 500
2017

V. CRITIQUE OF NORTHERN'S RATE OF RETURN TESTIMONY

Q. Please summarize the company's rate of return recommendation.

A. The Company has proposed a capital structure of 48.30% long-term debt and 51.70% common equity. The Company has recommended a long-term debt cost rate of 6.16%. Northern witness Mr. Robert B. Hevert has recommended a common equity cost rate of 10.30% for the gas distribution operations of Northern. The Company's overall proposed rate of return is 8.30%. This is summarized in Exhibit JRW-12.

Q. Please review Mr. Hevert's equity cost rate approaches and results.

A. Mr. Hevert has developed a proxy group of gas distribution companies and employs DCF, CAPM, and RP equity cost rate approaches. Mr. Hevert's equity cost rate estimates for the Company are summarized on page 1 of Exhibit JRW-

13. Based on these figures, he concludes that the appropriate equity cost rate for the Company is 10.30%. As I discuss below, there are a number of issues with the inputs, applications, and results of his equity cost rate models.

Q. What issues do you have with the Company's cost of capital position?

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

(1) Mr. Hevert's analyses and ROE results and recommendations are based on the assumption of higher interest rates and capital costs. I review current market conditions and conclude that interest rates and capital costs are at low levels and are likely to remain low for some time;

(2) Mr. Hevert's DCF equity cost rate estimates, and in particular the fact that: (a) He has given very little weight if any to his DCF results; (b) In his constant-growth and multi-stage growth DCF analyses, he has relied exclusively on the overly optimistic and upwardly biased EPS growth rate forecasts of Wall Street analysts and *Value Line*; and (c) In his multi-stage DCF model, he has employed a terminal growth rate of 5.48% which is about 100 basis points above the projected long-term growth in U.S. GDP;

(3) The projected interest rates and market or equity risk premiums in Mr. Hevert's CAPM and RP approaches are inflated and are not reflective of market realities or expectations;

(4) Mr. Hevert's consideration of flotation costs and the size of the Company in arriving at a recommended ROE.

A. The Company's DCF Approach

Q. Please summarize Mr. Hevert's DCF estimates.

A. On pages 12-27 of his testimony and in Schedules RBH-3 - RBH-5, Mr. Hevert develops an equity cost rate by applying the DCF model to the Hevert Proxy Group. Mr. Hevert's DCF results are summarized in Panel A of page 1 of Exhibit JRW-13. He uses constant-growth and multistage growth DCF models. Mr. Hevert uses three dividend yield measures (30, 90, and 180 days) in his DCF models. In his constant-growth DCF models, Mr. Hevert has relied on the forecasted EPS growth rates of Zacks, First Call, and *Value Line*. His multi-stage DCF model uses analysts' EPS growth rate forecasts as a short-term growth rate and his projection of GDP growth as the long-term growth rate. For all three models, he reports Mean Low, Mean, and Mean High results

Q. What are the errors in Mr. Hevert's DCF analyses?

A. The primary issues in Mr. Hevert's DCF analyses are: (1) the lack of weight he gives to his constant-growth DCF results, (2) his exclusively use of the overly optimistic and upwardly biased EPS growth rate forecasts of Wall Street analysts and *Value Line*, and (3) the use of an inflated terminal growth rate of 5.48% in his multi-stage DCF model that it is not reflective of prospective economic growth

in the U.S. and is about 100 basis points above the projected long-term GDP growth;

1. The Low Weight Given to the Constant-Growth DCF Results

Q. How much weight has Mr. Hevert given his DCF results in arriving at an equity cost rate for the company?

A. Apparently, very little, if any at all. The average of all of his mean constant-growth and multi-stage stage DCF equity cost rates is only 9.10%. Had he given these results more weight, or even any weight, he would have arrived at a much lower equity cost rate recommendation.

2. Analysts' EPS Growth Rate Forecasts

Q. Please discuss Mr. Hevert's exclusive reliance on the projected growth rates of Wall Street analysts and *Value Line.*

A. It seems highly unlikely that investors today would rely exclusively on the EPS growth rate forecasts of Wall Street analysts and ignore other growth rate measures in arriving at their expected growth rates for equity investments. As I previously indicated, the appropriate growth rate in the DCF model is the dividend growth rate, not the earnings growth rate. Hence, consideration must be given to other indicators of growth, including historical prospective dividend growth, internal growth, as well as projected earnings growth. In addition, a recent study by Lacina, Lee, and Xu (2011) 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.[25] As such, the weight given to analysts' projected EPS growth rates should be limited. And 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.[26] Hence, using these growth rates as a DCF growth rate produces an overstated equity cost rate. A recent study by Easton and Sommers (2007) found that optimism in analysts' earnings growth rate forecasts leads to an upward bias in estimates of the cost of equity capital of almost 3.0 percentage points.[27] Therefore, exclusive reliance on these forecasts for a DCF growth rate results in failure of one the basic inputs in the equation.

3. The GDP Growth Rate in the Multi-Stage DCF Analysis

Q. Please discuss Mr. Hevert's multi-stage DCF analysis.

A. Mr. Hevert has employed a multi-stage growth DCF model; (1) the first-stage is the average projected analyst growth rate of Wall Street analysts as published by First Call, Zacks, and *Value Line;* and (2) the terminal stage is his projected measure of long-term GDP growth. He uses a long-term nominal GDP growth rate of 5.48% which is based on (1) a real GDP growth rate of 3.22% which is

[25] 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
[26] See references in footnote 13.
[27] Easton, P., & Sommers, G. (2007). Effect of analysts' optimism on estimates of the expected rate of return implied by earnings forecasts. *Journal of Accounting Research*, 45(5), 983–1015.

calculated over the 1929-2016 time period and (2) an inflation rate of 2.19%.

Q. What are the primary errors with Mr. Hevert's multi-stage DCF analysis?

A There are two primary errors with Mr. Hevert's multi-stage DCF analysis; (1) the first-stage DCF growth rate is the average projected EPS growth rate from Wall Street analysis which, as discussed above, are overly optimistic and upwardly biased; and (2) the long-term GDP growth rate is based on historical GDP growth and is about 100 basis points above long-term projections of GDP growth.

Q. Please identify the errors with Mr. Hevert's projected long-term GDP growth rate of 5.48%.

A. There are two major errors in this analysis. First, Mr. Hevert has not provided any theoretical or empirical support that long-term GDP growth is a reasonable proxy for the expected growth rate of the companies in his proxy group. Five-year and ten-year historic measures of growth for earnings and dividends for gas distribution companies, as shown on page 3 of Exhibit JRW-10, suggest growth that is about 100 basis points below Mr. Hevert's 5.48% GDP growth rate. Mr. Hevert has provided no evidence as to why investors would rely on his estimate of long-term GDP growth as the appropriate growth rate for gas distribution companies.

The second error is the magnitude of Mr. Hevert's long-term GDP growth rate estimate of 5.48%. On page 1 of Exhibit JRW-14 of my testimony, I provide an analysis of GDP growth since 1960. Since 1960, nominal GDP has grown at a compounded rate of 6.51%. Whereas GDP has grown at a compounded rate of

6.51% since 1960, economic growth in the U.S. has slowed considerably in recent decades. Page 2 of Exhibit JRW-14 provides the nominal annual GDP growth rates over the 1961 to 2015 time period. Nominal GDP growth grew from 6.0% to over 12% from the 1960s to the early 1980s due in large part to inflation and higher prices. With the exception of an uptick during the mid-2000s, annual nominal GDP growth rates have declined to the 3.5% to 4.0% range over the past five years.

The components of nominal GDP growth are real GDP growth and inflation. Page 3 of Exhibit JRW-14 shows annual real GDP growth rate over the 1961 to 2015 time period. Real GDP growth has gradually declined from the 5.0% to 6.0% range in the 1960s to the 2.0% to 3.0% during the most recent five year period. The second component of nominal GDP growth is inflation. Page 4 of Exhibit JRW-14 shows inflation as measured by the annual growth rate in the Consumer Price Index (CPI) over the 1961 to 2015 time period. The large increase in prices from the late 1960s to the early 1980s is readily evident. Equally evident is the rapid decline in inflation during the 1980s as inflation declined from above 10% to about 4%. Since that time inflation has gradually declined and has been in the 2.0% range or below over the past five years.

The graphs on pages 2, 3, and 4 of Exhibit JRW-14 provide very clear evidence of the decline in nominal GDP as well as its components, real GDP and inflation, in recent decades. To gauge the magnitude of the decline in nominal GDP growth, Table 4 and page 5 of Exhibit JRW-15 provide the compounded GDP growth rates for 10-, 20-, 30-, 40- and 50- years. Whereas the 50-year

compounded GDP growth rate is 6.45%, there has been a monotonic and significant decline in nominal GDP growth over subsequent 10-year intervals, especially in the most recent 10 year interval. These figures clearly suggest that nominal GDP growth in recent decades has slowed and that a growth rate in the range of 4.0% to 5.0% is more appropriate today for the U.S. economy. Mr. Hevert's long-term GDP growth rate of 5.48% is clearly inflated.

Table 4
Historic GDP Growth Rates

10-Year Average	**2.97%**
20-Year Average	**4.23%**
30-Year Average	**4.77%**
40-Year Average	**5.90%**
50-Year Average	**6.45%**

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-14. The mean 10-year nominal GDP growth forecast (as of February 2017) 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 4.2% for the period 2017-2050.[28] The Congressional Budget Office ("CBO"), in its forecasts for the period

[28]Energy Information Administration, A*nnual Energy Outlook,* https://www.eia.gov/outlooks/aeo/data/browser/#/?id=18-AEO2017&cases=ref2017&sourcekey=0

2017 to 2047, 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 2017-2095.[30] SSA's projected growth GDP growth rate over this period is 4.4%.

Q. Does Mr. Hevert provide any reasons why he has ignored the well-known long-term GDP forecasts of the CBO, SSA, and EIA?

A. No.

Q. In your opinion, what is wrong with Mr. Hevert's real GDP forecast on historic data and ignoring the well-known long-term GDP forecasts of the CBO, SSA, and EIA?

A. In developing a DCF growth rate for his constant-growth DCF analysis, Mr. Hevert has totally ignored historic EPS, DPS, and BVPS data and relied solely on the long-term EPS growth rate projections of Wall Street analysts and *Value Line*. However, in developing a terminal DCF growth rate for his multi-stage growth DCF analysis, Mr. Hevert has also totally ignored the well-known long-term real GDP growth rate forecasts of the CBO and EIA and relied solely on historic data going back to 1929. Simply put, he is inconsistent in his methodology.

[29] Congressional Budget Office, The *2017 Long-Term Budget Outlook*, March 2017. https://www.cbo.gov/system/files/115th-congress-2017-2018/reports/52480-ltbo.pdf (Table A-1, p. 30).

[30] Social Security Administration, 2017 Annual Report of the Board of Trustees of the Old-Age, Survivors, and Disability Insurance (OASDI) Program. https://www.ssa.gov/oact/tr/2017/tr2017.pdf, Table VI.G4, p. 211. The 4.4% represents the compounded growth rate in projected GDP from $19,455 trillion in 2017 to $564,614 trillion in 2095.

B. CAPM Approach

Q. Please discuss Mr. Hevert's CAPM.

A. On pages 27-31 of his testimony and in Schedules RBH-5 - RBH-7, Mr. Hevert 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. Hevert uses two different measures of the 30-Year Treasury bond yield (a) current yield of 2.97% and a near-term projected yield of 3.43%; (b) two different Betas (an average Bloomberg Beta of 0.631 and an average *Value Line* Beta of 0.750), and (c) two market risk premium measures - a Bloomberg, DCF-derived market risk premium of 10.39% and *Value Line* derived market risk premium of 11.12%. Based on these figures, he finds a CAPM equity cost rate range from 9.53% to 11.77%. Mr. Hevert's CAPM results are summarized in Panel B of page 1 of Exhibit JRW-13.

Q. What are the errors in Mr. Hevert's CAPM analysis?

A. The two issues are: (1) the near-term projected 30-Year Treasury yield of 3.43%; and (2) Mr. Hevert's CAPM analysis are the expected market risk premiums of 10.39% and 11.12%.

1. Projected Risk-Free Interest Rates

Q. What is the issue with the projected long-term Treasury rate of 3.52%?

A. The 3.43% near-term projected yield is more than 50 basis points above current 30-year Treasury rates. Thirty-year Treasury bonds are currently yielding about 2.75%. Institutional investors would not be buying bonds at this yield if they expected interest rates to increase so much in the near-term. An increase of yields of more than 50 basis points on 30-year Treasury bonds in near-term would result in significant capital losses for investors buying bonds today at current market yields.

2. Market Risk Premiums

Q. What are the errors in Mr. Hevert's CAPM analyses?

A. The primary errors in Mr. Hevert's CAPM analyses are the market premiums of 10.39% and 11.12% which are based on the upwardly-biased long-term EPS growth rate estimates of Wall Street analysts.

Q. Please assess Mr. Hevert's market risk premiums derived from applying the DCF model to the S&P 500 and *Value Line Investment Survey*.

A. For his Bloomberg and *Value Line* market risk premiums, Mr. Hevert computes market risk premiums of 10.39% and 11.12% by: (1) calculating an expected market return by applying the DCF model to the S&P 500; and, then (2) subtracting the current 30-year Treasury bond yield from the calculation. Mr. Hevert's estimated expected market returns from these are 13.37% (using Bloomberg three- to five-year EPS growth rate estimates) and of 14.09% (using

Value Line three- to five-year EPS growth rate estimates). Mr. Hevert also uses (1) a dividend yield of 1.96% and an expected DCF growth rate of 11.40% for Bloomberg and (2) a dividend yield of 1.89% and an expected DCF growth rate of 12.20% for *Value Line*. These results are not realistic in today's market.

Q. How did Mr. Hevert err when analyzing market premiums?

A. The primary error is that Mr. Hevert computed the expected market return using the DCF model with the growth rate being the projected 5-year EPS growth rate from Wall Street analysts. As explained below, this produces an overstated expected market return and equity risk premium.

Q. What evidence can you provide that Mr. Hevert's growth rates are erroneous?

A. Mr. Hevert's expected long-term EPS growth rates of 11.40% for Bloomberg and 12.20% for *Value Line* represent the forecasted 5-year EPS growth rates of Wall Street analysts. The error with this approach is that the EPS growth rate forecasts of Wall Street securities analysts are overly optimistic and upwardly biased, and are inconsistent with the historic and projected growth in earnings and the economy for three reasons: (1) long-term growth in EPS is far below Mr. Hevert's projected EPS growth rates; (2) more recent trends in GDP growth, as well as projections of GDP growth, suggest slower long-term 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 over the past 50 plus years. 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-14, and a summary is provided in Table 5 below.

Table 5
GDP, S&P 500 Stock Price, EPS, and DPS Growth
1960-Present

Nominal GDP	**6.51%**
S&P 500 Stock Price	**6.74%**
S&P 500 EPS	**6.56%**
S&P 500 DPS	**5.74%**
Average	**6.39%**

The results are presented graphically on page 6 of Exhibit JRW-14. In sum, the historical long-run growth rates for GDP, S&P EPS, and S&P DPS are in the 5% to 7% range.

Q. Do more recent data suggest that U.S. economic growth is faster or slower than the long-term data?

A. As previously discussed and presented in Table 4, the more recent trend suggests lower future economic growth than the long-term historic GDP growth. The historic GDP growth rates for 10-, 20-, 30-, 40- and 50- years clearly suggest that nominal GDP growth in recent decades has slowed to the 4.0% to 5.0% area. By comparison, Mr. Hevert's long-run growth rate projections of 11.40% and 12.20% are vastly overstated. These estimates suggest that companies in the U.S. would be expected to: (1) increase their growth rate of EPS by almost 100% 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. What level of GDP growth is forecasted by economists and various government agencies?

A. As previously discussed, there are several forecasts of annual GDP growth that are available from economists and government agencies. These are listed in page 5 of Exhibit JRW-14. These forecasts suggest long-term GDP growth rate in the 4.0% to 4.7% range.

Q. Why is GDP growth relevant in your discussion of Mr. Hevert's use of the long-term EPS growth rates in developing a market risk premium for his CAPM?

A. Because, as indicated in recent research, the long-term earnings growth rates of companies are on average limited to the growth rate in GDP. Brad Cornell of the California Institute of Technology recently published a study on GDP growth, earnings growth, and equity returns. He finds that long-term EPS growth in the U.S. is directly related to GDP growth, with GDP growth providing an upward limit on EPS growth. In addition, he finds that long-term stock returns are determined by long-term earnings growth. He concludes with the following observations:[31]

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

> 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 and real returns in the 4% to 5% range, the results imply nominal expected stock market returns in the 6% to 8% range. As such, Mr. Hevert'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.

Q. Please provide a summary assessment of Mr. Hevert's projected equity risk premium derived from expected market returns.

A. Mr. Hevert'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. They are well aware of the historical stock and bond return studies of Ibbotson. The CFOs in the September 2017 *CFO Magazine* – Duke

University Survey of about 300 CFOs shows an expected return on the S&P 500 of 6.50% over the next ten years. In addition, the financial forecasters in the February 2017 Federal Reserve Bank of Philadelphia survey expect an annual nominal market return of 5.60% 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.

C. Bond Yield Risk Premium Approach

Q. Please review Mr. Hevert's BYRP analysis.

A. On pages 31--33 of his testimony and in Schedule RBH-8, Mr. Hevert estimates an equity cost rate using a RP model. Mr. Hevert develops an equity cost rate by: (1) regressing the authorized returns on equity for gas distribution companies from the January 1, 1980 to April 20, 2017 time period on the thirty-year Treasury Yield; and (2) adding the appropriate risk premium established in step (1) to three different thirty-year Treasury yields: (a) current yield of 2.97% and a near-term projected yield of 3.43%, and a long-term projected yield of 4.35%. Mr. Hevert's RP results are provided in Panel C of page 1 of Exhibit JRW-13**.** He reports RP equity cost rates ranging from 9.93% to 10.24%.

Q. What are the errors in Mr. Hevert's RP analysis?

A. The two issues are: (1) the near-term and long-term projected 30-Year Treasury yields of 3.43% and 4.35; and (2) primarily, the excessive risk premium.

1. Projected Risk-Free Interest Rates

Q. What are the issues with the projected long-term Treasury rates of 3.43% and 4.35%?

A. The 3.43% and 4.35% projected yields are more than 50 and 150 basis points above current 30-year Treasury rates. These figures are simply not reasonable. Thirty-year Treasury bonds are currently yielding about 2.75%. Institutional investors would not be buying bonds at this yield if they expected interest rates to increase so dramatically in the coming years. An increase of yields of more than 50 and 150 basis points on 30-year Treasury bonds in the next couple years would result in significant capital losses for investors buying bonds today at current market yields.

2 Risk Premium

Q. What are the issues with Mr. Hevert's risk premium?

A. There are several problems with this approach. The methodology produces an inflated measure of the risk premium because the approach uses historic authorized ROEs and Treasury yields, and the resulting risk premium is applied to projected Treasury Yields. Treasury yields are always forecasted to increase. The resulting risk premium would be smaller if done correctly, that is, using projected Treasury yields in the analysis rather than historic Treasury yields.

. In addition, Mr. Hevert's RP 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 in setting ROEs. As such, Mr. Hevert's approach and results reflect 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 especially true when the authorized ROE data includes the results of rate cases that are settled and not fully litigated.

Finally, Mr. Hevert'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 produced an inflated equity cost rate.

D. Flotation Cost and Size Adjustments

Q. Please discuss Mr. Hevert's adjustment for flotation costs.

A. Mr. Hevert claims than an equity cost rate recommendation of 0.11% is justified to account for flotation costs. However, he has not identified any flotation costs for Northern. Therefore, he is claiming that the Company deserves additional revenues in the form of a high ROE to account for flotation costs that have not been identified.

Beyond this issue, it is commonly argued that a flotation cost adjustment (such as that used by the Company) is necessary to prevent the dilution of the existing shareholders. However, this is incorrect for several reasons:

(1) If an equity flotation cost adjustment is similar to a debt flotation cost adjustment, the fact that the market-to-book ratios for gas distribution companies are over 1.5X actually suggests that there should be a flotation cost *reduction* (and not an increase) to the equity cost rate. This is because when (a) a bond is issued at a price in excess of face or book value, and (b) the difference between its market price and the book value is greater than the flotation or issuance costs, the cost of that debt is lower than the coupon rate of the debt. The amount by which market values of gas distribution companies are in excess of book values is much greater than flotation costs. Hence, if common stock flotation costs were exactly like bond flotation costs, and one was making an explicit flotation cost adjustment to the cost of common equity, the adjustment would be downward;

(2) If a flotation cost adjustment is needed to prevent dilution of existing stockholders' investment, then the reduction of the book value of stockholder investment associated with flotation costs can occur only when a company's stock is selling at a market price at or below its book value. As noted above, gas distribution companies are selling at market prices well in excess of book value. Hence, when new shares are sold, existing shareholders realize an increase in the book value per share of their investment, not a decrease;

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

(4) Flotation costs, in the form of the underwriting spread, are a form of a transaction cost in the market. They represent the difference between the price paid by investors and the amount received by the issuing company. Whereas Northern believes that it should be compensated for these transaction costs, it has not accounted for *other* market transaction costs in determining its cost of equity.

Most notably, brokerage fees that investors pay when they buy shares in the open market are another market transaction cost. Brokerage fees increase the effective stock price paid by investors to buy shares. If the Company had included these brokerage fees or transaction costs in its DCF analysis, the higher effective stock prices paid for stocks would lead to lower dividend yields and equity cost rates. This would result in a downward adjustment to their DCF equity cost rate.

Finally, I would point out that the New Hampshire PUC has found that, lacking any evidence of actual or planned issuances, such costs should not be compensated." *See* Re: Pennichuck Water Works, Inc. 70 NH PUC 850, 863 (1985, 70 NH PUC 862).

Q. What other adjustments does Mr. Hevert propose?

A. In his assessment of the Company's business risk, Mr. Hevert claims that Northern deserves a small size premium.

Q. Do you agree with Mr. Hevert's claim that the company deserves a small size premium?

A. No. The inclusion of a size premium is erroneous for two reasons.

First, I have used the credit ratings of Northern and the companies in the proxy group for risk comparison purposes. In their assessment of business risk, credit rating agencies include various factors including the size and geographic service territory of a utility. Therefore, there is no reason to make a separate adjustment for size.

Second, Mr. Hevert justifies his size adjustment 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.[32] 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.[33] 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

[32] 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; J. P. Morgan, "The Most Important Number in Finance," p. 6., Duff & Phelps, Client Alert, March 16, 2016, p. 35.

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

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, 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.[34]

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

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

estimating a CAPM equity cost rate requires that a firm carry the extra size premium in its discount factor for an extended period of time, not just for one year, which is the presumption with annual rebalancing. Through an analysis of small firm stock returns for longer time periods (and without annual rebalancing), Lu finds that the size premium disappears within two years. Lu's conclusion with respect to the size premium is that "a small firm should not be expected to have a higher size premium going forward sheerly because it is small now":[35]

> 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.

Finally, in a more recent paper, Ang (2017) tested for a size effect over the time period 1981-2016.[36] He used value-weighted size-based decile returns obtained from French's Data Library, with the smallest size-based decile as a proxy for small stocks and the largest size-based decile as a proxy for large stocks. He found that small stocks underperformed large stocks by 12% over the period 1981 to 2016. He claims that this result is consistent with other studies that the size effect vanished in the 1980s. He concluded with the following:[37]

[35] Ching-Chih Lu, "The Size Premium in the Long Run," 2009 Working Paper, SSRN abstract no. 1368705.
[36] Clifford Ang, "The Absence of a Size Effect Relevant to the Cost of Equity," June 9, 2017, available at https://ssrn.com/abstract=2984599.
[37] *Ibid.*, p. 6.

My review of the evidence and analysis strongly suggests the proponents of the size effect are nowhere close to meeting their burden. I find that investors use the CAPM and do not demand compensation for size when setting their required rate of return, which directly contradicts the need to augment or modify the CAPM Cost of Equity with a size premium. I show that small stocks do not outperform large stocks, which calls into question the very premise of a size effect. I also find that studies finding a size effect suffer from the twin fatal flaws of lacking a theoretical basis and data mining, which are very difficult, if not impossible, to overcome. Given the above, practitioners should abandon the practice of augmenting or modifying the CAPM Cost of Equity with a size premium.

Q. Does this conclude your testimony?

A. Yes, it does.