CORROBORATIVE EQUITY CAPITAL COST ESTIMATION METHODS

CAPITAL ASSET PRICING MODEL

Q. PLEASE DESCRIBE THE CAPITAL ASSET PRICING MODEL (CAPM) YOU USED TO ARRIVE AT AN ESTIMATE FOR THE COST RATE OF THE COMPANY'S EQUITY CAPITAL.

A. The CAPM states that the expected rate of return on a security is determined by a risk-free rate of return plus a risk premium which is proportional to the non-diversifiable (systematic) risk of a security. Systematic risk refers to the risk associated with movements in the macro-economy (the economic "system") and, thus, cannot be eliminated through diversification by holding a portfolio of securities. The beta coefficient (□) is a statistical measure that attempts to quantify the non-diversifiable risk of the return on a particular security against the returns inherent in general stock market fluctuations. The formula is expressed as follows:

$$k = r_f + \beta(r_m - r_f), \qquad \text{(i)}$$

where "k" is the cost of equity capital of an individual security, "r_f" is the risk-free rate of return, "□" is the beta coefficient, "r_m" is the average market return and "$r_m - r_f$" is the market risk premium. The CAPM is used in my analysis, not as a primary cost of equity analysis, but as support for the DCF cost of equity estimate. Although I believe the CAPM can be useful in testing the reasonableness of a cost of capital estimate, certain theoretical shortcomings of this model (when applied in cost of capital analysis) reduce its usefulness as a stand-alone methodology.

Q. CAN YOU EXPLAIN WHY YOU APPLY THE CAPM ANALYSIS WITH CAUTION?

A. Yes. The reasons why the CAPM should be used in cost of capital analysis with caution

are set out below. It is important to understand that my caution with regard to the use of the CAPM in a cost of equity capital analysis does not indicate that the model is not a useful description of the capital markets. Rather, my caution recognizes that in the practical application of the CAPM to cost of capital analysis there are problems that can cause the results of that type of analysis to be less reliable than other, more widely accepted models such as the DCF.

The CAPM was originally designed as a point-in-time tool for selecting stock portfolios that matched a particular investor's risk/return preference. Its use in rate of return analysis to estimate multi-period return expectations for one stock or one type of stock, rather than a diversified portfolio of stocks, takes the model out of the context for which it was intended. Also, questions regarding the fundamental applicability of the CAPM theory, the accuracy of beta and the magnitude of the market risk premium have arisen recently in the financial literature.

There has been much comment in the financial literature over the strength of the assumptions that underlie the CAPM and the inability to substantiate those assumptions through empirical analysis. Also, there are problems with the key CAPM risk measure, beta, that indicate that the CAPM analysis is not a reliable primary indicator of equity capital costs.

Cost of capital analysis is a decidedly forward-looking, or *ex-ante*, concept. Beta is not. The measurement of beta is derived with historical, or *ex-post*, information. Therefore, the beta of a particular company, because it is usually derived with five years of historical data, is slow to change to current (i.e., forward-looking) conditions, and some price abnormality that may have happened four years ago could substantially affect beta while, currently, being of little actual concern to investors. Moreover, this same shortcoming, which assumes that past results mirror investor expectations for the future plagues the market risk premium in an ex-post, or historically-oriented CAPM.

Also, an important study performed for the Center for Research in Security Prices at the University of Chicago Graduate School of Business shows that the assumed linear relationship between beta, risk and return (i.e., beta varies directly with risk and return)

simply does not appear to exist in the marketplace. As Value Line reported in its Industry Review published in March of 1992:

> Two of the most prestigious researchers in the financial community, Professors Eugene F. Fama and Kenneth R. French from the University of Chicago have challenged the traditional relationship between Beta and return in a recent paper published by the Center for Research in Security Prices. In this study, the duo traced the performance of thousands of stocks over 50 years, but found no statistical support for the hypothesis that the relationship between volatility and return is significantly different from random.[1]

Fama and French have continued their investigation of the CAPM since their 1992 article and have postulated that a CAPM that better correlates with historical data would use two additional risk measures in addition to beta. However, it is important to note that while those authors tout the superiority of their three-factor CAPM to the single-beta CAPM on theoretical grounds, they recognize that there are significant problems with any type of asset pricing model when it comes to using the model to estimate the cost of equity capital. Recently, Fama and French noted regarding the CAPM:

> The attraction of the CAPM is that is offers powerful and intuitively pleasing predictions about how to measure risk and the relation between expected return and risk. Unfortunately, the empirical record of the model is poor—poor enough to invalidate the way it is used in applications. The CAPM's empirical problems may reflect theoretical failings, the result of many simplifying assumptions. But they may also be caused by difficulties in implementing valid tests of the model….In the end, we argue that whether the model's problems reflect weaknesses in the theory or in its empirical implementation, the failure of the CAPM in empirical tests implies that most applications of the model are invalid.[2]

---

[1] Value Line Industry Review, March 13, 1992, pp. 1-8.

[2] (Fama, E., French, K., "The Capital Asset Pricing Model: Theory and Evidence," *Journal of Economic Perspectives*, Vol. 18, No. 3, Summer 2004, pp. 25-46).

While the recently published conclusions as to the imprecision of equity cost estimates produced by CAPM-type models do not necessarily negate the risk/return basis of asset pricing, it does call for more accurate measures with which asset returns can be more reliably indexed. However, unless and until such indices are published and widely accepted in the marketplace, CAPM cost of equity capital estimates should be relegated to a supporting role or informational status. Therefore, I use the CAPM for informational purposes and do not rely on that methodology as a primary equity capital cost estimation technique.

Q. WHAT VALUE HAVE YOU CHOSEN FOR A RISK-FREE RATE OF RETURN IN YOUR CAPM ANALYSIS?

A. As the CAPM is designed, the risk-free rate is that rate of return investors can realize with certainty. The nearest analog in the investment spectrum is the 13-week U. S. Treasury Bill. However, T-Bills can be directly influenced by Federal Reserve policy, as they have been over the past several years. While longer-term Treasury bonds have equivalent default risk to T-Bills, those longer-term government securities carry maturity risk that the T-Bills do not have. When investors tie up their money for longer periods of time, as they do when purchasing a long-term Treasury, they must be compensated for future investment opportunities forgone as well as the potential for future changes in inflation. Investors are compensated for this increased investment risk by receiving a higher yield on T-Bonds. However, when T-Bills and T-Bonds exhibit a "normal" (historical average) spread of about 1.5% to 2%, the results of CAPM analyses that match a higher market risk premium with lower T-Bill yields or a lower market risk premium with higher T-Bond yields, are very similar.

As I noted in my previous discussion of the macro-economy, the Fed has acted vigorously since the onset of the sub-prime mortgage crisis last year to lower short-term interest rates in order to maintain market liquidity. Over the most recent six-week period, T-Bills have produced an average yield of 2.15% and Treasury Bonds have yielded

4.48% (data from Value Line *Selection & Opinion*, six most recent weekly editions). [3]

Q. DO YOU BELIEVE THE USE OF A LONG-TERM TREASURY BOND RATE IS APPROPRIATE IN THE CAPM?

A. In the current economic environment, the use of a long-term Treasury bond produces a more accurate estimate of investors' cost of equity. Although the selection of a long- or short-term Treasury security as the risk free rate of return to be used in the CAPM is one of the areas of contention in applying the model in cost of capital analysis, the use of a normalized short-term T-Bill rate is the more prevalent in the literature. However, the T-Bill yield can be influenced by Federal Reserve policy, and, produce inaccurate indications of the cost of equity, especially if the yield differential between T-Bonds and T-Bills is different from long-term averages.

Recently, with the Fed pushing down short-term T-Bill yields resulting through credit easing, the yield differential between T-Bonds and T-Bills has widened to about 2.3%, which is well below long-term averages of about 1.5% to 2%. Therefore, the short-term CAPM will probably understate the cost of equity. While I will present the results of both long- and short-term CAPM analyses, for purposes of analysis in this proceeding I will rely on the long-term Treasury bond yields for the risk-free rate in the CAPM. Also, along with those measures of the risk-free rate I use the corresponding measures of market risk premiums.

Q. YOU MENTIONED PREVIOUSLY THAT RECENT RESEARCH HAS RAISED QUESTIONS REGARDING THE MAGNITUE OF THE PROPER MARKET RISK PREMIUM TO USE IN A CAPM ANALYSIS. CAN YOU SUMMARIZE THAT RESEARCH AND ITS IMPACT ON ESTIMATING THE MARKET RISK PREMIUM?

---

[3] Current T-Bill yield, six-week average yield from Value Line Selection & Opinion (2/1/08-3/7/08).

A. The market risk premium is the difference between the return investors expect on stocks and the return they expect on a risk-free rate of return like a U.S. Treasury bond. The "traditional" view, supported primarily by the earned return data over the past 80 years published by Morningstar, is based on the historical difference between the returns on stocks and the returns on bonds. That view assumes that the returns actually earned by investors over a long period of time are representative of the returns they expect to earn in the future.

For example, the Morningstar data show that investors have earned a return of 12.3% on stocks and 5.8% on long-term Treasury bonds since 1926.[4] Therefore, based on those historical data, it is often assumed that investors will require a risk premium in the future of 6.5% above the long-term risk-free rate to invest in stocks [12.3% - 5.8% = 6.5%]. With a current long-term T-Bond yield of 4.9%, that assumption indicates an investor expectation of an 11.4% return for the stock market in general [4.9% + 6.5% = 11.4%]. However, current research indicates that there are aspects of the Morningstar historical data set that, when examined, point not only to lower historical risk premiums than those reported by Morningstar but also expected risk premiums that are much lower.

The large body of research on the market risk premium was set in motion shortly after the first publication of Ibbotson and Sinquefield's first study of the historical database of security prices and returns in 1977.[5] In response to Ibbotson's historical data, Mehra and Prescott published a paper on what would come to be known as the "equity risk premium puzzle."[6] In that paper, Mehra and Prescott noted that historical earned risk premiums were much higher than could be rationalized with standard economic models based on investors with reasonable risk aversion parameters. As Mehra notes in a recent article reviewing the risk premium research that he spawned:

---

4 Morningstar, SBBI Valuation Edition, 2007 Yearbook, p. 28.

5 Ibbotson, R., Sinquefield, R., Stocks, Bonds, Bills and Inflation: The Past (1926-1976) and The Future (1977-2000), Financial Analysts Research Foundation, University of Virginia, Charlottesville VA, 1977.

6 Mehra, R., Prescott, E., "The Equity Premium: A Puzzle," Journal of Monetary Economics, No. 15 (March 1985), pp. 145-61.

> To the original question: Are stocks so much riskier than T-bills that a 7 pp [percentage point] differential in their rates of return is justified? …Stocks and bonds pay off in approximately the same states of nature or economic scenarios, and hence, as argued earlier, they should command approximately the same rate of return. In fact, using standard theory to estimate risk-adjusted returns, we found that stocks, on average, should command, at most, a 1 pp return premium over bills.[7]

Mehra's 1985 paper challenged the academic community and set off a flurry of research on two tracks. One track focused on behavioral finance, attempting to apply new aspects to traditional models describing investors' utility preferences, and expanding on Mehra's original research, which indicated that equities should at most command return premiums of 1% above bonds. If it could be shown that other models indicated that the theoretical return difference for equities was higher (and closer to the historical result), the "puzzle" originally postulated by Mehra would be somewhat less problematic. As Mehra notes in the abstract of the 2003 article cited above, the "proposed resolutions" in this track of research "fail along crucial dimensions." In other words, no one has yet come up with a behavioral economics model that explains the risk premium puzzle.

The other track of research that resulted from Mehra's original article was a detailed examination of the historical financial data based on the earned returns of stocks and bonds. The questions examined included: is the period chosen by Ibbotson (now Morningstar) too short; is the volatility experienced historically likely to be representative of the future; are there stochastic problems in the data such a survivor bias? It is to this latter research track that I refer—the research in financial economics directly related to the determination of the historical market risk premium. The overwhelming result of that recent research is that the Morningstar data overstate investors' current risk premium expectations.

For example, Dimson, Marsh, and Staunton published a recent article that evaluates returns over the past 100 years in the U.S., as well as other established stock

---

[7] (Mehra, R., "The Equity Premium: Why Is It a Puzzle?", Financial Analysts Journal, January/February 2003, p. 56).

markets, "Risk and Return in the 20th and 21st Centuries." Those researchers summarize their findings this way:

> The single most important contemporary issue in finance is the equity risk premium. This drives future equity returns, and is the key determinant of the cost of capital. The risk premium—the expected reward for bearing the risk of investing in equities, rather than in low-risk investments such as bills or bonds—is usually estimated from historical data….The authors show that the historical equity risk premium has been lower than previously believed, and argue that the future risk premium is likely to be lower still.[8]

Dimson, et al, show that the Morningstar historical data set, which measures bond and stock return data from 1926 forward, suffers from survivor bias. Simply put, Morningstar's data is based on the stock market results of only the successful stocks, i.e., those that were successful enough to be listed on a major U.S. exchange. The return data of the stocks that did not grow large enough to be listed on a stock exchange or data from markets or time periods that were difficult to measure are not included in the Morningstar data—and those results are overstated for that reason. Dimson, et al, measure historical returns over a longer period than Morningstar—100 years of data—and include an analysis of the returns of stock markets in other countries, which gives a broader sample of investor opinion than the oft-cited Morningstar data.

Researching more data over a longer period of time, those authors come to the conclusion that over the past 100 years common stocks worldwide have earned an average arithmetic return that is 5.0% above Treasury bonds.[9] Morningstar's return difference between stock and long-term bonds is 6.5%—150 basis points higher.

---

[8] Dimson, Marsh, Staunton, "Risk and Return in the 20th and 21st Centuries," *Business Strategy Review*, 2000, Volume 11, Issue 2, pp. 1-18.The Dimson, et al, article cited here was an advance summary of a subsequent textbook on the subject of the market risk premium: Triumph of the Optimists, Princeton University Press, Princeton NJ, 2002.

[9] A market risk premium of 5% added to a current T-Bond yield of 4.9% would indicate an equity return expectation for common stocks of 9.9% (expected utility stock returns would be lower).

However, Dimson and his co-authors show that historical results, alone, are not accurate measures of future returns expectations unless the abnormalities in the historical record that are unlikely to exist in the future are removed. Taking those facts into account, the authors conclude that, "the key qualitative point is that [the expected risk premium] is lower than the raw historical risk premium."

There is significant additional research on historical returns that supports the reasonableness of lower market risk premiums. For example, in Stocks for the Long Run, A Guide to Selecting Markets for Long-term Growth (Irwin Professional Publishing, Chicago, IL, 1994, pp. 11-15), Professor Jeremy Siegel concludes that between 1802 and 1992, the return differential between stocks and long-term Treasuries ranged from 3.4% to 5.1%. Using the approximate mid-point, a 4% historical risk premium would indicate that investors could reasonably expect a stock market return of about 9% (5% long-term T-Bonds plus a 4% risk premium).

Therefore, recent research on the historical market risk premium, using a broader range of stock market data, show that the Morningstar data overstate long-term historical market risk premiums. Moreover, that research indicates that the risk premium investors expect for the future—the prime determinant of today's equity return requirements—is lower than long-term historical experience would indicate.

Q. IS THERE OTHER RECENT RESEARCH ON THE MARKET RISK PREMIUM THAT IS NOT BASED PURELY ON HISTORICAL EARNED RETURNS, AND WHICH SHOWS THE MARKET RISK PREMIUM TO BE SUBSTANTIALLY LOWER THAN THAT PUBLISHED BY MORNINGSTAR?

A. Yes, there is other new research regarding the risk premium, which is not based on historical earned returns. That research also indicates the Morningstar data is skewed upward and that the forward-looking market risk premium is lower. In 2003, Eugene Fama and Kenneth French published an article in *The Journal of Finance* focusing on the equity risk premium and measured (instead of the realized return) the expected return on the market less the expected return on bonds (the yield) over a long-term period as well

as several sub-periods. Their research based on long-term historical expected returns indicates that the *expected* (i.e., forward-looking) risk premium is in the range of 2.6% to 4.3%.[10]

Also, Professors Graham and Harvey of Duke University, who are currently co-editors of the *Journal of Finance*, in conjunction with *CFO Magazine*, regularly poll corporate financial officers regarding their expectations regarding the expected market risk premium. The most recent result of the quarterly poll (January 2007) indicates that the financial executives polled expect stock returns over the next ten years to be only 3.2% higher than bond returns.[11] Since the survey was initiated (2000), the forward-looking market risk premium has ranged from about 2.5% to 4.5%. That means that corporate financial officers—individuals that are arguably well versed in capital markets—expect equity returns to range from 2.5% to 4.5% above ten-year US Treasury bonds. With current 20-year Treasury bond yields of approximately 5%, the Duke survey pegs investor equity return expectations ranging from about 7.5% to 9.5%.

Also, in three independent papers presented to the Social Security Advisory Board, in 2001, John Y. Campbell (Harvard), Peter A. Diamond (M.I.T.), and John B. Shoven (Stanford), conclude that the long-term expected market risk premium is lower than exemplified by historical experience and will range from 3% to 4% above US Treasury securities in the future. With current T-Bond levels, that risk premium indicates an expected return on the stock market, generally, of about 8% to 9%.

I have mentioned a few of the research articles regarding the market risk premium that have been published over the last few years. There have been many, and the vast majority of them indicate that the expected market risk premium is below that exhibited in the Morningstar historical data.[12]

---

[10] Fama, E., French, K., "The Equity Premium," *The Journal of Finance*, Vol. LVII, No. 2, April 2003, pp. 637-659.

[11] Graham, J., Harvey, C., "The Equity Risk Premium in January 2007: Evidence from the Global CFO Outlook Survey," Duke University/CFO Magazine, http://www.cfosurvey.org.

[12] There is only one academic study that, to my knowledge, supports the Morningstar historical risk premium data: Harris, Marston, Mishra and Obrien, "Ex Ante cost of Equity Estimates of the S&P 500 Firms: The Choice between Global and Domestic CAPM," *Financial Management*, Autumn 2003, pp. 51-

Q. HAS THE RESEARCH YOU CITE FOUND ITS WAY INTO TODAY'S FINANCE TEXTBOOKS?

A. Yes. In the 2006 edition of their finance textbook, Brealey, and Meyers [13] discuss the findings of Dimson, Staunton and Marsh. Importantly, in prior editions of their textbooks Brealey, et al, cited the Morningstar historical data, now they do not. They also discuss other recent findings regarding the market risk premium (e.g., Fama/French, Graham/Harvey). The textbook authors conclude, based on a review of the recent evidence regarding the market risk premium, that a reasonable range of equity premiums above short-term Treasury Bills is 5% to 8%.[14] Because, the long-term historical difference in the return between T-Bonds and T-Bills has been 1.2%, Brealey and Meyers' textbook indicates a long-term market risk premium relative to T-Bonds ranging from 3.8% to 6.8% [5% - 1.2% = 3.8%; 8% - 1.2% = 6.8%].[15] The mid-point of that 3.8% to 6.8% reasonable risk premium range is 5.3%. Although 5.3% is higher than other risk premium estimates, that average market risk premium added to a current T-Bond yield of 4.5%, would produce a current equity return expectation for U.S. equities of 9.3%. Because utility stocks are less risky than the market as a whole, an appropriate return on equity for utilities would be lower.

Q. WHAT HAVE YOU CHOSEN AS THE MARKET RISK PREMIUM FOR THE CAPM ANALYSIS?

A. In their 2007 edition of Stocks, Bonds, Bills and Inflation, Morningstar indicates that the average market risk premium between stocks and T-Bills over the 1926–2006 time period is 6.5% (based on an arithmetic average), and 5.0% (based on a geometric average). I

---

66. However, that study reviewed a relatively short period of data (mid-80s to late 90s), which included the longest bull market in U.S. history—unlikely to be representative of long-term expectations for the future.

13 Brealey, R., Meyers, S., Allen, F., Principles of Corporate Finance, 8th Edition, McGraw-Hill, Irwin, Boston MA, 2006.

14 *Id.*, p. 154.

15 *Id.*, pp. 149, 222.

have, in prior testimony, used these values as an estimate of the market risk premium in the CAPM analysis. Due to the volume of research on the market risk premium discussed above, more recently, I have relied more heavily on the lower end of that range.

As I have noted above, recent research in the field of financial economics has shown that the market risk premium data published by Morningstar overstates investor-expected market risk premiums. Current textbooks (Brealey & Meyers) indicate that the long-term market risk premium ranges from 3.8% to 6.8%—reaching much lower levels than the Morningstar data indicates. The mid-point of Brealey & Meyer's long-term risk premium range is 5.3%, which is within the 5% to 6.5% range published by Morningstar. For purposes of determining the CAPM cost of equity in this proceeding I will use the mid-point of the long-term risk premium range set out in the most recent Brealey & Meyer's text—5.3%, as well as the Morningstar market risk premiums to develop a range of CAPM equity cost estimates.

Q. WHAT VALUES HAVE YOU CHOSEN FOR THE BETA COEFFICIENTS IN THE CAPM ANALYSIS?

A. Value Line reports beta coefficients for all the stocks it follows. Value Line's beta is derived from a regression analysis between weekly percentage changes in the market price of a stock and weekly percentage changes in the New York Stock Exchange Composite Index over a period of five years. The average beta coefficient of the sample group of electric and combination gas and electric companies is 0.82. Value Line reports Puget Energy's beta to be 0.80. Due to the very slight difference between the sample average beta and Puget's beta, when Puget is removed from the sample group, the average beta remains 0.82.

Q. WHAT IS YOUR RECOMMENDED COST OF EQUITY CAPITAL FOR THE SAMPLE OF UTILITY COMPANIES USING THE CAPITAL ASSET PRICING MODEL ANALYSIS?

A. Exhibit No. ___(SGH-13), shows that the average Value Line beta coefficient for the

group of electric and gas companies under study, rounded to two decimal places, is 0.82. The mid-point of range of market risk premiums published by Brealey and Meyers of 5.3% would, upon the adoption of a 0.82 beta, become a sample group premium of 4.36% (0.82 x 5.3%). That non-specific risk premium added to the risk-free T-Bond rate of 4.48%, previously derived, yields a common equity cost rate estimate of 8.84%. Using the range of market risk premiums published by Morningstar (5.0% to 6.5%) the resulting CAPM equity cost estimates range from 8.59% to 9.83%, with a mid-point of 9.21%.

MODIFIED EARNINGS-PRICE RATIO ANALYSIS

Q. PLEASE DESCRIBE THE MODIFIED EARNINGS-PRICE RATIO (MEPR) ANALYSIS OF THE COST OF COMMON EQUITY CAPITAL.

A. The earnings-price ratio is calculated simply as the expected earnings per share divided by the current market price. In cost of capital analysis, the earnings-price ratio (which is one portion of this analysis) can be useful in a corroborative sense, since it can be a good indicator of the proper range of equity costs when the market price of a stock is near its book value. When the market price of a stock is *above* its book value, the earnings-price ratio *understates* the cost of equity capital. Exhibit No. ____(SGH-14) contains mathematical proof for this concept. The opposite is also true, i.e.; the earnings-price ratio *overstates* the cost of equity capital when the market price of a stock is *below* book value.

Under current market conditions, the utilities under study have an average market-to-book ratio of 1.51 and, therefore, the average earnings-price ratio alone would understate the cost of equity for the sample groups. However, I do not use the earnings-price ratio alone as an indicator of equity capital cost rates. Because of the relationship among the earnings-price ratio, the market-to-book ratio, and the investor-expected return on equity described in Exhibit No. ____(SGH-14), I have modified the standard earnings-price ratio analysis by including expected returns on equity for the companies under study. It is that modified analysis that I will use to assist in estimating an appropriate

range of equity capital costs in this proceeding.

Q. PLEASE EXPLAIN THE RELATIONSHIP AMONG THE EARNINGS-PRICE RATIO, THE EXPECTED RETURN ON EQUITY, AND THE MARKET-TO-BOOK RATIO.

A. When the expected return (ROE) approximates the cost of equity, the market price of the utility approximates its book value and the earnings-price ratio provides an unbiased estimate of the cost of equity. When the investor-expected return on equity for a utility (ROE) exceeds the investor-required return (the cost of equity capital), the market price of the firm will tend to exceed its book value. As explained above, when the market price exceeds book value, the earnings-price ratio understates the cost of equity capital. Therefore, when the expected equity return (ROE) exceeds the cost of equity capital, the earnings-price ratio will understate that cost rate.

Also, in situations where the expected equity return is below what investors require for that type of investment, market prices fall below book value. Further, when market-to-book ratios are below 1.0, the earnings-price ratio overstates the cost of equity capital. Thus, the expected rate of return on equity and the earnings-price ratio tend to move in a countervailing fashion around the cost of equity capital.

When market-to-book ratios are above one, the expected equity return exceeds and the earnings-price ratio understates the cost of equity capital. When market-to-book ratios are below one, the expected equity return understates and the earnings-price ratio exceeds the cost of equity capital. Further, as market-to-book ratios approach unity, the expected return and the earnings price ratio approach the cost of equity capital. Therefore, the average of the expected book return and the earnings price ratio provides a reasonable estimate of the cost of equity capital.

These relationships represent general rather than precisely quantifiable tendencies but are useful in corroborating other cost of capital methodologies. The Federal Energy Regulatory Commission, in its generic rate of return hearings, found this technique useful and indicated that under the circumstances of market-to-book ratios exceeding unity, the

cost of equity is bounded above by the expected equity return and below by the earnings-price ratio (e.g., 50 Fed Reg, 1985, p. 21822; 51 Fed Reg, 1986, pp. 361, 362; 37 FERC ¶ 61,287). The mid-point of these two parameters, therefore, produces an estimate of the cost of equity capital which, when market-to-book ratios are different from unity, is far more accurate than the earnings-price ratio alone.

Q. IS THERE OTHER THEORETICAL SUPPORT FOR THE USE OF AN EARNINGS-PRICE RATIO IN CONJUNCTION WITH AN EXPECTED RETURN ON EQUITY AS AN INDICATOR OF THE COST OF EQUITY CAPITAL?

A. Elton and Gruber, Modern Portfolio Theory and Investment Analysis (New York University, Wiley & Sons, New York, 1995, pp. 401-404) provide support for reliance on my modified earnings price ratio analysis.

The Elton and Gruber posit the following formula,

$$k = (1-b)E/(1-cb)P, \text{ where} \qquad \text{(ii)}$$

"k" is the cost of equity capital, "b" is the retention ratio, "E" is earnings, "P" is market price and "c" is the ratio of the expected return on equity to the cost of equity capital (ROE/k). This formula shows that when ROE = k, "c" equals 1.0 and the cost of equity capital equals the earnings-price ratio. Moreover, in that case, ROE is greater than "k" (as it is in today's market), "c" is greater than 1.0 and the earnings-price ratio will understate the cost of equity. Also, the more that ROE exceeds "k" the more the earnings price ratio will understate "k." In other words, as I note in my Direct Testimony those two parameters, the earnings-price ratio and the expected return on equity (ROE) orbit around the cost of equity capital, with the cost of equity as the locus, and fluctuate so that their mid-point approximates the cost of equity capital.

Assuming an industry average retention ratio of about 30% (i.e., 70% of earnings are paid out as dividends), the stochastic relationship between the expected return (ROE) and the earnings price ratio can be determined from Equation (ii), above, as shown in

Table A below. Most importantly, Equation (ii), shows that the average of the EPR and ROE (which is my MEPR analysis) will approximate "k", the cost of equity capital.

Table A.

SUPPORT FOR THE MODIFIED EARNINGS PRICE RAITO ANALYSIS

Cost of Equity	Retention Ratio	ROE	ROE/k	Earnings Price Ratio	M.E.P.R. (ROE+EPR)/2
[1]	[2]	[3]	[4]=[3]/[1]	[5]	[6]=([3]+[5])/2
10.00%	35.00%	13.00%	1.3	8.38%	10.69%
10.00%	35.00%	12.00%	1.2	8.92%	10.46%
10.00%	35.00%	11.00%	1.1	9.46%	10.23%
10.00%	35.00%	10.00%	1.0	10.00%	10.00%
10.00%	35.00%	9.00%	0.9	10.54%	9.77%
10.00%	35.00%	8.00%	0.8	11.08%	9.54%
10.00%	35.00%	7.00%	0.7	11.62%	9.31%

[5] From Equation (ii): $E/P = k(1-cb)/(1-b)$

As the data in Table A shows, the average of the expected return (ROE) and the earnings price ratio (EPR) produces an estimate of the cost of common equity capital of sufficient accuracy to serve as a check of other analyses, which is how I use the model in my testimony.

Q. WHAT ARE THE RESULTS OF YOUR EARNINGS-PRICE RATIO ANALYSIS OF THE COST OF EQUITY FOR THE SAMPLE GROUP?

A. Exhibit No. ____(SGH-15) shows the Reuters projected 2009 per share earnings for each of the firms in the sample groups. Recent average market prices (the same market prices used in my DCF analysis), Value Line's projected return on equity for 2008 and 2010-2012 for each of the companies are also shown.

The average earnings-price ratio for the electric sample group without Puget, 7.20%, is below the cost of equity for those companies due to the fact that their average market-to-book ratio is currently above unity (average electric utility M/B = 1.5). The

sample electric companies' 2008 expected book equity return averages 9.69%. For the electric sample group, then, the mid-point of the earnings-price ratio and the current equity return is 8.45%. Including Puget Energy in the sample group indicates a near-term MEPR of 8.34% for the group.

Exhibit No. ____(SGH-15) also shows that the average expected book equity return for the electric and gas utilities over the next three- to five-year period increases slightly to 10.08%, indicating relatively consistent return expectations, on average for the group. The midpoint of these two boundaries of equity capital cost for the whole group, i.e., the long-term projected return on book equity (10.08%) and the current earnings-price ratio (7.20%) is 8.64%, which provides another forward-looking estimate of the equity capital cost rate of electric utility firms. Including the data for Puget Energy in the sample group causes that forward-looking average to decline slightly to 8.56%.

MARKET-TO-BOOK RATIO ANALYSIS

Q. PLEASE DESCRIBE YOUR MARKET-TO-BOOK (MTB) ANALYSIS OF THE COST OF COMMON EQUITY CAPITAL FOR THE SAMPLE GROUPS.

A. This technique of analysis is a derivative of the DCF model that attempts to adjust the capital cost derived with regard to inequalities that might exist in the market-to-book ratio. This method is derived algebraically from the DCF model and, therefore, cannot be considered a strictly independent check of that method. However, the MTB analysis is useful in a corroborative sense. The MTB seeks to determine the cost of equity using market-determined parameters in a format different from that employed in the DCF analysis. In the DCF analysis, the available data is "smoothed" to identify investors' long-term sustainable expectations. The MTB analysis, while based on the DCF theory, relies instead on point-in-time data projected one year and five years into the future and, thus, offers a practical corroborative check on the traditional DCF. The MTB formula is derived as follows:

Solving for "P" from Equation (1), the standard DCF model, we have

$$P = D/(k-g). \qquad \text{(iii)}$$

But the dividend (D) is equal to the earnings (E) times the earnings payout ratio, or one minus the retention ratio (b), or

$$D = E(1-b). \qquad \text{(iv)}$$

Substituting Equation (iv) into Equation (iii), we have

$$P = \frac{E(1-b)}{k-g} \ . \qquad \text{(v)}$$

The earnings (E) are equal to the return on equity (r) times the book value of that equity (B). Making that substitution into Equation (v), we have

$$P = \frac{rB(1-b)}{k-g} \ . \qquad \text{(vi)}$$

Dividing both sides of Equation (vi) by the book value (B) and noting from Equation (iii) in Appendix B that g = br+sv,

$$\frac{P}{B} = \frac{r(1-b)}{k-br-sv} \ . \qquad \text{(vii)}$$

Finally, solving Equation (vi) for the cost of equity capital (k) yields the MTB formula:

$$k = \frac{r(1-b)}{P/B} + br + sv. \qquad \text{(ix)}$$

Equation (ix) indicates that the cost of equity capital equals the expected return on equity

multiplied by the payout ratio, divided by the market-to-book ratio plus growth. Exhibit No. ____(SGH-16) shows the results of applying Equation (ix) to the defined parameters for the utility firms in the comparable sample. For the electric utility sample group, page 1 of Exhibit No. ___(SGH-16) utilizes current year (2008) data for the MTB analysis while page 2 utilizes Value Line's 2010-2012 projections, respectively.

The MTB cost of equity for the sample of electric utility firms, recognizing a current average market-to-book ratio of 1.51 is ~~9.21~~9.27% using the current year data and ~~9.36~~9.44% using projected three- to five-year data. Including Puget Energy in the sample group slightly reduces the averages: ~~9.18~~9.31% (near term) and ~~9.35~~9.45% (long-term). Those estimates indicate that my DCF equity cost estimate may be somewhat overstated as a representation of current equity cost rates.

Q. DOES THIS CONCLUDE YOUR DISCUSSION OF YOUR CORROBORATIVE EQUITY COST ESTIMATION ANALYSES?

A. Yes.