BEFORE THE WASHINGTON STATE

UTILITIES & TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION,

Complainant,

V.

PUGET SOUND ENERGY,

RESPONDENT.

DOCKETS UE-170033 & UG-170034 (*Consolidated*)

DIRECT TESTIMONY OF J. RANDALL WOOLRIDGE (JRW-1T)

ON BEHALF OF

WASHINGTON STATE OFFICE OF THE ATTORNEY GENERAL,

PUBLIC COUNSEL UNIT

JUNE 30, 2017

DIRECT TESTIMONY OF J. RANDALL WOOLRIDGE (JRW-1T)

DOCKETS UE-170033 and UG-170034 (*Consolidated)*

TABLE OF CONTENTS

FIGURES

TABLES

DIRECT TESTIMONY OF RANDALL R. WOOLRIDGE (JRW-1T)

DOCKETS UE-170033 and UG-170034 (*Consolidated*)

EXHIBITS LIST

I. INTRODUCTION

Q: Please state your full name, address, and occupation.

A: My name is J. Randall Woolridge, and my business address is 120 Haymaker Circle, State College, PA 16801. I am a Professor of Finance and the Goldman, Sachs & Co. and Frank P. Smeal Endowed University Fellow in Business Administration at the University Park Campus of the Pennsylvania State University. I am also the Director of the Smeal College Trading Room and President of the Nittany Lion Fund, LLC. A summary of my educational background, research, and related business experience is provided in Exhibit JRW-2.

Q: On whose behalf are you testifying?

A: I have been asked by the Public Counsel Unit of the Washington State Attorney General's Office ("Public Counsel") to provide an opinion as to the overall fair rate of return or cost of capital for the regulated electric and gas utility service of Puget Sound Energy ("PSE" or the "Company") and to evaluate PSE's rate of return testimony in this proceeding.[1]

Q: How is your testimony organized?

A: The following is an outline of my testimony:

- First, I summarize my cost of capital recommendation for the Company, and review the primary areas of contention on the Company's position.
- Second, I provide an assessment of capital costs in today's capital markets.
- Third, I discuss the selection of a proxy group of electric utility companies for estimating the cost of equity capital for the Company.

[1] In my testimony, I use the terms 'rate of return' and 'cost of capital' interchangeably. This is because the required rate of return of investors on a company's capital is the cost of capital.

- Fourth, I discuss the Company's recommended capital structure and debt cost rates.
- Fifth, I provide an overview of the concept of the cost of equity capital, and then estimate the equity cost rate for the Company.
- Finally, I critique PSE's rate of return analysis and testimony. A table of contents is provided just after the title page.

II. SUMMARY OF RECOMMENDATION AND AREAS OF CONTENTIONS

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: A 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 public utility. The United States Supreme Court established the guiding principles for determining an appropriate level of profitability for regulated public utilities in two cases: (1) *Hope*[2] and (2) *Bluefield*.[3] In

[2] *Fed. Power Comm'n v. Hope Nat. Gas Co., ("Hope")* 320 U.S. 591, 64 S. Ct. 281, 88 L. Ed. 333 (1944).
[3] *Bluefield Waterworks & Imp. Co. v. Pub. Serv. Comm'n of W. Va.,* ("*Bluefield*") 262 U.S. 679, 43 S. Ct. 675, 67 L. Ed. 1176 (1923).

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 the economic models and formulas in cost of capital testimony, such as the Discounted Cash Flow Model and the Capital Asset Pricing Model, which I have included in my testimony, is to estimate, using market data of similar-risk firms, the rate of return on equity investors require for this specific risk-class of firms, in order to set an appropriate ROE for a regulated firm.

Q: Please review your proposed alternative recommendations regarding the appropriate rate of return for the company.

A: The Company has proposed a capital structure consisting of 1.00 percent short-term debt, 50.50 percent long-term debt, and 48.50 percent common equity for PSE. I have adopted this capital structure, as it is reflective of the capital structures of my proxy groups of electric, combination electric and gas, and gas distribution companies. I have also employed the Company's proposed senior capital cost rates. Dr. Roger A. Morin has recommended a common equity cost rate of 9.80 percent for the Company. I have applied the Discounted Cash Flow Model ("DCF") and the Capital Asset Pricing Model ("CAPM") to a proxy group of publicly-held electric utility companies ("Electric Proxy Group"), the group developed by Dr. Morin ("Morin Proxy Group") and a group of gas

distribution companies ("Gas Proxy Group"). My analysis indicates an appropriate equity cost rate of 8.85 percent for the Company. This figure is in the upper end of my equity cost rate range of 7.7 percent to 8.90 percent. With my proposed capital structure and senior capital cost rates for PSE, I am recommending an overall fair rate of return or cost of capital of 7.28 percent for PSE. This is summarized in Exhibit JRW-3.

Q: What are the primary areas of disagreement in estimating the rate of return or cost of capital in this proceeding?

A: Since I have employed PSE's capital structure and senior capital cost rates, the primary rate of return issue in this case is the appropriate ROE. Our disagreements on this issue include:

1. Our differing views regarding the state of the markets and capital costs;
2. The Company's DCF equity cost rate estimates, and in particular Dr. Morin's exclusive use of the earnings per share growth rates of Wall Street analysts and *Value Line*;
3. The base interest rate and market or equity risk premium in Dr. Morin's CAPM and Risk Premium approaches; and
4. The level of ROE is adequate to meet *Hope* and *Bluefield* standards.

III. CAPITAL COSTS IN TODAY'S MARKETS

A. Historic Interest Rates and Capital Costs

Q: Please discuss long-term interest rates and capital costs in U.S. markets.

A: Long-term capital cost rates for U.S. corporations are a function of the required returns on risk-free securities plus a risk premium. The risk-free rate of interest is the yield on long-term U.S. Treasury bonds. The yields on ten-year U.S. Treasury bonds from 1953

to the present are provided on Panel A of Exhibit JRW-4. These yields peaked in the early 1980s and have generally declined since that time. These yields fell to below 3.0 percent in 2008, as a result of the financial crisis. In 2012, the yields on ten-year Treasuries declined from 2.5 percent to 1.5 percent as the Federal Reserve (the "Fed") initiated the third stage of its quantitative easing program ("QE III") to support a low interest rate environment. These yields increased to 3.0 percent as of December 2013 on speculation of a tapering of the Federal Reserve's QE III policy. The Federal Reserve ended the QE III program in 2015 and increased the federal funds rate in December 2015. Nonetheless, due to slow economic growth and low inflation, the ten-year Treasury yield subsequently declined to 1.5 percent in 2016. The ten-year Treasury yield has since increased to the 2.25 percent range, with much of that increase coming in response to the November 8, 2016 U.S. presidential election.

Panel B on Exhibit JRW-4 shows the differences in yields between ten-year Treasuries and Moody's Baa-rated bonds since the year 2000. This differential primarily reflects the additional risk premium required by bond investors for the risk associated with investing in corporate bonds as opposed to obligations of the U.S. Treasury. The difference also reflects, to some degree, yield curve changes over time. The Baa rating is the lowest of the investment grade bond ratings for corporate bonds. The yield differential hovered in the 2.0 percent to 3.5 percent range until 2005, declined to 1.5 percent until late 2007, and then increased significantly in response to the financial crisis. This differential peaked at 6.0 percent at the height of the financial crisis in early 2009 due to tightening in credit markets, which increased corporate bond yields, and the "flight to quality," which decreased Treasury yields. The differential subsequently declined and

bottomed out at 2.4 percent. The differential has since increased to the 3.00 percent range.

Q: You mentioned risk premium being reflected as the differential between the ten-year Treasuries and Moody's Baa-rated bonds. Please explain what the risk premium is and how it affects your analysis.

A: The risk premium is the return premium required by investors to purchase riskier securities. The risk premium required by investors to buy corporate bonds is observable based on yield differentials in the markets. The market risk premium is the return premium required to purchase stocks as opposed to bonds. The market or equity risk premium is not readily observable in the markets (like bond risk premiums) because expected stock market returns are not readily observable. As a result, equity risk premiums must be estimated using market data. As discussed later in my testimony, there are alternative methodologies to estimate the equity risk premium, and these alternative approaches and the equity risk premium results are subject to much debate. One way to estimate the equity risk premium is to compare the mean returns on bonds and stocks over long historical periods. Measured in this manner, the equity risk premium has been in the five percent to seven percent range. However, studies by leading academics indicate that the forward-looking equity risk premium is actually in the four percent to six percent range.[4] These lower equity risk premium results are in line with the findings of equity risk premium surveys of CFOs, academics, analysts, companies, and financial forecasters.

Q: Please review the interest rates on long-term utility bonds.

[4] Exh. JRW-13, at 5-6.

A: Panel A of Exhibit JRW-5 provides the yields on A-rated public utility bonds. These yields peaked in November 2008 at 7.75 percent and henceforth, declined significantly. These yields dropped below 4.0 percent on three occasions - in mid-2013, in the first quarter of 2015, and then again in the summer of 2016. These yields have increased to about 4.15 percent, with much of the increase coming in the wake of the U.S. presidential election.

Panel B of Exhibit JRW-5 provides the yield spreads between long-term A-rated public utility bonds relative to the yields on 20-year U.S. Treasury bonds. These yield spreads increased dramatically in the third quarter of 2008 during the peak of the financial crisis and have decreased significantly since that time. The yield spreads between 20-year U.S. Treasury bonds and A-rated utility bonds peaked at 3.4 percent in November 2008, then declined to about 1.5 percent in the summer of 2012 as investor return requirements declined. The differential has gradually increased in recent years, and is now close to 2.0 percent.

B. Capital Market Conditions

Q: **Why are capital market conditions and the outlook for interest rates and capital costs important in this case?**

A: As discussed above, a company's rate of return is its overall cost of capital. Capital costs, including the cost of debt and equity financing, are established in capital markets and reflect investors' return requirements on alternative investments based on risk and capital market conditions. These capital market conditions are a function of investors' expectations concerning many factors, including economic growth, inflation, the government's monetary and fiscal policies, and international developments, among

others. In the wake of the financial crisis, much of the focus in the capital markets has been on the interaction of economic growth, interest rates, and the actions of the Federal Reserve. Additionally, capital markets capital costs are also impacted by global events.

Q: What is Dr. Morin's assessment of the capital markets environment?

A: Dr. Morin indicates that "All of noted interest rate forecasts that I am aware of point to significantly higher interest rates over the next several years."[5] He employs forecasts of interest rates in his CAPM and risk premium approaches.

Q: Please explain your concerns regarding Dr. Morin's conclusion of higher long-term interest rates.

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

> The survey of economists' yield projections is generally skewed toward rising rates — only a few times since early 2009 have a majority of respondents to the Bloomberg survey thought rates would fall. But the unanimity of the rising rate forecasts in the spring was a stark reminder of how one-sided market views can become. It also teaches us that economists can be universally wrong.[6]

Two other financial publications have produced studies on how economists consistently predict higher interest rates, and yet they have been wrong. The first publication, titled

[5] Direct Testimony of Roger A. Morin, Exh. RAM-1T, at 36-37, ll. 9-10.

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

"How Interest Rates Keep Making People on Wall Street Look Like Fools," evaluated economists' forecasts for the yield on ten-year Treasury bonds at the beginning of the year for the last ten years.[7] The results demonstrated that economists consistently predict that interest rates will go higher, and interest rates have not fulfilled those predictions.

The second study tracked economists' forecasts for the yield on ten-year Treasury bonds on an ongoing basis from 2010 until 2015.[8] The results of this study, which was entitled "Interest Rate Forecasters are Shockingly Wrong Almost All of the Time," are shown in Figure 1 below and demonstrate how economists continually forecast increasing interest rates, yet they do not. Indeed, as Bloomberg has reported, economists' continued failure in forecasting increasing interest rates has caused the Federal Reserve Bank of New York to stop using the interest rate estimates of professional forecasters in the Bank's interest rate model due to the unreliability of those forecasters' interest rate forecasts.[9]

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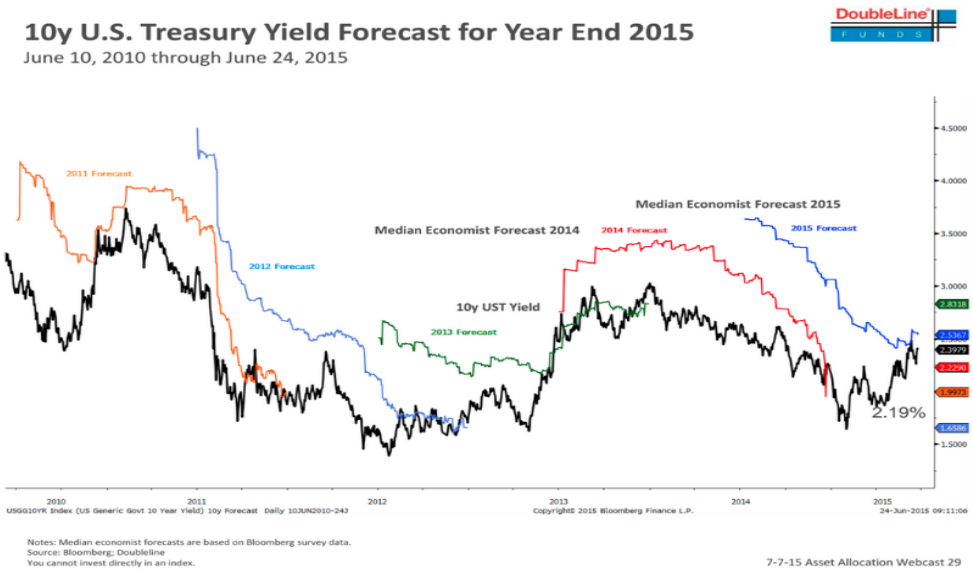
[7] Joe Weisenthal, *How Interest Rates Keep Making People on Wall Street Look Like Fools*, Bloomberg (Mar. 16, 2015), http://www.bloomberg.com/news/articles/2015-03-16/how-interest-rates-keep-making-people-on-wall-street-look-like-fools.

[8] Akin Oyedele, *Interest Rate Forecasters are Shockingly Wrong Almost All of the Time*, Business Insider (Jul. 18, 2015). http://www.businessinsider.com/interest-rate-forecasts-are-wrong-most-of-the-time-2015-7.

[9] *Id*.

Figure 1
Economists' Forecasts of the Ten-Year Treasury Yield
2010-2015



Q: Please review the Federal Reserve's decision to raise the Federal funds rate in December 2015.

A: On December 16, 2015, the Fed decided to increase the target rate for Federal Funds to 0.25 – 0.50 percent.[10] This increase came after the rate was kept in the 0.0 to 0.25 percent range for over five years in order to spur economic growth in the wake of the financial crisis. The move occurred almost two years after the end of QE III program, the Federal Reserve's bond buying program. The Federal Reserve has been cautious in its approach to scaling its monetary intervention, and has paid close attention to a number of economic variables, including GDP growth, retail sales, consumer confidence, unemployment, the housing market, and inflation.

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

Q: How did long-term interest rates react to the Federal Reserve's 2015 decision to increase the Federal Fund rate?

A: The Fed's decision to increase the Federal Fund rate range from 0.0-0.25 percent to 0.25-0.50 percent was highly anticipated in the markets. Yet, the yield on long-term Treasury bonds subsequently decreased from the 3.0 percent range at the time of the announcement to below 2.50 percent in mid-2016.

Q: Please address the Federal Reserve's decision to raise the Federal Funds rate in December 2016, and the impact of the U.S. Presidential election on the Federal Funds rate.

A: Long-term interest rates in the U.S. bottomed out in August 2016 and have increased since that time with improvements in the economy. Notable improvements include lower unemployment and improving economic growth and corporate earnings. Then came November 8, 2016, and financial markets moved significantly in the wake of the unexpected results in the U.S. presidential election. The stock market gained more than 10 percent and the 30-year Treasury yield increased more than 50 basis points to about 3.2 percent. These market adjustments reflected the expectation that the new administration will make changes in fiscal, regulatory, and possibly monetary policies, which could lead to higher economic growth and inflation. Partly due to these developments, the Federal Reserve's decision at its December 13-14, 2016 meeting to raise its federal funds target rate to 0.50 - .075 percent was broadly expected and there was no significant market reaction.

Q: What is the Federal Reserve expected to do with the Federal Funds rate in 2017?

A: The Federal Reserve again increased the federal funds rate target rate range to 0.75 – 1.00

percent at its March 13-14, 2017 meetings. And the yield on 30-year Treasury yields declined! Subsequently, on June 14, 2017, the Federal Reserve again increased the federal funds rate target rate range from 1.00 percent to 1.25 percent. Depending on developments with respect to economic growth and inflation during the year, it is an open question as to whether the Federal Reserve will increase the federal funds rate one more time before the end of 2017.

Q: Will increases in the Federal Fund rate result in an increase in long-term interest rates?

A: Not necessarily. As the Federal Reserve increased the federal funds rate in March and June, the yield on 30-year Treasury bonds have drifted downward, to their current level of about 2.75 percent. As discussed below, the Federal Reserve does not directly determine long-term rates. Long-term rates are primarily driven by economic growth and inflation.

Q: How will interest rates and cost of capital be affected by economic factors in the long term?

A: In the long term, the key drivers of economic growth measured in nominal dollars are population growth, the advancement and diffusion of science and technology, and currency inflation.[11] Although the U.S. experienced rapid economic growth during the "post-war" period (the 63 years that separated the end of World War II and the 2008 financial crisis), the post-war period is not necessarily reflective of expected future growth. It was marked by a near-trebling of global population, from under 2.5 billion to approximately 6.7 billion. Over the next 50 years, according to United Nations

[11] Loretta Mester, *Long-Run Economic Growth*, Federal Reserve Bank of Cleveland (Oct. 15, 2015), https://www.clevelandfed.org/newsroom-and-events/speeches/sp-20151015-long-run-economic-growth.aspx.

projections, the global population will grow considerably more slowly, reaching approximately 10.3 billion in 2070. With population growth slowing, life expectancies lengthening, and post-war "baby boomers" reaching retirement age, median ages in developed-economy nations have risen and continue to rise. The postwar period was also marked by rapid catch-up growth as Europe, Japan, and China recovered from successive devastations and as regions such as India and China, deployed and leapfrogged technologies that had been developed over a much longer period in earlier-industrialized nations. That period of rapid catch-up growth is coming to an end. For example, although China remains one of the world's fastest-growing regions, its growth is now widely expected to slow substantially. This convergence of projected growth in the former "second world" and "third world" towards the slower growth of the nations that have long been considered "first world" is illustrated in this "key findings" chart published by the Organization for Economic Co-operation and Development.

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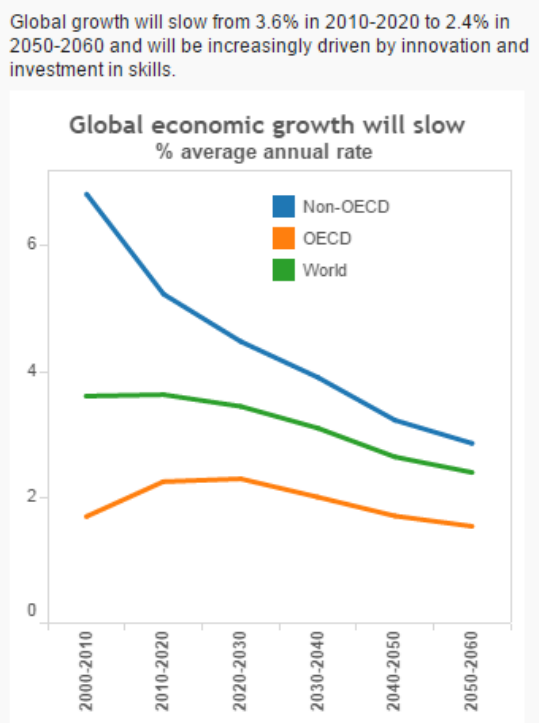
Figure 2
Projected Global Growth[12]

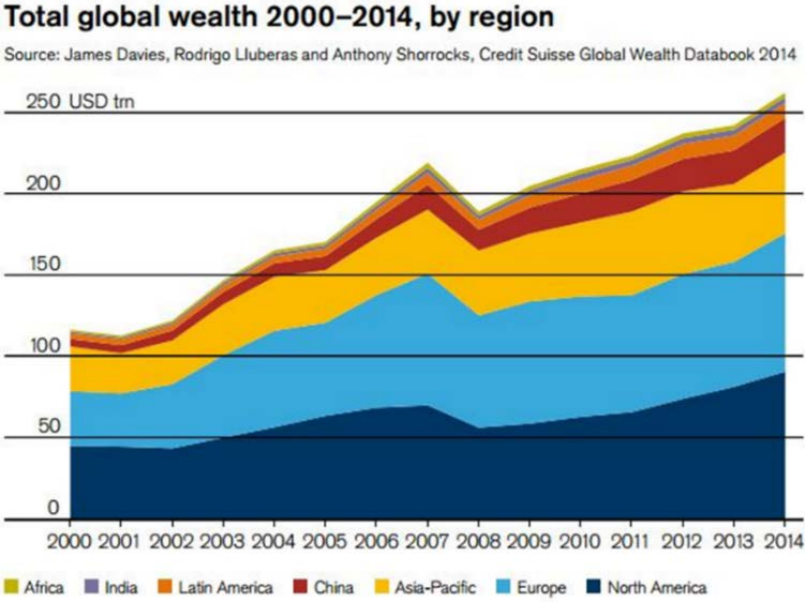


As to dollar inflation, it has declined to far below the level it reached in the 1970s. The Federal Reserve targets a 2 percent inflation rate; however, actual inflation has been below this figure. Indeed, inflation has been below the Fed's target rate for over five years due to a number of factors, including slow global economic growth, slack in the economy, and declining energy and commodity prices. The slow pace of inflation is also reflected in the decline in forecasts of future inflation. The Energy Information Administration's annual Energy Outlook includes in its nominal GDP growth projection a long-term inflation component, which the EIA projects at only 2.1 percent per year for its forecast period through 2040.[13]

[12] OECD, *Economic Outlook, Analysis and Forecasts*, Organization for Economic Co-operation and Development (last visited Jun. 29, 2017), http://www.oecd.org/eco/outlook/lookingto2060.htm.
[13] U.S Energy Information Administration, *EIA Annual Energy Outlook 2016*, *see* Table 20, EIA, http://www.eia.gov/forecasts/aeo/tables_ref.cfm).

All of this translates into slowed growth in annual economic production and income, even when measured in nominal rather than real dollars. Meanwhile, as shown below, the stored wealth that is available to fund investments has continued to rise.[14] According to the most recent release of the Credit Suisse global wealth report, global wealth has more than doubled since the turn of this century, notwithstanding the temporary setback following the 2008 financial crisis:

Figure 3
Global Wealth – 2000-2014



These long-term trends mean that overall, and relative to what had been the post-war norm, the world now has more wealth chasing fewer opportunities for investment rewards. Ben Bernanke, the former Chairman of the Federal Reserve, called this phenomenon a "global savings glut."[15] Like any other liquid market, capital markets are subject to the law of supply and demand. With a large supply of capital available for

[14] Jim Davies, Rodrigo Liuberas, & Anthony Shorrocks, *Credit Suisse Global Wealth Report 2014*, Credit Suisse (Oct. 2014), http://economics.uwo.ca/people/davies_docs/credit-suisse-global-wealth-report-2014.pdf

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

investment and relatively scarce demand for investment capital, it should be no surprise to see the cost of investment capital decline, keeping interest rates low.

Q: On the issue of the Federal Reserve and long-term interest rates, please highlight Mr. Bernanke's recent take on the low interest rates in the U.S.

A: Mr. Bernanke addressed the issue of the continuing low interest rates in his weekly Brookings Blog. He indicated that the focus should be on real and not nominal interest rates and noted that, in the long term, these rates are not determined by the Federal Reserve:

> If you asked the person in the street, "Why are interest rates so low?," he or she would likely answer that the Fed is keeping them low. That's true only in a very narrow sense. The Fed does, of course, set the benchmark nominal short-term interest rate. The Fed's policies are also the primary determinant of inflation and inflation expectations over the longer term, and inflation trends affect interest rates, as the figure above shows. But what matters most for the economy is the real, or inflation-adjusted, interest rate (the market, or nominal, interest rate minus the inflation rate). The real interest rate is most relevant for capital investment decisions, for example. The Fed's ability to affect real rates of return, especially longer-term real rates, is transitory and limited. Except in the short run, real interest rates are determined by a wide range of economic factors, including prospects for economic growth—not by the Fed. [16]

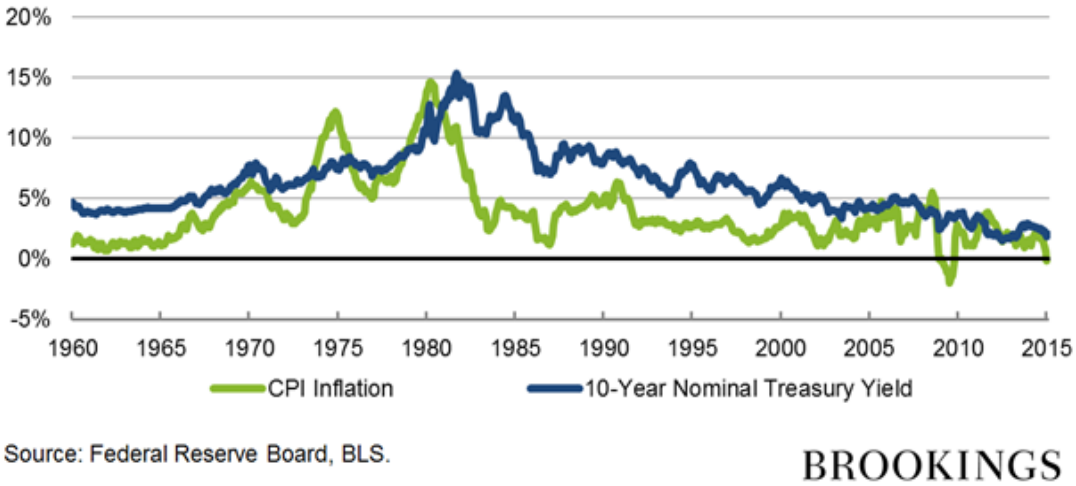
Mr. Bernanke also addressed the issue about whether low-interest rates are a short-term aberration or a long-term trend:

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

[16] Ben S. Bernanke, *Why are Interest Rates So Low*, Brookings Weekly Blog, (Mar. 30, 2015), https://www.brookings.edu/blog/ben-bernanke/2015/03/30/why-are-interest-rates-so-low/.

also very low today; the real or inflation-adjusted return on lending to the U.S. government for five years is currently about minus 0.1 percent.[17] Figure 4 below presents Mr. Bernanke's comparison of interest rates and CPI inflation over time.

Figure 4[18]
Interest Rates and Inflation
1960-2015



Q: What is your opinion regarding the future outlook for interest rates and capital costs?

A: I believe that U.S. Treasuries offer an attractive yield relative to those of other major governments around the world. The yield will attract capital to the U.S. and keep U.S. interest rates down. There are several factors driving this conclusion.

First, the U.S. economy has been growing for over seven years, and as noted above, the Federal Reserve sees continuing strength in the economy. The labor market has improved, unemployment is now below 5.0 percent, and the stock market is near an all-time high.

Second, interest rates remain at relatively low levels and are likely to remain low.

[17] *Id.*
[18] *Id.*

There are two factors driving the continued lower interest rates: (1) inflationary expectations in the U.S. remain low; and (2) global economic growth – including Europe, where growth is stagnant, and China, where growth is slowing significantly.

As a result, while the yields on long-term U.S. Treasury bonds are low by historical standards, these yields are well above the government bond yields in Germany, Japan, and the United Kingdom. Thus, U.S. Treasuries offer an attractive yield relative to those of other major governments around the world, thereby attracting capital to the U.S. and keeping U.S. interest rates down.

Q: What do you recommend the commission do regarding the forecasts of higher interest rates and capital costs?

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

which would be a negative 20 percent return on the stock.[19] Obviously, investors would not buy the utility stock with an expected return of negative 20 percent due to higher dividend yield requirements.

In sum, it appears to be impossible to accurately forecast prices and rates that are determined in the financial markets, such as interest rates, the stock market, and gold prices. For interest rates, I have never seen a study that suggests one forecasting service is consistently better than others or that interest rate forecasts are consistently better than just assuming that the current interest rate will be the rate in the future.

IV. PROXY GROUP SELECTION

Q: Please describe your approach to developing a fair rate of return recommendation for the company.

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 utility companies ("Electric Proxy Group"). I have also employed the group developed by Dr. Morin ("Morin Proxy Group"), as well as a group of gas distribution companies ("Gas Proxy Group").

Q: Please describe your proxy group of companies.

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

- At least 50 percent of revenues from regulated electric operations as reported by *AUS Utilities Report*;
- Listed as an Electric Utility by *Value Line Investment Survey*;
- An investment-grade corporate credit and bond rating;

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

- Has paid a cash dividend for the past six months, with no cuts or omissions;
- Not involved in an acquisition of another utility, and not the target of an acquisition; and
- Analysts' long-term earnings per share (EPS) growth rate forecasts available from Yahoo, Reuters, and/or Zack's.

The Electric Proxy Group includes thirty companies. Summary financial statistics for the proxy group are listed in Exhibit JRW-6, page one.[20] The median operating revenues and net plant among members of the Electric Proxy Group are $6,237.5 million and $17,722.5 million, respectively. The group receives 82 percent of its revenues from regulated electric operations, has a BBB+ bond rating from Standard & Poor's and a Baa1 rating from Moody's, a common equity ratio of 46.9 percent, and an earned return on common equity of 9.3 percent.

Q: Please describe the Morin proxy group.

A: Dr. Morin's group is smaller (eighteen utilities) and includes combination electric and gas utility companies. Summary financial statistics for Dr. Morin's proxy group are provided in Panel B of page one of Exhibit JRW-6. The median operating revenues and net plant for the Morin Proxy Group are $6,935.7 million and $17,722.5 million, respectively. The group receives 67 percent of its revenues from regulated electric operations and 20 percent from regulated gas operations, has a A-/BBB+ bond rating from Standard & Poor's and a Baa1 rating from Moody's, a common equity ratio of 47.1 percent and an earned return on common equity of 9.4 percent.

Q: Please describe your proxy group of gas distribution companies.

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

A: My Gas Proxy Group consists of eight natural gas distribution companies. The companies include Atmos Energy, Chesapeake Utilities, New Jersey Resources, NiSource, Inc. Northwest Natural Gas Company, South Jersey Industries, Southwest Gas, and Spire.

Summary financial statistics for the Gas Proxy Group are listed on Panel C of page one of Exhibit JRW-6. The median operating revenues and net plant among members of the Gas Proxy Group are $1,709.1 million and $2,955.5 million, respectively. The group receives 59 percent of revenues from regulated gas operations, has an A- average issuer credit rating from S&P and an A3 long-term rating from Moody's, a median common equity ratio of 48.1 percent, and a median earned return on common equity of 9.4 percent.

Q: How does the investment risk of the company compare to that of your proxy groups?

A: I believe that bond ratings provide a good assessment of the investment risk of a company. PSE's issuer credit rating is BBB according to S&P and Baa1 according to Moody's. As shown in Table 1, PSE's Moody's credit rating is the same as the Electric and Morin Proxy Groups, and below the Gas Proxy Group. PSE's S&P issuer credit rating and a notch below the Electric Proxy Group (BBB vs. BBB+), a notch a one-half below the Morin Proxy Group (BBB vs. A-/BBB+), and two notches below the Gas Proxy Group (BBB vs. A-). This suggests that PSE is slightly riskier than the averages of the proxy groups.

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Table 1
S&P and Moody's Credit Ratings

	S&P Issuer Credit	Moody's Long-Term Credit Rating
PSE	**BBB**	**Baa1**
Electric Proxy Group	**BBB+**	**Baa1**
Morin Proxy Group	**A-/BBB+**	**Baa1**
Gas Proxy Group	**A-**	**A3**

Q: Please discuss the risk analysis you preformed on page two of Exhibit JRW-6.

A: On page two of Exhibit JRW-6, I have assessed the riskiness of the three 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 (0.68 vs. 0.68 vs. 0.72), Financial Strength (A vs. A vs. A) Safety (2.0 vs. 1.8 vs. 1.9), Earnings Predictability (80 vs. 83 vs. 78), and Stock Price Stability (95 vs. 95 vs. 88). Overall, these measures suggest that the three proxy groups are similar in risk.

V. CAPITAL STRUCTURE RATIOS AND DEBT COST RATES

Q: What are PSE's recommended capital structure and senior capital cost rates for ratemaking purposes?

A: PSE witness Mr. Brandon Lohse provides PSE's capital structure and senior capital cost rates. Mr. Lohse has recommended a capital structure consisting of 1.00 percent short-term debt, 50.50 percent long-term debt, and 48.50 percent common equity for PSE. He has recommended short-term and long-term debt cost rates of 3.06 percent and 5.73 percent. His weighted short-term debt rate includes as adjustment of 0.02 percent for commitment fees and 0.01 percent for the amortization of short-term issue costs. His

weighted long-term debt cost rate includes an adjustment of 0.03 percent for the amortization of reacquired debt.[21]

Q: Please discuss the capital structures of the companies in the proxy groups.

A: Panel B of Exhibit JRW-7 provides the average common equity ratios for the companies in the three proxy groups. The average common equity ratios for the Electric, Morin, and Gas Proxy Groups were 46.91 percent, 47.08 percent, and 48.09 percent as of December 31, 2016. These ratios indicate that PSE's proposed capital structure, with a common equity ratio of 48.50 percent, is similar to the averages of the proxy groups. Based on this similarity, I believe that PSE's proposed capital structure is reasonable and I will employ it in my cost of capital recommendation.

Q: What senior capital cost rates are you using for PSE?

A: I am using the Company's proposed short-term and long-term debt cost rates of 3.06 percent and 5.73 percent. I am also utilizing the adjustments to the short-term and long-term debt cost rate for commitment fees and amortization of term issuance costs and of reacquired debt.

VI. 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

[21] Direct Testimony of Brandon J. Lohse, BJL-1T, at 1-2.

avoiding duplication of these services and the construction of utility infrastructure facilities, many 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 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 that required by investors, or when a firm earns a return on equity in excess of its cost of equity, investors respond by valuing the firm's equity in excess of its book value.

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

> 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. [22]

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

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

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

A: This relationship is discussed in a classic Harvard Business School case study entitled "Note on Value Drivers." On page two 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 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*[23]

To assess the relationship by industry, as suggested above, I performed a regression study between estimated ROE and market-to-book ratio ratios using natural gas distribution, electric utility, and water utility companies. I used all companies in these three industries that are covered by *Value Line* and have estimated ROE and market-to-book ratio data. The results are presented in Panels A-C of Exhibit JRW-8. The average R-squares for the electric, gas, and water companies are 0.77, 0.56, and 0.75,

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

respectively.[24] This demonstrates the strong positive relationship between ROEs and market-to-book ratios for public utilities.

Q: What economic factors have affected the cost of equity capital for public utilities?

A: Exhibit JRW-9 provides indicators of public utility equity cost rates over the past decade.

Page one shows the yields on long-term A-rated public utility bonds. These yields decreased from 2000 until 2003, and then hovered in the 5.50 percent-6.50 percent range from mid-2003 until mid-2008. These yields peaked in November 2008 at 7.75 percent during the Great Recession. Henceforth, these yields have generally declined since then, dropping below 4.0 percent on three occasions - in mid-2013, in the first quarter of 2015, and then again in the summer of 2016. These yields have increased to about 4.15 percent in the past six months, with much of the increase coming in the wake of the November 2016 U.S. presidential election.

Page two of Exhibit JRW-9 provides the dividend yields for electric utilities over the past 16 years. The dividend yields for this electric group have declined from the year 2000 to 2007, increased to 5.2 percent in 2009, and have declined steadily since that time. The average dividend yield was 3.40 percent in 2016.

Average earned returns on common equity and market-to-book ratios for electric utilities are on page three of Exhibit JRW-9. For the electric group, earned returns on common equity have declined gradually since the year 2000 and have been in the 9.0 percent range in recent years. The average market-to-book ratios for this group peaked at 1.68X in 2007, declined to 1.07X in 2009, and have increased since that time. As of

[24] 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.

2016, the average market-to-book for the group was 1.75X. This means that, for at least the last decade, returns on common equity have been greater than the cost of capital, or more than necessary to meet investors' required returns. Furthermore, this implies that customers have been paying more than necessary to support an appropriate profit level for regulated utilities.

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 affecting 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.

In Exhibit JRW-10, I provide an assessment of investment risk for 97 industries as measured by beta, which according to modern capital market theory, is the only relevant measure of investment risk. These betas come from the *Value Line Investment Survey*. The study shows that the investment risk of utilities is very low. The average betas for electric, water, and gas utility companies are 0.69, 0.73, and 0.76, respectively.[25] As such, the cost of equity for utilities is among the lowest of all industries in the U.S.

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 with comparable risks.

According to valuation principles, the present value of an asset equals the discounted value of its expected future cash flows.[26] 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 associate with common stock ownership.

[25] The beta for the *Value Line* Electric Utilities is the simple average of Value Line's Electric East (0.65), Central (0.73), and West (0.70) group betas.
[26] R. Brealey, S. Myers, & F. Allen, Principles of Corporate Finance, Chapter 2, (9th ed. 2008).

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 do you plan to estimate the cost of equity capital for PSE?

A: I rely primarily on the discounted cash flow ("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 a capital asset pricing model ("CAPM") study; however, I give these results less weight, as 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.

A. Discounted Cash Flow Analysis

Q: Please describe the theory behind the traditional DCF model.

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

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

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

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

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

A: Yes. Virtually all investment firms use some form of the DCF model as a valuation technique. One common application for investment firms is called the three-stage DCF or dividend discount model ("DDM").[27] The stages in a three-stage DCF model are presented in Exhibit JRW-11, Page one of two. 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

[27] *Id.* Chapter 5.

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. The constant-growth DCF model is appropriate when a firm is in the maturity stage of the life cycle.

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

Q: How do you estimate stockholders' expected or required rate of return using the DCF model?

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

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

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

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

Q: In your opinion, is the constant-growth DCF model appropriate for public utilities?

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

Q: What factors should one consider when applying the DCF methodology?

A: One should be sensitive to several factors when using the DCF model to estimate a firm's cost of equity capital. In general, one must recognize the assumptions under which the DCF model was developed in estimating its components (the dividend yield and the expected growth rate). The dividend yield can be measured precisely at any point in time; however, it tends to vary somewhat over time. Estimation of expected growth is

considerably more difficult, as it considers recent firm performance, in conjunction with current economic developments and other information available to investors, to accurately estimate investors' expectations.

Q: What dividend yields have you reviewed?

A: I have calculated the dividend yields for the companies in the proxy group using the current annual dividend and the 30-day, 90-day, and 180-day average stock prices. These dividend yields are provided in Panel A of page two in Exhibit JRW-12. For the Electric Proxy Group, the median dividend yields using the 30-day, 90-day, and 180-day average stock prices range from 3.20 percent to 3.40 percent. I am using the average of the medians, 3.30 percent, as the dividend yield for the Electric Proxy Group. The dividend yields for the Morin Proxy Group are shown in Panel B of page 2 of Exhibit JRW-12. The median dividend yields range from 3.2 percent to 3.4 percent using the 30-day, 90-day, and 180-day average stock prices. I am using the average of the medians, 3.25 percent, as the dividend yield for the Morin Proxy Group. The dividend yields for the Gas Proxy Group are shown in Panel C of page two of Exhibit JRW-12. The median dividend yields range from 2.7 percent to 2.9 percent using the 30-day, 90-day, and 180-day average stock prices. I am using the average of the medians, 2.8 percent, as the dividend yield for the Gas Proxy Group.

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

A: According to the traditional DCF model, the dividend yield term relates 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 four, 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.[28]

In applying the DCF model, some analysts adjust the current dividend for growth over the coming year as opposed to the coming quarter. This can be complicated because firms tend to announce changes in dividends at different times during the year. As such, the dividend yield computed based on presumed growth over the coming quarter as opposed to the coming year can be quite different. Consequently, it is common for analysts to adjust the dividend yield by some fraction of the long-term expected growth rate.

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

A: I adjust the dividend yield by one-half (1/2) of the expected growth, so as to reflect growth over the coming year. This is the approach employed by the Federal Energy Regulatory Commission ("FERC").[29] The DCF equity cost rate ("K") is computed as:

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

Q: Please discuss the growth rate component of the DCF model.

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

Q: What growth data have you reviewed for the proxy groups?

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[28] *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 (Apr. 1980).

[29] Opinion No. 414-A, *Transcon. Gas Pipe Line Corp.*, 84 FERC ¶ 61, 084 (F.E.R.C. July 29, 1998).

A: I have analyzed a number of measures of growth for companies in the proxy groups. I reviewed *Value Line's* historical and projected growth rate estimates for earnings per share ("EPS"), dividends per share ("DPS"), and book value per share ("BVPS"). In addition, I utilized the average EPS growth rate forecasts of Wall Street analysts as provided by Yahoo, Reuters and Zacks.[30] 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. Additionally, 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

[30] www.reuters.com, www.zacks.com, https://finance.yahoo.com/.

capital using the conventional DCF model, a look to long-term growth rate expectations is required.

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 and is also significant in determining long-run earnings and, therefore, dividends. Investors recognize the importance of internally generated growth and pay premiums for stocks of companies that retain earnings and earn high returns on internal investments.

Q: Please discuss the services that provide analysts' EPS forecasts.

A: Analysts' EPS forecasts for companies are collected and published by a number of different investment information services, including Institutional Brokers Estimate System ("I/B/E/S"), Bloomberg, FactSet, Zacks, First Call and Reuters, among others. These services do not reveal the analysts who are solicited for forecasts or the identity of the analysts who actually provide the EPS forecasts, which are used in the compilations published by the services.

Q: Please provide an example of these EPS forecasts.

A: The following example provides the EPS forecasts compiled by Reuters for Alliant Energy Corp. (stock symbol "LNT"). The figures and citation are provided on page two of Exhibit JRW-11. Line one shows that one analyst has provided EPS estimates for the quarter ending June 30, 2017. The mean, high and low estimates are $0.37, $0.41, and $0.31, respectively. The second line shows the quarterly EPS estimates for the quarter ending September 30, 2017 of $0.91 (mean), $1.02 (high), and $0.86 (low). Line three

shows the annual EPS estimates for the fiscal year ending December 2017 ($2.00 (mean), $2.04 (high), and $1.96 (low). Line four shows the annual EPS estimates for the fiscal year ending December 2018 ($2.13 (mean), $2.19 (high), and $2.10 (low). The quarterly and annual EPS forecasts in lines one through four are expressed in dollars and cents. As in the LNT case shown here, it is common for more analysts to provide estimates of annual EPS as opposed to quarterly EPS. The bottom line (five) shows the projected long-term EPS growth rate, which is expressed as a percentage. For LNT, two analysts have provided a long-term EPS growth rate forecast, with mean, high, and low growth rates of 6.35 percent, 6.70 percent, and 6.00 percent.

Q: Which of these eps forecasts is used in developing a DCF growth rate?

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

Q: Why do you not rely exclusively on the eps forecasts of Wall Street analysts in arriving at a DCF growth rate for the proxy group?

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

Second, a recent study by Lacina, Lee, and Xu (2011) has shown that analysts' long-term earnings growth rate forecasts are not more accurate at forecasting future

earnings than naïve random walk forecasts of future earnings.[31] 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 three to five years proved to be just as accurate as using the EPS estimates from analysts' long-term earnings growth rate forecasts. In the authors' opinion, these results indicate that analysts' long-term earnings growth rate forecasts should be used with caution as inputs for valuation and cost of capital purposes.

Finally, and most significantly, it is well known that the long-term EPS growth rate forecasts of Wall Street securities analysts are overly optimistic and upwardly biased. This has been demonstrated in a number of academic studies over the years.[32] 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.[33]

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

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

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[31] 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 at 77-101.

[32] 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, at 725-55 (Jun./Jul. 1999);. P. DeChow, A. Hutton, & 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, at 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, at 14-17, (Spring 2010).

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

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

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

Q: Please discuss the historical growth of the companies in the proxy groups, as provided by *value line.*

A: Page three of Exhibit JRW-12 provides the five- and ten- 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 percent to 5.5 percent, with an average of the medians of 4.3 percent. For the Morin Proxy Group, as shown in Panel B of page 3 of Exhibit JRW-12, the historical growth measures in EPS, DPS, and BVPS, as measured by the medians, range from 4.0 percent to 6.0 percent, with an average of the medians of 4.9 percent. The median historical growth measures for EPS, DPS, and BVPS for the Gas Proxy Group, as provided in Panel C, range from 3.8 percent to 6.5 percent, with an average of the medians of 5.4 percent.

Q: Please summarize *Value Line's* projected growth rates for the companies in the Proxy Groups.

A: *Value Line's* projections of EPS, DPS, and BVPS growth for the companies in the proxy groups are shown on page 4 of Exhibit JRW-12. 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 Exhibit JRW-12, the medians range from 4.0 percent to 6.0 percent,

with an average of the medians of 5.2 percent. The range of the medians for the Morin Proxy Group, shown in Panel B of page 4 of Exhibit JRW-12, is from 4.0 percent to 6.0 percent, with an average of the medians of 5.2 percent. The range of the medians for the Gas Proxy Group, shown in Panel C of page 4 of Exhibit JRW-12, is from 4.5 percent to 6.8 percent, with an average of the medians of 5.4 percent.

Also provided on page four of Exhibit JRW-12 are the prospective sustainable growth rates for the companies in the 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, Morin and Gas Proxy Groups, the median prospective sustainable growth rates are 3.9 percent, 4.3 percent and 4.2 percent, respectively.

Q: Please assess growth for the proxy groups as measured by analysts' forecasts of expected five-year EPS growth.

A: Yahoo, Zacks, and Reuters collect, summarize, and publish Wall Street analysts' long-term EPS growth rate forecasts for the companies in the proxy groups. These forecasts are provided for the companies in the proxy groups on page five of Exhibit JRW-12. 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 each company. The mean/median of analysts' projected EPS growth rates for the Electric, Morin, and Gas Proxy Groups are 4.5 percent/5.4 percent, 5.5 percent/5.6

percent, and 6.1 percent/6.5 percent, respectively.[34]

Q: Please summarize your analysis of the historical and prospective growth of the Proxy Groups.

A: Page six of Exhibit JRW-12 shows the summary DCF growth rate indicators for the proxy groups.

The historical growth rate indicators for my Electric Proxy Group imply a baseline growth rate of 4.3 percent. The average of the projected EPS, DPS, and BVPS growth rates from *Value Line* is 4.8 percent, and *Value Line*'s projected sustainable growth rate is 3.9 percent. The projected EPS growth rates of Wall Street analysts for the Electric Proxy Group are 4.5 percent and 5.4 percent as measured by the mean and median growth rates. The overall range for the projected growth rate indicators (ignoring historical growth) is 3.9 percent to 5.4 percent. Giving primary weight to the projected EPS growth rate of Wall Street analysts, I believe that the appropriate projected growth rate is 5.25 percent. 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 Morin Proxy Group, the historical growth rate indicators indicate a growth rate of 4.9 percent. The average of the projected EPS, DPS, and BVPS growth rates from *Value Line* is 5.2 percent, and *Value Line*'s projected sustainable growth rate is 4.3 percent. The projected EPS growth rates of Wall Street analysts are 5.5 percent and 5.6 percent as measured by the mean and median growth rates. The overall range for the projected growth rate indicators is 4.3 percent to 5.6 percent. Giving primary weight to the projected EPS growth rate of Wall Street analysts, I believe that the appropriate

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

projected growth rate is 5.5 percent for the Morin Group. This growth rate figure is in the upper end of the range of historic and projected growth rates for the Morin Proxy Group.

The historical growth rate indicators for my Gas Proxy Group indicate a baseline growth rate of 5.4 percent. The average of the projected EPS, DPS, and BVPS growth rates from *Value Line* is 5.4 percent, and *Value Line*'s projected sustainable growth rate is 4.2 percent. The projected EPS growth rates of Wall Street analysts for the Gas Proxy Group are 6.1 percent and 6.5 percent as measured by the mean and median growth rates. The overall range for the projected growth rate indicators (ignoring historical growth) is 4.2 percent to 6.5 percent. Giving primary weight to the projected EPS growth rate of Wall Street analysts, I believe that the appropriate projected growth rate is 6.0 percent for the Gas Proxy Group. This growth rate figure is in the upper end of the range of historic and projected growth rates for the group.

Q: Based on the above analysis, what are your indicated common equity cost rates from the DCF model for the Proxy Groups?

A: My DCF-derived equity cost rates for the groups are summarized on page one of Exhibit JRW-12 and in Table 2 below.

Table 2
DCF-derived Equity Cost Rate/ROE

	Dividend Yield	**1 + ½ Growth Adjustment**	**DCF Growth Rate**	**Equity Cost Rate**
Electric Proxy Group	**3.30%**	**1.02625**	**5.25%**	**8.65%**
Morin Proxy Group	**3.25%**	**1.02750**	**5.50%**	**8.85%**
Gas Proxy Group	**2.80%**	**1.03000**	**6.00%**	**8.90%**

The DCF result for the Electric Proxy Group is the 3.30 percent dividend yield, times the one and one-half growth adjustment of 1.02625, plus the DCF growth rate of 5.25 percent, which results in an equity cost rate of 8.65 percent. The result for the Morin Proxy Group is 8.85 percent, which includes a dividend yield of 3.25 percent, an adjustment factor of 1.02750, and a DCF growth rate of 5.50 percent. For the Gas Proxy Group, the DCF result Group is the 2.80 percent dividend yield, times the one and one-half growth adjustment of 1.0300, plus the DCF growth rate of 6.0 percent, which results in an equity cost rate of 8.90 percent.

B. Capital Asset Pricing Model

Q: Please discuss the capital asset pricing model ("CAPM").

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

$$k = R_f + RP$$

The yield on long-term U.S. Treasury securities is normally used as R_f. Risk premiums are measured in different ways. The CAPM is a theory of the risk and expected returns of common stocks. In the CAPM, two types of risk are associated with a stock: firm-specific risk or unsystematic risk, and market or systematic risk, which is measured by a firm's beta. The only risk that investors receive a return for bearing is systematic risk.

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

$$K = (R_f) + ß * [E(R_m) - (R_f)]$$

Where:

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

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

Q: Please discuss Exhibit JRW-13.

A: Exhibit JRW-13 provides the summary results for my CAPM study. Page one 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 two of Exhibit JRW-13, the yield on 30-year U.S. Treasury bonds has been in the 2.5 percent to 4.0 percent range over the 2013–2017 time period. The current 30-year Treasury yield is in the middle of this range. Given the recent range of yields and the possibility of higher interest rates, I use the higher end 4.0 percent as the risk-free rate, or R_f, in my CAPM.

Q: Does your 4.0 percent risk-free interest rate take into consideration forecasts of higher interest rates?

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

Q: What Betas are you employing in your CAPM?

A: Beta (ß) is a measure of the systematic risk of a stock. The market, usually taken to be the S&P 500, has a beta of 1.0. The beta of a stock with the same price movement as the market also has a beta of 1.0. A stock whose price movement is greater than that of the

market, such as a technology stock, is riskier than the market and has a beta greater than 1.0. A stock with below average price movement, such as that of a regulated public utility, is less risky than the market and has a beta less than 1.0. Estimating a stock's beta involves running a linear regression of a stock's return on the market return.

As shown on page three of Exhibit JRW-13, the slope of the regression line is the stock's ß. A steeper line indicates that the stock is more sensitive to the return on the overall market. This means that the stock has a higher ß and greater-than-average market risk. A less steep line indicates a lower ß and less market risk.

Several online investment information services, such as Yahoo and Reuters, provide estimates of stock betas. Usually these services report different betas for the same stock. The differences are usually due to: the time period over which ß is measured and any adjustments that are made to reflect the fact that betas tend to regress to 1.0 over time. In estimating an equity cost rate for the proxy groups, I am using the betas for the companies as provided in the *Value Line Investment Survey*. As shown on page three of Exhibit JRW-13, the median betas for the companies in the Electric Morin, and Gas Proxy Groups are 0.68, 0.68, and 0.70, respectively.

Q: Please discuss the market risk premium.

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

measure $E(R_m)$, and studies have come up with significantly different magnitudes for $E(R_m)$. As Merton Miller, the 1990 Nobel Prize winner in economics indicated, $E(R_m)$ is very difficult to measure and is one of the great mysteries in finance.[35]

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

A: Page four of Exhibit JRW-13 highlights the primary approaches to, and issues in, estimating the expected MRP. The traditional way to measure the MRP was to use the difference between historical average stock and bond returns. In this case, historical stock and bond returns, also called *ex post* returns, were used as the measures of the market's expected return (known as the *ex-ante* or forward-looking expected return). This type of historical evaluation of stock and bond returns is often called the "Ibbotson approach" after Professor Roger Ibbotson, who popularized this method of using historical financial market returns as measures of expected returns.[36] Most historical assessments of the equity risk premium suggest an equity risk premium range of five percent to seven percent above the rate on long-term U.S. Treasury bonds. However, this can be a problem because: (1) *ex post* returns are not the same as *ex ante* expectations; (2) market risk premiums can change over time, increasing when investors become more risk-averse and decreasing when investors become less risk-averse; and (3) market conditions can change, such that *ex post* historical returns are poor estimates of *ex ante* expectations.

The use of historical returns as market expectations has been criticized in numerous academic studies, as discussed later in my testimony. The general theme of

[35] Merton Miller, *The History of Finance: An Eyewitness* Account, Journal of Applied Corporate Finance, at 3, (2000).
[36] Roger Ibbotson, et al, Duff & Phelps, *2016 SBBI Yearbook Stocks, Bonds, Bills, and Inflation*, (Sept. 6, 2016).

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.[37]

In addition, there are a number of surveys of financial professionals regarding the MRP. There have also been several published surveys of academics on the equity risk premium. *CFO Magazine* conducts a quarterly survey of CFOs, which includes questions regarding their views on the current expected returns on stocks and bonds. Usually, over 300 CFOs participate in the survey.[38] 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*.[39] This survey of professional economists has been published for almost fifty years. Additionally, Pablo Fernandez conducts annual surveys of financial analysts and companies regarding the equity risk premiums they use in their investment and financial decision-making.[40]

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[37] Rajnish Mehra & Edward C. Prescott, *The Equity Premium: A Puzzle*, Journal of Monetary Economics, at 145 (1985).

[38] DUKE/CFO Magazine Global Business Outlook Survey (March 2017), www.cfosurvey.org,

[39] Federal Reserve Bank of Philadelphia, *Survey of Professional Forecasters* (Feb. 2017). The Survey of Professional Forecasters was formerly conducted by the American Statistical Association ("ASA") and the National Bureau of Economic Research ("NBER") and was known as the ASA/NBER survey. The survey, which began in 1968, is conducted each quarter. The Federal Reserve Bank of Philadelphia, in cooperation with the NBER, assumed responsibility for the survey in June 1990.

[40] Pablo Fernandez, Vitaly Pershin & Isabel Fernandez Acín, *Discount Rate (Risk-Free Rate and Market Risk Premium) used for 41 countries in 2017: A Survey*. IESE Business School, (Apr. 17, 2017).

Q: Please provide a summary of the MRP studies.

A: Derrig and Orr (2003), Fernandez (2007), and Song (2007) completed the most comprehensive review of the research on the MRP.[41] Derrig and Orr's study evaluated the various approaches to estimating MRPs, as well as the issues with the alternative approaches and summarized the findings of the published research on the MRP. Fernandez examined four alternative measures of the MRP – historical, expected, required, and implied. He also reviewed the major studies of the MRP and presented the summary MRP results. Song provides an annotated bibliography and highlights the alternative approaches to estimating the MRP.

Page five of Exhibit JRW-13 provides a summary of the results of the primary risk premium studies reviewed by Derrig and Orr, Fernandez, and Song, as well as other more recent studies of the MRP. In developing page five of Exhibit JRW-13, I have categorized the studies as discussed on page 4 of Exhibit JRW-13. 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 five of Exhibit JRW-13.

A: Page five of Exhibit JRW-13 provides a summary of the results of the MRP studies that I have reviewed. These include the results of: (1) the various studies of the historical risk premium, (2) *ex ante* MRP studies, (3) MRP surveys of CFOs, financial forecasters,

[41] *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).

analysts, companies and academics, and (4) the Building Blocks approach to the MRP. There are results reported for over forty studies, and the median MRP is 4.63 percent.

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

A: Page five of Exhibit JRW-13 includes some identifiable studies containing every MRP study and survey published over the past decade, where an MRP estimate was provided. Most of these studies were published prior to the financial crisis that began in 2008. In addition, some of these studies were published in the early 2000s at the market peak. It should be noted that many of these studies (as indicated) used data over long periods of time (as long as fifty years of data) and so were not estimating an MRP as of a specific point in time (e.g., the year 2001). To assess the effect of the earlier studies on the MRP, I have reconstructed page five of Exhibit JRW-13 on page six of Exhibit JRW-13; however, I have eliminated all studies dated before January 2, 2010. The median for this subset of studies is 4.86 percent.

Q: Given these results, what MRP are you using in your CAPM?

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

Q: Is your *ex ante* MRP consistent with the MRPs used by CFOs?

A: Yes. In the March 2017 CFO survey conducted by *CFO Magazine* and Duke University, which included approximately 300 responses, the expected 10-year MRP was 4.20 percent.[42] Thus, my 5.5 percent value is a conservatively high estimate of the MRP.

Q: Is your *ex ante* MRP consistent with the MRPs of professional forecasters?

A: The financial forecasters in the previously referenced Federal Reserve Bank of Philadelphia survey projected both stock and bond returns. In the February 2017 survey, the median long-term expected stock and bond returns were 5.60 percent and 3.68 percent, respectively. This provides an expected MRP of 1.92 percent (5.60 percent-3.68 percent). Again, my 5.5 percent value is a conservatively high estimate of the MRP.

Q: Is your *ex ante* MRP consistent with the MRPs of financial analysts and companies?

A: Yes. Pablo Fernandez published the results of his 2017 survey of academics, financial analysts, and companies.[43] This survey included over 4,000 responses. The median MRP employed by U.S. analysts and companies was 5.7 percent.

Q: Is your *ex ante* MRP consistent with the MRPs of financial advisors?

A: Yes. Duff & Phelps is a well-known valuation and corporate finance advisor that publishes extensively on the cost of capital. As of 2017, Duff & Phelps recommended using a 5.5 percent MRP for the U.S, with a normalized risk-free interest rate of 3.5 percent.[44]

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

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[42] *Id.*, at 35.
[43] *Id.*, at 3.
[44] Duff & Phelps, *Cost of Capital*, (last visited Jun. 29, 2017). http://www.duffandphelps.com/insights/publications/cost-of-capital/index.

A: The results of my CAPM study for the proxy groups are summarized on page one of Exhibit JRW-13 and in Table 3 below.

Table 3
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	**4.0%**	**0.68**	**5.5%**	**7.7%**
Morin Proxy Group	**4.0%**	**0.68**	**5.5%**	**7.7%**
Gas Proxy Group	**4.0%**	**0.70**	**5.5%**	**7.9%**

For the Electric and Morin Proxy Groups, the risk-free rate of 4.0 percent plus the product of the beta of 0.68 times the equity risk premium of 5.5 percent results in a 7.7 percent equity cost rate. For the Gas Proxy Group, the risk-free rate of 4.0 percent plus the product of the beta of 0.70 times the equity risk premium of 5.5 percent results in a 7.9 percent equity cost rate.

C. Equity Cost Rate Summary

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

A: My DCF analyses for the Electric, Morin and Gas Proxy Groups indicate equity cost rates are 8.65 percent, 8.85 percent, and 8.90 percent, respectively. The CAPM equity cost rates for the Electric, Morin and Gas Proxy Groups are 7.7 percent, 7.7 percent, and 7.9 percent.

Table 4
ROEs Derived from DCF and CAPM Models

	DCF	CAPM
Electric Proxy Group	**8.65%**	**7.70%**
Morin Proxy Group	**8.85%**	**7.70%**
Gas Proxy Group	**8.90%**	**7.90%**

Q: Given these results, what is your estimated equity cost rate for the groups?

A: Given these results, I conclude that the appropriate equity cost rate for companies in the Electric and Morin Proxy Groups is in the 7.70 percent to 8.90 percent range. Because I give primary weight to the DCF results, and because PSE is a little riskier than the proxy groups, I will use an equity cost rate of 8.85 percent for PSE.

Q: Please indicate why an equity cost rate of 8.85 percent is appropriate for the electric operations of PSE.

A: There are a number of reasons why an equity cost rate of 8.85 percent is appropriate and fair for the Company in this case:

1. I have employed PSE' recommended capital structure and senior capital cost rates;

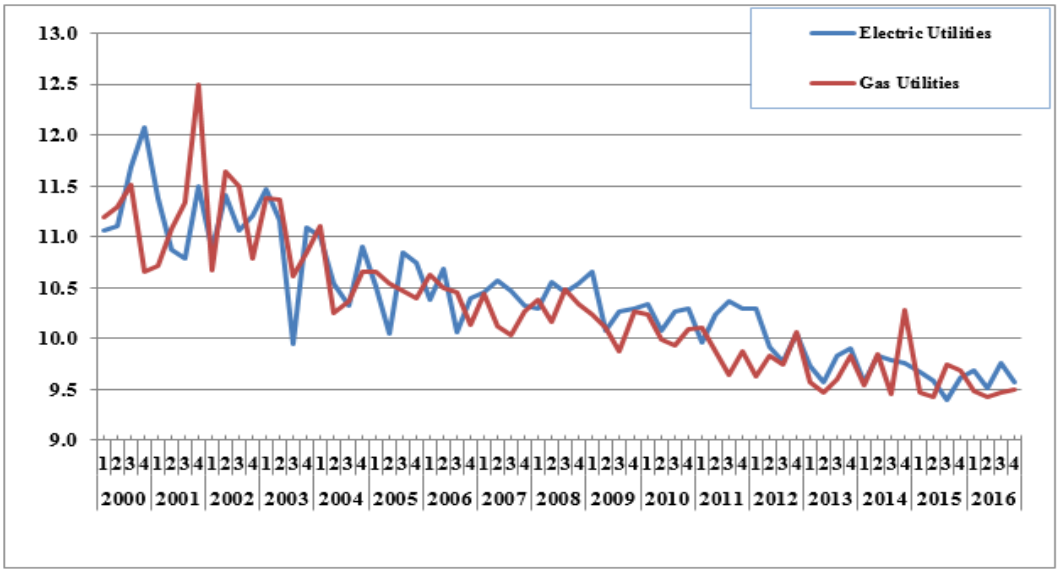
2. As shown in Exhibits JRW-4 and JRW-5, capital costs for utilities, as indicated by long-term bond yields, are still at low levels. In addition, given low inflationary expectations and slow global economic growth, interest rates are likely to remain at low levels for some time.

3. As shown in Exhibit JRW-10, the electric utility and gas distribution industries are among the lowest risk industries in the U.S. as measured by beta. As such, the cost of equity capital for this industry is among the lowest in the U.S., according to the CAPM.

4. As shown in Figure 5, the authorized ROEs for electric utility and gas distribution companies have declined in recent years. The authorized ROEs for electric utilities have declined from 10.01 percent in 2012, to 9.8 percent in 2013, to 9.76 percent in 2014, 9.58 percent in 2015, and 9.60 percent in 2016, according to Regulatory

Research Associates.[45] The authorized ROEs for gas distribution companies have declined from 9.94 percent in 2012, to 9.68 percent in 2013, to 9.78 percent in 2014, 9.60 percent in 2015, and 9.50 percent in 2016. In my opinion, these authorized ROEs have lagged behind capital market cost rates, or in other words, authorized ROEs have been slow to reflect low capital market cost rates. This has been especially true in recent years as some state commissions have been reluctant to authorize ROEs below 10 percent. However, the trend has been towards lower ROEs, and the norm now is below ten percent. Hence, I believe that my recommended ROE reflects the low capital cost rates in today's markets, and these low capital cost rates are finally being recognized by state utility commissions.

Figure 5
Authorized ROEs for Electric Utility and Gas Distribution Companies
2000-2016



[45] *Regulatory Focus*, Regulatory Research Associates, (Jan. 2016). The electric utility authorized ROEs exclude the authorized ROEs in Virginia, which include generation adders.

Q: Do you believe that your 8.85 percent ROE recommendation meets *hope* and *bluefield* standards?

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

Utilities have been earning ROEs of about 9.0 percent (on average) in recent years. As shown on page one of Exhibit JRW-6, the median earned ROE for the year 2016 for the companies in the Electric and Morin Proxy Groups are 9.3 percent and 9.4 percent, respectively.

Given this level of return, the credit ratings of utility companies are going up. The Edison Electric Institute ("EEI") tracks the rating actions of Standard & Poor's, Moody's, and Fitch. Figure 6 shows the rating actions from 2003-2016.[46] The bottom line is the number of rating actions, and the top line is the percentage of upgrades. The percentage of upgrades have been at least 70 percent over the past four years. This provides direct evidence that the investment risk of utility companies is low and declining.

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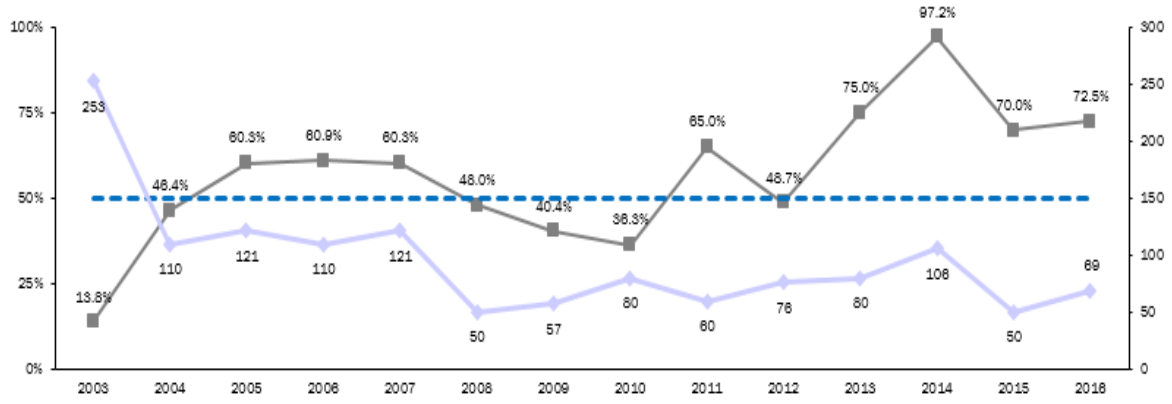
[46] Edison Electric Institute, *Electric Utility Industry Financial Data and Trend Analysis*, EEI, (last visited Jun. 29, 2017). http://www.eei.org/resourcesandmedia/industrydataanalysis/industryfinancialanalysis/QtrlyFinancialUpdates/Pages/default.aspx

Figure 6
Electric Utility Rating Actions and Percentage of Credit Upgrades
2003-2016



Source: Edison Electric Institute, 2017.

Q: Please also discuss your recommendation in light of a Moody's publication on 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. The article explains:

> 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.[47]

Moody's indicates that with the lower authorized ROEs, electric and gas companies are earning ROEs of 9.0 percent to 10.0 percent, yet this is not impairing their credit profiles and is not deterring them from raising record amounts of capital. With

[47] Moody's Investors Service, *Lower Authorized Equity Returns Will Not Hurt Near-Term Credit Profiles*, (Mar. 10, 2015).

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.

> Robust cost recovery mechanisms will help ensure that US regulated utilities' credit quality remains intact over the next few years. As a result, falling authorized ROEs are not a material credit driver at this time, but rather reflect regulators' struggle to justify the cost of capital gap between the industry's authorized ROEs and persistently low interest rates. We also see utilities struggling to defend this gap, while at the same time recovering the vast majority of their costs and investments through a variety of rate mechanisms.[48]

Overall, this article further supports the prevailing/emerging belief that lower authorized ROEs are not hurting the financial integrity of utilities or their ability to attract capital.

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

A: Moody's also highlights in the article that utilities are raising about $50 billion a year in debt capital, despite the lower ROEs.[49]

Q: Have the lower roes hurt the stock performance of utility stocks?

A: No. The graph below show the Dow Jones Utility Index ("DJU") versus the S&P 500 since January 1, 2017.[50] Both the DJU and the S&P 500 are near record levels, and the DJU has actually outperformed over this time period. As a result, with high stock prices, utility dividend yields and DCF equity cost rates are low.

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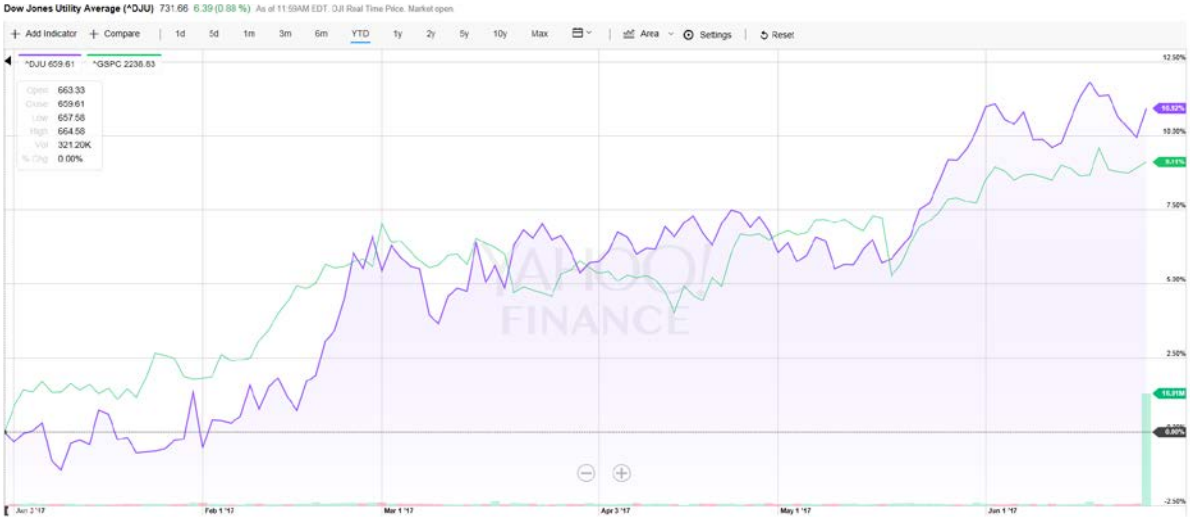
[48] *Id.*
[49] *Id.*
[50] https://finance.yahoo.com/.

Figure 7
Dow Jones Utilities vs. S&P 500
2017



Q: Please review the impact of PSE's 2013 rate plan which included a decoupling mechanism, an expedited rate filing, annual k-factor increases for electric and gas delivery, and an earnings sharing mechanism.

A: PSE witness Mr. Doyle provides a detailed summary of the impact of the 2013 rate plan. He indicates that the plan has enabled PSE to mitigate regulatory lag and attrition and earn ROEs for electric and gas operations, depending on how they are measured, that are slightly below and slightly above PSE's authorized ROE.

Q: In your opinion, what is the impact on the risk and required roe of PSE?

A: As noted in the recent credit reports of both S&P and Moody's, the elements of the 2013 rate plan are clearly a credit positive for PSE and therefore, have reduced the business risk of the Company. Moody's provides details involving the impact of the rate plan on the credit quality of PSE:

> The rate design and regulatory support offered by the WUTC is the primary ratings driver for PSE, which continues to operate under a three year rate

> plan, initiated in 2013 and extended through this year (see section below). This plan includes a series of predetermined annual rate increases, with an allowed ROE of 9.8% on an equity layer of 48%. Forward-looking rate plans are positive, since it provides a degree of assurance and predictability into PSE's financial performance.
>
> PSE's revenue decoupling mechanism is also credit supportive, since it helps PSE to have greater fixed cost recovery in both its electric and gas segments, even in the current declining sales volume environment. The rate plan also included a property tax and conservations riders, as well as an annual earnings test that requires PSE to share with customers on an equal basis any earnings that exceed its authorized return.
>
> PSE also continues to receive timey recovery for it's most significant costs, through the power cost adjustment (PCA), purchased gas adjustment (PGA), and power cost only rate case (PCORC). The PCA and PGA are allowing the company to directly pass the costs of purchased power and natural gas through to customers within a year's time, while the PCORC allows PSE to revise electric rates after an expedited 6-month review of the company's power costs and new resources, instead of filing a traditional general rate case. These are positive to PSE's credit in that they help to address some of the highest and most volatile costs that PSE faces, including variability in power supply and commodity costs, as well as hydrology levels. [51]
>
> As such, PSE's rate plan which includes decoupling, is seen as a credit positive

for PSE which indicates that it lowers the risk profile of PSE.

Q: What are Mr. Doyle's assertions regarding the asymmetric earnings profile an issue for the roe?

A: Mr. Doyle asserts that the "asymmetrical earnings profile, biased to the downside" tends to increase PSE's risk profile in a way that should be "taken into consideration when setting PSE's ROE."

Q: WHAT IS YOUR OPINION ON THIS ISSUE?

A: I have two opinions. First, I agree with PCU witness Mr. Michael Brosch. He noted:

[51] Exh. No. BJL-7, Moody's Investors Service Credit Opinion, Puget Sound Energy, at 2, (Aug. 5, 2016).

"The Earnings Test has no effect whenever as long as normalized earnings do not exceed authorized ROE levels. It only serves to limit the Company's earnings upside above that level whenever revenues grow more quickly than costs."[52] Second, as noted by S&P and Moody's, the rate design and regulatory support in the Plan provide a degree of assurance and predictability into PSE's financial performance. Therefore, from a risk perspective, the most important issue is the ability to achieve predictable financial results, not how earnings above a Commission-determined authorized ROE should be handled.

VII. CRITIQUE OF PSE'S RATE OF RETURN TESTIMONY

Q: Please summarize the company's cost of capital recommendation.

A: The Company has proposed a capital structure consisting of 1.00 percent short-term debt, 50.50 percent long-term debt, and 48.50 percent common equity with short-term and long-term debt cost rates of 3.06 percent and 5.73 percent, respectively.[53] Dr. Morin has recommended a ROE of 9.8 percent for the Company. The overall rate of return recommendation is 7.74 percent. This is summarized on page one of Exhibit JRW-14.

Q: What issues do you have with the company's cost of capital position?

A: Since I have employed PSE's capital structure and senior capital cost rates, the primary rate of return issue in this case is the appropriate ROE. I will now review Dr. Morin's DCF, CAPM, and risk premium approaches.

Q: Please review Dr. Morin's equity cost rate approaches and results.

A: Dr. Morin has developed a proxy group of electric utility companies and employs DCF, CAPM, and risk premium equity cost rate approaches. Dr. Morin's equity cost rate estimates for PSE are summarized on page one of Exhibit JRW-15. Based on these

[52] Direct Testimony of Michael Brosch, Exh. MLB-1T at 54.
[53] Lohse, Exh. BJL-1T at 2.

figures, he concludes that the appropriate equity cost rate is 9.80 percent for PSE.

A. PSE's Approach Number One: DCF Approach

Q: PLEASE SUMMARIZE DR. MORIN'S DCF ESTIMATES.

A: Dr. Morin develops an equity cost rate by applying the DCF model to the companies in his proxy group.[54] Dr. Morin's DCF results are summarized in Exhibit JRW-15. He uses the current dividend yields for companies in his group as reported by *Value Line*, and adjusts these yields by a full-year growth rate (1+G). As a DCF growth rate, Dr. Morin has employed the forecasted EPS growth rates of Zacks and *Value Line*. His DCF equity cost rates estimated are 9.78 percent using *Value Line* growth and 9.36 percent using Zacks' growth.

Q: WHAT ARE THE ERRORS IN DR. MORIN'S DCF ANALYSES?

A: The primary issues in Dr. Morin's DCF analyses are: (1) the full year growth adjustment to dividend yields; and (2) the exclusive use of the overly optimistic and upwardly biased EPS growth rate forecasts of Wall Street analysts. Each will be discussed in a separate section below.

1. Dividend Yield Adjustment

Q: Please discuss the appropriate adjustment to the dividend yield in the DCF model.

A: As indicated previously, the appropriate dividend yield adjustment for growth in the DCF model is the expected dividend for the next quarter multiplied by four. In applying the DCF model, the appropriate growth rate adjustment to the dividend yield is complicated because companies change their quarterly dividend payments at different times during the year. This means that it is not appropriate to make a full-year adjustment

[54] Morin, Exh. RAM-1T at 18-23

to the dividend yield. Therefore, I have adjusted the dividend yields for the two groups by half the expected growth rate. This is consistent with the approach used by FERC.[55]

Also, Dr. Morin argues that investors require additional compensation during the coming year because their dividends are paid out quarterly instead of being paid all in a lump sum. The error in this logic and approach is that the investor receives the money from each quarterly dividend and has the option to reinvest it as he or she chooses. This reinvestment generates its own compounding growth, but it is outside of the dividend payments of the issuing company.

2. Analysts' EPS Growth Rates

Q: Please review Dr. Morin's DCF growth rate.

A: In his DCF model, Dr. Morin employs the EPS growth rate forecasts of Zacks and *Value Line*.

Q: Please discuss Dr. Morin's reliance on the projected growth rates of Wall Street analysts and *value line.*

A: It is 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 discussed in my cost of capital report, 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. Also, a study by Lacina, Lee, and Xu (2011) has shown that analysts'

[55] Opinion No. 414-A, *Transcontinental Gas Pipe Line Corporation*, 84 FERC ¶ 61,084.

long-term earnings growth rate forecasts are not more accurate at forecasting future earnings than naïve random walk forecasts of future earnings.[56] 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.[57] Hence, using these growth rates as a DCF constant 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.[58]

B. PSE's Approach Number Two: CAPM Approach

Q: Please discuss Dr. Morin's CAPM.

A: On pages 32-49 of his testimony and in Exhibit No. RAM-7, Dr. Morin develops an equity cost rate by applying the DCF model to the companies in his proxy group. Dr. Morin has used a traditional CAPM, as well as a variant, the Empirical CAPM ("ECAPM"). The CAPM approach requires an estimate of the risk-free interest rate, beta, and the MRP. Dr. Morin calculates a CAPM equity cost rate using a projected long-term Treasury bond yield of 4.4 percent, an average betas of 0.70 from *Value Line* a MRP of 7.0 percent from Duff & Phelps. The ECAPM variant of the CAPM generates adjustments to the risk-free rate and the market risk premium in calculating an equity cost rate. Dr. Morin reports CAPM and ECAPM equity cost rates of 9.3 percent and 9.8 percent.

Q: What are the errors in Dr. Morin's CAPM/ECAPM analyses?

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[56] 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, at.77-101

[57] See footnote No. 30 of this testimony.

[58] Peter D. Easton and Gregory A. Sommers, .*Effect of analysts' optimism on estimates of the expected rate of return implied by earnings forecasts*. Journal of Accounting Research, at 983–1015. (Vol. 45 No. 5, Dec. 2007).

A: The primary errors, which will be reviewed below, with Dr. Morin's CAPM/ECAPM analyses are: (1) the use of the ECAPM version of the CAPM; (2) the projected risk-free interest rate; (3) the MRP of 7.0 percent.

1. ECAPM Approach

Q: What issues do you have with Dr. Morin's ECAPM?

A: The ECAPM, as promoted by Dr. Morin, attempts to model the well-known findings of tests employing the CAPM, which have indicated the Security Market Line ("SML") is not as steep as predicted by the CAPM. As such, the ECAPM is nothing more than an ad hoc version of the CAPM. Moreover, the ECAPM has not been theoretically or empirically validated in any refereed journals. The ECAPM provides for weights, which are used to adjust the risk-free rate and market risk premium in applying the ECAPM. Dr. Morin uses 0.25 and 0.75 factors to boost the equity risk premium measure, but provides no empirical justification for those figures.[59]

Beyond the lack of any theoretical or empirical validation of the ECAPM, there is an error in Dr. Morin's ECAPM. I am not aware of any tests of the CAPM that use adjusted betas such as those used by Dr. Morin.[60] Adjusted betas effectively address the empirical issue with the CAPM by increasing the expected returns for low beta stocks and decreasing the returns for high beta stocks.

2. The Projected Risk-Free Interest Rate

Q: Please discuss the base yield of Dr. Morin's CAPM/ECAPM analyses.

A: Dr. Morin uses a projected risk-free interest rate 4.4 percent in his CAPM/ECAPM

[59] Morin, Exh. RAM-1T at 45-49.

[60] In Public Counsel Data Request No. 333, Dr. Morin was asked to provide the published studies that used adjusted betas and found the risk-return relationship is not as steeply as predicted by the CAPM. None were provided. This is presented as Exh. JRW-16.

analyses. This figure is almost 150 basis points above the current yield on long-term Treasury bonds. This is excessive for two reasons. First, as discussed previously, economists are always predicting that interest rates will increase, and yet they are almost always wrong. Obviously, investors are well aware of the consistently wrong forecasts of higher interest rates, and therefore place little weight on such forecasts. Second, investors would not be buying long-term Treasury bonds at their current yields if they expected interest rates to suddenly increase. If interest rates do increase, the prices of the bonds investors bought at today's yields go down, producing a negative return.

3. Market Risk Premium

Q: Please assess Dr. Morin's MRP of 7.0 percent.

A: Dr. Morin's MRP of 7.0 percent is computed as the difference in the arithmetic mean stock and Treasury bond income returns over the 1925-2015 time period as published by Duff & Phelps.

Q: What are the issues with this approach to estimating a MRP?

A: There are a number of issues with this approach. First, Dr. Morin is using annual stock returns, which include the annual dividend and the annual change in the stock price; however, he is not using the annual bond return. Instead, he uses the annual bond income return. This measure includes the annual interest income but excludes the annual price change. This is an apples to oranges comparison and results in an overstatement of the MRP. Second, there are a number of empirical issues with using historical stock and bond returns to estimating an expected MRP, which is discussed below.

Q: Please address the issues involved in using historical stock and bond returns to compute a forward-looking or *ex ante* risk premium.

A: As previously discussed, one way to measure a market risk premium is to compute the difference between historic stock and bond returns. However, this approach can produce differing results depending on several factors, including: the measure of central tendency used (arithmetic versus geometric means), the time period evaluated, and the stock and bond market index employed. Furthermore, there are a myriad of empirical problems in this approach, which result in historical market returns producing poor estimates of expected risk premiums. Among the errors are: the U.S. stock market survivorship bias (the "Peso Problem"), the company survivorship bias (only successful companies survive – poor companies do not survive), the measurement of central tendency (the arithmetic versus geometric mean), the historical time horizon used, and the unattainable return bias (the procedure presumes monthly portfolio rebalancing).[61] The bottom line is that there are a number of empirical problems in using historical stock and bond returns to measure an expected equity risk premium.

Q: Please discuss the arithmetic versus geometric mean issue.

A: The measure of investment return has a significant effect on the interpretation of the risk premium results. When analyzing a single security price series over time (i.e., a time series), the best measure of investment performance is the geometric mean return. Using the arithmetic mean overstates the return experienced by investors. In a study entitled "Risk and Return on Equity: The Use and Misuse of Historical Estimates," Carleton and Lakonishok make the following observation: "The geometric mean measures the changes

[61] These issues are addressed in a number of studies, including: Aswath. Damodaran, *Equity Risk Premiums (ERP): Determinants, Estimation and Implications*,NYU Working Paper, at 32-5 (2015); *See* Richard Roll, *On Computing Mean Returns and the Small Firm Premium*, Journal of Financial Economics, at 371-86, (Vol 12, 1983); Jay Ritter, *The Biggest Mistakes We Teach*, Journal of Financial Research (Summer 2002); Bradford Cornell, *The Equity Risk Premium*, at 36-78, (1999); and Marc Zenner et al,, *The Most Important Number in Finance*, J.P Morgan, at 6, (May 2008).

in wealth over more than one period on a buy and hold (with dividends invested) strategy."[62] When a historic stock and bond return study covers more than one period (and he assumes that dividends are reinvested), Dr. Morin should employ the geometric mean and not the arithmetic mean.

To demonstrate the upward bias of the arithmetic mean, consider the following example. Assume that you have a stock (that pays no dividend) that is selling for $100 today, increases to $200 in one year, and then falls back to $100 in two years. The table below shows the prices and returns.

Table 5

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

The arithmetic mean return is simply (100% + (-50%))/2 = 25% per year. The geometric mean return is $((2 * .50)^{(1/2)}) - 1 = 0\%$ per year. Therefore, the arithmetic mean return suggests that your stock has appreciated at an annual rate of 25 percent, while the geometric mean return indicates an annual return of 0 percent. Since after two years, your stock is still only worth $100, the geometric mean return is the appropriate return measure.

For this reason, when stock returns and earnings growth rates are reported in the financial press, they are generally reported using the geometric mean. This is because of the upward bias of the arithmetic mean. As further evidence of the appropriate mean

[62] Willard T. Carleton and Josef Lakonishok, *Risk and Return on Equity: The Use and Misuse of Historical Estimates*, Financial Analysts Journal, at 38-47, (Jan-Feb 1985).

return measure, the Securities and Exchange Commission (SEC) requires equity mutual funds to report historic return performance using geometric mean and not arithmetic mean returns.[63] Therefore, the historic arithmetic mean return measures are biased and should be disregarded.

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

> The arithmetic average return measures the simple mean of the series of annual returns, whereas the geometric average looks at the compounded return. Many estimation services and academics argue for the arithmetic average as the best estimate of the equity risk premium. In fact, if annual returns are uncorrelated over time, and our objective was to estimate the risk premium for the next year, the arithmetic average is the best and most unbiased estimate of the premium. There are, however, strong arguments that can be made for the use of geometric averages. First, empirical studies seem to indicate that returns on stocks are negatively correlated over long periods of time. Consequently, the arithmetic average return is likely to overstate the premium. Second, while asset pricing models may be single period models, the use of these models to get expected returns over long periods (such as five or ten years) suggests that the estimation period may be much longer than a year. In this context, the argument for geometric average premiums becomes stronger. Indro and Lee (1997) compare arithmetic and geometric premiums, find them both wanting, and argue for a weighted average, with the weight on the geometric premium increasing with the time horizon. [64]

[63] United States Securities and Exchange Commission, Form N-1A. https://www.sec.gov/files/formn-1a.pdf

[64] Aswath. Damodaran, *Equity Risk Premiums (ERP): Determinants, Estimation and Implication,* NYU Working Paper at 34, *(*2017 ed. Mar. 27, 2017).

Q: What is the source of Dr. Morin's 7.0 percent historical MRP?

A: He uses the historical returns annual yearbook, which is now published by Duff & Phelps. [65]

Q: **What is Duff & Phelps opinion regarding the use of historical stock market returns to estimate an MPR?**

A: In its Client Update on the MRP, dated March 16, 2016, Duff & Phelps made the following statements regarding using historical returns to compute an MRP:

> In estimating the conditional ERP, valuation analysts cannot simply use the long term historical ERP, without further analysis. A better alternative would be to examine approaches that are sensitive to the current economic conditions. As previously discussed, Duff & Phelps employs a multi-faceted analysis to estimate the conditional ERP that takes into account a broad range of economic information and multiple ERP estimation methodologies to arrive at its recommendation.[66]

Q: Does Duff & Phelps use a historic stock market return figure as its recommended equity or market risk premium?

A: No.

Q: What does Duff & Phelps say about the expected ERP and historical returns?

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

> ERP is a forward-looking concept. It is an expectation as of the valuation date for which no market quotes are directly observable. While an analyst can observe premiums realized over time by referring to historical data (i.e., realized return approach or ex post approach), such realized premium data do not represent the ERP expected in prior periods, nor do they represent the current ERP estimate. Rather, realized premiums represent, at best, only a sample from prior periods of what may have then been the expected ERP. To the extent that realized premiums on the average equate

[65] Morin, Exh. RAM-1T at 39-40.

[66] Duff & Phelps, *Client Alert*, at 37, (Mar. 16, 2017). (emphasis supplied). Duff & Phelps uses the term equity risk premium or ERP to refer to the MRP.

> to expected premiums in prior periods, such samples may be representative of current expectations. But to the extent that prior events that are not expected to recur caused realized returns to differ from prior expectations, such samples should be adjusted to remove the effects of these nonrecurring events. Such adjustments are needed to improve the predictive power of the sample. [67]

Q: Does Duff & Phelps publish its recommended MRP?

A: Yes. In fact, on the same internet page on which they sell their annual valuation handbook used by Dr. Morin, Duff & Phelps publishes its estimate of the equity or market risk premium.[68] On this page, Duff & Phelps notes that the firm increased its U.S. equity risk premium to 5.50 percent as of January 31, 2016. I find it puzzling that Dr. Morin would use the historical average annual stock return from the Duff & Phelps book and then totally ignore Duff & Phelps' recommendation as to the appropriate ERP.

Q: Do you agree that the U.S. equity risk premium of 5.50 percent is a reasonable and well-supported number in the current capitalization climate?

A: Yes, in fact, that is the exact number I have used in my CAPM.

Q: What cost of equity capital would Dr. Morin be recommending if he had used Duff & Phelps risk-free interest rate of 3.5 percent and its equity or market risk premium of 5.50 percent?

A: He would be at a much lower level.

$$K = (R_f) + ß * [E(R_m) - (R_f)]$$
$$K = 3.5\% + 0.70 * 5.5\%$$
$$K = 7.4\%$$

C. PSE Approach Number Three: Risk Premium Approach

Q: Please discuss Dr. Morin's risk premium approach.

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[67] *Id.*, at 35. (emphasis supplied).

[68] Duff & Phelps, *Cost of Capital*, (last visited Jun. 29, 2017). http://www.duffandphelps.com/insights/publications/cost-of-capital/index.

A: Dr. Morin develops an equity cost rate for PSE with historical and allowed ROE risk premium studies.[69]

The historical study computes a risk premium established as the difference in the arithmetic mean historical returns over the 1931-2015 time period on the S&P Public Utility Index and U.S. Treasury bonds. He adds this risk premium to a projected 4.40 percent yield on long-term U.S. Treasury bonds.

Dr. Morin's second risk premium study establishes a risk premium by a regression of authorized ROEs for electric utilities and long-term Treasury yields over the 1986-2015 time period. He then adds the resulting risk premium to a projected yield on 30-year Treasury yield of 4.40 percent. Dr. Morin's analyses produced equity cost rates of 10.5 percent and 10.7 percent for PSE.

Q: What are the errors in Dr. Morin's risk premium analyses?

A: The primary errors with Dr. Morin's risk premium analyses are: (1) the projected risk-free interest rate of 4.0 percent in both the historical and allowed risk premium approaches; (2) the use of historical stock and bond returns in the historical risk premium approach; and (3) the risk premium in the allowed risk premium approach.

1. The Projected Risk-Free Interest Rate

Q: Please discuss the base yield of Dr. Morin's risk premium analyses.

A: Dr. Morin uses a projected long-term Treasury yield of 4.40 percent in both of his risk premium approaches. This figure is almost 150 basis points above the current yield on long-term Treasury bonds. As discussed above, this figure is excessive because: (1) economists are always predicting that interest rates will rise , and yet they are almost always

[69] Morin, Exh. RAM-1T at 50-54; Exh. RAM-8; Exh. RAM-9.

wrong; and (2) investors would not be buying long-term Treasury bonds at their current yields if they expected interest rates to suddenly increase.

2. The Use of Historical Returns in the Historical Risk Premium Approach

Q: Please discuss the errors in Dr. Morin's historical risk premium analysis.

A: There are two primary errors in Dr. Morin historical risk premium analysis. First, he computed the historical risk premium as the difference in the arithmetic mean stock and bond returns and then added the risk premium to a forecasted long-term Treasury yield. The error occurs in comingling historical returns with a projected expected return. Second, and most significantly, the risk premium is based on historical stock and bond returns. As discussed at length above, there are a myriad of empirical problems in using historical market returns to estimate an expected risk premium. Among the errors are the U.S. stock market survivorship bias (the "Peso Problem"), the company survivorship bias (only successful companies survive – poor companies do not survive), the measurement of central tendency (the arithmetic versus geometric mean), the historical time horizon used, and the unattainable return bias (the procedure presumes monthly portfolio rebalancing).

3. The Risk Premium in the Allowed ROE Risk Premium Approach

Q: What are the issues with Dr. Morin's allowed risk premium?

A: There are several problems with this approach. First, the methodology produces an inflated measure of the risk premium because the approach uses historic authorized ROEs and Treasury yields, and the resulting risk premium is applied to projected Treasury Yields. Since Treasury yields are always forecasted to increase, the resulting risk

premium would be minor if done correctly, and would employ projected Treasury yields in the analysis rather than historic Treasury yields.

Second, Dr. Morin's used the average annual allowed ROEs from the Regulatory Research Associates (RRA) that include a number of cases for Virginia that include ROE adders of 100 to 200 basis points for specific generation projects. For example, RRA reports an average allowed ROE for electric utilities of 9.85 percent including the Virginia cases, and 9.60 percent excluding the Virginia cases with ROE adders.

Dr. Morin's risk premium approach is a gauge of *commission* behavior and not *investor* behavior. Capital costs are determined in the market place through the financial decisions of investors and are reflected in such fundamental factors as dividend yields, expected growth rates, interest rates, and investors' assessment of the risk and expected return of different investments. Regulatory commissions evaluate capital market data in setting authorized ROEs, but also take into account other utility- and rate case-specific information in setting ROEs. As such, Dr. Morin'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.

Finally, Dr. Morin's methodology produces an inflated required rate of return since utilities have been selling at market-to-book ratios in excess of 1.0 for many years. This indicates that the authorized rates of return have been greater than the return that investors require. As discussed earlier in my testimony, a market-to-book ratio above 1.0

indicates a company's ROE is above its equity cost rate. Therefore, the risk premium produced from the study is overstated as a measure of investor return requirements and produced an inflated equity cost rate.

Q: Does this conclude your testimony?

A: Yes, it does.