BEFORE THE
STATE OF NEW HAMPSHIRE
PUBLIC UTILITIES COMMISSION

DOCKET NO. DG 21-104

IN THE MATTER OF: NORTHERN UTILITIES, INC.

REQUEST FOR CHANGE IN RATES

DIRECT TESTIMONY

OF

Dr. J. RANDALL WOOLRIDGE
CONSULTANT TO NEW HAMPSHIRE DEPARTMENT OF ENERGY

April 1, 2022

Northern Utilities, Inc.
DG-21-104

Direct Testimony of
Dr. J. Randall Woolridge

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I. <u>Introduction</u>

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 Attachment JRW-1.

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

A. I have been asked by the New Hampshire Department of Energy 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 will review my cost of capital recommendation for Northern and review the primary areas of contention between Northern' s rate of return position and DOE's. Second, I provide an assessment of capital costs in today's capital markets. Third, I discuss my proxy group of gas utility companies for estimating the cost of capital for Northern. Fourth, I present my recommendations for the Company's capital structure and debt cost rate. Fifth, I discuss the concept of the cost of equity capital, and then estimate the equity cost rate for Northern. Finally, I critique the

Company's rate of return analysis and testimony. I have a table of contents just after the title page for a more detailed outline.

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 0.00% short-term debt, 47.53% long-term debt, and 52.47% common equity. The Company has recommended a long-term debt cost rate of 4.93%. Mr. John Cochran has recommended a common equity cost rate of 10.30% for the New Hampshire gas distribution operations of Northern. The Company's overall proposed rate of return is 7.75%. This is summarized in Table 1.

[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*").

Table 1
Northern' s Recommended Cost of Capital

Capital Source	Capitalization Ratios	Cost Rate	Weighted Cost Rate
Long-Term Debt	47.53%	4.93%	2.34%
Common Equity	52.47%	10.30%	5.40%
Total Capital	100.00%		7.75%

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. As discussed later in my testimony, this capital structure has much more equity and less financial risk than other gas utilities. As a result, I have used a capital structure with a common equity ratio of 50.0%. This is very fair to the Company given that other gas companies have much less equity than that proposed by the Company. 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 utility companies ("Gas Proxy Group"). This is the same group used by Mr. Cochran. My DCF and CAPM analyses indicate an equity cost rate range of 7.20% to 8.90%. Given the recent increase in interest rates, I am recommending a ROE at the high end of this range, 8.90%, for the Company. Combined with my recommended capitalization ratios and senior capital cost rate, my overall rate of return or cost of capital for the Company is 6.92% as summarized in Table 2 and Attachment JRW-2.

Table 2
Staff's Recommended Cost of Capital

Capital Source	Capitalization Ratios	Cost Rate	Weighted Cost Rate
Long-Term Debt	50.00%	4.93%	2.47%
Common Equity	50.00%	8.90%	4.45%
Total Capital	100.00%		6.92%

Q. Isn't your ROE recommendation low by historic standards?

A. Yes. But, as I discuss in my testimony, with interest rates near historic lows and stock prices near historic highs, capital costs are at historic lows.

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 issues in this case include the following:

Capital Structure - The Company has proposed a capital structure that includes a common equity ratio (52.47%) that is higher than the average common equity ratios employed by the proxy group. Hence, as a result, I am employing a capital structure with a common equity ratio of 50.0%.

DCF Approach – Mr. Cochrane and I have both employed the traditional constant-growth DCF model. Mr. Cochrane has also used a multi-stage growth version of the model. There are several errors in Mr. Cochrane's DCF analyses: (1) he has exclusively used the overly optimistic and upwardly biased earnings per share ("EPS") growth rate forecasts of Wall Street analysts and *Value Line*; (2) he has combined abnormally high *Value Line* projected EPSs for his proxy companies, computed from a three-year base period, with three-to-five-year projected growth rates of Yahoo and Zack's; and (3) his terminal growth rate of 5.49% in his multi-stage DCF model is inflated, does not reflect the prospective economic growth in the U.S., and is about 100 basis points above the projected long-term GDP growth. 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.

CAPM Approach – The CAPM approach requires an estimate of the risk-free interest rate, beta, and the market or risk premium. There are several issues with Mr. Cochrane's overstated average market risk premium of 11.88%. First, the 11.88% market risk premium is much larger than: (1) indicated by historic stock and bond return data; and (2) found in the published studies and surveys of the market risk premium. Second, the 11.88% market risk premium is based on unrealistic assumptions of future economic and earnings growth and stock returns. To compute his market risk premium, Mr. Cochrane has applied the DCF to the S&P 500 and employed analysts' three-to-five-year EPS growth-rate projections as a growth rate to compute an expected market return and market risk premiums. This approach results in an expected market return of 14.02%. As I demonstrate later in my testimony, the EPS growth-rate projection of 12.59% used for the S&P 500 and the resulting expected market return and market risk premium include unrealistic assumptions regarding future economic and earnings growth and stock returns.

As I highlight in my testimony, there are three procedures for estimating a market risk premium – historic returns, surveys, and expected return models. I have used a market risk premium of 5.50%, which: (1) factors in all three approaches – historic returns, surveys, and expected return models – to estimate a market premium; and (2) employs the results of many studies of the market risk premium. As I note, the 5.50% figure 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.

Flotation Costs - Mr. Cochrane's recommendation includes an adjustment of 0.10% for equity flotation costs. Yet, Mr. Cochrane has not identified any flotation costs that have been paid by the Company. Therefore, the Company should not be rewarded with a higher ROE that includes flotation costs when the Company has not paid any such costs. Furthermore, the Commission has traditionally not allowed flotation costs.

Small Size Premium – Mr. Cochrane's ROE recommendation also includes a consideration of a size premium for the Company. However, as I show, any such premium for size is not appropriate for a regulated public utility. In addition, the Commission has traditionally not allowed a size premium.

CAPITAL MARKET CONDITIONS AND AUTHORIZED ROES

A. Capital Market Conditions

Q. Please provide a summary of the utility capital market indicators in Attachment JRW-3.

A. Page 1 of Attachment JRW-3 shows the yields on A rated public utility bonds. Between 2012-2019, the yields hovered primarily in the 4.0% to 5.0% range. They declined to below 3.0% in 2020 during the pandemic. They have increased as the economy has recovered, and currently are in the 3.5% range in 2022.

The average dividend yield for gas companies is shown on page 2 of Attachment JRW-3. These yields declined over the last decade, bottoming out at 2.7% in 2017. They have increased in recent years, and were in the 3.5% range as of 2021. The average earned ROE and market-to-book ratio for publicly-held gas companies are shown on page 3 of Attachment JRW-3. The average ROE for gas companies has been in the range of 8.0%-9.0% in recent years, while the average market-to-book ratio reached 2.25X in 2019, but has fallen to the 1.50X range as of the end of 2021.

Q. Please review the impact of the economy on interest rates.

A. Figure 1 shows 30-year Treasury yields over the past two years (2019-22). These yields were in the 3.0% range at the end of 2018. These yields declined to the 2.25% range in 2019 due primarily to slow economic growth and low inflation. In 2020, with the advent of the Covid-19 pandemic in February of 2020, 30-year Treasury yields declined to record low levels, declining about 100 basis points to the 1.25%

range. They began their recovery in the summer of 2020 and increased to about 2.50% in the first quarter of 2021. They subsequently fell to below 2.0% in the fourth quarter of 2021, but have increased again to the 2.50% range in 2022 with the uptick in inflation. Despite their recovery, these rates are still at historically low levels.

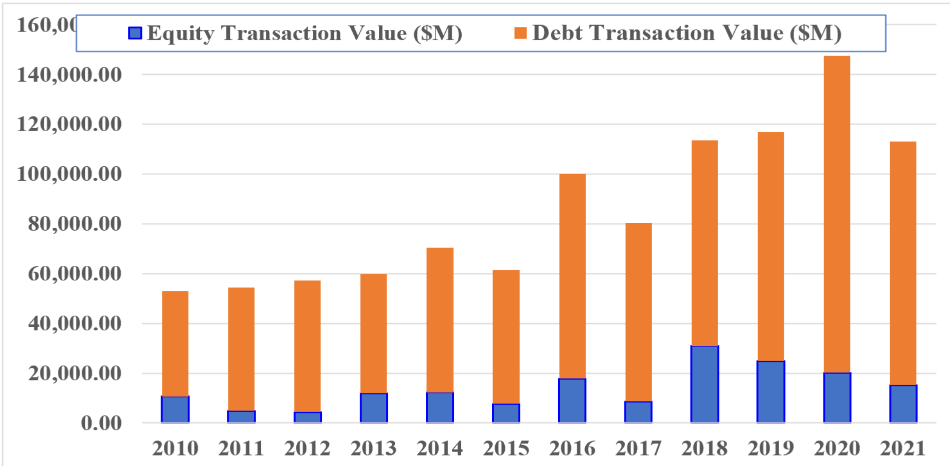
Figure 1
30-Year Treasury Yields

Data Source: https://fred.stlouisfed.org/series/DGS30

Q. Have utilities taken advantage of the lower bond yields to raise capital?

A. Yes. Figure 2 shows the annual amounts of debt and equity capital raised by public utility companies over the past decade. Electric utility and gas distribution companies have taken advantage of the low interest rate and capital cost environment of recent years and raised record amounts of capital in the markets. In fact, in each of the last four years, public utilities have raised a total of over $100 billion in debt and equity.

Figure 2
Debt and Equity Capital Raised by Public Utilities
2010-21



Source: S&P Global Market Intelligence, S&P Cap IQ, 2022.

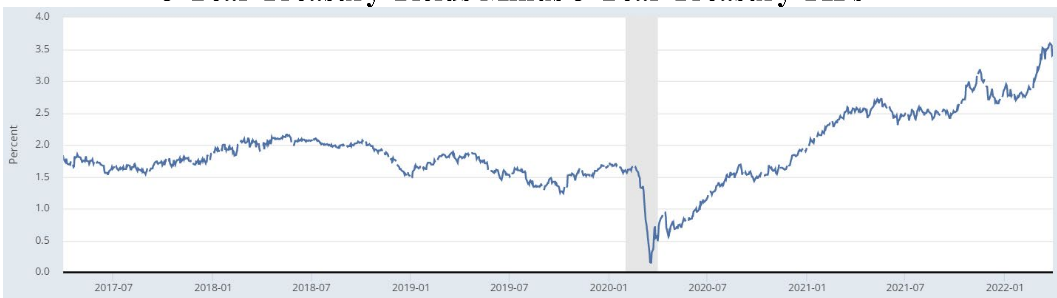
Q. Please discuss the increase in interest rates over the past year.

A. Two factors have led to higher interest rates over the past year – an improving economy and higher inflation. Real GDP growth increased 5.7% in 2021, compared to a decline of -3.4% in 2020. This recovery had led to greater business activity, higher levels of business and consumer spending and record increases in housing prices. Unemployment, which was 6.7% in 2020, declined to 3.9% in 2021. The recovery in the economy puts upward pressure on interest rates by increasing the demand for capital. In addition, as reported extensively in the financial press, inflation has picked up significantly over the past year, putting additional pressure on interest rates. The high inflation reported in recent months is more a reflection of three factors: (1) the recovering economy, as discussed above; (2) the production shut-downs during the pandemic led to supply-chain shortages as the global economy has recovered: and (3) the war in Ukraine has led to higher energy and gasoline prices worldwide.

In response to the higher inflation, the Federal Reserve is expected to increase the discount rate multiple times in 2022. However, the Federal Reserve's actions on the discount rate only impact short-term rates. Long-term rates are more a function of expected economic growth and expected inflation. One conundrum is that whereas the government is reporting annual year-over-year inflation rates as high as 7.5%, the 30-year Treasury yield is still only 2.5%. Investors' inflation expectation can be seen by looking at the difference between yields on ordinary Treasuries and the yields on inflation-protected Treasuries, known as TIPS. Panel A of Figure 4 shows the expected inflation rate over the next five years. You can see the big increase over the past year, with an expected inflation rate of 3.41% over the next five years. Panels B and C of Figure 4 show the expected inflation rate over the next ten and thirty years. The expected inflation rates over the next ten and thirty years are 2.86% and 2.18%. When the expected inflation rate is higher over five years than over ten and thirty years, as is the case now, it is known as a bond-market inversion and it reflects that, despite a short-term expectation of higher inflation, the long-term inflation rate is still just above 2.0%.[2]

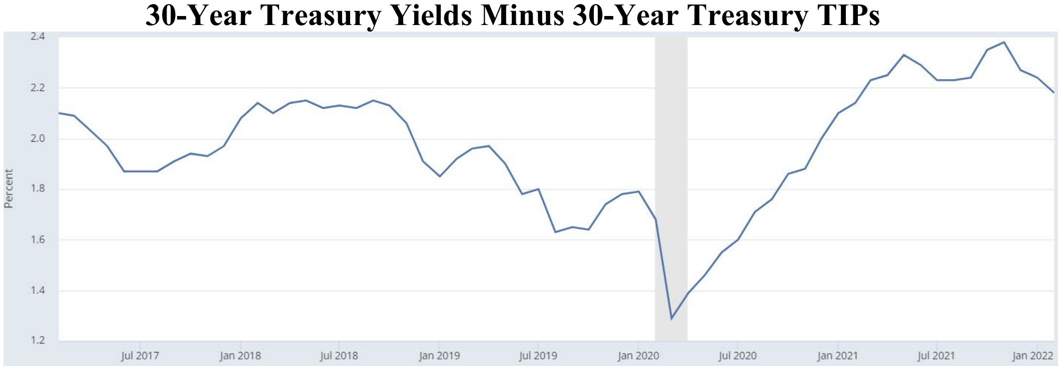
[2] Paul J. Davies – "Rare Bond-Market Inversion Signals Short-Lived Boost to Inflation," *Wall Street Journal*, February 25, 2021.

Figure 3
Panel A
5-Year Treasury Yields Minus 5-Year Treasury TIPs



Panel B
10-Year Treasury Yields Minus 10-Year Treasury TIPs

Panel C
30-Year Treasury Yields Minus 30-Year Treasury TIPs



Date Source: https://fred.stlouisfed.org/

Q. How has the change in interest rates over the past year impacted capital costs for utilities?

A. As discussed below, with Covid-19 and the record low interest rates, authorized ROEs for utilities also reached record low levels in the last two years. However, whereas interest rates declined by about 100 basis points in 2020, authorized ROEs only declined by about 25 basis points. Therefore, utility ROEs never declined to the extent that interest rates declined in 2020.

Q. Please summarize your assessment of the current capital market situation.

The U.S. economy, which declined nearly twenty percent in the first half of 2020, rebounded significantly in 2021 and has continued the rebound in 2022. This rebound has seen big increases in consumer and business spending, lower unemployment, and higher housing prices. The rebounding economy has put pressure on prices. This has been further exacerbated by the post-Covid supply chain issues and the higher energy prices brought on by the Russia-Ukraine conflict. Nonetheless, interest rates and capital are still at historic low levels, utilities have taken advantage of the low yields to raise record amounts of capital, and stock prices are near all-time highs. The big economic issue appears to be reported inflation. However, as I noted above, the yields on TIPS suggest that, while short-term inflation is expected to be above 3.0%, longer-term inflation expectations are low and just above 2.0%.

B. Authorized ROEs

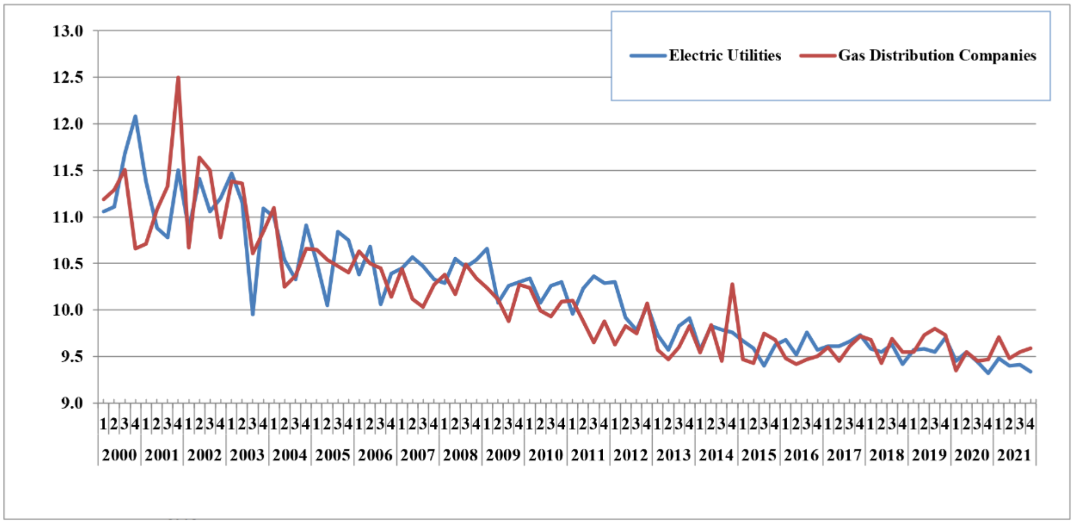
Q. Please discuss the trend in authorized ROEs for electric and gas companies.

A. In Figure 4, I have graphed the quarterly authorized ROEs for electric and gas companies from 2000 to 2021. Over the years, as interest rates have come down, authorized ROEs for electric utility and gas distribution companies have slowly declined to reflect a low capital cost environment. In 2020 and 2021, authorized ROEs for utilities hit an all-time low. On an annual basis, the authorized ROEs for gas distribution companies have been 9.94% in 2012, 9.68% in 2013, 9.78% in 2014, 9.60% in 2015, 9.50% in 2016, 9.72% in 2017, 9.59% in 2018, 9.71% in 2019, 9.46% in 2020, and 9.56% in 2021, according to Regulatory Research Associates. On an annual basis, the average authorized ROEs for electric utilities have been an average of 10.01% in 2012, 9.8% in 2013, 9.76% in 2014, 9.58% in 2015, 9.60% in 2016, 9.68% in 2017, 9.56% in 2018, 9.65% in of 2019, 9.44% in 2020, and 9.38% in 2021, according to Regulatory Research Associates.[3] It should be noted that the most comparable cases to gas companies are the authorized ROEs for electric distribution companies. The average authorized ROE for electric distribution companies in 2020 and 2021 were 9.10% and 9.04%, respectively.[4]

[3] S&P Global Market Intelligence, RRA *Regulatory Focus*, 2022.

[4] *Id.*

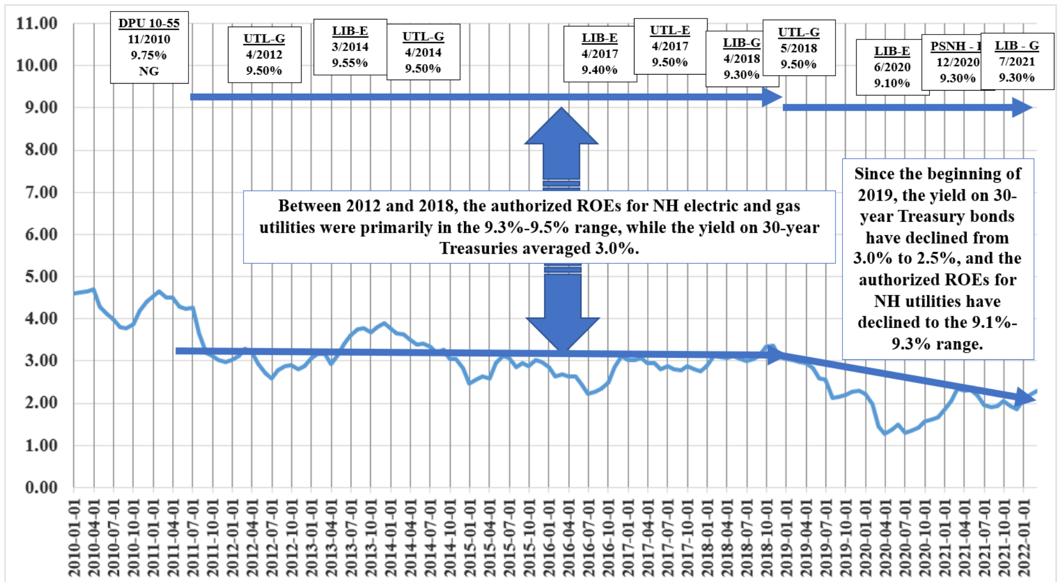
Figure 4
Authorized ROEs for Gas Utility and Gas Distribution Companies
2000-2021



Q. Please review the authorized ROEs in New Hampshire.

A. I reviewed this relationship in Figure 5, in which I show (1) the authorized ROEs in New Hampshire for electric utility and gas distribution companies and (2) 30-year Treasury yields, since 2010. Between 2013 and 2018, the authorized ROEs in New Hampshire were in the 9.4%-9.5% range, while the 30-year Treasury yield averaged 3.0%. Over the 2019-21 period, the yield on 30-year Treasury bonds declined from 3.0% to as low as about 1.2% during the pandemic, and now is in the 2.50% range. The lower capital costs in the 2020-22 time were reflected in the authorized electric and gas ROEs in New Hampshire, as ROEs declined to the 9.10%-9.30% range.

Figure 5
30-Year Treasury Yields and New Hampshire
Electric and Gas Authorized ROEs
2010-2021



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

A. Yes, I do. As previously noted, according to the *Hope* and *Bluefield* decisions, returns on capital should be: (1) comparable to returns investors expect to earn on other investments of similar risk; (2) sufficient to assure confidence in the company's financial integrity; and (3) adequate to maintain and support the company's credit and to attract capital. As shown on page 3 of Attachment JRW-3, gas distribution companies have been earning ROEs in the range of 8.0% to 9.0% in recent years. With such a ROE, gas companies such as those in the proxy group have strong investment grade credit ratings, their stocks have been selling well over book value, and they have been raising abundant amounts of capital. While my recommendation is a little below the average authorized

ROEs for gas distribution companies, it reflects the record low levels of interest rates and capital costs. Therefore, I believe that my ROE recommendation meets the criteria established in the *Hope* and *Bluefield* decisions.

III. 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 (market cost of equity), I evaluated the return requirements of investors on the common stock of a proxy group of nine publicly held gas distribution companies ("the Gas Proxy Group"). The Gas Proxy Group consists of nine natural gas distribution companies listed by *Value Line* in the Natural Gas Company industry group: Atmos Energy, Chesapeake Utilities, Inc., New Jersey Resources, NiSource, Northwest Natural Holding Company, One Gas, Inc., South Jersey Industries, Southwest Gas Corporation, and Spire, Inc.

Q. How does your group compare to Mr. Cochrane's group of gas distribution companies?

A. I am using the same group used by Mr. Cochrane.

Q. Please discuss the financial statistics for your proxy group.

A. On page 1 of Attachment JRW-4, I list the summary financial statistics for the Gas Proxy Group. The median operating revenues and net plant among members of the Gas Proxy Group are $2.16 billion and $5.22 billion, respectively. On average, the group receives 69% of revenues from regulated gas operations, has an BBB+ average issuer credit rating from S&P, an average common equity ratio of 38.6 %, and an average earned return on common equity of 8.5%.

Q. What role do bond ratings play in the investment community?

A. I believe that bond ratings provide a good independent assessment of the investment risk of a company.

Q. How does the investment risk of the Company compare to that of your gas group?

A. As shown in Attachment JRW-4, the average S&P and Moody's issuer credit ratings for the gas group is BBB+ and Baa1. Northern' s parent, Until, has S&P and Moody's issuer credit rating of BBB+ and Baa2. These are the same as the average of the Gas Proxy Group. Overall, these credit ratings suggest that Northern is similar in risk to the proxy group.

Q. Please discuss the investment risk of the gas proxy group as measured by the risk metrics published by *Value Line*.

A. On page 2 of Attachment JRW-4, I show the riskiness of the Gas Proxy Group using five different risk measures from *Value Line*. The mean values of these various risk measures are : (1) Beta (0.87); (2) Financial Strength (A); (3) Safety (2.0); (4) Earnings Predictability (68); and (5) Stock Price Stability (88).[5] In my

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

opinion, these risk measures indicate that the group's investment risk is relatively low.

IV. Capital Structure Ratios and Debt Cost Rate

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

A. The Company has proposed a capital structure of 0.00% short-term debt, 47.53% long-term debt, and 52.47% common equity. The Company has recommended a long-term debt cost rate of 4.93%. This is summarized in Panel A of page 1 of Attachment JRW-5.

Q. How does this proposed capital structure compare to the Northern and its parent, Until Corporation's, capital structure.

A. Panels B and C provide the average quarterly capitalization ratios, including and excluding short-term, debt over the 2019-21 time period. Northern's average common equity ratios are 48.63% including and 50.48% excluding short-term debt. Unitil's average common equity ratios are 41.93% including and 43.62% excluding short-term debt. There are two observations on these figures: (1) Northern' s proposed capital structure includes a little higher common equity ratio (52.47%) than it has maintained over the past two years; and (2) Northern's parent, Until Corp., has a much lower common equity ratio than that proposed by Northern..

Q. What are the average common equity ratios in the capitalizations of the proxy group?

A. Panels D and E provide the average quarterly capitalization ratios for the companies in the proxy group, including and excluding short-term debt, over the 2019-21 time period. The group's average common equity ratios are 43.34% including and 48.54% excluding short-term debt. As such, Northern' s proposed capital structure includes a significantly higher common equity ratio than the average of the proxy group. This issue is addressed below.

Q. Is it more appropriate to use the common equity ratios of the parent holding companies or the subsidiary operating utilities when comparing to the Company's proposed capitalization?

A. It is more appropriate to use the common equity ratios of the utility holding companies because the holding companies are publicly-traded and their stocks are used in the cost of equity capital studies. The equities of the operating utilities are not publicly-traded and hence their stocks cannot be used to compute the cost of equity capital for Northern.

Q. Is it appropriate to include short-term debt in the capitalization when comparing the common equity ratios of the holding companies to the Company's proposed capitalization?

A. Yes. In comparing the common equity ratios of the holding companies to the Company's recommendation, it is appropriate to include short-term debt when computing the holding company common equity ratios. That is because short-term debt, like long-term debt, has a higher claim on the assets and earnings of the company and requires timely payment of interest and repayment of principal. In addition, the financial risk of a company is based on total debt, which includes both short-term and long-term debt. This is why credit rating agencies use total debt in assessing the leverage and financial risk of companies.

Q. Please discuss the significance of the amount of equity that is included in a utility's capital structure.

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

Q. Please review a utility's decision to use debt versus equity to meet its capital needs.

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

Q. Why is this relationship important to the utility's customers?

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

Q. How have utilities typically struck this balance?

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

Q. On pages 33-4 of his testimony and in Attachment JC-11, Mr. Cochrane defends the Company's proposed capitalization. Please respond.

A. Mr. Cochrane justifies the Company's proposed capital structure by computing the average common equity ratios for his proxy group using data from *Value Line*. The big issue is that he excludes short-term debt when measuring the common equity ratios. As discussed above, when assessing financial risk and computing a common equity ratio, it is appropriate to include short-term debt. As noted, short-term debt, like long-term debt, has a higher claim on the assets and earnings of the company and requires timely payment of interest and repayment of principal. Therefore, the financial risk of a company is based on total debt, which includes both short-term and long-term debt. This is why credit rating agencies use total debt in assessing the leverage and financial risk of companies.

Q. Given that the Company's proposed capitalization has a higher common equity ratio than: (1) the Company has maintained in the past; (2) the average common equity ratio of its parent, Until Corp.; and (3) the average common ratio employed by the proxy group, what capital structure and debt cost rate are you recommending for Northern?

A. As indicated, the Company's proposed capital structure has more equity and less financial risk than it's parent and other gas distribution companies. As a result, I am recommending a capital structure with a common equity ratio of 50.0%. This figure is near the midpoint of Northern' s proposed common equity ratio (52.47%) and the average common equity ratio of the proxy group (48.54% excluding short-term debt).

Q. Are you using the Company's proposed long-term debt cost rate?

A. Yes.

V. The Cost of Common Equity Capital

A. Overview

Q. Why must an overall cost of capital or fair rate of return be established for a public utility?

A. In a competitive industry, the return on a firm's common equity capital is determined through the competitive market for its goods and services. Due to the capital requirements needed to provide utility services and the economic benefit to society from avoiding duplication of these services and the construction of utility-infrastructure facilities, most public utilities are monopolies. Because of the lack of competition and the essential nature of their services, it is not appropriate to permit monopoly utilities to set their own prices.

Thus, regulation seeks to establish prices that are fair to consumers and, at the same time, sufficient to meet the operating and capital costs of the utility, *i.e.*, provide an adequate return on capital to attract investors.

Q. Please provide an overview of the cost of capital in the context of the theory of the firm.

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

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

In a competitive market, firms can achieve competitive advantage due to product-market imperfections. Most notably, companies can gain competitive advantage through product differentiation (adding real or perceived value to products) and by achieving economies of scale (decreasing marginal costs of production). Competitive advantage allows firms to price products above average cost and thereby earn accounting profits greater than those required to cover capital costs. When these profits are in excess of those required by investors, or when a firm earns a return on equity in excess of its cost of equity, investors respond by valuing the firm's equity in excess of its book value.

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

> Fundamentally, the value of a company is determined by the cash flow it generates over time for its owners, and the minimum acceptable rate of return required by capital investors. This "cost of equity capital" is used to discount the expected equity cash flow, converting it to a present value. The cash flow is, in turn, produced by the interaction of a company's return on equity and the annual rate of equity growth. High return on equity (ROE) companies in low-growth markets, such as Kellogg, are prodigious generators of cash flow, while low ROE companies in high-growth markets, such as Texas Instruments, barely generate enough cash flow to finance growth.
>
> A company's ROE over time, relative to its cost of equity, also determines whether it is worth more or less than its book value. If its ROE is consistently greater than the cost of equity capital (the investor's minimum acceptable return), the business is economically profitable and its market value will exceed book value. If, however, the business earns an ROE consistently less than its cost of equity, it is economically unprofitable and its market value will be less than book value. [6]

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

Q. Please provide additional insights into the relationship between ROE and market-to-book ratios.

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

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

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

Profitability	*Value*
If ROE > K	*then Market/Book > 1*
If ROE = K	*then Market/Book =1*
If ROE < K	*then Market/Book < 1*[7]

To assess the relationship by industry, as suggested above, I performed a regression study between estimated ROE and market-to-book ratios using natural gas distribution and gas utility companies. I used all companies in these two industries that are covered by *Value Line* and have estimated ROE and market-to-book ratio data. The results are presented on page 1 of Attachment JRW-6. The average R-square is 0.50.[8] This demonstrates the strong positive relationship between ROEs and market-to-book ratios for public utilities. Given that the market-to-book ratios have been above 1.0 for a number of years, this also demonstrates that utilities have been earning ROEs above the cost-of-equity capital for many years.

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

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

Q. What factors determine investors' expected or required rate of return on equity?

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

Q. How does the investment risk of utilities compare with that of other industries?

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

Page 2 of Attachment JRW-6 provides an assessment of investment risk for 94 industries as measured by beta, which, according to modern capital market theory, is the only relevant measure of investment risk. These betas come from the *Value Line Investment Survey.* The study shows that the investment risk of utilities is low compared to other industries. The average betas for electric, gas, and water utility companies are 0.89, 0.89, and 0.79, respectively.[9] As such, the cost of equity for utilities is the lowest of all industries in the U.S., based on modern capital market theory.

Q. What is the cost of common equity capital?

A. The costs of debt and preferred stock are normally based on historical or book values and can be determined with a great degree of accuracy. The cost of common-equity-capital, however, cannot be determined precisely and must instead be estimated from market data and informed judgment. This return requirement of the stockholder should be commensurate with the return requirement on investments in other enterprises having comparable risks.

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

Q. How can the expected or required rate of return on common equity capital be determined?

[9] The beta for the *Value Line* electric utilities is the simple average of *Value Line*'s Electric East (0.89), Central (0.89), and West (0.90) group betas.

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

Q. How did you estimate the cost of equity capital for the Company?

A. Primarily, I rely on the DCF model to estimate the cost-of-equity capital. Given the investment-valuation process and the relative stability of the utility business, the DCF model provides the best measure of equity-cost rates for public utilities. I have also performed an analysis using the capital asset pricing model ("CAPM"); however, I give these results less weight because I believe that risk-premium studies, of which the CAPM is one form, provide a less reliable indication of equity-cost rates for public utilities.

Q. Please explain why you believe that the CAPM provides a less reliable indicator of equity cost rates?

A. I believe that the CAPM provides a less reliable measure of a utility's equity-cost rate because it requires an estimate of the market-risk premium. As discussed below, there is a wide variation in estimates of the market-risk premium found in studies by academics and investment firms as well as in surveys of market professionals.

B. <u>Discounted Cash Flow Approach</u>

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 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:

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

where P is the current stock price, D_1, D_2, D_n are the dividends in (respectively) year 1, 2, and in the future years 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 on Page 3 of Attachment JRW-6. 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. **<u>Growth stage</u>**: 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. **<u>Transition stage</u>**: 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. **<u>Maturity (steady-state) stage</u>**: Eventually, the company reaches a position where its new investment opportunities offer, on average, only slightly more attractive ROEs. At that time, its earnings growth rate, payout ratio, and ROE stabilize for the remainder of its life. As I will explain below, the constant-growth DCF model is appropriate when a firm is in the maturity stage of the life cycle.

In using the 3-stage 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. Please briefly explain the concept of "Present Value."

A. Present value is the concept that an amount of money today is worth more than that same amount in the future. In other words, money received in the future is not worth as much as an equal amount received today. Present value tells an investor how much he or she would need in today's dollars to earn a specific amount in the future.

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 P is the current stock price, D_1 represents the expected dividend over the coming year, k is investor's required return on equity, 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 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 page 2 of Attachment JRW-7. Using both the means and medians, the dividend yields range from 3.2% to 3.4% for the Gas Proxy Group. Therefore, I will use a dividend yield of 3.30% for my Gas Proxy Group.

Q. Please discuss the appropriate adjustment to the spot dividend yield.

A. According to the traditional DCF model, the dividend yield term relates the dividend paid over the coming period to the current stock price. 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.[10]

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.

[10] *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 to reflect growth over the coming year. This is the approach employed by the Federal Energy Regulatory Commission ("FERC").[11] The DCF equity-cost rate ("K") is computed as:

$$K = \left[\left(\frac{D}{P}\right) \times (1 + 0.5g)\right] + g$$

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 groups. I reviewed *Value Line's* historical and projected growth rate estimates for earnings per share ("EPS"), dividends per share ("DPS"), and book value per share ("BVPS"). In addition, I utilized the average EPS growth-rate forecasts of Wall Street analysts as provided by Yahoo, Zacks and S&P Cap IQ. These

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

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 several different investment information services, including Institutional Brokers Estimate System ("I/B/E/S"), Bloomberg, FactSet, S&P Cap IQ, 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, S&P Cap IQ, and Zacks each 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, S&P Cap IQ, and First Call are fee-based services. These services usually provide detailed reports and other data in addition to analysts' EPS forecasts. In contrast, Thompson Reuters and Zacks 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. 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. 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, and projected earnings growth. Second, a study by Lacina, Lee, and Xu (2011) has shown that analysts' three-to-five year EPS growth-rate forecasts are not more accurate at forecasting future earnings than naïve random walk forecasts of future earnings.[12] Employing data over a twenty-year period, these authors demonstrate that using the most recent year's actual EPS figure to forecast EPS in the next 3-5 years proved to be just as accurate as using the EPS estimates from analysts' three-to-five year EPS 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

[12] 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.

studies over the years.[13] 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.[14]

Q. Are analysts' projected EPS growth rates for utilities likewise overly optimistic and upwardly biased?

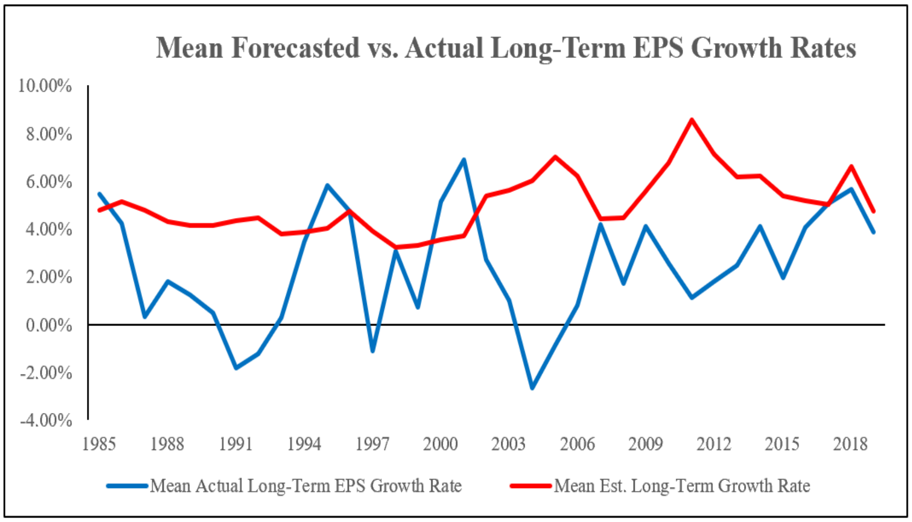
A. Yes. I have completed a study of the accuracy of analysts' EPS growth rates for utilities over the 1985-2020 time period. In the study, I used the utilities listed in the East, West, and Central Electric Utilities sectors by *Value Line*. I collected the three-to-five year projected EPS growth rate from I/B/E/S for each utility, and compared that growth rate to the utility's actual subsequent three-to-five year EPS growth rate. As shown in Figure 6, the mean forecasted EPS growth rate (depicted in the red line in Figure 6) is consistently greater than the achieved actual EPS growth rate over the time period, with the exception of 1994-96 and 2000-2002. Over the entire period, the mean forecasted EPS growth rate is over

[13] 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).

[14] 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).

200 basis points above the actual EPS growth rate. As such, the projected EPS growth rates for electric utilities are overly-optimistic and upwardly-biased.

Figure 6
Mean Forecasted vs. Actual Long-Term EPS Growth Rates
Electric Utilities
1985-2020



Data Source: S&P Global Market Intelligence, Capital IQ, I/B/E/S, 2021.

Q. Are the projected EPS growth rates of *Value Line* also overly optimistic and upwardly biased?

A. Yes. A study by Szakmary, Conover, and Lancaster (2008) evaluated the accuracy of *Value Line*'s three-to-five-year EPS growth rate forecasts using companies in the Dow Jones Industrial Average over a thirty-year time period and found these forecasted EPS growth rates to be significantly higher than the EPS growth rates that these companies subsequently achieved.[15]

[15] Szakmary, A., Conover, C., & Lancaster, C. (2008), "An Examination of *Value Line*'s Long-Term Projections," *Journal of Banking & Finance*, May 2008, pp. 820-833.

Szakmary, Conover, and Lancaster (SCL) studied the predicted versus the projected stock returns, sales, profit margins, and earnings per share made by *Value Line* over the 1969 to 2001 time period. *Value Line* projects variables from a three-year base period (e.g., 2019-2021) to a future three-year projected period (e.g., 2025-27). SCL used the sixty-five stocks included in the Dow Jones Indexes (30 Industrials, 20 Transports and 15 Utilities). SCL found that the projected annual stock returns for the Dow Jones stocks were "incredibly overoptimistic" and of no predictive value. The mean annual stock return of 20% for the Dow Jones' stocks in *Value Line*'s forecasts was nearly double the realized annual stock return. The authors also found that *Value Line*'s forecasts of earnings per share and profit margins were termed "strikingly overoptimistic." *Value Line*'s forecasts of annual sales were higher than achieved levels, but not statistically significant. SCL concluded that the overly-optimistic projected annual stock returns were attributable to *Value Line*'s upwardly-biased forecasts of earnings per share and profit margins.

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

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

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

A. According to the DCF model, the equity cost rate is a function of the dividend yield and expected growth rate. Since this bias is well known, stock prices and therefore dividend yields reflect this bias. However, in the DCF model, the growth rate needs to be adjusted downward from the projected EPS growth rate to reflect the upward bias.

Q. Please discuss the historical growth of the companies in the proxy group, as provided by V*alue Line.*

A. Page 3 of Attachment JRW-7 provides the 5- and 10- year historical growth rates for EPS, DPS, and BVPS for the companies in the proxy group, as published in the *Value Line Investment Survey.* The median historical growth measures for EPS, DPS, and BVPS for the Gas Proxy Group, as provided in Panel A, range from 2.5% to 6.5%, with an average of the medians of 5.1%.

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 Attachment JRW-7. As stated above, due to the presence of outliers, the medians are used in the analysis. For the Gas Proxy Group, as shown in Panel A of page 4 of Attachment JRW-7, the medians range from 5.0% to 8.0%, with an average of the medians of 6.3%. As discussed later in my testimony, I give less weight to these projections due to issues in which these growth rates are calculated.[16]

[16] It should be noted that *Value Line* uses a different approach in estimating projected growth. *Value Line* does not project growth from today, but *Value Line* projects growth from a three-year base period – 2019-2021 – to a projected three-year period for the period 2025-2027. Using this approach, the three-year based period can have a significant impact on the *Value L*ine growth rate if this base period includes years with abnormally high or low earnings. Therefore, I evaluate these growth rates separately from analysts EPS growth rates and give them less weight.

Also provided on page 4 of Attachment JRW-7 are the prospective sustainable growth rates for the companies in the proxy group 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 Proxy Group, the median prospective sustainable growth rate is 4.7%.

Q. Please assess growth for the proxy group as measured by analysts' forecasts of expected 5-year eps growth.

A. Yahoo and Zacks and S&P Cap IQ 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 group on page 5 of Attachment JRW-7. 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 Proxy Group are 5.9%/5.6%.

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

A. Page 6 of Attachment JRW-7 shows the summary DCF growth rate indicators for the proxy group.

The historical growth rate indicators for my Gas Proxy Group imply a baseline growth rate of 5.1%. The average of the projected EPS, DPS, and BVPS growth rates from *Value Line* is 6.3%, and *Value Line*'s projected sustainable growth rate is 4.7%. The mean and median projected EPS growth rates of Wall Street analysts for the Gas Proxy Group are 5.9% and 5.6% as measured by the mean and median growth rates. Giving primary weight to the projected EPS growth rate of Wall Street analysts, I believe that the appropriate projected growth rate is in the 5.0%-6.0% range. I will use the midpoint of this range, 5.5%, as my DCF growth rate. This growth rate figure is in the upper end of the range of historic and projected growth rates for the Gas Proxy Group.

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

A. My DCF-derived equity cost rates for the groups are summarized on page 1 of Attachment JRW-7 and in Table 3 below.

Table 3
DCF-Derived Equity Cost Rate/ROE

	Dividend Yield	1 + ½ Growth Adjustment	DCF Growth Rate	Equity Cost Rate
Gas Proxy Group	**3.30%**	**1.0275**	**5.50%**	**8.90%**

The result for the Gas Proxy Group is the 3.30% dividend yield, times the one and one-half growth adjustment of 1.0275, plus the DCF growth rate of 5.50%, which results in an equity cost rate of 8.90%.

C. 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:

$$\boldsymbol{K = (R_f) + \text{ß} * [E(R_m) - (R_f)]}$$

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 Attachment JRW-8.

A. Attachment JRW-8 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 Attachment JRW-8, the yield on 30-year U.S. Treasury bonds has been in the 1.3% to 4.0% range over the 2013–2022 time period. The current 30-year Treasury yield is about 2.50%. Given the recent range of yields, I am using 2.50% as my risk-free interest rate. This is similar to the normalized risk-free interest rate used by the investment advisory firm Duff & Phelps.[17]

Q. Does the 2.50% risk-free interest rates take into consideration of forecasts of higher interest rates?

A. No, it does not. Forecasts of higher interest rates have been notoriously wrong for a decade.[18] My 2.50% risk-free interest rate considers the range of interest rates in the past and effectively synchronizes the risk-free rate with the market risk premium. The risk-free rate and the market risk premium are interrelated in that the market risk premium is developed in relation to the risk-free rate. As discussed below, my market risk premium is based on the results of many studies and surveys that have been published over time. Therefore, my risk-free interest rate of 2.50% 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

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

[18] Ben Eisen, "Yes, 100% of economists were dead wrong about yields, *Market Watch*," October 22, 2014. Perhaps reflecting this fact, *Bloomberg* reported that the Federal Reserve Bank of New York has stopped using the interest rate estimates of professional forecasters in the Bank's interest rate model due to the unreliability of those interest rate forecasts. See Susanne Walker and Liz Capo McCormick, "Unstoppable $100 Trillion Bond Market Renders Models Useless," *Bloomberg.com* (June 2, 2014). http://www.bloomberg.com/news/2014-06-01/the-unstoppable-100-trillion-bond-market-renders-models-useless.html. Joe Weisenthal, "How Interest Rates Keep Making People on Wall Street Look Like Fools," Bloomberg.com, March 16, 2015. http://www.bloomberg.com/news/articles/2015-03-16/how-interest-rates-keep-making-people-on-wall-street-look-like-fools. Akin Oyedele, "Interest Rate Forecasters are Shockingly Wrong Almost All of the Time," Business *Insider*, July 18, 2015. http://www.businessinsider.com/interest rate-forecasts-are-wrong-most-of-the-time-2015-7. "*Market Watch*," October 22, 2014.

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 Attachment JRW-8, 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 Attachment JRW-8, the median beta for the companies in the Gas Proxy Group is 0.85.

Q. Please discuss the change in betas in 2020.

A. I have traditionally used the betas as provided in the *Value Line Investment Survey*. As discussed above, the betas for utilities recently increased significantly as a result of the volatility of utility stocks during the stock-market meltdown associated with the novel coronavirus in March of 2020. *Value Line* betas are computed using weekly returns, and the volatility of utility stocks during March 2020 was impacted by using weekly and not monthly returns. Yahoo Finance uses five years of monthly returns to compute betas, and Yahoo Finance's betas for utilities are lower than *Value Lin*e's.

Q. Given this discussion, what betas are you using in your CAPM?

A. At present, I will continue to use *Value Line* betas in my CAPM, which I believe is a conservative approach.

Q. Please discuss the market risk premium.

A. The market-risk premium 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 market-risk premium 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 market-risk premium 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 I discuss below, there are different ways to measure $E(R_m)$, and studies have been developed 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."[19]

Q. Please discuss the alternative approaches to estimating the market risk premium.

[19] Merton Miller, *The History of Finance: An Eyewitness Account*, J. OF APPLIED CORP. FIN., 3 (2000).

A. Page 4 of Attachment JRW-8 highlights the primary approaches to, and issues in, estimating the expected market-risk premium. The traditional way to measure the market-risk premium 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. However, this historical evaluation of returns can be problematic 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, which I discuss later. 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.[20]

In addition, there are a number of surveys of financial professionals regarding the market-risk premium, as well as several published surveys of academics on the equity risk premium. Duke University has published a CFO Survey on a quarterly basis for over 10 years.[21] 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*.[22] This survey of professional economists has been published for almost 50 years. In addition, Pablo Fernandez conducts annual surveys of financial analysts and companies regarding the equity risk premiums used in their investment and financial decision making.[23]

Q. PLEASE PROVIDE A SUMMARY OF THE MARKET RISK PREMIUM STUDIES.

[20] Rajnish Mehra & Edward C. Prescott, The Equity Premium: A Puzzle, J. OF MONETARY ECON. 145 (1985).

[21] DUKE UNIVERSITY, *The CFO Survey* (2022) https://www.richmondfed.org/cfosurvey.

[22] FEDERAL RESERVE BANK OF PHILADELPHIA, *Survey of Professional Forecasters* (Feb. 2020), https://www.philadelphiafed.org/-/media/research-and-data/real-time-center/survey-of-professional-forecasters/2019/spfq119.pdf?la=en. The Survey of Professional Forecasters was formerly conducted by the American Statistical Association (ASA) and the National Bureau of Economic Research (NBER) and was known as the ASA/NBER survey. The survey, which began in 1968, is conducted each quarter. The Federal Reserve Bank of Philadelphia, in cooperation with the NBER, assumed responsibility for the survey in June 1990.

[23] Pablo Fernandez, Sophia Banuls, & Javier Acín, SURVEY: MARKET RISK PREMIUM AND RISK-FREE RATE USED FOR 88 COUNTRIES IN 2020 (June 7, 2021), IESE Business School Working Paper.

A. Derrig and Orr, Fernandez, and Song completed the most comprehensive reviews of the research on the market risk premium.[24] Derrig and Orr's study evaluated the various approaches to estimating market-risk premiums, discussed the issues with the alternative approaches, and summarized the findings of the published research on the market risk premium.

Fernandez examined four alternative measures of the market-risk premium – historical, expected, required, and implied. He also reviewed the major studies of the market-risk premium and presented the summary market-risk premium results.

Song provided an annotated bibliography and highlighted the alternative approaches to estimating the market risk premium.

Page 5 of Attachment JRW-8 provides a summary of the results of the primary risk-premium studies reviewed by Derrig and Orr, as well as other more recent studies of the market risk premium.

In developing page 5 of Attachment JRW-8, I have categorized the types of studies as discussed on page 4 of Attachment JRW-8. 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 Attachment JRW-8.

[24] *See* Richard Derrig & Elisha Orr, EQUITY RISK PREMIUM: EXPECTATIONS GREAT AND SMALL, Working Paper (version 3.0), Automobile Insurers Bureau of Massachusetts, (Aug. 28, 2003); Pablo Fernandez, EQUITY PREMIUM: HISTORICAL, EXPECTED, REQUIRED, AND IMPLIED, IESE Business School Working Paper (2007); Zhiyi Song, THE EQUITY RISK PREMIUM: AN ANNOTATED BIBLIOGRAPHY, CFA Institute (2007).

A. Page 5 of Attachment JRW-8 provides a summary of the results of the market risk-premium studies that I have reviewed. These include the results of: (1) the various studies of the historical risk premium, (2) *ex ante* market risk-premium studies, (3) market risk-premium surveys of CFOs, financial forecasters, analysts, companies and academics, and (4) the Building Blocks approach to the market risk premium. There are results reported for over 30 studies, and the median market-risk premium of these studies is 4.83%.

Q. Please highlight the results of more recent risk premium studies and surveys.

A. The studies cited on page 5 of Attachment JRW-8 include every market risk-premium study and survey I could identify that was published over the past 15 years and that provided a market risk-premium estimate. Many of these studies were published prior to the financial crisis that began in 2008. In addition, some of these studies were published in the early 2000s at the market peak. It should be noted that many of these studies (as indicated) used data over long periods of time (as long as 50 years of data) and so were not estimating a market-risk premium as of a specific point in time (e.g., the year 2001). To assess the effect of the earlier studies on the market-risk premium, I have reconstructed page 5 of Attachment JRW-8 on page 6 of Attachment JRW-8; however, I have eliminated all studies dated before January 2, 2010. The median market-risk-premium estimate for this subset of studies is 5.16%.

Q. Please summarize the market risk premium studies and surveys.

A. As noted above, there are three approaches to estimating the market-risk premium – historic stock and bond returns, *ex ante* or expected returns models, and surveys. The studies on page 6 of Attachment JRW-8 can be summarized in the following manners:

Historic Stock and Bond Returns - Historic stock and bond returns suggest a market-risk premium in the 4.40% to 6.71% range, depending on whether one uses arithmetic or geometric mean returns.

Ex Ante Models - Market risk-premium studies that use expected or ex ante return models indicate a market-risk premium in the range of 3.47% to 6.00%.

Surveys – Market-risk premiums developed from surveys of analysts, companies, financial professionals, and academics are lower, with a range from 3.88% to 5.70%.

Building Block – The mean reported market risk premiums reported in studies using the building block approach range from 3.00% to 5.21%.

Q. Please highlight the ex ante market risk-premium studies and surveys that you believe are most timely and relevant.

A. I will highlight several studies/surveys.

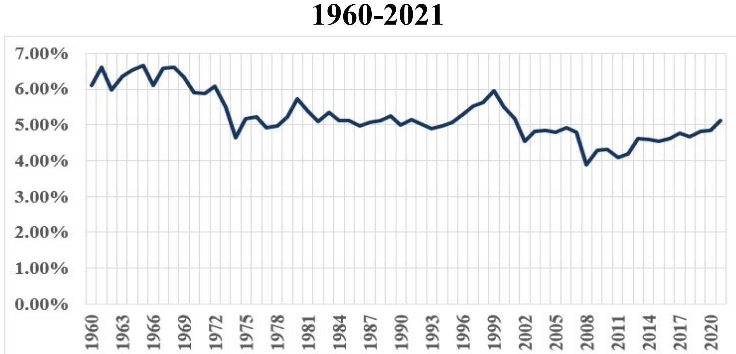
Pablo Fernandez conducts annual surveys of financial analysts and companies regarding the equity risk premiums used in their investment and financial decision-making.[25] His survey results are included on pages 5 and 6 of

[25] Pablo Fernandez, Sofia Banuls, and Pablo Acín, A Survey: MARKET RISK PREMIUM AND RISK-FREE RATE USED FOR 88 COUNTRIES IN 2021, IESE Business School (June 2021).

Attachment JRW-8. The results of his 2021 survey of academics, financial analysts, and companies, which included 4,000 responses, indicated a mean market-risk premium employed by U.S. analysts and companies of 5.5%.[26] His estimated market-risk premium for the U.S. has been in the 5.00% to 5.60% range in recent years.

Professor Aswath Damodaran of New York University, a leading expert on valuation and the market-risk premium, provides a monthly updated market-risk premium based on projected S&P 500 EPS and stock-price level and long-term interest rates. His estimated market-risk premium, shown graphically in Figure 7, below, has primarily been in the range of 4.0% to 6.0% since 2010. As of March 1, 2022, his estimate of the implied market-risk premium was 5.37%.[27]

Figure 7
Damodaran Market Risk Premium
1960-2021



Source: Aswath Damodaran, Damodaran Online, N.Y. UNIVERSITY, http://pages.stern.nyu.edu/~adamodar/.

Duff & Phelps, an investment advisory firm, provides recommendations for the normalized risk-free interest rate and market-risk premiums to be used in

26 *Id.* at 3.

27 Aswath Damodaran, *Damodaran Online*, N.Y. UNIVERSITY. http://pages.stern.nyu.edu/~adamodar/.

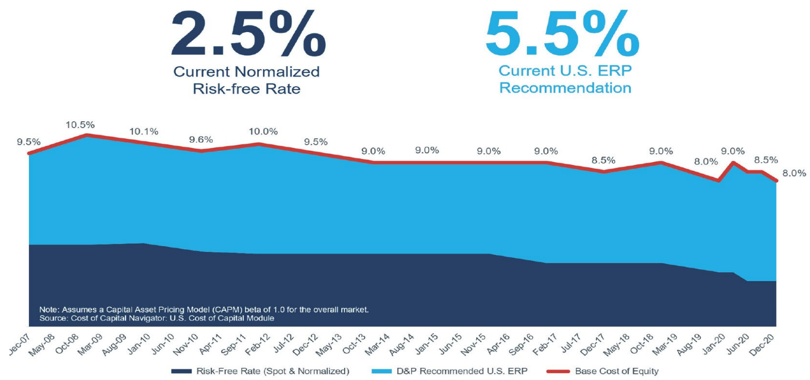
calculating the cost-of-capital data. Its recommendations over the 2008–2021 time periods are shown on page 7 of Attachment JRW-8 and are shown graphically in Figure 8. Over the past decade, Duff & Phelps' recommended normalized risk-free interest rates have been in the 2.50% to 4.00% and market-risk premiums have been in the 5.0% to 6.0% range. In early 2020, in the wake of the novel coronavirus in 2020, Duff & Phelps decreased its recommended normalized risk-free interest rate from 3.0% to 2.50% and increased its market-risk premium from 5.00% to 6.00%. Subsequently, on December 9, 2020, Duff & Phelps reduced its recommended market-risk premium to 5.50%.[28]

Finally, KPMG, the international accounting firm, regularly publishes an update to their market risk premium to be used in their valuation practice. KPMG's market risk premium, which was as high as 6.75% in 2020, was lowered on March 31, 2021 to 5.75% on June 30, 2021, to 5.50%, and on September 30th, to 5.00%.[29]

[28] https://www.duffandphelps.com/insights/publications/cost-of-capital/duff-and-phelps-recommended-us-equity-risk-premium-decreased-december-2020.

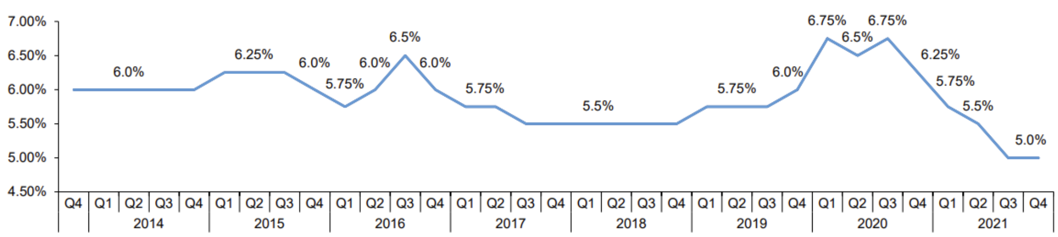
[29] KPMG Corporate Finance NL recommends a MRP of 5.0% as per 30 September 2021. See https://indialogue.io/clients/reports/public/5d9da61986db2894649a7ef2/5d9da63386db2894649a7ef5

Figure 8
Duff & Phelps
Normalized Risk-Free Rate and Market-Risk Premium Recommendations
2007-2021



Source: https://www.duffandphelps.com/insights/publications/cost-of-capital

Figure 9
KPGM
Market-Risk Premium Recommendations
2013-2021



Source:file: https://diaprodnlreports.blob.core.windows.net/report-5d9da61986db2894649a7ef2-media/document_61decb398e93b0f6721de9db.pdf?sv=2019-02-02&spr=https&st=2022-03-16T16%3A04%3A33Z&se=2022-03-16T17%3A13%3A33Z&sr=c&sp=r&sig=zHitzYdV%2FHIRx6bgKfbLrgcpjmmAyfvRffEvQp4yrWQ%3D&rscd=inline

Q. Given these results, what market risk premium are you using in your CAPM?

A. The studies on page 6 of Attachment JRW-8, and more importantly, the more timely and relevant studies just cited, suggest that the appropriate market-risk premium in the U.S. is in the 4.0% to 6.0% range. I will use an expected market-risk premium of 5.50%, which is the upper end of the range, as the market-risk premium. I gave most weight to the market risk-premium estimates of Duff & Phelps, KPMG, the Fernandez survey, and Damodaran. This is a conservatively high estimate of the market-risk premium considering the many studies and surveys of the market-risk premium.

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

A. The results of my CAPM study for the proxy groups are summarized on page 1 of Attachment JRW-8 and in Table 4 below.

Table 4
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	**2.50%**	**0.85**	**5.50%**	**7.2%**

For the Gas Proxy Group, the risk-free rate of 2.50% plus the product of the beta of 0.85 times the equity risk premium of 5.50% results in a 7.20% equity cost rate.

D. <u>Equity Cost Rate Summary</u>

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

A. My DCF and CAPM analyses for the Gas Proxy Group indicate equity-cost rates of 8.90% and 7.20%.

Table 5
ROEs Derived from DCF and CAPM Models

	DCF	CAPM
Gas Proxy Group	**8.90%**	**7.20%**

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 is in the range of 7.20% to 8.90% for the companies in the Gas Proxy Group. However, since I rely primarily on the DCF model and given the recent increase in interest rates, I am using an equity cost rate at the high end of the range, 8.90%, for the Company.

q. Please indicate why your equity-cost rate recommendation is appropriate for Northern.

A. There are a number of reasons why an equity-cost rate of 8.90% is appropriate and fair for the Company in this case:

1. As shown in Attachment JRW-3 (page 1), capital costs for utilities, as indicated by long-term, utility-bond yields, are still at historically low levels;
2. As shown in Attachment JRW-6.2, the gas utility 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 the lowest in the U.S., according to the CAPM;
3. I have employed a Company capital structure with a higher common equity ratio and lower financial risk than the average of the proxy group;
4. The investment risk of the Company is similar to than the average of the Gas Proxy Group, as indicated by its S&P and Moody's issuer credit ratings; and
5. My recommended equity-cost rate lies at the high end of the range of my ROE outcomes.

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

A. In 2015 Moody's published an article on utility ROEs and credit quality. In the article, Moody's recognizes that authorized ROEs for electric and gas companies are declining due to lower interest rates. [30]

> 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.[31]

> 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.

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

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

Overall, this article further supports the belief that lower authorized ROEs are unlikely to hurt the financial integrity of utilities or their ability to attract capital.

Q. Do you believe that your 8.90% 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. As shown on page 3 of Attachment JRW-3,p. 3 gas distribution companies have been earning ROEs in the range of 8.0% to 9.0% in recent years. With such a ROE, gas companies such as those in the proxy group have strong investment grade credit ratings, their stocks have been selling well over book value, and they have been raising abundant amounts of capital. While my recommendation is a little below the average authorized ROEs for gas distribution companies, it reflects the record low levels of interest rates and capital costs. Therefore, I believe that my ROE recommendation meets the criteria established in the *Hope* and *Bluefield* decisions.

VI. 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 0.00% short-term debt, 47.53% long-term debt, and 52.47% common equity. The Company has recommended a long-term debt cost rate of 4.93%. Mr. Cochran has recommended a common equity cost rate of 10.30% for the Company. The Company's overall proposed rate of return is 7.75%. This is summarized on page 1 of in Attachment JRW-9.

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

A. Mr. Cochrane has developed a proxy group of gas distribution companies and employs DCF and CAPM equity cost rate approaches. Mr. Cochrane's equity cost rate estimates for the Company are summarized on page 2 of Attachment JRW-9. 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 primary rate of return issues in this case include the following:

<u>Capital Structure</u> - The Company has proposed a capital structure that includes a common equity ratio (52.47%) that is higher than the average common equity ratios employed by the proxy group. Hence, as a result, I am employing a capital structure with a common equity ratio of 50.0%.

<u>DCF Approach</u> – Mr. Cochrane and I have both employed the traditional constant-growth DCF model. Mr. Cochrane has also used a multi-stage growth version of the model. There are several errors in Mr. Cochrane's DCF analyses: (1) he has exclusively used the overly optimistic and upwardly biased earnings per share ("EPS") growth rate forecasts of Wall Street analysts and *Value Line*; (2) he has combined abnormally high *Value Line* projected EPSs for his proxy companies, computed from a three-year base period, with three-to-five-year projected growth rates of Yahoo and Zack's; and (3) his terminal growth rate of 5.49% in his multi-stage DCF model is inflated, does not reflect the prospective economic growth in the U.S., and is about 100 basis points above the projected long-term GDP growth.

CAPM Approach – The CAPM approach requires an estimate of the risk-free interest rate, beta, and the market or risk premium. There are several issues with Mr. Cochrane's overstated average market risk premium of 11.88%. First, the 11.88% market risk premium is much larger than: (1) indicated by historic stock and bond return data; and (2) found in the published studies and surveys of the market risk premium. Second, the 11.88% market risk premium is based on unrealistic assumptions of future economic and earnings growth and stock returns. To compute his market risk premium, Mr. Cochrane has applied the DCF to the S&P 500 and employed analysts' three-to-five-year EPS growth-rate projections as a growth rate to compute an expected market return and market risk premiums. This approach results in an expected market return of 14.02%. As I demonstrate later in my testimony, the EPS growth-rate projection of 12.59% used for the S&P 500 and the resulting expected market return and market risk premium include unrealistic assumptions regarding future economic and earnings growth and stock returns.

Flotation Costs - Mr. Cochrane's recommendation includes an adjustment of 0.10% for equity flotation costs. Yet, Mr. Cochrane has not identified any flotation costs that have been paid by the Company. Therefore, the Company should not be rewarded with a higher ROE that includes flotation costs when the

Company has not paid any such costs. Furthermore, the Commission has traditionally not allowed flotation costs.

Small Size Premium – Mr. Cochrane's ROE recommendation also includes a consideration of a size premium for the Company. However, as I show, any such premium for size is not appropriate for a regulated public utility. In addition, the Commission has traditionally not allowed a size premium.

A. DCF Approach

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

A. On pages 12-19 of his testimony and in Attachments JC-4 - JC-5, Mr. Cochrane develops an equity cost rate by applying the DCF model to his proxy group. Mr. Cochrane's DCF results are summarized in page 2 of Attachment JRW-9. He uses constant-growth and multistage growth DCF models. Mr. Cochrane uses three dividend yield measures (30, 90, and 180 days) in his DCF models. In his constant-growth DCF models, Mr. Cochrane has relied on the forecasted EPS growth rates of Zacks, Yahoo Finance, 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 of 5.49% as the long-term growth rate. For all three models, he reports Mean Low, Mean, and Mean High results. His equity cost rate results are provided on page 2 of Attachment JRW-9.

Q. What are the issues in Mr. Cochrane's DCF analyses?

A. The primary issues in Mr. Cochrane's DCF analyses are: (1) his exclusive use of the overly optimistic and upwardly biased EPS growth rate forecasts of Wall Street analysts and *Value Line*; (2) he has combined abnormally high *Value Line* projected EPSs for his proxy companies, computed from a three-year base period, with three-to-five-year projected growth rates of Yahoo and Zack's; and (3) his terminal growth rate of 5.49% in his multi-stage DCF model is inflated, does not reflect the prospective economic growth in the U.S., and is about 100 basis points above the projected long-term GDP growth.

1. <u>Analysts' EPS Growth Rate Forecasts</u>

Q. Please discuss Mr. Cochrane'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.[32] 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.[33] 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.[34] Therefore, exclusive reliance on these forecasts for a DCF growth rate results in failure of one the basic inputs in the equation. In addition, as noted above, a study by Szakmary, Conover, and Lancaster (2008) discovered that the three-to-five-year EPS growth rate forecasts of *Value Line*'s to be significantly higher than the EPS growth rates that these companies subsequently achieved.[35]

Q. Have changes in regulations impacting Wall Street analysts and their research impacted the upward bias in their projected EPS growth rates?

A. No. A number of the studies I have cited above demonstrate that the upward bias has continued despite changes in regulations and reporting requirements over the past two decades. This observation is highlighted by a 2010 McKinsey study

[32] 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

[33] See references in footnotes 13-16.

[34] 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.

[35] Szakmary, A., Conover, C., & Lancaster, C. (2008). "An Examination of *Value Line*'s Long-Term Projections," *Journal of Banking & Finance*, May 2008, pp. 820-833.

entitled "Equity Analysts: Still Too Bullish," which involved a study of the accuracy of analysts' long-term EPS growth rate forecasts. The authors conclude that after a decade of stricter regulation, analysts' long-term earnings forecasts continue to be excessively optimistic. They made the following observation:[36]

> Alas, a recently completed update of our work only reinforces this view—despite a series of rules and regulations, dating to the last decade, that were intended to improve the quality of the analysts' long-term earnings forecasts, restore investor confidence in them, and prevent conflicts of interest. For executives, many of whom go to great lengths to satisfy Wall Street's expectations in their financial reporting and long-term strategic moves, this is a cautionary tale worth remembering. This pattern confirms our earlier findings that analysts typically lag behind events in revising their forecasts to reflect new economic conditions. When economic growth accelerates, the size of the forecast error declines; when economic growth slows, it increases. So as economic growth cycles up and down, the actual earnings S&P 500 companies report occasionally coincide with the analysts' forecasts, as they did, for example, in 1988, from 1994 to 1997, and from 2003 to 2006. *Moreover, analysts have been persistently overoptimistic for the past 25 years, with estimates ranging from 10 to 12 percent a year, compared with actual earnings growth of 6 percent. Over this time frame, actual earnings growth surpassed forecasts in only two instances, both during the earnings recovery following a recession. On average, analysts' forecasts have been almost 100 percent too high.*

This is the same observation made in a *Bloomberg Businessweek* article.[37] The author concluded:

[36] Marc H. Goedhart, Rishi Raj, and Abhishek Saxena, "Equity Analysts, Still Too Bullish," *McKinsey on Finance*, pp. 14-17, (Spring 2010) (emphasis added).

[37] Roben Farzad, "For Analysts, Things Are Always Looking Up," *Bloomberg Businessweek* (June 10, 2010), https://www.bloomberg.com/news/articles/2010-06-10/for-analysts-things-are-always-looking-up.

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

2. *Value Line* Projected EPS Growth Rates

Q. Please discuss Mr. Cochrane's use of *Value Line's* projected EPS growth rates.

A. Table 6 shows Mr. Cochrane's DCF growth rates from Yahoo, Zacks, and *Value Line*. The Yahoo and Zacks growth rates are the average of analysts' three-to-five-year projected growth rates compiled by Yahoo and Zacks. *Value Line* uses a different approach in estimating projected growth. *Value Line* projects growth from a three-year base period – 2018-2020 – to a projected three-year period for the period 2024-2026. Using this approach, the three-year based period can have a significant impact on the *Value L*ine growth rate if this base period includes years with abnormally high or low earnings. For most of the nine proxy companies, the *Value* Line projected EPS growth rates are larger than the average of the Yahoo and Zacks growth rates, and especially so for South Jersey Industries ("SJI"). Overall, on average, the *Value* Line projected EPS growth rates are more than 100 basis points above those from Zacks and Yahoo.

Table 6
Mr. Cochran's DCF Growth Rates

Company	*Value Line*	Zacks	Yahoo
Atmos Energy	7.00%	7.30%	7.17%
Chesapeake Utilities	8.50%	NA	4.74%
NiSource Inc.	9.50%	6.40%	3.52%
New Jersey Resources	2.00%	7.10%	6.00%
Northwest Natural	5.50%	3.90%	3.80%
ONE Gas Inc.	6.00%	5.00%	5.00%
South Jersey Inds.	11.50%	5.40%	4.90%
Spire Inc.	10.00%	5.50%	7.31%
Southwest Gas	9.00%	5.50%	4.00%
Mean	7.67%	6.41%	6.36%

Q. What skews *Value Line*'s growth rates?

A. *Value Line's* data includes a projected EPS growth rate of 11.5% for SJI as shown in Table 6. Panel A of Table 7 shows that *Value Line* projected EPS growth rate of 11.5% is from a three-year base period – 2018-2020 – to project growth for three-year period of 2024-2026. Panel B of Table 7 shows how the 11.5% is determined. The 11.5% represents the growth from $1.39 (the average of SJI's EPS for 2018, 2019, and 2020 EPS figures of $1.38, $1.12, and $1.68) to the projected EPS of $2.70 in the 2024-26 period. This 11.5% growth rate is inflated by including the abnormally low 2019 EPS figure of $1.12 in the three-year base period (2018-20). The projected growth rate is 11.5% over the six-year period and is rounded from the actual growth rate figure from the base to projected periods of 11.66%.

Table 7
NI's *Value Line* Projected EPS Growth Rate
Panel A

ANNUAL RATES of change (per sh)	Past 10 Yrs.	Past 5 Yrs.	Est'd '18-'20 to '24-'26
Revenues	1.5%	6.5%	*3.0%*
"Cash Flow"	4.5%	3.0%	*6.0%*
Earnings	1.5%	-1.5%	*11.5%*
Dividends	6.5%	4.0%	*4.5%*
Book Value	5.5%	2.5%	*4.5%*

Panel B

SJI	2018	2019	2020	2021	2022	2024-26
EPS	1.38	1.12	1.68	1.65	1.80	2.70
3-Year Base and Projected Periods						
		2018-20				2024-26
Base/Projected EPS		1.39				2.70
Base/Projected EPS Growth Rate				11.66%		

Value Line Investment Survey, November 26, 2021

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

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

A. Mr. Cochrane 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 Yahoo Finance, 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 5.49% which is based on (1) a real GDP growth rate of 3.14% which is calculated over the 1929-2020 time period and (2) an inflation rate of 2.28%.

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

A There are two primary errors with Mr. Cochrane'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. Cochrane's projected long-term GDP growth rate of 5.49%.

A. There are two major errors in this analysis. First, Mr. Cochrane has not provided any theoretical or empirical support that projected long-term GDP growth is a reasonable proxy for the expected growth rate of the companies in his proxy group. The second error is the magnitude of Mr. Cochrane's long-term GDP growth rate estimate of 5.49%. On page 1 of Attachment JRW-10 of my testimony, I provide an analysis of GDP growth since 1960. Since 1960, nominal GDP has grown at a compounded rate of 6.34%. However, while GDP has grown at a compounded rate of 6.34% since 1960, economic growth in the U.S. has slowed considerably in recent decades. Page 2 of Attachment JRW-10 provides the nominal annual GDP growth rates over the 1961 to 2021 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. There was an uptick in nominal GDP growth during the mid-2000s. but the average growth rate has been in the 4.0% range over the past decade. There were three exceptions: (1) +5.4% in 2018 due to a one-time boost associated with the 2017 tax cut; (2) -2.2% in 2020 due to Covid-19; and (3) +10.1% in 2021 due to the economic recovery from Covid-19.

The components of nominal GDP growth are real GDP growth and inflation. Page 3 of Attachment JRW-10 shows annual real GDP growth rate over the 1961 to 2020 time period. Real GDP growth has gradually declined from the 5.0% to

6.0% range in the 1960s to the 2.0% range during the most recent five-year period, notwithstanding the -3.4% growth rate in 2020 and the 5.7% growth rate in 2021. The second component of nominal GDP growth is inflation. Page 4 of Attachment JRW-10 shows inflation as measured by the annual growth rate in the Consumer Price Index (CPI) over the 1960 to 2020 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. Inflation did jump to 4.7% in 2021 with the economic recovery from Covid-19.

The graphs on pages 2, 3, and 4 of Attachment JRW-10 provide 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 8 and page 5 of Attachment JRW-10 provide the compounded GDP growth rates for 10-, 20-, 30-, 40- and 50- years. Whereas the 50-year compounded GDP growth rate is 6.15%, 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 4.0% range is more appropriate today for the U.S. economy. Mr. Cochrane's long-term GDP growth rate of 5.49% is clearly inflated.

Table 8
Historic GDP Growth Rates

10-Year Average	**3.96%**
20-Year Average	**3.96%**
30-Year Average	**4.49%**
40-Year Average	**5.05%**
50-Year Average	**6.15%**

Q. Are the lower GDP growth rates of recent decades consistent with the forecasts of GDP growth?

A. 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 Attachment JRW-10. The mean 10-year nominal GDP growth forecast (as of February, 2022) by economists in the recent *Survey of Financial Forecasters* is 4.70%.[38] The federal Energy Information Administration (EIA), in its projections used in preparing *Annual Energy Outlook,* forecasts long-term GDP growth of 4.5% for the period 2020–2050.[39] The Congressional Budget Office (CBO), in its forecasts for the period 2020 to 2030, projects a nominal GDP growth rate of 4.0%.[40] Finally, the Social Security Administration (SSA), in its Annual OASDI Report, provides a projection of nominal GDP from 2020–2095.[41] SSA's

[38] https://www.philadelphiafed.org/research-and-data/real-time-center/survey-of-professional-forecasters/

[39] U.S. Energy Information Administration, *Annual Energy Outlook 2021*, Table: Macroeconomic Indicators.

[40] Congressional Budget Office, *The 2021 Long-Term Budget Outlook*, July 15, 2021.

[41] Social Security Administration, *2021 Annual Report of the Board of Trustees of the Old-Age, Survivors, and Disability Insurance (OASDI) Program*, Table VI.G4, (July 1, 2021), The 4.2% growth rate is the growth in projected GDP from 2020 to 2095.

projected growth GDP growth rate over this period is 4.2%. Overall, these forecasts suggest long-term GDP growth rate in the 4.0–4.5 percent range. The trends and projections indicating slower GDP growth indicate that Mr. Cochrane's GDP growth rate of 5.49% is inflated.

Q. Does Mr. Cochrane 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. Cochrane's basing his 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. Cochrane has ignored <u>historic</u> EPS, DPS, and BVPS data and relied solely on the long-term EPS growth rate <u>projections</u> of Wall Street analysts and *Value Line*. At the same time, however, in developing a terminal DCF growth rate for his multi-stage growth DCF analysis, Mr. Cochrane ignores the well-known long-term real GDP growth rate <u>forecasts</u> of the CBO and EIA and relies solely on <u>historic</u> data going back to 1929. Simply put, he is inconsistent in his methodology.

B. CAPM Approach

Q. Please discuss Mr. Cochrane's CAPM.

A. On pages 20-24 of his testimony and in Attachments JC-6 through JC-8, Mr. Cochrane 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. Cochrane uses: (1) a current (30-day average, 90-day average, and 180-day average) 30-Year Treasury bond yields of 2.30%, 2.21%, and 1.91%; (2) an average *Value Line* Beta of 0.88; and (3) an average market risk premium of 11.88%. Mr. Cochrane's CAPM results are summarized on page 2 of Attachment JRW-9.

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

A. The primary issue is Mr. Cochrane's expected market risk premium of 11.88%.

1. <u>The Market Risk Premium</u>

Q. Please assess Mr. Cochrane's market risk premium derived from applying the DCF model to the S&P 500 using *Value Line* EPS growth rates.

A. As shown in Table 9, Mr. Cochrane computes a market risk premium of 11.88% by: (1) calculating an expected stock market return by applying the DCF model to the S&P 500; and, then (2) subtracting three measures (30, 90, and 180 day averages) of the current 30-year Treasury bond yield. The market risk premium is then computed as the expected stock market return minus the risk-free interest rate. The average market risk premium (using the three risk-free rates) is 11.88%.

Table 9
CAPM Market Risk Premium Calculation

	30-Day	90-Day	180-Day	Average
Expected Market Return	14.02%	14.02%	14.02%	14.02%
Risk-Free Interest Rate	2.30%	2.21%	1.91%	2.14%
Market Risk Premium	11.72%	11.81%	12.11%	11.88%

Q. How did Mr. Cochrane err when analyzing market premium?

A. Mr. Cochrane's market risk premium is based on an estimated expected market return is 14.02% which is calculated by applying the DCF model to the S&P 500. As shown in Table 10, Mr. Cochrane also uses (1) a dividend yield of 1.43% and an expected DCF growth rate of 12.59% using *Value Line* EPS growth rate estimates for the S&P 500 companies.

Table 10
Expected Market Return Calculation

Dividend Yield	1.43%
+ Expected EPS Growth	12.59%
= Expected Market Return	14.02%

The error is that Mr. Cochrane computed the expected market return using the DCF model with the growth rate being the projected 5-year EPS growth rate from *Value Line*. Simply stated, the expected EPS growth rates and the associated expected stock market return and resulting market risk premium are totally unrealistic and defy economic logic.

Q. Is Mr. Cochrane's average market risk premium of 11.88% reflective of the market risk premiums found in published studies and surveys?

A. No. It is well in excess of the market risk premiums: (1) found in studies of the market risk premiums by leading academic scholars; (2) produced by analyses of historic stock and bond returns; and (3) found in surveys of financial professionals. Page 6 of Attachment JRW-8 provides the results of over thirty market risk premiums studies from the past ten years. Historic stock and bond returns suggest a market risk premium in the 4.4% to 6.71% range, depending on whether one uses arithmetic or geometric mean returns. There have been many studies using expected return (also called *ex ante*) models, and their market risk premiums results vary from as low as 3.47% to as high as 6.00%. Finally, the market risk premiums developed from surveys of analysts, companies, financial professionals, and academics suggest lower market risk premiums, in a range of from 3.88% to 5.70%. The bottom line is that there is no support in historic return data, surveys, academic studies, or reports for investment firms for a market risk premium as high as those used by Mr. Cochrane.

Q. Please once again address the issues with analysts' as well as *Value Line*'s EPS growth rate forecasts.

A. The key point is that Mr. Cochrane's CAPM market risk premium methodology is based entirely on the concept that *Value Line*'s projections of companies' EPS growth rates reflect investors' expected *long-term* EPS growth for those companies. However, this seems highly unrealistic given the research on these projections. As noted above, the EPS growth rate forecasts of *Value Line*, such as those used by Mr. Cochrane, have been to be significantly higher than the EPS growth rates that these companies subsequently achieve.[42]

Q. Is there other evidence that indicates that Mr. Cochrane's market risk premium developed using *Value Line*'s EPS growth rates is excessive?

A. Yes. The fact is that a long-term EPS growth rate of 12.59% is inconsistent with both historic and projected economic and earnings growth in the U.S for several reasons: (1) long-term EPS and economic(GDP) growth is less than one-half of Mr. Cochrane's projected EPS growth rate of 12.59%; (2) as discussed below, long-term EPS and GDP growth are directly linked; and (3) more recent trends in GDP growth, as well as projections of GDP growth, suggest slower economic and earnings growth in the future.

Long-Term Historic EPS and GDP Growth have been in the 6%-7% Range – In Attachment JRW-10, 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 Attachment JRW-10, and a summary is shown in Table 11.

Table 11
GDP, S&P 500 Stock Price, EPS, and DPS Growth – 1960-2021

Nominal GDP	**6.34%**
S&P 500 Stock Price	**7.49%**
S&P 500 EPS	**7.12%**
S&P 500 DPS	**5.73%**
Average	**6.67%**

[42] Szakmary, A., Conover, C., & Lancaster, C. (2008). "An Examination of *Value Line*'s Long-Term Projections," *Journal of Banking & Finance*, May 2008, pp. 820-833.

The results show that the historical long-run growth rates for GDP, S&P EPS, and S&P DPS are in the 6% to 7% range. By comparison, Mr. Cochrane's long-run growth rate projection of 12.59% is at best overstated. This estimate suggests that companies in the U.S. would be expected to: (1) increase their growth rate of EPS by 100% in the future, and (2) maintain that growth indefinitely in an economy that is expected to grow at about one-third of his projected growth rates.

There is a Direct Link Between Long-Term EPS and GDP Growth - The results in Attachment JRW-10 and Table 11 show that historically there has been a close link between long-term EPS and GDP growth rates. Brad Cornell of the California Institute of Technology 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:[43]

> 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.

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

<u>The Trend and Projections Indicate Slower GDP Growth in the Future</u> - The components of nominal GDP growth are real GDP growth and inflation. As discussed above and shown on pages 2-5 of Attachment JRW-10, real GDP growth has gradually declined from the 5.0% to 6.0% range in the 1960s to the 2.0% range during the recent years. In addition, inflation as measured by the annual growth rate in the CPI has declined and has been in the 2.0% range or below over the past five years. This decline in nominal GDP growth was shown in Table 8 and suggests that a figure in the range of 4.0% to 4.5% is more appropriate today for the U.S. economy.

<u>Long-Term GDP Projections also Indicate Slower GDP Growth in the Future</u> Likewise, as discussed above, projections of nominal GDP by various government and industry agencies including the EIA, CBO, and SSA project growth rates for long-term GDP in the 4.0% - 4.5% range. Mr. Cochrane's market risk premium presumes a projected EPS growth rate of 12.59% that is almost three times projected GDP growth. Given the connection between EPS and GDP growth rates, this defies economic logic.

Q. What fundamental factors have led to the decline in prospective GDP growth?

A. As addressed in a study by the consulting firm McKinsey & Co., two factors drive real GDP growth over time: (a) the number of workers in the economy (employment); and (2) the productivity of those workers (usually defined as output per hour).[44] According to McKinsey, real GDP growth over the past 50 years was driven by population and productivity growth which grew at compound annual rates of 1.7% and 1.8%, respectively.

However, global economic growth is projected to slow significantly in the years to come. The primary factor leading to the decline is slow growth in employment (working-age population), which results from slower population growth and longer life expectancy. McKinsey estimates that employment growth will slow to 0.3% over the next fifty years. They conclude that even if productivity remains at the rapid rate of the past fifty years of 1.8%, real GDP growth will fall by 40 percent to 2.1%.

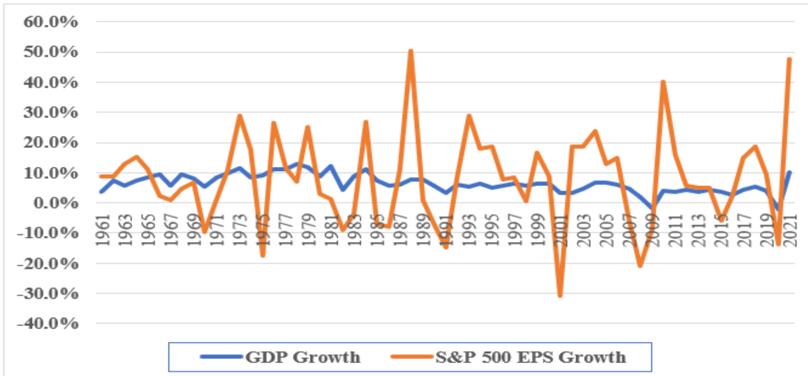
Q. Please provide more insights into the relationship between S&P 500 EPS and GDP growth.

A. Figure 10 shows the average annual growth rates for GDP and the S&P 500 EPS since 1960. The one very apparent difference between the two is that the S&P 500 EPS growth rates are much more volatile than the GDP growth rates, when compared using the relatively short, and somewhat arbitrary, annual conventions used in these data.[45] Volatility aside, however, it is clear that over the medium to long run, S&P 500 EPS growth does not outpace GDP growth.

[44] McKinsey & Co., "Can Long-Term Growth be Saved?", McKinsey Global Institute, (Jan. 2015).

[45] Timing conventions such as years and quarters are needed for measurement and benchmarking but are somewhat arbitrary. In reality, economic growth and profit accrual occur on continuous bases. A 2014 study evaluated the timing relationship between corporate profits and nominal GDP growth. The authors found that aggregate accounting earnings growth is a leading indicator of the GDP growth with a quarter-ahead forecast horizon. *See* Yaniv Konchitchki and Panos N. Patatoukas, "Accounting Earnings and Gross Domestic Product," *Journal of Accounting and Economics* 57 (2014), pp. 76–88.

Figure 10
Average Annual Growth Rates
GDP and S&P 500 EPS
1960-2021



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

A fuller understanding of the relationship between GDP and S&P 500 EPS growth requires consideration of several other factors.

<u>Corporate Profits are Constrained by GDP</u> – Milton Friedman, the noted economist, warned investors and others not to expect corporate profit growth to sustainably exceed GDP growth, stating, "Beware of predictions that earnings can grow faster than the economy for long periods. When earnings are exceptionally high, they don't just keep booming."[46] Friedman also noted in the *Fortune* interview that profits must move back down to their traditional share of GDP. In Table 12, below, I show that currently the aggregate net income levels for the S&P 500 companies, using 2021 figures, represent 6.22% of nominal GDP.

[46] Shaun Tully, "Corporate Profits Are Soaring. Here's Why It Can't Last," Fortune, (Dec. 7, 2017), http://fortune.com/2017/12/07/corporate-earnings-profit-boom-end/.

Table 12
S&P 500 Aggregate Net Income as a Percent of GDP

	2021 Value
Aggregate Net Income for S&P 500	$1,430.79
2021 Nominal U.S. GDP	$22,997.50
Net Income/GDP (%)	6.22%

Data Sources: 2021 Net Income for S&P 500 companies – *Value Line* (March 31, 2022). 2019 Nominal GDP – Moody's - https://www.economy.com/united-states/nominal-gross-domestic-product.

Short-Term Factors Impact S&P 500 EPS – The growth rates in the S&P 500 EPS and GDP can diverge on a year-to-year basis due to short-term factors that impact S&P 500 EPS in a much greater way than GDP. As shown above, S&P EPS growth rates are much more volatile than GDP growth rates. The EPS growth for the S&P 500 companies has been influenced by low labor costs and interest rates, commodity prices, the recovery of different sectors such as the energy and financial sectors, the cut in corporate tax rates, etc. These short-term factors can make it appear that there is a disconnect between the economy and corporate profits.

The Differences Between the S&P 500 EPS and GDP – In recent years, as the EPS for the S&P 500 has grown at a faster rate than U.S. nominal GDP, some have pointed to the differences between the S&P 500 and GDP.[47] These differences include: (a) corporate profits are about 2/3 manufacturing driven,

[47] *See* the following studies: Burt White and Jeff Buchbinder, "The S&P and GDP are not the Same Thing," LPL Financial, (Nov. 4, 2014), https://www.businessinsider.com/sp-is-not-gdp-2014-11; Matt Comer, "How Do We Have 18.4% Earnings Growth In A 2.58% GDP Economy?," Seeking Alpha, (Apr. 2018), https://seekingalpha.com/article/4164052-18_4-percent-earnings-growth-2_58-percent-gdp-economy; Shaun Tully, "How on Earth Can Profits Grow at 10% in a 2% Economy?," Fortune, (July 27, 2017), http://fortune.com/2017/07/27/profits-economic-growth/.

while GDP is 2/3 services driven; (b) consumer discretionary spending accounts for a smaller share of S&P 500 profits (15%) than of GDP (23%); (c) corporate profits are more international-trade driven, while exports minus imports tend to drag on GDP; and (d) S&P 500 EPS is impacted not just by corporate profits but also by share buybacks on the positive side (fewer shares boost EPS) and by share dilution on the negative side (new shares dilute EPS). While these differences may seem significant, it must be remembered that the Income Approach to measure GDP includes corporate profits (in addition to employee compensation and taxes on production and imports) and therefore effectively accounts for the first three factors.[48]

The bottom line is that despite the intertemporal short-term differences between S&P 500 EPS and nominal GDP growth, the long-term link between corporate profits and GDP is inevitable.

Q. Please provide addition evidence showing that Mr. Cochrane's S&P 500 EPS growth rate of 12.59% is not realistic.

A. Beyond my previous discussion, I have also performed the following analysis of S&P 500 EPS and GDP growth in Table 13 below. Specifically, I started with the 2019 aggregate net income for the S&P 500 companies and 2019 nominal GDP for the U.S. As shown in Table 12, the aggregate profit for the S&P 500 companies represented 6.22% of nominal GDP in 2021. In Table 13, I then

[48] The Income Approach to measuring GDP includes wages, salaries, and supplementary labor income, corporate profits, interest and miscellaneous investment income, farmers' incomes, and income from non-farm unincorporated businesses

projected the aggregate net income level for the S&P 500 companies and GDP as of the year 2050. For the growth rate for the S&P 500 companies, I used Mr. Cochrane's projected S&P 500 EPS growth rate of 12.59%. As a growth rate for nominal GDP, I used the average of the long-term projected GDP growth rates from SFF, CBO, SSA, and EIA (4.7%, 4.0%, 4.2%, and 4.5%), which is 4.35%. Using Mr. Cochran's S&P 500 EPS growth rate of 12.59%, the projected 2050 level for the aggregate net income level for the S&P 500 companies is $50.1 trillion. Over the same period GDP is expected to grow to $82.5 trillion. As such, if the aggregate net income for the S&P 500 grows in accordance with the growth rate used by Mr. Cochrane, and if nominal GDP grows at rates projected by major government agencies, the net income of the S&P 500 companies will represent growth from 6.22% of GDP in 2021 to 60.83% of GDP in 2050. Obviously, it is totally implausible for the net income of the S&P 500 to become such a large component of GDP.

Table 13
Projected S&P 500 Earnings and Nominal GDP
2021-2050
S&P 500 Aggregate Net Income as a Percent of GDP

	2021 Value ($B)	Growth Rate	No. of Years	2050 Value ($B)
Aggregate Net Income for S&P 500	$1,430.79	12.59%	30	$ 50,184.67
2021 Nominal U.S. GDP	$22,997.50	4.35%	30	$ 82,500.06
Net Income/GDP (%)	6.22%			60.83%

Data Sources: 2021 Aggregate Net Income for S&P 500 companies – *Value Line* (March 31, 2022).
2019 Nominal GDP – Moody's - https://www.economy.com/united-states/nominal-gross-domestic-product.
S&P 500 EPS Growth Rate - Mr. Cochrane's projected S&P 500 growth rate of 12.59%.
Nominal GDP Growth Rate – The average of the long-term projected GDP growth rates from SFF, CBO, SSA, and EIA (4.7%, 4.0%, 4.2%, and 4.5%).

Q. Please provide a summary assessment of GDP and S&P 500 EPS growth rates.

A. As noted above, the long-term link between corporate profits and GDP is inevitable. The short-term differences in growth between the two has been highlighted by some notable market observers, including Warren Buffet, who indicated that corporate profits as a share of GDP tend to go far higher after periods where they are depressed, and then drop sharply after they have been hovering at historically high levels. In a famous 1999 *Fortune* article, Mr. Buffet made the following observation:[49]

> You know, someone once told me that New York has more lawyers than people. I think that's the same fellow who thinks profits will become larger than GDP. When you begin to expect the growth of a component factor to forever outpace that of the aggregate, you get into certain mathematical problems. In my opinion, you have to be wildly optimistic to believe that corporate profits as a percent of GDP can, for any sustained period, hold much above 6%. One thing keeping the percentage down will be competition, which is alive and well. In addition, there's a public-policy point: If corporate investors, in aggregate, are going to eat an ever-growing portion of the American economic pie, some other group will have to settle for a smaller portion. That would justifiably raise political problems – and in my view a major reslicing of the pie just isn't going to happen.

In sum, Mr. Cochrane's long-term S&P 500 EPS growth rate of 12.59% is grossly overstated and has no basis in economic reality. In the end, the big question remains as to whether corporate profits can grow faster than GDP. Jeremy Siegel, the renowned finance professor at the Wharton School of the University of Pennsylvania, believes that going forward, earnings per share can

[49] Carol Loomis, "Mr. Buffet on the Stock Market," *Fortune*, (Nov. 22, 1999), https://money.cnn.com/magazines/fortune/fortune_archive/1999/11/22/269071/.

grow about half a point faster than nominal GDP, or about 5.0%, due to the big gains in the technology sector. But he also believes that sustained EPS growth matching analysts' near-term projections is absurd: "The idea of 8% or 10% or 12% growth is ridiculous. It will not happen."[50]

Q. Finally, please provide an overall evaluation of Mr. Cochrane's expected stock market return that is used to develop his market risk premium.

A. Simply put, the 14.02% expected stock market return is unrealistic. The compounded annual return in the U.S. stock market is about 10% (9.98% according to Damodaran between 1928-2021).[51] Mr. Cochrane's CAPM results assume that return on the U.S. stock market will be over 40% higher in the future than it has been in the past! The extremely high expected stock market return, and the resulting market risk premium and equity cost rate result, is directly related to the 12.59% expected EPS growth rate. A projected growth rate of 12.59% does not reflect economic reality. As noted above, it assumes that S&P 500 companies can grow their earnings in the future at a rate that is triple the expected GDP growth rate.

C. Flotation Cost and Size Adjustments

Q. Please discuss Mr. Cochrane's consideration of flotation costs.

[50] Shaun Tully, "Corporate Profits Are Soaring. Here's Why It Can't Last," *Fortune*, (Dec. 7, 2017), http://fortune.com/2017/12/07/corporate-earnings-profit-boom-end/.

[51] http://pages.stern.nyu.edu/~adamodar/

A. Mr. Cochrane claims than a flotation cost adjustment of 0.10% is justified to account for flotation costs. However, this is unnecessary for two reasons. First, Mr. Cochran has provided no evident that the Company has paid any equity flotation costs. Therefore, Mr. Cochrane 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 or paid.

Beyond this issue, it is commonly argued that a flotation cost adjustment (such as that used by the Company) is necessary to prevent the stock price 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).

Q. What other adjustments does Mr. Cochrane propose?

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

Q. Please review the research on the size effect.

A. Mr. Cochrane justifies the size premium by referring to Duff & Phelps. Duff & Phelps compute a size premium based on the historical stock market returns for companies based on their size. There are numerous errors in using historical market returns to compute risk premiums. These errors provide inflated estimates of expected risk premiums. Among the errors are survivorship bias (only successful companies survive – poor companies do not) and unattainable return bias (the Ibbotson procedure presumes monthly portfolio rebalancing).

The net result is that Ibbotson's size premiums are poor measures for risk adjustment to account for the size of a utility.

Professor Annie Wong has also tested for a company size premium in utilities and concluded that, unlike industrial stocks, utility stocks do not display a significant company size premium.[52] 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 (or the issuance of debt). Furthermore, unlike for their industrial counterparts, accounting standards and reporting are fairly standardized for public utilities. Finally, a utility's earnings are predetermined to a certain degree through the ratemaking process in which performance is reviewed by state commissions and other stakeholders. 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 company size premium.

Q. Please discuss the research on the company size premium in estimating the cost of equity capital.

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

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.[53]

In a more recent paper, Ang (2017) tested for a size effect over the time period 1981-2016.[54] 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:[55]

> 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

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

[54] Clifford Ang, "The Absence of a Size Effect Relevant to the Cost of Equity," June 9, 2017, available at https://ssrn.com/abstract=2984599.

[55] *Ibid.*, p. 6.

practice of augmenting or modifying the CAPM Cost of Equity with a size premium.

Q. What other evidence can you provide regarding the size effect?

A. Professor Damodaran, the New York University valuation scholar, provides a thorough analysis of the company size effect, which he terms the small firm or cap premium. Figure 119 traces the small firm premium over the 1927-2014 time period.[56] Damodaran has studied the issue for years and makes a number of observations on the size premium or effect:

(1) the effect has largely disappeared since 1980, which is the year the Banz article was published;[57]

(2) the small firm premium tends to come and go over time;

(3) the small firm premium tends to be associated with the January effect (small companies only earn abnormal returns in the first two weeks of January);

(4) the small cap premium seems to actually be a microcap premium, as it disappears when companies with market capitalizations below $5 million are removed;

(5) Damodaran does not find a small cap premium when he estimates a small firm required return;

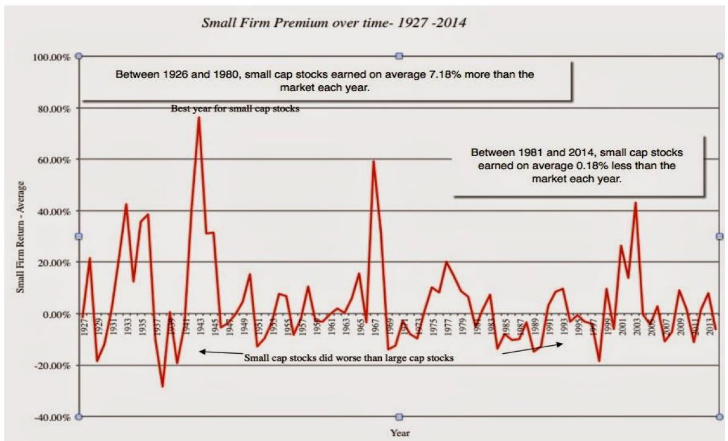
(6) he has never used a small cap premium when valuing small companies; and

[56] Damodaran – "The Small Cap Premium_ Where is the beef," Business Valuation Review: Winter 2015, Vol. 34, No. 4, pp. 152-157, 2015

[57] The 1980 article by Rolf Banz was the first study that reported the existence of a small company premium.

(7) he blames three factors for some analysts' continued use of a small cap premium: (i) intuition (it seems smaller companies should be riskier), (ii) inertia (individuals and institutions are slow to change and to adopt new ideas); and (iii) bias (analysts prefer higher discount rates and lower valuations).

Figure 11
The Small Firm Premium
1927-2014



Source: Aswath Damodaran, "The Small Cap Premium - Where is the beef," Business Valuation Review: Winter 2015, Vol. 34, No. 4, pp. 152-157, 2015.

Q. Please summarize your evidence on the small size premium.

A. Mr. Cochrane has claimed that the Company deserves an incremental return due to its small size. However, he has not performed any empirical studies to support his contention that the Company is riskier due to its small size, and he does not point to any independent reports to support his claim. The size effect is usually associated with Duff & Phelps annual stock return study where they compute so-called size premiums based on the historical stock market returns for companies where size is measured by market capitalizations. As discussed above, the existence of a size premium in the stock market in an ongoing debate in investment circles, and many believe that it has disappeared over time. In addition, there is evidence that no such size premium exists for regulated public utilities. As such, the Commission should reject the Company's request to have a ROE adder for its small size in the absence of any study that supports this claim.

Q. Does this conclude your testimony?

A. Yes, it does.

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

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

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

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

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

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

Over the past 35 years Dr. Woolridge has prepared testimony and/or provided consultation services in regulatory rate cases in the rate of return area in following states: Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Hawaii, Indiana, Kansas, Kentucky, Maryland, Massachusetts, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Washington, D.C. He has also testified before the Federal Energy Regulatory Commission.

J. Randall Woolridge

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Academic Experience

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

President, Nittany Lion Fund LLC, (January 1, 2005 to the present)
Director, the Smeal College Trading Room (January 1, 2001 to the present)
Goldman, Sachs & Co. and Frank P. Smeal Endowed University Fellow in Business Administration (July 1, 1987 to the present).

Associate Professor of Finance, College of Business Administration, the Pennsylvania State University (July 1, 1984 to June 30, 1990).
Assistant Professor of Finance, College of Business Administration, the Pennsylvania State University (September, 1979 to June 30, 1984).

Education

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

Books

James A. Miles and J. Randall Woolridge*, Spinoffs and Equity Carve-Outs: Achieving Faster Growth and Better Performance* (Financial Executives Research Foundation), 1999
Patrick Cusatis, Gary Gray, and J. Randall Woolridge, *The StreetSmart Guide to Valuing a Stock* (2nd Edition, McGraw-Hill), 2003.
J. Randall Woolridge and Gary Gray, *The New Corporate Finance, Capital Markets, and Valuation: An Introductory Text* (Kendall Hunt, 2003).

Research

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

Attachment JRW-2

Northern Utilities, Inc.
Recommended Rate of Return

Capital Source	Capitalization Ratios	Cost Rate	Weighted Cost Rate
Long-Term Debt	50.00%	4.93%	2.47%
Common Equity	50.00%	8.90%	4.45%
Total Capital	100.00%		6.92%

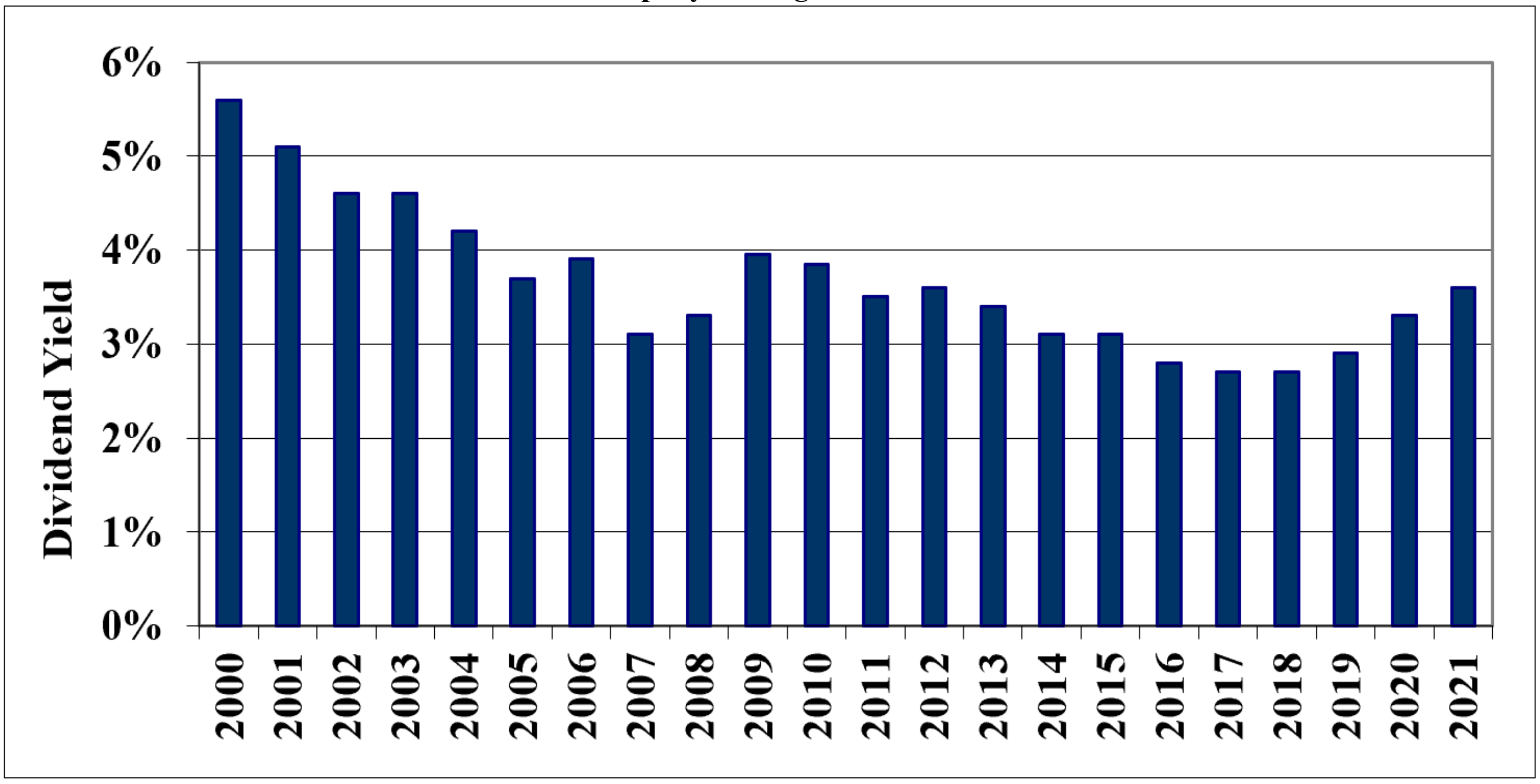
* Capital Structure Ratios are developed in Attachment JRW-5.

Attachment JRW-3
Long-Term 'A' Rated Public Utility Bonds

Data Source: Mergent Bond Record

Attachment JRW-3

Gas Company Average Dividend Yield

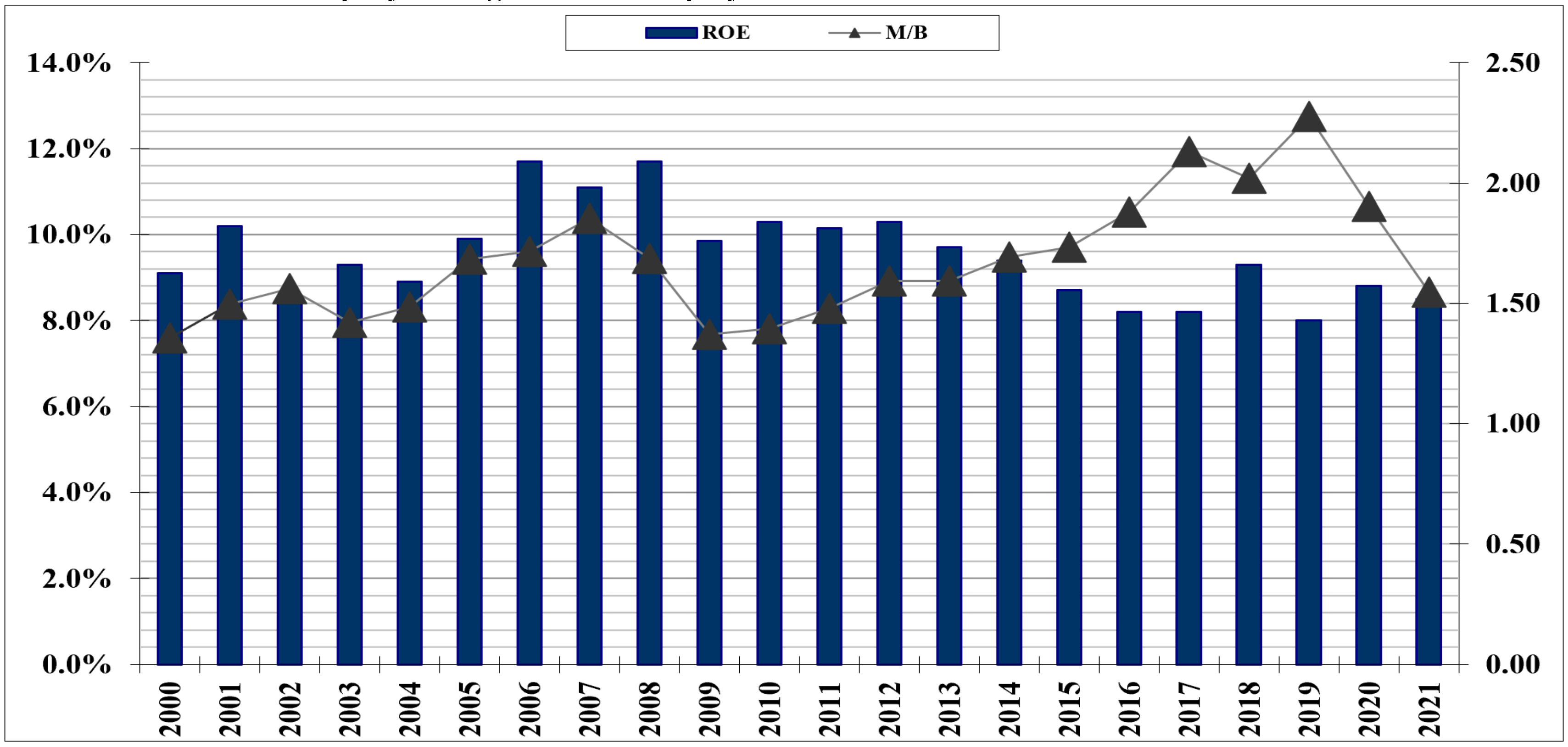


Data Source: ***Value Line Investment Survey, 2022.***

Docket No. DG 21-104
Attachment JRW-3
Public Utility Capital Cost Indicators
Page 3 of 3

Attachment JRW-3

Gas Company Average Return on Equity and Market-to-Book Ratios



Data Source: ***Value Line Investment Survey, 2022.***

Attachment JRW-4

Northern Utilities, Inc.

Gas Proxy Group

	Operating Revenue ($bil)	Percent Gas Revenue	Percent Elec Revenue	Net Plant ($bil)	Market Cap ($bil)	S&P Issuer Credit Rating	Moody's Issuer Credit Rating	Pre-Tax Interest Coverage	Primary Service Area	Common Equity Ratio	Earned Return on Equity	Market to Book Ratio
Atmos Energy Company (NYSE-ATO)	3.41	95%	0%	15.29	14.40	A-	NR	9.53	TX,LA,MS,CO,KS,KY	51.1	8.8	1.82
Chesapeake Utilities (NYSE-CPK)	0.57	41%	12%	1.76	2.30	NR	NR	6.51	DE,MD,FL	49.2	11.3	2.97
New Jersey Resources Corp. (NYSE-NJR)	2.16	34%	0%	4.39	3.90	NR	NR	3.34	NJ	37.2	6.9	2.39
Nisource Inc (NYSE-NI)	4.90	65%	35%	17.92	11.20	BBB+	Baa2	2.91	IN,OH,PA,KY,VA,MD,MA	31.6	9.1	1.61
Northwest Natural Holdings (NYSE-NWN)	0.86	95%	0%	2.95	1.40	A+	NR	3.67	OR,WA	38.2	8.6	1.50
ONE Gas, Inc.(NYSE-OGS)	1.81	100%	0%	5.22	4.00	BBB+	NR	4.81	OK,KS,TX	35.8	9.0	1.70
South Jersey Industries, Inc. (NYSE-SJI)	1.99	49%	0%	4.93	2.80	BBB	NR	2.75	NJ	35.5	4.8	1.41
Southwest Gas Company (NYSE-SWX)	3.68	43%	0%	7.71	4.00	BBB-	Baa2	3.07	AZ,NV,CA	30.8	7.3	1.35
Spire (NYSE-SR)	2.24	95%	0%	5.59	3.30	A-	NR	4.06	MO	37.8	10.2	1.24
Mean	$2.40	69%	5%	$7.30	$5.26	BBB+	Baa2	4.52		38.6	8.5	1.78
Median	$2.16	65%	0%	$5.22	$3.90	BBB+	Baa2	3.67		37.2	8.8	1.61

Data Source: S&P Capital IQ, 2021 Fiscal Year-end data, Value Line Investment Survey, 2022.

Attachment JRW-4

Northern Utilities, Inc.

***Value Line* Risk Metrics**

Gas Proxy Group

Company	Beta	Financial Strength	Safety	Earnings Predictability	Stock Price Stability
Atmos Energy Company (NYSE-ATO)	0.80	A+	1	100	95
Chesapeake Utilities (NYSE-CPK)	0.80	A	2	95	90
New Jersey Resources Corp. (NYSE-NJR)	1.00	A+	2	55	85
Nisource Inc (NYSE-NI)	0.85	B+	2	45	100
Northwest Natural Gas Co. (NYSE-NWN)	0.80	A	1	10	90
ONE Gas, Inc. (NYSE-OGS)	0.80	A	2	100	95
South Jersey Industries, Inc. (NYSE-SJI)	1.00	A	3	65	65
Southwest Gas Company (NYSE-SWX)	0.95	A	3	95	80
Spire (NYSE-SR)	0.85	B++	2	45	95
Mean	0.87	A	2.0	68	88

Data Source: *Value Line Investment Survey*, 2022.

Value Line Risk Metrics

Beta

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

Financial Strength

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

Safety Rank

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

Earnings Predictability

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

Stock Price Stability

A measure of the stability of a stock's price. It includes sensitivity to the market (see Beta as well as the stock's inherent volatility.) *Value Line's* Stability ratings range from 100 (most stablility) to 5 (lowest stability).

Source: *Value Line Investment Analyzer* .

Attachment JRW-5

Northern Utilities, Inc.
Capital Structure Ratios and Debt Cost Rate

Panel A - Northern's Proposed Capital Structure and Debt Cost Rates

Capital Source	Capitalization Ratios	Cost Rate
Long-Term Debt	47.53%	4.93%
Common Equity	52.47%	
Total Capital	100.00%	

Panel B - Northern and Unitil's Average Quarterly Capital Structure Ratios Including Short-Term Debt

	Northern	Unitil
Short-Term Debt	3.67%	3.91%
Long-Term Debt	47.70%	54.14%
Preferred Stock	0.00%	0.02%
Common Equity	48.63%	41.93%
Total Capital	100.00%	100.00%

Panel C - Northern and Unitil's Average Quarterly Capital Structure Ratios Excluding Short-Term Debt

	Northern	Unitil
Long-Term Debt	49.52%	56.36%
Preferred Stock	0.00%	0.02%
Common Equity	50.48%	43.62%
Total Capital	100.00%	100.00%

Data Source: Page 2 of this Attachment.

Panel D - Proxy Group Average Quarterly Capital Structure Ratios Including Short-Term Debt

	Average
Short-Term Debt	10.54%
Long-Term Debt	45.28%
Preferred Stock	0.85%
Common Equity	43.34%
Total Capital	100.0%

Panel E - Proxy Group Average Quarterly Capital Structure Ratios Excluding Short-Term Debt

	Average
Long-Term Debt	50.54%
Preferred Stock	0.92%
Common Equity	48.54%
Total Capital	100.0%

Data Source: S&P Capital IQ.

Panel F - Staff Recommended Capital Structure Ratios

		Rate
Long-Term Debt	50.00%	4.93%
Common Equity	50.00%	
Total Capital	100.00%	

Attachment JRW-5

Northern Utilities, Inc.
Average Quarterly Capital Structure Ratios - 2020-21

Panel A - Northern Utilities Quarterly Capitalization Ratios

	12/31/2020	3/31/2021	6/30/2021	9/30/2021	Average
Short-Term Debt	5.48%	1.59%	1.39%	6.23%	3.67%
Long-Term Debt	47.10%	48.17%	48.64%	46.88%	47.70%
Common Equity	47.42%	50.24%	49.97%	46.89%	48.63%
Total Capital	100.00%	100.00%	100.00%	100.00%	100.00%
	12/31/2020	3/31/2021	6/30/2021	9/30/2021	Average
Long-Term Debt	49.83%	48.95%	49.32%	50.00%	49.52%
Common Equity	50.17%	51.05%	50.68%	50.00%	50.48%
Total Capital	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: S&P Capital IQ.

Panel B - Unitil Corporation's Quarterly Capitalization Ratios

	12/31/2020	3/31/2021	6/30/2021	9/30/2021	Average
Short-Term Debt	5.59%	3.85%	3.09%	3.10%	3.91%
Long-Term Debt	54.67%	54.52%	55.10%	52.28%	54.14%
Preferred Stock	0.02%	0.02%	0.02%	0.02%	0.02%
Common Equity	39.72%	41.61%	41.79%	44.60%	41.93%
Total Capital	100.00%	100.00%	100.00%	100.00%	100.00%
	12/31/2020	3/31/2021	6/30/2021	9/30/2021	Average
Long-Term Debt	57.91%	56.71%	56.85%	53.96%	56.36%
Preferred Stock	0.02%	0.02%	0.02%	0.02%	0.02%
Common Equity	42.07%	43.27%	43.13%	46.02%	43.62%
Total Capital	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Company Response to Staff 5-15.

Attachment JRW-5

Northern Utilities, Inc.
Average Quarterly Proxy Group Capital Structure Ratios - 2019-21

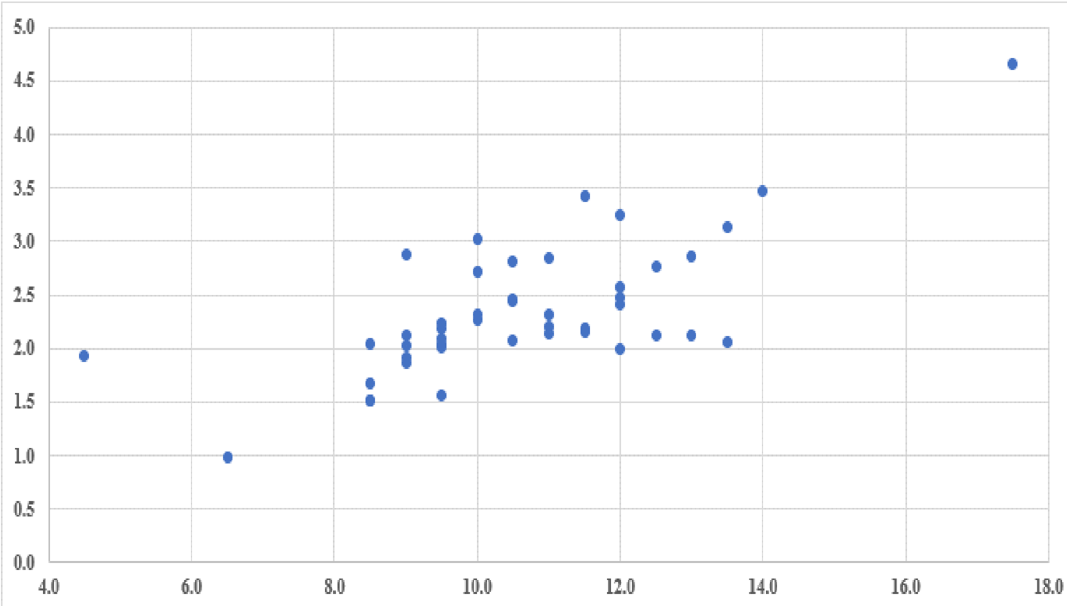
	ATO	CPK	NJR	NI	NWN	OGS	SJI	SWX	SR	Average
Short-Term Debt	2.0%	21.3%	7.3%	8.7%	14.5%	9.8%	15.0%	3.80%	12.3%	10.5%
Long-Term Debt	42.6%	32.6%	48.7%	60.1%	43.3%	37.4%	51.6%	47.85%	43.4%	45.3%
Preferred Stock	0.0%	0.0%	0.0%	7.6%	0.0%	0.0%	0.0%	0.00%	0.0%	0.8%
Common Equity	55.5%	46.1%	43.9%	23.6%	42.1%	52.8%	33.4%	48.35%	44.3%	43.3%
Total Capital	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.00%	100.0%	100.0%
	ATO	CPK	NJR	NI	NWN	OGS	SJI	SWX	SR	Average
Long-Term Debt	43.4%	41.3%	52.5%	65.8%	50.8%	41.4%	60.4%	49.72%	49.4%	50.5%
Preferred Stock	0.0%	0.0%	0.0%	8.3%	0.0%	0.0%	0.0%	0.00%	0.0%	0.9%
Common Equity	56.6%	58.7%	47.5%	25.9%	49.2%	58.6%	39.6%	50.28%	50.6%	48.5%
Total Capital	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.00%	100.0%	100.0%

Data Source: S&P Capital IQ.

Docket No. DG 21-104
Attachment JRW-6
The Relationship Between Expected ROE and Market-to-Book Ratios

Attachment JRW-6
Electric Utilities and Gas Distribution Companies

Market-to-Book



Expected Return on Equity
R-Square = .50, N=43

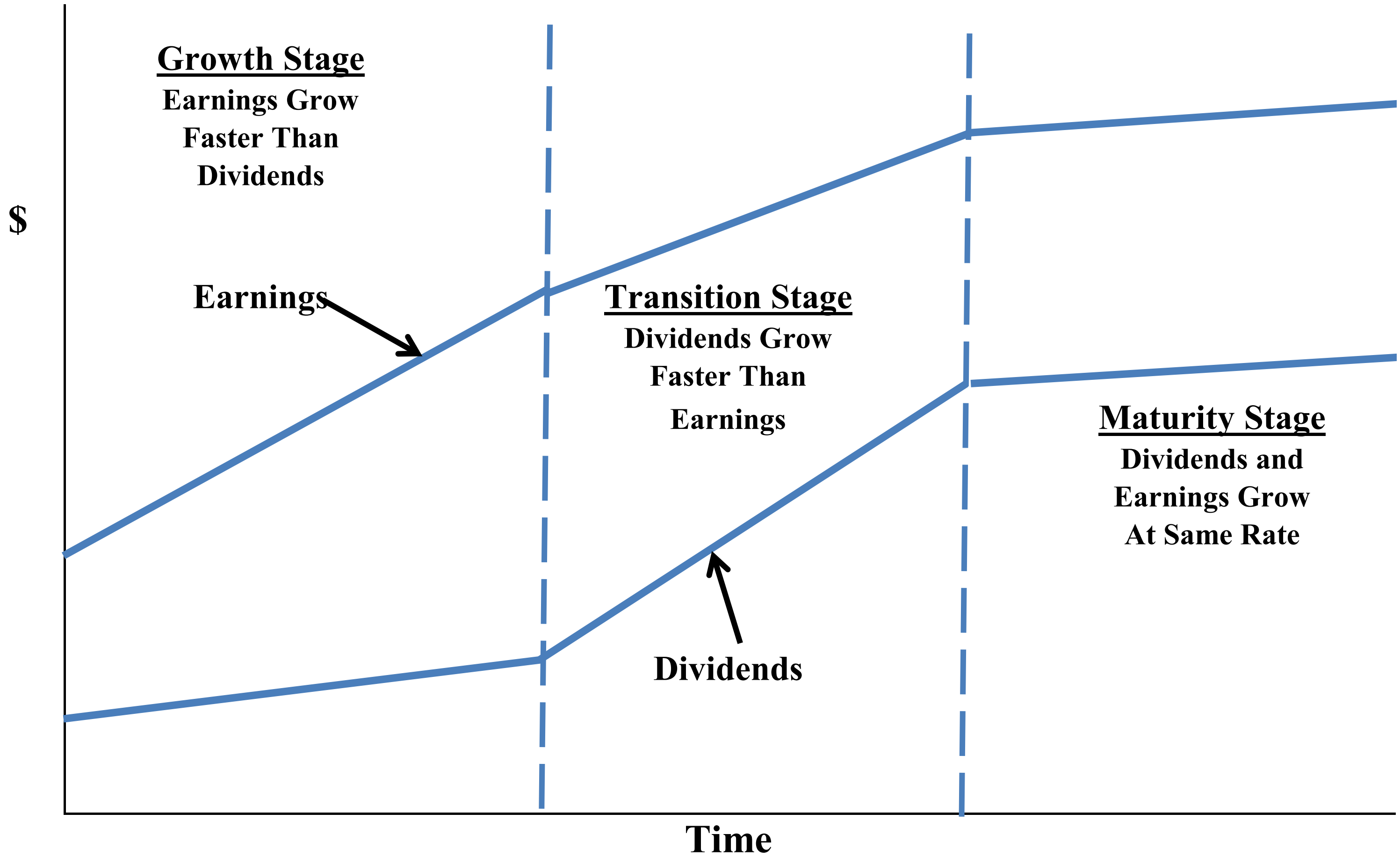
Attachment JRW-6
Industry Average Betas*
Value Line Investment Survey* Betas*
4-Feb-22

Rank	Industry	Beta	Rank	Industry	Beta	Rank	Industry	Beta
1	Oilfield Svcs/Equip.	1.50	33	Bank	1.19	65	Educational Services	1.02
2	Insurance (Life)	1.47	34	Chemical (Specialty)	1.19	66	Retail Store	1.01
3	Petroleum (Integrated)	1.44	35	Electronics	1.19	67	Environmental	1.01
4	Hotel/Gaming	1.43	36	Machinery	1.18	68	Investment Co.(Foreign)	1.01
5	Homebuilding	1.41	37	Toiletries/Cosmetics	1.18	69	Investment Co.	1.01
6	Petroleum (Producing)	1.41	38	Medical Services	1.18	70	IT Services	1.00
7	Apparel	1.40	39	Electrical Equipment	1.17	71	Med Supp Non-Invasive	1.00
8	Air Transport	1.39	40	R.E.I.T.	1.16	72	Computer Software	0.99
9	Shoe	1.38	41	Heavy Truck & Equip	1.15	73	E-Commerce	0.98
10	Office Equip/Supplies	1.36	42	Maritime	1.14	74	Cable TV	0.97
11	Retail (Hardlines)	1.32	43	Chemical (Basic)	1.13	75	Drug	0.95
12	Aerospace/Defense	1.32	44	Automotive	1.12	76	Healthcare Information	0.94
13	Building Materials	1.30	45	Semiconductor Equip	1.12	77	Tobacco	0.93
14	Auto Parts	1.29	46	Publishing	1.12	78	Trucking	0.93
15	Retail (Softlines)	1.29	47	Reinsurance	1.12	79	Beverage	0.91
16	Pipeline MLPs	1.29	48	Computers/Peripherals	1.10	80	Electric Utility (West)	0.90
17	Metal Fabricating	1.27	49	Med Supp Invasive	1.10	81	Foreign Electronics	0.90
18	Steel	1.27	50	Industrial Services	1.09	82	Telecom. Utility	0.90
19	Metals & Mining (Div.)	1.26	51	Power	1.08	83	Telecom. Services	0.90
20	Advertising	1.26	52	Precision Instrument	1.06	84	Electric Utility (East)	0.89
21	Retail Automotive	1.25	53	Packaging & Container	1.06	85	Natural Gas Utility	0.89
22	Restaurant	1.24	54	Semiconductor	1.06	86	Electric Util. (Central)	0.87
23	Public/Private Equity	1.24	55	Entertainment	1.06	87	Biotechnology	0.87
24	Oil/Gas Distribution	1.23	56	Wireless Networking	1.05	88	Retail/Wholesale Food	0.81
25	Furn/Home Furnishings	1.23	57	Insurance (Prop/Cas.)	1.05	89	Household Products	0.80
26	Recreation	1.23	58	Human Resources	1.05	90	Water Utility	0.79
27	Paper/Forest Products	1.23	59	Railroad	1.05	91	Food Processing	0.78
28	Financial Svcs. (Div.)	1.22	60	Information Services	1.03	92	Entertainment Tech	0.77
29	Bank (Midwest)	1.21	61	Retail Building Supply	1.03	93	Precious Metals	0.62
30	Natural Gas (Div.)	1.21	62	Thrift	1.03			
31	Chemical (Diversified)	1.21	63	Telecom. Equipment	1.02			
32	Diversified Co.	1.20	64	Internet	1.02		Mean	1.11

* Industry averages for 93 industries using *Value Line*'s database of 1,705 companies - Updated 2-2-22.

** *Value Line* computes betas using monthly returns regressed against the New York Stock Exchange Index for five years. These betas are then adjusted as follows: *VL* Beta = [{(2/3) * Regressed Beta} + {(1/3) * (1.0)}] to account to tendency for Betas to regress toward average of 1.0. See M. Blume, "On the Assessment of Risk," *Journal of Finance*, March 1971.

Attachment JRW-6
DCF Model



Attachment JRW-7

Northern Utilities, Inc.
Discounted Cash Flow Analysis

Gas Proxy Group

Dividend Yield*	3.30%
Adjustment Factor	1.0275
Adjusted Dividend Yield	3.39%
Growth Rate**	5.50%
Equity Cost Rate	8.90%

* Page 2 of Attachment JRW-7

** Based on data provided on pages 3, 4, 5, and 6 of Attachment JRW-7

Attachment JRW-7

Northern Utilities, Inc.
Monthly Dividend Yields

Gas Proxy Group

Company	Annual Dividend	Dividend Yield 30 Day	Dividend Yield 90 Day	Dividend Yield 180 Day
Atmos Energy Corporation (NYSE-AWR)	$ 2.50	2.3%	2.5%	2.5%
Chesapeake Utilities Corp. (NYSE-CPK)	$ 1.76	1.3%	1.3%	1.4%
New Jersey Resources Corp. (NYSE-NJR)	$ 0.88	3.0%	3.2%	3.4%
NiSource Inc. (NYSE-NI)	$ 1.33	3.2%	3.3%	3.4%
Northwest Natural Gas Co. (NYSE-NWN)	$ 1.92	3.9%	4.0%	3.9%
One Gas, Inc. (NYSE-OGS)	$ 2.32	2.9%	3.1%	3.2%
South Jersey Industries, Inc. (NYSE-SJI)	$ 1.21	4.4%	4.7%	4.8%
Southwest Gas Corporation (NYSE-SWX)	$ 2.38	3.5%	3.5%	3.5%
Spire (NYSE-SR)	$ 2.60	4.0%	4.0%	3.9%
Mean		3.2%	3.3%	3.3%
Median		3.2%	3.3%	3.4%

Data Source: S&P Cap IQ, March, 2022.

Attachment JRW-7

Northern Utilities, Inc.
DCF Equity Cost Growth Rate Measures
***Value Line* Historic Growth Rates**

Gas Proxy Group

Company	*Value Line* Historical Growth					
	Past 10 Years			Past 5 Years		
	Earnings	Dividends	Book Value	Earnings	Dividends	Book Value
Atmos Energy Company (NYSE-ATO)	8.5	5.5	8.5	8.5	8.0	11.0
Chesapeake Utilities (NYSE-CPK)	9.5	6.5	9.5	9.0	7.5	11.0
New Jersey Resources Corp. (NYSE-NJR)	5.0	6.5	7.5	2.5	6.5	7.0
Nisource Inc (NYSE-NI)	2.0	-1.5	-3.0	-0.5	-3.0	-5.0
Northwest Natural Gas Co. (NYSE-NWN)	-1.5	1.5	1.0	1.5	0.5	
ONE Gas, Inc. (NYSE-OGS)*				10.0	14.5	3.0
South Jersey Industries, Inc. (NYSE-SJI)	1.5	6.5	5.5	-1.5	4.0	2.5
Southwest Gas Company (NYSE-SWX)	7.5	8.5	6.0	5.5	8.0	7.0
Spire (NYSE-SR)	2.0	4.5	6.5	2.5	6.0	4.5
Mean	4.3	4.8	5.2	4.2	5.8	5.1
Median	3.5	6.0	6.3	2.5	6.5	5.8
Data Source: *Value Line Investment Survey.*	Average of Median Figures =			5.1		

Attachment JRW-7

Northern Utilities, Inc.
DCF Equity Cost Growth Rate Measures
***Value Line* Projected Growth Rates**

Gas Proxy Group

	Value Line			*Value Line*		
	Projected Growth			Sustainable Growth		
Company	Est'd. '19-'21 to '25-'27			Return on Equity	Retention Rate	Internal Growth
	Earnings	Dividends	Book Value			
Atmos Energy Company (NYSE-ATO)	8.0	8.0	7.0	9.0%	52.0%	4.7%
Chesapeake Utilities (NYSE-CPK)	8.0	8.0	7.0	11.5%	60.0%	6.9%
New Jersey Resources Corp. (NYSE-NJR)	4.5	5.0	4.0	12.0%	37.0%	4.4%
Nisource Inc (NYSE-NI)	10.5	4.5	5.0	12.0%	52.0%	6.2%
Northwest Natural Gas Co. (NYSE-NWN)	6.0	0.5	5.5	8.0%	41.0%	3.3%
ONE Gas, Inc. (NYSE-OGS)	6.0	6.5	6.5	7.5%	41.0%	3.1%
South Jersey Industries, Inc. (NYSE-SJI)	10.0	3.5	4.0	12.0%	43.0%	5.2%
Southwest Gas Company (NYSE-SWX)	8.0	5.0	6.0	9.5%	53.0%	5.0%
Spire (NYSE-SR)	9.0	5.0	7.0	8.0%	35.0%	2.8%
Mean	7.8	5.1	5.8	9.9%	46.0%	4.6%
Median	8.0	5.0	6.0	9.5%	43.0%	4.7%
Average of Median Figures =		6.3			Median =	4.7%

* 'Est'd. '19-'21 to '25-'27' is the estimated growth rate from the base period 2019 to 2021 until the future period 2025 to 2027.

Data Source: *Value Line Investment Survey.*

Attachment JRW-7

Northern Utilities, Inc.
DCF Equity Cost Growth Rate Measures
Analysts Projected EPS Growth Rate Estimates

Gas Proxy Group

Company	Yahoo	Zacks	S&P Cap IQ	Mean
Atmos Energy Company (NYSE-ATO)	7.6%	7.3%	7.0%	7.3%
Chesapeake Utilities (NYSE-CPK)	7.0%	na	9.4%	8.2%
New Jersey Resources Corp. (NYSE-NJR)	6.0%	6.0%	8.2%	6.7%
Nisource Inc (NYSE-NI)	3.5%	7.2%	6.0%	5.6%
Northwest Natural Gas Co. (NYSE-NWN)	5.9%	5.1%	5.9%	5.6%
ONE Gas, Inc. (NYSE-OGS)	2.9%	5.0%	6.0%	4.6%
South Jersey Industries, Inc. (NYSE-SJI)	5.2%	na	5.4%	5.3%
Southwest Gas Company (NYSE-SWX)	4.0%	5.0%	5.0%	4.7%
Spire (NYSE-SR)	4.3%	5.3%	5.0%	4.9%
Mean	5.2%	5.8%	6.4%	5.9%
Median	5.2%	5.3%	6.0%	5.6%

Data Sources: www.zacks.com, http://quote.yahoo.com, S&P Cap IQ, March, 2022.

Attachment JRW-7

Northern Utilities, Inc.
DCF Growth Rate Indicators

Gas Proxy Group

Growth Rate Indicator	Gas Proxy Group
Historic *Value Line* Growth in EPS, DPS, and BVPS	5.1%
Projected *Value Line* Growth in EPS, DPS, and BVPS	6.3%
Sustainable Growth ROE * Retention Rate	4.7%
Projected EPS Growth from Yahoo, Zacks, and Reuters - Median	5.9%/5.6%

Attachment JRW-8

Northern Utilities, Inc.
Capital Asset Pricing Model

Gas Proxy Group

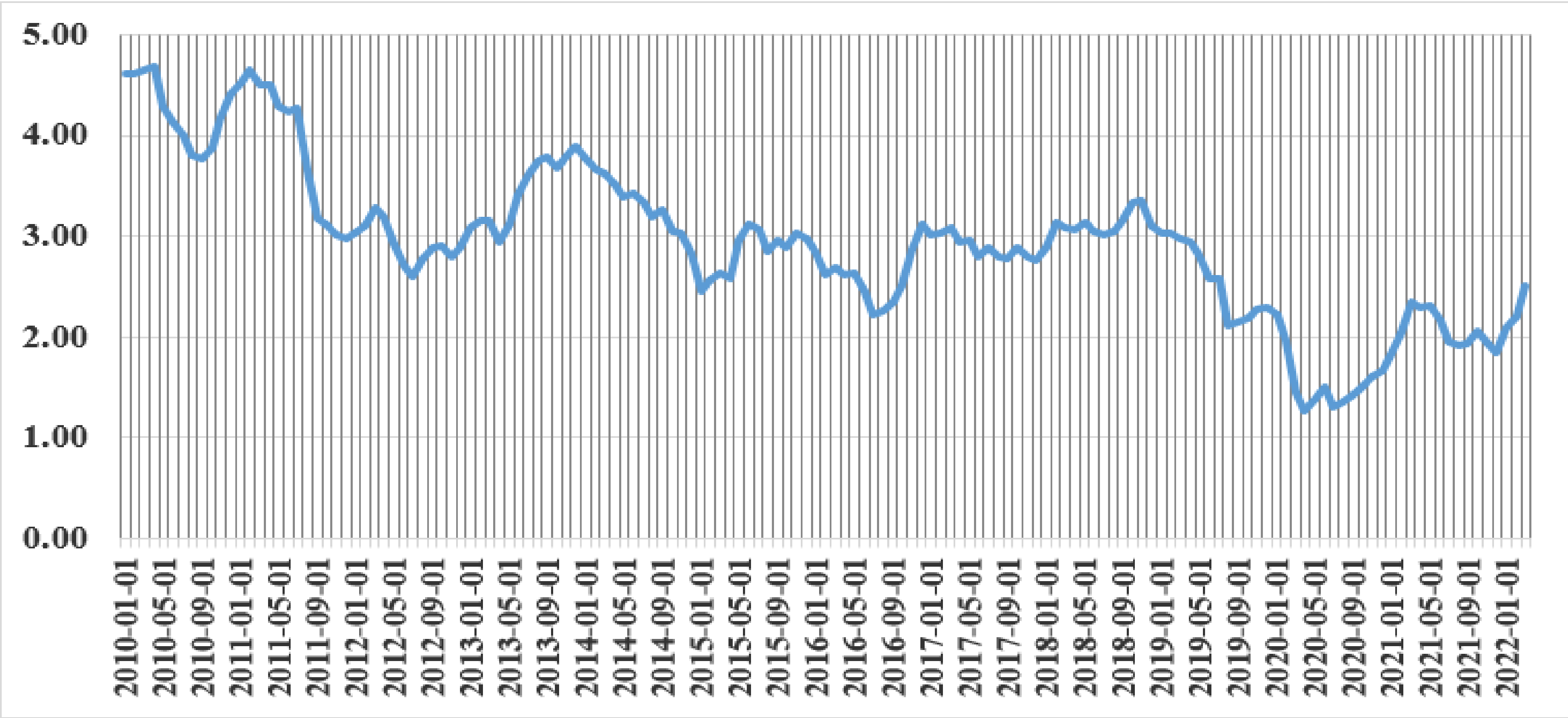
Risk-Free Interest Rate	**2.50%**
Beta*	**0.85**
Ex Ante Equity Risk Premium**	**5.50%**
CAPM Cost of Equity	**7.2%**

* See page 3 of Attachment JRW-8

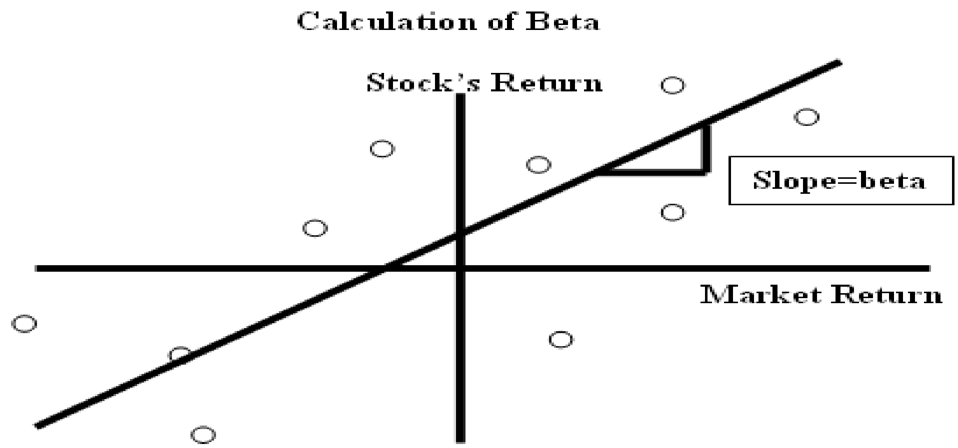
** See pages 5 and 6 of Attachment JRW-8

Attachment JRW-8

Thirty-Year U.S. Treasury Yields
2010-2022



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



Gas Proxy Group

Atmos Energy Company (NYSE-ATO)	**0.80**
Chesapeake Utilities (NYSE-CPK)	**0.80**
New Jersey Resources Corp. (NYSE-NJR)	**1.00**
Nisource Inc (NYSE-NI)	**0.85**
Northwest Natural Gas Co. (NYSE-NWN)	**0.80**
ONE Gas, Inc. (NYSE-OGS)	**0.80**
South Jersey Industries, Inc. (NYSE-SJI)	**1.00**
Southwest Gas Company (NYSE-SWX)	**0.95**
Spire (NYSE-SR)	**0.85**
Mean	**0.87**
Median	**0.85**

Data Source: *Value Line Investment Survey* , 2022.

Attachment JRW-8
Risk Premium Approaches

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

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

Attachment JRW-8

Capital Asset Pricing Model
Market Risk Premium

Category	Study Authors	Publication Date	Time Period Of Study	Methodology	Return Measure	Range Low	Range High	Midpoint of Range	Mean	Median
Historical Risk Premium										
	Ibbotson	2016	1928-2015	Historical Stock Returns - Bond Returns	Arithmetic				6.00%	
					Geometric				4.40%	
	Damodaran	2022	1928-2021	Historical Stock Returns - Bond Returns	Arithmetic				6.71%	
					Geometric				5.17%	
	Dimson, Marsh, Staunton _Credit Suisse Report	2019	1900-2018	Historical Stock Returns - Bond Returns	Arithmetic				5.50%	
					Geometric					
	Bate	2008	1900-2007	Historical Stock Returns - Bond Returns	Geometric				4.50%	
	Shiller	2006	1926-2005	Historical Stock Returns - Bond Returns	Arithmetic				7.00%	
					Geometric				5.50%	
	Siegel	2005	1926-2005	Historical Stock Returns - Bond Returns	Arithmetic				6.10%	
					Geometric				4.60%	
	Dimson, Marsh, and Staunton	2006	1900-2005	Historical Stock Returns - Bond Returns	Arithmetic				5.50%	
	Goyal & Welch	2006	1872-2004	Historical Stock Returns - Bond Returns					4.77%	
	Median									5.50%
Ex Ante Models (Puzzle Research)										
	Claus Thomas	2001	1985-1998	Abnormal Earnings Model					3.00%	
	Arnott and Bernstein	2002	1810-2001	Fundamentals - Div Yld + Growth					2.40%	
	Constantinides	2002	1872-2000	Historical Returns & Fundamentals - P/D & P/E					6.90%	
	Cornell	1999	1926-1997	Historical Returns & Fundamental GDP/Earnings		3.50%	5.50%	4.50%	4.50%	
	Easton, Taylor, et al	2002	1981-1998	Residual Income Model					5.30%	
	Fama French	2002	1951-2000	Fundamental DCF with EPS and DPS Growth		2.55%	4.32%		3.44%	
	Harris & Marston	2001	1982-1998	Fundamental DCF with Analysts' EPS Growth					7.14%	
	McKinsey	2002	1962-2002	Fundamental (P/E, D/P, & Earnings Growth)		3.50%	4.00%		3.75%	
	Siegel	2005	1802-2001	Historical Earnings Yield					2.50%	
	Grabowski	2006	1926-2005	Historical and Projected		3.50%	6.00%	4.75%	4.75%	
	Maheu & McCurdy	2006	1885-2003	Historical Excess Returns, Structural Breaks,		4.02%	5.10%	4.56%	4.56%	
	Bostock	2004	1960-2002	Bond Yields, Credit Risk, and Income Volatility		3.90%	1.30%	2.60%	2.60%	
	Bakshi & Chen	2005	1982-1998	Fundamentals - Interest Rates					7.31%	
	Donaldson, Kamstra, & Kramer	2006	1952-2004	Fundamental, Dividend yld., Returns,, & Volatility		3.00%	4.00%	3.50%	3.50%	
	Campbell	2008	1982-2007	Historical & Projections (D/P & Earnings Growth)		4.10%	5.40%		4.75%	
	Best & Byrne	2001	Projection	Fundamentals - Div Yld + Growth					2.00%	
	Fernandez	2007	Projection	Required Equity Risk Premium					4.00%	
	DeLong & Magin	2008	Projection	Earnings Yield - TIPS					3.22%	
	Siegel - Rethink ERP	2011	Projection	Real Stock Returns and Components					5.50%	
	Duff & Phelps	2022	Projection	Normalized with 2.5% Long-Term Treasury Yield					5.50%	
	Mschchowski - VL - 2014	2014	Projection	Fundamentals - Expected Return Minus 10-Year Treasury Rate					5.50%	
	American Appraisal Quarterly ERP	2015	Projection	Fundamental Economic and Market Factors					6.00%	
	Market Risk Premia	2022	Projection	Fundamental Economic and Market Factors					3.47%	
	KPMG	2022	Projection	Fundamental Economic and Market Factors					5.00%	
	Damodaran -3-1-22	2022	Projection	Fundamentals - Implied from FCF to Equity Model (Trailing 12 month, with adjusted payout)					5.37%	
	Social Security									
	Office of Chief Actuary		1900-1995							
	John Campbell	2001	1860-2000	Historical & Projections (D/P & Earnings Growth)	Arithmetic	3.00%	4.00%	3.50%	3.50%	
			Projected for 75 Years		Geometric	1.50%	2.50%	2.00%	2.00%	
	Peter Diamond	2001	Projected for 75 Years	Fundamentals (D/P, GDP Growth)		3.00%	4.80%	3.90%	3.90%	
	John Shoven	2001	Projected for 75 Years	Fundamentals (D/P, P/E, GDP Growth)		3.00%	3.50%	3.25%	3.25%	
	Median									4.00%
Surveys										
	New York Fed	2015	Five-Year	Survey of Wall Street Firms					5.70%	
	Survey of Financial Forecasters	2022	10-Year Projection	About 20 Financial Forecastsers					3.88%	
	Duke - CFO Magazine Survey	2020	10-Year Projection	Approximately 200 CFOs					4.05%	
	Welch - Academics	2008	30-Year Projection	Random Academics		5.00%	5.74%	5.37%	5.37%	
	Fernandez - Academics, Analysts, and Companie	2020	Long-Term	Survey of Academics, Analysts, and Companies					5.60%	
	Median									5.37%
Building Block										
	Ibbotson and Chen	2015	Projection	Historical Supply Model (D/P & Earnings Growth)	Arithmetic			6.22%	5.21%	
					Geometric			4.20%		
	Chen - Rethink ERP	2010	20-Year Projection	Combination Supply Model (Historic and Projection)	Geometric				4.00%	
	Ilmanen - Rethink ERP	2010	Projection	Current Supply Model (D/P & Earnings Growth)	Geometric				3.00%	
	Grinold, Kroner, Siegel - Rethink ERP	2011	Projection	Current Supply Model (D/P & Earnings Growth)	Arithmetic			4.63%	4.12%	
					Geometric			3.60%		
	Median									4.06%
Mean										**4.73%**
Median										**4.83%**

Attachment JRW-8

Capital Asset Pricing Model
Market Risk Premium

Summary of 2010-22 Equity Risk Premium Studies

Category	Study Authors	Publication Date	Time Period Of Study	Methodology	Return Measure	Range Low	Range High	Midpoint of Range	Mean	Average
Historical Risk Premium										
	Ibbotson	2016	1928-2015	Historical Stock Returns - Bond Returns	Arithmetic				6.00%	
					Geometric				4.40%	
	Damodaran	2022	1928-2021	Historical Stock Returns - Bond Returns	Arithmetic				6.71%	
					Geometric				5.17%	
	Dimson, Marsh, Staunton _Credit Suisse Report	2019	1900-2018	Historical Stock Returns - Bond Returns	Arithmetic				5.50%	
					Geometric					
	Median									5.56%
Ex Ante Models (Puzzle Research)										
	Siegel - Rethink ERP	2011	Projection	Real Stock Returns and Components					5.50%	
	Duff & Phelps	2022	Projection	Normalized with 2.5% Long-Term Treasury Yield					5.50%	
	Mschchowski - VL - 2014	2014	Projection	Fundamentals - Expected Return Minus 10-Year Treasury Rate					5.50%	
	American Appraisal Quarterly ERP	2015	Projection	Fundamental Economic and Market Factors					6.00%	
	Market Risk Premia	2022	Projection	Fundamental Economic and Market Factors					3.47%	
	KPMG	2022	Projection	Fundamental Economic and Market Factors					5.00%	
	Damodaran -3-1-22	2022	Projection	Fundamentals - Implied from FCF to Equity Model (Trailing 12 month, with adjusted payout)					5.37%	
	Median									5.50%
Surveys										
	New York Fed	2015	Five-Year	Survey of Wall Street Firms					5.70%	
	Survey of Financial Forecasters	2022	10-Year Projection	About 20 Financial Forecastsers					3.88%	
	Duke - CFO Magazine Survey	2020	10-Year Projection	Approximately 200 CFOs					4.05%	
	Fernandez - Academics, Analysts, and Companies	2020	Long-Term	Survey of Academics, Analysts, and Companies					5.60%	
	Median									4.83%
Building Block										
	Ibbotson and Chen	2015	Projection	Historical Supply Model (D/P & Earnings Growth)	Arithmetic			6.22%	5.21%	
					Geometric			4.20%		
	Chen - Rethink ERP	2010	20-Year Projection	Combination Supply Model (Historic and Projection)	Geometric				4.00%	
	Ilmanen - Rethink ERP	2010	Projection	Current Supply Model (D/P & Earnings Growth)	Geometric				3.00%	
	Grinold, Kroner, Siegel - Rethink ERP	2011	Projection	Current Supply Model (D/P & Earnings Growth)	Arithmetic			4.63%	4.12%	
					Geometric			3.60%		
	Median									4.06%
Mean										**4.98%**
Median										**5.16%**

Duff & Phelps Risk-Free Interest Rates and Equity Risk Premium Estimates

DUFF & PHELPS

Table: Equity Risk Premium & Risk-free Rates

December 9, 2020

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

For additional information, please visit https://www.duffandphelps.com/insights/publications/cost-of-capital

Date	Risk-free Rate (R_f)	R_f (%)	Duff & Phelps Recommended ERP (%)	What Changed
Current Guidance:				
December 9, 2020 – UNTIL FURTHER NOTICE	Normalized 20-year U.S. Treasury yield	2.50	5.50	ERP
June 30, 2020 – December 8, 2020	Normalized 20-year U.S. Treasury yield	2.50	6.00	Rf
March 25, 2020 – June 29, 2020	Normalized 20-year U.S. Treasury yield	3.00	6.00	ERP
December 19, 2019 – March 24, 2020	Normalized 20-year U.S. Treasury yield	3.00	5.00	ERP
September 30, 2019 – December 18, 2019	Normalized 20-year U.S. Treasury yield	3.00	5.50	R_f
December 31, 2018 – September 29, 2019	Normalized 20-year U.S. Treasury yield	3.50	5.50	ERP
September 5, 2017 – December 30, 2018	Normalized 20-year U.S. Treasury yield	3.50	5.00	ERP
November 15, 2016 – September 4, 2017	Normalized 20-year U.S. Treasury yield	3.50	5.50	R_f
January 31, 2016 – November 14, 2016	Normalized 20-year U.S. Treasury yield	4.00	5.50	ERP
December 31, 2015	Normalized 20-year U.S. Treasury yield	4.00	5.00	
December 31, 2014	Normalized 20-year U.S. Treasury yield	4.00	5.00	
December 31, 2013	Normalized 20-year U.S. Treasury yield	4.00	5.00	
February 28, 2013 – January 30, 2016	Normalized 20-year U.S. Treasury yield	4.00	5.00	ERP
December 31, 2012	Normalized 20-year U.S. Treasury yield	4.00	5.50	
January 15, 2012 – February 27, 2013	Normalized 20-year U.S. Treasury yield	4.00	5.50	ERP
December 31, 2011	Normalized 20-year U.S. Treasury yield	4.00	6.00	
September 30, 2011 – January 14, 2012	Normalized 20-year U.S. Treasury yield	4.00	6.00	ERP
July 1 2011 – September 29, 2011	Normalized 20-year U.S. Treasury yield	4.00	5.50	R_f
June 1, 2011 – June 30, 2011	Spot 20-year U.S. Treasury yield	Spot	5.50	R_f
May 1, 2011 – May 31, 2011	Normalized 20-year U.S. Treasury yield	4.00	5.50	R_f
December 31, 2010	Spot 20-year U.S. Treasury yield	Spot	5.50	
December 1, 2010 – April 30, 2011	Spot 20-year U.S. Treasury yield	Spot	5.50	R_f
June 1, 2010 – November 30, 2010	Normalized 20-year U.S. Treasury yield	4.00	5.50	R_f
December 31, 2009	Spot 20-year U.S. Treasury yield	Spot	5.50	
December 1, 2009 – May 31, 2010	Spot 20-year U.S. Treasury yield	Spot	5.50	ERP
June 1, 2009 – November 30, 2009	Spot 20-year U.S. Treasury yield	Spot	6.00	R_f
December 31, 2008	Normalized 20-year U.S. Treasury yield	4.50	6.00	
November 1, 2008 – May 31, 2009	Normalized 20-year U.S. Treasury yield	4.50	6.00	R_f
October 27, 2008 – October 31, 2008	Spot 20-year U.S. Treasury yield	Spot	6.00	ERP
January 1, 2008 – October 26, 2008	Spot 20-year U.S. Treasury yield	Spot	5.00	Initialized

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

To learn more about cost of capital issues, and to ensure that you are using the most recent Duff & Phelps Recommended ERP, visit www.duffandphelps.com/insights/publications/cost-of-capital.
This and other related resources can also be found in the online Cost of Capital Navigator platform. To learn more about the Cost of Capital Navigator and other Duff & Phelps valuation and industry data products, visit www.DPCostofCapital.com.

Source: https://www.duffandphelps.com/-/media/assets/pdfs/publications/articles/dp-erp-rf-table-2020.pdf?

Northern Utilities, Inc. Recommended Cost of Capital

Capital Source	Capitalization Ratios	Cost Rate	Weighted Cost Rate
Long-Term Debt	47.53%	4.93%	2.34%
Common Equity	52.47%	10.30%	5.40%
Total Capital	100.00%		7.75%

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Northern Utilities, Inc. ROE Results

SUMMARY OF COCHRAN'S ROE ANALYSES

Constant Growth DCF - Earnings Growth			
Mean	**Low ROE**	**Mid ROE**	**High ROE**
30-Day Average	7.86%	9.62%	11.70%
90-Day Average	8.07%	9.84%	11.91%
180-Day Average	8.23%	9.99%	12.07%
Average	8.05%	9.82%	11.89%

Multi-Stage Growth DCF			
Mean	**Low ROE**	**Mid ROE**	**High ROE**
30-Day Average	8.86%	9.27%	9.83%
90-Day Average	9.09%	9.51%	10.10%
180-Day Average	9.25%	9.69%	10.31%
Average	9.07%	9.49%	10.08%

CAPM	
Current 30-Day Treasury	**CAPM**
30-Day Average	12.65%
90-Day Average	12.64%
180-Day Average	12.61%
Average	12.64%

Flotation Cost Adjustment	0.10%

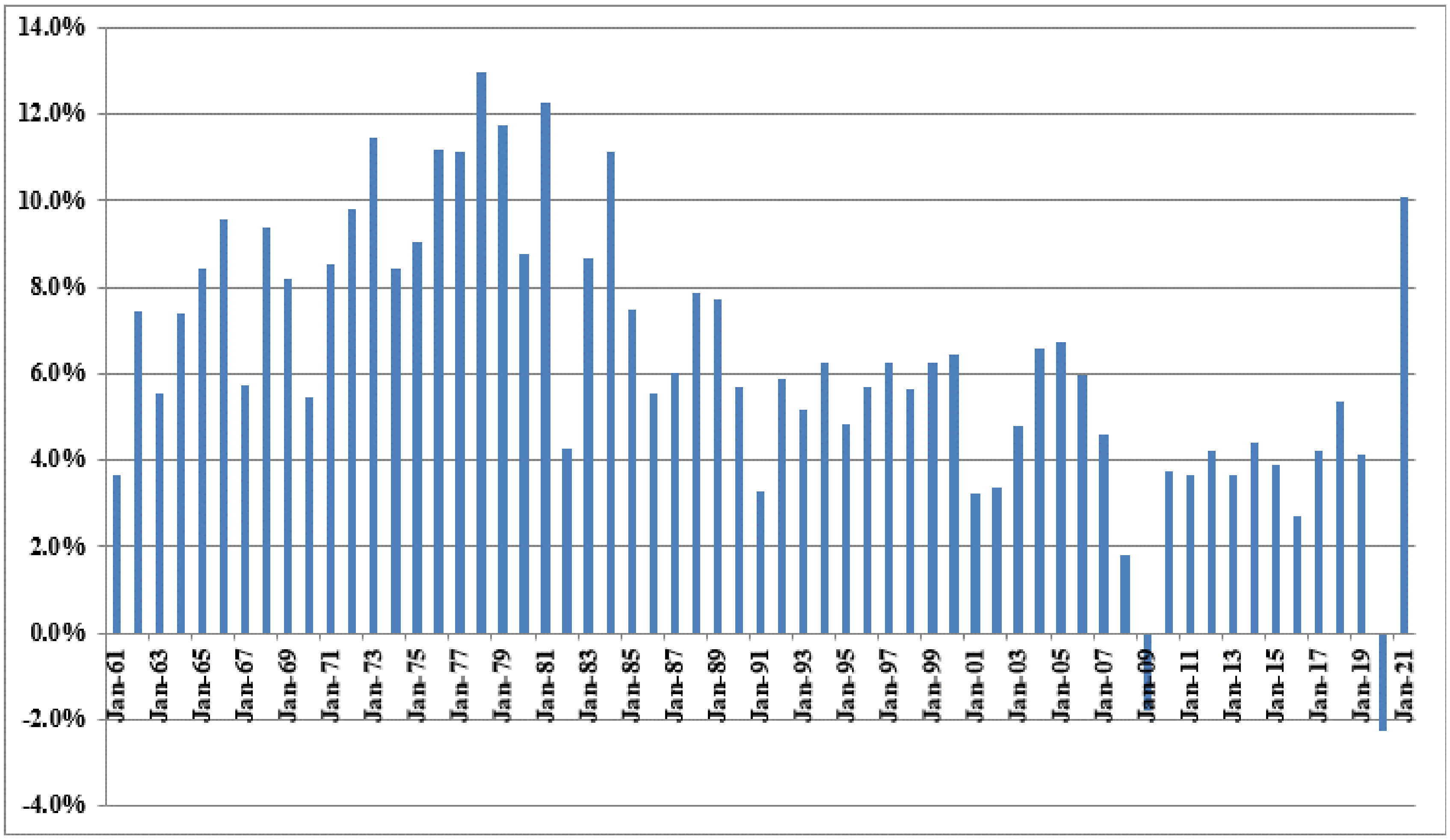
Zone of Reasonableness			
Method	**Low ROE**	**Mid ROE**	**High ROE**
Constant Growth DCF	8.05%	9.82%	11.89%
Multi-Stage DCF	9.07%	9.49%	10.08%
CAPM	12.64%	12.64%	12.64%
Mean	9.92%	10.65%	11.54%
With Flotation Costs	10.02%	10.75%	11.64%

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

	GDP	S&P 500	S&P 500 EPS	S&P 500 DPS	
1960	542.38	58.11	3.10	1.98	
1961	562.21	71.55	3.37	2.04	
1962	603.92	63.10	3.67	2.15	
1963	637.45	75.02	4.13	2.35	
1964	684.46	84.75	4.76	2.58	
1965	742.29	92.43	5.30	2.83	
1966	813.41	80.33	5.41	2.88	
1967	859.96	96.47	5.46	2.98	
1968	940.65	103.86	5.72	3.04	
1969	1,017.62	92.06	6.10	3.24	
1970	1,073.30	92.15	5.51	3.19	
1971	1,164.85	102.09	5.57	3.16	
1972	1,279.11	118.05	6.17	3.19	
1973	1,425.38	97.55	7.96	3.61	
1974	1,545.24	68.56	9.35	3.72	
1975	1,684.90	90.19	7.71	3.73	
1976	1,873.41	107.46	9.75	4.22	
1977	2,081.83	95.10	10.87	4.86	
1978	2,351.60	96.11	11.64	5.18	
1979	2,627.33	107.94	14.55	5.97	
1980	2,857.31	135.76	14.99	6.44	
1981	3,207.04	122.55	15.18	6.83	
1982	3,343.79	140.64	13.82	6.93	
1983	3,634.04	164.93	13.29	7.12	
1984	4,037.61	167.24	16.84	7.83	
1985	4,338.98	211.28	15.68	8.20	
1986	4,579.63	242.17	14.43	8.19	
1987	4,855.22	247.08	16.04	9.17	
1988	5,236.44	277.72	24.12	10.22	
1989	5,641.58	353.40	24.32	11.73	
1990	5,963.14	330.22	22.65	12.35	
1991	6,158.13	417.09	19.30	12.97	
1992	6,520.33	435.71	20.87	12.64	
1993	6,858.56	466.45	26.90	12.69	
1994	7,287.24	459.27	31.75	13.36	
1995	7,639.75	615.93	37.70	14.17	
1996	8,073.12	740.74	40.63	14.89	
1997	8,577.55	970.43	44.09	15.52	
1998	9,062.82	1,229.23	44.27	16.20	
1999	9,631.17	1,469.25	51.68	16.71	
2000	10,250.95	1,320.28	56.13	16.27	
2001	10,581.93	1,148.09	38.85	15.74	
2002	10,929.11	879.82	46.04	16.08	
2003	11,456.45	1,111.91	54.69	17.88	
2004	12,217.20	1,211.92	67.68	19.407	
2005	13,039.20	1,248.29	76.45	22.38	
2006	13,815.58	1,418.30	87.72	25.05	
2007	14,474.23	1,468.36	82.54	27.73	
2008	14,769.86	903.25	65.39	28.05	
2009	14,478.07	1,115.10	59.65	22.31	
2010	15,048.97	1,257.64	83.66	23.12	
2011	15,599.73	1,257.60	97.05	26.02	
2012	16,253.97	1,426.19	102.47	30.44	
2013	16,843.20	1,848.36	107.45	36.28	
2014	17,550.69	2,058.90	113.01	39.44	
2015	18,206.02	2,043.94	106.32	43.16	
2016	18,695.11	2,238.83	108.86	45.03	
2017	19,479.62	2,673.61	124.94	49.73	
2018	20,527.16	2,506.85	148.34	53.61	
2019	21,372.58	3,230.78	162.35	58.80	
2020	20,893.75	3,756.07	138.12	56.70	
2021	22,997.50	4,766.18	206.38	59.20	Average
Growth Rates	6.34%	7.49%	7.12%	5.73%	6.67%

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

Nominal GDP Growth Rates
Annual Growth Rates - 1961-2021



Data Sources: GDPA -https://fred.stlouisfed.org/series/GDPA

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Real GDP Growth Rates
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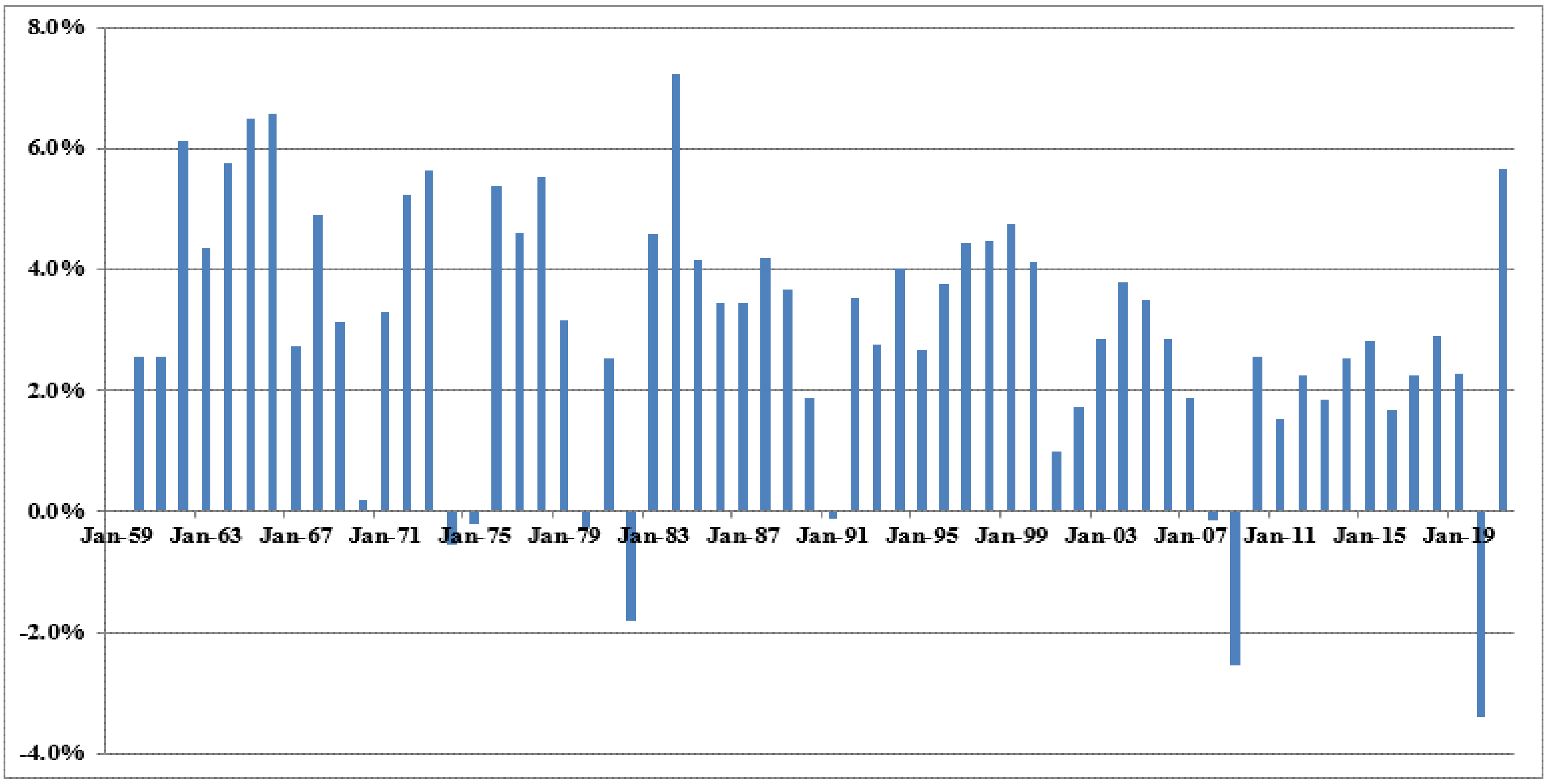
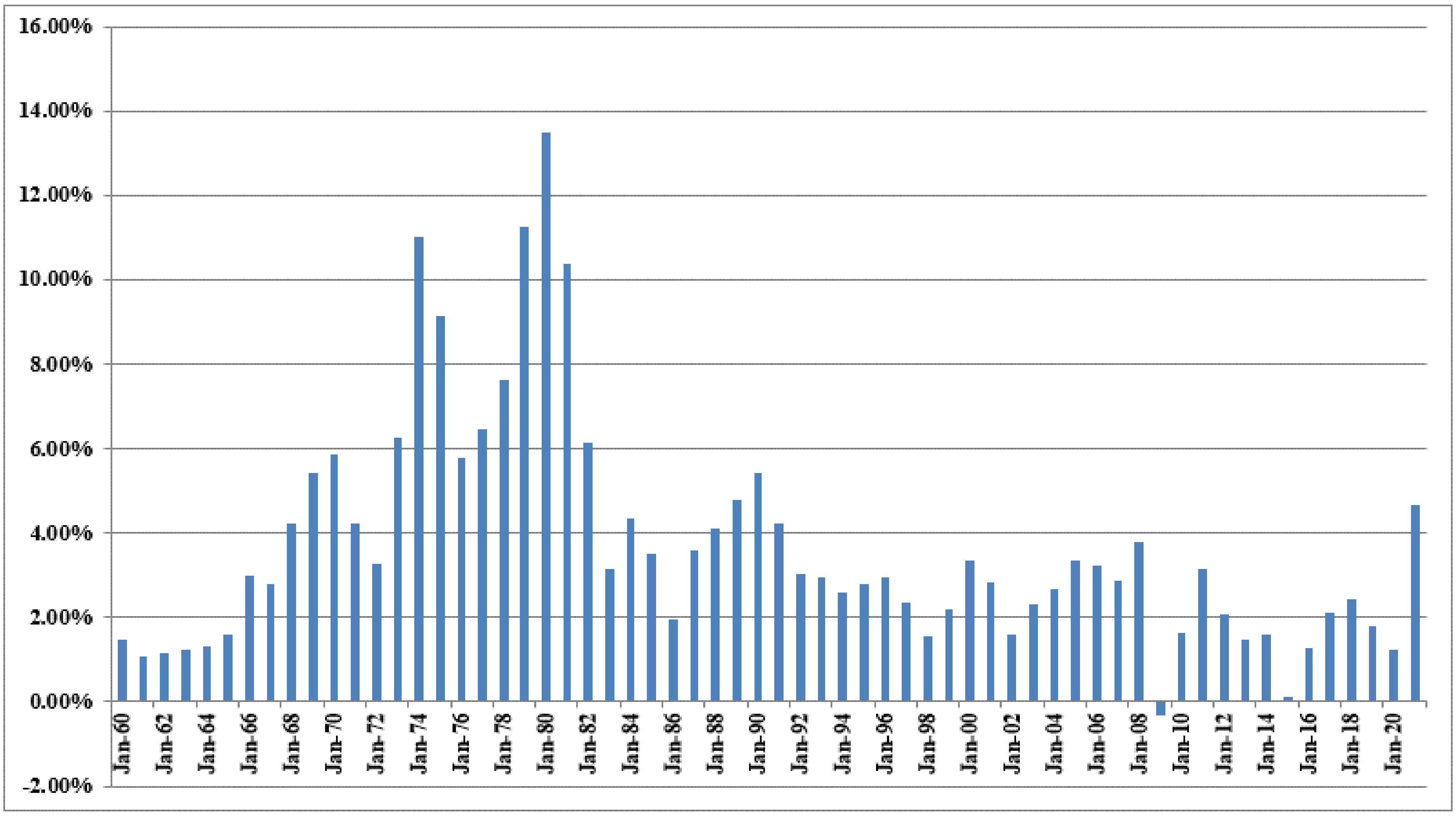
Annual Real GDP Growth Rates
1961-2021



Data Sources: GDPC1 - https://fred.stlouisfed.org/series/GDPCA

Annual Inflation Rates
1961-2021



Data Sources: CPIAUCSL - https://fred.stlouisfed.org/series/CPIAUCSL

Panel A
Historic GDP Growth Rates

10-Year Average		**3.96%**
20-Year Average		**3.96%**
30-Year Average		**4.49%**
40-Year Average		**5.05%**
50-Year Average		**6.15%**

Calculated using GDP data on Page 1 of Attachment JRW-10

Panel B
Projected GDP Growth Rates

	Time Frame	Projected Nominal GDP Growth Rate
Congressional Budget Office	**2020-30**	**4.0%**
Survey of Financial Forecasters	**Ten Year**	**4.7%**
Social Security Administration	**2020-2095**	**4.2%**
Energy Information Administration	**2020-2050**	**4.5%**

Sources:
Congressional Budget Office,The *2021 Long-Term Budget Outlook* , July 15, 2021.
U.S. Energy Information Administration, *Annual Energy Outlook 2021* , Table: Macroeconomic Indicators,
Social Security Administration, 2021 Annual Report of the Board of Trustees of the Old-Age,
Survivors, and Disability Insurance (OASDI) Program, Table VI.G4,
The 4.2% growth rate is the growth in projected GDP from 20 trillion in 2020 to $444 trillion in 2095.
https://www.philadelphiafed.org/research-and-data/real-time-center/survey-of-professional-forecasters/

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