BEFORE THE
STATE OF NEW HAMPSHIRE
PUBLIC UTILITIES COMMISSION

DOCKET NO. DE 21-030

IN THE MATTER OF: UNITIL ENERGY SYSTEMS, INC.

REQUEST FOR CHANGE IN RATES

DIRECT TESTIMONY

OF

Dr. J. Randall Woolridge

On Behalf of

New Hampshire Department of Energy

November 23, 2021

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I. INTRODUCTION

Q. Please state your full name.

A. My name is J. Randall Woolridge.

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

A. I am a Professor of Finance and the Goldman, Sachs & Co. and Frank P. Smeal Endowed University Fellow in Business Administration at the University Park Campus of Pennsylvania State University. I am also the Director of the Smeal College Trading Room and President of the Nittany Lion Fund, LLC. A summary of my educational background, research, and related business experience is provided in 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 ("DOE") to provide an opinion as to the overall fair rate of return or cost of capital for the regulated electric distribution service of Unitil Energy Systems ("Unitil" or the "Company") and to evaluate Unitil'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 Unitil and review the primary areas of contention between Unitil's rate of return position and the DOE's. Second, I provide an assessment of capital costs in today's capital markets. Third, I discuss my proxy group of electric utility companies for estimating the cost of capital for Unitil. 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 Unitil. 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, 46.99% long-term debt, 0.10% preferred stock, and 52.91% common equity. The Company has recommended short-term and long-term debt cost rates of 1.69% and 5.49% and a preferred stock cost rate of 6.00%. Ms. Jennifer E. Nelson has recommended a common equity cost rate of 10.20% for the New Hampshire electric distribution operations of Unitil. However, the Company has elected to

[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*").

propose a ROE of 10.0%. The Company's overall proposed rate of return is 7.88%. This is summarized in Table 1.

Table 1
Unitil's Recommended Cost of Capital

Capital Source	Capitalization Amounts	Capitalization Ratios	Cost Rate	Weighted Cost Rate
Short-Term Debt	-	0.00%	1.69%	0.00%
Long-Term Debt	89,900,000.00	46.99%	5.49%	2.58%
Preferred Stock	188,700.00	0.10%	6.00%	0.01%
Common Equity	101,242,877.00	52.91%	10.00%	5.29%
Total Capital	191,331,577.00	100.00%		7.88%

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

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 more equity and less financial risk than other electric utilities. In addition, the Company has excluded short-term debt in its capital structure, despite the fact that Unitil consistently uses short-term debt to finance its operations. As a result, I have included the Company's actual historical amount of short-term debt, which amounts to $18,066,524, in my recommended capital structure. In addition, The DOE is using the end-of-test year rate base in this proceeding, and so I am using the end-of-test-year capital structure. With these two adjustments, my capital structure is more reflective of the common equity ratios and financial risk of electric utility companies, with a common equity ratio of 46.02%. 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 electric utility companies ("Electric Proxy Group"). I have also used Ms. Nelson's Proxy Group. My recommendation is that the appropriate ROE for the Company is 8.75%. This figure is at the upper end of my equity cost rate range of 7.50% to 8.75%. Combined with my recommended capitalization ratios and senior capital cost rate, my overall rate of return or cost of capital for the Company is 6.69% as summarized in Attachment JRW-2.

Table 2
The DOE's Recommended Cost of Capital

Capital Source	Capitalization Amounts	Capitalization Ratios	Cost Rate	Weighted Cost Rate
Short-Term Debt	18,066,524.0	7.82%	1.69%	0.13%
Long-Term Debt	106,500,000.00	46.08%	5.49%	2.53%
Preferred Stock	188,700.00	0.08%	6.00%	0.00%
Common Equity	106,351,927.55	46.02%	8.75%	4.03%
Total Capital	231,107,151.55	100.00%		6.69%

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 are the appropriate capital structure and ROE for the Company.

Capital Structure - The Company has proposed a capital structure that includes a common equity ratio of 52.91%. This capital structure excludes short-term debt and includes a higher common equity ratio than the average common equity ratios employed by the proxy groups. I show that the Company has consistently used short-term debt in financing plans. In addition, since The DOE is using the end-of-test year rate base, I am using the end-of-test-year capital structure. With these two adjustments, my capital structure is more reflective of the common equity ratios and financial risk of electric utility companies, with a common equity ratio of 46.02%.

Capital Market Conditions – Ms. Nelson's analyses, ROE results, and recommendations are based on forecasts of higher interest rates and capital costs. However, I show that interest rates continue to be at historically low levels, and that economists' forecasts of higher interest rates have been wrong for over a decade.

DCF Approach – Ms. Nelson and I have both employed the traditional constant-growth DCF model. Ms. Nelson's has erred in three ways: (1) she has given little weight to her DCF results; (2) she has exclusively used the overly optimistic and upwardly biased EPS growth rate forecasts of Wall Street analysts and *Value Line*; and (3) she has claimed that the DCF results underestimate the market-determined cost of equity capital due to high utility stock valuations and low dividend yields. 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. In addition, these errors are magnified by the fact that she has used a small proxy group.

CAPM Approach – The CAPM approach requires an estimate of the risk-free interest rate, beta, and the market or risk premium. There are three issues with Ms. Nelson's CAPM analysis: (1) she has used an ad hoc version of the CAPM, the Empirical CAPM; (2) her long-term projected (2.72%) 30-year Treasury yields are well in excess of current market yields; and (3) primarily, she has computed a market risk premium of 12.37%. The 12.37% 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. In addition, I demonstrate that the 12.37% market risk premium is based on totally unrealistic assumptions of future economic and earnings growth and stock returns. To compute her market risk premium, Ms. Nelson has applied the DCF to the S&P 500 and employed *Value Line*'s projected earnings per share ("EPS") growth-rate projections as a growth rate to compute an expected market return and market risk premium. As I demonstrate later in my testimony, the EPS growth-rate projection used for the S&P 500 and the resulting expected market return and market risk premium include totally 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.

Bond Yield Plus Risk Premium Model ("BYRP") - Ms. Nelson also estimates an equity cost rate using an alternative risks premium model which she calls the Bond Yield Plus Risk Premium ("BYRP") approach. There are two issues with this approach: (1) the base interest rates; and (2) the risk premium. With respect to the base rates, her projected long-term projected (2.72%) 30-year Treasury rates yields are well in excess of current market yields. The risk premium in her BYRP method is based on the historical relationship between the yields on long-term Treasury yields and authorized ROEs for electric utility companies. There are several issues with this approach: (1) This approach is a gauge of commission behavior and not investor behavior. Capital costs are determined in the market place through the financial decisions of investors and are reflected in such fundamental factors as dividend yields, expected growth rates, interest rates, and investors' assessment of the risk and expected return of different investments; (2) Ms. Nelson's methodology produces an inflated measure of the risk premium because her approach uses historical authorized ROEs and Treasury yields, and the resulting risk premium is applied to projected Treasury yields; and (3) the risk premium is inflated as a measure of investor's required risk premium because

electric utility companies have been selling at market-to-book ratios in excess of 1.0. This indicates that the authorized rates of return have been greater than the return that investors require.

Other Factors - Ms. Nelson's recommendation takes into account the additional risk associated with the small size of Until. As discussed later in my testimony, the risks associated with the size of Unitil is reflected in its credit ratings and the Company's S&P and Moody's credit ratings of BBB+ and Baa1 are equal to the averages of the two proxy groups.

II. 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. These yields have gradually declined in the past decade from 7.5% to the 3.0% range. They have increased since the middle of 2020 to the 3.3% range. Page 2 of Attachment JRW-3 shows the average dividend yield for publicly-held electric utilities. These yields declined over the past decade, bottoming out at 3.1% in 2019. They increased to 3.6% in 2020. The average earned ROE and market-to-book ratio for publicly-held electric utilities is shown on page 3 of Attachment JRW-3. The average earned ROE has been in the 9.0% to 10.25% range over the

past five years. The average market-to-book ratio increased over the decade, peaking at 2.0X in 2019, and declined to 1.75X in 2020.

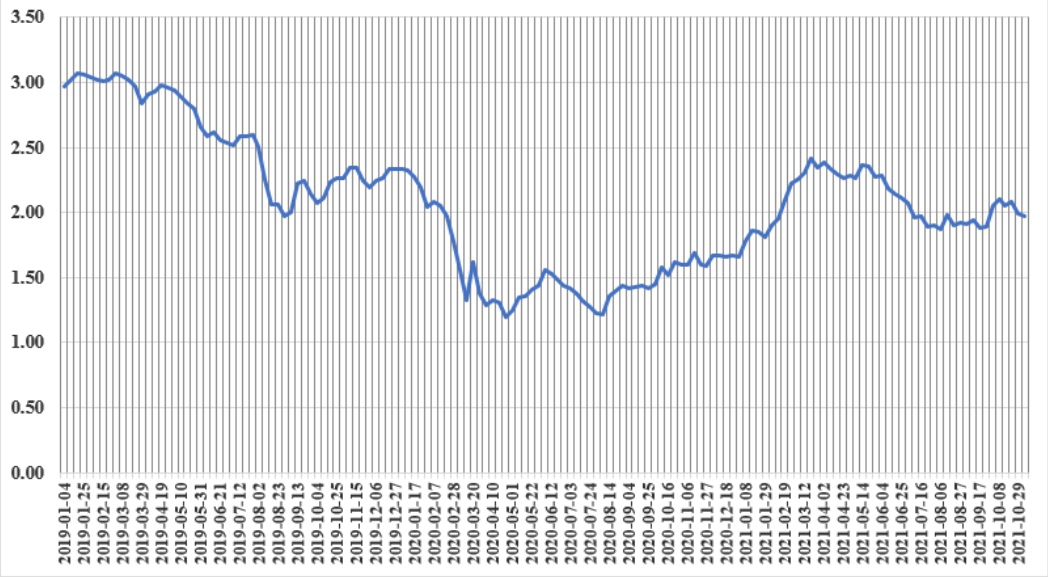
Q. Please review the economy and financial markets in 2021.

A. With much monetary and fiscal stimulus from the federal government, the economic recovery from the 2020 Covid-19 Pandemic has been strong and ongoing. Quarterly Nominal GDP growth has averaged about 5.0% since the third quarter of 2020. The U.S. unemployment rate, which peaked at 15% in April of 2020, has decreased steadily and now stands at 4.6%. As discussed in more detail below, the yield on 30-year Treasury yields, which dropped to an all-time low of 1.25%, have recovered but remain in the 2.0% range. Meanwhile the stock market has hit more than 50 all-time highs in 2021. The major area of concern in financial markets has been the increase in inflation in 2021.

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

A. Figure 1 shows 30-year Treasury yields over the past two years (2019-21). These yields were in the 3.0% range at the end of 2018, and declined to the 2.25% range in 2019, due primarily to slow economic growth and low inflation. As noted, in 2020, with the proliferation of the COVID-19 pandemic in February, 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 almost 2.50% in the first quarter of 2021. These yields have since declined to the 2.0% range and therefore remain at historically low levels.

Figure 1
30-Year Treasury Yields

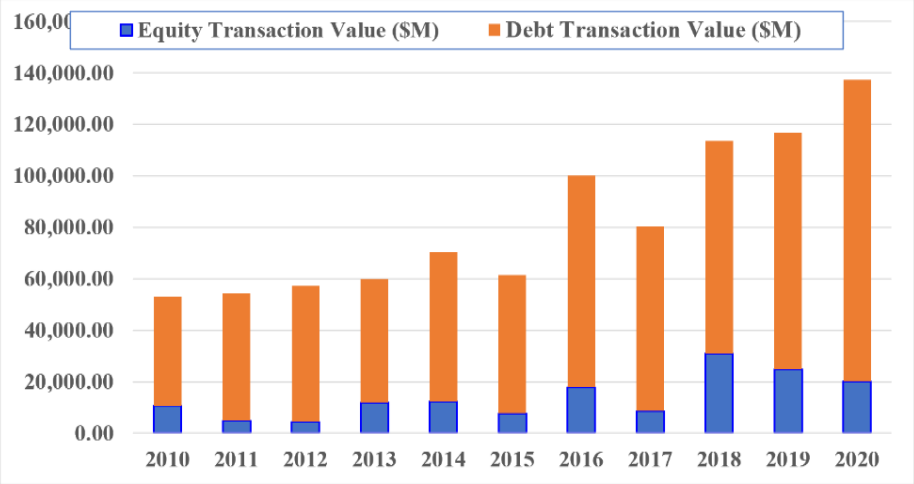


Data Source: https://fred.stlouisfed.org/series/DGS30

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 three 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
2010-20



Source: S&P Global Market Intelligence, S&P Cap IQ, 2021.

Q. Please discuss the increase in inflation in 2021.

A. The financial press and capital market participants have focused on the increased in inflation in 2021. Reported annual inflation rates, as measured by the CPI, have been in the 4.0% to 6.2% range since the first quarter of 2021. The driving force has been the shortages brought on by the economic collapse and then recovery from the Covid-19 pandemic. However, year-over-year comparisons of corporate profits, consumer prices, and other economic and corporate data are reported because they provide a sense of how the economy is changing over time. With respect to the economy, a year ago the economy was beginning to recover from the impact of COVID-19 and prices for goods and services like apparel, gasoline, hotels, air flights and car rentals collapsed. As a result, the higher inflation rate over the past year may be overstated as a picture of price

pressures in the economy because it is from a very deflated base in the second quarter of 2020.

One big issue is, despite the economic recovery and the increase in reported inflation, the yield on the 30-year Treasury yield is still about 2.0%. 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 Treasury Inflation-Protected Securities ("TIPS"). Panel A of Figure 3 shows the expected inflation rate over the next five years. Panel A of Figure 3 shows a noticeable increase over the past year, with an expected inflation rate of 2.57% over the next five years. Panels B and C of Figure 3 show the expected inflation rate over the next ten and thirty years, respectively. The expected inflation rates over the next ten and thirty years are 2.41% and 2.26%, respectively. 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 a little 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. What other economic signals are indicated by the recent changes in interest rates?

A. One significant move in credit markets is that the spreads between utility and Treasury bond yields have declined, indicating two things: (1) utility bond yields have not increased as much as Treasury yields since mid-2020; and (2) investors have confidence in the economy and hence their degree of risk aversion is lower. This was highlighted in another recent *Wall Street Journal* article, in which the author indicated the following:[3]

> The spread relative to Treasuries, however, is arguably an even better measure of investors' outlook for the economy, since it shows how much investors feel they need to be compensated for the risk that companies may default on their debt. The narrow speculative-grade bond spreads indicate debt investors think that the economic environment for businesses over the next several years could be better than at any time since the 2008-2009

[3] D. Goldfarb, "Corporate Bond Gauge Signals Dwindling Economic Risk," *Wall Street Journal*, April 22, 2021.

financial crisis—a striking development after many feared a severe, long-lasting economic downturn just last year.

I have shown the yield differential between 30-year 'A' rated utility bonds and 30-year Treasury yields over the past decade in Figure 4. The yield differential was in the 100 to 150 basis points range in the years prior to 2020. The differential jumped to over 200 basis points in the spring of 2020 as the pandemic spread and the global economy was shut down. However, the yield differential has declined over the past year, and is at its low point of about 100 basis points. As indicated above, this reflects increased confidence in the economy as indicated by the lower spread and risk aversion.

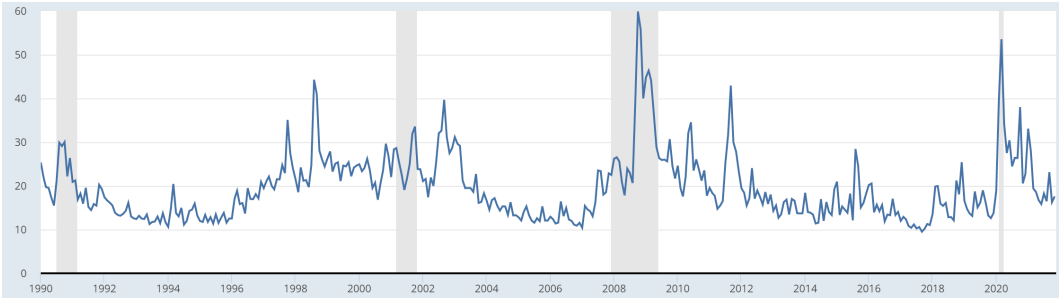
Figure 4
30-Year 'A' Rates Utility Yields Minus 30-Year Treasury Yields
2000-21

Date Source: https://fred.stlouisfed.org/ and Mergent Bond Yields

Q. Is there any other evidence that the financial markets' volatility associated with the pandemic has subsided?

A. Yes. Figure 5 shows the level of the VIX from 1990 to 2021. The VIX increased from 15 to over 50 in 2020, a level which has not been seen since the financial crisis in 2008. It has since decreased and is now below its long-term average of 20.

Figure 5
The VIX
1990-2021



Date Source: https://fred.stlouisfed.org/. Shaded areas represent economic recession time periods.

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

A. The U.S. economy has rebounded significantly over the past year after declining nearly twenty percent in the first half of 2020. Gross Domestic Product ("GDP") grew at 6.5% in the first half of 2021, and the economy is now back above pre-COVID-19 levels. The U.S. unemployment rate peaked in the second quarter of 2020 at about 15% and is now at 4.6%. The stock market began its recovery in the third week of March of 2020 and despite the negative health and economic issues associated with COVID-19, the S&P 500 has come back strong and has hit over 50 record highs in 2021s. The 30-year Treasury yield, which dropped to 1.25% in 2020, has come back to its pre-COVID-19 level of 2.00%. But, as

noted above, the spread between utility and Treasury bond yields has declined, which means that the yields on utility bonds have not increased as much as Treasury bond yields. Finally, the markets "fear index," the VIX, which topped out over 50, is below its long-time average of 20.

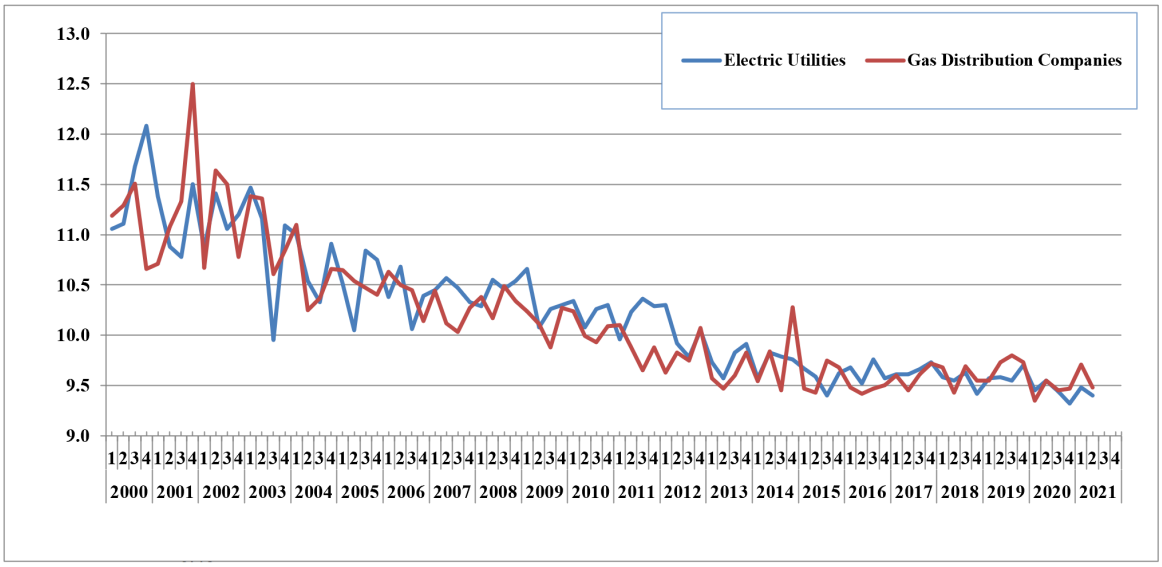
B. Authorized ROEs

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

A. In Figure 6, I have graphed the quarterly authorized ROEs for electric and gas companies from 2000 to 2020. 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, authorized ROEs for utilities hit an all-time low. On an annual basis, the average authorized ROEs for electric utilities have declined from an average of 10.01% in 2012 to 9.8% in 2013; 9.76% in 2014; 9.58% in 2015; 9.60% in 2016; 9.68% in 2017; 9.58% in 2018; 9.65% in of 2019; 9.39% in 2020; and 9.45% in the first two quarters of 2021, according to Regulatory Research Associates.[4]

[4] S&P Global Market Intelligence, RRA *Regulatory Focus*, 2021.

Figure 6
Authorized ROEs for Electric Utility and Gas Distribution Companies
2000-2021



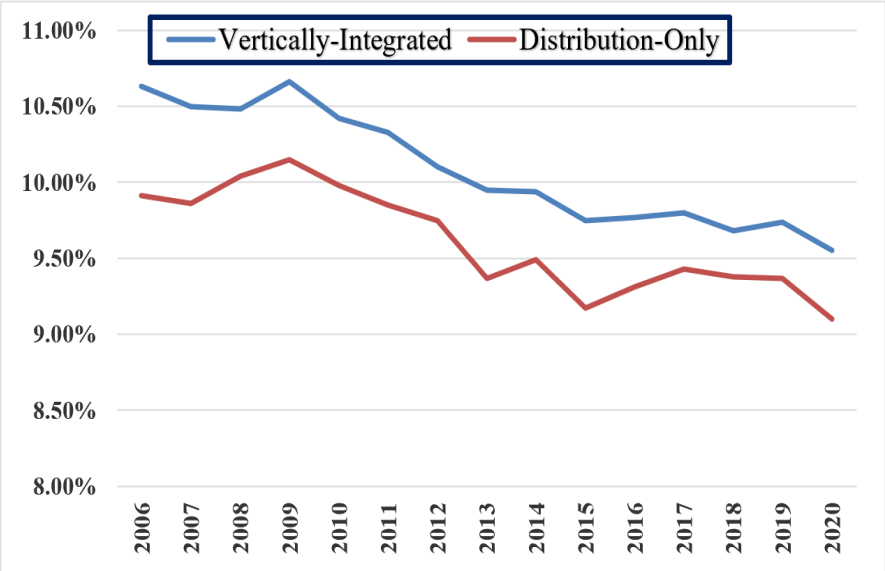
Date Source: S&P Global Market Intelligence, RRA *Regulatory Focus*, 2021.

Q. Do authorized ROEs for electric distribution companies like the Company differ from the authorized ROEs for integrated electric utilities?

A. Yes. One consistent factor in electric utility authorized ROEs is that the ROEs for delivery or distribution companies have consistently been below those of vertically integrated utilities. This is shown in Figure 7 below. The lower authorized ROEs are usually attributed to the fact that delivery or distribution companies do not own and operate electric generation which is presumed to be the riskier part of electric utility operations. I believe that commissions in states which have restructured (i.e. deregulated) recognize the lesser risk and award lower ROEs. The authorized ROEs for electric delivery companies have been 30-50 basis points below those of vertically-integrated electric utilities in recent

years. In 2020, the average authorized ROE for electric delivery companies was 9.10%.[5]

Figure 7
Authorized ROEs for Vertically Integrated versus
Delivery Only Electric Utilities
2006-2020

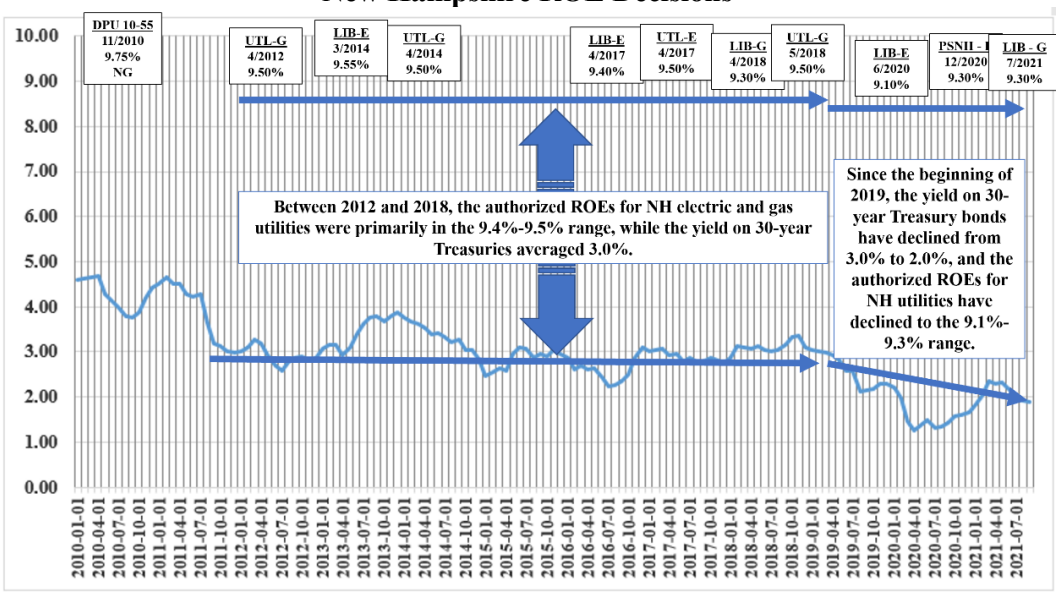


Q. Please review the authorized ROEs in New Hampshire.

A. Figure 8 shows the authorized ROEs in New Hampshire and the 30-year Treasury yield over the past decade. Notably, over the 2011-2018 time period, ROEs have been in the 9.3%-9.5% range, while the 30-year Treasury yields averaged 3.0%. However, since 2019, while NH authorized ROEs have declined slightly to the 9.10%-9.3% range, the 30-year Treasury yield has declined from 3.0% to 2.0%.

[5] S&P Global Market Intelligence, RRA *Regulatory Focus*, 2021.

Figure 8
New Hampshire ROE Decisions



III. PROXY GROUP SELECTION

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

A. To develop a fair rate of return recommendation for the Company, I have evaluated the return requirements of investors on the common stock of a proxy group of publicly-held electric distribution companies ("Electric Proxy Group"). I have also used the group developed by Ms. Nelson ("Nelson Proxy Group").

Q. Please describe the Electric Proxy Group.

A. The selection criteria for the Electric Proxy Group include the following:

(1) At least 50% of revenues from regulated electric operations as reported in SEC Form 10-K Report;
(2) Listed as a U.S.-based Electric Utility by *Value Line Investment Survey*;
(3) An investment-grade corporate credit and bond rating;
(4) Has paid a cash dividend for the past six months, with no cuts or omissions;
(5) Not involved in an acquisition of another utility, and not the target of an acquisition; and
(6) Analysts' long-term EPS growth rate forecasts available from Yahoo, S&P Cap IQ, and/or Zack's.

The Electric Proxy Group includes twenty-six companies. Summary financial statistics for the proxy group are listed in Attachment JRW-4. The median operating revenues and net plant among members of the Electric Proxy Group are $6,245.5 million and $21,439.2 million, respectively. The group on average receives 80% of its revenues from regulated electric operations, has a BBB+ bond rating from Standard & Poor's and a Baa1 rating from Moody's, a current average common equity ratio of 44.5%, and an earned return on common equity of 10.3%.

Q. Please discuss the Nelson Proxy Group.

A. Ms. Nelson's group has twenty-five companies. Summary financial statistics for Ms. Nelson's proxy group are provided in Panel B of page 1 of Attachment JRW-4. The median operating revenues and net plant for the Nelson Proxy Group are $6,845.0 million and $21,650.0 million, respectively. The group on average receives 77% of its revenues from regulated electric operations, has a

BBB+ bond rating from Standard & Poor's ("S&P's") and a Baa1 rating from Moody's, a common equity ratio of 44.3%, and a current earned return on common equity of 10.5%.

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

A. I believe that bond ratings provide a good assessment of the investment risk of a company. The S&P and Moody's issuer credit ratings for Unitil are BBB+ and Baa1, respectively. The average S&P and Moody's ratings for the Electric and Nelson Proxy Groups are also BBB+ and Baa1. Hence, Unitil's S&P and Moody's ratings are equal to the average of the two proxy groups. These credit metrics suggest that the Company is similar in risk to the proxy groups.

On page 2 of Attachment JRW-4, I have assessed the riskiness of the two proxy groups using five different risk measures. These measures include Beta, Financial Strength, Safety, Earnings Predictability, and Stock Price Stability. These risk measures indicate that the two proxy groups are similar in risk. The comparisons of the risk measures include Beta (0.89 vs. 0.90), Financial Strength (A vs. A) Safety (1.7 vs. 1.7), Earnings Predictability (85 vs. 90), and Stock Price Stability (89 vs. 89). On balance, these measures suggest that the two proxy groups are similar in risk.

IV. CAPITAL STRUCTURE RATIOS AND DEBT COST RATE

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

A. The Company has proposed a capital structure of 0.00% short-term debt, 46.99% long-term debt, 0.10% preferred stock, and 52.91% common equity. The Company has recommended short-term and long-term debt cost rates of 1.69% and 5.49% and a preferred stock cost rate of 6.00%. This is summarized in Table 1 and Panel A of Attachment JRW-5.

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

A. As shown in Attachment JRW-4, the mean common equity ratio for the companies in the Electric and Nelson Proxy Groups are 44.5% and 44.3%. This indicates that the Company's proposed capitalization has a much higher common equity ratio than the averages of the proxy groups. It should be noted that the capitalization ratios of the proxy groups include total debt which consists of both short-term and long-term debt. In assessing financial risk, short-term debt is included because, just like long-term debt, short-term has a higher claim on the assets and earnings of the company and requires timely payment of interest and repayment of principal.

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. Please indicate why the Company has not included short-term debt in its capital structure?

A. With respect to this issue, the Company's Mr. Diggins made the following observation:[6]

> The proposed capital structure includes only the sources of long-term capital that fund the long-lived assets included in rate base. Those sources do not include short-term debt. The Company believes it is important to match the long-lived nature of utility assets with similarly termed capital. Short-term debt is used principally to fund seasonal working capital requirements, construction work in process ("CWIP") and long-term debt sinking fund redemptions. As CWIP is not included in rate base, the short-term debt funding associated with CWIP should not be considered in the Company's regulatory capital structure for rate setting purposes. Over time, capital

[6] Testimony of Mr. Todd R. Diggins, pp. 4-5.

spending and sinking fund requirements will result in short-term debt balances that accumulate to levels that can be rolled into long-term financings. Under that financing cycle, short-term debt balances fall, and the capital structure's term is aligned with the long-term nature of utility assets. For these reasons, the Company does not rely on short-term debt as a permanent element of its capital structure, and does not believe it should be included in the regulatory cost of capital for rate setting purposes.

Q. Do you agree with this observation?

A. No. A review of the Company's historical financing indicates that Until consistently uses short-term debt as part of its core financing options, including to finance its rate base.

Q. Please elaborate.

A. There are several issues:

1. Schedule TRD-2 shows that Until has consistently used between $25 and $35 million in short-term financing;

2. Schedule TRD-5 shows that Until projects to use between $20 and $40 million in short-term financing in the next five years;

3. Until has proposed to increase its short-term debt limits by $10 million in the future so it can increase its amount of short-term debt in the future;

4. Schedule RevReq-5-5 shows that over the past year, the Company has had an average daily amount of $18,066,524 in short-term debt outstanding;

5. In Table 3, I have used the data provided in Schedule RevReq-5-5 to assess whether the Company's rate base is financed by long-term capital. This analysis shows that Unitil's rate base is $34.7 million larger than its long-term capital.

Therefore, there is a $34 million deficiency that must be financed by short-term debt.

Table 3
Rate Base and Long-Term Capital

	Proforma 2020
Rate Base	226,030,082.0
Long-Term Debt	89,900,000.0
Preferred Stock	188,700.0
Common Equity	101,242,877.0
Total Long-Term Capital	191,331,577.0
Financing Deficiency	34,698,505.0

Data Source: Until Schedules RevReq-4 and RevReq-5.

Q. Given these observations regarding short-term debt, are you including short-term debt in your proposed capitalization?

A. Yes. I have included the Company's actual historical daily amount of short-term debt, which amounts to $18,066,524, in my recommended capital structure. This is a conservative approach, given that this amount is less than the Company's projected amount of short-term debt outstanding.

Q. Are you making any other adjustments in your recommended capital structure?

A. Yes. In addition, since The DOE is using the end-of-test year rate base, I am using the end-of-test-year capital structure amounts.

Q. With these two adjustments, what is your recommended capital structure?

A. My recommended capital structure is summarized in Table 2 and in Panel B of Attachment JRW-4 and Table 4. With my two adjustments, my capital structure is more reflective of the common equity ratios and financial risk of electric utility companies, with a common equity ratio of 46.02%.

Table 4
DOE's Proposed Capital Structure Ratios and Debt Cost Rates

Capital Source	Capitalization Amounts	Capitalization Ratios	Cost Rate
Short-Term Debt	18,066,524.0	7.82%	1.69%
Long-Term Debt	106,500,000.0	46.08%	5.49%
Preferred Stock	188,700.0	0.08%	6.00%
Common Equity	106,351,927.6	46.02%	
Total Capital	231,107,151.6	100.00%	

Q. On pages 74-8 of her testimony and in Attachment JEN-10, Ms. Nelson attempts to justify the Company's proposed capital structure by comparing Unitil's proposed 52.91% common equity ratio to the average equity ratio of the operating utilities owned by the proxy holding companies. Is this the appropriate comparison?

A. No. Contrary to Ms. Nelson's assertions, the appropriate comparison when it comes to common equity ratios is between the common equity ratio as proposed by the Company and the average common equity ratios for the holding companies in the proxy groups, not the operating utilities owned by the holding companies. The reason is that both Ms. Nelson and I use the holding companies to estimate a cost of equity capital for the Company. That is because the holding companies have common stock outstanding, so we can apply DCF and CAPM equity cost rate approaches. Therefore, it is their common equity ratio that is appropriate for comparison purposes, since it is their common equity ratio which reflects their financial risk. The common equity ratios of the operating utilities are higher, and therefore they are subject to less financial risk.

Q. Are you using the Company's proposed short-term debt, long-term debt, and preferred stock cost rates?

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. [7]

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

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

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.

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*[8] |

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 electric 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.[9] This demonstrates the strong positive relationship between ROEs and market-to-book ratios for public utilities. Given

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

[9] 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.

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.

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.[10] 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.

[10] 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.

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

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. Discounted Cash Flow Approach

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. **Growth stage**: Characterized by rapidly expanding sales, high profit margins, and an abnormally high growth in earnings per share. Because of highly profitable expected investment opportunities, the payout ratio is low. Competitors are attracted by the unusually high earnings, leading to a decline in the growth rate.

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

3. **Maturity (steady-state) stage**: Eventually, the company reaches a position where its new investment opportunities offer, on average, only slightly 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 groups using the current annual dividend and the 30-day, 90-day, and 180-day average stock prices. These dividend yields are provided on page 2 of Attachment JRW-7. Using both the means and medians, the dividend yields range from 3.3% to 3.4% for the Electric Proxy Group and 3.3% to 3.5% for the Nelson Proxy Group. Therefore, I will use dividend yields of 3.35% and 3.40% for my Electric Proxy Group and the Nelson Proxy Group, respectively.

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.[11]

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

[11] *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).

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

Q. Given this discussion, what adjustment factor do you use for your dividend yield?

A. I adjust the dividend yield by one-half (1/2) of the expected growth to reflect growth over the coming year. This is the approach employed by the Federal Energy Regulatory Commission ("FERC").[12] 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

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

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 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.[13] 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

[13] 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.

and upwardly biased. This has been demonstrated in a number of academic studies over the years.[14] 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.[15]

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

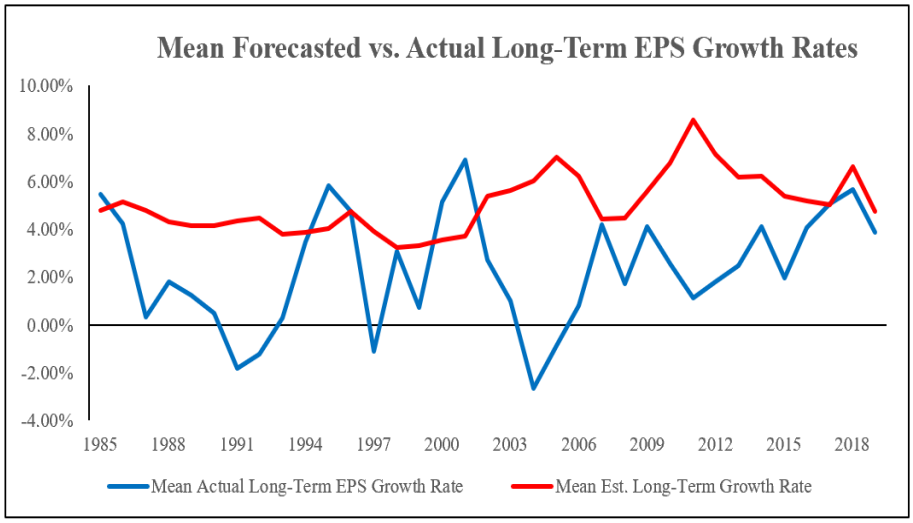
A. Yes. I have completed a study of the accuracy of analysts' EPS growth rates for electric utilities over the 1985-2020 time period. In the study, I used the utilities listed in the East, West, and Central Electric Utilities sectors by *Value Line*. I collected the three-to-five year projected EPS growth 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 9, the mean forecasted EPS growth rate (depicted in the red line in Figure 9) is consistently greater than the achieved actual EPS growth rate over the time period, with the exception of

[14] 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).

[15] 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).

1994-96 and 2000-2002. Over the entire period, the mean forecasted EPS growth rate is over 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 9
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.[16]

Szakmary, Conover, and Lancaster (SCL) studied the predicted versus the actual 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., 2012-2014) to a future three-year projected period (e.g., 2016-18). 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.

[16] 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.

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 two proxy groups, as published in the *Value Line Investment Survey.* The median historical growth measures for EPS, DPS, and BVPS for the Electric Proxy Group, as provided in Panel A, range from 4.0% to 6.0%, with an average of the medians of 4.9%. For the Nelson Proxy Group, as shown in Panel B of page 3 of Attachment JRW-7, the historical growth measures in EPS, DPS, and BVPS, as measured by the medians, range from 4.0% to 5.5%, with an average of the medians of 4.8%.

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 groups 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 Electric Proxy Group, as shown in Panel A of page 4 of Attachment JRW-7, the medians range from 4.0% to 6.0%, with an average of the medians of 5.1%. The

range of the medians for the Nelson Proxy Group, shown in Panel B of page 4 of Attachment JRW-7, is from 4.0% to 5.8%, with an average of the medians of 4.9%.[17]

Also provided on page 4 of Attachment JRW-7 are the prospective sustainable growth rates for the companies in the two proxy groups as measured by *Value Line*'s average projected retention rate and return on shareholders' equity. As noted above, sustainable growth is a significant and a primary driver of long-run earnings growth. For the Electric and Nelson Proxy Groups, the median prospective sustainable growth rates are 3.8% and 3.8%, respectively.

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 groups on page 5 of Attachment JRW-7. I have reported both the mean and median growth rates for the groups. 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

[17] 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 – 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. Therefore, I evaluate these growth rates separately from analysts EPS growth rates.

each company. The mean/median of analysts' projected EPS growth rates for the Electric and Nelson Proxy Groups are 5.4%/5.9% and 5.4%/5.8%, respectively.

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 Electric Proxy Group imply a baseline growth rate of 4.9%. The average of the projected EPS, DPS, and BVPS growth rates from *Value Line* is 5.1%, and *Value Line*'s projected sustainable growth rate is 3.8%. The projected EPS growth rates of Wall Street analysts for the Electric Proxy Group are 5.4% and 5.9% as measured by the mean and median growth rates. The overall range for the projected growth-rate indicators (ignoring historical growth) is 3.8% to 5.9%. Giving primary weight to the projected EPS growth rate of Wall Street analysts and *Value Line*, I believe that the appropriate projected growth rate is in the 5.0%-5.5% range. I will use the midpoint of this range, 5.25%, 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 Electric Proxy Group.

For the Nelson Proxy Group, the historical growth rate indicators suggest a growth rate of 3.5%. The average of the projected EPS, DPS, and BVPS growth rates from *Value Line* is 4.9%, and *Value Line*'s projected sustainable growth rate is 3.8%. The projected EPS growth rates of Wall Street analysts are 5.4% and 5.5% as measured by the mean and median growth rates. The overall range

for the projected growth rate indicators is 3.5% to 5.8%. Giving primary weight to the projected EPS growth rate of Wall Street analysts and *Value Line*, I believe that the appropriate projected growth rate is in the 5.0%-5.5% range. I will use the midpoint of this range, 5.25%, 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 Nelson 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 5 below.

Table 5
DCF-Derived Equity Cost Rate/ROE

	Dividend Yield	1 + ½ Growth Adjustment	DCF Growth Rate	Equity Cost Rate
Electric Proxy Group	**3.35%**	**1.02625**	**5.25%**	**8.70%**
Nelson Proxy Group	**3.40%**	**1.02625**	**5.25%**	**8.75%**

The result for the Electric Proxy Group is the 3.35% dividend yield, times the one and one-half growth adjustment of 1.02625, plus the DCF growth rate of 5.25%, which results in an equity cost rate of 8.70%. The result for the Nelson Proxy Group is 8.75%, which includes a dividend yield of 3.40%, an adjustment factor of 1.02625, and a DCF growth rate of 5.25%.

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:

$$K = (R_f) + ß * [E(R_m) - (R_f)]$$

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

To estimate the required return or cost of equity using the CAPM requires three inputs: the risk-free rate of interest (R_f), the beta (ß), and the expected equity or market risk premium $[E(R_m) - (R_f)]$. R_f is the easiest of the inputs to

measure – it is represented by the yield on long-term U.S. Treasury bonds. ß, the measure of systematic risk, is a little more difficult to measure because there are different opinions about what adjustments, if any, should be made to historical betas due to their tendency to regress to 1.0 over time. And finally, an even more difficult input to measure is the expected equity or market risk premium ($E(R_m) - (R_f)$). I will discuss each of these inputs below.

Q. Please discuss 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 2013–2021 time period. The current 30-year Treasury yield is about 2.0%. 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.[18]

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

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. [19] 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 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

[19] 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, 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 betas for the companies in the Electric and Nelson Proxy Groups are 0.90 and 0.90, respectively.

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. As shown on page 3 of Attachment JRW-8, the median *Value Line* beta for the Electric and Nelson Proxy Groups are 0.90 and 0.90, respectively. 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."[20]

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

[20] 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.[21]

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.[22] Questions regarding expected stock and bond returns are also included in the Federal Reserve Bank of Philadelphia's annual survey of financial forecasters, which is published as the *Survey of Professional Forecasters*.[23] This survey of professional economists has been published for almost 50 years. In addition, Pablo Fernandez conducts annual surveys of financial analysts and companies regarding the equity risk premiums used in their investment and financial decision making.[24]

Q. Please provide a summary of the market risk premium studies.

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

[22] DUKE UNIVERSITY, *The CFO Survey* (2020) https://www.richmondfed.org/cfosurvey.

[23] 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.

[24] Pablo Fernandez, Eduardo Apellániz, & Javier Acín, SURVEY: MARKET RISK PREMIUM AND RISK-FREE RATE USED FOR 81 COUNTRIES IN 2020 (Mar. 25, 2020), IESE Business School Working Paper No. WP-1244-E, Available at SSRN: https://ssrn.com/abstract=3560869 or http://dx.doi.org/10.35139/ssrn.3560869.

A. Derrig and Orr, Fernandez, and Song completed the most comprehensive reviews of the research on the market risk premium.[25] 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.

[25] *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 5.10%.

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 6.44% 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 3.42% to 6.00%.

Surveys – Market-risk premiums developed from surveys of analysts, companies, financial professionals, and academics are lower, with a range from 3.36% 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.[26] His survey results are included on pages 5 and 6 of

[26] 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).

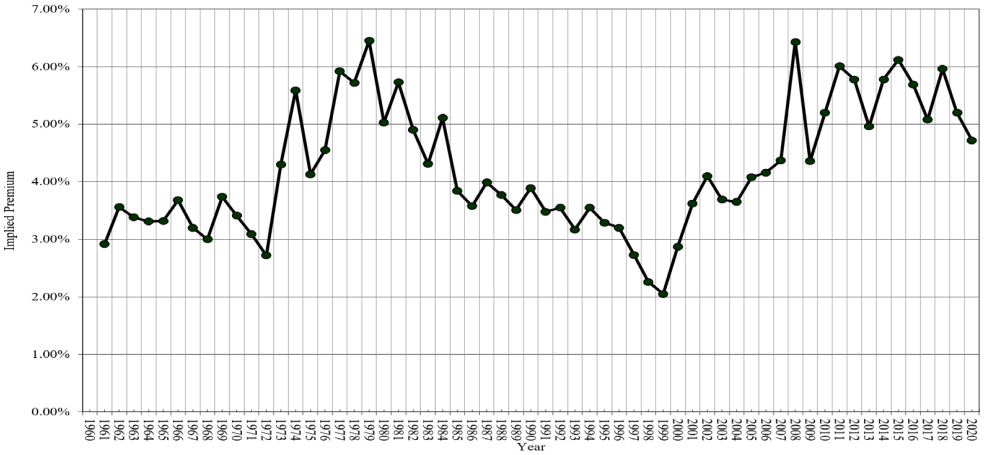
Attachment JRW-8. The results of his 2021 survey of academics, financial analysts, and companies, which included 4,000 responses, indicated a mean market-risk premium employed by U.S. analysts and companies of 5.5%.[27] His estimated market-risk premium for the U.S. has been in the 5.00% to 5.60% range 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 10, below, has primarily been in the range of 5.0% to 6.0% since 2010. As of November 2021, his estimate of the implied market-risk premium was 4.53%.[28]

[27] *Id.* at 3.

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

Figure 10
Damodaran Market Risk Premium
1960-2020



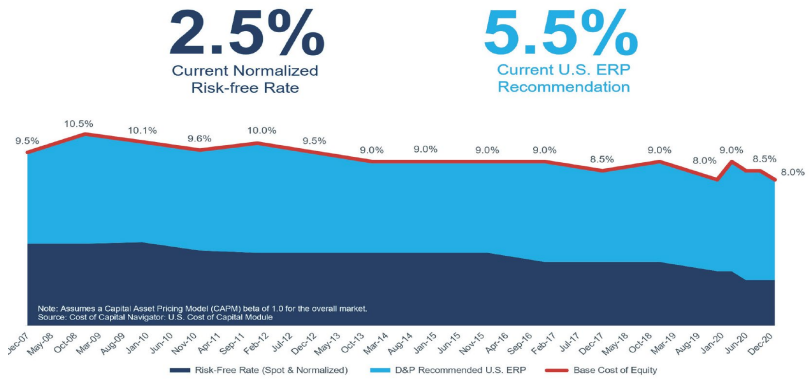
Source: Aswath Damodaran, Damodaran Online, N.Y. UNIVERSITY, http://pages.stern.nyu.edu/~adamodar/.

Duff & Phelps, an investment advisory firm, provides recommendations for the normalized risk-free interest rate and market-risk premiums to be used in 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 11. 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 the second quarter of 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%.[29]

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

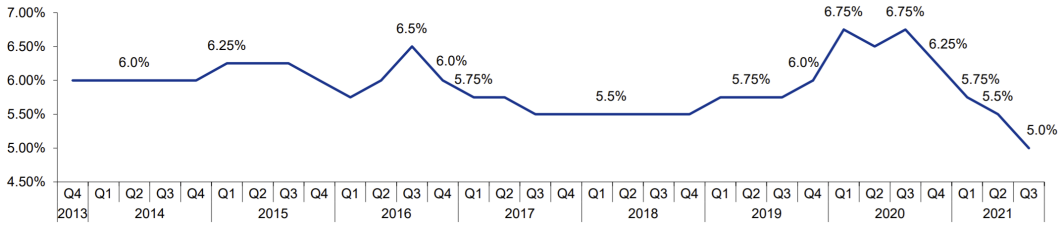
Finally, KPMG, the international accounting firm, regularly publishes an update to their market risk premium to be used in their valuation practice. KPMG's market risk premium, which was as high as 6.75% in 2020, was lowered on March 31, 2021 to 5.75% on June 30, 2021, to 5.50%, and again, on September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

Figure 11
Duff & Phelps
Normalized Risk-Free Rate and Market-Risk Premium Recommendations
2007-2021



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

Figure 12
KPMG
Market-Risk Premium Recommendations
2013-2021



Source:file:https://indialogue.io/clients/reports/public/5d9da61986db2894649a7ef2/5d9da63386db2894649a7ef5

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

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 6 below.

Table 6
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
Electric Proxy Group	**2.50%**	**0.90**	**5.50%**	**7.5%**
Nelson Proxy Group	**2.50%**	**0.90**	**5.50%**	**7.5%**

For the Electric and Nelson Proxy Groups, the risk-free rate of 2.50% plus the product of the beta of 0.90 times the equity risk premium of 5.50% results in a 7.50% equity cost rate.

D. Equity Cost Rate Summary

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

A. My DCF analyses for the Electric Proxy Group indicate an equity-cost rate of 8.70%, and for the Nelson Proxy Group an equity cost rate of 8.75%. The CAPM equity cost rates for the Electric and Nelson are 7.50% and 7.50%, respectively.

Table 7
ROEs Derived from DCF and CAPM Models

	DCF	CAPM
Electric Proxy Group	**8.70%**	**7.50%**
Nelson Proxy Group	**8.75%**	**7.50%**

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 7.50% to 8.75% for the companies in the Electric Proxy Group and in the Nelson Proxy Group. However, since I rely primarily on the DCF model, I believe that the appropriate range is in the 8.70%-8.75% range. For Until, I will use an ROE of 8.75%.

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

A. There are a number of reasons why an equity-cost rate of 8.75% 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-5, the electric 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 that reflects the Company's financial plans and a higher common equity ratio and lower financial risk than the averages of the two proxy groups;

4. The investment risk of Until is similar to the averages of the two proxy groups, as indicated by its S&P and Moody's issuer credit ratings;

5. My recommended equity-cost rate lies at the high end of the range of my ROE outcomes: and

6. The average authorized ROEs for electric utilities have declined from an average of 10.01% in 2012 to 9.8% in 2013; 9.76% in 2014; 9.58% in 2015; 9.60% in 2016; 9.68% in 2017; 9.58% in 2018; 9.65% in of 2019; 9.39% in 2020; and 9.45% in the first two quarters of 2021, according to Regulatory Research Associates. In addition, the authorized ROEs for electric distribution companies have been 30-40 basis points below those for integrated electric utilities. In my opinion, authorized ROEs have lagged behind capital market cost rates, or in other words, authorized ROEs have been slow to reflect low capital market cost rates.

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

A. Moody's recently published an article on utility ROEs and credit quality. In the article, Moody's recognizes that authorized ROEs for electric and gas companies are declining due to lower interest rates. [31]

> 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.[32]

> 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

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

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

> the cost of capital gap between the industry's authorized ROEs and persistently low interest rates. We also see utilities struggling to defend this gap, while at the same time recovering the vast majority of their costs and investments through a variety of rate mechanisms.

Overall, this article further supports the 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 8.75% 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.

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

A. As previous discussed, utilities have been raising over $100 million per year in debt and equity capital in recent years.

VI. CRITIQUE OF UNITIL 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, 46.99% long-term debt, 0.10% preferred stock, and 52.91% common equity. The Company has recommended short-term and long-term debt cost rates of 1.69%

and 5.49% and a preferred stock cost rate of 6.00%. Ms. Jennifer E. Nelson has recommended a common equity cost rate of 10.20% for the New Hampshire electric distribution operations of Unitil. However, the Company has elected to propose a ROE of 10.0%. The Company's overall proposed rate of return is 7.88%. This is summarized in Attachment JRW-9.

Q. Please review Ms. Nelson's equity cost rate approaches and results.

A. Ms. Nelson has developed a proxy group of electric utility companies and employs DCF, CAPM, and BYRP equity cost rate approaches. Ms. Nelson's equity cost rate estimates for the Company are summarized on page 2 of Attachment JRW-9. Based on these figures, she concludes that the appropriate equity cost rate for the Company is 10.2%. As I discuss below, there are a number of issues with the inputs, applications, and results of her 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 are the appropriate capital structure and ROE for the Company.

Capital Structure - The Company has proposed a capital structure that includes a common equity ratio of 52.91%. This capital structure excludes short-term debt and includes a higher common equity ratio than the average common equity ratios employed by the proxy groups. I show that the Company has consistently used short-term debt in financing plans. In addition, since the DOE is using the end-of-test year rate base, I am using the end-of-test-year capital structure. With these two adjustments, my capital structure is more reflective of the common

equity ratios and financial risk of electric utility companies, with a common equity ratio of 46.02%.

Capital Market Conditions – Ms. Nelson's analyses, ROE results, and recommendations are based on forecasts of higher interest rates and capital costs. However, I show that interest rates continue to be at historically low levels, and that economists' forecasts of higher interest rates have been wrong for over a decade.

DCF Approach – Ms. Nelson and I have both employed the traditional constant-growth DCF model. Ms. Nelson's has erred in three ways: (1) she has given little weight to her DCF results; (2) she has exclusively used the overly optimistic and upwardly biased EPS growth rate forecasts of Wall Street analysts and *Value Line*; and (3) she has claimed that the DCF results underestimate the market-determined cost of equity capital due to high utility stock valuations and low dividend yields. 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. In addition, these errors are magnified by the fact that she has used a small proxy group.

CAPM Approach – The CAPM approach requires an estimate of the risk-free interest rate, beta, and the market or risk premium. There are three issues with Ms. Nelson's CAPM analysis: (1) she has used an ad hoc version of the CAPM, the Empirical CAPM; (2) her long-term projected (2.72%) 30-year Treasury yields are well in excess of current market yields; and (3) primarily, she has computed a

market risk premium of 12.37%. The 12.37% 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. In addition, I demonstrate that the 12.37% market risk premium is based on totally unrealistic assumptions of future economic and earnings growth and stock returns.

Bond Yield Plus Risk Premium Model ("BYRP") - Ms. Nelson also estimates an equity cost rate using an alternative risks premium model which she calls the Bond Yield Plus Risk Premium ("BYRP") approach. There are two issues with this approach: (1) the base interest rates; and (2) the risk premium. With respect to the base rates, her projected long-term projected (2.72%) 30-year Treasury rates yields are well in excess of current market yields. The risk premium in her BYRP method is based on the historical relationship between the yields on long-term Treasury yields and authorized ROEs for electric utility companies. The big issues is that this approach is a gauge of commission behavior and not investor behavior.

Other Factors - Ms. Nelson's recommendation includes a consideration of the additional risk associated with size of Unitil.

The capital structure and capital market conditions issues were addressed above. The other issues are discussed below.

A. DCF Approach

Q. Please summarize Ms. Nelson's DCF estimates.

A. On pages 39-50 of her testimony and in Exhibits JEN-3 – JEN-4, Ms. Nelson develops an equity cost rate by applying the DCF model to her proxy group. Ms. Nelson's DCF results are summarized in Panel A of page 2 of Attachment JRW-11. She uses the constant-growth growth DCF model, and uses both an annual and a quarterly DCF model. Ms. Nelson uses three dividend yield measures (30, 90, and 180 days) in her DCF models. In her constant-growth DCF models, Ms. Nelson has relied on the forecasted EPS growth rates of Zacks, Yahoo Finance, and *Value Line*. Ms. Nelson's DCF results are summarized on page 2 of Attachment JRW-9.

Q. What are the errors in Ms. Nelson's DCF analyses?

A. The primary issues in Ms. Nelson's DCF analyses are: (1) she has given little weight to her DCF results; (2) she has exclusively used the overly-optimistic and upwardly-biased EPS growth rate forecasts of Wall Street analysts and *Value Line*; and (3) she has claimed that the DCF results underestimate the market-determined cost of equity capital due to high utility stock valuations and low dividend yields.

1. The Low Weight Given the DCF Results

Q. Has Ms. Nelson given appropriate weight to her DCF result?

A. No, I believe she has given them too little weight. As described above, Witness Nelson used the mean results from her DCF, CAPM, and risk premium equity cost rate approaches. She reports an average constant growth DCF equity cost

rate of 9.12%. As detailed below, there are numerous errors in her CAPM approach which result in grossly inflated equity cost rate estimates.

2. Analysts' EPS Growth-Rate Forecasts

Q. Please review Ms. Nelson's DCF growth rate.

A. In her constant-growth DCF model, Witness Nelson's DCF growth rate is the average of the projected EPS growth-rate forecasts of Wall Street analysts as compiled by Yahoo Finance, Zack's, and *Value Line*.

Q. Please discuss Ms. Nelson'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, the 2011 study by Lacina, Lee, and Xu cited earlier 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. 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 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 of 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* were 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 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]

[33] See references in footnotes 20-22

[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.

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

> 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:

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

3. Claim that the DCF Model Understates the Cost of Equity Capital

Q. Please discuss Ms. Nelson's claim that the DCF model understates the cost of equity capital.

[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.

A. On pages 9-12 and 48-9 of her testimony, Witness Nelson makes the claim that using current utility stock valuations and low dividend yields will underestimate the market-determined ROE using the DCF model.

Q. What is your response to this claim?

A. Ms. Nelson's claim is totally without merit for the following reasons: (1) she is saying that utility stocks are overvalued, and their stock prices will decline in the future (and therefore their dividend yield will increase). Hence, Ms. Nelson presumes that she knows more than investors in the stock market. Actually, if she believes that utility stock prices will decline in the future, she should be forecasting negative returns; (2) her high-end results are the sum of the dividend yield and only the highest projected growth rate for each proxy utility. Therefore, this approach is reliant on one analyst and is not a consensus forecast of growth; and (3) the DCF approach directly measures the cost of equity capital because it uses dividends, stock prices, and expected growth rates. The CAPM is an indirect method of measuring the cost of equity capital with the only company-specific input being beta. In addition, it is highly dependent on the market risk premium which, as discussed above, is one of the great mysteries in finance; and (4) as discussed below, Ms. Nelson's CAPM result is grossly inflated due to its totally unrealistic assumptions on future earnings and economic growth and future stock returns.

B. CAPM Approach

Q. Please discuss Ms. Nelson's CAPM.

A. On pages 50-9 of her testimony and in Exhibits JEN-5-Jen-7, Ms. Nelson estimates an equity cost rate by applying a CAPM model to her proxy group. She employs the traditional and the empirical versions of the CAPM. The CAPM approach requires an estimate of the risk-free interest rate, beta, and the equity risk premium. Ms. Nelson uses: (1) current (1.97%) and projected (2.72%) 30-year Treasury yields; (2) *Value Line* betas; and (3) a market risk premium of 12.37%. Based on these figures, she finds CAPM equity cost rates ranging from 12.48% to 13.27%. These results are summarized on page 2 of Attachment JRW-9.

Q. What are the errors in Ms. Nelson's CAPM analysis?

A. The three issues are: (1) she has used an ad hoc version of the CAPM, the Empirical CAPM; (2) her long-term projected (2.72%) 30-year Treasury yields is well in excess of current market yields; and (3) primarily she has computed a market risk premium of 12.37%. To compute her market risk premium, Ms. Nelson has applied the DCF to the S&P 500 and employed analysts' projected earnings per share ("EPS") growth-rate projections from *Value Line* as a growth rate to compute an expected market return and market risk premium. As I demonstrate later in my testimony, the EPS growth-rate projection used for the S&P 500 and the resulting expected market return and market risk premium include totally unrealistic assumptions regarding future economic and earnings growth and stock returns.

1. Validity of the EMPERICAL "E" CAPM Approach

Q. Do you believe that the ECAPM is a valid methodology to determine Unitil's cost of equity capital>

A. No. The ECAPM, as popularized by rate of return consultant Dr. Roger Morin, attempts to model the well-known finding of tests of the CAPM that have indicated that the Security Market Line ("SML") is not as steep as predicted by the CAPM.[38] As such, the ECAPM is nothing more than an ad hoc version of the CAPM. Moreover, the ECAPM has not been theoretically or empirically validated in refereed journals. The ECAPM provides for weights which are used to adjust the risk-free rate and market risk premium in applying the ECAPM.

Beyond the lack of any theoretical or empirical validation of the ECAPM, there are two errors in Ms. Nelson's ECAPM: (1) I am not aware of any tests of the CAPM that use adjusted betas such as those used by Ms. Nelson; and (2) adjusted betas address the empirical issues with the CAPM by increasing the expected returns for low beta stocks and decreasing the returns for high beta stocks.

[38] Also known as the "characteristic line," the Security Market Line (SML) is a visualization of the CAPM, where the x-axis of the chart represents risk (in terms of beta), and the y-axis of the chart represents expected return. The market risk premium of a given security is determined by where it is plotted on the chart relative to the SML.

2. Risk-Free Interest Rate

Q. What is the issue with Ms. Nelson's projected risk free interest rate?

A. Ms. Nelson's projected 30-year Treasury yield of 2.72% is well above the current 30-year Treasury yield. Institutional investors would not be buying bonds at the current is yield if they expected interest rates to increase so dramatically in the coming years. An increase in yields of almost 100 basis points on 30-year Treasury bonds within the next couple years would result in significant capital losses for investors buying bonds today at current market yields, suggesting that Ms. Nelson's use of projected 30-year Treasury yields is unreasonable.

Q. What do you recommend the Commission do regarding Ms. Nelson's use of interest rate forecasts?

A. I suggest that the Commission set an equity cost rate based on current indicators of market-cost rates and not speculate on the future direction of interest rates. Economists have been predicting that interest rates would be going up for a decade, and they consistently have been wrong. For example, after the announcement of the end of the Quantitative Easing III ("QE III") program in 2014, all the economists in Bloomberg's interest rate survey forecasted that interest rates would increase in 2014, and 100% of the economists were wrong. According to the *Market Watch* article:[39]

> The survey of economists' yield projections is generally skewed toward rising rates — only a few times since early 2009 have a majority of respondents to the Bloomberg survey thought rates

[39] Ben Eisen, "Yes, 100% of economists were dead wrong about yields," *Market Watch*, October 22, 2014.

would fall. But the unanimity of the rising rate forecasts in the spring was a stark reminder of how one-sided market views can become. It also teaches us that economists can be universally wrong.

Two other financial publications produced studies on how economists consistently predict higher interest rates and turn out to be wrong. The first publication, entitled "How Interest Rates Keep Making People on Wall Street Look Like Fools," evaluated economists' forecasts for the yield on 10-year Treasury bonds at the beginning of the year for the last ten years.[40] The results demonstrated that economists consistently predict that interest rates will go higher, and interest rates have not fulfilled those predictions.

The second study tracked economists' forecasts for the yield on 10-year Treasury bonds on an ongoing basis from 2010 until 2015.[41] The study, entitled "Interest Rate Forecasters are Shockingly Wrong Almost All of the Time," indicates that economists are continually forecasting that interest rates are going up, yet they do not. Indeed, as Bloomberg has reported, economists' continued failure in forecasting increasing interest rates has caused the Federal Reserve Bank of New York to stop using the interest-rate estimates of professional forecasters in the Bank's interest-rate model due to the unreliability of those interest-rate forecasts.[42]

[40] 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.

[41] 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.

[42] See Susanne Walker and Liz Capo McCormick, "Unstoppable $100 Trillion Bond Market Renders Models Useless," *Bloomberg.com* (June 2, 2014).

Obviously, investors are well aware of the consistently wrong forecasts of higher interest rates, and therefore place little weight on such forecasts. Investors would not be buying long-term Treasury bonds or utility stocks at their current yields if they expected interest rates to suddenly increase, thereby producing higher yields and negative returns.

In sum, it is practically impossible to accurately forecast interest rates and prices of investments that are determined in financial markets, such as interest rates and prices for stocks and commodities. For interest rates, I am not aware of any study that suggests one forecasting service is consistently better than others or that interest-rate forecasts are consistently better than just assuming the current interest rate will be the rate in the future.

3. Market Risk Premium

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

A. Ms. Nelson computes a market risk premium of 12.37% by: (1) calculating an expected stock market return by applying the DCF model to the S&P 500; and, then (2) subtracting the 30-year Treasury bond yield. Ms. Nelson's estimated expected market return is 14.34% (using *Value Line*'s projected EPS growth rate estimates). Ms. Nelson also uses (1) a dividend yield of 2.12% and an expected

http://www.bloomberg.com/news/2014-06-01/the-unstoppable-100-trillion-bond-market-renders-models-useless.html.

DCF growth rate of 12.22%. The market risk premium is then computed as the expected stock market return minus the risk-free interest rate (14.34%-1.97% =12.37%).

Q. How did Ms. Nelson err when analyzing market premium?

A. The error is that Ms. Nelson computed the expected market return using the DCF model with the growth rate being the projected 5-year EPS growth rate from *Value Line*. Witness Nelson's CAPM market risk premium methodology employs an expected DCF growth rate of 12.22%, which produces the expected stock market return of 14.34%. As previously discussed, the expected EPS growth rates of Wall Street analysts, which are used to compute the expected market return, are overly-optimistic and upwardly-biased. As explained in detail below, the projected EPS growth rate of 12.22% and resulting projected market return of 14.34% are totally unrealistic and inconsistent with historic and projected earnings growth rates in the U.S.

Q. Initially, please provide additional insights into the expected stock market return of 14.34%.

A. Simply put, the assumption of a 14.34% expected stock market return is excessive and unrealistic. The compounded annual return in the U.S. stock market is about 10% (9.79% according to Damodaran between 1928-2020).[43] Witness Nelson's CAPM results assume that the return on the U.S. stock market will be more than 40% higher in the future than it has been in the past! The

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

extremely high expected stock market return, and the resulting market risk premium and equity cost rate results, is directly related to computing the expected stock market return as the sum of the adjusted dividend yield plus the expected EPS growth rate of 12.22%.

Q. Please once again address the issues with analysts' EPS growth rate forecasts.

A. The key point is that Witness Nelson's CAPM market risk premium methodology is based entirely on the concept that analyst projections of companies' three-to-five year EPS growth rates reflect investors' expected *long-term* EPS growth for those companies. However, this seems highly unrealistic given the published research on these projections. As previously noted, numerous studies have shown that the long-term EPS growth rate forecasts of Wall Street securities analysts are overly optimistic and upwardly biased.[44] Moreover, as discussed above, the Lacina, Lee and Xu study showed that analysts' forecasts of EPS growth over the next three-to-five years are no more accurate than their forecasts of the next single year's EPS growth (and the single year forecasts are notoriously inaccurate). The inaccuracy of analysts' overly-

[44] Such studies 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); L. Chan, J. Karceski, & J. Lakonishok, "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 (2011).

optimistic growth rate forecasts leads to an upward bias in equity cost estimates that has been estimated at about 300 basis points.[45]

Q. Is Ms. Nelson's market risk premium of 12.37% reflective of the market risk premiums found in studies and surveys of the market risk premium?

A. No. This figure is well in excess of 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 Exhibit JRW-8 provides the results of over thirty market risk premiums studies from the past fifteen years. Historic stock and bond returns suggest a market risk premium in the 4.40%-6.44% 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 premium results vary from as low as 3.42% to as high as 6.00%. Finally, the market risk premiums developed from surveys of analysts, companies, financial professionals, and academics suggest even potentially lower market risk premiums, in a range from 3.36% 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 the 12.37% used by Witness Nelson.

[45] Peter D. Easton & Gregory A. Sommers, "Effect of Analysts' Optimism on Estimates of the Expected Rate of Return Implied by Earnings Forecasts," 45, *Journal of Accounting Research*, pp. 983–1015 (2007).

Q. Is a projected EPS growth rate of 12.22% that Ms. Nelson uses to compute her market risk premium of 12.37% reasonable given the projected growth in the U.S.?

A. No. A long-term EPS growth rate of 12.22% is inconsistent with both historic and projected economic and earnings growth in the U.S. for several reasons: (1) long-term EPS and economic growth is about one-half of Witness Nelson's projected EPS growth rate of 12.22%; (2) 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 near future, during the period when the rates from this case will be effective.

Long-Term Historic EPS and GDP Growth have been in the 6%-7% Range – In Exhibit JRW-10, I show the growth in nominal GDP, S&P 500 stock price appreciation, and S&P 500 EPS and DPS growth since 1960. The results are provided on page 1 of Exhibit JRW-10, and a summary is shown in Table 8.

Table 8
GDP, S&P 500 Stock Price, EPS, and DPS Growth
1960-Present

Nominal GDP	**6.28**
S&P 500 Stock Price	**7.20**
S&P 500 EPS	**6.53**
S&P 500 DPS	**5.75**
Average	**6.44**

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, Witness Nelson's long-run growth rate projection of 12.22% 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 her projected growth rates.

There is a Direct Link between Long-Term EPS and GDP Growth - The results in Exhibit JRW-10 and Table 8 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:[46]

> 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% 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% in real terms.

The Trend and Projections Indicate Slower GDP Growth in the Future - The components of nominal GDP growth are real GDP growth and inflation. On page 1 of Exhibit JRW-10 to my testimony, I provide an analysis of nominal GDP

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

growth since 1960. Since 1960, annual nominal GDP has grown at a compounded rate of 6.28%. Whereas GDP has grown at a compounded rate of 6.28% since 1960, economic growth in the U.S. has slowed considerably in recent decades. Page 2 of Exhibit JRW-10 provides the nominal annual GDP growth rates over the 1961 to 2020 time period. Nominal GDP growth grew from 6.0% to over 12.0% from the 1960s to the early 1980s due in large part to inflation and higher prices. Despite an uptick during the mid-2000s, and notwithstanding the negative 2.3% nominal growth rate in 2020, the annual nominal GDP growth rates have declined to the 4.0% range over the past decade.[47]

The components of nominal GDP growth are real GDP growth and inflation. Page 3 of Exhibit 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 negative 3.5% growth rate in 2020. The second component of nominal GDP growth is inflation. Page 4 of Exhibit 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

[47] Nominal GDP did increase to 5.5% in 2018. However, this is a one-time boost associated with the 2017 decrease in income taxes.

about 4%. Since that time inflation has gradually declined and has been in the 2.0% range or below over the past five years.

The graphs on pages 2, 3, and 4 of Exhibit JRW-10 provide very clear evidence of the decline in nominal GDP as well as its components—real GDP and inflation—in recent decades. To gauge the magnitude of the decline in nominal GDP growth, Table 9 and page 5 of Exhibit 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 6.28%, there has been a monotonic and significant decline in nominal GDP growth over subsequent 10-year intervals, especially in the most recent 10-year interval. These figures clearly suggest that nominal GDP growth in recent decades has slowed and that a growth rate in the range of 3.50% to 4.0% is more appropriate today for the U.S. economy.

Table 9
Historic GDP Growth Rates

10-Year Average	**3.40%**
20-Year Average	**3.63%**
30-Year Average	**4.27%**
40-Year Average	**5.10%**
50-Year Average	**6.12%**

Long-Term GDP Projections also Indicate Slower GDP Growth in the Future - 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 on page 5 of Exhibit JRW-10. The mean 10-year nominal GDP growth forecast (as of March 2020) by

economists in the recent *Survey of Financial Forecasters* is 4.30%.[48] The federal Energy Information Administration (EIA), in its projections used in preparing the *Annual Energy Outlook,* forecasts long-term GDP growth of 4.2% for the period 2019–2050.[49] The Congressional Budget Office (CBO), in its forecasts for the period 2019 to 2029, projects a nominal GDP growth rate of 3.8%.[50] Finally, the Social Security Administration (SSA), in its Annual OASDI Report, provides a projection of nominal GDP from 2020–2095.[51] SSA's projected GDP growth rate over this period is 4.1%. Overall, these forecasts suggest long-term GDP growth rate in the 4.0–4.3% range.

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: (1) the number of workers in the economy (employment); and (2) the productivity of those workers (usually defined as output per hour).[52] 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.

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

[49] U.S. Energy Information Administration, *Annual Energy Outlook 2020*, Table: Macroeconomic Indicators.

[50] Congressional Budget Office, *The 2020 Long-Term Budget Outlook*, June 25, 2020.

[51] Social Security Administration, *2020 Annual Report of the Board of Trustees of the Old-Age, Survivors, and Disability Insurance (OASDI) Program*, Table VI.G4, (July 1, 2020). The 4.1% growth rate is the growth in projected GDP from $22,341 trillion in 2020 to $450,425 trillion in 2095.

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

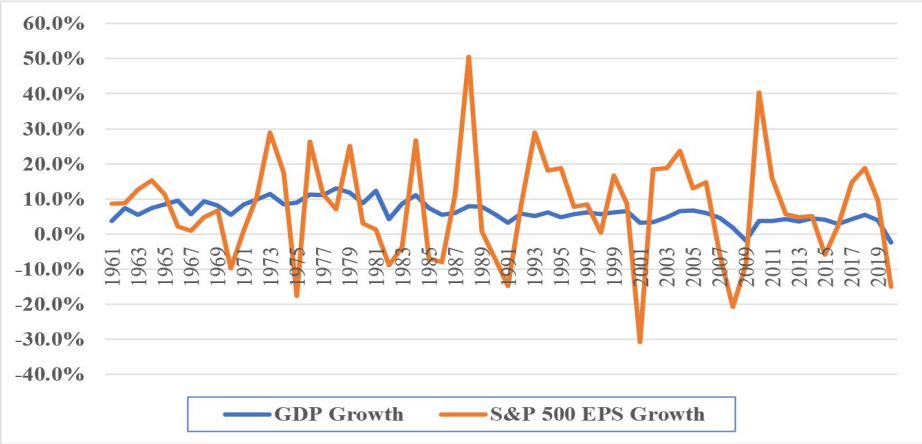
However, global economic growth is projected to slow significantly in the years to come. The primary factor leading to the decline is slow growth in employment (working-age population), which results from slower population growth and longer life expectancy. McKinsey estimates that employment growth will 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% to 2.1%.

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

A. Figure 13 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.[53] Volatility aside, however, it is clear that over the medium to long run, S&P 500 EPS growth does not outpace GDP growth.

[53] 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 13
Average Annual Growth Rates
GDP and S&P 500 EPS
1960-2020



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.

Corporate Profits are Constrained by GDP – 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."[54] Friedman also noted in the *Fortune* interview that profits must move back down to their traditional share of GDP. In Table 10 below, I show that currently the aggregate net income levels for the S&P 500 companies, using 2020 figures, represent 5.47% of nominal GDP.

[54] 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 10
S&P 500 Aggregate Net Income as a Percent of GDP

	2020 Value
Aggregate Net Income for S&P 500	**$1,144,698.40**
2020 Nominal U.S. GDP	**$ 20,934,000.00**
Net Income/GDP (%)	**5.47%**

Data Sources: 2020 Net Income for S&P 500 companies – *Value Line* (April 5, 2021).
2020 Nominal GDP – Moody's - https://www.economy.com/united-states/nominal-gross-domestic-product.
2020 value for Net Income and GDP in $trillion.

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, when 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.[55] These differences include: (a) corporate profits are about 2/3 manufacturing driven,

[55] *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.[56]

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 additional insights into the relationship between S&P 500 EPS and GDP growth.

A. Beyond my previous discussion, I have performed the following analysis of S&P 500 EPS and GDP growth in Table 11 below. Specifically, I started with the 2020 aggregate net income for the S&P 500 companies and 2020 nominal GDP for the U.S. As shown in Table 10, the aggregate profit for the S&P 500

[56] 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

companies represented 5.47% of nominal GDP in 2020. In Table 11, I then 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 Witness Nelson's projected S&P 500 EPS growth rate of 12.22%. 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 (4.3%, 3.8%, 4.1%, and 4.0%), which is 4.09%. The projected 2050 level for the aggregate net income level for the S&P 500 companies is $35.4 trillion. Over the same period GDP is expected to grow to $69.7 trillion. As such, if the aggregate net income for the S&P 500 grows in accordance with the growth rate used by Witness Nelson, 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 5.47% of GDP in 2020 to 52.20% of GDP in 2050. Obviously, it is totally unrealistic for the net income of the S&P 500 to become over 50% of GDP.

Table 11
Projected S&P 500 Earnings and Nominal GDP
2020-2050
S&P 500 Aggregate Net Income as a Percent of GDP

	2020 Value	Growth Rate	No. of Years	2050 Value
Aggregate Net Income for S&P 500	**$1,144,698.40**	**12.22%**	**30**	**$ 36,374,665.38**
2020 Nominal U.S. GDP	**$20,934,000.00**	**4.09%**	**30**	**$ 69,682,299.83**
Net Income/GDP (%)	**5.47%**			**52.20%**

2020 Nominal GDP – Moody's - https://www.economy.com/united-states/nominal-gross-domestic-product.
S&P 500 EPS Growth Rate - Witness Nelson's projected S&P 500 growth rate of 12.22%;
Nominal GDP Growth Rate – The average of the long-term projected GDP growth rates from SFF, CBO, SSA, and EIA (4.3%, 3.8%, 4.0%, and 4.1%).
2020 and 2050 values for Net Income and GDP in $trillion.

Q. Please provide a summary analysis of the relationship between GDPP 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:[57]

> 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%.

In sum, Ms. Nelson's long-term S&P 500 EPS growth rate of 12.22% is grossly overstated and has little (if any) 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 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

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

matching analysts' near-term projections is absurd: "The idea of 8% or 10% or 12% growth is ridiculous. It will not happen."[58]

C. Bond Yield Risk Premium Approach ("BYRP")

Q. Please review Ms. Nelson's BYRP approach.

A. On pages 59-62 of her testimony and in Attachment JEN-7, Ms. Nelson estimates an equity cost rate using a risk premium model. She uses the quarterly authorized ROEs for all electric utility companies from Q1 1992 until Q1 2021. Ms. Nelson develops an equity cost rate by: (1) regressing the authorized returns on equity for electric utility companies on the thirty-year Treasury Yield; and then (2) adding the risk premium established in (1) to each of her two different thirty-year Treasury yields: (a) a current yield of 1.97%, and projected yield of 2.97%. Ms. Nelson's RP results are provided in page 2 of Attachment JRW-9. She reports RP equity cost rates ranging from 9.80% to 9.89%.

Q. What are the errors in Ms. Nelson's BYRP analysis?

A. The two issues are: (1) the projected 30-year Treasury yield; (2) the risk premium.

1. Risk-Free Interest Rate

Q. What is the issue with Ms. Nelson's projected risk free interest rate?

[58] 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/.

A. As previously noted, Ms. Nelson's projected 30-year Treasury yield of 2.72% is well above the current 30-year Treasury yield.

2. Risk Premium

Q. What are the issues with Ms. Nelson's risk premium in the BYRP analysis?

A. There are several problems with this approach for calculating risk premium.

First, the methodology produces an inflated measure of the risk premium because it uses historic authorized ROEs and Treasury yields, and the resulting risk premium is applied to projected Treasury Yields. Since Treasury yields are always forecasted to increase, the resulting risk premium would be smaller if done correctly, which would be to use projected Treasury yields in the analysis rather than historic Treasury yields.

. Second, Ms. Nelson's RP approach is a gauge of *commission* behavior and not *investor* behavior. Capital costs are determined in the marketplace through the financial decisions of investors and are reflected in such fundamental factors as dividend yields, expected growth rates, interest rates, and investors' assessment of the risk and expected return of different investments. Regulatory commissions evaluate capital market data in setting authorized ROEs, but also consider other utility- and rate case-specific information in setting ROEs. As such, Ms. Nelson's approach and results reflect other factors such as capital structure, credit ratings and other risk measures, service territory, capital expenditures, energy supply issues, rate design, investment and expense trackers,

and other factors used by utility commissions in determining an appropriate ROE in addition to capital costs. This may especially be true when the authorized ROE data includes the results of rate cases that are settled and not fully litigated.

Third, since the stocks of electric utilities have been selling above book value for the last decade, it is obvious that the authorized ROEs of state utility commissions are above the returns that investors require.

Finally, as previously noted, the authorized ROEs for electric distribution companies have been 30 to 40 basis points below those of integrated electric utilities. In her BYRP approach, Ms. Nelson used both types of utilities.

D. Other Factors

Q. What other factors did Ms. Nelson consider in arriving at her 10.20% ROE recommendation for the company?

A. Ms. Nelson also claim that Unitil deserves an increment to its authorized ROE due to its small size.

Q. Please discuss the size effect.

A. Ms. Nelson claims that the Company deserves additional return due to its small size. She justifies the magnitude of the adjustment by referring to Duff & Phelps who computes a so-called size adjustment 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 exhibit a significant company size premium.[59] 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 size effect.

[59] Annie Wong, *Utility Stocks and the Size Effect: An Empirical Analysis*, J. OF THE MIDWEST FIN. ASS'N, 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.[60]

Q. Do you have any other thoughts on the size effect.

A. Yes. Professor Damodaran, the New York University valuation guru, provides a thorough analysis of the company size effect, which he terms the small firm or cap premium. Figure 14 traces the small firm premium over the 1927–2014 time period.[61] 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. Rolf Banz published one of the first studies shows a small firm effect in the *Journal of Finance* in 1980.

(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;

[60] *See* Richard Roll, *On Computing Mean Returns and the Small Firm Premium*, J. OF FIN. ECON. 371-86, (1983).

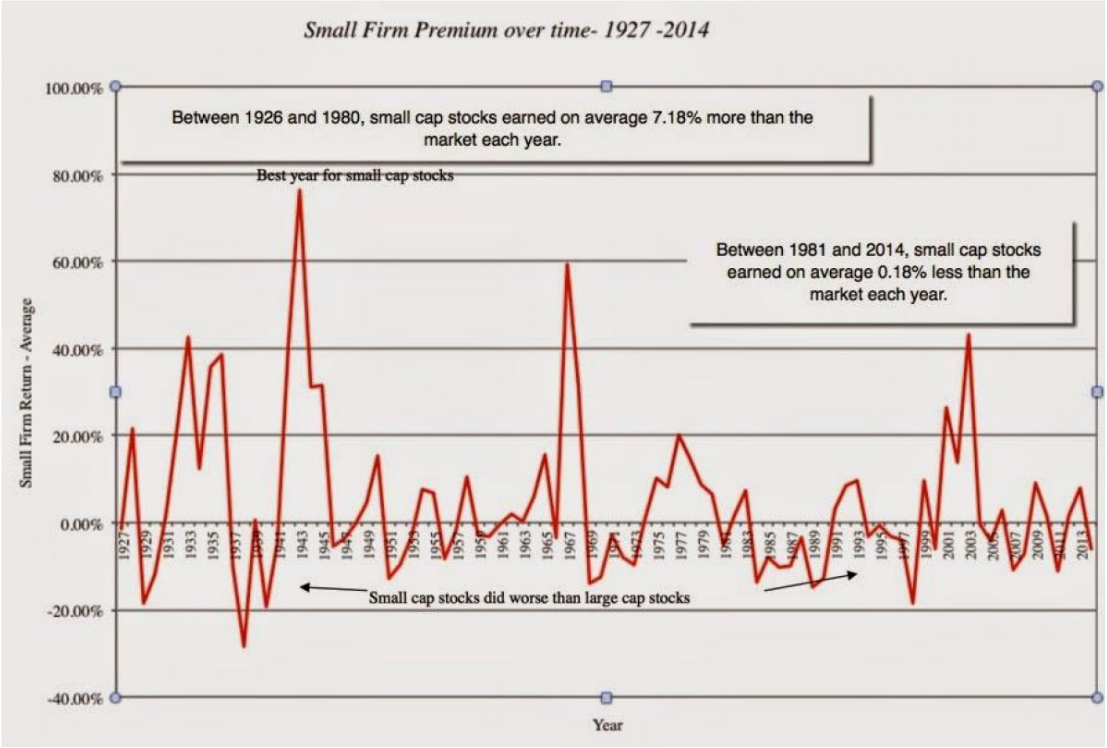
[61] Aswath Damodaran, *The Small Cap Premium: Where is the Beef*, 34 No. 4 Business Valuation Review 152-157 (2015).

(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

(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 14
The Small Firm Premium
1927-2014
Source: Aswath Damodaran, *The Small Cap Premium - Where is the Beef*, 34 No. 4 Business Valuation Review 152-157 (2015).



Q. Does this conclude your testimony?

A. Yes, it does.

Attachment JRW-1
Educational Background, Research, and Related Business Experience
J. Randall Woolridge

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

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

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

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

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

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

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Academic Experience

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

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

Associate Professor of Finance, College of Business Administration, the Pennsylvania State University (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*.

Unitil Energy Systems

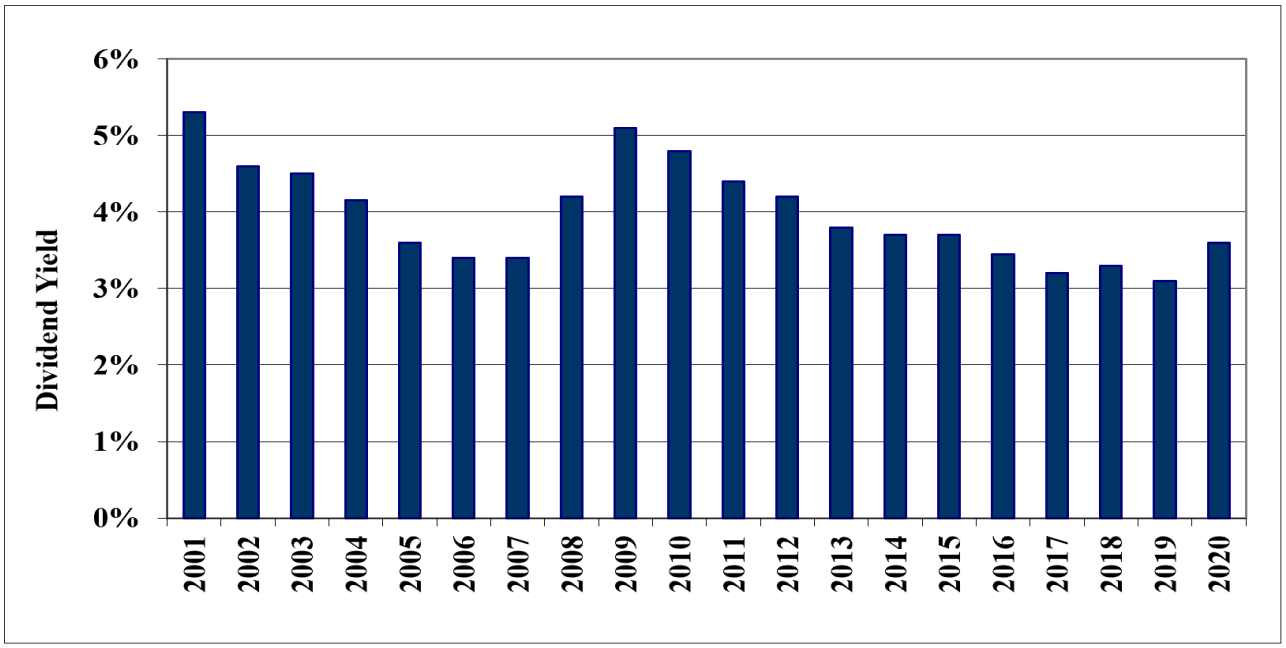
DOE's Recommended Cost of Capital

Capital Source	Capitalization Amounts	Capitalization Ratios	Cost Rate	Weighted Cost Rate
Short-Term Debt	18,066,524.0	7.82%	1.69%	0.13%
Long-Term Debt	106,500,000.00	46.08%	5.49%	2.53%
Preferred Stock	188,700.00	0.08%	6.00%	0.00%
Common Equity	106,351,927.55	46.02%	8.75%	4.03%
Total Capital	231,107,151.55	100.00%		6.69%

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

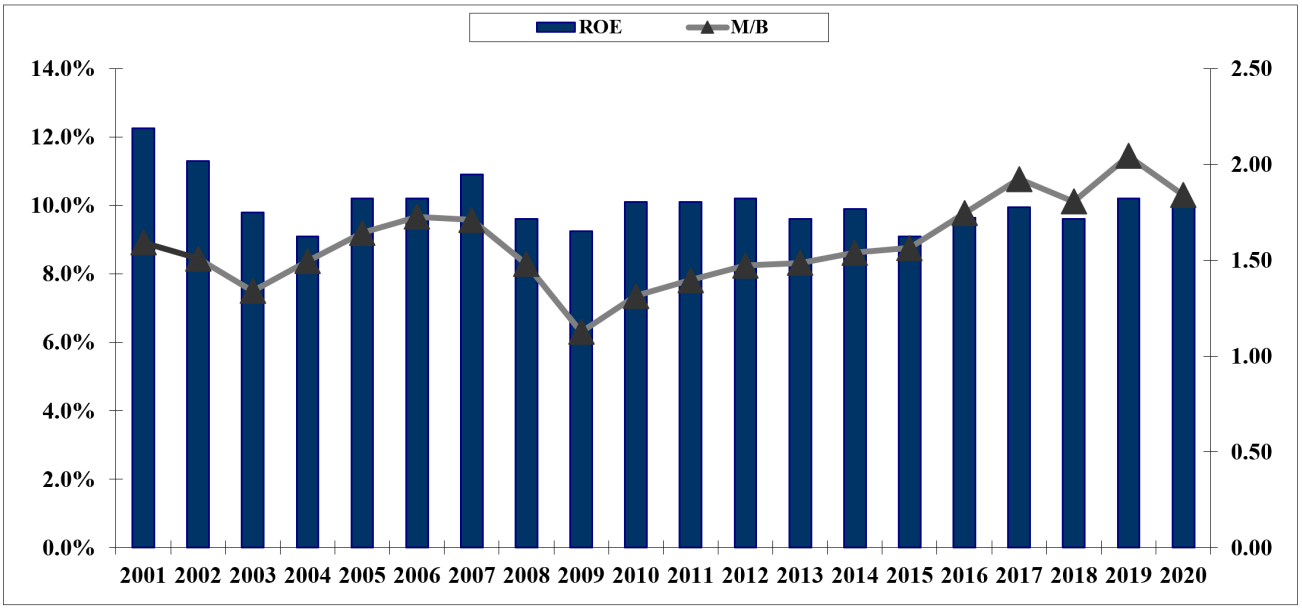
Data Source: Mergent Bond Record

Electric Utility Average Dividend Yield



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

Electric Utility Average Return on Equity and Market-to-Book Ratios



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

Summary Financial Statistics for Proxy Groups

Panel A
Electric Proxy Group

Company	Operating Revenue ($mil)	Percent Reg Elec Revenue	Percent Reg Gas Revenue	Net Plant ($mil)	Market Cap ($mil)	S&P Issuer Credit Rating	Moody's Long Term Rating	Pre-Tax Interest Coverage	Primary Service Area	Common Equity Ratio	Return on Equity	Market to Book Ratio
ALLETE, Inc. (NYSE-ALE)	$1,240.5	84%	0%	$4,405.6	$3,983.2	BBB	Baa1	2.89x	MN, WI	56.1%	8.5%	1.78
Alliant Energy Corporation (NYSE-LNT)	$3,647.7	84%	12%	$13,527.1	$14,177.5	A-	Baa2	2.63x	WI,IA,IL,MN	43.6%	11.4%	2.72
Ameren Corporation (NYSE-AEE)	$5,646.0	80%	13%	$24,412.0	$21,439.4	BBB+	Baa1	3.56x	IL,MO	44.7%	10.6%	2.66
American Electric Power Co. (NYSE-AEP)	$15,561.4	96%	0%	$61,095.5	$49,306.3	A-	Baa2	2.67x	10 States	38.6%	9.9%	2.51
Avista Corporation (NYSE-AVA)	$1,345.6	64%	22%	$4,944.9	$3,488.8	BBB	Baa2	2.21x	WA,OR,AK,ID	45.7%	10.6%	1.80
CMS Energy Corporation (NYSE-CMS)	$6,845.0	65%	28%	$18,973.0	$19,402.5	BBB+	NA	2.54x	MI	27.3%	13.9%	3.87
Consolidated Edison, Inc. (NYSE-ED)	$12,574.0	64%	17%	$44,747.0	$29,375.6	A-	Baa2	2.58x	NY,PA	44.2%	7.7%	1.62
Dominion Energy Inc. (NYSE-D)	$16,572.0	67%	34%	$69,581.0	$74,607.2	BBB+	NA	2.49x	VA,NC,SC,OH,WV,UT	40.5%	5.4%	2.52
Duke Energy Corporation (NYSE-DUK)	$24,658.0	91%	7%	$102,339.0	$74,542.2	BBB+	Baa2	2.59x	NC,OH,FL,SC,KY	40.5%	8.3%	1.66
Edison International (NYSE-EIX)	$12,347.0	100%	0%	$44,849.0	$25,437.9	BBB	Baa3	2.54x	CA	37.9%	10.8%	1.91
Entergy Corporation (NYSE-ETR)	$10,878.7	88%	0%	$35,515.6	$25,636.9	BBB+	Baa2	2.15x	LA,AR,MS,TX	33.4%	13.0%	2.50
Evergy, Inc. (NYSE-EVRG)	$5,147.8	100%	0%	$19,216.9	$16,564.2	A-	NA	3.07x	KS,MO	46.0%	7.2%	1.93
Eversource Energy (NYSE-ES)	$8,526.5	82%	12%	$27,635.4	$32,513.5	A-	Baa1	3.49x	CT,NH,MA	44.4%	7.5%	2.57
Hawaiian Electric Industries (NYSE-HE)	$2,874.6	89%	0%	$5,308.8	$5,109.8	BBB	Baa1	3.73x	HI	47.7%	9.8%	2.24
IDACORP, Inc. (NYSE-IDA)	$1,346.4	100%	0%	$4,531.5	$5,372.7	BBB	Baa1	2.96x	ID	57.2%	9.6%	2.18
MGE Energy, Inc. (NYSE-MGEE)	$555.0	70%	30%	$1,643.4	$2,631.0	AA-	A1	4.95x	WI	60.3%	10.4%	3.07
NextEra Energy, Inc. (NYSE-NEE)	$19,204.0	71%	0%	$82,010.0	$137,996.0	A-	Baa1	2.43x	FL	43.8%	10.6%	3.73
NorthWestern Corporation (NYSE-NWE)	$1,257.9	78%	22%	$4,704.6	$3,932.3	BBB	NA	2.83x	MT,SD,NE	47.5%	10.2%	1.93
OGE Energy Corp. (NYSE-OGE)	$2,231.6	100%	0%	$8,964.8	$8,015.1	BBB+	NA	3.36x	OK,AR	55.2%	10.6%	1.94
Otter Tail Corporation (NDQ-OTTR)	$919.5	50%	0%	$1,775.7	$2,065.4	BBB	Baa2	4.16	MN,ND,SD	52.1%	11.5%	2.64
Pinnacle West Capital Corp. (NYSE-PNW)	$3,471.2	95%	0%	$14,254.3	$11,273.2	A-	A3	2.95x	AZ	47.8%	10.1%	2.08
Portland General Electric Company (NYSE-POR)	$2,123.0	100%	0%	$6,820.0	$5,325.9	BBB+	A3	2.62x	OR	48.1%	8.4%	2.06
Sempra Energy (NYSE-SRE)	$10,829.0	56%	44%	$37,043.0	$43,210.1	BBB+	Baa2	2.31x	CA,TX	36.5%	10.4%	2.44
Southern Company (NYSE-SO)	$21,419.0	73%	14%	$84,420.0	$71,408.9	BBB+	Baa1	3.20x	GA,FL,NJ,IL,VA,TN,MS	34.1%	18.1%	2.60
WEC Energy Group (NYSE-WEC)	$7,523.1	58%	42%	$23,661.5	$32,871.4	A-	Baa1	3.12x	WI,IL,MN,MI	43.9%	11.4%	3.25
Xcel Energy Inc. (NYSE-XEL)	$11,529.0	83%	16%	$40,781.0	$36,307.1	A-	Baa1	2.69x	MN,WI,ND,SD,MI	39.2%	10.8%	2.74
Mean	$8,087.4	80%	12%	$30,275.4	$29,076.7	BBB+	Baa1	2.95		44.5%	10.3%	2.42
Median	$6,245.5	82%	10%	$21,439.2	$20,421.0	BBB+	Baa1	2.76		44.3%	10.4%	2.47

Data Source: Company 2020 SEC 10-K filings, S&P Capital IQ; *Value Line Investment Survey*, 2021.

Panel B
Nelson Proxy Group

Company	Operating Revenue ($mil)	Percent Reg Elec Revenue	Percent Reg Gas Revenue	Net Plant ($mil)	Market Cap ($mil)	S&P Issuer Credit Rating	Moody's Long Term Rating	Pre-Tax Interest Coverage	Primary Service Area	Common Equity Ratio	Return on Equity	Market to Book Ratio
ALLETE, Inc. (NYSE-ALE)	$1,240.5	84%	0%	$4,405.6	$3,983.2	BBB	Baa1	2.89x	MN, WI	56.1%	8.5%	1.78
Alliant Energy Corporation (NYSE-LNT)	$3,647.7	84%	12%	$13,527.1	$14,177.5	A-	Baa2	2.63x	WI,IA,IL,MN	43.6%	11.4%	2.72
Ameren Corporation (NYSE-AEE)	$5,646.0	80%	13%	$24,412.0	$21,439.4	BBB+	Baa1	3.56x	IL,MO	44.7%	10.6%	2.66
American Electric Power Co. (NYSE-AEP)	$15,561.4	96%	0%	$61,095.5	$49,306.3	A-	Baa2	2.67x	10 States	38.6%	9.9%	2.51
Avista Corporation (NYSE-AVA)	$1,345.6	64%	22%	$4,944.9	$3,488.8	BBB	Baa2	2.21x	WA,OR,AK,ID	45.7%	10.6%	1.80
CMS Energy Corporation (NYSE-CMS)	$6,845.0	65%	28%	$18,973.0	$19,402.5	BBB+	NA	2.54x	MI	27.3%	13.9%	3.87
Consolidated Edison, Inc. (NYSE-ED)	$12,574.0	64%	17%	$44,747.0	$29,375.6	A-	Baa2	2.58x	NY,PA	44.2%	7.7%	1.62
DTE Energy Company (NYSE-DTE)	$14,212.0	37%	39%	$21,650.0	$20,066.4	BBB+	Baa1	3.15	MI	42.9%	10.8%	1.87
Duke Energy Corporation (NYSE-DUK)	$24,658.0	91%	7%	$102,339.0	$74,542.2	BBB+	Baa2	2.59x	NC,OH,FL,SC,KY	40.5%	8.3%	1.66
Entergy Corporation (NYSE-ETR)	$10,878.7	88%	0%	$35,515.6	$25,636.9	BBB+	Baa2	2.15x	LA,AR,MS,TX	33.4%	13.0%	2.50
Evergy, Inc. (NYSE-EVRG)	$5,147.8	100%	0%	$19,216.9	$16,564.2	A-	NA	3.07x	KS,MO	46.0%	7.2%	1.93
Eversource Energy (NYSE-ES)	$8,526.5	82%	12%	$27,635.4	$32,513.5	A-	Baa1	3.49x	CT,NH,MA	44.4%	7.5%	2.57
Hawaiian Electric Industries (NYSE-HE)	$2,874.6	89%	0%	$5,308.8	$5,109.8	BBB	Baa1	3.73x	HI	47.7%	9.8%	2.24
IDACORP, Inc. (NYSE-IDA)	$1,346.4	100%	0%	$4,531.5	$5,372.7	BBB	Baa1	2.96x	ID	57.2%	9.6%	2.18
NextEra Energy, Inc. (NYSE-NEE)	$19,204.0	71%	0%	$82,010.0	$137,996.0	A-	Baa1	2.43x	FL	43.8%	10.6%	3.73
NorthWestern Corporation (NYSE-NWE)	$1,257.9	78%	22%	$4,704.6	$3,932.3	BBB	NA	2.83x	MT,SD,NE	47.5%	10.2%	1.93

Value Line Risk Metrics for Proxy Groups

Panel A
Electric Proxy Group

Company	Beta	Financial Strength	Safety	Earnings Predictability	Stock Price Stability
ALLETE, Inc. (NYSE-ALE)	0.90	A	2	90	90
Alliant Energy Corporation (NYSE-LNT)	0.85	A	2	95	95
Ameren Corporation (NYSE-AEE)	0.85	A	1	95	95
American Electric Power Co. (NYSE-AEP)	0.75	A+	1	95	100
Avista Corporation (NYSE-AVA)	0.95	B++	2	60	65
CMS Energy Corporation (NYSE-CMS)	0.80	B++	2	90	95
Consolidated Edison, Inc. (NYSE-ED)	0.75	A+	1	100	85
Dominion Energy Inc. (NYSE-D)	0.85	B++	2	55	90
Duke Energy Corporation (NYSE-DUK)	0.90	A	2	90	95
Edison International (NYSE-EIX)	1.00	B+	3	5	75
Entergy Corporation (NYSE-ETR)	0.95	B++	2	70	90
Evergy, Inc. (NYSE-EVRG)	0.95	B++	2	NMF	70
Eversource Energy (NYSE-ES)	0.90	A	1	100	85
Hawaiian Electric Industries (NYSE-HE)	0.85	A	2	75	85
IDACORP, Inc. (NYSE-IDA)	0.85	A	1	100	100
MGE Energy, Inc. (NYSE-MGEE)	0.75	A+	1	100	95
NextEra Energy, Inc. (NYSE-NEE)	0.95	A+	1	80	90
NorthWestern Corporation (NYSE-NWE)	0.95	B++	2	90	85
OGE Energy Corp. (NYSE-OGE)	1.05	A	2	90	80
Otter Tail Corporation (NDQ-OTTR)	0.90	A	2	95	100
Pinnacle West Capital Corp. (NYSE-PNW)	0.95	A	2	100	90
Portland General Electric Company (NYSE-POR)	0.90	B++	3	85	90
Sempra Energy (NYSE-SRE)	1.00	A	2	85	90
Southern Company (NYSE-SO)	0.95	A	2	95	90
WEC Energy Group (NYSE-WEC)	0.80	A+	1	95	85
Xcel Energy Inc. (NYSE-XEL)	0.80	A+	1	100	95
Mean	0.89	A	1.7	85	89

Data Source: *Value Line Investment Survey* , 2021.

Nelson Proxy Group

Company	Beta	Financial Strength	Safety	Earnings Predictability	Stock Price Stability
ALLETE, Inc. (NYSE-ALE)	0.90	A	2	90	90
Alliant Energy Corporation (NYSE-LNT)	0.85	A	2	95	95
Ameren Corporation (NYSE-AEE)	0.85	A	1	95	95
American Electric Power Co. (NYSE-AEP)	0.75	A+	1	95	100
Avista Corporation (NYSE-AVA)	0.95	B++	2	60	65
CMS Energy Corporation (NYSE-CMS)	0.80	B++	2	90	95
Consolidated Edison, Inc. (NYSE-ED)	0.75	A+	1	100	85
DTE Energy Company (NYSE-DTE)	0.95	A	2	95	90
Duke Energy Corporation (NYSE-DUK)	0.90	A	2	90	95
Entergy Corporation (NYSE-ETR)	0.95	B++	2	70	90
Evergy, Inc. (NYSE-EVRG)	0.95	B++	2	NMF	70
Eversource Energy (NYSE-ES)	0.90	A	1	100	85
Hawaiian Electric Industries (NYSE-HE)	0.85	A	2	75	85
IDACORP, Inc. (NYSE-IDA)	0.85	A	1	100	100
NextEra Energy, Inc. (NYSE-NEE)	0.95	A+	1	80	90

Value Line Risk Metrics for Proxy Groups

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 1 (highest) to 5 (lowest).

Source: *Value Line Investment Analyzer* .

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Attachment JRW-5
Capital Structure Ratios and Debt Cost Rates
Page 1 of 1

Attachment JRW-5

Unitil Energy Systems
Capital Structure Ratios and Debt Cost Rates

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

Capital Source	Capitalization Amounts	Capitalization Ratios	Cost Rate
Short-Term Debt	-	0.00%	1.69%
Long-Term Debt	89,900,000.00	46.99%	5.49%
Preferred Stock	188,700.00	0.10%	6.00%
Common Equity	101,242,877.00	52.91%	
Total Capital	191,331,577.00	100.00%	

Panel B - DOE's Recommended Capital Structure Ratios and Debt Cost Rates

Capital Source	Capitalization Amounts	Capitalization Ratios	Cost Rate
Short-Term Debt	18,066,524.0	7.82%	1.69%
Long-Term Debt	106,500,000.0	46.08%	5.49%
Preferred Stock	188,700.0	0.08%	6.00%
Common Equity	106,351,927.6	46.02%	
Total Capital	231,107,151.6	100.00%	

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Attachment JRW-6
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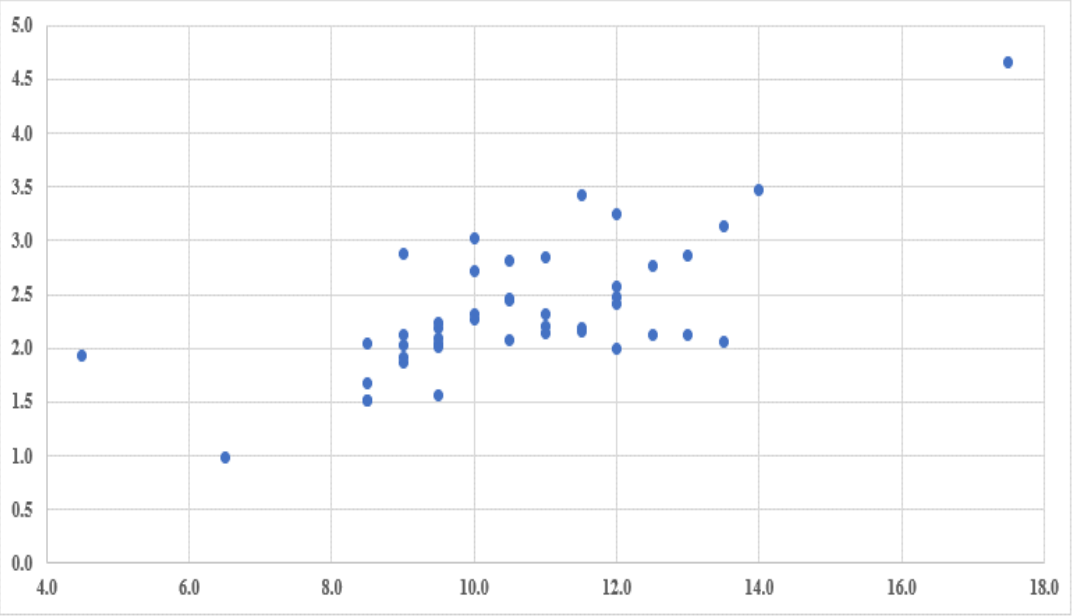
The Relationship Between Expected ROE and Market-to-Book Ratios

Electric Utilities and Gas Distribution Companies

Market-to-Book



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

Industry Average Betas

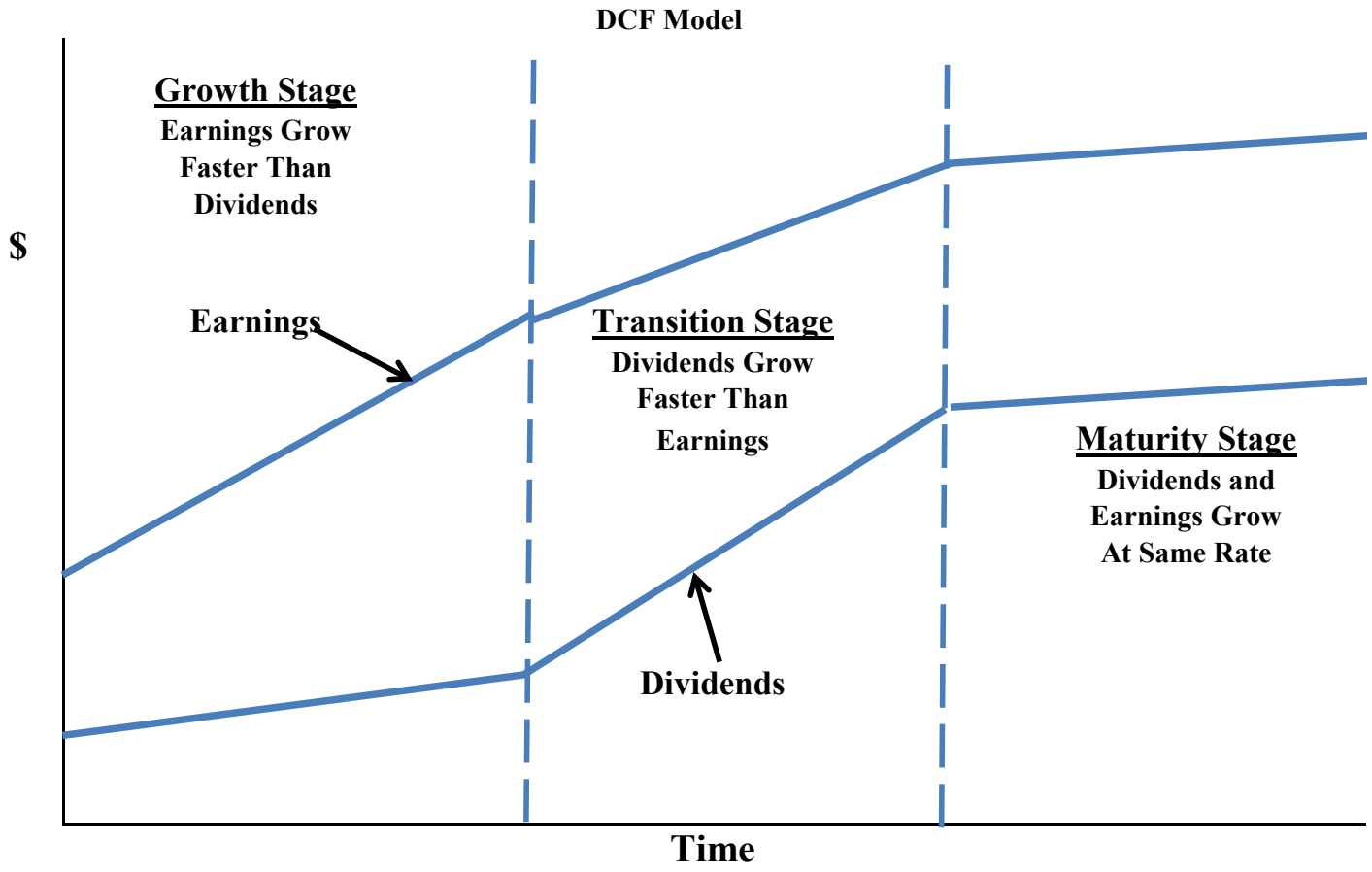
Value Line Investment Survey **Betas****

28-Jan-21

Rank	Industry	Beta	Rank	Industry	Beta	Rank	Industry	Beta
1	Oilfield Svcs/Equip.	1.49	34	Bank (Midwest)	1.20	67	Investment Co.	1.01
2	Homebuilding	1.47	35	Restaurant	1.19	68	Med Supp Non-Invasive	1.00
3	Insurance (Life)	1.47	36	Machinery	1.19	69	Environmental	1.00
4	Petroleum (Integrated)	1.42	37	Electrical Equipment	1.18	70	Telecom. Equipment	1.00
5	Hotel/Gaming	1.42	38	Bank	1.18	71	Investment Co.(Foreign)	1.00
6	Petroleum (Producing)	1.41	39	Medical Services	1.17	72	E-Commerce	0.99
7	Apparel	1.39	40	Electronics	1.17	73	Retail Store	0.98
8	Air Transport	1.37	41	Maritime	1.17	74	Cable TV	0.96
9	Shoe	1.37	42	Heavy Truck & Equip	1.15	75	Drug	0.96
10	Retail (Hardlines)	1.36	43	Toiletries/Cosmetics	1.15	76	Telecom. Services	0.95
11	Building Materials	1.33	44	R.E.I.T.	1.15	77	Healthcare Information	0.94
12	Office Equip/Supplies	1.33	45	Automotive	1.15	78	Computer Software	0.94
13	Aerospace/Defense	1.31	46	Reinsurance	1.14	79	Tobacco	0.94
14	Metals & Mining (Div.)	1.30	47	Publishing	1.11	80	Trucking	0.94
15	Metal Fabricating	1.30	48	Computers/Peripherals	1.10	81	Telecom. Utility	0.93
16	Pipeline MLPs	1.30	49	Semiconductor Equip	1.10	82	Electric Utility (West)	0.90
17	Auto Parts	1.29	50	Industrial Services	1.09	83	Foreign Electronics	0.90
18	Steel	1.28	51	Precision Instrument	1.09	84	Biotechnology	0.90
19	Retail Automotive	1.27	52	Packaging & Container	1.09	85	Beverage	0.89
20	Oil/Gas Distribution	1.26	53	Railroad	1.08	86	Electric Utility (East)	0.89
21	Paper/Forest Products	1.25	54	Power	1.07	87	Natural Gas Utility	0.89
22	Furn/Home Furnishings	1.25	55	Wireless Networking	1.07	88	Electric Util. (Central)	0.89
23	Public/Private Equity	1.24	56	Med Supp Invasive	1.06	89	Household Products	0.81
24	Natural Gas (Div.)	1.24	57	Retail Building Supply	1.06	90	Retail/Wholesale Food	0.81
25	Advertising	1.23	58	Educational Services	1.06	91	Water Utility	0.79
26	Financial Svcs. (Div.)	1.22	59	Semiconductor	1.06	92	Entertainment Tech	0.79
27	Recreation	1.21	60	Internet	1.05	93	Food Processing	0.77
28	Engineering & Const	1.21	61	Insurance (Prop/Cas.)	1.05	94	Precious Metals	0.68
29	Retail (Softlines)	1.21	62	Human Resources	1.04			
30	Chemical (Specialty)	1.21	63	Information Services	1.03			
31	Chemical (Diversified)	1.21	64	Entertainment	1.03			
32	Diversified Co.	1.20	65	Thrift	1.02			
33	Chemical (Basic)	1.20	66	IT Services	1.01		Mean	1.12

*** Industry averages for 94 industries using *Value Line*'s database of 1,700 companies - Updated 1-28-21.**

**** *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.**


DCF Model
Growth Stage
Earnings Grow
Faster Than
Dividends
$
Earnings
Transition Stage
Dividends Grow
Faster Than
Earnings
Maturity Stage
Dividends and
Earnings Grow
At Same Rate
Dividends
Time

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Attachment JRW-7
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DCF Study

Panel A
Electric Proxy Group

Dividend Yield*	**3.35%**
Adjustment Factor	**1.02625**
Adjusted Dividend Yield	**3.44%**
Growth Rate**	**5.25%**
Equity Cost Rate	**8.70%**

*** Page 2 of Attachment JRW-7**
**** Based on data provided on pages 3, 4, 5, and 6 of Attachment JRW-7**

Panel B
Nelson Proxy Group

Dividend Yield*	**3.40%**
Adjustment Factor	**1.02625**
Adjusted Dividend Yield	**3.49%**
Growth Rate**	**5.25%**
Equity Cost Rate	**8.75%**

*** Page 2 of Attachment JRW-7**
**** Based on data provided on pages 3, 4, 5, and 6 of Attachment JRW-7**

DCF Study
Dividend Yields

Panel A
Electric Proxy Group

Company		Annual Dividend	Dividend Yield 30 Day	Dividend Yield 90 Day	Dividend Yield 180 Day
ALLETE, Inc. (NYSE-ALE)	ALE	2.52	4.1%	3.8%	3.7%
Alliant Energy Corporation (NYSE-LNT)	LNT	1.52	2.7%	2.6%	2.7%
Ameren Corporation (NYSE-AEE)	AEE	2.20	2.6%	2.6%	2.7%
American Electric Power Co. (NYSE-AEP)	AEP	2.96	3.5%	3.4%	3.5%
Avista Corporation (NYSE-AVA)	AVA	1.69	4.2%	4.1%	3.9%
CMS Energy Corporation (NYSE-CMS)	CMS	1.74	2.9%	2.8%	2.8%
Consolidated Edison, Inc. (NYSE-ED)	ED	3.10	4.2%	4.2%	4.1%
Dominion Energy Inc. (NYSE-D)	D	2.52	3.4%	3.3%	3.3%
Duke Energy Corporation (NYSE-DUK)	DUK	3.86	3.8%	3.8%	3.9%
Edison International (NYSE-EIX)	EIX	2.65	4.5%	4.6%	4.6%
Entergy Corporation (NYSE-ETR)	ETR	3.80	3.7%	3.6%	3.7%
Evergy, Inc. (NYSE-EVRG)	EVRG	2.14	3.4%	3.3%	3.4%
Eversource Energy (NYSE-ES)	ES	2.41	2.8%	2.8%	2.8%
Hawaiian Electric Industries (NYSE-HE)	HE	1.36	3.3%	3.2%	3.2%
IDACORP, Inc. (NYSE-IDA)	IDA	2.84	2.7%	2.7%	2.8%
MGE Energy, Inc. (NYSE-MGEE)	MGEE	1.48	2.0%	1.9%	2.0%
NextEra Energy, Inc. (NYSE-NEE)	NEE	1.54	1.9%	1.9%	2.0%
NorthWestern Corporation (NYSE-NWE)	NWE	2.48	4.3%	4.1%	4.0%
OGE Energy Corp. (NYSE-OGE)	OGE	1.61	4.8%	4.7%	4.8%
Otter Tail Corporation (NDQ-OTTR)	OTTR	1.56	2.7%	2.9%	3.1%
Pinnacle West Capital Corp. (NYSE-PNW)	PNW	3.32	4.8%	4.4%	4.2%
Portland General Electric Company (NYSE-POR)	POR	1.63	3.4%	3.3%	3.4%
SEMPRA Energy (NYSE-SRE)	SRE	4.40	3.4%	3.4%	3.3%
Southern Company (NYSE-SO)	SO	2.56	4.1%	4.0%	4.0%
WEC Energy Group (NYSE-WEC)	WEC	2.71	3.0%	2.9%	2.9%
Xcel Energy Inc. (NYSE-XEL)	XEL	1.83	2.9%	2.7%	2.7%
Mean			3.4%	3.3%	3.4%
Median			3.4%	3.3%	3.3%

Data Sources: S&P Cap IQ., November, 2021.

Panel B
Nelson Proxy Group

Company		Annual Dividend	Dividend Yield 30 Day	Dividend Yield 90 Day	Dividend Yield 180 Day
ALLETE, Inc. (NYSE-ALE)	ALE	2.52	4.1%	3.8%	3.7%
Alliant Energy Corporation (NYSE-LNT)	LNT	1.52	2.7%	2.6%	2.7%
Ameren Corporation (NYSE-AEE)	AEE	2.20	2.6%	2.6%	2.7%
American Electric Power Co. (NYSE-AEP)	AEP	2.96	3.5%	3.4%	3.5%
Avista Corporation (NYSE-AVA)	AVA	1.69	4.2%	4.1%	3.9%
CMS Energy Corporation (NYSE-CMS)	CMS	1.74	2.9%	2.8%	2.8%
Consolidated Edison, Inc. (NYSE-ED)	ED	3.10	4.2%	4.2%	4.1%
DTE Energy Company (NYSE-DTE)	DTE	4.34	3.8%	3.7%	3.5%
Duke Energy Corporation (NYSE-DUK)	DUK	3.86	3.8%	3.8%	3.9%
Entergy Corporation (NYSE-ETR)	ETR	3.80	3.7%	3.6%	3.7%
Evergy, Inc. (NYSE-EVRG)	EVRG	2.14	3.4%	3.3%	3.4%
Eversource Energy (NYSE-ES)	ES	2.41	2.8%	2.8%	2.8%
Hawaiian Electric Industries (NYSE-HE)	HE	1.36	3.3%	3.2%	3.2%
IDACORP, Inc. (NYSE-IDA)	IDA	2.84	2.7%	2.7%	2.8%
NextEra Energy, Inc. (NYSE-NEE)	NEE	1.54	1.9%	1.9%	2.0%
NorthWestern Corporation (NYSE-NWE)	NWE	2.48	4.3%	4.1%	4.0%
OGE Energy Corp. (NYSE-OGE)	OGE	1.61	4.8%	4.7%	4.8%
Otter Tail Corporation (NDQ-OTTR)	OTTR	1.56	2.7%	2.9%	3.1%
Pinnacle West Capital Corp. (NYSE-PNW)	PNW	3.32	4.8%	4.4%	4.2%
Portland General Electric Company (NYSE-POR)	POR	1.63	3.4%	3.3%	3.4%
Public Service Enterprise Group Inc. (NYSE:PEG)	DTE	4.34	3.8%	3.7%	3.5%
Southern Company (NYSE-SO)	SO	2.56	4.1%	4.0%	4.0%
WEC Energy Group (NYSE-WEC)	WEC	2.71	3.0%	2.9%	2.9%
Xcel Energy Inc. (NYSE-XEL)	XEL	1.83	2.9%	2.7%	2.7%
Mean			3.5%	3.4%	3.4%
Median			3.5%	3.4%	3.4%

Data Sources: S&P Cap IQ., November, 2021.

DCF Study

DCF Equity Cost Growth Rate Measures
***Value Line* Historic Growth Rates**

Panel A
Electric Proxy Group

Company	*Value Line* Historic Growth					
	Past 10 Years			Past 5 Years		
	Earnings	Dividends	Book Value	Earnings	Dividends	Book Value
ALLETE, Inc. (NYSE-ALE)	4.0	3.0	5.0	2.5	3.5	4.5
Alliant Energy Corporation (NYSE-LNT)	7.0	6.5	5.0	6.5	7.0	6.5
Ameren Corporation (NYSE-AEE)	2.0	0.5		8.0	3.5	3.5
American Electric Power Co. (NYSE-AEP)	4.0	5.0	4.0	4.0	5.5	3.0
Avista Corporation (NYSE-AVA)	4.0	6.5	4.0	4.5	4.0	4.0
CMS Energy Corporation (NYSE-CMS)	7.5	11.5	5.0	7.0	7.0	5.5
Consolidated Edison, Inc. (NYSE-ED)	2.5	2.5	4.0	1.5	3.0	4.5
Dominion Energy Inc. (NYSE-D)	-1.5	7.5	5.0	-5.0	7.5	9.0
Duke Energy Corporation (NYSE-DUK)	2.5	3.0	2.0	1.5	3.5	1.0
Edison International (NYSE-EIX)	-8.0	7.0	1.5	-18.5	10.5	1.5
Entergy Corporation (NYSE-ETR)		1.5	1.0	3.0	2.0	-1.0
Evergy, Inc. (NYSE-EVRG)						
Eversource Energy (NYSE-ES)	5.5	8.5	6.5	5.5	6.5	4.0
Hawaiian Electric Industries (NYSE-HE)	6.0	0.5	3.0	3.5	0.5	3.5
IDACORP, Inc. (NYSE-IDA)	6.0	8.0	5.0	4.0	8.0	4.5
MGE Energy, Inc. (NYSE-MGEE)	5.0	3.5	5.5	3.0	4.5	6.0
Nextera Energy, Inc. (NYSE-NEE)	6.0	10.0	9.0	6.5	12.0	10.5
NorthWestern Corporation (NYSE-NWE)	5.5	5.5	6.0	3.5	6.5	5.5
OGE Energy Corp. (NYSE-OGE)	4.5	7.5	6.0	3.0	9.5	4.0
Otter Tail Corporation (NDQ-OTTR)	11.5	1.5	0.5	8.0	3.0	5.0
Pinnacle West Capital Corp. (NYSE-PNW)	6.5	4.0	3.5	5.0	5.5	4.0
Portland General Electric Company (NYSE-POR)	4.0	4.0	3.0	1.5	6.0	3.5
Sempra Energy (NYSE-SRE)	3.0	10.0	5.5	5.0	8.0	6.0
Southern Company (NYSE-SO)	3.0	3.5	3.5	2.5	3.5	3.0
WEC Energy Group (NYSE-WEC)	8.0	13.5	7.5	7.5	8.5	8.0
Xcel Energy Inc. (NYSE-XEL)	6.0	5.5	4.5	5.5	6.0	5.0
Mean	4.4	5.6	4.4	3.2	5.8	4.6
Median	4.8	5.5	4.8	4.0	6.0	4.5
Data Source: *Value Line Investment Survey.*	Average of Median Figures =			4.9		

Panel B
Nelson Proxy Group

Company	*Value Line* Historic Growth					
	Past 10 Years			Past 5 Years		
	Earnings	Dividends	Book Value	Earnings	Dividends	Book Value
ALLETE, Inc. (NYSE-ALE)	4.0	3.0	5.0	2.5	3.5	4.5
Alliant Energy Corporation (NYSE-LNT)	7.0	6.5	5.0	6.5	7.0	6.5
Ameren Corporation (NYSE-AEE)	2.0	0.5		8.0	3.5	3.5
American Electric Power Co. (NYSE-AEP)	4.0	5.0	4.0	4.0	5.5	3.0
Avista Corporation (NYSE-AVA)	4.0	6.5	4.0	4.5	4.0	4.0
CMS Energy Corporation (NYSE-CMS)	7.5	11.5	5.0	7.0	7.0	5.5
Consolidated Edison, Inc. (NYSE-ED)	2.5	2.5	4.0	1.5	3.0	4.5
DTE Energy Company (NYSE-DTE)	7.5	6.0	4.5	8.0	7.5	5.0
Duke Energy Corporation (NYSE-DUK)	2.5	3.0	2.0	1.5	3.5	1.0
Entergy Corporation (NYSE-ETR)		1.5	1.0	3.0	2.0	-1.0
Evergy, Inc. (NYSE-EVRG)						
Eversource Energy (NYSE-ES)	5.5	8.5	6.5	5.5	6.5	4.0
Hawaiian Electric Industries (NYSE-HE)	6.0	0.5	3.0	3.5	0.5	3.5
IDACORP, Inc. (NYSE-IDA)	6.0	8.0	5.0	4.0	8.0	4.5
Nextera Energy, Inc. (NYSE-NEE)	6.0	10.0	9.0	6.5	12.0	10.5
NorthWestern Corporation (NYSE-NWE)	5.5	5.5	6.0	3.5	6.5	5.5
OGE Energy Corp. (NYSE-OGE)	4.5	7.5	6.0	3.0	9.5	4.0
Otter Tail Corporation (NDQ-OTTR)	11.5	1.5	0.5	8.0	3.0	5.0
Pinnacle West Capital Corp. (NYSE-PNW)	6.5	4.0	3.5	5.0	5.5	4.0
Portland General Electric Company (NYSE-POR)	4.0	4.0	3.0	1.5	6.0	3.5
Public Service Enterprise Group Inc. (NYSE:PEG)	1.5	3.5	5.5	3.5	4.5	4.5
Southern Company (NYSE-SO)	3.0	3.5	3.5	2.5	3.5	3.0
WEC Energy Group (NYSE-WEC)	8.0	13.5	7.5	7.5	8.5	8.0
Xcel Energy Inc. (NYSE-XEL)	6.0	5.5	4.5	5.5	6.0	5.0
Mean	5.2	5.3	4.5	4.6	5.5	4.4
Median	5.5	5.0	4.5	4.0	5.5	4.5
Data Source: *Value Line Investment Survey.*	Average of Median Figures =			4.8		

DCF Study

DCF Equity Cost Growth Rate Measures
***Value Line* Projected Growth Rates**

Panel A
Electric Proxy Group

Company	*Value Line* Projected Growth Est'd. '18-'20 to '24-'26			*Value Line* Sustainable Growth		
	Earnings	Dividends	Book Value	Return on Equity	Retention Rate	Internal Growth
ALLETE, Inc. (NYSE-ALE)	5.0	4.0	3.0	9.0%	35.0%	3.2%
Alliant Energy Corporation (NYSE-LNT)	5.5	6.0	5.0	11.0%	35.0%	3.9%
Ameren Corporation (NYSE-AEE)	6.5	7.0	6.5	10.5%	42.0%	4.4%
American Electric Power Co. (NYSE-AEP)	6.5	5.5	5.5	11.0%	36.0%	4.0%
Avista Corporation (NYSE-AVA)	3.0	4.5	3.0	8.0%	26.0%	2.1%
CMS Energy Corporation (NYSE-CMS)	6.0	5.5	6.5	13.5%	40.0%	5.4%
Consolidated Edison, Inc. (NYSE-ED)	4.0	3.0	3.0	8.5%	36.0%	3.1%
Dominion Energy Inc. (NYSE-D)	12.0	-1.5	4.0	12.0%	32.0%	3.8%
Duke Energy Corporation (NYSE-DUK)	7.0	2.0	2.0	9.5%	34.0%	3.2%
Edison International (NYSE-EIX)	NMF	3.5	5.0	11.5%	40.0%	4.6%
Entergy Corporation (NYSE-ETR)	3.0	4.5	5.0	11.5%	37.0%	4.3%
Evergy, Inc. (NYSE-EVRG)	8.0	5.5	3.0	9.0%	38.0%	3.4%
Eversource Energy (NYSE-ES)	6.5	6.0	4.5	9.5%	38.0%	3.6%
Hawaiian Electric Industries (NYSE-HE)	3.0	3.0	3.5	9.0%	33.0%	3.0%
IDACORP, Inc. (NYSE-IDA)	4.0	6.5	4.0	9.5%	36.0%	3.4%
MGE Energy, Inc. (NYSE-MGEE)	5.5	5.0	5.5	10.0%	46.0%	4.6%
Nextera Energy, Inc. (NYSE-NEE)	10.5	10.0	5.5	12.5%	30.0%	3.8%
NorthWestern Corporation (NYSE-NWE)	3.0	3.5	3.0	8.5%	31.0%	2.6%
OGE Energy Corp. (NYSE-OGE)	4.0	4.5	1.5	13.0%	31.0%	4.0%
Otter Tail Corporation (NDQ-OTTR)	7.0	6.0	6.0	12.0%	41.0%	4.9%
Pinnacle West Capital Corp. (NYSE-PNW)	0.0	1.5	3.5	8.0%	30.0%	2.4%
Portland General Electric Company (NYSE-POR)	7.0	5.5	3.0	9.5%	36.0%	3.4%
Sempra Energy (NYSE-SRE)	10.0	6.0	7.5	11.5%	48.0%	5.5%
Southern Company (NYSE-SO)	6.0	3.0	4.0	14.0%	34.0%	4.8%
WEC Energy Group (NYSE-WEC)	6.5	6.5	4.0	13.0%	34.0%	4.4%
Xcel Energy Inc. (NYSE-XEL)	6.0	6.0	5.0	11.0%	39.0%	4.3%
Mean	5.8	4.7	4.3	10.6%	36.1%	3.8%
Median	6.0	5.3	4.0	10.8%	36.0%	3.8%
Average of Median Figures =		5.1			Median =	3.8%

*** 'Est'd. '18-'20 to '24-'26' is the estimated growth rate from the base period 2018 to 2020 until the future period 2024 to 2026.**
Data Source: *Value Line Investment Survey.*

Panel B
Nelson Proxy Group

Company	*Value Line* Projected Growth Est'd. '18-'20 to '24-'26			*Value Line* Sustainable Growth		
	Earnings	Dividends	Book Value	Return on Equity	Retention Rate	Internal Growth
ALLETE, Inc. (NYSE-ALE)	5.0	4.0	3.0	9.0%	35.0%	3.2%
Alliant Energy Corporation (NYSE-LNT)	5.5	6.0	5.0	11.0%	35.0%	3.9%
Ameren Corporation (NYSE-AEE)	6.5	7.0	6.5	10.5%	42.0%	4.4%
American Electric Power Co. (NYSE-AEP)	6.5	5.5	5.5	11.0%	36.0%	4.0%
Avista Corporation (NYSE-AVA)	3.0	4.5	3.0	8.0%	26.0%	2.1%
CMS Energy Corporation (NYSE-CMS)	6.0	5.5	6.5	13.5%	40.0%	5.4%
Consolidated Edison, Inc. (NYSE-ED)	4.0	3.0	3.0	8.5%	36.0%	3.1%
DTE Energy Company (NYSE-DTE)	2.0	1.5	4.5	9.5%	42.0%	4.0%
Duke Energy Corporation (NYSE-DUK)	7.0	2.0	2.0	9.5%	34.0%	3.2%
Entergy Corporation (NYSE-ETR)	3.0	4.5	5.0	11.5%	37.0%	4.3%
Evergy, Inc. (NYSE-EVRG)	8.0	5.5	3.0	9.0%	38.0%	3.4%
Eversource Energy (NYSE-ES)	6.5	6.0	4.5	9.5%	38.0%	3.6%
Hawaiian Electric Industries (NYSE-HE)	3.0	3.0	3.5	9.0%	33.0%	3.0%
IDACORP, Inc. (NYSE-IDA)	4.0	6.5	4.0	9.5%	36.0%	3.4%
Nextera Energy, Inc. (NYSE-NEE)	10.5	10.0	5.5	12.5%	30.0%	3.8%
NorthWestern Corporation (NYSE-NWE)	3.0	3.5	3.0	8.5%	31.0%	2.6%
OGE Energy Corp. (NYSE-OGE)	4.0	4.5	1.5	13.0%	31.0%	4.0%
Otter Tail Corporation (NDQ-OTTR)	7.0	6.0	6.0	12.0%	41.0%	4.9%
Pinnacle West Capital Corp. (NYSE-PNW)	0.0	1.5	3.5	8.0%	30.0%	2.4%
Portland General Electric Company (NYSE-POR)	7.0	5.5	3.0	9.5%	36.0%	3.4%
Public Service Enterprise Group Inc. (NYSE:PEG)	3.5	4.0	4.5	11.0%	43.0%	4.7%
Southern Company (NYSE-SO)	6.0	3.0	4.0	14.0%	34.0%	4.8%
WEC Energy Group (NYSE-WEC)	6.5	6.5	4.0	13.0%	34.0%	4.4%
Xcel Energy Inc. (NYSE-XEL)	6.0	6.0	5.0	11.0%	39.0%	4.3%
Mean	5.1	4.8	4.1	10.5%	35.7%	3.8%
Median	5.8	5.0	4.0	10.0%	36.0%	3.8%
Average of Median Figures =		4.9			Median =	3.8%

*** 'Est'd. '18-'20 to '24-'26' is the estimated growth rate from the base period 2018 to 2020 until the future period 2024 to 2026.**
Data Source: *Value Line Investment Survey.*

DCF Study

DCF Equity Cost Growth Rate Measures
Analysts Projected EPS Growth Rate Estimates

Panel A
Electric Proxy Group

Company	Yahoo	Zacks	S&P	Mean
ALLETE, Inc. (NYSE-ALE)	5.7%	6.0%	6.0%	5.9%
Alliant Energy Corporation (NYSE-LNT)	5.8%	5.9%	6.0%	5.9%
Ameren Corporation (NYSE-AEE)	7.9%	7.4%	7.1%	7.5%
American Electric Power Co. (NYSE-AEP)	5.5%	5.7%	6.0%	5.7%
Avista Corporation (NYSE-AVA)	6.2%	5.1%	5.0%	5.4%
CMS Energy Corporation (NYSE-CMS)	5.7%	7.0%	7.0%	6.6%
Consolidated Edison, Inc. (NYSE-ED)	2.0%	2.0%	2.2%	2.1%
Dominion Energy Inc. (NYSE-D)	6.9%	6.8%	6.8%	6.8%
Duke Energy Corporation (NYSE-DUK)	5.5%	5.3%	4.9%	5.2%
Edison International (NYSE-EIX)	4.1%	4.1%	3.4%	3.9%
Entergy Corporation (NYSE-ETR)	5.7%	NA	3.7%	4.7%
Evergy, Inc. (NYSE-EVRG)	5.7%	6.1%	6.7%	6.2%
Eversource Energy (NYSE-ES)	6.8%	6.3%	6.5%	6.5%
Hawaiian Electric Industries (NYSE-HE)	1.3%	7.3%	7.6%	5.4%
IDACORP, Inc. (NYSE-IDA)	3.2%	3.9%	3.6%	3.6%
MGE Energy, Inc. (NYSE-MGEE)	5.9%	5.9%	5.9%	5.9%
Nextera Energy, Inc. (NYSE-NEE)	8.9%	8.4%	8.0%	8.4%
NorthWestern Corporation (NYSE-NWE)	4.5%	4.8%	4.5%	4.6%
OGE Energy Corp. (NYSE-OGE)	3.9%	4.5%	2.4%	3.6%
Otter Tail Corporation (NDQ-OTTR)	9.0%	4.7%	6.0%	6.6%
Pinnacle West Capital Corp. (NYSE-PNW)	0.1%	5.0%	-1.9%	1.1%
Portland General Electric Company (NYSE-POR)	7.2%	8.6%	4.4%	6.7%
Sempra Energy (NYSE-SRE)	4.3%	4.9%	4.2%	4.5%
Southern Company (NYSE-SO)	6.5%	4.9%	6.2%	5.9%
WEC Energy Group (NYSE-WEC)	6.6%	6.3%	6.6%	6.5%
Xcel Energy Inc. (NYSE-XEL)	6.9%	6.4%	6.0%	6.4%
Mean	5.4%	5.7%	5.2%	5.4%
Median	5.7%	5.9%	6.0%	5.9%

Data Sources: www.zacks.com, http://quote.yahoo.com, S&P Cap IQ, November, 2021.

Panel B
Nelson Proxy Group

Company	Yahoo	Zacks	S&P	Mean
ALLETE, Inc. (NYSE-ALE)	5.7%	6.0%	6.0%	5.9%
Alliant Energy Corporation (NYSE-LNT)	5.8%	5.9%	6.0%	5.9%
Ameren Corporation (NYSE-AEE)	7.9%	7.4%	7.1%	7.5%
American Electric Power Co. (NYSE-AEP)	5.5%	5.7%	6.0%	5.7%
Avista Corporation (NYSE-AVA)	6.2%	5.1%	5.0%	5.4%
CMS Energy Corporation (NYSE-CMS)	5.7%	7.0%	7.0%	6.6%
Consolidated Edison, Inc. (NYSE-ED)	2.0%	2.0%	2.2%	2.1%
DTE Energy Company (NYSE-DTE)	2.7%	6.0%	6.0%	4.9%
Duke Energy Corporation (NYSE-DUK)	5.5%	5.3%	4.9%	5.2%
Entergy Corporation (NYSE-ETR)	5.7%	NA	3.7%	4.7%
Evergy, Inc. (NYSE-EVRG)	5.7%	6.1%	6.7%	6.2%
Eversource Energy (NYSE-ES)	6.8%	6.3%	6.5%	6.5%
Hawaiian Electric Industries (NYSE-HE)	1.3%	7.3%	7.6%	5.4%
IDACORP, Inc. (NYSE-IDA)	3.2%	3.9%	3.6%	3.6%
Nextera Energy, Inc. (NYSE-NEE)	8.9%	8.4%	8.0%	8.4%
NorthWestern Corporation (NYSE-NWE)	4.5%	4.8%	4.5%	4.6%
OGE Energy Corp. (NYSE-OGE)	3.9%	4.5%	2.4%	3.6%
Otter Tail Corporation (NDQ-OTTR)	9.0%	4.7%	6.0%	6.6%
Pinnacle West Capital Corp. (NYSE-PNW)	0.1%	5.0%	-1.9%	1.1%
Portland General Electric Company (NYSE-POR)	7.2%	8.6%	4.4%	6.7%
Public Service Enterprise Group Inc. (NYSE:PEG)	2.8%	3.5%	4.1%	3.5%
Southern Company (NYSE-SO)	6.5%	4.9%	6.2%	5.9%
WEC Energy Group (NYSE-WEC)	6.6%	6.3%	6.6%	6.5%
Xcel Energy Inc. (NYSE-XEL)	6.9%	6.4%	6.0%	6.4%
Mean	5.2%	5.7%	5.2%	5.4%
Median	5.7%	5.9%	6.0%	5.8%

Data Sources: www.zacks.com, http://quote.yahoo.com, S&P Cap IQ, November, 2021.

DCF Study

DCF Growth Rate Indicators

Electric and Nelson Proxy Groups

Growth Rate Indicator	Electric Proxy Group	Nelson Proxy Group
Historic *Value Line* Growth in EPS, DPS, and BVPS	4.9%	3.5%
Projected *Value Line* Growth in EPS, DPS, and BVPS	5.1%	4.9%
Sustainable Growth ROE * Retention Rate	3.8%	3.8%
Projected EPS Growth from Yahoo and Zacks - Mean/Median	5.4%/5.9%	5.4%/5.8%

Docket No. DE 21-030
Attachment JRW-8

Capital Asset Pricing Model

Panel A
Electric Proxy Group

Risk-Free Interest Rate	**2.50%**
Beta*	**0.90**
Ex Ante Equity Risk Premium**	**5.50%**
CAPM Cost of Equity	**7.5%**

* See page 3 of Attachment JRW-8

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

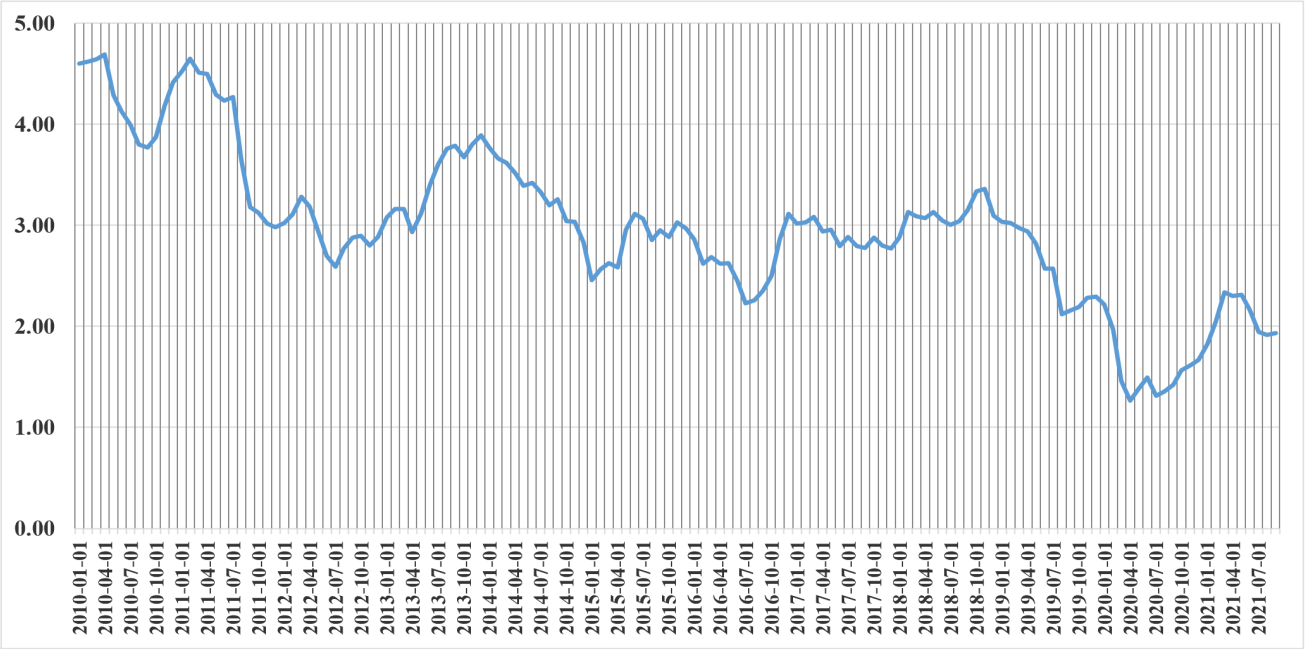
Panel B
Nelson Proxy Group

Risk-Free Interest Rate	**2.50%**
Beta*	**0.90**
Ex Ante Equity Risk Premium**	**5.50%**
CAPM Cost of Equity	**7.5%**

* See page 3 of Attachment JRW-8

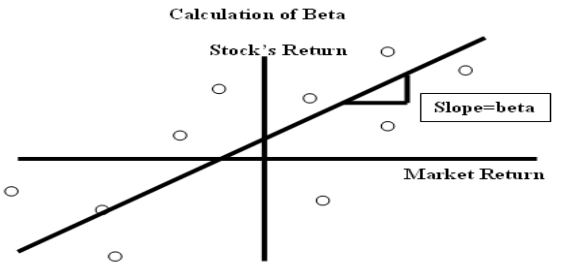
** See pages 5 and 6 of Attachment JRW-8

Thirty-Year U.S. Treasury Yields
2010-2021



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

CAPM Study



Panel A
Electric Proxy Group

Company	Beta
ALLETE, Inc. (NYSE-ALE)	0.90
Alliant Energy Corporation (NYSE-LNT)	0.85
Ameren Corporation (NYSE-AEE)	0.85
American Electric Power Co. (NYSE-AEP)	0.75
Avista Corporation (NYSE-AVA)	0.95
CMS Energy Corporation (NYSE-CMS)	0.80
Consolidated Edison, Inc. (NYSE-ED)	0.75
Dominion Energy Inc. (NYSE-D)	0.85
Duke Energy Corporation (NYSE-DUK)	0.90
Edison International (NYSE-EIX)	1.00
Entergy Corporation (NYSE-ETR)	0.95
Evergy, Inc. (NYSE-EVRG)	0.95
Eversource Energy (NYSE-ES)	0.90
Hawaiian Electric Industries (NYSE-HE)	0.85
IDACORP, Inc. (NYSE-IDA)	0.85
MGE Energy, Inc. (NYSE-MGEE)	0.75
NextEra Energy, Inc. (NYSE-NEE)	0.95
NorthWestern Corporation (NYSE-NWE)	0.95
OGE Energy Corp. (NYSE-OGE)	1.05
Otter Tail Corporation (NDQ-OTTR)	0.90
Pinnacle West Capital Corp. (NYSE-PNW)	0.95
Portland General Electric Company (NYSE-POR)	0.90
Sempra Energy (NYSE-SRE)	1.00
Southern Company (NYSE-SO)	0.95
WEC Energy Group (NYSE-WEC)	0.80
Xcel Energy Inc. (NYSE-XEL)	0.80
Mean	0.89
Median	0.90

Data Source: *Value Line Investment Survey*, 2021.

Panel B
Nelson Proxy Group

Company	Beta
ALLETE, Inc. (NYSE-ALE)	0.90
Alliant Energy Corporation (NYSE-LNT)	0.85
Ameren Corporation (NYSE-AEE)	0.85
American Electric Power Co. (NYSE-AEP)	0.75
Avista Corporation (NYSE-AVA)	0.95
CMS Energy Corporation (NYSE-CMS)	0.80
Consolidated Edison, Inc. (NYSE-ED)	0.75
DTE Energy Company (NYSE-DTE)	0.95
Duke Energy Corporation (NYSE-DUK)	0.90
Entergy Corporation (NYSE-ETR)	0.95
Evergy, Inc. (NYSE-EVRG)	0.95
Eversource Energy (NYSE-ES)	0.90
Hawaiian Electric Industries (NYSE-HE)	0.85
IDACORP, Inc. (NYSE-IDA)	0.85
NextEra Energy, Inc. (NYSE-NEE)	0.95
NorthWestern Corporation (NYSE-NWE)	0.95
OGE Energy Corp. (NYSE-OGE)	1.05
Otter Tail Corporation (NDQ-OTTR)	0.90
Pinnacle West Capital Corp. (NYSE-PNW)	0.95
Portland General Electric Company (NYSE-POR)	0.90
Public Service Enterprise Group Inc. (NYSE:PEG)	0.95
Sempra Energy (NYSE-SRE)	1.00
Southern Company (NYSE-SO)	0.95
WEC Energy Group (NYSE-WEC)	0.80
Xcel Energy Inc. (NYSE-XEL)	0.80
Mean	0.90
Median	0.90

Data Source: *Value Line Investment Survey*, 2021.

CAPM Study

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).

CAPM Study

Market Risk Premium Results - 2000-2021

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	2021	1928-2020	Historical Stock Returns - Bond Returns	Arithmetic				6.44%	
					Geometric				4.83%	
	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	2021	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	2021	Projection	Fundamental Economic and Market Factors					3.42%	
	KPMG	2021	Projection	Fundamental Economic and Market Factors					5.00%	
	Damodaran -11-21	2021	Projection	Fundamentals - Implied from FCF to Equity Model (Trailing 12 month, with adjusted payout)					4.53%	
	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	2020	10-Year Projection	About 20 Financial Forecastsers					3.36%	
	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	2021	Long-Term	Survey of Academics, Analysts, and Companies					5.50%	
	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%**

CAPM Study

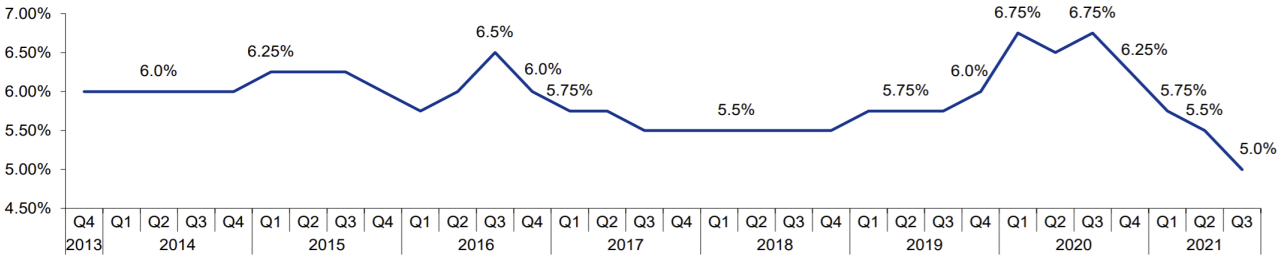
Market Risk Premium Results - 2010-2021

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	2021	1928-2020	Historical Stock Returns - Bond Returns	Arithmetic				6.44%	
					Geometric				4.83%	
	Dimson, Marsh, Staunton _Credit Suisse Report	2019	1900-2018	Historical Stock Returns - Bond Returns	Arithmetic				5.50%	
	Median									5.43%
Ex Ante Models (Puzzle Research)										
	Siegel - Rethink ERP	2011	Projection	Real Stock Returns and Components					5.50%	
	Duff & Phelps	2021	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	2021	Projection	Fundamental Economic and Market Factors					3.42%	
	KPMG	2021	Projection	Fundamental Economic and Market Factors					5.00%	
	Damodaran -11-21	2021	Projection	Fundamentals - Implied from FCF to Equity Model (Trailing 12 month, with adjusted payout)					4.53%	
	Median									5.50%
Surveys										
	New York Fed	2015	Five-Year	Survey of Wall Street Firms					5.70%	
	Survey of Financial Forecasters	2020	10-Year Projection	About 20 Financial Forecastsers					3.36%	
	Duke - CFO Magazine Survey	2020	10-Year Projection	Approximately 200 CFOs					4.05%	
	Fernandez - Academics, Analysts, and Companies	2021	Long-Term	Survey of Academics, Analysts, and Companies					5.50%	
	Median									4.78%
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			d						4.06%
Mean										**4.94%**
Median										**5.10%**

CAPM Study

KPMG and Duff & Phelps Equity Risk Premium Estimates

KPMG Equity Risk Premium Estimates



Duff & Phelps Risk-Free Rate and Equity Risk Premium Estimates

DUFF&PHELPS

December 9, 2020

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

Table: Equity Risk Premium & Risk-free Rates

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

Date	Risk-free Rate (R_f)	R_f (%)	Duff & Phelps Recommended ERP (%)	What Changed
Current Guidance:				
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.

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Unitil's Recommended Cost of Capital

Capital Source	Capitalization Amounts	Capitalization Ratios	Cost Rate	Weighted Cost Rate
Short-Term Debt	-	0.00%	1.69%	0.00%
Long-Term Debt	89,900,000.00	46.99%	5.49%	2.58%
Preferred Stock	188,700.00	0.10%	6.00%	0.01%
Common Equity	101,242,877.00	52.91%	10.00%	5.29%
Total Capital	191,331,577.00	100.00%		7.88%

Summary of Nelson Equity Cost Rate Results

Constant Growth DCF	**Low**	**Mean**	**High**
30-Day Average	8.45%	9.20%	9.83%
90-Day Average	8.44%	9.06%	9.75%
180-Day Average	8.48%	9.09%	9.84%
Quarterly Growth DCF	**Low**	**Mean**	**High**
30-Day Average	8.55%	9.29%	9.99%
90-Day Average	8.52%	9.14%	9.91%
180-Day Average	8.55%	9.21%	9.99%
***Value Line*-based CAPM**		**Current 30-Year Treasury Yield (1.97%)**	**Projected 30-Year Treasury Yield (2.72%)**
Proxy Group Average		12.82%	12.91%
Proxy Group Median		12.48%	12.59%
***Value Line*-based Empirical CAPM**		**Current 30-Year Treasury Yield (1.97%)**	**Projected 30-Year Treasury Yield (2.72%)**
Proxy Group Average		13.20%	13.27%
Proxy Group Median		12.95%	13.03%
Bond Yield Plus Risk Premium			
Current 30-Year Treasury Yield (1.97%)		9.89%	
Projected 30-Year Treasury Yield (2.72%)		9.80%	

GDP and S&P 500 Growth Rates

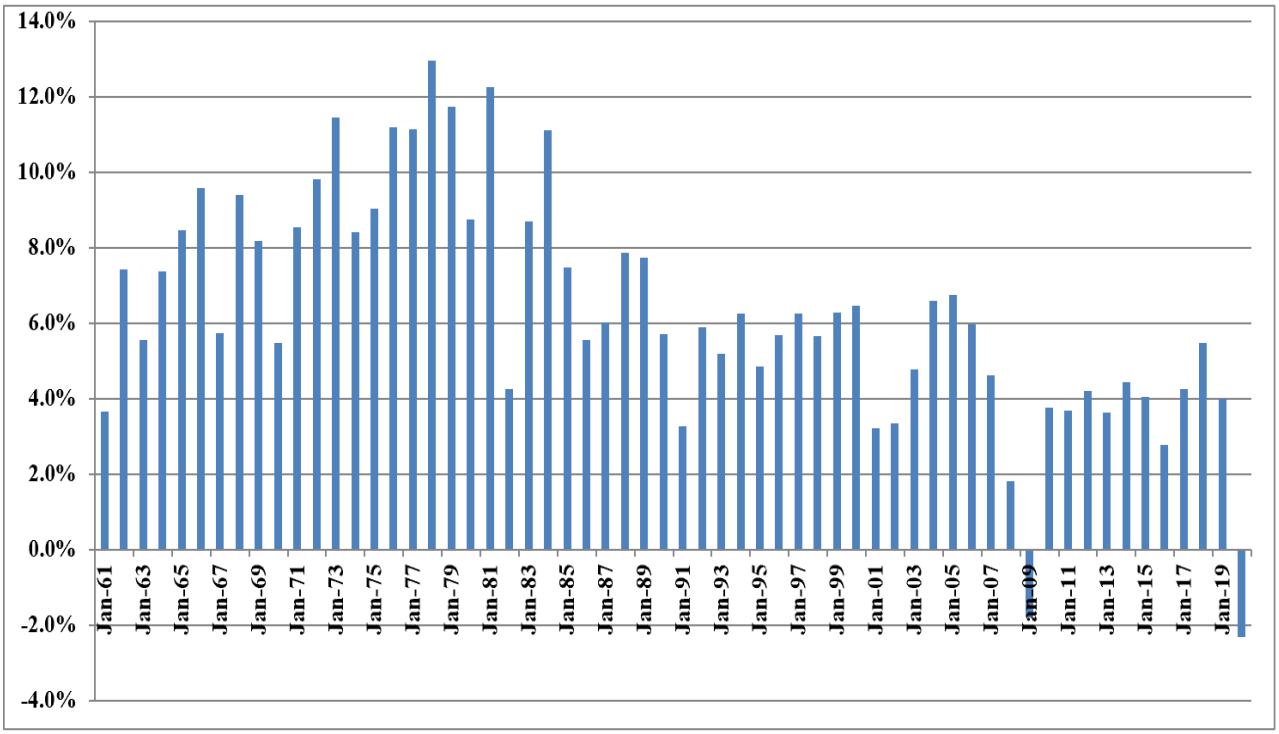
Growth Rates
GDP, S&P 500 Price, EPS, and DPS

	GDP	S&P 500	S&P 500 EPS	S&P 500 DPS
1960	**542.382**	**58.11**	**3.10**	**1.98**
1961	**562.210**	**71.55**	**3.37**	**2.04**
1962	**603.921**	**63.1**	**3.67**	**2.15**
1963	**637.451**	**75.02**	**4.13**	**2.35**
1964	**684.460**	**84.75**	**4.76**	**2.58**
1965	**742.289**	**92.43**	**5.30**	**2.83**
1966	**813.414**	**80.33**	**5.41**	**2.88**
1967	**859.958**	**96.47**	**5.46**	**2.98**
1968	**940.651**	**103.86**	**5.72**	**3.04**
1969	**1017.615**	**92.06**	**6.10**	**3.24**
1970	**1073.303**	**92.15**	**5.51**	**3.19**
1971	**1164.850**	**102.09**	**5.57**	**3.16**
1972	**1279.110**	**118.05**	**6.17**	**3.19**
1973	**1425.376**	**97.55**	**7.96**	**3.61**
1974	**1545.243**	**68.56**	**9.35**	**3.72**
1975	**1684.904**	**90.19**	**7.71**	**3.73**
1976	**1873.412**	**107.46**	**9.75**	**4.22**
1977	**2081.826**	**95.1**	**10.87**	**4.86**
1978	**2351.599**	**96.11**	**11.64**	**5.18**
1979	**2627.334**	**107.94**	**14.55**	**5.97**
1980	**2857.307**	**135.76**	**14.99**	**6.44**
1981	**3207.042**	**122.55**	**15.18**	**6.83**
1982	**3343.789**	**140.64**	**13.82**	**6.93**
1983	**3634.038**	**164.93**	**13.29**	**7.12**
1984	**4037.613**	**167.24**	**16.84**	**7.83**
1985	**4338.979**	**211.28**	**15.68**	**8.20**
1986	**4579.631**	**242.17**	**14.43**	**8.19**
1987	**4855.215**	**247.08**	**16.04**	**9.17**
1988	**5236.438**	**277.72**	**24.12**	**10.22**
1989	**5641.580**	**353.4**	**24.32**	**11.73**
1990	**5963.144**	**330.22**	**22.65**	**12.35**
1991	**6158.129**	**417.09**	**19.30**	**12.97**
1992	**6520.327**	**435.71**	**20.87**	**12.64**
1993	**6858.559**	**466.45**	**26.90**	**12.69**
1994	**7287.236**	**459.27**	**31.75**	**13.36**
1995	**7639.749**	**615.93**	**37.70**	**14.17**
1996	**8073.122**	**740.74**	**40.63**	**14.89**
1997	**8577.552**	**970.43**	**44.09**	**15.52**
1998	**9062.817**	**1229.23**	**44.27**	**16.20**
1999	**9630.663**	**1469.25**	**51.68**	**16.71**
2000	**10252.347**	**1320.28**	**56.13**	**16.27**
2001	**10581.822**	**1148.09**	**38.85**	**15.74**
2002	**10936.418**	**879.82**	**46.04**	**16.08**
2003	**11458.246**	**1111.91**	**54.69**	**17.88**
2004	**12213.730**	**1211.92**	**67.68**	**19.407**
2005	**13036.637**	**1248.29**	**76.45**	**22.38**
2006	**13814.609**	**1418.3**	**87.72**	**25.05**
2007	**14451.860**	**1468.36**	**82.54**	**27.73**
2008	**14712.845**	**903.25**	**65.39**	**28.05**
2009	**14448.932**	**1115.10**	**59.65**	**22.31**
2010	**14992.052**	**1257.64**	**83.66**	**23.12**
2011	**15542.582**	**1257.60**	**97.05**	**26.02**
2012	**16197.007**	**1426.19**	**102.47**	**30.44**
2013	**16784.851**	**1848.36**	**107.45**	**36.28**
2014	**17527.258**	**2058.90**	**113.01**	**39.44**
2015	**18238.301**	**2043.94**	**106.32**	**43.16**
2016	**18745.075**	**2238.83**	**108.86**	**45.03**
2017	**19542.980**	**2673.61**	**124.94**	**49.73**
2018	**20611.861**	**2506.85**	**148.34**	**53.61**
2019	**21433.226**	**3230.78**	***162.35***	***58.80***
2020	**20934.850**	**3756.07**	**138.12**	**56.70**
Growth Rates	**6.28**	**7.20**	**6.53**	**5.75**

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

Annual Nominal GDP Growth Rates

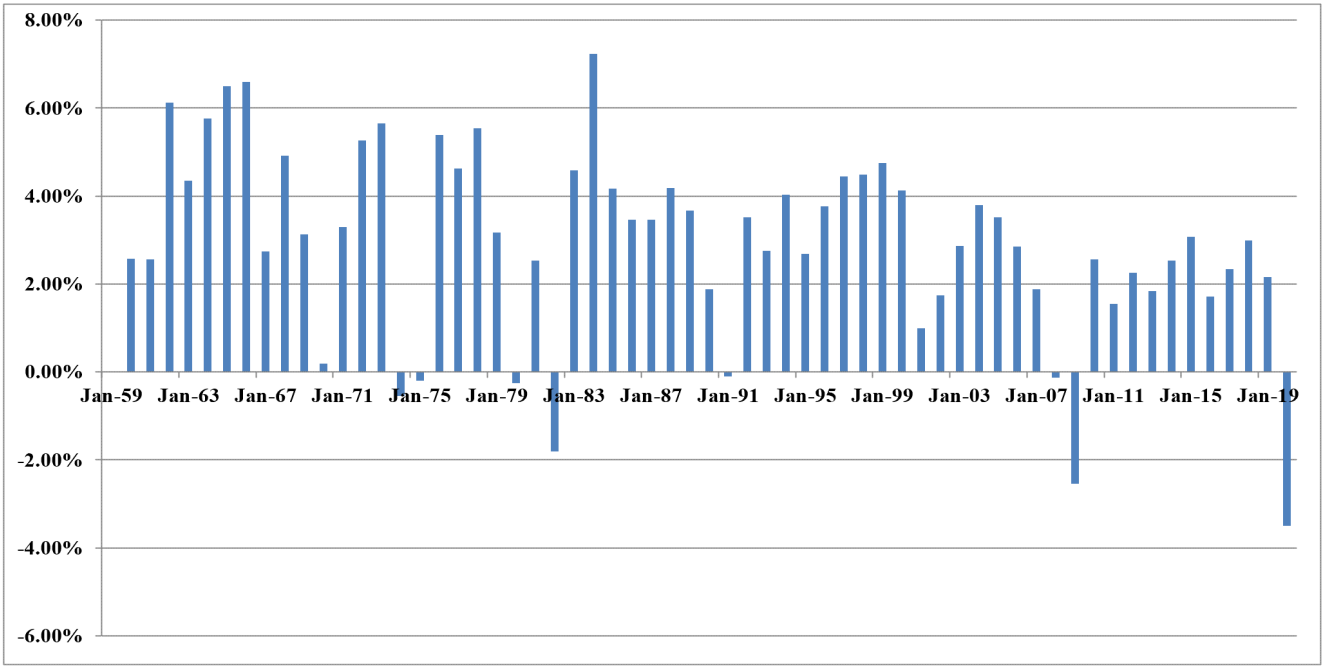
Annual Growth Rates - 1961-2020



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

Real GDP Growth Rates

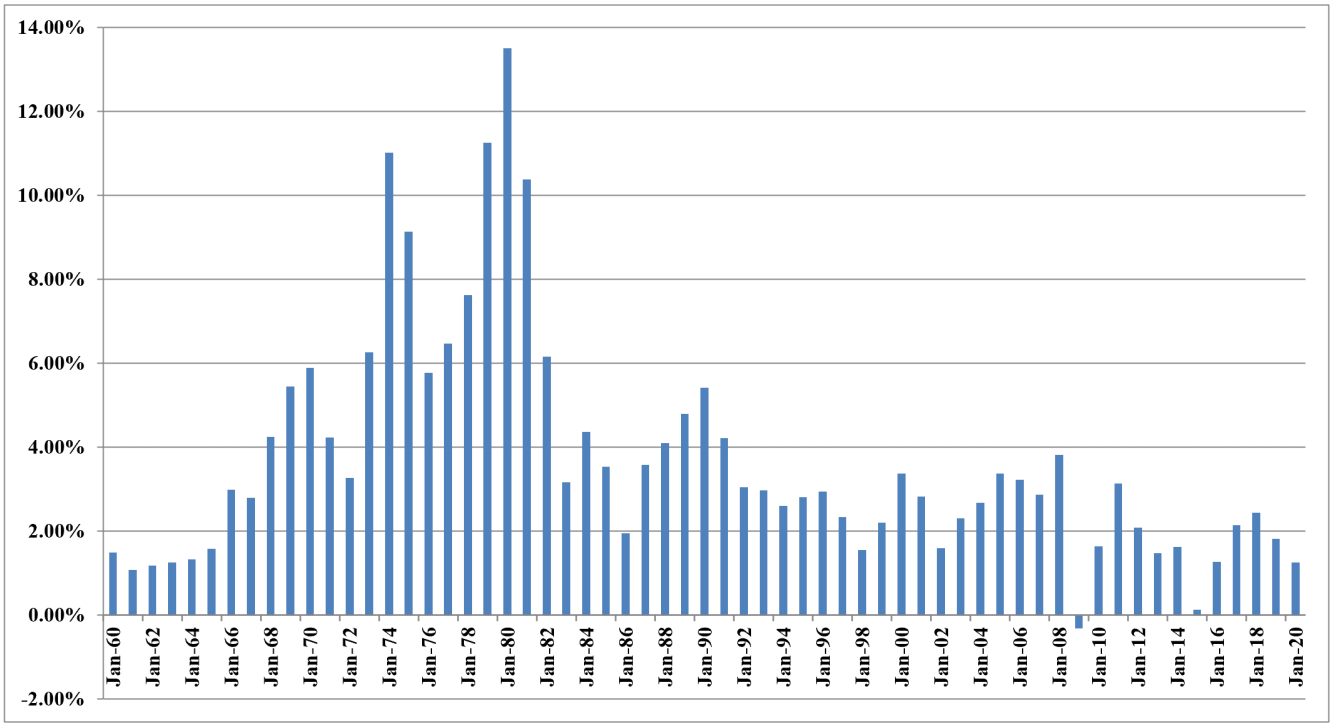
Annual Real GDP Growth Rates
1961-2020



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

Inflation Rates

Annual Inflation Rates
1961-2020



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

Projected Nominal GDP Growth Rates

Panel A
Historic GDP Growth Rates

10-Year Average		**3.40%**
20-Year Average		**3.63%**
30-Year Average		**4.27%**
40-Year Average		**5.10%**
50-Year Average		**6.12%**

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	**2019-29**	**3.8%**
Survey of Financial Forecasters	**Ten Year**	**4.3%**
Social Security Administration	**2020-2095**	**4.1%**
Energy Information Administration	**2019-2050**	**4.2%**

Sources:

Congressional Budget Office,The *2020 Long-Term Budget Outlook* , June 25, 2020.

U.S. Energy Information Administration, *Annual Energy Outlook 2020* , Table: Macroeconomic Indicators,

Social Security Administration, 2020 Annual Report of the Board of Trustees of the Old-Age,
Survivors, and Disability Insurance (OASDI) Program, Table VI.G4, p. 211(July 15, 2020),

The 4.1% growth rate is the growth in projected GDP from $22,341 trillion in 2020 to $450,425 trillion in 2095.

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

GDP and S&P 500 Growth Rates

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