BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF DELAWARE

IN THE MATTER OF THE APPLICATION OF DELMARVA POWER & LIGHT COMPANY FOR AN INCREASE IN GAS BASE RATES AND MISCELLANEOUS TARIFF CHANGES (FILED JULY 2, 2010)	)))))	PSC DOCKET NO. 10-237

Direct Testimony and Exhibits of James A. Rothschild

On Behalf of the Staff of the Delaware Public Service Commission

Dated: October 25, 2010

I. STATEMENT OF QUALIFICATIONS

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is James A. Rothschild and my address is 115 Scarlet Oak Drive, Wilton, CT 06897.

Q. WHAT IS YOUR OCCUPATION?

A. I am a financial consultant specializing in utility regulation. I have experience in the regulation of electric, gas, telephone, sewer, and gas utilities throughout the United States.

Q. FOR WHOM ARE YOU APPEARING IN THIS PROCEEDING?

A. I am appearing on behalf of the Staff of the Delaware Public Service Commission.

Q. PLEASE SUMMARIZE YOUR UTILITY REGULATORY EXPERIENCE.

A. I have been a consultant since 1972. I founded Rothschild Financial Consulting in 1985. From 1979 through January 1985, I was President of Georgetown Consulting Group, Inc. From 1976 to 1979, I was the President of J. Rothschild Associates. Both of these firms specialized in utility regulation. From 1972 through 1976, Touche Ross & Co., a major international accounting firm (which later became Deloitte Touche), employed me as a management consultant, where much of my consulting was in the area of utility regulation. I have worked for various state utility commissions, attorneys general and public advocates on matters relating to regulatory and financial issues and have filed approximately 350 testimonies relating to public utility ratemaking in numerous jurisdictions in the United States and Canada addressing rate of return, financial issues, and accounting issues. (See Appendix A.)

Q. WHAT IS YOUR EDUCATIONAL BACKGROUND?

A. I received an MBA in Banking and Finance from Case Western University (1971) and a BS in Chemical Engineering from the University of Pittsburgh (1967).

II. INTRODUCTION AND PURPOSE OF TESTIMONY

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. Finance has taken center-stage in the world news. The current economic crisis that began with the downfall of old names such as Bear Stearns, Lehman Brothers, and AIG has had a major impact on virtually every American and many others throughout the World. Over the last two years, the U.S. has experienced what is commonly described as the worst economic times since the Great Depression of the 1930's. More recently, the economy has experienced a modest economic recovery; however, unemployment remains very high and growth is slowing. Economists are divided over whether or not the U.S. economy might experience a "double dip" recession.

As of August 31, 2010 interest rates on U.S. treasury bonds were extremely low by historic standards. One-year treasury bonds are yielding 0.24%, 10-year bonds are yielding 2.47%, and 30-year bonds are yielding 3.52%.[1] Three reasons interest rates are so low are: (1) the actions of the Federal Reserve to stimulate the economy by driving interest rates down; (2) a meaningful number of investors anticipate the possibility of deflation;[2] and (3) investors' aversion to risk is unusually high.

[1] Federal Reserve Statistical Release, Release Date September 7, 2010.

[2] Deflation, if it were to occur, would increase the purchasing power of the dollars these bond investors receive in the future. Therefore, deflation increases the desirability of investing in U.S. treasury bonds.

The purpose of this testimony is to provide financial guidance to the Commission in determining the proper cost of capital for Delmarva Power & Light Company's ("Delmarva" or the "Company") regulated gas utility operations. To successfully accomplish this, it is more important than ever to apply cost of capital measurement tools that are fundamentally sound. Certain simplifying assumptions that are sometimes tolerated are especially troubling in the current financial environment. For example, a DCF method that uses five-year projected earnings per share growth rates, when the point from which measurement begins is the bottom of a recession to some point five years into the future when the economy might return to normal, will result in an exaggeration of the actual sustainable growth rate that investors can expect. As for the risk premium method, the commonly-used simplifying assumption that risk premiums are constant produces an invalid result because in the current economic climate, investors have a heightened aversion to risk.

Most of the controversy in cost of capital debate in rate proceedings focuses on the computation of the cost of equity component. Part of that controversy is due to many cost of equity witnesses providing testimony that combines overly simplified methods to determine the cost of equity with overly complex and invalid criticisms of their adversaries' methods.

Over the time I have been testifying on the cost of capital, I have seen much misuse of cost of equity techniques. I provide information in this testimony on the correct way to implement common cost of equity approaches. I will not only show how I have arrived at my cost of capital, but will also provide enough of the basics on why my approaches are appropriate and how to implement them properly.

I recognize that readers of this testimony have considerably different levels of knowledge about the cost of capital and widely varying perspectives. Providing enough information to allow those desiring a deeper understanding of an appropriate way to compute the cost of equity requires more length than some might wish. Therefore, the summaries included within the testimony are intended to allow those who only require an overview to efficiently obtain needed information.

III. CONCLUSIONS

Q. PLEASE SUMMARIZE YOUR COST OF CAPITAL CONCLUSIONS IN THIS CASE.

A. Before considering the appropriate deduction to the cost of capital resulting from the revenue-decoupled rate design that Delmarva has proposed, I conclude that the overall cost of capital to Delmarva is 7.04%. This is based upon the Company's requested capital structure containing 48.28% common equity and 51.72% long-term debt, using a 9.25% cost of equity (which represents the mid-point of a range of 8.90% to 9.60%), and using a cost of long-term debt of 4.93%.

My recommended 9.25% cost of equity is conservatively high because (1) it is based on the DCF results (any weighting given to the risk premium/CAPM result would lower this conclusion), and (2) for reasons I explain later and also based on the information in Appendix E of this testimony, the long track record of analysts' exaggerated earnings forecasts causes the DCF result to be higher.

As discussed in detail later in this testimony, I implemented the DCF method by first computing the dividend yield. Then I determined growth in a way that is consistent with the dividend yield. This often overlooked procedure to provide consistency

between the dividend yield and growth rate computations is vital to the integrity of the results obtained from the DCF method. Growth for a utility company is not an abstraction, but results directly from a company using the portion of earnings not paid out as a dividend to purchase productive assets that cause earnings to grow. This is why consistency with the way the dividend rate is obtained and growth is computed is an important part of properly applying the DCF method. While accounting for this interrelationship between earnings and dividends requires a simple mathematical step, failing to correct for this can easily result in a mathematically invalid growth rate conclusion.

My conservatively high implementation of the DCF method currently indicates an 8.98% to 9.74% cost of equity for the comparative groups of companies as of August 31, 2010, a result that is virtually identical to the 8.89% to 9.70% range that is indicated based on prices averaged for the entire 12 months ending on August 31, 2010.[3] Both of these results should be reduced by 0.10% in order to align these results with Delmarva's financial risk due to its higher level of common equity.

The net result of examining the risk premium/CAPM methods is an indicated cost of equity of 7.84% to 7.99% (see Schedule JAR 8, Page 1). While these results are lower than usually seen in utility rate proceedings, they are a realistic view of the current financial climate. In particular, these results are in line with the specific risk premium result obtained in the *Ibbotson SBBI 2010 Classic Yearbook* (hereafter, the "*Yearbook*") p. 128), which finds a cost of equity of 8.44% for companies of average risk. After consideration of the lower risk as measured by beta of the proxy groups of companies,

[3] Schedule JAR 2.

the *Yearbook* result applied to the proxy companies produces a result lower than the range I obtained from my risk premium/CAPM approach.

Q. WHY IS YOUR DCF RESULT CONSERVATIVELY HIGH?

A. I have computed the growth rate based on what analysts expect the future sustainable earned return on book equity to be. However, the literature has established that analysts have a strong tendency to be overly optimistic in making forecasts. Although some have argued that analysts have become increasingly independent, evidence refutes this. For instance, a recent McKinsey & Company publication, "McKinsey on Finance,"[4] contains an article entitled, "Equity analysts: Still too bullish," which notes:

> After almost a decade of stricter regulation, analysts' earnings forecasts continue to be excessively optimistic.
>
> No executive would dispute that analysts' forecasts serve as an important benchmark of the current and future health of companies. To better understand their accuracy, we undertook research nearly a decade ago that produced sobering results. Analysts, we found, were typically overoptimistic, slow to revise their forecasts to reflect new economic conditions, and prone to making increasingly inaccurate forecasts when economic growth declined.
>
> Alas, a recently completed update of our work only reinforces this view—despite a series of rules and regulations, dating to the last decade, that were intended to improve the quality of the analysts' long--term earnings forecasts, restore investor confidence in them, and prevent conflicts of interest. For executives, many of whom go to great lengths to satisfy Wall Street's expectations in their financial reporting and long-term strategic moves, this is a cautionary tale worth remembering.
>
> Exceptions to the long pattern of excessively optimistic forecasts are rare, as a progression of consensus earnings

[4] McKinsey on Finance, Number 35, Spring 2010

> estimates for the S&P 500 shows (Exhibit 1). Only in years such as 2003 to 2006, when strong economic growth generated actual earnings that caught up with earlier predictions, do forecasts actually hit the mark.

(*Id.* at 14). (A copy of this article is included as Appendix E to this testimony).

Q. DO CAPITAL MARKETS BELIEVE THE ANALYSTS' FORECASTS EVEN THOUGH THEY HAVE SUCH A LONG-TERM HISTORY OF BEING WRONG?

A. No, not according to McKinsey. This same report says:

> Capital markets, on the other hand, are notably less giddy in their predictions. Except during the market bubble of 1999–2001, actual price--to-- earnings ratios have been 25 percent lower than implied P/E ratios based on analyst forecasts (Exhibit 3). What's more, an actual forward P/E ratio of the S&P 500 as of November 11, 2009 is consistent with long--term earnings growth of 5 percent. This assessment is more reasonable, considering that long--term earnings growth for the market as a whole is unlikely to differ significantly from growth in GDP as prior McKinsey research has shown. Executives, as the evidence indicates, ought to base their strategic decisions on what they see happening in their industries rather than respond to the pressures of forecasts, since even the market doesn't expect them to do so.

Id. at 16-17.

Q. HOW DOES YOUR COST OF CAPITAL RECOMMENDATION CHANGE AFTER CONSIDERING THE IMPACT OF THE REVENUE DECOUPLED RATE DESIGN?

A. As explained later in this testimony, implementing a revenue-decoupled rate design removes a considerable amount of the risk borne by Delmarva's common equity investors. It is therefore appropriate to lower the allowed return on equity by at least 0.5% to 1.50% so long as a revenue-decoupled rate design is in effect. Using the 1.00%

mid-point of this range lowers the cost of equity to 8.25% from 9.25%. This reduction reduces Delmarva's overall cost of capital from 7.04% to 6.55%.[5]

Q. HAVE YOU MADE ANY ADJUSTMENT TO ANY OF YOUR RESULTS TO RECOGNIZE THE HIGHER RISK PREMIUM CAUSED BY THE GREAT RECESSION?

A. Yes. The recession has reduced available opportunities for capital, causing investors to have to settle for lower returns than are available in more normal times. Additionally, current economic conditions have increased the amount of money investors wish to keep in extremely safe investments such as U.S. treasury bonds and bills. While the overall cost of capital has declined for most if not all asset classes, the decline in the returns available on U.S. treasury bonds and bills is especially extreme. Because the decrease in the returns on U.S. treasury bonds and bills has been greater than for assets such as common stock, the return difference (or risk premium) between U.S. treasuries and common stock is considerably higher today than is typical. Therefore, if a properly computed historically determined risk premium is added to the current cost of U.S. treasury bonds or bills, the resulting indicated cost of equity will likely be understated. While both the cost of equity and the cost of U.S. treasury debt dropped, since the cost of the debt dropped more than the cost of equity, determining the cost of equity by simply assuming the cost of equity has dropped as much as did the cost of the U.S. treasury debt would be wrong. To ensure that the CAPM result, which is based on historical risk premium numbers, still has relevance today, this fact should be recognized and treated accordingly. As economic conditions hopefully return to normal in the future, it likely will be once again appropriate to reach a valid estimate of the cost

[5] Schedule JAR 1.

of equity by adding the historically determined risk premium to the then current cost of U.S. treasury debt.

Q. WHAT ARE THE OTHER DIFFERENCES BETWEEN YOUR RECOMMENDATIONS AND THOSE OF MR. HANLEY?

A. One other difference is his 0.21% to 0.25% allowance for financing costs.[6] As explained later, the actual financing costs Delmarva incurred to raise equity over the last 20 years were only 0.05% per year, a small fraction of 0.21% to 0.25%. This 0.05% is so small that it is easily offset by the impact of selling stock above book value. This fact was the reason the Commission rejected an allowance for financing costs in Docket No. 05-304, Delmarva's last electric base rate case in which the Commission has rendered a decision.

In addition, Mr. Hanley has only recommended a 0.25% reduction to the cost of equity to account for a revenue-decoupled rate design.

IV. CAPITAL STRUCTURE AND COST OF DEBT

Q. WHAT IS THE APPROPRIATE CAPITAL STRUCTURE TO USE FOR DETERMINING DELMARVA'S OVERALL COST OF CAPITAL?

A. I computed Delmarva's overall cost of capital based on the capital structure proposed by the Company. See Schedule JAR 1. This capital structure includes no short-term debt. However, since short-term debt is currently the most inexpensive source of investor supplied capital, it could be reasonable to add short-term debt to the

[6] Schedule FJH-1, Page 2.

capital structure in the future, especially if Delmarva returns to its prior practice of using a significant amount of short-term debt between now and the next rate case.[7]

Q. WHAT DID YOU USE FOR THE COST OF LONG-TERM DEBT?

A. The Company has requested an embedded cost of long-term debt of 5.28%, made without any consideration for what impact PHI's unregulated activities might have had on the cost of long-term debt. See Schedule FJH-21. Liberty Consulting Group advised me in Delmarva's 2009 electric distribution rate case that PHI's unregulated activities caused two problems. First, on November 25, 2008 Delmarva issued $250 million of long-term debt right in the middle of the severe financial crisis. Liberty explained that Delmarva could not wait for a more favorable environment to issue the debt because of the capital needs of the unregulated activities. Absent the unregulated activities, Liberty explained that the financing would have occurred no sooner than sometime in the first quarter of 2009 (and in fact the Company testified in that case that it accelerated that debt issuance).[8] Second, Liberty concluded that the $250 million debt issuance made in November 2008[9] would have had a higher bond rating by about "one notch" if not for the impact of the unregulated activities. One notch is equal to approximately 1/3 of the way between adjacent bond ratings.

Q. HOW DO THESE TWO ISSUES IMPACT DELMARVA'S COST OF DEBT COMPUTATION?

A. Delmarva's November 2008 $250 million debt issuance has an interest rate of 6.40% (Schedule FJH-23). As shown on my Schedule JAR-4, Page 2, if this issuance

[7] Liberty Consulting Group's November 2009 report states Delmarva used "[h]igh levels of short-term debt (5 sources) to fund DPL 2008 ops."
[8] Docket No. 09-414, Ex. 16B (Kamerick-Ring Fencing) at 16-17).
[9] Schedule FJH-23.

had been made at the rate that was on average available in the first quarter of 2009 instead, and if the impact of unregulated activities is excluded, then the cost of this debt would have been 5.31% instead of 6.40%.

Q. HOW DO THE ABOVE CORRECTIONS TO THE COMPANY'S REQUESTED COST OF CAPITAL INFLUENCE THE OVERALL RESULT?

A. As shown on Schedule JAR 4, Page 1, the impact of correcting for the timing of the $250 million debt issuance and of eliminating the effect of unregulated activities is to lower Delmarva's embedded cost of debt from 5.24% to 4.93%.

V. COST OF EQUITY DETERMINATION

A. DISCOUNTED CASH FLOW ("DCF") METHOD

Q. WHAT IS THE DISCOUNTED CASH FLOW METHOD?

A. The DCF method is an approach to determining the cost of equity that recognizes that investors purchase common stock to receive future cash payments. These payments come from: (a) current and future dividends; and (b) proceeds from selling stock.

Q. HAVE INVESTORS ALWAYS USED THE DCF METHOD?

A. While investors who buy stock have always done so for future cash flow, the DCF approach first appeared in the 1937 Harvard Ph.D. thesis of John Burr Williams titled *The Theory of Investment Value*. "Williams's model for valuing a security calls for the investor to make a long-run projection of a company's future dividend payments …".[10] The Williams DCF model separately discounts each and every future expected cash flow.

[10] P. BERNSTEIN, *Capital Ideas: The Improbable Origins of Modern Wall Street* (The Free Press, © 1992).

Q. HOW DID INVESTORS EVALUATE STOCKS BEFORE WILLIAMS INTRODUCED THE DCF METHOD?

A. Before the DCF method, investors used methods such as P/E ratios (or its reciprocal the E/P ratio, or earnings yield), or dividend yield (D/P). While these methods are still used today, knowledgeable investors are aware that they are very incomplete and provide only rough guidelines to investment value.

The appropriate P/E ratio for a company with high growth prospects can be much higher than for a company with meager growth opportunities. Therefore, P/E ratios alone do not predict the total return an investor expects to earn from purchasing stock in that company. Similarly, the D/P analysis cannot distinguish important differences between companies with similar D/P ratios but vastly different prospects for future dividend payments. By concentrating on both current dividends and future expected dividend payments, the Williams DCF model filled in the major gaps in the P/E ratio and D/P methods.

Q. BY USING CASH FLOW EXPECTATIONS AS THE VALUATION PARAMETER, DOES THE WILLIAMS DCF MODEL EFFECTIVELY IGNORE EARNINGS?

A. No. Instead, it separates the two ways that earnings create cash flow:

1) DIVIDENDS. Earnings paid out as dividends, and

2) GROWTH. Earnings retained in the business and reinvested to help maintain or grow future earnings, i.e. the portion of earnings that causes future growth in dividends.

Dividends are the only source of cash to the investor while the stock is owned. For companies that pay dividends, those payments continue until the stock is sold. The sales price obtainable when the stock is sold depends upon investors' expectations of future dividends at that time.

Every dollar of earnings is used for the benefit of stockholders, either in the form of a dividend payment or earnings reinvested for future growth in earnings and/or dividends. Earnings paid out as a dividend have a different value to investors than earnings retained in the business. Recognizing this difference and properly considering it in the quantification process is a major strength of the DCF model, and is why the Williams DCF model is a major improvement over either the P/E ratio or D/P methods.

Q. WHY IS THERE A DIFFERENCE TO INVESTORS IN THE VALUE OF EARNINGS PAID OUT AS A DIVIDEND COMPARED TO THE VALUE OF EARNINGS RETAINED IN THE BUSINESS?

A. The return on earnings retained in the business depends upon the opportunities available to that company. If a regulated utility reinvests earnings in needed used and useful utility assets, then those reinvested earnings earn at whatever return is consistent with the ratemaking procedures allowed and the skill of management.

When an investor receives a dividend, he can either reinvest it in the same or another company or use it for other things, such as paying down debt or paying living expenses. Although an investor could theoretically use the proceeds from any dividend payments to simply buy more stock in the same company, when an investor increases his investment in a company by purchasing more stock the transaction occurs at market price. However, when the same investor sees his investment in a company increase because earnings are retained rather than paid as a dividend, the reinvestment occurs at book value. Stated within the context of the DCF terminology: earnings retained in the business earn at the future expected return on book equity "r," and dividends used to purchase new stock earn at the rate "k." When the market price exceeds book value (that is, the market-to-book ratio exceeds 1.0), retained earnings are worth more than

earnings paid out as a dividend because "r" will be higher than "k." Conversely, when the market price is below book value, "k" will be higher than "r," meaning that earnings paid out as a dividend earn a higher rate than retained earnings.

Q. IF RETAINED EARNINGS ARE MORE VALUABLE WHEN THE MARKET-TO-BOOK RATIO IS ABOVE 1.0, WHY WOULD A COMPANY WITH A MARKET-TO-BOOK RATIO ABOVE 1.0 PAY A DIVIDEND RATHER THAN RETAIN ALL OF THE EARNINGS?

A. Retained earnings are only more valuable than dividends if there are sufficient opportunities to profitably reinvest those earnings. Regulated utility companies are only allowed to earn the cost of capital on assets that are used and useful in providing safe and adequate utility service. Investing in assets that are not needed may not produce any return at all.

Opportunities for unregulated companies to reinvest funds are limited by the demands of the business. How many new computer chips can Intel profitably develop at the same time?

Q. IS THE DCF METHOD STILL VALID WHEN MARKET-TO-BOOK RATIOS ARE DIFFERENT THAN ONE?

A. Yes. Because the DCF model is specifically designed to recognize the difference in the value of earnings paid out as a dividend and retained earnings, a properly applied DCF model maintains its accuracy irrespective of the market-to-book ratio. It is old methods like the P/E ratio whose accuracy deteriorates as the market-to-book ratio varies from unity.

Q. HAVE YOU SEEN WITNESSES IN PUBLIC UTILITY RATE PROCEEDINGS CLAIM THAT THE DCF METHOD LOSES ITS ACCURACY AS THE MARKET-TO-BOOK RATIO VARIES FROM 1.0?

A. Yes. However, such a statement could only be true if: (1) the form of the DCF model being used by that person were defective; or (2) the result of the DCF model were being used for a different purpose other than that rate proceeding.

Q. PLEASE PROVIDE AN EXAMPLE OF USING THE DCF MODEL FOR A DIFFERENT PURPOSE THAN RATE PROCEEDINGS.

A. In utility rate proceedings, the cost of equity should be the return rate that will allow the utility to earn enough to maintain the original cost valuation. In other words, when a utility raises capital from equity investors (whether through the sale of new common stock or by retaining earnings), it uses the proceeds from that sale to purchase utility assets. Assuming that the assets are used and useful, those assets are added to rate base at an amount equal to their net original cost. The return rate being earned by those assets should be sufficient to allow investors to conclude that the net present value of the income stream anticipated from that cash flow is equivalent to the net original cost of the assets.

While it is never appropriate to do so in utility rate proceedings, there are times when the management of unregulated companies looks at the DCF result differently. They might not be concerned with the cost of equity, but instead may care about maintaining a specific stock price. Under such circumstances, the term "cost of equity" as we use it in utility rate proceedings might be confused with the similar sounding but completely different "return on book equity" that must be earned in order to maintain the company's stock price.

The management of a company with a high stock price (because it is earning a very high return on book equity) might consider its "cost" of equity to be equal to the return required to maintain the current stock price rather than using the capital attraction

standard appropriate for ratemaking purposes. But that is a different perspective than the appropriate cost of equity to apply to an original cost rate base in a utility ratemaking proceeding.

Q. UNDER THE WILLIAMS DCF MODEL, IS IT NECESSARY FOR EARNINGS AND DIVIDENDS TO GROW AT A CONSTANT RATE FOR THE MODEL TO BE ABLE TO ACCURATELY DETERMINE THE COST OF EQUITY?

A. No. Because the Williams DCF model separately discounts each and every future expected cash flow, it does *not* rely on any assumptions of constant growth. The dividend yield can be different from period to period, and growth can bounce around in any imaginable pattern without harming the accuracy of the answer obtained from quantifying those expectations. When the Williams DCF model is correctly used, the answer obtained is as accurate as the estimates of future cash flow. As with any valid equation, however, its accuracy is dependent upon the accuracy of the determination of the future cash flow expectations.

Q. IS THE WILLIAMS DCF MODEL GENERALLY USED IN UTILITY RATE PROCEEDINGS?

A. While the Williams DCF model could be used today, it is far more common in utility rate proceedings to use the simplified D/P + g form of the DCF model (often referred to as the Gordon model).[11] However, the result of the D/P +g "constant growth" form of the DCF model is identical to the result obtained from the Williams

[11] The Gordon model is named after Dr. Myron Gordon, who is generally recognized as the first person to use the DCF model in utility rate proceedings. He demonstrated that it was possible to simplify the Williams DCF model for application to public utility companies.

model (which requires a separate discounting calculation for each and every future expected cash flow) only when this "constant growth" is a reasonable expectation.

Q. WHAT IS THE GORDON CONSTANT GROWTH FORM OF THE DCF MODEL?

A. The Gordon model is the equation k= D/P + g, where:[12]

k= cost of equity;
D=Dividend rate; and
P=Market price of stock.

In the above equation:

g=the growth rate, where g= br + sv;
b=the earnings retention rate;
r=rate of return on common equity investment;
v=the fraction of funds raised by the sale of stock that increases the book value of the existing shareholders' common equity; and
s=the rate of continuous new stock financing.

The Gordon model is therefore correctly recognized to be:

k=D/P + br +sv

Q. DOES THIS MEAN THAT THE CONSTANT GROWTH, OR GORDON, MODEL CANNOT BE USED UNLESS FUTURE GROWTH FOR ALL THESE ITEMS TURNS OUT TO BE EXACTLY THE SAME?

A. No. Of course, in the real world there would virtually never be an instance where earnings, dividends, stock price, and book value would all actually grow at the same rate as each other and at the same rate in every future year. But, so long as the *best estimate* of what future growth for each will be can be reasonably estimated as the same growth rate, then it can be proper to use the Gordon constant growth DCF model. For example, if an investor expects that future dividends, earnings, book value, and stock price will grow at 4% per year with unpredictable random variations of +/- 0.5% in each

[12] M. GORDON, *Cost of Capital to a Public Utility*, at 32-33 (MSU Public Utility Studies 1974).

year, then the 4% growth rate will produce the correct answer in the constant growth DCF model (i.e. exactly the same answer as in the Williams DCF model) because it is the best estimate of what investors expect for future growth.

Q. ARE THERE ANY IMPORTANT CONSIDERATIONS IN DETERMINING THE INPUTS FOR THE CONSTANT GROWTH DCF MODEL?

A. Yes. One important and commonly overlooked consideration is the basic principle behind the DCF method: that it works because it first divides all future expected earnings into either dividend yield or growth, and then values each stream separately. Implementations of the constant growth DCF model tend to be consistent in recognizing that the future cash flow from dividends must be valued separately from the portion of retained earnings. However, needless inaccuracies occur when users of the constant growth DCF method fail to respect the necessity to count all future expected earnings once and only once. Leave some of the future expected earnings out, and the DCF method will tend to understate the cost of equity. Double-count some of the future expected earnings, and the DCF method will tend to overstate the cost of equity.

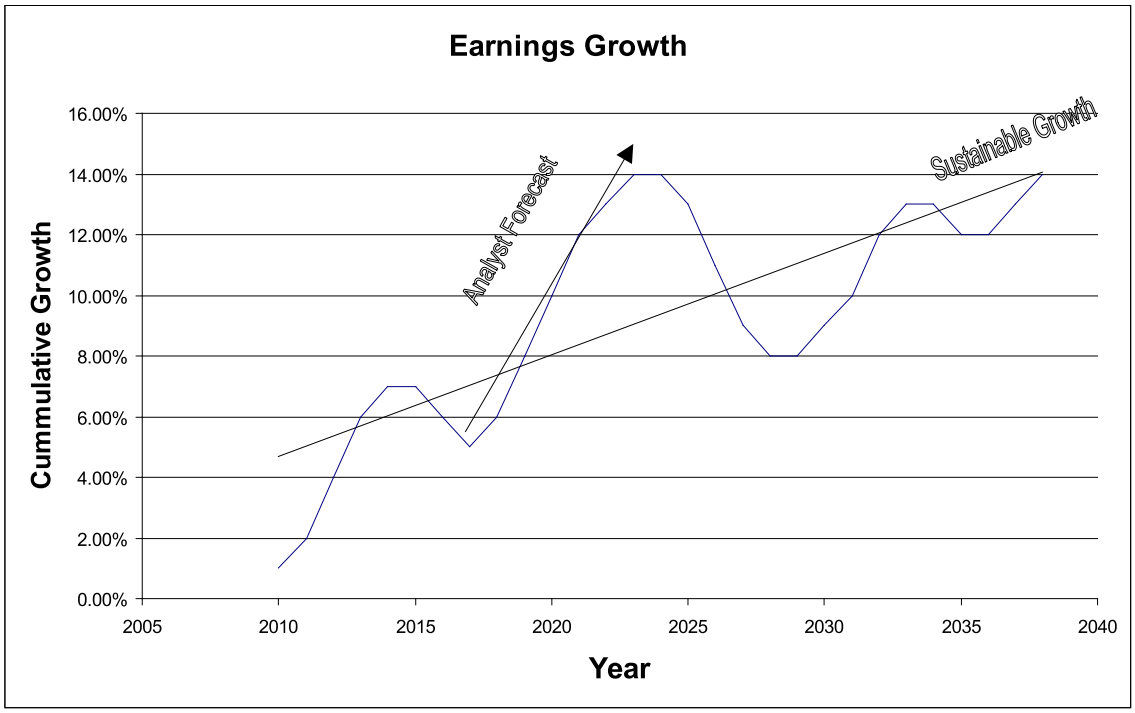
Q. WHAT HAPPENS IF THE CONSTANT GROWTH DCF MODEL IS USED WITH SOME VALUE OTHER THAN BR + SV FOR G?

A. Unless great care is taken in obtaining "g," the model suffers what could be a substantial loss of its mathematical integrity because it is likely that such an alternative growth rate will not be the kind of growth that is *required* for use in the constant growth DCF model: namely a growth rate that is reasonably representative of long-term future expected growth in dividends, earnings, book value and stock price.

A common mistake in implementing the constant growth DCF model is to oversimplify the process by using analysts' unadjusted five-year earnings per share

("EPS") growth rate as a proxy for long-term sustainable constant growth. While these growth rates may provide some guidance in determining what future cash flows will be, they should never be used in the constant growth DCF model without making adjustments for their known deficiencies as a proxy for the kind of growth required for "g" in the constant growth form of the DCF model.

The graph below shows actual earnings per share and earnings per share at a sustainable growth rate. The straight line around which the wavy line fluctuates represents sustainable growth. The arrow shows what often happens if a five-year growth rate is substituted for the long-term sustainable growth rate. While the graph depicts a hypothetical situation, it correctly depicts why shorter-term five-year EPS growth rates are the wrong ones for the constant growth DCF model.



Q. ARE THE PUBLISHED ANALYSTS' GROWTH RATES LONG-TERM SUSTAINABLE GROWTH RATES OR ARE THEY THE SHORTER GROWTH RATES DEPICTED IN THIS GRAPH?

A. They are shorter-term growth rates. Those that mistakenly use analysts' growth rates in the DCF formula typically use sources such as Zacks (which compiles the consensus of analysts' five year EPS growth rates), or Value Line (which provides its own 3-5 or 4-6 year growth rates).

The main differences between Value Line's future oriented growth rates and the growth rates compiled by Zacks are that: (1) Value Line provides some attempt at a partial normalization because it uses a three-year period rather than a one-year base period; and (2) Value Line provides forecasts for much more than just earnings.

It is improper to apply the constant growth DCF method by simply adding Value Line's approximately five-year EPS growth rate to the dividend yield. Factors such as the forecasted dividend growth rate, the forecasted stock price, forecasted changes in the dividend payout ratio or changes in the earned return on book equity between the three-year base period and the end years of the forecast all have a huge impact on the proper inputs into a long-term sustainable growth rate. For example, if EPS are forecasted to grow more rapidly than book value per share over the period being examined by Value Line, then in this period earnings are growing at an abnormal, unsustainable rate. The peril in ignoring these other factors is a needlessly inaccurate DCF result.

Q. IS THERE A SIMPLE WAY TO IDENTIFY WHEN ANALYSTS' FORECASTED EPS GROWTH RATES ARE NOT REPRESENTATIVE OF THE LONG-TERM SUSTAINABLE CONSTANT GROWTH RATE REQUIRED TO ACCURATELY IMPLEMENT THE CONSTANT GROWTH DCF MODEL?

A. Yes. One way is to look for forecasted changes in the earned return on book equity. Changes in the earned return on book equity are not sustainable because, if they are increasing, either competitive or regulatory pressures provide a practical limit on how high an earned return on equity can grow. For example, if in some five year period

a company's earned return on book equity is expected to increase from 8% in the most recent historical year to12% in the last year of the projection, any EPS increase required to make this expectation a reality would not occur in the future unless the earned return on book equity continued to increase at the same rate in the future. It might be possible to find companies that are expected to see sustained earned returns on book equity of 12%, but a return on book equity over the subsequent five years that would result from a further increase in the earned return on book equity from 12% to 16% followed by an increase from 16% to 20%, etc. becomes increasingly less and less credible. In fact, for regulated public utilities, future expected returns on book equity as high as 16% are rare and sustainable returns above 20% really start to stretch the imagination. When an expected future return of 16% en route to 20% starts to become a remote possibility for one company (let alone in aggregate for a group of utilities selected to be comparable), such a result has no credibility whatsoever, yet such returns would commonly have to be expected to occur eventually if the component of EPS growth were incorrectly allowed to stay as part of the "g" term mistakenly used in the constant growth form of the DCF method.

Q. ARE ANALYSTS' FORECASTS USEFUL IN APPLYING THE CONSTANT GROWTH DCF FORMULA?

A. As stated earlier in this testimony, the recent McKinsey & Company publication contained in Appendix E of this testimony has found that investors generally recognize analysts' earnings forecasts to be overly optimistic. Keeping this in mind, analysts' forecasts can be used to establish an upward limit to the growth rate expected by investors. However, the habitual optimism built into analysts' EPS forecasts makes it all the more important to reject use of analysts' five year EPS growth rates. This is because

the impact on the growth rate computations of those overly optimistic forecasts is exaggerated when the five-year EPS forecast is used.

The effect of analysts' overly optimistic forecasts can be considerably less pronounced if such forecasts are used only to compute the return on book equity analysts forecast a company will be able to earn in five years. Typically, when analysts go out for five years, the forecast for that period is based upon an expectation of the year being normal. Knowing what the analyst expects the return on book equity to be in a normal year provides one insight into what investors expect as the future sustainable return. This future sustainable return on book equity is an important input into the computation of "g" because "g" is defined as "br" + "sv," where "r" is the sustainable earned return on book equity.

Value Line provides forecasts of company-specific future expected returns on book equity. The earned return on book equity that would be required to achieve the forecasted earnings growth rate can only be estimated for the Zacks earnings consensus since Zacks does not provide five-year forecasts of dividends or book value. While it is simple to compute the future expected EPS consistent with the Zacks consensus growth rate because earnings in the base year can be escalated at the specified EPS growth rate, computing the earned return on book equity requires knowing what the projected book value per share will be.

The level of earned return on book equity consistent with the Zacks consensus forecast can only be estimated if estimates are made about future dividend payout ratios and the impact that sales of new common stock above book value will have on book value growth. Book value growth from retained earnings can be estimated by: (1)

adding earnings to book value and subtracting dividends from book value; and (2) estimating the growth in book value caused by the sale of common stock above book value. Since the Zacks consensus forecast fails to provide the future expected return on book equity, the dividend growth rate, or information needed to determine the level of the increase in book value caused by sales of common stock above book value, other resources such as Value Line must be used to supplement the Zacks information. Once an estimate for the future book value is obtained, the future expected earned return on book value can be computed by simply dividing the projected earnings by the projected book value.

Q. YOU HAVE EXPLAINED WHY ANALYSTS' FIVE-YEAR EPS FORECASTS REQUIRE SUSTAINABILITY ADJUSTMENTS BEFORE BEING USED AS THE VALUE FOR "G" IN THE CONSTANT GROWTH DCF FORMULA. ARE SIMILAR ADJUSTMENTS REQUIRED TO THE BR + SV APPROACH?

A. No. Unlike the DCF approach based on analysts' forecasts, the values for the retention rate "b" and the future expected return on equity "r" are already the same in the beginning year as in the ending year. Therefore, no adjustments are needed.

The "br" term is used to compute the growth rate that results from retained earnings, while the "sv" term is used to quantify sustainable growth that can occur if a company is able to consistently sell new common stock at a price above book value. Both the "br" and "sv" growth are sustainable growth rate methods because they result in permanent increases to the company's book value per share. In the case of "br," book value per share grows because the retained earnings become part of this component of book equity. In the case of "sv," book value grows because the sale of new common stock above book value increases total book value more rapidly than the corresponding

increase in the number of shares outstanding, making the result from dividing total book value by the number of shares outstanding higher than before the new equity sale.

Q. WILL THE EARNINGS GROWTH THAT RESULTS FROM RETAINED EARNINGS VARY IN RESPONSE TO CHANGES IN THE EARNED RETURN ON BOOK EQUITY?

A. Yes, the actual earned return on book equity fluctuates. However, for a regulated utility's investments in used and useful utility plant that is added to regulated rate base, this variation will usually be within a relatively narrow range surrounding its allowed return. While changes in the earned return might not be predictable, the average return the new plant investment will earn can generally be determined with reasonable accuracy. A utility's investment in plant under construction might not be immediately added to rate base, but many such projects earn an Allowance for Funds Used During Construction instead of a return on rate base that produces earnings growth comparable to used and useful assets that are added to rate base. For unregulated companies, or the unregulated operations of companies that own regulated utilities, the earned return opportunities on new investments are not controlled by commission-authorized returns, but instead are limited by the normal give and take of competition. Future actual earned returns for new investments made by a company in unregulated activities can be estimated by examining both historical actual earned returns on book equity and future expected returns on book equity as estimated by analysts. However, when interpreting analysts' forecasts, the long track record of habitual optimism should be remembered.

Q. CAN CHANGES IN THE OVERALL EARNED RETURN IMPACT GROWTH ABOVE AND BEYOND WHATEVER GROWTH RESULTS FROM EARNINGS RETENTION?

A. Yes, but one-time changes in EPS caused by a perceived change in the future expected earned return are unsustainable. The new perceived earned return on book equity should be part of the computation, but the one-time growth spurt to get there should *not*. A champion marathon runner might be able to run 26 miles in a little over two hours, but this does not mean that he could cover 52 miles in a little more than four hours.

Q. HOW CAN INACCURACIES IN THE DCF RESULT CAUSED BY FORECASTED DIFFERENCES BETWEEN THE EPS GROWTH RATE AND THE DIVIDENDS PER SHARE GROWTH RATE BE ELIMINATED?

A. One way to correct such a problem is to reject the constant growth DCF model in favor of the complex version.[13] The complex form separately discounts the anticipated cash flow in each subsequent year so that changes in the dividend payout ratio and anticipated changes in the earned return on book equity can both be quantified in a way that retains mathematical accuracy. The simplest way to avoid adding this extra complexity in a way that, especially for regulated public utilities, will generally retain mostly all of the accuracy obtainable from the complex model is to quantify growth by using "br" + "sv," in which:

1. The retention rate "b" is the earnings retention ratio computed to be consistent with the dividend rate used in the D/P term of the constant growth DCF formula, and

2. it is recognized that at any point in time, the price investors are willing to pay for a company's stock relates to what earnings are expected at that time. The only

[13] I am aware that the cost of capital consultants that the Commission Staff has used in prior years have used the simplified constant growth DCF model and have used analysts' five-year EPS growth estimates as an input; however, as I explain in this testimony, it is more appropriate to use analysts' forecasts to help quantify the future expected return on book equity and to then use that expected return on book equity in the sustainable growth rate computation. Doing so produces a DCF result that is based on a more precise quantification of future expected cash flows.

relevant estimate of the return on equity "r" that should be used in the DCF formula is the one that investors expect to be on average earned at the time of the quantification of the stock price used in the DCF formula.

By following these two relatively simple guidelines, the accuracy of the DCF method will in most cases be almost entirely related to the quality of the estimate for the value of the future expected return on book equity, "r." Otherwise, the accuracy is subject to both the quality of the estimate of future growth and the mathematical inaccuracies that result from trying to fit non-constant growth estimates into a formula that has a mathematical requirement for constant growth.

Q. ARE YOU AWARE OF CLAIMS THAT A PROBLEM WITH THE "BR" APPROACH TO THE CONSTANT GROWTH DCF MODEL IS THAT IT RELIES ON THE VALUE OF THE FUTURE EXPECTED RETURN ON BOOK EQUITY "R" TO ESTIMATE WHAT THE EARNED RETURN ON EQUITY SHOULD BE?

A. Yes. In fact, Delmarva showed that it was under this misconception in its recent electric rate case in Delaware. However, the concern is as invalid as saying thermostats can't work because they use room temperature to set room temperature.

Q. PLEASE EXPLAIN.

A. The cost of equity, "k," is not the same variable as the future expected earned return on equity, "r." In fact, there often is a large difference between the two. As Mark Twain once said, the difference between "lightning" and "lightning bug" is but one word.

Determining the cost of equity is *not* just about finding what return on book equity investors expect a company will earn, but also about quantifying how investors react to that expected return. That is where stock price comes in. For bond yield, when investors perceive the coupon yield interest rate to be higher than needed, they bid up

the bond's price. Conversely, if investors perceive the coupon yield to be inadequately low, the price of the bond drops. Exactly the same is true for the price of common stock. The difference is that the coupon yield is known for bonds, whereas for stocks the future expected return on book equity is estimated.

Another reason this criticism is misplaced is because when the DCF method is applied, it equates the stock price *at a given point in time* to investors' expectations *at that same time*. A commission decision could change investors' expectations for the value of "r" that will be earned in the future, but concurrently with this change in expectations for "r," the stock price will also change. Unless something else changes to cause either the company's risk to be altered or an overall change in financial markets, then the stock price will respond to the change in "r" just enough so that the cost of equity "k" does not change just because "r" changed.

Another way of looking at it is to think about the "br" value in the context of the DCF equation. As previously observed, the whole premise behind the DCF method is that investors purchase a stock to obtain the rights to the future cash flows that will result from its ownership. If the level of expected cash flows changes, the stock price is expected to change accordingly. For example, suppose a commission properly implementing the DCF method is convinced that as of the time of implementation, investors expect the company to be able to earn an average 11% return on book equity. As a result of that expectation and the actual dividend rate, etc. the commission determines that the company's cost of equity is 9%. As a result of the commission's action, investors lower their expectations for the future return on book equity from 11% to 9%. Under such circumstances, the DCF model would predict that the stock price

would change so that the cost of equity computed from using the new expected values for D/P + (br + sv) would still equal "k." In this example, both "r" and "P" would go down, and other variables in the equation would likely change, but since there would not necessarily be any change in the cost of equity "k," investors would change the stock price so that the cost of equity "k" would remain the same.

Q. HOW HAVE YOU IMPLEMENTED THE DCF MODEL IN THIS CASE?

A. The DCF method is based upon estimating future cash flows anticipated by investors. Since there is no contract or any other document that definitively determines what investors expect future cash flows to be, there will always be some degree of inaccuracy associated with the DCF method. However, approaches to quantifying the variables in the DCF equation that are inconsistent with the mathematical derivation of the equation can and should be avoided. For all the reasons stated earlier in this testimony, analysts' five-year EPS forecasts are *not* consistent with the value of "g" in the formula. Even if somehow one knew with certainty what investors expected the five-year EPS forecast to be, using that number for "g" would still produce a wrong answer because it is a non-constant growth rate.

The proper way to adjust for the computational errors that occur because of the impact of non-constant growth when using a five-year analysts' forecast as a proxy for growth is to stay true to the mathematically-derived "k=D/P +(br + sv)" form of the DCF model. Furthermore, when using this formula, one should take care to fully allocate all future expected earnings to either future cash flow in the form of dividends ("D") or to retained earnings (the retention rate, "b"). This extra accuracy is obtained

only when the retention rate "b" is derived from the values used for "D" and "r" rather than independently.

Q. PLEASE EXPLAIN HOW YOU OBTAINED THE VAUES TO INPUT INTO THE k=D/P + (br + sv) FORM OF THE DCF METHOD.

A. The DCF model generally calls for the use of the dividend expected over the next year. A reasonable way to estimate next year's dividend rate is to increase the quarterly dividend rate by ½ of the current actual quarterly dividend rate. This is a good approximation of the rate that would be obtained if the full prior year's dividend were escalated by the entire growth rate.

Q. CAN YOU PRESENT AN EXAMPLE THAT SHOWS HOW THIS APPROACH WORKS?

A. Yes. Assume a company paid a dividend of $0.50 in the first quarter a year ago, and has a dividend growth rate of 4% per year. This dividend growth rate equals (1.04)^4-1=0.00985% per quarter. Thus, the dividend is $.5049 in the second quarter, $.5099 in the third quarter, and $0.5149 in the fourth quarter.

If that 4% per annum growth continues into the following year, then the dividend would be $0.5199 in the 1st quarter, $0.5251 in the 2nd quarter, $0.5303 in the 3rd quarter, and $0.5355 in the 4th quarter. Thus, the total dividends for the following year equal $2.111 (0.5199 + 0.5251 + 0.5303 + 0.5355). I computed the dividend yield by taking the current quarter (the $0.5149 in the 4th quarter in this example), and multiplying it by 4 to get an annual rate of $2.06. I then escalated this $2.06 by ½ the 4% growth rate,

which means it is increased by 2%. $2.06 x 1.02= $2.101, which is within one cent of the $2.111 obtained in the example.[14]

Q. HOW DID YOU OBTAIN THE PROXY GROUPS YOU USED IN YOUR DCF ANALYSIS?

A. I used the same two proxy groups that Delmarva witness Hanley used. On page 11-12 of his direct testimony he lists the criteria he used to select his proxy groups. It should be noted that these proxy companies do contain some level of unregulated operations. Therefore, the cost of equity result for this group is probably higher than appropriate for Delmarva because of the upward influence on the cost of equity these unregulated activities likely have. This helps make my cost of equity recommendation conservatively high, especially in this highly risk-averse financial market.

Q. WHAT IS DELMARVA'S COST OF EQUITY FROM YOUR DCF MODEL?

A. I obtained the stock price "P" used in my DCF analysis from the closing prices of the stocks on August 31, 2010. I also obtained an average stock price for the 12 months ending August 31, 2010 by averaging the high and low stock prices for the year.

I estimated the future expected return on book equity, "r," for the proxy group of gas distribution companies to be 11.80%, derived by considering Value Line's future expectation return on book equity (12.29%), the future expectation consistent with Zacks' five year earnings consensus projection (11.32%), and recent actual earned return on book equity data (11.31% to 12.20% over the last three years for the natural gas

[14] Note that without escalation, the result would have been low by 5.1 cents, and if a full year's growth rate escalation had been used instead of the half year's growth, the result would have been high by over 3 cents. Therefore, using ½ of a year's growth rate is a very reasonable approximation, whereas either of the above alternatives contains noticeable errors.

companies). See Schedule JAR-5, page 2. I estimated the future expected return on book equity "r" for the proxy group of eleven combination gas and electric companies to be 10.00%, obtained by considering Value Line's future expected return on book equity (10.45%), the future expected return on book equity consistent with Zacks' consensus growth rate (9.52%) and the recent actual earned return on book equity data (9.43% to 10.73% over the last three years). See Schedule JAR-5, Page 1.

There is no way to determine precisely what investors expect and no one best way to interpret the data I have presented. Therefore, this is one area where there is room for some (albeit usually relatively narrow) difference of opinion. While other knowledgeable and objective estimates of the future expected returns on book equity that give rise to the stock prices used in the DCF computation are possible, especially since McKinsey has shown that investors are aware that analysts have a propensity to be optimistic, my estimate of what investors expect for the future value of "r" is conservatively high.

This return on book equity expectation used in the DCF method to compute growth must *not* be confused with the cost of equity. Since the stock prices for the comparative companies are considerably higher than their book value, the return investors expect to receive on their market price investment is considerably less than whatever is the anticipated return on book value. What the DCF method is all about is deriving mathematically the relationship between the expected return on book equity and how, based on market price, investors react to that expectation. The expected return on book equity only says something about the cost of equity *after* that earned return is brought into context by relating it to the market price (or, more precisely, the market-to-

book ratio) resulting from that expectation. If the market price is low, the cost of equity will be higher than the future expected return on book equity, and if the market price is high, then the return on book equity will be less than the cost of equity.

I quantified reinvestment growth by applying "sv," using the actual market-to-book ratio and the compound annual growth rate of stock that is forecasted to be issued by Value Line.

Pure financial theory tends to prefer concentrating on the results from the most current price because investors cannot purchase stock at historical prices. Others are concerned about the potential distortion of using just a spot price. I present both so the Commission can use the perspective it feels most appropriate. In this case, the concern is not warranted because the results from either the spot or historical average pricing are almost identical. Thus, as shown on Schedule JAR 5, Pages 1 and 2, my DCF method, applied to Mr. Hanley's proxy groups of eleven combination gas and electric companies and seven natural gas distribution companies respectively, indicates a cost of equity of 8.89% and 9.70% as of August 31, 2010, and a cost of equity of 8.98% and 9.74% based on average stock prices for the twelve months ending August 31, 2010. I reduced these results by 0.10% to recognize that Delmarva's requested capital structure contains a higher percentage of common equity than the companies in the comparative group

Schedule JAR 5, Page 1 shows the details of my DCF computation for the proxy group of eleven combination gas and electric companies. The dividend yield as of August 31, 2010 was 4.60%. I added 0.10% to the dividend yield to allow for growth in dividends to next year. I estimated the overall growth rate to be 4.19%. I derived an estimated cost of equity of 8.89% for this proxy group.

Schedule JAR 5, Page 2 shows the details of my DCF computation for the proxy group of seven natural gas distribution companies. The dividend yield as of August 31, 2010 was 3.78%. I added 0.11% to the dividend yield to allow for growth in dividends to next year. I estimated the overall growth rate to be 5.82%. I derived an estimated cost of equity of 9.70% for this proxy group.

Based on these results, I recommend a DCF-derived cost of equity of 9.00% to 9.70% based on the proxy groups. To apply that result to Delmarva, a reduction of 0.10% should be made because the requested capital structure for Delmarva contains more common equity than the average common equity of the proxy group.

B. CAPITAL ASSET PRICING MODEL ("CAPM")

Q. PLEASE PROVIDE AN OVERVIEW OF YOUR CAPM CONCLUSIONS.

A. The CAPM method currently indicates a cost of equity of 7.98%, obtained from combining results of the traditional CAPM and a market-derived CAPM and including an additional Great Recession risk premium.

While this 7.98% result is considerably lower than risk premium/CAPM results that both others and I have found in prior cases, these are unusual financial times. This 7.98% result is compatible with the 8.44% risk premium result presented in the 2010 *Yearbook* based on its current application of the 1926-2009 data.[15] Since the comparative companies used to evaluate Delmarva's cost of equity have an average beta that indicates a materially lower risk than the average company to which the 8.44% is intended to apply, the result applicable to Delmarva would be less than this 8.44%.

Q. WHAT IS THE TRADITIONAL CAPM?

[15] *Ibbotson SBBI 2010 Classic Yearbook*, pages 127-128.

A. The traditional CAPM estimates a company's cost of equity by adding a risk premium to a theoretical "risk-free" rate.

Q. WHAT IS THE MARKET-DERIVED CAPM?

A. Rather than effectively taking only two points (the expected return for an average-risk company being one point and the risk-free rate being the other point), the market-derived CAPM develops the relationship between the cost of equity and beta by graphing the actual earned return and the actual beta. The earned return data from 1926-2009 for each of ten different groups of companies is plotted, and a graph showing the actual historical relationship between the beta and the earned return is produced.

Q. IN BOTH THE TRADITIONAL AND THE MARKET-DERIVED CAPM APPROACHES, YOU ADJUSTED THE COST OF EQUITY UPWARD TO ACCOUNT FOR THE SPECIAL RISK PREMIUM CAUSED BY THE GREAT RECESSION. HOW DID YOU QUANTIFY THIS AMOUNT, AND HAVE YOU MADE A SIMILAR ADJUSTMENT IN THE PAST?

A. I quantified this adjustment by observing that the interest rate being demanded by investors on BB-rated bonds in excess of the interest rate on 10-year U.S. treasury bonds is considerably higher than it has been, on average, in the past. In the current highly uncertain financial climate, investors have shown an unusually strong preference for very low risk assets. This has caused investments such as U.S. treasury bills to yield especially low interest rates. This flight to quality disappears more rapidly than normal as investors move up to more and more risky investments. The risk premium/CAPM method is based on examining the relationship between the returns earned on various investment risk classes on average from 1926 to 2009, and the current environment varies greatly from average conditions. Therefore, to make the risk premium/CAPM method relevant to current market conditions, a special upward adjustment is required.

The only time in the past that I have proposed an adjustment to recognize that the historically derived risk premium is currently inapplicable is in my testimony in PSC Docket No. 09-414, Delmarva's electric rate case filing made last year. I have never made this adjustment before because this is the first time since the Great Depression years of the 1930's that the risk premium has departed so dramatically from its historical average.

Q. IF THIS UPWARD ADJUSTMENT IS NO LONGER NEEDED WHEN THINGS RETURN TO MORE NORMAL, DOES THIS MEAN THE COST OF EQUITY WILL GO DOWN?

A. No, not necessarily. There are other ways this difference could return to normal. Currently, the interest rates available to investors on low-risk investments are especially low (the 0.16%[16] current interest rate on short-term treasuries is an obvious extreme), but interest rates on longer-term low-risk investments are also low. As the economy recovers, investors will become increasingly willing to take on more risk. As investor risk tolerance returns to normal, the demand for very low-risk investments will go down and the demand for higher-risk investments will go up. Therefore, it could be that rather than the cost of equity decreasing as the extraordinary risk premium returns to normal, the interest rate on lower-risk investments could go up or down depending on how the other distortions in the financial marketplace are reconciled.

Q. PLEASE EXPLAIN HOW DEBT-BASED METHODS ARE USED TO ESTIMATE THE COST OF EQUITY.

A. Both the cost of debt and the cost of equity can be viewed to consist of the following components:

[16] Federal Reserve Statistical Release September 7, 2010, yield on 1-month treasury bill as of August 31, 2010.

(a) Risk-free cost of capital;
(b) Allowance for inflation (to maintain purchasing power of the investor's capital); and
(c) Allowance for risk.

If all three of these components were known, the cost of equity could be determined simply by summing them up. Unlike the cost of equity, the cost of debt may be quantified more precisely. Academics, investment bankers, and investors have done much financial work to try to estimate the cost of equity based upon the cost of debt.

Typically, it is reasonable to determine the cost of equity by establishing a risk-free interest rate that includes both the risk-free cost of capital and an allowance for inflation, and adding an appropriate allowance for risk. This approach is based on an expectation that the risk-free cost of capital and the allowance for inflation expressed in the risk-free interest rate and embedded in the computed risk premium is sufficient to fully account for all of the components of the cost of equity.

Parallels between the cost of equity and cost of debt are not perfect because: (a) bond returns are mostly fixed while equity returns are variable; and (b) the time periods over which the various bond's or note's interest rate is applicable can be different, and the allowance for inflation is not necessarily the same for all future time periods. In times when the relationship between the cost of debt and the cost of equity is reasonably normal, these differences are unimportant so long as there is consistency in the compilation of the risk premium data and the risk. Therefore, methods that estimate the cost of equity based on the cost of debt focus on differences in the risk premium.

Q. ARE CONDITIONS CURRENTLY NORMAL?

A. No. In late 2008 and early 2009, the U.S. financial markets experienced a financial trauma that was anything but normal. The banking system was highly stressed

by the failure or near-failure of Lehman Brothers, Bear Stearns, AIG, Merrill Lynch, etc. The Federal Reserve dramatically lowered interest rates, and the U.S. Government has implemented (and is continuing to implement) significant activities to stimulate the economy. One factor that makes all this important to debt-based equity cost computations is that the allowance for inflation has become more uncertain. Some fear that the weak economy could result in deflation; others worry that large deficit spending could cause high future inflation rates. This uncertainty makes the allowance for inflation component of the cost of capital a source of greater variability than normal. Since the interest rate on bonds is fixed, while the return on common equity is variable, long-term changes to the inflation rate could increase the risk of investing in bonds more than it would impact the risk of investing in common stocks. To the extent this is true, this factor alone could reduce the cost difference between debt and equity.

Q. WHAT ARE THE RELEVANT DIFFERENCES BETWEEN THE COST OF DEBT AND THE COST OF EQUITY?

A. Investing in bonds is different than purchasing equity because of the following:

a. PAYMENT PRIORITY. Bondholders have a right to interest and principal payments before the company's equity holders are paid dividends;

b. FIXED VERSUS VARIABLE PAYMENTS. As mentioned previously, bond payments are fixed, which means they have more inflation risk compared to common stock. In times of high inflation, it is at least possible (but not guaranteed) that a company can raise prices enough to allow earnings to keep pace with inflation, whereas for bondholders that is not possible;

c. INCOME TAXES. Investors are concerned with how much income is received after paying income taxes. In the United States, the income earned on bonds and stocks is taxed differently. Currently, dividends paid on common stocks are often eligible to be taxed at the lower long-term capital gains rate, and the portion of the income investors receive from investing in common stocks does not have to be paid until the stock

is sold. The interest income investors receive on bonds is taxed at regular (higher) income tax rates. Sometimes bonds also have a component of the total return that is subject to capital gains treatment in the same way as stocks, but that component is a much smaller percentage of the total return than it generally is for common stocks. Investors such as pension funds are not subject to income taxes, so they do not need to take income tax differences into consideration, but for many other investors, income tax differences can be an important part of the investment decision process.

Typically, methods used to estimate the cost of equity based upon the cost of debt concentrate on quantifying the cost difference based upon the payment priority without giving specific consideration to the latter two points. It is important for users of the method to at least be aware of these points because there are times when they can become critical.

Q. IS AN INVESTMENT IN DEBT LESS RISKY THAN AN INVESTMENT IN COMMON STOCK?

A. For any given company, the risk of investing in its bonds can be expected to be lower than investing in its common stock. Bondholders are paid out of available funds before stockholders are paid, and the size and timing of payments to bondholders are more predictable. It therefore takes a smaller downturn in a company's business for it to fail to earn the dividend payment for equity investors than to fail to earn enough income to make its interest payments to bondholders.

It is theoretically possible that under extreme conditions, the cost of debt will exceed the cost of equity for a given company. This could happen if investors were sufficiently worried about future inflation rates that they perceived the fixed nature of bond payments as a serious problem.

Q. IS THE COST OF DEBT CURRENTLY HIGHER THAN THE COST OF EQUITY?

A. No, not unless the cost of equity for a company of typical risk is being compared to the cost of debt for a highly speculative company. As of August 31, 2010, the cost of 30-year treasury bonds was 3.52%,[17] suggesting that a company's cost of equity will be higher than its cost of long-term fixed rate debt.[18]

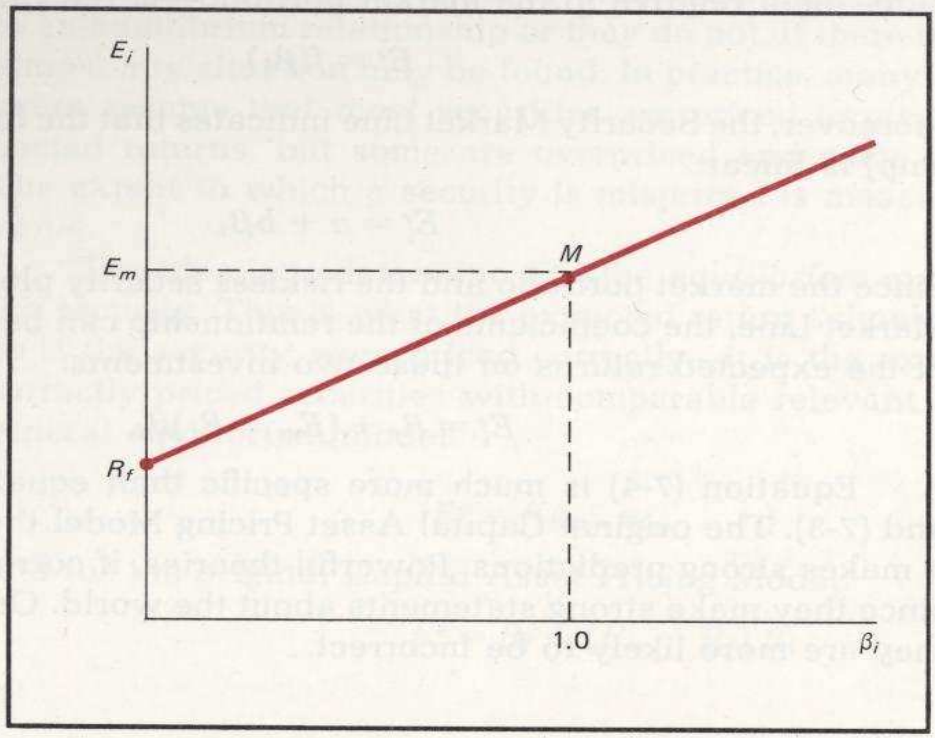
1. TRADITIONAL CAPM

Q. IS THERE A COMMONLY USED METHOD TO DETERMINE THE COST OF EQUITY BASED ON THE COST OF DEBT?

A. Yes. In 1964, William Sharpe developed the CAPM.[19] The CAPM is based on the principle that investors own stocks as part of a diversified portfolio. The return on that portfolio depends upon both the risk-free rate of interest and the risk borne by that portfolio. The only risk that impacts the return available to investors is non-diversifiable risk. Dr. Sharpe defined the relationship between risk and return as "The Security Market Line" (SML):[20]

[17] Federal Reserve Statistical Release dated September 7, 2010.
[18] Back in 1982, the cost of long-term treasury bonds briefly exceeded 14%, and the interest rate on even investment-grade corporate bonds was higher yet. It is possible that at that time, investors were sufficiently uncertain as to what future inflation rates would be that the cost of equity for some companies might have dipped below their cost of fixed-rate long-term debt.
[19] P. BERNSTEIN, *Capital Ideas* at 86(Free Press © 1992).
[20] W. SHARPE, *Investments* at 161 (Prentice-Hall, Inc. 3d ed.© 1985,1981,1978).

FIGURE 7-3
The Security Market Line



In the above graph, the "x" axis is the measure of risk quantified by the "beta" of a security and the "y" axis is the investor's expected return.

Dr. Sharpe further states:

> How does the equilibrium relationship shown by the Security Market Line come about? Through the combined effects of investors' adjustments in holdings and the resultant pressures on security prices. Given a set of security prices, investors calculate expected returns and security covariances, then determine desired (optimal) portfolios. If the amount of a security collectively desired differs from the amount available, there will be upward or downward pressure on its price. Given a new set of prices, investors will reassess their desires for various securities. The process will continue until investors' quantity adjustments do not require further marketwide price adjustments.[21]

[21] *Id*. at 161-62.

Q. WHAT IS BETA?

A. Beta is a number that reflects how risky an investment in a particular company is in relation to a risk in a broad-based index such as the S&P 500. A company with a beta of 1.0 is, on average, expected to move up or down the same percentage as the broad index against which the beta computation is based. A company with a beta of 1.5 is expected to, on average, move up 50% more than the percentage change in the broad index in up periods, and move down 50% more than the broad index in down periods: i.e., if the market moves up 10%, companies with a beta of 1.5 are expected to move up by 15%. Conversely, a company with a beta of 0.75 is expected to move up only 75% as fast as the broad index in up periods, and down only 75% as fast over down periods: i.e., if the market moves up 10%, companies with a beta of .75 should be expected to go up by 7.5%. It is appropriate to consider beta as a measure of the risk of a diversified portfolio of stocks, with the beta of the portfolio being a measure of the cost-of-equity proportional risk of that portfolio.

Beta is commonly quantified by regressing the historic percentage change in a specific company's risk against the percentage change in a broad index over the same period. A historically computed beta can be inaccurate, especially if the company's characteristics have changed. Important changes include changes to the capital structure, the kind of businesses a company owns, and large relative changes in the size of the various businesses a company may own. For these reasons, professional investors sometimes use theoretical betas instead of historically determined betas.

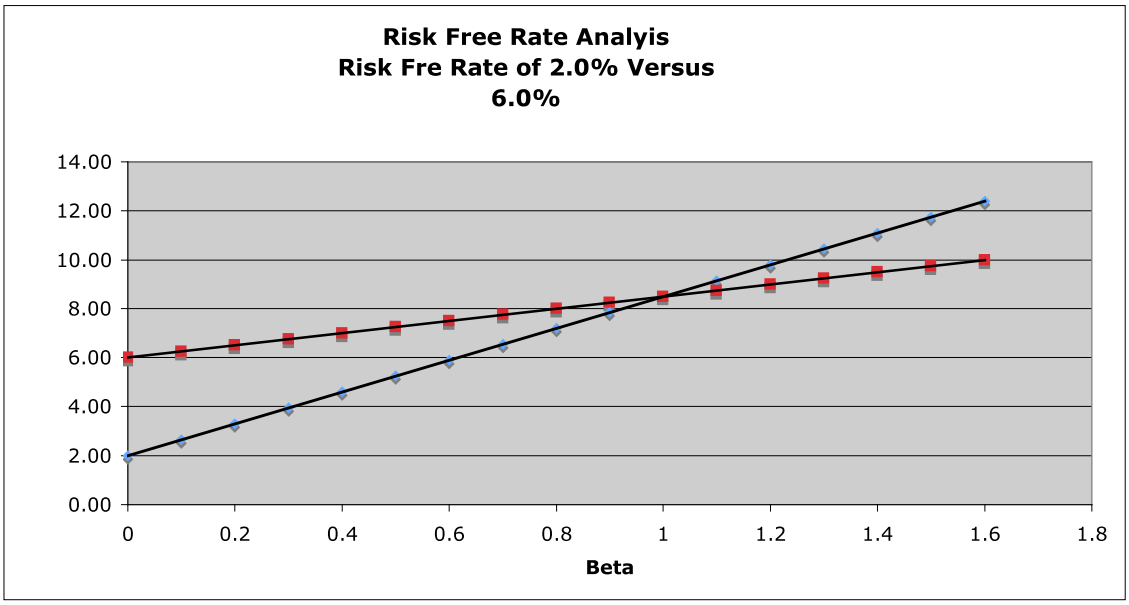
Historical betas computed by Value Line are commonly used in public utility rate proceedings. See JAR Appendix B to see how Value Line says it calculates beta.

Q. WHEN IMPLEMENTING THE TRADITIONAL CAPM, HOW SHOULD THE RISK-FREE RATE OF INTEREST APPROPRIATE FOR USE IN DEVELOPING THE SML BE DETERMINED?

A. One should use the risk-free interest rate that best fits with the requirement of the SML construct of the CAPM. Note that the SML graph depicts a straight line from the data point indicated by where the beta is zero and connects to the point where the beta is 1.0. The expected beta for a risk-free investment is zero. A beta of 1.0 is consistent with a security having a risk that is exactly the average of the group against which betas were determined.

Q. WHAT HAPPENS IF A RISK-FREE RATE THAT IS HIGHER THAN APPROPRIATE IS USED?

A. As illustrated in the following graph, if one uses a risk-free rate that is too high, the "slope" of the SML flattens out. Flattening out is bad because, as the graph shows, it causes the cost of equity for companies with a beta below 1.0 to be overstated and causes the cost of equity for companies with a beta above 1.0 to be understated.



Investments with a below average risk are expected to be found along the SML somewhere between the zero point and the point depicted by the return with a beta of 1.0.

The appropriate risk-free rate depends upon how that rate is going to be used. When applying the CAPM, the risk-free rate should be one that can best explain changes in the cost of equity based on differences in beta between various groups that may be the subject of the CAPM computations. Within this context, the best risk-free rate to use is the current normalized interest rate on short-term treasury bills.[22]

Q. HAVE YOU SEEN ATTEMPTS TO IMPLEMENT THE CAPM BY USING AN UNADJUSTED LONG-TERM INTEREST RATE ON U.S. TREASURY BONDS AS THE RISK-FREE RATE?

A. Unfortunately, yes, this is a common mistake. This is unacceptable unless the purpose is to estimate the cost of equity for a company(ies) with a beta of 1.0.

For anyone who doubts that a long-term treasury bond has risk, consider the following. Which investment is lower risk: one that involves taking a sum of money and using it to purchase one-year treasury bonds each year for 20 years, or taking the same money and investing it all in one 20-year treasury bond? The series of one-year bonds is considerably lower in risk from the perspective of protecting the purchasing power of the investment because if inflation is high, the interest will go up during the 20-year investment horizon. Contrast this to the single fixed investment for 20 years. In this second case, if interest rates and inflation were to accelerate over the 20 years, the

[22] I am aware that prior Staff cost of capital witnesses have testified that use of a long-term treasury bond interest rate is the appropriate interest rate to use for the risk-free rate component of the CAPM. For the reasons I will discuss subsequently, however, I believe that using the current normalized interest rate on short-term treasury bills is a superior approach that takes best advantage of the strengths of the long-term rate and the strengths of the short-term rate.

purchasing power of the remaining investment could be substantially worse than in the case of the 20 different one-year treasury bill investments.

Q. ARE YOU AWARE OF THE JUSTIFICATIONS FOR USING A LONG-TERM TREASURY BOND AS THE RISK-FREE RATE?

A. Yes. The two reasons I have seen given are that: (1) the maturity of a long-term bond is closer to the maturity of common stock; and (2) the short-term treasury bill rate is too volatile.

Q. WHAT IS YOUR RESPONSE?

A. The first reason is based on faulty logic. While it is true that common stock does not have a maturity date and therefore has a closer maturity to a long-term bond than a short-term bond, this has no bearing on how the risk-free rate is being used in the CAPM. In the traditional CAPM, the risk-free rate is used as one of the two points that establish the SML. This is correct whether a graphical solution or the CAPM formula is being used. A formula is a mathematical way of determining the same answer and using the same approach as if the graphical solution were employed. Either way, the risk-free rate is being used specifically and totally to determine the slope. If the correct short-term debt rate is used, the slope is steeper than if the long-term debt rate is used, but the cost of equity for a company of average risk is not changed. Therefore, whether to use the cost of long-term debt or the cost of short-term debt as the risk-free rate does not influence the cost of equity for a company of average risk. All it does is influence how much the cost of equity changes in response to a change in risk.

As for the contention that the short-term debt rate is too volatile, there is a standard and very reasonable way to solve the problem: determine the normalized short-term debt rate. This is done by subtracting the average difference between short-term

treasury bills and long-term treasury bonds ("the maturity premium") from the long-term debt rate, where the maturity premium is equal to the average difference between the return on long-term treasuries and the return on short-term treasuries. In this way, the short-term debt rate experiences the same exact basis point swing as the long-term debt rate, but the risk-free rate has properly excluded the maturity premium.

Q. SHOULD THE COST OF EQUITY INCLUDE A MATURITY PREMIUM?

A. The maturity premium for debt is very different than for equity because the interest rate on debt is fixed while the return on equity varies. When either the actual earned returns earned by common equity investments as is commonly done when implementing the CAPM or the cost of equity is determined by a properly applied DCF method, the maturity premium either earned or demanded by equity investors is already included in the equity cost computation. In the CAPM, the maturity premium must be excluded from the risk-free debt cost but included in the risk premium because the maturity premium component of the cost of equity is part of the risk premium that varies with beta. When the maturity premium is excluded from what is used as the risk-free rate, changes in beta have a greater impact on the CAPM-measured cost of equity: it is proportionally lower for companies/portfolios with a beta below 1.0, and proportionally higher for companies/portfolios with a beta above 1.0.

Q. IS THE NORMALIZED INTEREST RATE ON SHORT-TERM TREASURY BILLS DIFFERENT THAN THE CURRENT ACTUAL INTEREST RATE ON SHORT-TERM TREASURY BILLS?

A. Yes. The Federal Reserve uses short-term interest rates as a tool to provide some degree of control over economic conditions. This control creates short-term interest rates that can be substantially artificial at any one point in time. Also, when investors

are especially concerned about safety, the demand for short-term treasuries may become unusually large, further pushing down the short-term rate. This is why it is preferable to estimate a normal short-term interest rate by subtracting the maturity premium from the current interest rate on long-term treasury bonds.

From 1926-2009, the maturity premium between short-term treasury bills and long-term U.S. treasury bonds averaged 1.7%.[23] Although it is regarded as virtually certain that investors will be paid the dollars that are contractually due on exactly the date that they are due for both short-term U.S. treasury bills and U.S. treasury bonds, it is never certain what purchasing power those dollars will have. Very short-term treasury bills have minimal risk of change in the purchasing power of a dollar because the shorter the time period, the less likely there will be any change in the purchasing power of the dollar. Long-term U.S. treasury bonds are generally not as subject to the same extreme market distortions as short-term treasury bills, but they are not truly risk-free investments because they contain a maturity premium risk (or a "bond horizon premium," as it is called on page 54 of the *Yearbook*).

Q. HOW SHOULD THE RISK-FREE RATE OF INTEREST TO BE USED IN THE CAPM BE DETERMINED?

A. A reasonable place to start is the risk-free interest rate developed by determining the average return on short-term U.S. treasury bonds over a long enough period of time to sufficiently average times of economic stimulus with times of economic dampening. However, because the actual risk-free rate over an historical time period includes an allowance for the inflation expected for that time period while the true normalized risk-

[23] *Ibbotson "SBBI" 2010 Classic Yearbook*, pp. 249, 261 (difference between 5.4% for long-term government bonds and 3.7% for U.S. treasury bills).

free rate for the current time depends on current inflation expectations, some adjustment to the historical risk premium number is required.

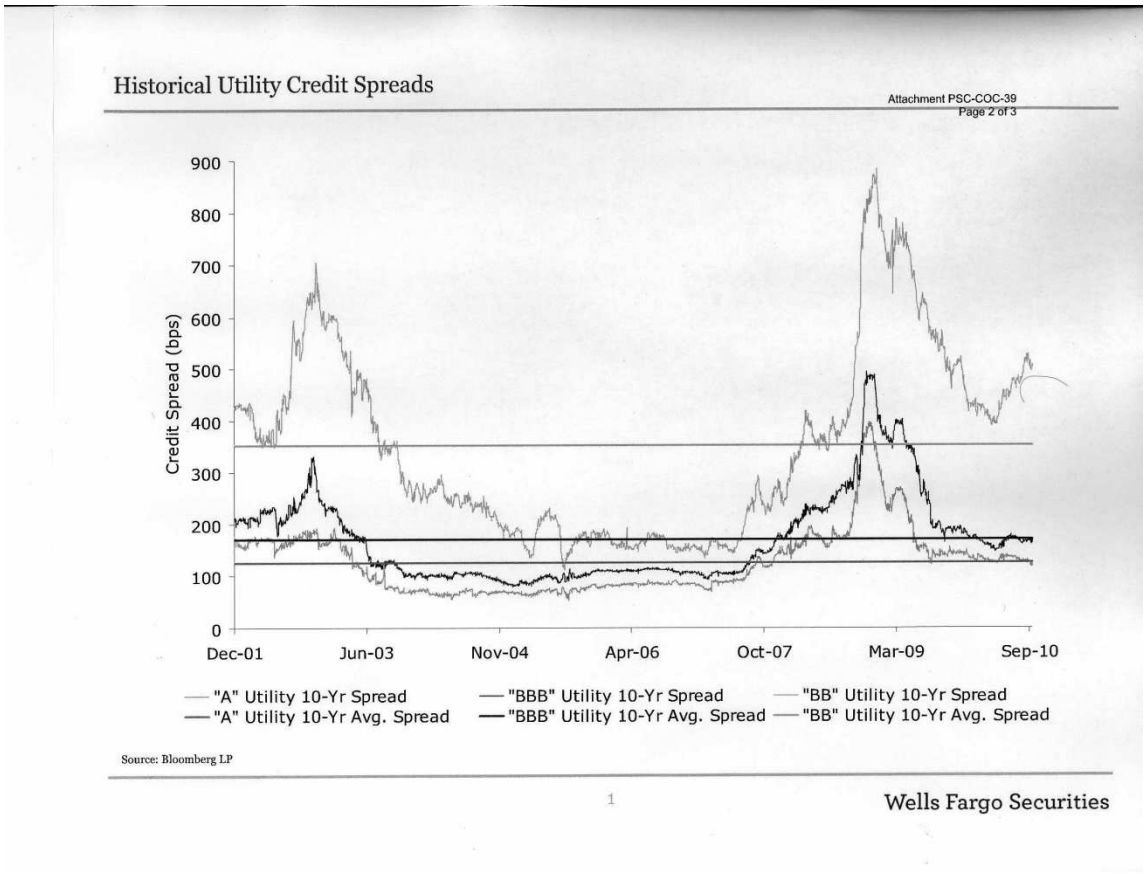
Q. DO INVESTORS WHO BUY A LONG-TERM TREASURY BOND WHEN IT IS ISSUED AND HOLD IT TO MATURITY STILL EXPERIENCE RISK ON THIS INVESTMENT?

A. Yes. Investors might be able to predict with certainty when and how much the payments will be over the next thirty years, but they will *not* know what the purchasing power of the future stream of payments will be, or what the opportunity cost would have been if the same treasury bond had been purchased later. This makes the rate on long-term treasury bonds inadequate as a quantifier of the risk-free interest rate.

Q. ARE FINANCIAL CONDITIONS THE SAME TODAY AS THEY WERE ON AVERAGE BETWEEN 1926-2009?

A. No. While there are many differences, one must consider the impact of the Great Recession when applying debt-based methods in the current financial environment.

In times of financial strife, investors can respond by becoming more risk averse. This risk aversion can become extreme when fear of bad economic times elevates sufficiently. One demonstration of this extreme is a graph prepared by Wells Fargo (provided by Delmarva in response to PSC-COC-39).


Historical Utility Credit Spreads
Attachment PSC-COC-39
Page 2 of 3
900
800
700
600
500
400
300
200
100
0
Credit Spread (bps)
Dec-01
Jun-03
Nov-04
Apr-06
Oct-07
Mar-09
Sep-10
"A" Utility 10-Yr Spread
"A" Utility 10-Yr Avg. Spread
"BBB" Utility 10-Yr Spread
"BBB" Utility 10-Yr Avg. Spread
"BB" Utility 10-Yr Spread
"BB" Utility 10-Yr Avg. Spread
Source: Bloomberg LP
1
Wells Fargo Securities

1

This graph shows several important facts. First, the spreads for all three ratings briefly, but significantly, exceeded the average spread during 2002. 2002 was a time of turmoil in the financial markets that is often called the "tech wreck." These spreads returned to normal in less than a year and were followed by a sustained period where the risk premium was below normal. Second, the risk premium widened suddenly and substantially starting in 2008 and briefly reached an extreme before heading back towards normal. Then, a few months ago, the spreads once again began to increase. As of the end of August 2010, the premium on BB-rated bonds had again become materially higher than normal. This recent peak is no doubt investor reaction to the current high level of financial uncertainty in the economy of the United States and much of the rest of the world. Third, the degree of spread increased as the bond rating category decreased, with the lowest-rated BB bonds seeing a much larger increase in the spread than the other categories. Note that as of the time the graph was prepared, the interest rate spread on A- and BBB-rated bonds had come close to returning to normal, but the spread on BB-rated bonds has turned back up and is considerably above its historical average.

Q. IS THE OBSERVED INCREASE IN SPREADS FOR THE LOWER RATED BONDS A LOGICAL RESPONSE BY INVESTORS?

A. Yes. Lower rated companies have weaker businesses and/or weaker balance sheets, so they become more vulnerable during times of general economic weakness.

Q. DOES THIS OBSERVED INCREASE IN THE RISK PREMIUM HAVE ANY IMPLICATIONS FOR THE RISK PREMIUM APPLICABLE TO EQUITY?

A. It could. As of the end of August 2010, the interest rate on 10-year treasury bonds was 2.47%.[24] The graph shows that the interest rate spread between BB-rated bonds and 10-year treasury bonds as of the end of August 2010 was about 5.10%. Adding this 5.10% to the 2.47% produces an interest rate of 7.57% on BB-rated bonds. This is less than the cost of equity indicated by the DCF method, so it could be that in the current marketplace the increase to the risk premium applicable to a common stock investment caused by the Great Recession could be somewhat higher than the spread applicable to BB-rated bonds.

Q. GIVEN YOUR EXPLANATIONS, HOW DID YOU IMPLEMENT THE TRADITIONAL CAPM?

A. As shown on Schedule JAR-8, page 3, I started with the 9.8%[25] compound (or geometric) actual return earned by the average industrial company from 1926-2009 as reported in the 2010 *Classic Yearbook*. I then determined that the average risk premium over 1926-2009 was 6.10% (9.8% compound annual (geometric) average return on common stocks minus the 3.7%[26] compound annual (geometric) average return on short-term U.S. treasury bills). I then multiplied the average risk premium over 1926-2009 by a beta of 0.64 to 0.68[27] to arrive at a risk premium of 3.88% to 4.16% over the average cost of short-term debt from 1926-2009 of 3.70%. I then adjusted the historically indicated risk premium upward by 0.12% to account for both a net average decrease in

[24] Federal Reserve Statistical Release, release date September 7, 2010.

[25] *Ibbotson SBBI 2010 Classic Yearbook*, page 231.

[26] *Ibbotson SBBI 2010 Classic Yearbook*, page 26l.

[27] JAR Schedule 3, page 3.

the interest rate environment of 1.48% and a net increase of 1.60% due to financial conditions caused by the Great Recession. See Schedule JAR 8, Page 2.

As shown on Schedule JAR 8, Page 1, the result is a traditional CAPM-indicated cost of equity of 7.98%.

2. MARKET-DERIVED CAPM

Q. IS IT POSSIBLE TO KNOW WHAT TOTAL RETURN INVESTORS EXPECT FOR A PORTFOLIO WITH A SPECIFIC BETA?

A. No, but there are ways to produce a reasonable estimate. The actual earned return achieved by the S&P 500 industrial companies from 1926 to date can be obtained from the *Classic Yearbook*, but it is not possible to know the extent to which the actual returns achieved in aggregate from 1926-2009 reflect what investors expect for the future.

Some people rely heavily on the historical actual earned returns from 1926-2009 with an expression of strong confidence because of a belief in the reversion to the mean principle. This is an oversimplification. In 1926, the United States was still in the industrial revolution. Since then, World War II occurred, followed by the semiconductor age, the internet, and globalization. Each of these factors was both significant and unique. Nobody knows what will occur in the future, or what it will mean as world economies mature.

It could theoretically be possible to compute what investors expect as the return on common stock investments by applying the DCF method to the S&P 500. While this could be reasonable if the DCF method were applied correctly, to the extent the purpose of applying the CAPM method is to use it as either a check on or reinforcement of a DCF method, then using the DCF method as an element in the CAPM method would

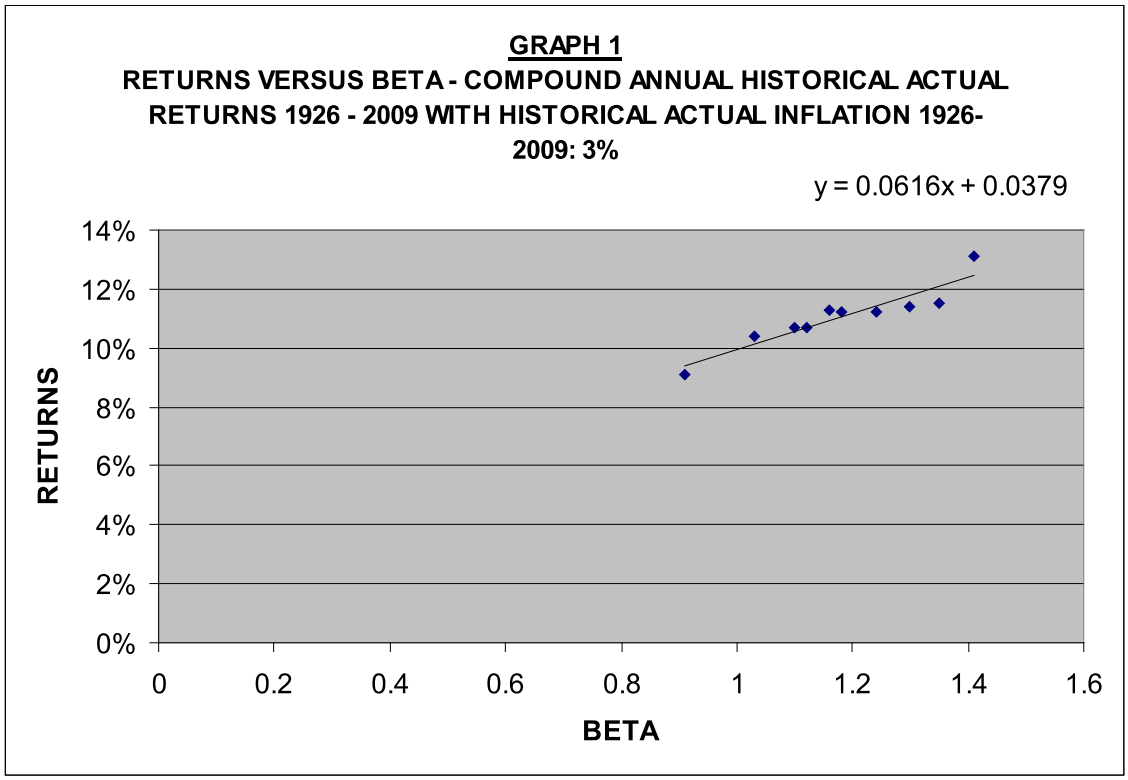
defeat that intent. For example, if a person were using a defective DCF method when applying the DCF method initially, those defects would carry over to the CAPM, thereby creating the illusion that what appeared to be a confirmation was nothing but the same mistake in a different package.

Q. HOW SHOULD THE MARKET-DERIVED CAPM BE IMPLEMENTED?

A. Data is available to compute the actual historical relationship between the earned return on equity and the beta for ten different portfolios. This provides a solid starting point, but the unadjusted result should not be used. It is important to consider the following. First, the allowance for inflation demanded by investors over the historical period could be materially different today. Since the total return demanded by investors includes the risk-free rate, an allowance for inflation, and an allowance for risk, differences in investors' expectations for inflation between the historical period and today must be considered. Second, the risk premium investors demand for any given beta may not be the same today as it was on average over the historical period.

Q. DID YOU DEVELOP AN SML SHOWING THE HISTORICAL RELATIONSHIP BETWEEN BETA AND THE ACTUAL TOTAL RETURN ACHIEVED BY INVESTORS?

A. Yes. The following shows how beta has related to historical actual returns over the time period from 1926-2009:



Points numbered 1 through 10 are actual data. The solid line is the least-squares best fit line through the data.

Q. IN THE ABOVE GRAPH, HOW WERE THE HISTORIC ACTUAL RETURNS COMPUTED?

A. I used the compound annual (geometric) returns achieved by each group of companies from 1926-2009. I obtained the actual returns and the groups from page 86 of the 2010 *Classic Yearbook*.

Q. DO THE HISTORICAL ACTUAL RETURNS FROM 1926-2009 NECESSARILY REPRESENT WHAT INVESTORS EXPECT FUTURE RETURNS TO BE?

A. No, but looking at such returns can provide a helpful comparison to a more purely forward-looking DCF method. The theory behind looking at earned returns over

a long period of time is that *if* returns gravitate to a central mean, then the returns achieved over a long period of time will provide guidance.

Q. ARE THE *YEARBOOK'S* COMPUTATIONS BASED ON AN EXPECTATION THAT ALL ASPECTS OF THE HISTORICAL EARNED RETURN SHOULD BE EXPECTED TO GRAVITATE BACK TO THE MEAN?

A. No. The *Classic Yearbook* opines that the portion of the historical returns that resulted from the expansion of P/E ratios is not repeatable and should be adjusted out of the numbers. It makes no other adjustments; therefore, everything else (including interest rates and inflation) is modeled to revert back to the mean.[28] To correct the 1926-2009 for P/E ratio creep, the 9.80% geometric return on all common stocks became 8.44%.

Q. HOW IS THE COMPOUND ANNUAL (GEOMETRIC) AVERAGE COMPUTED?

A. The compound annual (geometric) return is computed by finding the overall compound annual return an investor would have to earn for the starting value of the investment to grow to the ending value of the investment. For example, if an investor made a $1,000 investment ten years ago that is worth $2,400 today, such an investment would have earned 9.15% per year.[29] What happened to the investment in the intervening years is irrelevant: irrespective of what happened in between, the investor still ended up with the same $2,400.

Q. HOW IS THE ARITHMETIC AVERAGE OF ANNUAL RETURNS COMPUTED?

[28] *Ibbotson SBBI 2010 Classic Yearbook*, pp. 127-128.

[29] (2,400/1,000)^.1=9.15%

A. The arithmetic average of annual returns is computed by determining the percentage gain or loss in each year, and then computing an average of each of those annual percentage gains or losses.

Q. DO COST OF CAPITAL WITNESSES AGREE ON WHETHER TO USE THE ARITHMETIC OR THE GEOMETRIC AVERAGE WHEN QUANTIFYING HISTORICAL RETURNS?

A. No, but it can make a big difference. Some use the arithmetic average; others use the geometric average; others use a mix of both. What average to choose for computing historical returns is so confusing to many (and so useful to those who subconsciously or otherwise want to overstate returns) that the debate simply won't go away. I have even seen on occasion what are otherwise good textbooks give amazingly flawed examples purporting to support the arithmetic average.

Q. ARE BOTH THE GEOMETRIC AND THE ARITHMETIC AVERAGES USEFUL?

A. If used in the correct way, they are both helpful. However, if one is used for the approach attended for the other, the results will be at best highly unreliable. The primary advantage of the arithmetic average of annual stock returns is that it is the number to use, in conjunction with standard deviation, to examine the annual ups and downs that occur in the stock market and therefore give an investor insight into the probability distribution that will result from an investment. The geometric average is the central tendency return - the one that investors should expect to achieve on the investment after consideration of both the ups and downs and the standard deviation.

Q. DOES THE IBBOTSON SBBI 2010 CLASSIC YEARBOOK EXPRESS AN OPINION ON WHETHER THE ARITHMETIC OR THE GEOMETRIC MEAN SHOULD BE USED IN THE DETERMINATION OF THE RISK PREMIUM METHOD?

A. Yes. A risk premium is a "derived series" because it is computed based on the difference between two averages. Chapter 4 of the *Yearbook* is titled "Description of the Derived Series." This chapter starts with the following:

> Historical data suggests that investors are rewarded for taking risks and that returns are related to inflation rates. The risk/return and the real/nominal relationships in the historical data are revealed by looking at the risk premium and inflation-adjusted series derived from the basic asset series. Annual total returns for the four risk premia and six inflation-adjusted series are presented in Table 4-1 of this chapter.
>
> **Geometric Differences Used to Calculate Derived Series**
>
> Derived series are calculated as the geometric differences between two basic asset classes.[30]

Later on the same page, the *Yearbook* specifically lists the Equity Risk Premium as one of the "derived series."

Page 126 of the *Yearbook*, which is part of Chapter 10, "Using Historical Data in Forecasting and Optimization," contains a section titled "Approaches to Calculating the Equity Risk Premium." It provides:

> The expected return on stocks over bonds, the equity risk premium, has been estimated by a number of authors who have utilized a variety of different approaches. Such studies can be categorized into four groups based on the approaches they have taken. The first group of studies derives the equity risk premium from historical returns between stocks and bonds. Supply side models, using fundamental information such as earnings, dividends, or overall productivity, are used by the second group to measure the expected equity risk premium. A third group adopts demand side models that derive the expected returns of equities through the payoff demanded by equity investors for bearing the additional risk. The opinions of financial professionals through broad surveys are relied upon by the fourth and final group.
>
> This section is based upon the work by Roger G. Ibbotson and Peng Chen, who combined the first and second approaches to arrive at their

[30] *Ibbotson SBBI 2010 Classic Yearbook*, p. 53.

> forecast of the equity risk premium. By proposing a new supply side methodology, the Ibbotson-Chen study challenges current arguments that future returns on stocks over bonds will be negative or close to zero. The results affirm the relationship between the stock market and the overall economy.

The same chapter goes on to show that the way the *Yearbook* uses "supply side models" to observe that the P/E ratio expansion that occurred during 1926-2009 should not be expected to continue. It shows that the P/E expansion contributed 1.31% to the growth rate. It then concludes that:

> Long-Term Market Predictions
> The supply side model estimates that stocks will continue to provide significant returns over the long run, averaging around 8.44 percent per year, assuming historical inflation rates. The equity risk premium, based on the supply side earnings model, is calculated to be 3.08 percent on a geometric basis and 5.18 percent on an arithmetic basis.[31]

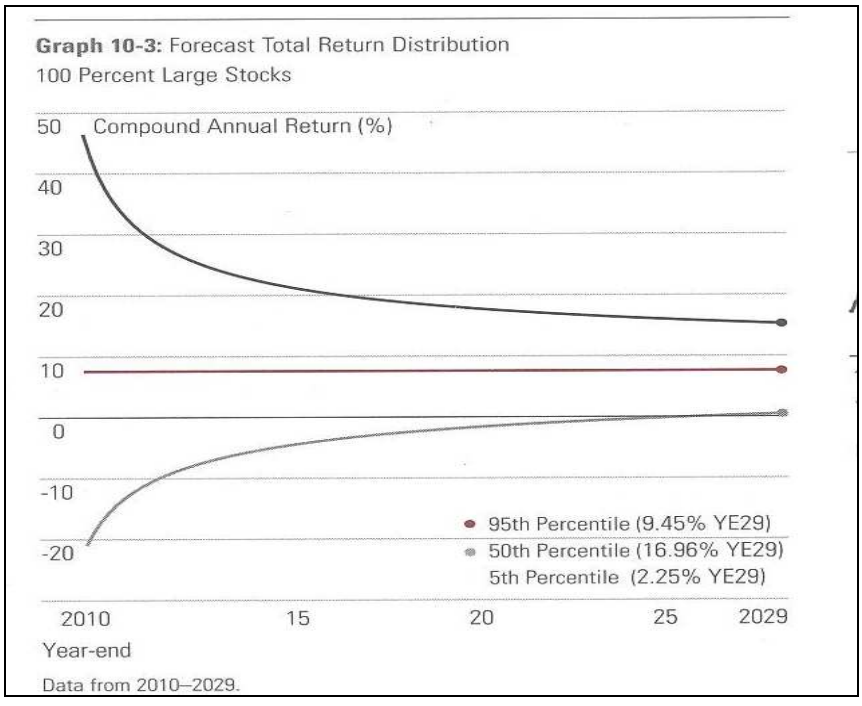
Q. THE ABOVE QUOTE YOU PROVIDED MENTIONS BOTH THE GEOMETRIC AVERAGE RISK PREMIUM AND THE ARITHMETIC AVERAGE RISK PREMIUM. WHICH HISTORICAL RETURN RATE WAS USED TO DERIVE THE 8.44 PERCENT RETURN RATE?

A. The 8.44% per year expected return rate is derived from the geometric return rate. This is obvious because if the 1.31% factor to adjust out the historical impact of the P/E ratio change is added back in, the result is 8.44 + 1.31, which equals 9.75%. 9.75% rounded to one decimal place is 9.8%. 9.8% is exactly the same number as the **geometric** mean return shown on page 28 of the *Classic Yearbook* to have been earned by "Large Company Stocks" from 1926-2009.

Q. SINCE YOU HAVE SHOWN THAT THE *CLASSIC YEARBOOK* USES THE GEOMETRIC AVERAGE IN A RISK PREMIUM ANALYSIS, WHY DOES THE SAME SECTION OF THE *YEARBOOK* PRESENT A RISK PREMIUM RESULT THAT CITES BOTH THE RISK PREMIUM APPLICABLE TO THE GEOMETRIC AVERAGE AND TO THE ARITHMETIC AVERAGE?

[31] *Ibbotson "SBBI" 2010 Classic Yearbook,* p. 128.

A. The risk premia based on the arithmetic average and the geometric average have different uses. From the perspective of determining the cost of equity, the geometric average is appropriate. However, the geometric average cannot provide insight into the dispersion of returns investors can expect going into the future. For example, if an investor were faced with an investment known to be able to produce an annual average geometric return of 8% compounded over the next ten years, the investor could not determine just from that information how much the returns might vary from year to year. The compound return of 8% over ten years could be achieved in a constant growth pattern over the entire 10 years, or could have wild swings with huge losses in some periods and gigantic gains in others. The arithmetic average is needed to gain understanding of the dispersion of returns over the future. The *Classic Yearbook* shows on page 116-117 how an arithmetic average is used to build the geometric average result, and Graph 10-3 on page 117 of the *Classic Yearbook* is helpful:



This shows the expected pattern of achieved returns over time for a portfolio consisting of 100% large stocks, which, in this example, are expected to achieve an annual average arithmetic return of 11.2%. The graph shows that this 11.2% arithmetic average return, combined with its expected standard deviation, will produce a dispersion of results which gets narrower over time. In the example, by the 20th year, actual total "compound annual" returns could be as low as about zero or as high as about 18%, and have a 50% chance of being equal to the geometric average return of 9.45%.

Q. HAVE YOU SEEN UTILITY WITNESSES ATTEMPT TO JUSTIFY USE OF THE ARITHMETIC AVERAGE BY CLAIMING THAT THE *CLASSIC YEARBOOK* SAYS THE ARITHMETIC AVERAGE IS FORWARD LOOKING?

A. Yes. One can reach this conclusion if one fails to read carefully enough. For example, page 75 of the *Classic Yearbook* says:

> The geometric mean is backward-looking, measuring the change in wealth over more than one period. On the other hand, the arithmetic mean better represents a typical performance over single periods.

If all one did was read the above-quoted section without reading other material in the *Classic Yearbook*, the statement could easily be misinterpreted.

Q. HAVE YOU SEEN UTILITY COST OF CAPITAL WITNESSES ATTEMPT TO JUSTIFY THE USE OF AN ARITHMETIC AVERAGE UNDER A CLAIM THAT THE GEOMETRIC AVERAGE DOES NOT QUANTIFY RISK?

A. Yes, but this is an inappropriate criticism. Actually, neither the arithmetic returns nor the geometric returns are used to quantify risk. What could provide some insight into risk is to examine the difference between the geometric returns and the annual arithmetic return. However, the more sophisticated beta computation is the standard for risk quantification.

Q. ON PAGE 36 OF HIS DIRECT TESTIMONY, COMPANY WITNESS HANLEY SAYS THAT "THE ARITHMETIC MEAN OF THE LONG-TERM ANNUAL HISTORICAL TOTAL RETURN RATES ON THE MARKET AS A WHOLE IS THE APPROPRIATE MEAN FOR USE IN ESTIMATING THE COST OF EQUITY CAPITAL BECAUSE IT PROVIDES ESSENTIAL INSIGHT INTO THE POTENTIAL VARIANCE OF EXPECTED RETURNS." PLEASE COMMENT.

A. This is incorrect. First, just knowing the arithmetic average return rate says nothing about the potential variance of expected returns. Second, the standard way to quantify risk, and the method that both Mr. Hanley and I have used, is to use beta, not historical average arithmetic returns.

Q. ON PAGE 37 OF HIS TESTIMONY, MR. HANLEY SAYS THAT "THE LONG-TERM HISTORICAL AVERAGE MARKET EQUITY RISK PREMIUM IS THE MOST LIKELY TO BE EXPERIENCED OVER A LONG-TERM PROSPECTIVE PERIOD." PLEASE COMMENT.

A. The empirical data presented in the *Classic Yearbook*, and reproduced on the preceding page of this testimony, shows that Mr. Hanley is wrong. The shorter the time period, the wider the array of potential return outcomes based on arithmetic average data. As the time period increases, the expected outcome based on arithmetic average date converges closer and closer to the geometric average. Also note that for all periods, it is the geometric average result that is the expected central tendency of the data.

Q. CAN YOU PROVIDE A REAL-WORLD EXAMPLE OF THE IMPACT OF USING THE ARITHMETIC VERSUS THE GEOMETRIC AVERAGE?

A. Yes, and this example should end this debate once and for all. Assume that you have worked very hard for many years, saved your money, sold your house and now have $1,000,000 cash as your total life savings. Before heading off on your dream voyage around the world, you are faced with a choice between two investments, and must put all of it in either one:

> **INVESTMENT A**: Put the entire $1 million in an investment that, in 2 years will produce an arithmetic return of an average of no less than 50% per year.
>
> **INVESTMENT B**: Put the entire amount in an investment that will earn a geometric return of no less than 8% per year for the two years.

Which would you choose? If the arithmetic average return was actually a goal investors should seek, then the prospect of at least a 50% return is very exciting indeed - especially if the alternative is a more down-to-earth 8% return. The thought of returns in excess of 50% creates fantasies of the $1 million growing to an amazing number. But frankly, only a fool would choose investment A. Here's why:

> **Investor A** could satisfy his requirement by investing $999,998 with Bernard Madoff, and $2.00 in cash in Year 1. After the first year, the $999,998 is worth zero, and the cash is still worth $2.00. Net investment value after year 1: $2.00. Arithmetic return in the first year is –(100)% after a tiny rounding error. In year 2,the $2.00 cash is used to buy a ticket on a racehorse that wins, returning $7.00 for the $2.00. Gain in the second year: (($7/$2)-1)/$2=2.5, or 250%. Average the (100)% return for year one with the +250% return for the second year, and the arithmetic average return is 75% per year (-100%+250%)/2, substantially beating the 50% promised minimum return. But that hard-earned $1 million is now worth only $7.00.
>
> **Investor B** could meet his requirement by investing the entire $1 million in an S&P 500 index fund in Year 1. The fund hits a rocky year, and declines in value to $900,000. First year return: (10)%. The second year is much better, and the fund increases in value from $900,000 to $1,170,000. The geometric return is a bit more complicated to compute, but it is ($1,170,000/$1,000,000)^2-1=8.17% - producing a very nice profit of $170,000. Note that because the geometric average focuses on the end result, by the rules established for Investment B, the minimum amount the account could be worth in 2 years is $1,166,400 ($1 million x $(1.08)^2$), irrespective of what the investment is worth in-between. While many routes exist that would produce an 8% or more annual geometric return over two years than the one in this example, *none* would have a total account value less than $1,166,400 at the end of the two years.

Investor A would receive truthful reports of having earned a return over 50%, only to return home to find that he is broke. If a way of computing return on investment is capable of producing as misleading a result as the arithmetic averaging approach did in this potentially real world example, how could any serious investor rely on it for reporting return on investment? Sure, the arithmetic average of annual returns is properly useful for computing the standard deviation of annual returns and can therefore be useful for estimating risk, but for estimating the outcome of a future investment opportunity the arithmetic average **does not tell you what return has been or will be earned in periods longer than one year.**

The arithmetic average approach produces such a highly misleading result because it fails to scale the investment by size; instead, it starts over in each year. Investor A ends up with the result that he did because the investment that lost almost 100% was $1 million, while the investment that returned 250% was only $2.00 - yet, the arithmetic average approach weights the -100% and the +250% equally. While this example might be an extreme case that intentionally flaunts this embedded error, exactly the same flaw exists when using the arithmetic average as a tool to measure return over ranges more typically found on a diversified portfolio of U.S. common stocks.

Contrast this to the geometric return. If Investor B received truthful information that the two-year geometric return on his investment was 8% per year, he can arrive home confident about how much money he still has.

Q. IS THERE A MATHEMATICALLY DEFINABLE RELATIONSHIP BETWEEN THE COMPOUND ANNUAL (GEOMETRIC) RESULT AND THE ARITHMETIC AVERAGE RESULT?

A. Yes. The *Classic Yearbook* shows that the compound annual (geometric) average and the arithmetic average of the return are related by the standard deviation of the returns.[32] The following equation defines the relationship:

$$R_A = R_G + \sigma^2 / 2$$

Where
R_A = the arithmetic average;
R_G = the geometric average;
σ = the standard deviation of equity returns.

Standard deviation is a routinely used statistic that is computed based upon the variability of the annual data. If one knows the arithmetic average and the standard deviation, it is possible to accurately compute the geometric average. Conversely, if one knows the geometric average and the standard deviation, it is possible to accurately compute the arithmetic average.

The standard deviation of the annual returns on stock is related to stock price volatility. If, for example, a utility company with a dividend yield of 5% had a growth rate of 4% and a cost of equity of 9%, this would mean that the company would be expected to both pay the 5% dividend and have its stock price grow at 4% per year. If, indeed, the stock price did grow at 4% per year and dividends kept pace with the stock price growth such that the dividend yield stayed at 5%, the standard deviation would be 0%. As can be seen from the relationship defined in the above equation, when the standard deviation is 0%, the arithmetic mean and the geometric mean are identical. The standard deviation changes and the arithmetic mean changes only when the stock price fluctuates such that in some years stock price growth is more than 4% and in other years the growth is less than 4% even though the company was allowed to and might actually

[32] *Ibbotson SBBI 2010 Classic Yearbook*, p. 143.

be earning 9% per year. The larger the annual fluctuations in stock price up and down, the larger the standard deviation and the larger the arithmetic mean return even if the earned return on book equity remains at the allowed 9% throughout.

Therefore, what makes the arithmetic mean return get higher and higher has nothing to do with the allowed return on equity but instead has everything to do with the stock price volatility. This means that the correct return to allow as the cost of equity to a utility is the compound annual geometric return. To the extent an investor might be counting on the opportunity to do better or worse than the allowed return based upon arithmetic mean computations, that difference will be take care of by the normal forces that cause the stock price to fluctuate and have nothing whatsoever to do with the return rate that should be allowed on the company's rate base investment.

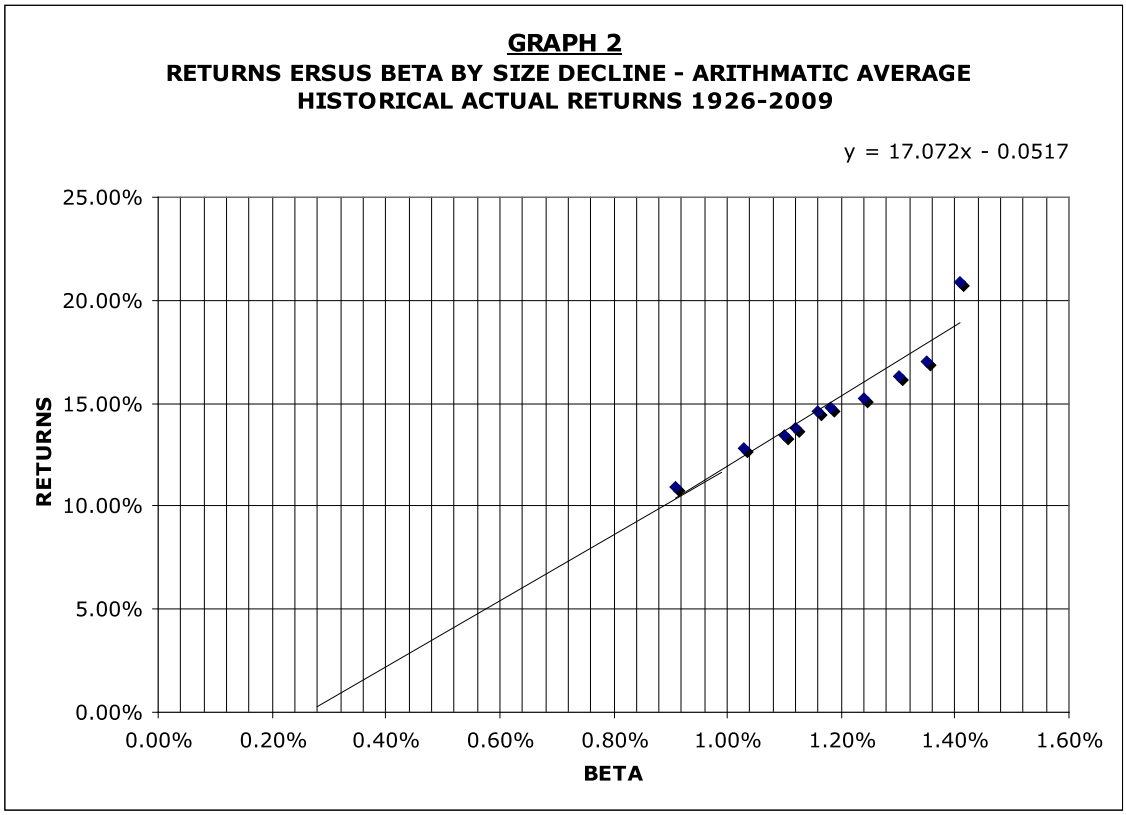
Q. EARLIER, YOU PRESENTED A GRAPH THAT SHOWED THE ACTUAL RELATIONSHIP BETWEEN THE EARNED RETURN AND BETA WITH THE EARNED RETURN COMPUTED USING THE COMPOUND ANNUAL (GEOMETRIC) RETURNS. HOW DO THOSE RESULTS COMPARE TO THE RETURNS BASED ON ARITHMETIC RETURNS?

A. The following graph shows earned returns versus beta using the arithmetic average of annual returns. Note that the results from the arithmetic average of annual returns are very strange in that if the line is continued to show what answer would be produced for a riskless (zero beta) asset, the result is a negative 4.49%. Contrast this to the positive 4.17%[33] result based upon the compound annual (geometric) results shown on Graph 1 on page 53 of this testimony. This 4.17% is within reasonable error tolerance of the positive 3.7%[34] actual earned return on short-term U.S. treasury bills

[33] See Schedule JAR, page 1.

[34] *Ibbotson SBBI 2009 Classic Yearbook*, p. 32

from 1926-2009. This result reinforces the appropriateness of the compound annual (geometric) average.



Q. ARE THOSE WHO ATTEMPT TO USE THE ARITHMETIC AVERAGE OF ANNUAL RETURNS RATHER THAN THE COMPOUND ANNUAL (GEOMETRIC) RETURN AWARE OF THE OBVIOUSLY ERRONEOUS RESULT OBTAINED FOR THE RISK-FREE ASSET PREDICTED FROM THE EMPIRICAL COMPILATION OF THE EARNED RETURN DATA FOR THE GROUPS OF COMPANIES WITH DIFFERENT BETAS?

A. Yes. I have seen discussions in testimonies in public utility rate proceedings and in some financial literature suggesting that this result casts doubt on the basic hypothesis of the CAPM that the required returns vary linearly with beta. These people typically go on to suggest that the graph based upon the historical compilation of arithmetic returns means that there must be some risk characteristics for which investors receive compensation that are not captured by beta. Rather than recognizing that the flaw is not

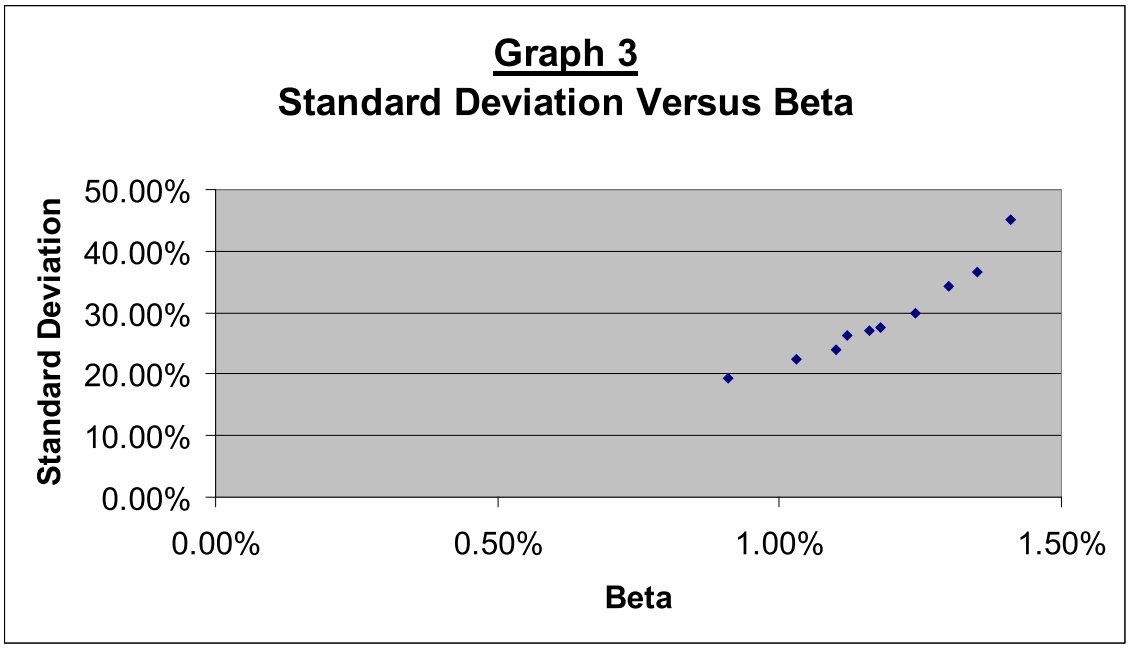
in the CAPM, but in the mathematical approach used to quantify the true historical actual returns, these people then propose adjustments to force the SML to behave in a way that forces it to bend towards a more realistic risk-free rate.

Q. SHOULD THOSE WHO HAVE ATTEMPTED TO "FIX" THE SML DERIVED FROM THE ARITHMETIC AVERAGE OF ANNUAL RETURNS KNOW BETTER?

A. Yes. As the *Classic Yearbook* correctly states:

> In general, the geometric mean for any time period is less than or equal to the arithmetic mean. The two means are equal only for a return series that is constant (i.e., the same return in every period). For a non-constant series, the difference between the two is positively related to the variability or standard deviation of the returns.[35]

As shown in Graph 3, the standard deviation goes up as the beta increases.[36]



Since the difference between the geometric and arithmetic means goes up as the standard deviation goes up, the standard deviation goes up as beta goes up. What this

[35] *Ibbotson SBBI 2010 Classic Yearbook*, pp. 75-76.

[36] *Ibbotson SBBI 2010 Classic Yearbook*, p. 86; Ibbotson *SBBI 2010 Valuation Yearbook*, p. 90.

shows is that the extraordinarily severe slope of the arithmetic average-derived SML, and impossibly low-risk-free rate, is caused by the predictable distortion of the arithmetic mean computational approach, *not* by any mysterious forces unexplainable by the CAPM method.

Q. IS THERE ANY LITERATURE THAT ADDRESSES THE ISSUE OF ARITHMETIC AVERAGE VERSUS GEOMETRIC AVERAGE?

A. Yes. I have attached as Appendix C an article titled "Fuzzy Math" that appeared in the October 8, 2003 edition of the Wall Street Journal. This article explains that the arithmetic average technique is a trick used to deceive unsuspecting investors into believing actual earned returns have been higher than they really are. Similarly, Appendix D is an article from Value Line entitled "Difference in Averaging," which explains that the arithmetic average method overstates actual returns while the geometric averaging method produces the correct return.

Q. IS THERE ANYTHING ELSE YOU WOULD LIKE TO SAY IN CASE ANY READERS STILL WANT TO BELIEVE IN THE FAIRY TALE USE OF THE ARITHMETIC MEAN AS A PROXY FOR LONG-TERM RETURNS EXPECTED BY INVESTORS?

A. Yes. Assume a commission determines that the cost of equity for a company it regulates is 9% and set rates such that the company actually earns that 9% year after year. If that company paid a dividend of 5% per year, growth in both stock price and dividend would be expected to be 4% per year. While such an outcome is entirely plausible, the stock market being what it is, the actual annual growth in the stock price for this company would vary. Sometimes it would be more than 4% and sometimes the stock price would decline for the year EVEN IF THE COMPANY ACTUALLY EARNED THE 9% RETURN on the portion of its equity invested in used and useful

utility assets each and every year. Since the characteristics of the stock market are such that stock prices will fluctuate, when the earned return is precisely equal to a constant geometric return, stock market fluctuation will essentially always cause the cause the arithmetic return to be higher than the earned return. So, if there really were any investors seeking an arithmetic return, normal stock market fluctuations would cause them to earn the arithmetic return increment over the geometric return.

Based on the above, since it is stock market fluctuations and not the allowed return on rate base that causes the standard deviation to climb, a company allowed a 9% cost of equity will, on an arithmetic average basis, earn more than 9% anyhow, with the increment above the 9% coming from the inevitable stock market movement

Q. ARE YOU SAYING THAT BECAUSE OF STOCK MARKET MOVEMENT, INVESTORS WILL EARN MORE THAN THE ALLOWED RETURN?

A. No. The geometric average method is the correct way to look at the total return. However, if there is an investor who wants to focus on the arithmetic return instead of the geometric return, in the eyes of this investor the higher arithmetic returns will still be there because the stock market fluctuations will still occur.

Q. GIVEN YOUR ABOVE EXPLANATIONS, HOW DID YOU IMPLEMENT THE MARKET-DERIVED CAPM?

A. I implemented the market-derived CAPM by:

a. Graphing the actual data available in the 2010 edition of the *Yearbook* which shows actual earned returns from 1926 to 2009, along with the betas for each of 10 groups of companies. The historical return data is available both as a compound annual (geometric) return and as an arithmetic return. For reasons explained in this testimony, my conclusions are based on the compound annual returns.

b. Using the SML graph to solve for the 1926-2009 average cost of equity based on the average beta of 0.64 for the gas company comparative group and 0.68 for the combination gas and electric comparative group;

c. Increasing the historically indicated risk premium by a net 0.12% to account for both a net average decrease in the risk-free rate of 1.48% and a net increase of 1.60% because of a higher current risk premium due to financial conditions caused by the Great Recession. See Schedule JAR 8, Page 2

Q. HOW DO INVESTORS' CURRENT EXPECTATIONS FOR INFLATION COMPARE TO THE HISTORICAL ACTUAL RATE OF INFLATION?

A. According to the *Classic Yearbook*,[37] the historical actual inflation rate was 3% per year. A comparison of the interest rate on long-term treasury bonds that make non-inflation-adjusted payments with long-term treasury bonds that are adjusted for inflation shows that the current expectation for inflation is 1.92%,[38] which is 1.08% lower than the 3% historical actual inflation rate.

Q. WOULD YOU MAKE ANY OTHER ADJUSTMENTS TO THE 8.44% RISK PREMIUM DEVELOPED IN THE *CLASSIC YEARBOOK*?

A. In addition to the factors noted in the *Classic Yearbook*, it is appropriate to adjust the 8.44% to account for both inflation expectations and the current actual financial environment for risk. As shown on Schedule JAR 8, Page 2, the net effect of both of these adjustments is to increase the 8.44% by 0.12%. This would make the appropriate adjustment to the *Classic Yearbook*-derived 8.44% an increase of 0.12%, for a total of 8.56% for a company or group of companies of average risk, i.e. with a beta of 1.0.

[37] *Ibbotson SBBI 2010 Classic Yearbook,* p. 28.

[38] See JAR Schedule 8, Page 2.

C. ALLOWED RETURN ENVIRONMENT

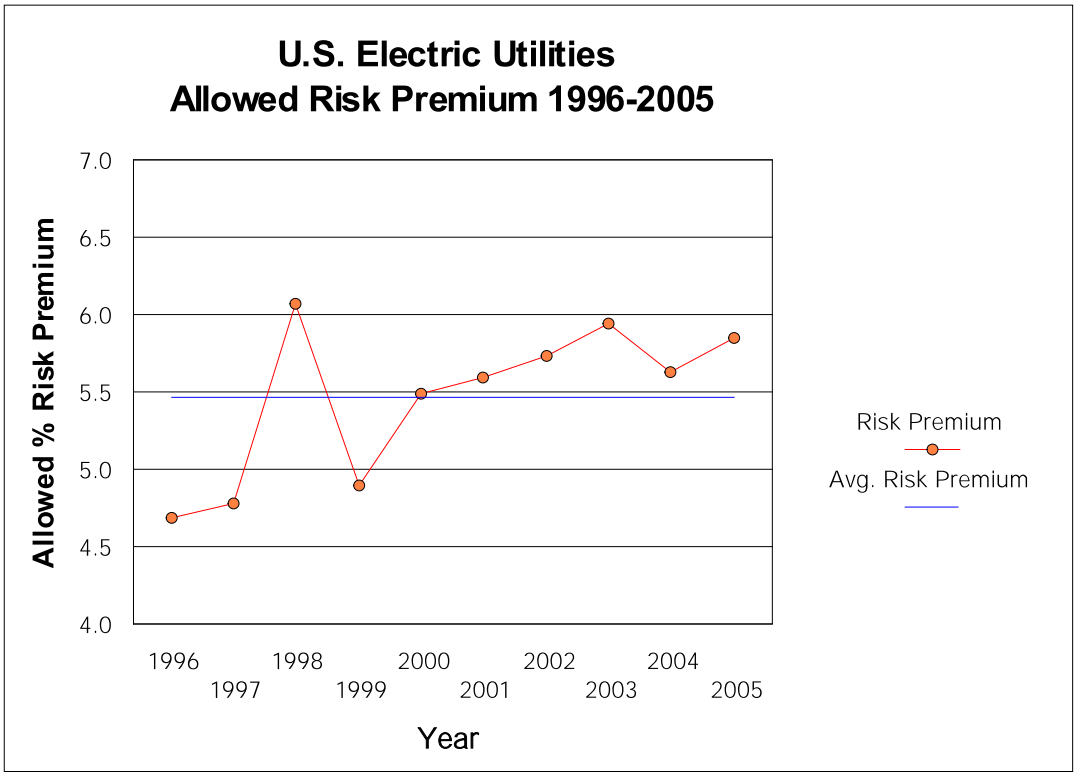
Q. IS IT PROPER FOR UTILITY COMMISSIONS TO DETERMINE THE COST OF EQUITY BY SIMPLY COMING UP WITH AN ALLOWED RETURN THAT IS IN ALIGNMENT WITH WHAT OTHER COMMISSIONS ARE ALLOWING?

A. No. Allowing a cost of equity based on what other commissions have allowed is dangerously circular. Think of what happens if one commission peeks at what another commission allowed if all that commission did was to look at what another commission did. One commission looks at another who looked at another, etc. The more that this happens, the more the allowed return on equity gets stuck in a rut. The result is that allowed returns can in general stay too high or too low for many years.

Q. IS THERE EVIDENCE THAT ALLOWED RETURNS HAVE FAILED TO RESPOND RAPIDLY ENOUGH TO CHANGES IN INTEREST RATES?

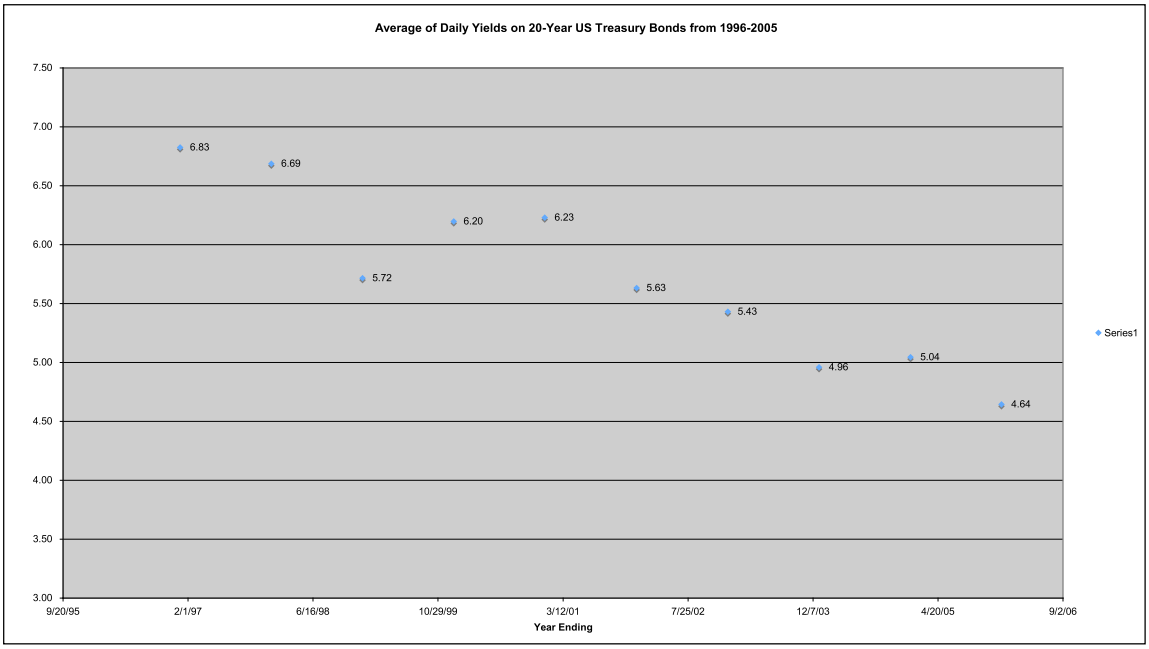
A. Yes. The following graph appeared on page 36 of Dr. Morin's 2005 rate of return direct testimony in PSC Docket 05-304:[39]

[39] Delmarva provided this testimony in response to Staff data request PSC-COC-3 in Docket 09-414.



This shows that at least from 1996 to 2005: (1) the risk premium allowed by utility commissions has been trending up, increasing by about 1.2%; and (2) over this same time period, the interest rate on long-term treasury bonds declined by 2.19%, from an annual average of 6.83% in 1996 to 4.64% in 2005:[40]

[40] The data to prepare the average interest rate on 20-year treasury bonds was downloaded from the U.S. Federal Reserve's website. The daily yields were averaged for each year to obtain the average for the year. 20-year bonds were used because there are several years over this span in which no 30-year bond data exists.



These results show that allowed returns on equity decreased less rapidly than long-term interest rates on treasury bonds. Adding the approximately 4.7% average allowed risk premium in 1996 to the 1996 average interest rate on 20-year treasuries of 7.5% produced an estimated average allowed return of 12.2% back in 1996. For 2005, the same computation produced an average allowed return of 10.44% (5.8% average allowed risk premium plus the 4.64% average interest rate on 20-year U.S. treasuries) Thus, what happened overall from 1996-2005 is that the allowed return on equity declined by only about 55% of the rate of decline in the interest rate on 20-year treasury bonds.[41]

Q. WHY DID ALLOWED RETURNS DECLINE SO MUCH LESS RAPIDLY THAN INTEREST RATES?

A. Comparing the change in allowed returns on equity and the change in interest rates does not reveal why. However, from my experience in having been involved in

[41] The 1.2% drop in allowed returns from 1995-2006 divided by the 2.19% drop in the average interest rate on 20-year treasury bonds.

numerous utility rate proceedings during the 1996-2005 period, much if not all of the reason that allowed returns did not drop as fast as they should have is because too many commissions were looking over their shoulders at what other commissions were doing. Such backwards-looking analyses cause a lag in the response to interest rates.

Q. IS THERE ANY REASON TO BELIEVE THAT IN GENERAL OVER THE 1996-2005 PERIOD THE ACTUAL RISK PREMIUM BETWEEN THE COST OF EQUITY AND THE COST OF DEBT COULD HAVE REALLY GONE UP?

A. No, and the empirical data points to the contrary. Consider, for example the actual relationship between the average interest rate on BB-rated bonds and the average interest rate on BB-rated bonds as shown on the graph provided on page 2 of the attachment to the response to PSC-COC-39 (reproduced earlier in this testimony). Remember that BB-rated bonds are below investment grade, and are therefore considerably more risky than A- or BBB-rated bonds. Because of the higher risk of BB-rated bonds, they are much closer in risk to the cost of common equity for the typical regulated public utility. The graph reveals a considerable decrease in the risk spread of BB-rated bonds from 2001 to 2005, with the risk premium declining from about 4.2% above 10-year treasuries to only about 1.75% above 10-year U.S. treasuries. Note that during this same period, the U.S. Electric Utilities Allowed Risk Premium continued to increase. This analytical observation of BB interest rates confirms my experience, which is that during periods when long-term interest rates are trending downward, allowed returns fail to fall as fast as financial conditions would justify.

The following from the 2009 edition of the *Classic Yearbook* further supports my conclusion that commissions should have been allowing lower and lower risk premiums rather than expanding them:[42]

- Regarding the stock market: "In the 1990s and 2000s, volatility was relatively moderate."

- Regarding the bond market: "While the astronomical interest rates of the 1979-1981 period have passed, the volatility of the bond market remains higher."[43]

Q. HOW HAVE YOU SEEN UTILITY COST OF CAPITAL WITNESSES USE THE ALLOWED RISK PREMIUM DATA?

A. I have seen utility cost of capital witnesses, including Delmarva cost of capital witness Hanley in this case,[44] reach the invalid conclusion that somehow the appropriate risk premium for regulated utility companies should increase as interest rates decline. Such a conclusion is reached by statistical analysis that regresses the allowed risk premium against interest rates.

Q. IS THERE A PROBLEM WITH USING REGRESSION ANALYSIS TO REACH A CONCLUSION WITH THIS DATA?

A. Yes. Statistics texts recognize that statistical models should have a theoretical basis:

> It is sound practice to have a logically plausible model that motivates the regression equation.[45]

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[42] The comment that risk premiums should have been coming down applies to the time period covered by the graphs. The impact of the Great Recession has, at least temporarily, changed that.

[43] *Ibbotson "SBBI" 2009 Classic Yearbook,* p. 95.

[44] Hanley Direct Testimony, page 33.

[45] G. SMITH, *Statistical Reasoning*, at 588 (1991).

Furthermore, even if there were some underlying financial theory to support the relationship, regressing time series data in which both independent variables are in a trend is an extremely dangerous thing to do. This is because many factors tend to grow over time even though they may have absolutely nothing to do with each other.

Q. ARE YOU SAYING THAT THE RISK PREMIUM IS CONSTANT?

A. No. Elsewhere in this testimony, I showed that the current substantial upward blip in the interest rate on BB-rated bonds supports the conclusion that the risky financial conditions caused by the Great Recession have indeed resulted in what is (for now) an increase in the risk premium. However, the same analysis shows that there was nothing like a steady increase in the risk premium as would have to be true if the Allowed Risk Premium data were somehow reflective of the true state of the financial markets. Therefore, because of the BB-rated bond risk premium data, the proper way to analyze time series data statistically, and the dangerous circularity issues I discussed, it is inadvisable to determine the cost of equity for any company based upon what other commissions have allowed for other utility companies at other points in time.

D. FINANCING COST ALLOWANCE AND MARKET TO BOOK RATIO

Q. DOES A COMPANY INCUR FINANCING COSTS ASSOCIATED WITH RAISING COMMON EQUITY?

A. Sometimes. Common equity is essentially raised either by selling new stock to investors through a public offering, or by retaining earnings. When stock is sold through a public offering, such sales are typically done with the help of an investment banking firm. These firms charge for their services. However, when capital is raised via the retained earnings route, no financing charges are incurred.

Q. ARE THERE ANY FACTORS THAT CAN MITIGATE THOSE CHARGES?

A. Yes. When a company sells stock at a price in excess of book value, the company's book value increases. The increase in book value benefits investors in regulated public utilities because the book value per share goes up.[46]

Since in most jurisdictions financing costs are not included as part of rate base, financing costs from selling new equity causes the net book value per share relevant to rate base to go down. This decrement to net book value per share can and usually is offset by an increase to net book value that occurs when the sale of this new common stock occurs above book value.

Q. HOW HAS THIS COMMISSION TREATED FINANCING COSTS FOR DELMARVA IN THE PAST?

A. In Order No. 6930 in Docket No. 05-304, this Commission said:

> 252. **Flotation Costs.** Finally, turning to the Company's request to include an allowance for flotation costs, the Hearing Examiner noted that the Commission has consistently rejected utilities' attempts to include an allowance for flotation costs in their authorized returns on equity. *See Delmarva Power*, *supra* at ¶231; *Wilmington Suburban*, 88 PUR 4th at 240. Furthermore, he noted that one of the leading treatises on public utility regulation stated that the need for a flotation cost adjustment is "less urgent when utility stocks are selling above book value." Bonbright, Danielsen & Kamerschen, *Principles of Public Utility Rates* at 333 (2d ed. 1988). He found that the evidence presented in this case demonstrated that utility stocks were selling above book value and that that they had been doing so for some time. (HER at 44, citing Exh. 22 (Parcell) at Sch. 12.) The Hearing Examiner found that Dr. Morin's discussion of flotation costs provided no reasons or facts to support such an adjustment that were any different than the reasons or facts put forth by expert witnesses supporting such an adjustment in prior rate cases in which this Commission has rejected such an adjustment. Thus,

[46] In the recent Delmarva electric case, Company witness Dr. Morin acknowledged on page 8 of his direct testimony that "(t)he rate base is essentially the net book value of the utility's plant and other assets used to provide utility service in a particular jurisdiction." *See* Docket No. 09-414, Ex. 33 (Morin) at 8).

the Hearing Examiner recommended that the Commission reject the flotation cost adjustment.

* * *

275. With respect to flotation costs, as noted previously, Delmarva did not except to the Hearing Examiner's findings and recommendation that such costs be denied. We adopt the Hearing Examiner's findings and recommendations on this issue. (Unanimous.)

Q. ARE UTILITY COMPANIES' STOCKS CURRENTLY SELLING AT A PRICE IN EXCESS OF BOOK VALUE?

A. Yes. As shown on Schedule JAR-3, Page 1, the average market-to-book ratio of the proxy group of natural gas companies selected by Company Witness Hanley averaged at least 1.8, and the market-to-book ratio of the proxy group of combination gas and electric companies averaged at least 1.31.

Q. ARE YOU AWARE THAT COMPANY WITNESS WATHEN HAS TESTIFIED THAT THE MARKET PRICE OF PHI IS BELOW BOOK VALUE?

A. Yes. On page 11 of his direct testimony, Mr. Wathen states that "in fact, as of June 15, 2010 PHI's stock was trading at approximately 86% of book value."

Q. IS THAT THE CORRECT PERCENTAGE OF BOOK VALUE TO USE TO EVALUATE WHETHER DELMARVA NEEDS AN ALLOWANCE FOR FINANCING COSTS?

A. No. That number must be evaluated within the context of the information provided by the Company in response to PSC-COC-36. In this response, the Company revealed that its assets include $1.4 billion of goodwill and this "[g]oodwill represents the excess of the purchase price over the fair value of net assets acquired." The response also states that none of this $1.4 billion has been included in rate base.

Q. IS THE $1.4 BILLION OF GOODWILL INCLUDED IN THE BOOK VALUE MR. WATHEN USED TO ARRIVE AT THE 86% OF BOOK VALUE FIGURE?

A. Yes.

Q. GIVEN THE RELATIONSHIP BETWEEN RATE BASE AND NET BOOK VALUE, WHAT SHOULD BE DONE WITH THE GOODWILL AMOUNT?

A. To determine whether or not the net book value that equates to rate base would increase or decrease as a result of a new stock offering, the $1.4 billion goodwill balance should be subtracted from gross book value to arrive at net book value.

Q. WHAT MARKET-TO-BOOK RATIO IS OBTAINED FOR PHI IF THE GOODWILL IS SUBTRACTED?

A. The response to PSC-COC-36 states that Mr. Wathen's conclusion that PHI stock was selling at 86% of book value is based on a book value per share of $18.72. It also says that the total book value is $4.178 billion. Therefore, the $1.4 billion of goodwill represents $1.4/$4.178, or 33.5%, of book value. Reducing book value per share by 33.5% to arrive at the book value figure net of goodwill results in a net book value figure of $12.45 per share. Since the stock price was 86% of $18.72, this means as of the time Mr. Wathen made his market-to-book computation, the market price of PHI stock was about $16.10. $16.10 compared to the net book value figure of $12.45 means that PHI's market-to-book ratio after excluding goodwill (which has intentionally been excluded from rate base) is 1.29, or 29% *above* book value. Therefore, the Company still benefits from selling stock at $16.10 per share because the net book value will increase.

Q. PUTTING ASIDE THE BENEFIT ACHIEVED BY THE COMPANY FROM THE SALE OF COMMON STOCK ABOVE BOOK VALUE, WHAT HAS THE COMPANY'S HISTORICAL EXPENSE EXPERIENCE BEEN REGARDING EQUITY FINANCING COSTS?

A. The Company's response to PSC-COC-17 shows that PHI paid underwriters total actual financing costs of $28.7 million over the last 21 years, or an average of about $1.4

million per year for the entire PHI system. PHI's total book value was about $4.2 billion before subtracting goodwill, or $2.8 billion after subtracting goodwill. Arguably, financing costs should be computed as a percentage of total (not net) equity, because even the goodwill equity had to be raised. But even if we compute the actual annual financing costs as a percentage of net book value, the annual cost rate is still only $1.4 million/$2.8 billion = .05%, or 5 basis points. This is a tiny fraction of the 21 to 25 basis point allowance Mr. Hanley recommends.

Q. BASED ON THE ABOVE, IS AN ALLOWANCE FOR FINANCING COSTS APPROPRIATE IN THIS CASE?

A. No. I agree with the Commission's practice of excluding flotation costs. For Delmarva, the fees paid to underwriters have averaged only about 5 basis points per year. These 5 basis points are more than offset by making sales of new common equity above net book value.

VI. IMPACT OF REVENUE DECOUPLING

Q. HOW WOULD THE REVENUE DECOUPLING PROPOSAL AFFECT THE RISK OF INVESTING IN DELMARVA COMMON EQUITY?

A. In its response to PSC-COC-40, the Company states that "(t)he MFV achieves revenue stabilization to the extent that fluctuations in volumetric gas sales no longer impact gas delivery revenue." This means that the Company will no longer experience any volatility in its earned revenues from variations in the demand for gas, whether those fluctuations in demand are due to changes in weather conditions or economic conditions. In this way, MFV will substantially minimize non-diversifiable risks. The risk of unexpected operating expenses or other operational issues will remain, but these

risks are largely diversifiable. Investors are only compensated for non-diversifiable risk, which is essentially risk caused by overall economic conditions.

Q. HOW WOULD REVENUE DECOUPLING IMPACT NON-DIVERSIFIABLE RISK?

A. Non-diversifiable risk is rooted in the movement of the entire economy. When the economy goes into recession, most companies are negatively impacted. When most companies are impacted by the same thing, diversification fails to protect investors. Other things being equal, a recession would cause Delmarva's customers (especially its commercial and industrial customers) to use less electricity. But revenue decoupling would still almost completely insulate Delmarva from losing revenues in bad economic times. Therefore, revenue decoupling would attenuate the correlation of overall economic growth to Delmarva's earnings and the contribution those earnings have to PHI's stock price.

Q. WOULD REVENUE DECOUPLING ELIMINATE ALL THE RISKS TO DELMARVA INVESTORS?

A. No. It would not eliminate risks such as operating cost overruns and other problems that could increase operating expenses. Since these risks are independent of the overall economy, an investor can eliminate these risks by investing in a portfolio of many stocks. Some of the companies in a portfolio will have positive operating expense surprises and others negative ones.

Some non-diversifiable risk would remain. The main one would be the risk of cost escalations due to general economic conditions: that is, the risk that Delmarva would have to pay higher prices for labor and materials inputs due to boom-time high demands.

Q. HOW MUCH WOULD REVENUE DECOUPLING LOWER DELMARVA'S RISK?

A. A starting point that could provide a concrete analysis on which to make a solid decision would be an analysis that shows historically how revenue decoupling would have changed the Company's income variation in prior years.

Q. HAS SUCH AN ANALYSIS BEEN DONE?

A. Amazingly, the Company performed no such study. (See response to PSC-COC-40). The lack of such a study disadvantages the Commission in deciding the appropriate decrease to the cost of equity.

Q. IN THE ABSENCE OF SUCH A STUDY, TO WHAT EVIDENCE CAN YOU LOOK TO DETERMINE THE IMPACT OF REVENUE DECOUPLING ON THE COST OF EQUITY?

A. One example is what happens to the cost of capital when a revenue stream effectively guaranteed by ratepayers is implemented to finance an asset of a utility company. By creating this guarantee, the risk borne by bond investors is reduced sufficiently so that they: (1) are willing to invest even without any equity capital to protect them; and (2) are willing to invest in debt that pays interest at very low risk AA or AAA categories.[47]

Q. WHERE HAVE YOU SEEN THIS?

A. I have seen this when utility companies have securitized stranded cost debt. One example of this securitization occurred when Atlantic City Electric Company, another PHI affiliate, issued such debt. It is possible to have the ability to finance the securitized assets with 100% debt and at the same time have that debt receive a very strong bond

[47] Part of the reason the extremely high AAA bond rating was achieved rather than the still very strong AA bond rating was because debt insurance was purchased.

rating. This is because investors have been assured that if there should be a revenue shortfall to service the debt financing the securitized assets, there is a clear path by which ratepayers will make up the shortfall. Although the proposed revenue decoupling does not have the recovery of shortfalls, it maintains the Company's income at the same level irrespective of changes in customer usage. Therefore, if implemented, the revenue decoupling would drive Delmarva's cost of equity down substantially, but not below the cost of AA-rated debt.

Q. COMPANY WITNESS HANLEY PROVIDES AN ANALYSIS OF COMPANIES THAT HAVE REVENUE STABILIZATION MECHANISMS. IS THIS ANALYSIS RELEVANT?

A. No. According to the response to PSC-COC-4, Mr. Hanley did not know the extent to which the revenues from either commercial or industrial customers of these utilities were or were not decoupled for reasons other than weather. The key to keeping revenue variation insulated from fluctuations in the economy is revenue decoupling for both commercial and industrial customers. Since Mr. Hanley does not even know whether total revenue stabilization is or is not in place for the industrial and commercial customers covered in his analysis, it is impossible to use the results of his analysis of revenue stabilization mechanisms..

Q. DO YOU RECOMMEND THAT THE DECREASE IN THE PRESENT RATE OF RETURN BE CONSTRAINED TO ACCOUNT FOR THE RISK THAT REVENUE DECOUPLING MIGHT SUBSEQUENTLY BE REJECTED?

A. No. The cost of equity should be lowered to the level appropriate for a company with revenue decoupling in place for as long as the decoupling procedures remain. Should revenue decoupling be cancelled, the cost of equity reduction should be removed at that time.

Q. WHAT IS THE APPROPRIATE COST OF EQUITY REDUCTION CAUSED BY REVENUE DECOUPLING?

A. Currently, the cost of long-term AAA- rated debt is about 4.26%.[48] This is more than 4% less than my recommendation for Delmarva's cost of equity. Without a study showing how much income stability would result from revenue decoupling, a conclusion on how much to lower the cost of equity is inherently less precise. Recognizing the difference between the cost of AAA rated debt and Delmarva's current cost of equity, it is appropriate to lower the cost of equity by at least 1.00%. This 1.00% should be revisited if and when the Company provides the requested study showing how revenue decoupling would have impacted earnings variability over the last ten years.

VII. COMMENTS ON TESTIMONY OF MR. HANLEY

Q. HAVE YOU READ THE TESTIMONY FILED BY COMPANY COST OF CAPITAL WITNESS MR. HANLEY IN THIS PROCEEDING?

A. Yes.

Q. WHAT IS YOUR OVERALL REACTION TO HIS TESTIMONY?

A. Mr. Hanley's cost of equity recommendation of 11.00% with an MFV or 11.25% without an MFV is much too high. A careful reading of his testimony shows why:

DCF METHOD. In his DCF method, he used analysts' short-term EPS growth rates as a proxy for long-term growth in cash flow. I explained earlier in this testimony why using a five-year EPS growth rate as a proxy for long-term growth in dividends and stock price is a serious violation of mathematics and finance that introduces needless and substantial errors into the computation.

RISK PREMIUM. Mr. Hanley implements his risk premium model by starting with his interpretation of the cost of Aaa-rated corporate bonds, adding several adjustments to that yield, and adding an equity risk premium to that amount. He adjusts the risk premium by separately using the average beta of each of his two comparative groups of

[48] Yahoo Finance, January 13, 2010

companies. The details of his method are shown on his Schedule FJH-13, pages 1-9. Mr. Hanley's approach to risk premium contains numerous errors, including the use of an unrealistically high 5.43% as the interest rate on Aaa-rated corporate bonds even though as of this time they are yielding only 4.26%; using the arithmetic mean of historic returns instead of the geometric mean; adding an upward adjustment of 0.55 percent to account for the difference between Aaa-rated and A-rated corporate bonds even though this adjustment functions as an inappropriate offset to a factor already considered in the beta adjustment; and incorrectly using future expected return data from Value Line.

CAPM METHOD. Mr. Hanley's CAPM method is really only a repeat of part of his Risk Premium method. The part he repeats is starting with a Value Line expectation for equity returns and adjusting the result by beta. Here, however, instead of making the adjustment on average for his group, he makes the beta adjustment separately for each company and then averages the result.

Q. HOW DOES MR. HANLEY'S DCF RESULT COMPARE TO YOUR DCF FINDINGS?

A. Mr. Hanley's Schedule FJH-9 shows that the average DCF result he obtained for his proxy group of natural gas distribution companies was 9.13%, and the median result was 9.67%. The same schedule shows that his results were 11.05% and 11.10% respectively for his proxy group of combination gas and electric companies. Thus, the result he obtained for his proxy group of gas distribution companies is actually lower than the 9.70% to 9.74% I obtained, while his 11.05% to 11.10% results for his combination companies is much higher than the 8.94% to 9.02% I obtained from applying the DCF method to the very same companies.

Q. HOW DOES THE WAY YOU AND MR. HANLEY HAVE IMPLEMENTED THE DCF METHOD DIFFER?

A. Mr. Hanley and I have used similar approaches to quantifying the dividend yield. Because I prepared my testimony after he did, my stock prices were as of August 31, 2010, while his were as of June 4, 2010. In addition to spot dividend yields, we also both presented an historical range. His historical range was for the last two months,

while mine was for the last year. For the dividend yield eventually used in his DCF analysis, he averaged the spot dividend yield and the yield for the last two months, while I showed both results separately. In this case, the results are very close regardless of whether the Commission relies on the my dates or his dates.

For the proxy group of gas distribution companies, Mr. Hanley used growth rates that averaged 5.11% for his proxy group of gas distribution companies,[49] while I concluded that the proper growth rate to use in the DCF model for these companies is 5.67% to 5.82%[50]. The higher growth rate I obtained is the reason my DCF result for the proxy group of gas distribution companies is higher than the result obtained by Mr. Hanley. When, on page 27 of his testimony, Mr. Hanley summarized the results of his DCF result from the gas distribution utility companies, he only gave weight to the 9.67% result he got based on the median of his results and none to the 9.13% average result.

For the proxy group of combination gas and electric companies, the growth rates used by Mr. Hanley averaged 5.98%,[51] while I used growth rates of 4.08% to 4.34%.

Q. **HOW DID MR. HANLEY COMPUTE THE GROWTH RATES THAT HE USED IN HIS DCF METHOD?**

A. Mr. Hanley averaged what he calls the "Value Line Projected Growth" with the "Reuters Mean Consensus Projected Five Year Growth Rate" and the "Zack's Five Year Projected Growth." See Hanley Direct Testimony at Schedule FJH-12. A review of the supporting documents provided on the subsequent pages of Schedule FJH-12 shows the

[49] Average of the growth rate numbers shown in column 4 of Mr. Hanley's Schedule FJH-9 for the proxy group of seven natural gas distribution companies.

[50] Schedule JAR 5, Page 1, line 5.

[51] Average of the growth rates of Mr. Hanley's Schedule FJH-9, column 4, for the proxy group of eleven combination gas and electric companies.

Value Line growth rate numbers that he actually used. For example, Schedule FJH-12 page 2 shows that what Mr. Hanley called "Value Line Projected Growth" for Laclede Group is really labeled by Value Line as "Est'd '07-'09 to '13 -'15" EPS growth.[52]

What this number that Mr. Hanley relies on actually represents can be developed from Value Line's EPS numbers for Laclede as an example. First: the average EPS of $2.623 from 2007-2009 is derived by averaging the $2.31, $2.64, and $2.92 EPS shown on line 3 of Schedule FJH-12, page 2. Second, remaining on Schedule FJH-12 page 2, line 3, Value Line forecasts EPS for Laclede to be $3.00 for 2013-2015. There are six years between the mid-point of 2007-2009 and 2013-2015. So, over that 6 year span, Value Line expects Laclede's EPS to increase from an average of $2.623 (average of $2.31, $2.64, and $2.92) to $3.00. An EPS increase from $2.623 to $3.00 over six years is a compound annual growth rate of 2.26%.[53] Rounding this off to the nearest 0.5% (because Value Line always shows these kind of growth rates to the nearest 0.5%), results in the exact 2.5% number that Mr. Hanley used on Schedule FJH-12, Page 1 as the Value Line growth rate for Laclede Group. Therefore, the growth rate that Mr. Hanley uses is a growth rate that is from an average base historical period to a period 6 years into the future.

There are several basic problems with this approach:

1. The growth rate from any point in history to any point in the future, even if the historical point in history is the average of a base period such as three years, is generally not a sustainable growth rate. In this particular case for Laclede, the growth

[52] Schedule FJH-12, Page 2, left side of page in box with label "ANNUAL RATES."

[53] ($3.00/$2.623)^1/6-1=2.26%.

rate is readily observed to be lower than the sustainable growth rate because the earned return on common equity as shown by Value Line for 2007-2009 on the third from the bottom line of numbers was higher than the earned return on common equity level forecast by Value Line for the future. When the forecasted earned return on equity is lower than in the past, the EPS growth rate will be lower than sustainable. Conversely, when the earned return on equity forecast for the future is higher than in the base period, EPS growth will be higher than sustainable.

2. The same problem exists with the consensus EPS forecasts Mr. Hanley used, only potentially worse. Whereas Value Line uses an average of three years as its base period, the five-year consensus EPS forecasts use only the most recently completed fiscal year as the base period.

Mr. Hanley ignored a caution in his own source, the Brigham and Daves text he references on page 22, line 2 of his direct testimony, that says "However, these forecasts often involve non-constant growth. For example, some analysts were forecasting that NCC would have a 10.4 percent growth rate in earnings and dividends over the next five years, but a growth rate after five years of 6.5 percent."[54]

3. Mr. Hanley did nothing to ensure that the dividend rate he used to compute the dividend yield was consistent with the future sustainable earnings rate. Future sustainable earnings can be highly influenced by a company's dividend policy. If a company pays a high dividend rate, this will suppress future sustainable growth, whereas a company can increase its sustainable growth rate if dividends per share grow more slowly than EPS. The way to minimize errors caused by changes in the dividend

[54] Page 331 of the source provided by Mr. Hanley in response to PSC-COC-5, which appears on page 13 of that response.

rate between now and the earnings forecast period is to synchronize the dividend rate used to compute the dividend yield portion of the DCF analysis and the dividend rate used to compute growth. By computing his dividend yield from the current spot actual dividend rate without making any attempt to coordinate the growth rate he used with that dividend rate, Mr. Hanley introduced avoidable error into his DCF method. For example, one of Mr. Hanley's proxy companies is Empire District Electric. Schedule FJH-12, Page 14 shows an expected EPS growth of 7.0% from 2007-2009 to 2013-2015, and expects dividends to grow only 1.0% over the same period. This lower dividends per share growth of only 1% will, other things being equal, make EPS grow more rapidly.[55] By focusing on EPS forecasts, Mr. Hanley picks up this extra growth that results from the lower growth in dividends, but he fails to make any adjustment to lower his dividend yield. Nevertheless, if earnings and stock price are growing more rapidly than dividends, then the dividend yield will come down.

Mr. Hanley's DCF model is further deficient because does not acknowledge that the analysts' optimism that McKinsey has explained is still present.[56]

Q. HOW DO YOU ADDRESS THE PROBLEMS INHERENT IN MR. HANLEY'S APPROACH TO THE DCF METHOD?

A. Rather than just taking a simplistic look at the growth rate from an historical point in time to some future time, I focus on what is the sustainable cause of the change in EPS.

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[55] The lower dividend growth means that there are more earnings available to be re-invested. If these earnings are reinvested in a way that earns any profits at all, EPS growth will be higher than if those extra earnings had been instead paid out as a dividend.

[56] See Mr. Hanley's response to PSC-COC-27 and the McKinsey report contained in Appendix E of this testimony.

To illustrate the difference between Mr. Hanley's approach to quantifying growth and mine, look what happens if his approach is applied to a straightforward investment in a bank CD. Consider an investor with a $1,000 investment in a 5-year bank CD that had been paying 2% who saw the earnings grow because the interest rate offered by the bank is expected to go up to 3% when the 5-year CD matures. In this example, earnings would grow from $20 per year to $30 per year. Mr. Hanley's approach to quantifying earnings growth would simply take the $20, compare it to $30 and erroneously conclude that the growth rate is 8.45%[57] because the compound annual rate of growth required for $20 to grow to $30 is 8.45% per year. The problem with this approach is that just because the interest rate on the CD is expected to increase from 2% to 3% in the next five years does not mean it is expected to increase any further. If, at the end of the next five years, the CD rate offered by the bank is once again 3%, reinvesting the $1,000 would not result in any growth in earnings at all.[58] The way to avoid this mistake is to focus on the earnings that can be produced at the future sustainable return rate and exclude the unsustainable transitional growth that results from the change in the earnings rate. In the case of a company, the way to establish the sustainable growth rate is to focus on the equivalent of the interest rate on the CD - which is the future expected earned return on book equity - and use that rate to determine what EPS growth rate that future expected earned return on book equity can sustain. This approach excludes from the computation the impact of the unsustainable growth that occurs from a transition in

[57] ($30/$20)^(1/5)-1=8.45%.

[58] In this example, for simplicity I have assumed that the investor took the interest income out of the CD every year. A similar point could be shown without this assumption, but the computations would be unnecessarily intricate.

the earned return rate on equity in the case of stock or, in the case of the CD, the interest rate being offered by the bank.

A review of the financial data shows that the inability of Mr. Hanley's approach to the DCF method to distinguish between non-constant growth caused by a change in the earnings rate and what growth rate is sustainable is a major cause of the difference in our DCF results. Remember that in the case of the natural gas distribution companies, Mr. Hanley's result is similar to mine. But, in the case of the combination electric and gas companies, Mr. Hanley's approach overstates the cost of equity. As shown on my Schedule JAR 5, Page 1, for the gas distribution companies, the earned return on book equity for 2007-2009 averaged 12.08%, which is very close to the average of 12.29% forecast by Value Line for 2013-2015. Conversely, in the case of the combination gas and electric companies where Mr. Hanley's DCF overstates the cost of equity, there is a relatively large difference between the base period average and the future expected return on book equity. As shown on Schedule JAR 5, Page 2, the combination gas and electric companies earned 10.73%, 9.62%, and 9.43% from 2007-2009 respectively, for an average of 9.93% for this base period, compared to the 10.45% Value Line estimate for 2013-15. While an increase in the average 9.93% earned return on book equity in the base period to 10.45% expected for the future might not seem like a large difference, the unsustainable increase in the EPS that is expected to occur just because of the rise in the earned return on equity from 9.93% to 10.45% in and of itself increases growth by 0.85%,[59] which represents almost half of the difference between Mr. Hanley's and my DCF results. Increases in EPS caused by increases in the return on book equity are

[59] ($10.45/$9.93)^(1/6)-1=0.85%.

unsustainable for utility companies because of regulation and are unsustainable for unregulated companies because of competitive pressures.

The growth rate data on my Schedule JAR-9 shows that Mr. Hanley's group of electric and gas combination companies is more susceptible to error caused by his failure to make the dividend yield computation consistent with the growth rate computation than is his gas distribution group. Schedule JAR-9 shows the average EPS and dividends per share growth rates from the same Value Line pages Mr. Hanley used. Note that the average Value Line forecasted EPS growth rate is 4.93% and the dividends per share growth rate is 4.43% for the gas distribution companies. While this is far enough apart to introduce some error, these growth rates are much closer together than the 5.36% Value Line forecasted EPS growth rate and the 4.14% Value Line forecasted dividends per share growth rates for the combination gas and electric company groups. This relatively large difference between the growth rates for the combination gas and electric distribution group is additive to the error caused by Mr. Hanley's failure to use a constant growth rate in his approach to the DCF method. The significance of this mistake is that the higher growth rate for EPS than dividends per share means that Mr. Hanley overstates the dividend yield. This happens because the higher EPS growth rate is expected to also make the stock price grow at the higher rate. Since dividend yield is the dividend rate divided by stock price, as long as stock price growth is greater than dividend growth, the dividend yield continues to decline.

Q. DID MR. HANLEY CLAIM TO HAVE ANY SUPPORT FOR HIS CHOICE OF WHAT TO USE FOR GROWTH RATES IN THE DCF METHOD?

A. Yes. Interrogatory PSC-COC-34 asked: "Has Mr. Hanley relied upon any studies supporting his decision to use analysts' EPS growth rates as a proxy for dividend

growth in his DCF analysis? If yes, provide a copy of all such reports." He responded by providing two different articles. The first one was a presentation by Dr. Myron Gordon dated February 19, 1990. The second was an article from the Journal of Portfolio Management by the same Dr. Myron Gordon along with David A. Gordon and Lawrence I. Gould and dated spring1989.

Q. DOES THE GORDON, GORDON AND GOULD ARTICLE PROVIDED BY MR. HANLEY PROVIDE SUPPORT FOR HIS GROWTH RATE METHOD COMPARED TO YOURS?

A. No. Rather, it rejects Mr. Hanley's approach and supports my approach.

Q. HOW DO YOU REACH THIS CONCLUSION?

A. The article finds that analysts' growth rates are superior to historical growth rates, whether those historical growth rates are EPS growth rates, dividends per share growth rates, or even earnings retention growth rates *where historical values of the retention rate and the earned return on equity are used*. However, the article does NOT merely accept the use of any analyst growth rate and does not reject any earnings retention growth computations that were produced by analysts. Rather, it specifically says:

> Before closing, we have three observations to make. First, the superior performance of KFRG[60] should come as no surprise. All four estimates of growth rely upon past data, but in the case of KFRG a larger body of past data is used, filtered through a group of security analysts who adjust for abnormalities that are not considered relevant for future growth**. We assume this is done by any analyst who develops retention growth estimates of yield for a firm**. If we had done this for all seventy-five firms in our utility sample, it is likely that the correlations would have been as good or better than those obtained with the analysts' forecasts of growth.[61]

[60] KFRG is the forecasted EPS growth rate.

[61] Attachment PSC-COC-34 (b), page 5 of 6.

(Emphasis added).

I already showed that the Value Line growth rates used by Mr. Hanley are nothing but a simple computation of the growth rate from the average of the three base years to the mid-point of the future forecasted period. They are NOT adjusted for the "… abnormalities that are not considered relevant…" that Professors Gordon, Gordon and Gould specifically state is necessary. Moreover, the Zacks and Reuters growth rates chosen by Mr. Hanley are not long-term sustainable growth rates, but are simply five-year EPS growth rates. Contrast Mr. Hanley's deficiencies with what I have done. I quantified the specified "…retention growth rates…" based on reviewing what analysts believe is sustainable in the future. While the approach I have used will still tend to result in overstating the EPS growth rate, because I use the sustainable growth rate method rather than a method that has the end-point distortion inherent in analysts' five year growth rate, I have eliminated the distortion caused by end point abnormalities. Also, by coordinating the growth rate computation with the portion of earnings used to compute dividend yield, I have substantially reduced errors caused by using a constant growth form of the DCF model in an environment where some change in the payout ratio is expected.

Q. IN THE ELECTRIC RATE PROCEEDING, DELMARVA CLAIMED THAT YOUR RETENTION GROWTH RATE METHOD IS CIRCULAR. PLEASE RESPOND.

A. Both Mr. Hanley and I use analysts' forecasts to develop growth rates. Therefore, just as my growth rates would change if a rate decision or any other factors should cause analysts' forecasts to change, so would his. However, neither Mr. Hanley's approach nor my approach is circular because both approaches match the

current stock price with investors' expectations as of the time the stock prices were obtained. With Mr. Hanley's approach, a change in the allowed return on equity would cause analysts to change the future expected EPS. This new EPS forecast would alter the five-year growth rate. With my approach, a change in the allowed return on equity could also change the growth rate as I compute it because an unexpected outcome for allowed return on book equity would likely change the future expected return on book equity. If investors also expected a change in future earnings growth for the same reasons that analysts changed their future earnings expectations, the stock price would change, resulting in a change in the dividend yield that would offset the change in the growth rate.

Q. ON PAGE 25 OF HIS DIRECT TESTIMONY, MR. HANLEY DISCUSSES HIS SCHEDULE FJH-8 TITLED "HYPOTHETICAL EXAMPLE OF THE INADEQUACY OF A DCF RETURN RATE RELATED TO BOOK VALUE WHEN MARKET VALUE IS GREATER/LESS THAN BOOK VALUE." DOES THIS EXAMPLE PROVIDE ANY REASON FOR THIS COMMISSION TO BE CONCERNED ABOUT USING THE RESULTS FROM A PROPERLY APPLIED DCF METHOD IN THE DETERMINATION OF THE COST OF CAPITAL FOR DELMARVA?

A. No. Whether derived using a properly applied DCF analysis, or a properly applied risk premium/CAPM analysis, the cost of equity is the return investors expect to be able to earn at market price, NOT the return investors expect to be able to earn on the book value investment. For example, note that the return available to investors on an investment in long-term U.S. treasury bonds was about 3.52% on August 31, 2010.[62] This 3.52% return is the return is the same for all U.S. treasury bonds of similar maturity even though the actual coupon rate may be materially higher than 3.52%. When a bond's coupon rate is higher than the current market rate for that bond, the bond's

[62] August 31, 2010 - Federal Reserve Statistical Release.

market price of the bond goes up so that its yield to maturity is equal to the current market rate of 3.52%. Investors who buy the bond with the higher coupon receive the higher coupon rate, but the higher coupon rate is offset by the decline in the price of the bond that will occur between the time the bond is purchased and the date it matures. While the analogous computation may be more complicated for a common stock investment than for a bond investment, the dynamic is the same. Equity investors start out by expecting a common stock investment to be able to earn the equivalent of the coupon yield on the book value of the common stock investment. They adjust the stock price up if that expected return on book value is higher than the cost of equity, and adjust the stock price down below book if that expected return on book value is lower than the cost of equity they demand.

Q. IF EITHER THE DCF RESULT OR THE RISK PREMIUM/CAPM RESULT IS USED BY REGULATORS IN SUCH A WAY THAT IT CAUSES INVESTORS TO CHANGE FUTURE EXPECTATION FOR EARNINGS ON ITS BOOK VALUE IVESTMENT, COULD THAT CAUSE THE STOCK PRICE OF A COMPANY TO CHANGE?

A. Yes. If a commission reaches a conclusion on the cost of equity that causes investors to change their future expected return on book equity, other things being equal the stock price of the company will change. This change in the stock price will not, however, change the cost of equity; it will merely change the stock price necessary for investors to believe they will be able to earn the cost of equity on new equity investments.

Q. IS IT APPROPRIATE FOR THE COMMISSION TO ALLOW A COST OF EQUITY THAT MIGHT CAUSE THE STOCK PRICE OF A COMPANY TO CHANGE?

A. Yes. While the Commission should give a company a reasonable opportunity to earn its cost of capital on its rate base investment, if investors have bid up the stock price above book value, the Commission does not have a responsibility to allow the excessive return that might be required to maintain the high stock price.

By raising the topic of maintaining the return on book value high enough to keep the return on market unchanged, Mr. Hanley is caught up in the incorrect concept of using market price as the "starting point" instead of the ending point. He ignores that in FPC v. Hope Natural Gas Co., 320 U.S. 591, 602 (1944) the United States Supreme Court stated:

> Rate-making is indeed but one species of price-fixing. Munn v. Illinois, , 134. The fixing of prices, like other applications of the police power, may reduce the value of the property which is being regulated. But the fact that the value is reduced does not mean that the regulation is invalid. Block v. Hirsh, 256 U.S. 135, 155-157, 41 S.Ct. 458, 459, 460, 16 A.L.R. 165; Nebbia v. New York, 291 U.S. 502, 523-539, 54 S. Ct. 505, 509-517, 89 A.L.R. 1469, and cases cited. It does, however, indicate that 'fair value' is the end product of the process of rate-making not the starting point as the Circuit Court of Appeals held. The heart of the matter is that rates cannot be made to depend upon 'fair value' when the value of the going enterprise depends on earnings under whatever rates may be anticipated. [Footnote 9]
>
> [Page 320 U.S. 591, 602]
>
> (Footnote 9) We recently stated that the meaning of the word 'value' is to be gathered 'from the purpose for which a valuation is being made. Thus the question in a valuation for rate making is how much a utility will be allowed to earn. The basic question in a valuation for reorganization purposes is how much the enterprise in all probability can earn.' Institutional Investors v. Chicago, M., St. P. & P.R. Co., 318 U.S. 523, 540, 63 S.Ct. 727, 738.

Q. HOW DOES MR. HANLEY'S RISK PREMIUM RESULT COMPARE WITH OTHER RESULTS?

A. Mr. Hanley's Schedule FJH-13 shows that his risk premium approach resulted in an indicated cost of equity of 10.29%. This is considerably higher than the 7.98% I

found the risk premium/CAPM approach to indicate for the comparative groups of companies, and is also substantially higher than the 8.44% risk premium result identified in the *Ibbotson SBBI 2010 Classic Yearbook*[63] for implementation to companies before considering the downward adjustment for the lower risk of the comparative companies.

Q. WHAT INTEREST RATE IS THE STARTING POINT OF MR. HANLEY'S RISK PREMIUM METHOD?

A. Schedule FJH-13, page 1 shows that Mr. Hanley started with a "Prospective Yield on Aaa Rated Corporate Bonds" of 5.43%. Footnote (4) on his Schedule FJH-13, Page 6 shows that he obtained the 5.43% by averaging what he believed would be the interest rate on Aaa-rated bonds in each of the six calendar quarters from the middle of 2010 through the third quarter of 2011.

Q. WHAT DOES MR. HANLEY EXPECT THIS INTEREST RATE TO BE IN THE THIRD QUARTER OF 2010?

A. 5.20%.

Q. HOW DOES THAT COMPARE TO THE ACTUAL INTEREST RATE ON AAA-RATED BONDS FOR THE THIRD QUARTER?

A. According to the U.S. Federal Reserve Statistical Release of September 7, 2010, the interest rate on Aaa-rated corporate bonds was 4.26%, or 0.94% below the level used by Mr. Hanley. This error alone causes a substantial overstatement of the cost of equity.

Q. HOW DID MR. HANLEY OBTAIN HIS HIGHLY INCORRECT FORECAST FOR THE INTEREST RATE ON AAA-RATED BONDS?

A. He relied on a forecast of future interest rates made by Blue Chip. See his Schedule FJH-13, page 7.

Q. ARE YOU FAULTING MR. HANLEY FOR NOT BEING ABLE TO CORRECTLY FORECAST INTEREST RATES?

[63] Ibbotson SBBI 2010 Classic Yearbook, page 128.

A. No, I am not faulting Mr. Hanley for failing to forecast interest rates. I am, however, faulting him for thinking that the Blue Chip forecast is smarter than the consensus opinion in the market. Even though interest rates have been in a general overall decline since the early 1980s, I do not remember ever seeing a Blue Chip forecast that did anything but forecast an increase in interest rates. This substantial and probably un-forecastable drop in interest rates should be a lesson to us all that at any point in time, the interest rate on long-term bonds is already the consensus forecast of the market. Using Blue Chip will only introduce an avoidable upward bias.

Q. HOW DOES MR. HANLEY USE THIS SUBSTANTIALLY OVERSTATE INTEREST RATE ON AAA-RATED CORPORATE BONDS?

A. He adds this interest rate to an equity risk premium that he determined to be 4.41% to 4.42% on his Schedule FJH-13, Page 5. His Schedule FJH-13, page 5 shows that he determined the equity risk premium three different ways, all of them wrong.

First, Mr. Hanley "calculated [the] equity risk premium based on the total market using the beta approach." His beta approach, in turn, has two separate approaches, each of which is wrong. The first approach, as shown on Schedule FJH-13, Page 6, starts with the arithmetic mean total return on the S&P 500 from 1926-2009 and subtracts the arithmetic mean return on Aaa- and Aa-rated corporate bonds from 1926-2009 to arrive at the arithmetic difference of the annual returns earned by each of those groups.

Q. WHAT IS WRONG WITH MR. HANLEY'S FIRST APPROACH TO QUANTIFYING THE RISK PREMIUM?

A. As explained earlier in this testimony, it is highly improper to use the arithmetic average in this kind of a computation. Second, because Aaa- and Aa-rated bonds are

NOT risk free, Mr. Hanley's downward adjustment for risk is understated. Page 54 of the Ibbotson 2010 SBBI *Classic Yearbook* correctly defines the equity risk premium as:

> … the geometric difference between large company stock total returns and U.S. Treasury bill total returns.

Page 28 of the *Classic Yearbook* shows that the geometric return on long-term corporate bonds was 5.9% from 1926-2009, while the geometric return on short-term treasury bills was 3.7%. This 2.2% difference is part of the overall risk difference between a true risk-free investment and the risk of a common equity investment. Because it is part of the overall risk difference, it must be included as part of the downward adjustment for risk based on the lower beta of the comparative companies. For example, the risk reduction portion of the risk premium computation for a company with a beta of 0.65 will be understated by 2.2% x (1-.65), or 0.77% as a result of Mr. Hanley's error.

Q. WHAT IS WRONG WITH THE SECOND APPROACH TO COMPUTING THE RISK PREMIUM USED BY MR. HANLEY ON HIS SCHEDULE FJH-13, PAGE 6?

A. Mr. Hanley's second approach starts with what he defines as the "Forecasted 3-5 year Total Annual Market Return" of 14.06%, which he derived from figures in Value Line. The simplest way to see why this approach is wrong is to directly observe that he has devised a complicated way to produce a highly inaccurate estimate of that which can be directly estimated. His starting point is what Value Line expects to be the total return earned by all of the companies it covers over the next five years, and then to make inferences about that total return to the specific companies in his proxy group. However, such a circuitous route is unnecessary because Value Line provides the specific future return expectation for each such company. Therefore, if the goal is to

determine what return Value Line expects will be earned by the stockholders of the companies in the proxy group over the next 3-5 years, the returns for each proxy company can be directly measured. The information to use this direct measurement approach is actually contained right on the Value Line pages included by Mr. Hanley in Schedule FJH-12, pages 2-19 in the extreme left-hand column in a box labeled "2013-15 Projections." As shown on my Schedule JAR-9, if one takes these numbers and averages them for all of the proxy companies, the result is a future expected total return (dividend plus capital appreciation) of 9.53%. This directly- measured 9.53% is considerably lower than the 11.59% to 11.65% that Mr. Hanley obtained by using his indirect method.[64] Mr. Hanley's indirect route compounds so many errors that it causes him to overstate Value Line's actual opinion by 2.12%.

Q. DO YOU RECOMMEND THAT THE COMMISSION RELY ON THE 9.53% DIRECT MEASUREMENT OF WHAT, ON AVERAGE, VALUE LINE EXPECTS FOR THE TOTAL RETURN FOR MR. HANLEY'S PROXY GROUP COMPANIES WHEN DECIDING ON THE FAIR COST OF EQUITY TO ALLOW TO DELMARVA?

A. No. While the 9.53% is a result that is close to my cost of equity recommendation, it is not always true that Value Line and investors expect the same thing. Note, for example, that Value Line's mid-point total return expectation for Laclede is 14.0%, while its mid-point total return expectation for South Jersey Industries is 5.50%. South Jersey Industries has a beta of 0.60, compared to only 0.55 for Laclede. Therefore, since there is no indication of a higher risk for an investment in Laclede than

[64] The forecasted equity risk premium of 8.63%shown on Schedule FJH-13, Page 6 was multiplied by an 0.65 beta to obtain 5.61% as the risk premium applicable to the proxy groups. Replicating what Mr. Hanley did on Schedule FJH-13, Page 1, one would start with this 5.61%, and add the 0.55% adjustment shown on line 2, the 0 to 0.06% adjustment shown on line 4, and the 5.43% prospective yield shown on line 1 to get 11.59% to 11.65%.

for South Jersey, if these two expectations were indeed indicative of what investors actually expected, investors would have quickly sold South Jersey and have taken the proceeds to buy Laclede.

Q. ON PAGE 43, LINES 22-23 OF HIS DIRECT TESTIMONY, MR. HANLEY SAYS THAT HE CHOSE THE LONG-TERM TREASURY RATE IN HIS RISK PREMIUM ANALYSES BECAUSE THE TREASURY BONDS HAVE A LONG-TERM HORIZON CONSISTENT WITH UTILITIES' COMMON STOCKS. PLEASE COMMENT.

A. Mr. Hanley is focusing on the wrong thing. Sure, common stock theoretically lasts much longer than bonds because, unlike bonds, common stock has no maturity date whatsoever. Common stock remains outstanding unless a company buys its own stock back, is bought out, or goes out of business. The purpose of selecting the risk-free interest rate is to find the difference between the interest rate on a risk-free investment and the investment in the common stock of a company with average risk (the "risk premium"). The appropriate risk premium is the one that captures the complete risk difference between a risk-free investment and the risk of that common stock. To properly implement the CAPM, this premium should capture all risk because the risk premium is multiplied by the beta of a group of companies to arrive at the risk premium specifically applicable to that group of companies. The resulting risk-adjusted beta is then added to the chosen risk-free rate to derive the CAPM-indicated cost of equity. Unless the risk premium used completely captures risk, the beta-based adjustment to the risk will understate the magnitude of the adjustment.

Q. MR. HANLEY ADDED 0.55%TO HIS RISK PREMIUM-DERIVED EQUITY COST RATE TO REFLECT THE YIELD SPREAD DIFFERENCE BETWEEN AAA-RATED BONDS AND A-RATED BONDS. PLEASE COMMENT.

A. This adjustment is wrong. The equity risk premium on line 6 of Schedule FJH-13 is supposed to be the cost difference between equity with the risk characteristics of the companies in his proxy groups and the cost rate for Aaa-rated bonds. Since Aaa-rated bonds are lower in cost than A-rated bonds, the cost difference between this equity and Aaa-rated bonds is greater than the cost difference between A-rated bonds and equity. In other words, if Mr. Hanley had computed the risk premium number on line 6 using A-rated bonds instead of Aaa-rated bonds, the risk premium on line 6 would have been lower than the 4.41% to 4.42% he shows. As a result, when he adds the 0.55% on line 2 of his Schedule FJH-13, page 6, he is effectively adding the risk difference between Aaa-rated and A-rated bonds twice. Because it should only be included in the risk difference once, it is wrong for Mr. Hanley to make the adjustment to his risk premium that he proposes on line 2.

Q. PLEASE COMMENT ON MR. HANLEY'S PROPOSED ADJUSTMENT ON LINE 4 OF SCHEDULE FJH-13, PAGE 1 TO MAKE AN ADJUSTMENT TO HIS RISK PREMIUM-INDICATED COST OF EQUITY RATE FOR BOND RATING DIFFERENCES OF THE PROXY GROUP.

A. Again, Mr. Hanley is wrong. The difference between the Aaa-rated bond rate and the cost of equity for each of his proxy groups was already accounted for by the average beta of each group. When he computed the betas for each of his groups, he found the beta of both to be 0.65.[65] Therefore, the cost of equity risk of both groups is identical. If the risk had been sufficiently different, the beta computation would have shown a difference and it already would have been accounted for. Either way, his proposed adjustment is redundant and therefore conceptually wrong.

[65] Schedule FJH-13, Page 6.

Q. DO YOU RECOMMEND COMPUTING THE BETA-BASED ADJUSTMENT TO THE RISK PREMIUM BY USING CURRENT SPOT SHORT-TERM INTEREST RATES?

A. No. The Federal Reserve intentionally controls short-term interest rates to help stimulate the economy and so they may not reflect true market-based interest rates. Therefore, in this environment, using the actual short-term interest rate to compute the degree of risk premium reduction due to the lower beta of the comparative groups could exaggerate the appropriate downward adjustment. As I explained earlier, a reasonable solution is to compute a normalized short-term interest rate by starting with a long-term interest rate and subtracting an allowance for the maturity premium. This rate has the identical changes to the interest rate as the long-term interest rate. Its advantage is that the CAPM beta adjustment can be applied to all of the risk difference between a true risk-free rate and the cost of equity for a company of average risk.

Q. DOES USING THIS NORMALIZED SHORT-TERM INTEREST RATE RESULT IN A LOWER COST OF EQUITY THAN IF A LONG-TERM INTEREST RATE HAD BEEN USED TO ESTABLISH THE RISK PREMIUM?

A. Not necessarily. For a company or portfolio of average risk, it does not matter if the short-term rate or the long-term rate is used. However, if the risk premium is increased for companies with a beta above 1.0 or decreased for companies with a beta below 1.0, then using a risk premium based on long-term rates instead of short-term rates overstates the cost of equity for companies like the Delmarva comparative groups because the lower the risk premium, the lower the adjustment for risk.

Q. ON PAGE 41 OF HIS DIRECT TESTIMONY, MR. HANLEY DISCUSSES A PROPOSED MODIFICATION TO THE CAPM BECAUSE OF WHAT HE BELIEVES TO BE A DIFFERENCE BETWEEN THE PREDICTED VERSUS THE OBSERVED RETURNS FROM THE CAPM. PLEASE COMMENT.

A. Mr. Hanley cites an empirical study by Dr. Morin (the same Dr. Morin who was the Company's cost of capital witness in Docket No. 09-414, the recent Delmarva electric rate proceeding) as support for his argument that there is a difference between the predicted and actual results from applying the CAPM. In Docket No. 09-414, Dr. Morin acknowledged on lines 14-16 of page 24 of his direct testimony that under the CAPM theory, the cost of capital is supposed to be proportional to beta. As the beta gets smaller, the required return likewise continues to be reduced. When the beta is zero, the required return is the risk-free rate. In his direct testimony in Docket No. 09-414, Dr. Morin provided empirical data that he claimed disproved the basic premise of the CAPM. (*Id*. at 25)

Q. DID IT?

A. No. All he showed is that using the arithmetic average to compile historical returns fails to produce results consistent with what was expected from the CAPM. But, as I have shown earlier in this testimony, if one replaces the flawed arithmetic averaging approach with the correct compound annual (geometric) average approach, the empirical data confirms the CAPM theory.

Q. EARLIER IN THIS TESTIMONY, YOU PROVIDED QUOTES FROM THE SBBI 2010 *CLASSIC YEARBOOK* THAT SHOW YOUR USE OF THE GEOMETRIC AVERAGE IS CONSISTENT WITH WHAT SBBI RECOMMENDS. MR. HANLEY PROVIDES QUOTES FROM THE SBBI 2010 VALUATION YEARBOOK IN SUPPORT OF THE ARITHMETIC AVERAGE. PLEASE COMMENT.

A. There are inconsistencies between the Valuation Edition and the Classic Edition.

Q. GIVEN THESE INCONSISTENCIES, HOW DOES ONE SELECT WHAT TO USE?

A. I have provided much support for the use of the geometric average, whether or not the *SBBI 2010 Classic Yearbook* statements are used. The statements in favor of the use of the geometric average have appeared in the more recent editions of the *Classic Yearbook* that must reflect improvements made since Morningstar acquired SBBI. Apparently, the Valuation Edition has not yet been revised to reflect those changes.

Q. ARE THERE ITEMS IN THE *SBBI 2010 SBBI VALUATION YEARBOOK* THAT REFUTE MR. HANLEY'S COST OF CAPITAL APPROACHES?

A. Yes. For example, page 31 of the *SBBI 2010 Valuation Edition* presents what it calls the build-up method to develop the cost of equity. It adds a riskless rate of 4.6% to an equity risk premium of 6.7%, for a total of 11.3%. It then makes two additional adjustments, one for "Industry Risk Premium" and another for "Size Premium." Page 37 shows that it recommends using a negative 3.65% as the industry premium for gas distribution companies. Therefore, before its recommended size adjustment, it would find a cost of equity of 11.3% -3.65%, or 7.65% for a large gas distribution company. PHI, Delmarva's parent company, has a market capitalization of over $4 billion. Therefore, the size premium that the SBBI 2010 Valuation Edition shows on the very last page of the edition (inside cover) is 0.85%. This makes PHI's Valuation Edition-determined cost of equity equal to 8.50%, based on its approach to the risk premium (7.65% +0.85%= 8.50%).

Q. ARE YOU RECOMMENDING THAT THE COMMISSION CONSIDER THE 8.50% FINDING FROM THE VALUATION EDITION AS A VALID INDICATOR OF DELMARVA's COST OF EQUITY IN THIS CASE?

A. No. While the database of historical performance in the Valuation Edition is the same as in the Classic Edition, the theoretical discussions in the Valuation Edition are frequently unreliable. My purpose of showing the development of the 8.50% result is to

illustrate that Mr. Hanley has selectively used parts of the risk premium approach illustrated by the Valuation Edition. If he had used it all instead of the parts he picked out of the pile, he would have obtained a cost of equity less than I have recommended.

Q. HAS MR. HANLEY MADE AN ADDITION TO HIS COST OF EQUITY TO PROVIDE AN ALLOWANCE FOR FINANCING COSTS?

A. Yes. On page 6 of his direct testimony, Mr. Hanley recommends adding 0.21% to 0.25% to his cost of equity for "flotation costs."

Q. PLEASE RESPOND TO MR. HANLEY'S REQUEST FOR A FINANCING COST ADJUSTMENT.

A. As I explained earlier, an allowance of 0.21% to 0.25% for financing costs is way in excess of the actual costs incurred by PHI to raise the capital for Delmarva and is therefore inappropriate. Furthermore, this Commission has repeatedly refused to approve an allowance for flotation costs.

Q. MR. HANLEY DISCUSSES THE IMPACT OF COMPANY SIZE ON THE COST OF EQUITY. PLEASE RESPOND.

A. Mr. Hanley explains why he believes size influences the cost of equity for a company, and concludes that the small size of Delmarva's gas operations requires an upward adjustment of 0.88% to its cost of equity; however, , in an effort to be conservative, he "only" made an upward 0.44% adjustment.

A size premium makes no sense because investors generally own securities as part of larger portfolios rather than individually. An investor can therefore synthesize the risk of owning one large company merely by owning several small companies. This is because a large company can be nothing but a collection of smaller businesses all under one common ownership. Because investors not only can do this, but in fact actually do it every day, any small size premium is quickly removed by normal market

forces. Actually, in the case of Delmarva's gas operations, investors have to do nothing at all to remove the small size effect. The only way outside investors can purchase ownership in Delmarva's gas operations is to purchase stock in its parent, PHI. By any reasonable measure, PHI is large, not small.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

Schedule JAR 1

DELMARVA POWER & LIGHT
Overall Cost of Capital

Recommended Capital Structure	Ratios	Cost Rate	Weighted Cost Rate [D]
Long-Term Debt	**51.72%** [A]	**4.97%** [B]	2.57%
Short-Term Debt			
Common Equity	**48.28%** [A]	9.25% [C]	4.47%
	100.0%		7.04%

Recommended capital structure With adjustment for lower risk of MFV	Ratios	Cost Rate	Weighted Cost Rate [D]
Debt	51.72% [A]	4.97% [B]	2.57%
Common Equity	48.28% [A]	8.25% [E]	3.98%
	100.0%		6.55%

Source:

[A] Schedule FJH-21, Actual at 6/30/10
[B] Schedule JAR 4, Page 1
[C] Schedule JAR 2 Midppont of range of 8.90% to 9.60%.
[D] Cost Rate X Ratio
[E] Cost of equity without revenue decoupling minus mid-point of 0.5% to 1.5% range as discussed in text of testimony.

Schedule JAR 2

DELMARVA POWER & LIGHT
COST OF EQUITY SUMMARY

SIMPLIFIED, OR CONSTANT GROWTH DCF (D/P +g) RESULTS:	**Average for Year ending 8/31/10**		**As of 8/30/2010**	
Combination of Gas & Electric Utilities	8.98%	[A]	8.89%	[A]
Gas Utility Companies	9.74%	[B]	9.70%	[B]

Risk Premium/Capital Asset Pricing Model

Combination of Gas & Electric Utilities		
Average of CAPM Methods	7.98%	[C]

	High	Low	
Recommended Equity Cost Rate	9.70%	9.00%	[D]
Adjustment for Capital Structure	-0.10%	-0.10%	[E]
Recommended cost of equity	9.60%	8.90%	

Source:

[A] Schedule JAR 5, Page 1
[B] Schedule JAR 5, Page 2
[C] Schedule JAR 8, Page 1
[D] There is no one correct way to establish a range. The range I have shown gives greater weight to the DCF results.
[E] Based on estimate of 0.04% change in cost of equity for each 1% change in common equity ratio. The difference between the 48.28% common equity component and the 44.29% and 46.90% being used by the comparative groups is between 3.95% and 1.34%. 3.95% X 0.04% is 0.16% 1.34% x 0.04=0.05%.
Therefore, the higher amount of common equity in the capital structure requested by Delmarva provides a reduction in the financial risk of between 0.05% and .016% of the cost of equity. This averages roughly 0.10%.

FINANCIAL DATA ON PROXY GROUPS

Schedule JAR 3, Page 1

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]
		Book Value Per Sh. Dec. 06	Book Value Per Sh. Dec. 07	Book Value Per Sh. Dec. 08	Book Value Per Sh. Dec. 09	Book Value Per Sh. 2013-2015	Market Price At 08/30/10	Market Price High for Year	Market Price Low for Year	Market to Book At 08/30/10	Market to Book Avg. for Year	Div. Rate	Dividend Yield At 8/30/2010	Dividend Yield Avg. for Year
		[A]	[A]	[A]	[A]	[A]	[B]	[B]	[B]	[C]	[C]	[A]	[D]	[D]
Proxy Group of Seven Natural Gas Distribution Companies														
Laclede Group, Inc.	LG	**$18.85**	**$19.79**	**$22.12**	**$23.32**	**$27.70**	**$33.30**	**$35.92**	**$30.17**	1.43	1.45	**$1.58**	4.74%	4.78%
New Jersey Resources Corp.	NJR	**$15.00**	**$15.50**	**$17.28**	**$16.59**	**$19.40**	**$37.21**	**$39.01**	**$33.49**	2.24	2.14	**$1.36**	3.65%	3.75%
Northwest Natural Gas Co.	NWN	**$22.01**	**$22.52**	**$23.71**	**$24.88**	**$29.65**	**$45.44**	**$49.00**	**$40.83**	1.83	1.85	**$1.66**	3.65%	3.70%
Piedmont Natural Gas Co.	PNY	**$11.83**	**$11.99**	**$12.11**	**$12.67**	**$14.65**	**$27.28**	**$28.52**	**$22.51**	2.15	2.06	**$1.12**	4.11%	4.39%
South Jersey Industries	SJI	**$15.11**	**$16.25**	**$17.33**	**$18.27**	**$23.55**	**$46.99**	**$49.05**	**$33.12**	2.57	2.31	**$1.32**	2.81%	3.21%
Southwest Gas Corporation	SWX	**$21.58**	**$22.98**	**$23.49**	**$24.46**	**$32.00**	**$31.45**	**$33.96**	**$23.63**	1.29	1.20	**$1.00**	3.18%	3.47%
WGL Holdings, Inc.	WGL	**$18.86**	**$19.83**	**$20.99**	**$21.89**	**$26.65**	**$35.27**	**$37.28**	**$30.96**	1.61	1.59	**$1.51**	4.29%	4.43%
	AVERAGE	$17.61	$18.41	$19.58	$20.30	$24.80	$36.71	$38.96	$30.67	1.87	1.80	$1.36	3.78%	3.96%
	MEDIAN									1.83	1.85		3.65%	3.75%
					Est.						Year	Rate		Year
		[A]	[A]	[A]	[A]	[A]	[B]	[B]	[B]	[C]	[C]	[A]	[D]	[D]
Proxy Group of Eleven Combination Gas and Electric Companies														
ALLETE	ALE	**$21.90**	**$24.11**	**$25.37**	**$26.41**	**$29.25**	**$35.57**	**$37.87**	**$29.99**	1.35	1.31	**$1.76**	4.95%	5.19%
Alliant Energy	LNT	**$22.83**	**$24.30**	**$25.56**	**$25.07**	**$31.05**	**$35.02**	**$36.30**	**$25.67**	1.40	1.22	**$1.58**	4.51%	5.10%
Black Hills Corp.	BKH	**$23.68**	**$25.66**	**$27.19**	**$27.84**	**$31.50**	**$30.43**	**$34.49**	**$23.16**	1.09	1.05	**$1.44**	4.73%	5.00%
Con. Edison	ED	**$31.09**	**$32.58**	**$35.43**	**$36.46**	**$41.10**	**$47.53**	**$48.53**	**$39.29**	1.30	1.22	**$2.38**	5.01%	5.42%
DTE Energy Co.	DTE	**$33.02**	**$35.86**	**$36.77**	**$37.96**	**$46.50**	**$46.85**	**$49.06**	**$33.75**	1.23	1.11	**$2.12**	4.53%	5.12%
Empire Ditrict	EDE	**$15.49**	**$16.04**	**$15.56**	**$15.75**	**$17.50**	**$19.62**	**$20.41**	**$17.57**	1.25	1.21	**$1.28**	6.52%	6.74%
NSTAR	NST	**$14.82**	**$15.95**	**$16.74**	**$17.53**	**$22.75**	**$38.03**	**$38.83**	**$30.76**	2.17	2.03	**$1.60**	4.21%	4.60%
PG&E Corp.	PCG	**$22.44**	**$24.18**	**$25.97**	**$27.88**	**$38.25**	**$46.76**	**$47.73**	**$39.53**	1.68	1.62	**$1.82**	3.89%	4.17%
SCANA Corp.	SCG	**$24.32**	**$25.30**	**$25.81**	**$27.71**	**$35.25**	**$39.03**	**$40.06**	**$33.59**	1.41	1.38	**$1.90**	4.87%	5.16%
Wisconsin Energy	WEC	**$24.70**	**$26.50**	**$28.54**	**$30.51**	**$40.75**	**$55.74**	**$56.64**	**$42.89**	1.83	1.69	**$1.60**	2.87%	3.22%
Xcel Energy Inc.	XEL	**$14.28**	**$14.70**	**$15.35**	**$15.92**	**$19.75**	**$22.31**	**$23.02**	**$18.53**	1.40	1.33	**$1.01**	4.53%	4.86%
	AVERAGE	$22.60	$24.11	$25.30	$26.28	$32.15	$37.90	$39.36	$30.43	1.46	1.38	$1.68	4.60%	4.96%
	MEDIAN									1.40	1.31		4.53%	5.10%

est= Estimated by Value Line

Sources:

[A] Value Line
[B] Yahoo Finance -- Historical Prices
[C] Market price divided by book value
[D] Dividend rate divided by market price

FINANCIAL DATA ON PROXY GROUPS **Schedule JAR 3, Page 2**

	[1] EPS 2006	[2] EPS 2007	[3] EPS 2008	[4] EPS 2009	[5] EPS Average 2006 - 2009	[6] EPS 2013 - 2015 Est.	[8] Return on Eq. 2008	[9] Return on Eq. 2009	[10] Value Line Future Exp. Return on Eq.	[11] Value Line EPS Exp.	[13] Return on Equity 2007
	[A]	[A]	[A]	[A]	[B]	[A]	[D]	[D]	[A]	[E]	[B]
Proxy Group of Seven Natural Gas											
EARNINGS PER SHARE AND RETURN ON EQUITY											
Laclede Group, Inc.	**$2.37**	**$2.31**	**$2.64**	**$2.92**	$2.56	**$3.00**	12.60%	12.85%	**11.00%**	$3.05	11.96%
New Jersey Resources Corp.	**$1.87**	**$1.55**	**$2.70**	**$2.40**	$2.13	**$3.20**	16.47%	14.17%	**16.50%**	$3.20	10.16%
Northwest Natural Gas Co.	**$2.35**	**$2.76**	**$2.57**	**$2.83**	$2.63	**$3.50**	11.12%	11.65%	**11.50%**	$3.41	12.40%
Piedmont Natural Gas Co.	**$1.28**	**$1.40**	**$1.49**	**$1.67**	$1.46	**$1.90**	12.37%	13.48%	**13.00%**	$1.90	11.75%
South Jersey Industries	**$2.46**	**$2.09**	**$2.27**	**$2.38**	$2.30	**$3.35**	13.52%	13.37%	**14.50%**	$3.41	13.33%
Southwest Gas Corporation	**$1.98**	**$1.95**	**$1.39**	**$1.94**	$1.82	**$2.80**	5.98%	8.09%	**9.00%**	$2.88	8.75%
WGL Holdings, Inc.	**$1.94**	**$2.09**	**$2.44**	**$2.53**	$2.25	**$2.70**	11.95%	11.80%	**10.50%**	$2.80	10.80%
	$2.04	$2.02	$2.21	$2.38	$2.16	$2.92	12.00%	12.20%	12.29%	$2.95	11.31%
							12.37%	12.85%	11.50%		11.75%
	[A]	[A]	[A]	[A]	[B]	[A]	[C]	[C]	[A]	[E]	[B]
Proxy Group of Eleven											
EARNINGS PER SHARE AND RETURN ON EQUITY											
ALLETE	**$2.77**	**$3.08**	**$2.82**	**$1.89**	$2.64	**$2.50**	11.40%	7.30%	**8.00%**	$2.34	13.39%
Alliant Energy	**$2.06**	**$2.69**	**$2.54**	**$1.89**	$2.30	**$3.60**	10.19%	7.47%	**11.50%**	$3.57	11.42%
Black Hills Corp.	**$2.21**	**$2.68**	**$0.18**	**$2.32**	$1.85	**$2.50**	0.68%	8.43%	**8.00%**	$2.52	10.86%
Con. Edison	**$2.95**	**$3.48**	**$3.36**	**$3.16**	$3.24	**$3.85**	9.88%	8.79%	**9.50%**	$3.90	10.93%
DTE Energy Co.	**$2.45**	**$2.66**	**$2.73**	**$3.24**	$2.77	**$4.25**	7.52%	8.67%	**9.00%**	$4.19	7.72%
Empire Ditrict	**$1.41**	**$1.09**	**$1.17**	**$1.18**	$1.21	**$1.75**	7.41%	7.54%	**10.50%**	$1.84	6.91%
NSTAR	**$1.93**	**$2.07**	**$2.22**	**$2.28**	$2.13	**$3.25**	13.58%	13.31%	**14.00%**	$3.19	13.45%
PG&E Corp.	**$2.76**	**$2.78**	**$3.22**	**$3.03**	$2.95	**$4.50**	12.84%	11.25%	**12.00%**	$4.59	11.93%
SCANA Corp.	**$2.59**	**$2.74**	**$2.95**	**$2.85**	$2.78	**$3.50**	11.54%	10.65%	**10.00%**	$3.53	11.04%
Wisconsin Energy	**$2.64**	**$2.84**	**$3.03**	**$3.20**	$2.93	**$5.00**	11.01%	10.84%	**12.50%**	$5.09	11.09%
Xcel Energy Inc.	**$1.35**	**$1.35**	**$1.46**	**$1.49**	$1.41	**$2.00**	9.72%	9.53%	**10.00%**	$1.98	9.32%
		$2.50	$2.33	$2.41	$2.38	$3.34	9.62%	9.43%	10.45%	$3.34	10.73%
							10.19%	8.79%	10.00%		11.04%

est= Estimated by Value Line

Source: [A] Value Line
[B] ((2012-2014 EPS)/(2009 EPS))^1/4
[C] Earnings Per Share divided by average book value. Book value shown on Schedule JAR 3, Page 1

RETURN ON EQUITY IMPLIED IN ZACKS NEXT FIVE YEAR GROWTH RATES

	[1] Dec. 09 Y/E Book [3]	[2] Earnings 2009	[3] Dividends	[4] Analyst 5 Year Growth Rate 10/	Y/E Book in 2013 at Zack's Growth Before SV	[5] Y/E Book in 2014 at Zack's Growth Before SV	[6] Growth In Book Value From SV	[7] Y/E Book in 2014 at Zack's Growth Including SV	Earnings 2014 at Zack's Growth	[8] Return on Equity to achieve Analysts' Growth	[9] VALUE LINE BETA
	[A]	[A]	[A]	[B]	[C]	[C]	[D]	[E]	[C]	[C]	[A]
Proxy Group of Seven Natural Gas											
EARNINGS PER SHARE AND RETURN ON EQUITY											
Laclede Group, Inc.	$23.32	$2.92	$1.58	**3.00%**	$29.09	$30.65	128.90%	$38.50	$3.39	8.79%	**0.55**
New Jersey Resources Corp.	$16.59	$2.40	$1.36	**4.00%**	$21.18	$22.45	90.58%	$19.76	$2.92	14.78%	**0.65**
Northwest Natural Gas Co.	$24.88	$2.83	$1.66	**4.90%**	$30.16	$31.65	110.03%	$34.01	$3.59	10.57%	**0.60**
Piedmont Natural Gas Co.	$12.67	$1.67	$1.12	**6.30%**	$15.24	$15.99	86.35%	$13.48	$2.27	16.81%	**0.65**
South Jersey Industries	$18.27	$2.38	$1.32	**6.50%**	$23.25	$24.70	145.07%	$34.78	$3.26	9.38%	**0.60**
Southwest Gas Corporation	$24.46	$1.94	$1.00	**6.00%**	$28.82	$30.08	116.06%	$34.18	$2.60	7.60%	**0.75**
WGL Holdings, Inc.	$21.89	$2.53	$1.51	**3.70%**	$26.35	$27.57	99.49%	$26.83	$3.03	11.31%	**0.65**
	$20.30	$2.38	$1.36	4.91%	$24.87	$26.15	110.93%	$28.79	$3.01	11.32%	0.64
				4.90%						10.57%	0.65

North Western Corp. excluded because not covered by basic Value Line subscription.

	[A]	[A]	[A]	10/ [B]	Growth Before SV [C]	Growth Before SV [C]	[D]	Growth Including SV [E]	Growth [C]	Growth [C]	BETA [A]
Proxy Group of Eleven											
EARNINGS PER SHARE AND RETURN ON EQUITY											
ALLETE	$26.41	$1.89	$1.76	**4.00%**	$26.98	$27.14	114.48%	$30.98	$2.30	7.42%	**0.70**
Alliant Energy	$25.07	$1.89	$1.58	**5.00%**	$26.47	$26.87	107.67%	$28.72	$2.41	8.40%	**0.70**
Black Hills Corp.	$27.84	$2.32	$1.44	**6.00%**	$31.92	$33.10	104.05%	$33.83	$3.10	9.18%	**0.80**
Con. Edison	$36.46	$3.16	$2.38	**4.50%**	$39.95	$40.92	103.08%	$41.68	$3.94	9.45%	**0.65**
DTE Energy Co.	$37.96	$3.24	$2.12	**5.00%**	$43.03	$44.46	110.71%	$48.43	$4.14	8.54%	**0.75**
Empire Ditrict	$15.75	$1.18	$1.28		$15.35	$15.25	114.55%	$17.53	$1.18	6.73%	**0.70**
NSTAR	$17.53	$2.28	$1.60	**6.00%**	$20.68	$21.59	87.14%	$18.42	$3.05	16.56%	**0.65**
PG&E Corp.	$27.88	$3.03	$1.82	**3.41%**	$33.15	$34.58	115.39%	$39.07	$3.58	9.17%	**0.55**
SCANA Corp.	$27.71	$2.85	$1.90	**4.30%**	$31.94	$33.11	132.31%	$43.03	$3.52	8.18%	**0.70**
Wisconsin Energy	$30.51	$3.20	$1.60	**8.70%**	$38.43	$40.86	99.98%	$39.64	$4.86	12.25%	**0.65**
Xcel Energy Inc.	$15.92	$1.49	$1.01	**5.70%**	$18.13	$18.76	112.43%	$20.74	$1.97	9.48%	**0.65**
	$26.28	$2.41	$1.68	5.26%	$29.64	$30.60	109.25%	$32.91	$3.09	9.58%	0.68
				5.00%						9.17%	0.70

Source:
- [A] Value Line
- [B] Zacks.com
- [C] Projected return on equity is obtained by escalating both dividends and earnings per share by the stated growth rate, and adding earnings and subtracting dividends in each year to determine the book value.
- [D] Market to Book Ratio X Compound Annual Growth rate of increase in Common Shares Outstanding (See Schedule JAR 6, Page 1)
- [E] Growth in Book Value From SV X Average of Y/E Book at Zack's Growth Before SV for 2013 and 2014

Schedule JAR 4

DELMARVA POWER & LIGHT COMPANY
COMPUTATION OF EMBEDDED COST OF DEBT

	[1] Net Amount Outstanding	[2] Effective Cost Rate	[3] Annual Net Cost	
Per Company Request	$ 862,458,578	5.28%	$ 45,580,369	[A]
Adjustment to lower interest rate on $250 million debt issuance from 6.40% to 5.31%			$ (2,725,000)	[B]
	$ 862,458,578	**4.97%**	**[C]** **$ 42,855,369**	

Source:

[A] Schedule FJH-23

[B] Schedule JAR 4, Page 2 , interest rate should change from 6.40% to 5.31%.
$250 million x (6.40%-5.31%)=(2,750,000)

[C] Column 3/Column [1]

APPROPRIATE REGULATORY INTEREST RATE ON DELMARVA DEBT

$250 million issued on 11/25/08	**AMOUNT**	Source
Interest rate reported by Company	6.40%	Schedule FJH-23
Adjustments:		
If issuance had been in first quarter of 2009 instead of 11/25/08		
a) Change in long-term treasury bond rates	-0.17%	0
b) Change in spread between utility debt and long-term treasury bonds	-0.25%	Interpretation of data shown on graph from UBS provided by Company in response to PSC-COC-39, page 2 of 3.
Interest Rate on $250 million issuance if it had been made during the first quarter of 2009	5.98%	
Adjustment to exclude impact of unregulated activities	-0.67%	Interpretation of data shown from Merrill Lynch for first quarter of 2009 as provided by Company in response to PSC-COC-39, page 2 of 3. Spread between A and BBB was about 2.00%. This was divided by 3 to get adjustment.
Interest rate on $250 million debt issuance if the debt issuance had been made in the first quarter of 2009 and if the rate had not been influenced by unregulated activities.		
APPROPRIATE REGULATORY INTEREST RATE ON $250 MILLION DEBT ISSED ON 11/25/08	5.31%	

INTEREST RATE ON 30-YEAR TREASURY BONDS

11/2/2004		4.33
11/3/2004		4.2
11/4/2004		4.13
11/5/2004		4.19
11/6/2004		4.25
11/9/2004		4.21
11/10/2004	ND	
11/11/2004		4.17
11/12/2004		4.34
11/13/2004		4.22
11/16/2004		4.2
11/17/2004		4.14
11/18/2004		3.96
11/19/2004		3.64
11/20/2004		3.7
11/23/2004		3.78
11/24/2004		3.63
11/25/2004		3.54
11/26/2004	ND	
11/27/2004		3.45
11/30/2004		3.22
12/1/2004		3.18
12/2/2004		3.17
12/3/2004		3.06
12/4/2004		3.11
12/7/2004		3.16
12/8/2004		3.06
12/9/2004		3.09
12/10/2004		3.07
12/11/2004		3.07
12/14/2004		2.98
12/15/2004		2.86
12/16/2004		2.66
12/17/2004		2.53
12/18/2004		2.55
12/21/2004		2.6
12/22/2004		2.63
12/23/2004		2.63
12/24/2004	ND	
12/25/2004		2.61
12/28/2004		2.63
12/29/2004		2.58
12/30/2004		2.69
12/31/2004	ND	
1/1/2005		2.83
1/4/2005		3

1/5/2005		3.04
1/6/2005		3.05
1/7/2005		3.04
1/8/2005		3.04
1/11/2005		2.99
1/12/2005		3
1/13/2005		2.89
1/14/2005		2.86
1/15/2005		2.89
1/18/2005	ND	
1/19/2005		2.97
1/20/2005		3.15
1/21/2005		3.25
1/22/2005		3.32
1/25/2005		3.39
1/26/2005		3.26
1/27/2005		3.44
1/28/2005		3.57
1/29/2005		3.58
2/1/2005		3.47
2/2/2005		3.64
2/3/2005		3.65
2/4/2005		3.63
2/5/2005		3.7
2/8/2005		3.69
2/9/2005		3.54
2/10/2005		3.45
2/11/2005		3.47
2/12/2005		3.68
2/15/2005	ND	
2/16/2005		3.47
2/17/2005		3.54
2/18/2005		3.68
2/19/2005		3.56
2/22/2005		3.53
2/23/2005		3.49
2/24/2005		3.59
2/25/2005		3.66
2/26/2005		3.71
3/1/2005		3.64
3/2/2005		3.67
3/3/2005		3.69
3/4/2005		3.51
3/5/2005		3.5
3/8/2005		3.59
3/9/2005		3.7
3/10/2005		3.67
3/11/2005		3.63
3/12/2005		3.66
3/15/2005		3.76
3/16/2005		3.83
3/17/2005		3.57
3/18/2005		3.62
3/19/2005		3.65
3/22/2005		3.69
3/23/2005		3.6
3/24/2005		3.73
3/25/2005		3.66
3/26/2005		3.62
3/29/2005		3.6
3/30/2005		3.56
AVERAGE FROM 1/1/09 THROUGH 3/31/09		3.46
ACTUAL ON 11/25/08		3.63
DIFFERENCE		**-0.17**
CHANGE IN SPREAD BETWEEN UTILITY BONDS AND TREASURY BONDS		**-0.25** [A]
Estimated change in interest rate if Delmarva had Waited to issue $250 million of debt until first quarter of 2009		**-0.42**

Source: Downloaded from U.S. Federal Reserve website.

GROUP OF ELEVEN COMBINATION ELECTRIC AND GAS UTILITY COMPANIES
SELECTED BY COMPANY WITNESS
DISCOUNTED CASH FLOW (DCF) INDICATED COST OF EQUITY

			BASED ON AVERAGE MARKET PRICE FOR Year Ending 8/31/10	BASED UPON MARKET PRICE AS OF 8/30/2010
1	Dividend Yield On Market Price	[B]	4.96%	4.60%
2	Retention Ratio:			
	a) Market-to-book	[B]	1.38	1.46
	b) Div. Yld on Book	[C]	6.84%	6.74%
	c) Return on Equity	[A]	10.00%	10.00%
	d) Retention Rate	[D]	31.80%	32.64%
3	Reinvestment Growth	[E]	3.16%	3.26%
4	New Financing Growth	[F]	0.76%	0.93%
5	Total Estimate of Investor Anticipated Growth	[G]	3.92%	4.19%
6	Increment to Dividend Yield for Growth to Next Year	[H]	0.10%	0.10%
7	**Indicated Cost of Equity**	[I]	8.98%	8.89%

Some of the Considerations for determining Future Expected Return on Equity:

		Median	Mean	Source:
[A]	Value Line Expectation	10.00%	10.45%	Schedule JAR 3, Page 2
	Return on Equity to Achieve Zacks' Growth	9.17%	9.58%	Schedule JAR 3, Page 3
	Earned Return on Equity in 2009	8.79%	9.43%	Schedule JAR 3, Page 2
	Earned Return on Equity in 2008	10.19%	9.62%	Schedule JAR 3, Page 2
	Earned Return on Equity in 2007	11.04%	10.73%	Schedule JAR 3, Page 2

[B] Schedule JAR 3, Page 1
[C] Line 1 x Line 2a
[D] 1- Line 2b/Line 2c
[E] Line 2c x Line 2d
[F] S X V

(M/B X (Ext. Fin Rate+1)/(M/B + Ext. Fin. Rate-1) Ext. Fin. rate used = 2.00% [J]

[G] Line 3 + Line 4
[H] Line 1 x one-half of line 5
[I] Line 1 + Line 5 + Line 6
[J] SCHEDULE JAR 6, Page 2

GROUP OF SEVEN GAS DISTRIBUTION COMPANIES
SELECTED BY COMPANY WITNESS
DISCOUNTED CASH FLOW (DCF) INDICATED COST OF EQUITY

			BASED ON AVERAGE MARKET PRICE FOR Year Ending 8/31/10	BASED UPON MARKET PRICE AS OF 8/30/2010
1	Dividend Yield On Market Price	[B]	3.96%	3.78%
2	Retention Ratio:			
	a) Market-to-book	[B]	1.80	1.87
	b) Div. Yld on Book	[C]	7.13%	7.08%
	c) Return on Equity	[A]	11.80%	11.80%
	d) Retention Rate	[D]	39.54%	40.02%
3	Reinvestment Growth	[E]	4.67%	4.72%
4	New Financing Growth	[F]	1.00%	1.09%
5	Total Estimate of Investor Anticipated Growth	[G]	5.67%	5.82%
6	Increment to Dividend Yield for Growth to Next Year	[H]	0.11%	0.11%
7	**Indicated Cost of Equity**	[I]	9.74%	9.70%

Some of the Considerations for determining Future Expected Return on Equity:

		Median	Mean	Source:
[A]	Value Line Expectation	11.50%	12.29%	Schedule JAR 3, Page 2
	Return on Equity to Achieve Zacks' Growth	10.57%	11.32%	Schedule JAR 3, Page 3
	Earned Return on Equity in 2009	12.85%	12.20%	Schedule JAR 3, Page 2
	Earned Return on Equity in 2008	12.37%	12.00%	Schedule JAR 3, Page 2
	Earned Return on Equity in 2007	11.75%	11.31%	Schedule JAR 3, Page 2
[B]	Schedule JAR 3, Page 1			
[C]	Line 1 x Line 2a			
[D]	1- Line 2b/Line 2c			
[E]	Line 2c x Line 2d			
[F]	S X V			
	[M/B X (Ext. Fin Rate+1]/(M/B + Ext. Fin. Rate-1)	Ext. Fin. rate used =	1.25%	[J]
[G]	Line 3 + Line 4			
[H]	Line 1 x one-half of line 5			
[I]	Line 1 + Line 5 + Line 6			

EXTERNAL FINANCING RATE
(Millions of Shares)

Proxy Group of Seven Natural Gas Distribution Companies		**Common Stock Outstanding 2009**	**20013-15**	**Compound Annual**
Laclede Group, Inc.	LG	22.17	26.00	4.06%
New Jersey Resources Corp.	NJR	41.59	40.00	-0.97%
Northwest Natural Gas Co.	NWN	26.53	27.80	1.18%
Piedmont Natural Gas Co.	PNY	73.27	69.00	-1.49%
South Jersey Industries	SJI	29.80	34.00	3.35%
Southwest Gas Corporation	SWX	45.09	50.00	2.62%
WGL Holdings, Inc.	WGL	50.14	50.00	-0.07%
			Average	1.24%
Source:	Most current Value Line at time of prep. of schedule		Median	1.18%
			Round to	**1.25%**

Proxy Group of Eleven Combination Gas and Electric Companies		**Common Stock Outstanding 2009**	**20013-15**	**Compound Annual**
ALLETE	ALE	35.20	38.50	2.27%
Alliant Energy	LNT	110.66	116.00	1.19%
Black Hills Corp.	BKH	38.97	40.25	0.81%
Con. Edison	ED	281.12	287.00	0.52%
DTE Energy Co.	DTE	165.40	178.00	1.85%
Empire Ditrict	EDE	38.11	42.00	2.46%
NSTAR	NST	106.81	101.00	-1.39%
PG&E Corp.	PCG	370.60	400.00	1.93%
SCANA Corp.	SCG	123.00	147.00	4.56%
Wisconsin Energy	WEC	116.91	116.90	0.00%
Xcel Energy Inc.	XEL	457.57	493.00	1.88%
			Average	1.46%
Source:	Most current Value Line at time of prep. of schedule		Median	1.85%
			Round to	**2.00%**

Schedule JAR 7

CAPITAL STRUCTURE RATIOS

						Quantity						Percentage			
Proxy Group of Seven Natural Gas Distribution Companies		**% Common Equity w/out Short Term Debt**				***($000,000s)***									
		2006	**2007**	**2008**	**2009**	**Total Debt**	**LT Debt**	**ST Debt**	**Pfd Stock**	**Equity**	**Total Capital**	**LT Debt**	**ST Debt**	**Pfd Stock**	**Equity Ratio With ST Debt**
Laclede Group, Inc.	LG	50.4%	54.6%	55.5%	57.1%	$ 504.3	$ 364.3	$ 140.0	$ -	$ 484.9	$ 989.2	36.8%	14.2%	0.0%	**49.0%**
New Jersey Resources Corp.	NJR	65.2%	62.7%	61.5%	60.2%	$ 562.4	$ 436.5	$ 125.9	$ -	$ 660.2	$ 1,222.6	35.7%	10.3%	0.0%	**54.0%**
Northwest Natural Gas Co.	NWN	53.7%	53.7%	55.1%	52.3%	$ 732.7	$ 601.7	$ 131.0	$ -	$ 659.7	$ 1,392.4	43.2%	9.4%	0.0%	**47.4%**
Piedmont Natural Gas Co.	PNY	51.7%	51.6%	52.8%	55.9%	$ 1,085.3	$ 732.3	$ 353.0	$ -	$ 928.2	$ 2,013.5	36.4%	17.5%	0.0%	**46.1%**
South Jersey Industries	SJI	16.3%	12.8%	13.1%	13.1%	$ 495.4	$ 326.4	$ 169.0	$ -	$ 49.2	$ 544.6	59.9%	31.0%	0.0%	**9.0%**
Southwest Gas Corporation	SWX	39.4%	41.9%	44.7%	46.5%	$ 1,123.1	$ 1,121.8	$ 1.3	$ -	$ 975.0	$ 2,098.1	53.5%	0.1%	0.0%	**46.5%**
WGL Holdings, Inc.	WGL	60.4%	60.3%	62.4%	65.0%	$ 804.2	$ 591.6	$ 212.6	$ 28.2	$ 1,151.1	$ 1,983.5	29.8%	10.7%	1.4%	**58.0%**
Average		**48.2%**	**48.2%**	**49.3%**	**50.0%**	**$758.2**	**$596.4**	**$161.8**	**$4.0**	**$701.2**	**$1,463.4**	**42.19%**	**13.31%**	**0.20%**	**44.29%**
											Median	**36.83%**	**10.72%**	**0.00%**	**47.38%**

Source: Most current Value Line at time of prep.

Schedule JAR 7, Page 2

						Quantity						Percentage			
Proxy Group of Eleven Combination Gas and Electric Companies		**% Common Equity w/out Short Term Debt**				***($000,000s)***									
		2006	**2007**	**2008**	**2009**	**Total Debt**	**LT Debt**	**ST Debt**	**Pfd Stock**	**Equity**	**Total Capital**	**LT Debt**	**ST Debt**	**Pfd Stock**	**Equity Ratio With ST Debt**
ALLETE	ALE	64.9%	64.4%	58.4%	57.2%	$ 713.4	$ 710.1	$ 3.3	$ -	$ 949.0	$ 1,662.4	42.7%	0.2%	0.0%	**57.1%**
Alliant Energy	LNT	62.9%	61.9%	58.6%	51.2%	$ 2,756.5	$ 2,204.7	$ 551.8	$ 243.8	$ 2,568.9	$ 5,569.2	39.6%	9.9%	4.4%	**46.1%**
Black Hills Corp.	BKH	55.7%	63.2%	67.7%	57.6%	$ 1,240.9	$ 993.5	$ 247.4	$ -	$ 1,349.7	$ 2,590.6	38.4%	9.6%	0.0%	**52.1%**
Con. Edison	ED	48.5%	53.1%	51.2%	51.0%	$ 10,857.0	$ 10,552.0	$ 305.0	$ 213.0	######	$ 22,274.4	47.4%	1.4%	1.0%	**50.3%**
DTE Energy Co.	DTE	43.9%	45.6%	43.6%	46.0%	$ 7,972.0	$ 7,295.0	$ 677.0	$ -	$ 6,214.3	$ 14,186.3	51.4%	4.8%	0.0%	**43.8%**
Empire Ditrict	EDE	50.3%	49.9%	46.4%	48.4%	$ 719.8	$ 639.9	$ 79.9	$ -	$ 600.2	$ 1,320.0	48.5%	6.1%	0.0%	
NSTAR	NST	39.7%	40.1%	42.8%	48.2%	$ 2,787.3	$ 2,341.7	$ 445.6	$ 43.0	$ 2,219.0	$ 5,049.3	46.4%	8.8%	0.9%	**43.9%**
PG&E Corp.	PCG	46.8%	46.1%	46.5%	47.4%	$ 13,095.0	$ 10,612.0	$ -	$ 252.0	$ 9,790.0	$ 20,654.0	51.4%	0.0%	1.2%	**47.4%**
SCANA Corp.	SCG	47.2%	49.7%	40.5%	43.2%	$ 4,881.0	$ 4,021.0	$ 860.0	$ -	$ 3,058.2	$ 7,939.2	50.6%	10.8%	0.0%	**38.5%**
Wisconsin Energy	WEC	48.2%	49.2%	44.8%	47.7%	$ 4,916.8	$ 4,396.1	$ 520.7	$ 30.4	$ 4,037.2	$ 8,984.4	48.9%	5.8%	0.3%	**44.9%**
Xcel Energy Inc.	XEL	47.0%	49.4%	47.1%	47.7%	$ 8,873.2	$ 7,862.9	$ 1,010.3	$ 105.0	$ 7,267.1	$ 16,245.3	48.4%	6.2%	0.6%	**44.7%**
Average		**50.5%**	**52.1%**	**49.8%**	**49.6%**	**$ 5,347**	**$ 4,694**	**$ 427**	**$ 81**	**$ 4,478**	**$ 9,680**	**46.70%**	**5.77%**	**0.76%**	**46.90%**
											Median	**48.40%**	**6.05%**	**0.34%**	**45.53%**

Source: Most current Value Line at time of prep.

CAPM SUMMARY OF RESULTS

		Results as of 8/30/2010
1	Market Based CAPM	8.11% [A]
2	Traditional CAPM	7.84% [B]
3	Average (Market Based and Traditional)	7.98% [C]

Source:

[A] Schedule JAR 8, Page 4
[B] Schedule JAR 8, Page 3
[C] Average of Line 1 and 2

ADJUSTMENT TO CAPM TO MAKE RESULT APPLICABLE TO CURRENT FINANCIAL MARKET

1	**PREMIUM TO ACCOUNT FOR GREAT RECESSION**			
a.	Recent Spread of BB Corp Bond Yield Over 20-Year US Treasury Bonds	5.10% [A]		
b.	Average Spread of BB Corp Bond over 20-year US Treasuries Over 8 Year Period Ending November 2008	3.50% [A]		
c.	Premium to Account for Great Recession			1.60%
2	**ADJUSTMENT FOR CURRENT INTEREST RATE ENVIRONMENT**			
	Current Risk Free Rate Based on Historical Normalized Interest Rate Adjusted for Inflation Expectations:			
a.	Interest Rate on 30-Year Treasury Bonds	3.52% [B]		
b.	Interest Rate on Long-Term Inflation Indexed Treasury Bonds	1.60% [B]		
c.	Current Market Inflation Expectation		1.92% [C]	
d.	Historical Actual Inflation		3.00% [D]	
e.	Current Risk Free Rate Based on Historical Normalized Interest Rate Adjusted for Inflation Expectations		-1.08%	
	Current Risk Free Rate Based on Normal Difference Between LT and ST treasuries:			
f.	Current Yield of 30-Year US Treasury Bonds		3.52% [B]	
g.	Average Return on Long-Term U.S. Treasury Bonds From 1926 to 2009	5.40% [D]		
h.	Average Return on Short-Term U.S. Treasury Bills from 1926 to 2009	3.70% [D]		
I.	Average Maturity Premium		1.70%	
j.	Current Risk Free Rate Based on Normal Difference Between LT and ST treasuries		1.82%	
k.	Historical Risk Free rate		3.70% [D]	
l.	Current Risk Free Rate Based on Normal Difference Between LT and ST treasuries:		-1.88%	
m.	**Adjustment for Current Interest Rate Environment**			-1.48% [E]
3	**TOTAL ADJUSTMENT TO CAPM METHODS TO MAKE RESULT APPLICABLE TO CURRENT FINANCIAL MARKET**			0.12% [F]

Sources:
[A] Response to PSC-COC-39, Page 3
[B] August 31, 2010 -- Federal Reserve Statiscial Release
www.federalreserve.gov/releases/h15/data.htm
[C] Line 2a - Line 2b
[D] Ibbotson "SBBI" 2010 Classic Yearbook, Page 28
[E] Average of Adjustment for Inflation and Adjustment for Difference Between LT and ST Treasuries
[F] Premium to Account for Great Recession - Adjustment for Current Interest Rate Environment

COMBINATION OF GAS & ELECTRIC UTILITIES

TRADITIONAL CAPM
BASED ON HISTORICAL ACTUAL COMPOUND ANNUAL RETURNS
FROM 1926-2008 AND ADJUSTED FOR MARKET CONDITIONS AS OF
8/30/2010

		Gas Companies	Combination Gas and Electric Companies	
1	Historical Actual Return on Large Company Stocks from 1926-2009	9.8%	9.8%	[A]
2	Average Return on Short-Term U.S. Treasury Bills	3.7%	3.7%	[A]
3	Risk Prium Stocks vs Treasury Bills	6.10%	6.10%	Line 1 x Line 2
4	Beta	0.64	0.68	[B]
5	Risk Prium Based on Comparative Group	3.88%	4.16%	Line 3 X Line 4
6	Average Return on Short-Term U.S. Treasury Bills	3.70%	3.70%	[A]
7	Adjustment to Make Resuts Applicable to Current Market	0.12%	0.12%	[C]
8	Indicated Cost of Equity for Portfolio of Companies with a beta of 0.72	7.70%	7.98%	
9	AVERAGE		7.84%	

Sources:
[A] *Ibbotson SBBI 2010 Classic Yearbook,* page 28
[B] Schedule JAR 3, Page 3
[C] Schedule JAR 8, Page 2

MARKET BASED CAPM

HISTORIC ACTUAL COMPOUND RETURNS FROM 1926-2009
BY BETA

	Portfolio by Size Decile	1	2	3	4	5	6	7	8	9	10
[A]	Beta	0.91%	1.03%	1.10%	1.12%	1.16%	1.18%	1.24%	1.30%	1.35%	1.41%
[B]	Historic Actual Compounded Annual Return	9.1%	10.4%	10.7%	10.7%	11.3%	11.2%	11.2%	11.4%	11.5%	13.1%

[D] Least Squared Line Derived from compouned annual returns returns per decile

Beta	Slope	Y-Intercept	Return
1	6.1625	3.79	9.95%

Least Squared Line

	Beta	Slope	Y-Intercept	Return
[D]	0.68	6.1625	3.79	7.99%

Historical Return for Companies with Beta of	0.68 [E]	7.99%
Adjustment to Make Resuts Applicable to Current Market		0.12% [F]
		8.11%

Sources:
[A] Ibbotson "SBBI" 2009 Classic Yearbook, Page 115
Ibbotson did no provide betas per decilde in their 2010 addition.
[B] Ibbotson Associates 2010 Yearbook, page 86
[C] by 1.08% actual difference between 3.00% historical and 1.92%
current expected long-term inflation rate.
[D] Trend Line Equation. See JAR Schedule 8, Page 6
[E] Schedule JAR 3, Page 3
[F] Schedule JAR 8, Page 2

Schedule JAR 9

Value Line Annual Total Return Projections
for each of Mr. Hanley's Proxy Group Companies

		Low	High	Midpoint	VL EPS GROWTH	VL DPS GROWTH	VL BOOK VALUE GROWTH
GAS DISTRIBUTON:	Laclede Group	10.00%	18.00%	14.00%	2.50%	2.50%	4.00%
	New Jersey Resources	7.00%	12.00%	9.50%	6.50%	5.50%	4.50%
	N.W. Natural Gas	6.00%	11.00%	8.50%	4.50%	5.50%	4.00%
	Piedmont Natural Gas	9.00%	16.00%	12.50%	3.50%	3.50%	3.00%
	South Jersey Industries	2.00%	9.00%	5.50%	7.00%	6.00%	5.50%
	Southwest Gas	7.00%	17.00%	12.00%	8.00%	5.00%	5.00%
	WGL Holdings	6.00%	12.00%	9.00%	2.50%	3.00%	4.00%
ELECTRIC AND GAS:	Allete	2.00%	9.00%	5.50%	-0.50%	1.00%	2.50%
	Alliant Energy	9.00%	17.00%	13.00%	7.00%	5.50%	3.50%
	Black Hills Corp.	3.00%	9.00%	6.00%	6.50%	2.50%	2.50%
	Con Edison	6.00%	10.00%	8.00%	2.50%	1.00%	3.00%
	DTE Energy	5.00%	13.00%	9.00%	7.00%	3.00%	4.00%
	Empire District	9.00%	13.00%	11.00%	7.00%	1.00%	1.50%
	Nstar	7.00%	12.00%	9.50%	5.50%	6.00%	4.50%
	PG&E Corp	6.00%	12.00%	9.00%	7.00%	7.50%	6.50%
	SCANA Corp.	7.00%	12.00%	9.50%	3.50%	1.50%	5.00%
	Wisconsin Energy	8.00%	15.00%	11.50%	8.00%	13.00%	6.00%
	Xcel Energy	4.00%	13.00%	8.50%	5.50%	3.50%	4.50%
	Average, Both Groups	**6.28%**	**12.78%**	**9.53%**	**5.19%**	**4.25%**	**4.08%**
	Gas Distdribution Average	6.71%	13.57%	10.14%	4.93%	4.43%	4.29%
	Electric and Gas Average	6.00%	12.27%	9.14%	5.36%	4.14%	3.95%

Source: Schedule FJH-12, pages 2-19.

APPENDIX A

TESTIFYING EXPERIENCE OF JAMES A. ROTHSCHILD

ALABAMA

Continental Telephone of the South; Docket No. 17968, Rate of Return, January, 1981

ARIZONA

Southwest Gas Corporation; Rate of Return, Docket No. U-1551-92-253, March, 1993
Sun City West Utilities; Accounting, January, 1985

CONNECTICUT

Aquarion Water Company, Docket No. 04-02-14, Rate of Return, June 2004
Connecticut American Water Company; Docket No. 800614, Rate of Return, September, 1980
Connecticut American Water Company, Docket No. 95-12-15, Rate of Return, February, 1996
Connecticut Light & Power Company; Docket No. 85-10-22, Accounting and Rate of Return, February, 1986
Connecticut Light & Power Company; Docket No. 88-04-28, Gas Divestiture, August, 1988
Connecticut Light & Power Company, Docket No. 97-05-12, Rate of Return, September, 1997
Connecticut Light & Power Company, Docket No. 98-01-02, Rate of Return, July, 1998
Connecticut Light & Power Company, Docket No. 99-02-05, Rate of Return, April, 1999
Connecticut Light & Power Company, Docket No. 99-03-36, Rate of Return, July, 1999
Connecticut Light & Power Company, Docket No. 98-10-08 RE 4, Financial Issues, September 2000
Connecticut Light & Power Company, Docket No. 00-05-01, Financial Issues, September, 2000
Connecticut Light & Power Company, Docket No. 01-07-02, Capital Structure, August, 2001
Connecticut Light & Power Company, Docket No. 03-07-02 , Rate of Return, October, 2003
Connecticut Natural Gas; Docket No. 780812, Accounting and Rate of Return, March, 1979
Connecticut Natural Gas; Docket No. 830101, Rate of Return, March, 1983
Connecticut Natural Gas; Docket No. 87-01-03, Rate of Return, March, 1987
Connecticut Natural Gas, Docket No. 95-02-07, Rate of Return, June, 1995
Connecticut Natural Gas, Docket No. 99-09-03, Rate of Return, January, 2000
Southern Connecticut Gas, Docket No. 97-12-21, Rate of Return, May, 1998
Southern Connecticut Gas, Docket No. 99-04-18, Rate of Return, September, 1999
United Illuminating Company; Docket No. 89-08-11:ES:BBM, Financial Integrity and Financial Projections, November, 1989.
United Illuminating Company; Docket No. 99-02-04, Rate of Return, April, 1999
United Illuminating Company, Docket No. 99-03-35, Rate of Return, July, 1999
United Illuminating Company, Docket No. 01-10-10-DPUC, Rate of Return, March 2002

DELAWARE

Artesian Water Company, Inc.; Rate of Return, December, 1986
Artesian Water Company, Inc.; Docket No. 87-3, Rate of Return, August, 1987
Delmarva Power and Light Company, Docket No. 09-414, 09-276T. Rate of Return, February 2010.

Diamond State Telephone Company; Docket No. 82-32, Rate of Return, November, 1982
Diamond State Telephone Company; Docket No. 83-12, Rate of Return, October, 1983
Wilmington Suburban Water Company; Rate of Return Report, September, 1986
Wilmington Suburban Water Company; Docket No. 86-25, Rate of Return, February, 1987

FEDERAL ENERGY REGULATORY COMMISSION (FERC)

Koch Gateway Pipeline Company, Docket No. RP97-373-000 Cost of Capital, December, 1997
Maine Yankee Atomic Power Company, Docket No. EL93-22-000, Cost of Capital, July, 1993
New England Power Company; CWIP, February, 1984. Rate of return.

New England Power Company; Docket No.ER88-630-000 & Docket No. ER88-631-000, Rate of Return, April, 1989
New England Power Company; Docket Nos. ER89-582-000 and ER89-596-000, Rate of Return, January, 1990
New England Power Company: Docket Nos. ER91-565-000, ER91-566-000 , FASB 106, March, 1992. Rate of Return.
Philadelphia Electric Company - Conowingo; Docket No. EL-80-557/588, July, 1983. Rate of Return.
Ocean State Power Company, Ocean States II Power Company, Docket No. ER94-998-000 and ER94-999-000, Rate of Return, July, 1994.
Ocean State Power Company, Ocean States II Power Company, Docket No ER 95-533-001 and Docket No. ER-530-001, Rate of Return, June, 1995 and again in October, 1995.
Ocean State Power Company, Ocean State II Power Company, Docket No. ER96-1211-000 and ER96-1212-000, Rate of Return, March, 1996.
Southern Natural Gas, Docket No. RP93-15-000. Rate of Return, August, 1993, and revised testimony December, 1994.
Transco, Docket No. RP95-197-000, Phase I, August, 1995. Rate of Return.

Transco, Docket Nos. RP-97-71-000 and RP97-312-000, June, 1997, Rate of Return.

FLORIDA

Alltel of Florida; Docket No. 850064-TL, Accounting, September, 1985
Aqua America, Docket No. 060368, Rate of Return, August 2007.
Aqua America, Docket No. 080121-WS, Rate of Return, October,2008
Florida Power & Light Company; Docket No. 810002-EU, Rate of Return, July, 1981
Florida Power & Light Company; Docket No. 82007-EU, Rate of Return, June, 1982
Florida Power & Light Company; Docket No. 830465-EI, Rate of Return and CWIP, March, 1984
Florida Power & Light Company, Docket No. , Rate of Return, March 2002
Florida Power Corporation; Docket No. 830470-EI, Rate Phase-In, June, 1984
Florida Power Corp.; Rate of Return, August, 1986
Florida Power Corp.; Docket No. 870220-EI, Rate of Return, October, 1987
Florida Power Corp; Docket No. 000824-EI, Rate of Return, January, 2002
GTE Florida, Inc.; Docket No. 890216-TL, Rate of Return, July, 1989
Gulf Power Company; Docket No. 810136-EU, Rate of Return, October, 1981
Gulf Power Company; Docket No. 840086-EI, Rate of Return, August, 1984
Gulf Power Company; Docket No. 881167-EI, Rate of Return, 1989
Gulf Power Company; Docket No. 891345-EI, Rate of Return, 1990

Gulf Power Company; Docket No.010949-EI, Rate of Return, December 2001
Leverage Graph, Docket 080006-WS, October 1, 2008.
Rolling Oaks Utilities, Inc.; Docket No. 850941-WS, Accounting, October, 1986
Southern Bell Telephone Company; Docket No. 880069-TL, Rate of Return, January, 1992
Southern Bell Telephone Company, Docket No. 920260-TL, Rate of Return, November, 1992
Southern Bell Telephone Company, Docket No. 90260-TL, Rate of Return, November, 1993
Southern States Utilities, Docket No. 950495-WS, Rate of Return, April, 1996
Tampa Electric Company; Docket No. 820007-EU, Rate of Return, June, 1982
Tampa Electric Company; Docket No. 830012-EU, Rate of Return, June, 1983
United Telephone of Florida; Docket No. 891239-TL, Rate of Return, November, 1989
United Telephone of Florida; Docket No. 891239-TL, Rate of Return, August, 1990
Water and Sewer Utilities, Docket No 880006-WS, Rate of Return, February, 1988.

GEORGIA

Georgia Power Company; Docket No. 3397-U, Accounting, July, 1983
BellSouth; Docket No. 14361-U, Rate of Return Rebuttal Testimony, October 2004.

ILLINOIS

Ameritech Illinois, Rate of Return and Capital Structure, Docket 96-0178, January and July, 1997.
Central Illinois Public Service Company; ICC Docket No. 86-0256, Financial and Rate of Return, October, 1986.
Central Telephone Company of Illinois, ICC Docket No. 93-0252, Rate of Return, October, 1993.
Commonwealth Edison Company; Docket No. 85CH10970, Financial Testimony, May, 1986.
Commonwealth Edison Company; Docket No. 86-0249, Financial Testimony, October, 1986.
Commonwealth Edison Company; ICC Docket No. 87-0057, Rate of Return and Income Taxes, April 3, 1987.
Commonwealth Edison Company; ICC Docket No. 87-0043, Financial Testimony, April 27, 1987.
Commonwealth Edison Company; ICC Docket Nos. 87-0169, 87-0427,88-0189,880219,88-0253 on Remand, Financial Planning Testimony, August, 1990.
Commonwealth Edison Company; ICC Docket Nos. 91-747 and 91-748; Financial Affidavit, March, 1991.
Commonwealth Edison Company; Financial Affidavit, December, 1991.
Commonwealth Edison Company, ICC Docket No. 87-0427, Et. Al., 90-0169 (on Second Remand), Financial Testimony, August, 1992.
Genesco Telephone Company, Financial Testimony, July, 1997.
GTE North, ICC Docket 93-0301/94-0041, Cost of Capital, April, 1994
Illinois Power Company, Docket No. 92-0404, Creation of Subsidiary, April, 1993
Illinois Bell Telephone Company, Dockets No. ICC 92-0448 and ICC _____, Rate of Return, July, 1993
Northern Illinois Gas Company; Financial Affidavit, February, 1987.
Northern Illinois Gas Company; Docket No. 87-0032, Cost of Capital and Accounting Issues, June, 1987.
Peoples Gas Light and Coke Company; Docket No. 90-0007, Accounting Issues, May, 1990.

KENTUCKY

Kentucky- American Water Company, Case No. 97-034, Rate of Return, June, 1997.
Kentucky Power Company; Case No. 8429, Rate of Return, April, 1982.
Kentucky Power Company; Case No. 8734, Rate of Return and CWIP, June, 1983.
Kentucky Power Company; Case No. 9061, Rate of Return and Rate Base Issues, September, 1984.
West Kentucky Gas Company, Case No. 8227, Rate of Return, August, 1981.

MAINE

Bangor Hydro-Electric Company; Docket No. 81-136, Rate of Return, January, 1982.
Bangor Hydro-Electric Company; Docket No. 93-62, Rate of Return, August, 1993
Maine Public Service Company; Docket No. 90-281, Accounting and Rate of Return, April, 1991.

MARYLAND

C & P Telephone Company; Case No. 7591, Fair Value, December, 1981

MASSACHUSETTS

Boston Edison Company; Docket No. DPU 906, Rate of Return, December, 1981
Fitchburg Gas & Electric; Accounting and Finance, October, 1984
Southbridge Water Company; M.D.P.U., Rate of Return, September, 1982

MINNESOTA

Minnesota Power & Light Company; Docket No. EO15/GR-80-76, Rate of Return, July, 1980

NEW JERSEY

Atlantic City Sewage; Docket No. 774-315, Rate of Return, May, 1977
Atlantic City Electric Company, Docket Nos. EO97070455 and EO97070456, Cost of Capital, Capital Cost Allocation, and Securitization, December, 1997.
Atlantic City Electric Company, Docket Nos. ER 8809 1053 and ER 8809 1054, Rate of Return, April, 1990
Atlantic City Electric Company, Securitization, 2002
Atlantic City Electric Company, BPU Docket No. ER03020121, Securitization, August, 2003
Bell Atlantic, Affidavit re Financial Issues regarding merger with GTE, June, 1999.
Bell Atlantic-New Jersey, Docket No. TO99120934, Financial Issues and Rate of Return, August 2000
Consumers New Jersey Water Company, BPU Docket No. WR00030174, September 2000
Conectiv/Pepco Merger, BPU Docket No. EM01050308, Financial Issues, September 2001
Elizabethtown Gas Company. BRC Docket No. GM93090390. Evaluation of proposed merger with Pennsylvania & Southern Gas Co. April, 1994
Elizabethtown Water Company; Docket No. 781-6,Accounting, April, 1978
Elizabethtown Water Company; Docket No. 802-76, Rate of Return, January, 1979
Elizabethtown Water Company; Docket No. PUC 04416-90, BPU Docket No. WR90050497J, Rate of Return and Financial Integrity, November, 1990.

Elizabethtown Water Company; Docket No. WR 9108 1293J, and PUC 08057-91N, Rate of Return and Financial Integrity, January, 1992.
Elizabethtown Water Company, Docket No. WR 92070774J, and PUC 06173-92N, Rate of Return and Financial Integrity, January, 1993.
Elizabethtown Water Company, Docket No. BRC WR93010007, OAL No. PUC 2905-93, Regulatory treatment of CWIP. May, 1993.
Elizabethtown Water Company, BPU Docket No. WR 95110557, OAL Docket No. PUC 12247-95, Rate of Return, March, 1996.
Elizabethtown Water Company, BPU Docket No. WR01040205, Cost of Capital, September 2001.
Elizabethtown Water Company, BPU Docket No. WR060307511, Cost of Capital, December 2003.
Essex County Transfer Stations; OAL Docket PUC 03173-88, BPU Docket Nos. SE 87070552 and SE 87070566, Rate of Return, October, 1989.
GPU/FirstEnergy proposed merger; Docket No. EM 00110870, Capital Structure Issues, April 2001
GPU/FirstEnergy securitization financing, Docket No.EF99080615, Financial issues, January 2002
Hackensack Water Company; Docket No. 776-455, October, 1977 and Accounting, February, 1979
Hackensack Water Company; Docket No. 787-847, Accounting and Interim Rate Relief, September, 1978
Hackensack Water Company; AFUDC & CWIP, June, 1979
Hackensack Water Company; Docket No. 804-275, Rate of Return, September, 1980
Hackensack Water Company; Docket No. 8011-870, CWIP, January, 1981
Inquiry Into Methods of Implementation of FASB-106, Financial Issues, BPU Docket No. AX96070530, September, 1996
Jersey Central Power & Light Company, Docket No. EO97070459 and EO97070460, Cost of Capital, Capital Cost Allocation, and Securitization, November 1997
Jersey Central Power & Light Company, Docket No. EF03020133, Financial Issues, January 2004.
Middlesex Water Company; Docket No. 793-254, Tariff Design, September, 1978
Middlesex Water Company; Docket No. 793-269, Rate of Return, June, 1979
Middlesex Water Company; Docket No. WR890302266-J, Accounting and Revenue Forecasting, July, 1989
Middlesex Water Company; Docket No. WR90080884-J, Accounting, Revenue Forecasting, and Rate of Return, February, 1991
Middlesex Water Company, Docket No. WR92070774-J, Rate of Return, January, 1993
Middlesex Water Company, Docket No. WR00060362, Rate of Return, October, 2000
Mount Holly Water Company; Docket No. 805-314, Rate of Return, August, 1980
Mount Holly Water Company, Docket No. WR0307059, Rate of Return, December, 2003.
National Association of Water Companies; Tariff Design, 1977
Natural Gas Unbundling Cases, Financial Issues, August 1999
New Jersey American Water Company, BPU Docket No. WR9511, Rate of Return, September, 1995
New Jersey American Water Company buyout by Thames Water, BPU Docket WM01120833, Financial Issues, July 2002,
New Jersey American Water Company, BPU Docket No. WR03070510, Rate of Return, December 2003.
New Jersey Bell Telephone; Docket No. 7711-1047, Tariff Design, September, 1978

New Jersey Land Title Insurance Companies, Rate of Return and Accounting, August and November, 1985
New Jersey Natural Gas; Docket No. 7812-1681, Rate of Return, April, 1979
New Jersey Water Supply Authority, Ratemaking Issues, February, 1995
Nuclear Performance Standards; BPU Docket No. EX89080719, Nuclear Performance Standards policy testimony
Pinelands Water Company and Pinelands Wastewater Company, Rate of Return, BPU Dockets WR00070454 and WR00070455, October, 2000.
Public Service Electric & Gas Company, Docket No. EX9412058Y and EO97070463, Cost of Capital, Capital Cost Allocation, and Securitization, November 1997
Public Service Electric & Gas Company, BPU Docket No. GR01050328, OAL Docket No. PUC-5052-01, Cost of Capital, August, 2001.
Rockland Electric Company; Docket No. 795-413, Rate of Return, October, 1979
Rockland Electric Company, Docket Nos. EO97070464 and EO97070465, Cost of Capital, Capital Cost Allocation, and Securitization, January, 1998
Rockland Electric Company, Docket No. , Cost of Capital, January 2003
Rockland Electric Company, Docket No. EF02110852, Financial Issues, January, 2004.
Salem Nuclear Power Plant, Atlantic City Electric Company and Public Service Electric & Gas Company, Docket No. ES96030158 & ES96030159, Financial Issues, April, 1996.
South Jersey Gas Company; Docket No. 769-988, Accounting, February, 1977
South Jersey Gas Company, BRC Docket No. GU94010002, June, 1994
South Jersey Gas Company, BPU Docket No. GR00050295, February, 2004
United Artists Cablevision; Docket No. CTV-9924- 83, Rate of Return, April, 1984
Verizon, Rate of Return, BPU Docket No. TO 00060356, October, 2000
Verizon, Rate of Return, BPU Docket No. TO 01020095, May 2001
Verizon, Rate of Return, BPU Docket No. TO00060356, January 2004
West Keansburg Water Company; Docket No. 838-737, Rate of Return, December, 1983

NEW HAMPSHIRE

Verizon New Hampshire, DT 02-110, Rate of Return, January, 2003.
Working Capital Carrying Charge, Doicket DG-07-072. May 5, 2008.

NEW YORK

Consolidated Edison Company; Case No.27353, Accounting and Rate of Return, October, 1978
Consolidated Edison Company; Case No. 27744, Accounting and Rate of Return, August 1980
Generic Financing Case for Electric & Gas Companies; Case No. 27679, May, 1981
Long Island Lighting Company; Case No. 27136, Accounting and Rate of Return, June, 1977
Long Island Lighting Company; Case No. 27774, Rate of Return, November, 1980
Long Island Lighting Company; Case No. 28176 and 28177, Rate of Return and Revenue Forecasting, June, 1982
Long Island Lighting Company, Case No. 28553, Rate of Return and Finance, March, 1984
Long Island Lighting Company, Case No. 93-E-1123, Rate of Return and Finance, May, 1994
New York Telephone, Case No. 27469, April, 1979
New York Telephone, Case No. 27710, Accounting, September, 1981

NOVA SCOTIA

Nova Scotia Power Company, UARB 257-370, Rate of Return, March 2002
Nova Scotia Power Company, UARB 62-113, Rate of Return, October 2004.

OHIO

Columbia Gas Company of Ohio; Case No. 77-1428-GA-AIR, March, 1979
Columbia Gas Company of Ohio; Case No. 78-1118-GA-AIR, Accounting and Rate of Return, May, 1979
Ohio Utilities Company; Case No. 78-1421-WS-AIR, Rate of Return, September, 1979

OKLAHOMA

Oklahoma Natural Gas Company, Case PUD No. 94000047, Rate of Return, May, 1995

OREGON

PacifiCorp, Case UE 116, Rate of Return, May 2001
Portland General Electric, Case UE 102, Rate of Return, July 1998
Portland General Electric, Case UE 115, Rate of Return, May 2001
Northwest Natural Gas Company, Docket No. UG-132, July 1999

PENNSYLVANIA

Allied Gas, Et. Al., Docket No. R-932952, Rate of Return, May, 1994
ATTCOM - Pennsylvania; Docket No. P-830452, Rate of Return, April, 1984
Borough of Media Water Fund; Docket No. R-901725, Rate of Return, November 1990
Bethel and Mt. Aetna Telephone Company; Docket No. LR-770090452, Accounting and Rate of Return, January, 1978
Big Run Telephone Company; Docket No. R-79100968, Accounting and Rate of Return, November, 1980.
Bloomsburg Water Company; Docket Nos. R-912064 and R-912064C001-C003, Rate of Return, December, 1991.
Citizens Utilities Water Company of Pennsylvania and Citizens Utilities Home Water Company; Docket No. R-901663 and R-901664, Rate of Return, September, 1990
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APPENDIX B

Value Line's Estimation of Beta

The return on security I is regressed against the return on the New York Stock Exchange
Composite Index in the following form:

$$\text{Ln}\left(p^{I}_{t} / p^{I}_{t-1}\right) = a_{I} + B_{I} * \text{Ln}\left(p^{m}_{t} / p^{m}_{t-1}\right)$$

Where:

p^{I}_{t} - The price of security I at time t

p^{I}_{t-1} - The price of security I one week before time t

p^{m}_{t} and p^{m}_{t-1} are the corresponding values of the NYSE Composite Index.

The natural log of the price ratio is used as an approximation of the return and no adjustment is made for dividends paid during the week.

The regression estimate of beta, B_{I}, is computed from data over the past five years, so that 259 observations of weekly price changes are used.

Value Line adjusts its estimate of beta for regression bind described by Blume (1971). The reported beta is the adjusted beta computed as:

$$\text{Adjusted } B_{I} = 0.35 + .67 * B_{I}$$

M. Blume, "On the assessment of risk," Journal of Finance, March 1971

APPENDIX C

Financial Advisers and Fuzzy Math

By KAJA WHITEHOUSE
Dow Jones Newswires

Next time your financial adviser makes a prediction for an average rate of return during an investment pitch, you might want to doublecheck the math.

Some financial advisers rely too heavily on a formula known as arithmetic average, which can be misleading when investing for the long term. Financial advisers who use this formula may be overstating your potential profit and leading you to take risks you might otherwise avoid, academics and other financial professionals say. Errors tend to widen when it comes to very volatile securities like emerging-markets stocks.

Arithmetic math involves a very simple formula, which is probably why so many people rely on it. To decide an average return, you add up all the return percentages and divide the results by the number of percentages.

It's a perfectly valid way to determine an average, as long as it's used to frame a stand-alone one-year return, said Knut Larsen, a partner with Brigus Group, a Toronto education service for financial advisers.

The classic example to illustrate the flaws with arithmetic math goes like this: You start with an investment of $100 and it grows 100% the first year and loses 50% the next year. To calculate the total return using arithmetic math, you would add the returns from both years—in this case 100 minus 50—and divide them by two, or the number of returns.

That leaves you with the illusion of a 25% profit, when in reality you're right back where you started—with $100. After rising 100% the first year, you had $200; but a drop of 50% cut that in half, back down to $100.

The alternative is known as geometric average, or compound annual return. This takes compounding and volatility into consideration.

Unfortunately, geometric average is a complicated formula, involving cube roots, so it may not be possible to figure out the results without a spreadsheet. But the point is to educate yourself on the issue, not to memorize complex formulas, Mr. Larsen said. Simply understanding when one formula should be used over the other, and knowing the flaws of arithmetic math is a good start, he said.

S&P 500 index annual returns from 1927 until now are lower using geometric math.

When comparing the two results, the arithmetic average generally ends up being higher than the geometric average, said Campbell Harvey, a finance professor with Duke University's Fuqua School of Business. For example, annual returns on the S&P 500 index from 1927 until now are about 12% using arithmetic math, and 10% using geometric math. That's a two percentage point difference.

The deviation isn't always enough to get worked up about, but it depends on factors such as volatility, and even fees and interest. For example, the greater the volatility of the security in question, the greater the spread will be between the two results, Mr. Harvey said.

He recalls feeling struck once by an advertisement touting Brazilian stocks attached to data showing "incredible returns" of about 50% a year. Knowing Brazil is a volatile market, Mr. Harvey went back and applied geometric math to the returns. His findings produced an average return closer to zero.

Volatility can affect the portfolio in negative ways because a severe drop makes it that much harder to catch up on the reduced amount, even if returns are phenomenal thereafter. But when using arithmetic average, all that is known is the one-year average return, not total results.

Misleading return projections using arithmetic math are common in the insurance world, said Peter Katt, an insurance analyst in Mattawan, Mich. Some products require high return forecasts to make the products work, and this is one way to get around that, he said, adding that consumers need to educate themselves.

"I deal with very bright clients and advisers, and they have no idea what I'm talking about" when referring to the different formulas for calculating results, he said.

It may seem like a lot of financial hocus-pocus, but sometimes the misrepresentations aren't intentional, Mr. Larsen said. He published a primer on the subject this summer after bumping into a financial adviser who legitimately didn't know the effects arithmetic math was having on his planning. The adviser had a client who suffered a portfolio loss of 45%, and the adviser believed the client would need an annual return of 15% a year to get back to the original investment in three years. In reality, he would have to prepare for a return of more like 22% a year, according to Mr. Larsen's calculations.

The Differences in Averaging

One of the frequent questions we receive is related to the proper procedure to calculate the average return of an investment (stock, mutual fund, or anything else). This article will briefly examine how to compute the average change of a specific investment 1) over a set period of time, 2) over a number of years, and 3) annualizing returns over a period shorter than a year.

Averaging Calculations

There are actually three averaging methods: arithmetic, geometric, and harmonic. These formulas are shown below:

Arithmetic: $(y_1 + y_2 + ... + y_n) / n$

Geometric: $(((1+y_1) * (1+y_2) * ... * (1+y_n)) - 1)^{1/n}$

Harmonic: $(1 / ((1/n) * ((1+y_1) + (1+y_2) + ... + (1+y_n)))) - 1$

In each case *n* is the number of years of data and each *y* is the ending price divided by the beginning price minus 1. Stated simply, the geometric mean is the n^{th} root of the product of the individual averages. Since there are often negative returns involved in this sort of calculation, one is added to each term. At the end, the one is subtracted to get back to the decimal fraction number.

The arithmetic average has an upward bias, though it is the simplest to calculate. The geometric average does not have any bias, and thus is best to use when compounding (over a number of years) is involved. Lastly, the harmonic average has a downward bias. But since it is rarely used, we will focus on the arithmetic and geometric averages in the following discussion.

Over a Set Period of Time

The simplest way to compute the price change is to take the ending price and divide it into the beginning price. After subtracting one from the result, you are left with the holding period yield. This calculation produces the decimal fraction equivalent of the percentage change. A change in price from 4 to 5, would be computed as (5 ÷ 4) - 1, which yields .25, or 25%.

The holding period return is independent of time. That means that it can be computed on an annual basis, over a ten-year period, or any other time frame.

Compounding: Averages Over a Number of Years

Now assume we have been watching a stock for two years, and we want to compute the annual return for each year, and the average annual return for the two-year period. Let's say this stock was initially priced at $10, rose to $20 by the end of year 1, but fell back down to $10 by the end of year two. From the above-mentioned example, we know how to find the price change for the first and second year. Then we can also find the total price change over the two year period. These figures are shown in the table below:

Year	Price	% Price Change
0	$10	—
1	20	100%
2	10	-50%

Price change from year 0 to year 2: 0%

Arithmetic Average: 25%
Geometric Average: 0%

One of the more interesting observations that arises from such an example is the asymmetric nature of the returns. Notice that in this example, the stock only has to fall half as much in year two as it rose in year one to completely wipe out any paper gains the investor had during the interim. This nature highlights the importance of using the geometric return. As shown, the arithmetic average indicates that the stock had an average annual return of 25% over the past two years. However, the true return, which is corroborated by the geometric mean, is zero.

Another interesting point is that the asymmetry magnifies as the price changes increase in size. For example, let's say the stock price increased to $50 before falling back to $10.

Year	Price	% Price Change
0	$10	—
1	50	400%
2	10	-80%

Price change from year 0 to year 2: 0%

Arithmetic Average: 160%
Geometric Average: 0%

Originally, the stock had to fall 50% to wipe a 100% gain. But in the second scenario, the stock had to drop only 80% to wipe out a phenomenal 400% gain. This growing discrepancy between the different averaging techniques highlights the importance of accurately measuring and portraying investment results. Again we see that the geometric average portrays the true return accurately.

Annualizing Returns

An annualized holding period return figure can be computed by taking the $1/n^{th}$ root of the holding period return, where n is the length of the sub-period relative to the year. (For a three-month period, n would equal .25, or one-fourth of the year. For a two-year period, n would equal 2.) Below are two examples that show how this operation is performed.

Let's say you wanted to figure out the annualized return of a stock that rose 5% in the first quarter. The annualized return would then be computed as $(1.05)^{1/.25}$, or 21.6%.

We can also compute an average annualized return figure from a period longer than a year. For example, if the stock rose 20% for two straight years, the cumulative growth rate would be 44% (1.20 * 1.20). This figure could be dissected into the average annual rate using the same formula shown above $(1.44)^{1/2}$, which we can verify as 1.20, or 20%.

Roger J. Bos
Analyst

Timely Income Stocks

For equity investors with more of an eye for current income, we've screened our database for issues that combine high estimated dividend yields and above-average relative year-ahead performance potential, without undue investment risk.

This roster includes only those equities whose dividend yields are at least 2.7%, which is 70 basis points above the 2.0% median for all stocks in Value Line's universe. Ranks here must be no less than 2 (Above Average) for Timeliness and no less than 3 (Average) for Safety.

Although the focus here is on current income and near-term price performance; we shape our criteria to ensure solid potential returns for longer-term investors as well. Accordingly, we require a minimum projected three- to five-year total return potential of 15%, compared with the median of 14.6% for all stocks under our review. In addition, our analyst's projection for capital appreciation had to be at least 55%, which is in line with the current median price appreciation potential for all stocks in the Value Line universe.

Given the relatively stringent criteria applied here, this is a fairly short list which encompasses stocks from a fairly diverse group of industries. This list would seem to be a good starting point for income-minded investors with both short- and long-term investment perspectives. As always, though, we urge investors to consult the individual and supplementary analyses in *Ratings & Reports* before committing to any of the issues listed in the table below.

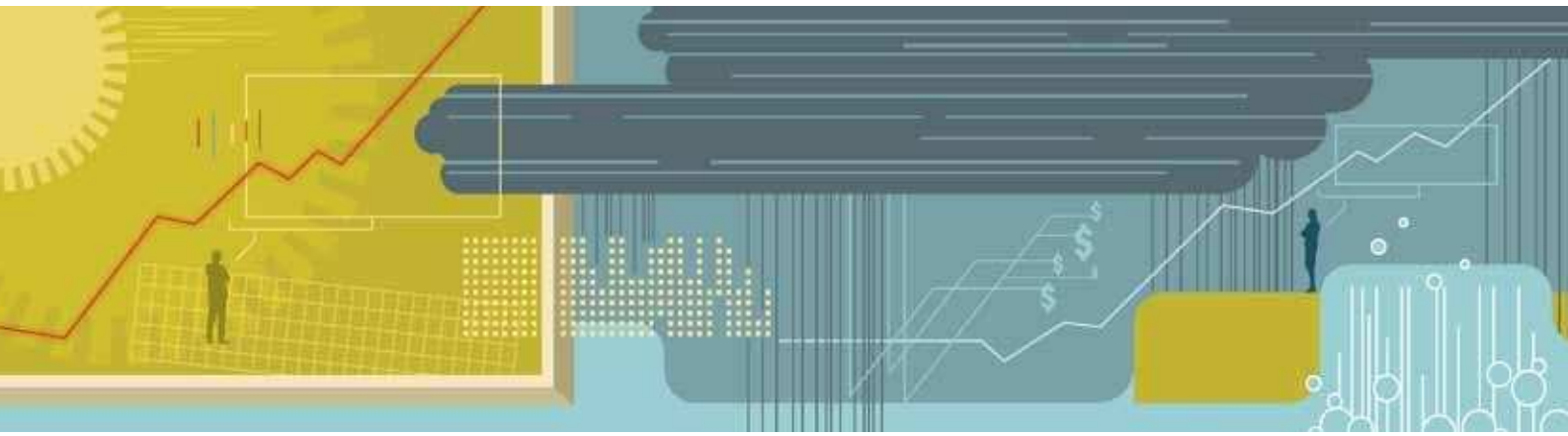
Ratings & Reports Page	Ticker	Company Name	Div'd Yld.	Recent Price	Timeliness	Safety	3-5 Yr. App. Pot.	3-5 Yr. Avg. Ret.	P/E
2141	AC	Alliance Capital Mgmt.	8.9%	27	2	3	75%	19%	10.3
816	ARV	Arvin Ind.	3.0	26	2	3	65	16	13.0
535 1580	MO	Philip Morris	4.6	39	2	3	65	18	13.4
525	KWR	Quaker Chemical	4.4	16	2	3	55	15	13.1
315	TBY	TCBY Enterprises	3.4	5¾	2	3	70	17	17.6
802	CTC	Telecom. de Chile ADR	2.8	32	1	3	70	17	15.0
591	TRN	Trinity Inds.	2.9	26	2	3	130	25	8.3
429	MRO	USX-Marathon Group	2.7	28	2	3	80	18	13.3
1401	X	USX-U.S. Steel Group	3.4	29	2	3	105	22	6.8
575	UIC	United Industrial Corp.	3.9	7⅛	2	3	60	16	9.6

APPENDIX E

McKinsey on Finance

Number 35,
Spring 2010

Perspectives on
Corporate Finance
and Strategy



Equity analysts: Still too bullish

After almost a decade of stricter regulation, analysts' earnings forecasts continue to be excessively optimistic.

Marc H. Goedhart, Rishi Raj, and Abhishek Saxena

No executive would dispute that analysts' forecasts serve as an important benchmark of the current and future health of companies. To better understand their accuracy, we undertook research nearly a decade ago that produced sobering results. Analysts, we found, were typically overoptimistic, slow to revise their forecasts to reflect new economic conditions, and prone to making increasingly inaccurate forecasts when economic growth declined.[1]

Alas, a recently completed update of our work only reinforces this view—despite a series of rules and regulations, dating to the last decade, that were intended to improve the quality of the analysts' long-term earnings forecasts, restore investor confidence in them, and prevent conflicts of interest.[2] For executives, many of whom go to great lengths to satisfy Wall Street's expectations in their financial reporting and long-term strategic moves, this is a cautionary tale worth remembering.

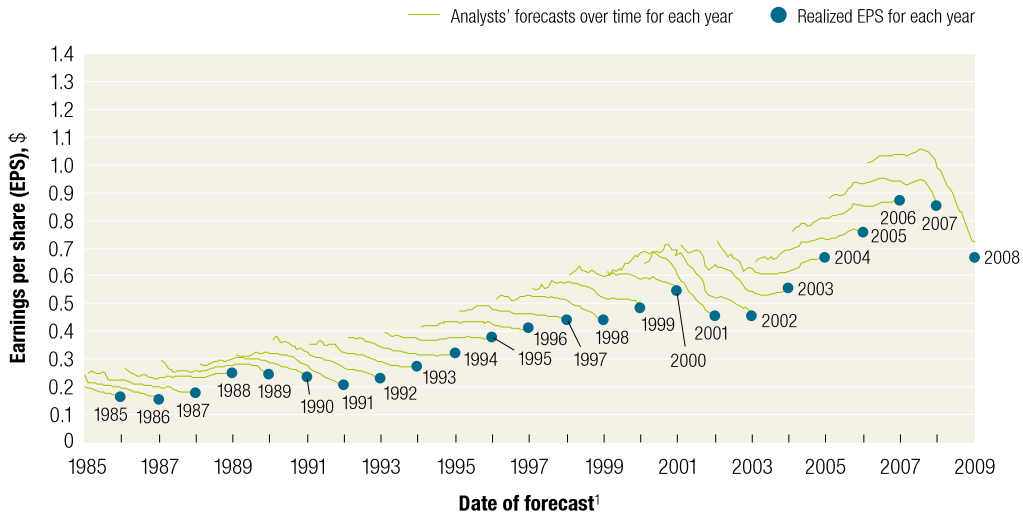
Exceptions to the long pattern of excessively optimistic forecasts are rare, as a progression of consensus earnings estimates for the S&P 500 shows (Exhibit 1). Only in years such as 2003 to 2006, when strong economic growth generated actual earnings that caught up with earlier predictions, do forecasts actually hit the mark.

Exhibit 1

Off the mark

With few exceptions, aggregate earnings forecasts exceed realized earnings per share.

S&P 500 companies



[1]Monthly forecasts.

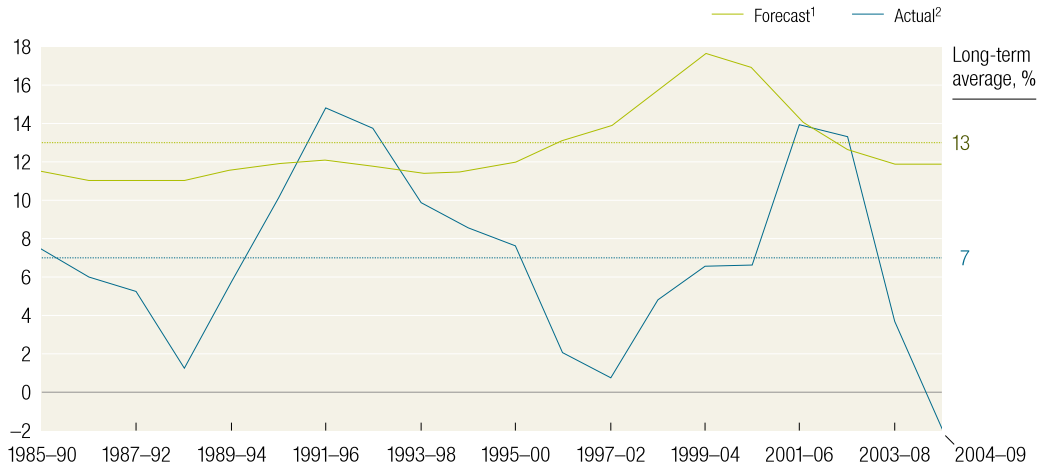
Source: Thomson Reuters I/B/E/S Global Aggregates; McKinsey analysis

Exhibit 2

Overoptimistic

Actual growth surpassed forecasts only twice in 25 years—both times during the recovery following a recession.

Earnings growth for S&P 500 companies, 5-year rolling average, %



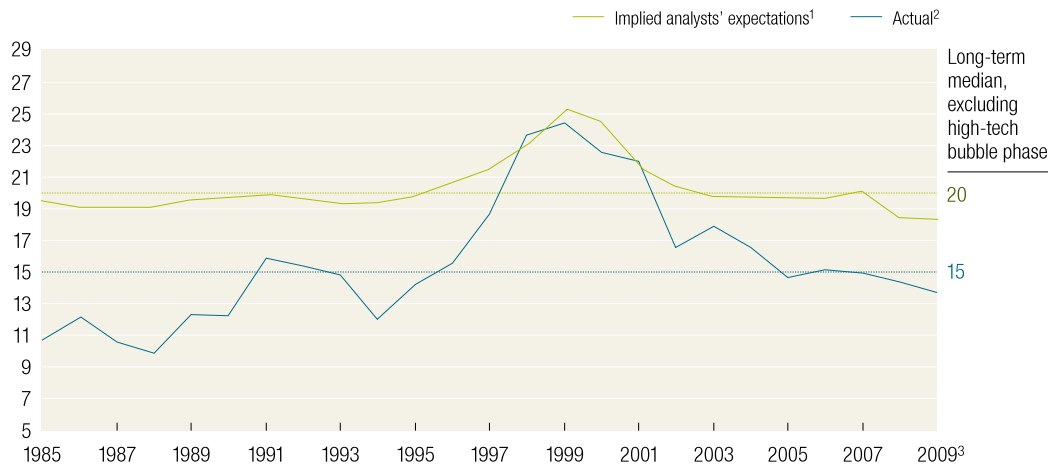
[1]Analysts' 5-year forecasts for long-term consensus earnings-per-share (EPS) growth rate. Our conclusions are same for growth based on year-over-year earnings estimates for 3 years.
[2]Actual compound annual growth rate (CAGR) of EPS; 2009 data are not yet available, figures represent consensus estimate as of Nov 2009.

Source: Thomson Reuters I/B/E/S Global Aggregates; McKinsey analysis

Exhibit 3
Less giddy

Capital market expectations are more reasonable.

Actual P/E ratio vs P/E ratio implied by analysts' forecasts, S&P 500 composite index



[1]P/E ratio based on 1-year-forward earnings-per-share (EPS) estimate and estimated value of S&P 500. Estimated value assumes: for first 5 years, EPS growth rate matches analysts' estimates then drops smoothly over next 10 years to long-term continuing-value growth rate; continuing value based on growth rate of 6%; return on equity is 13.5% (long-term historical median for S&P 500), and cost of equity is 9.5% in all periods.
[2]Observed P/E ratio based on S&P 500 value and 1-year-forward EPS estimate.
[3]Based on data as of Nov 2009.

Source: Thomson Reuters I/B/E/S Global Aggregates; McKinsey analysis

This pattern confirms our earlier findings that analysts typically lag behind events in revising their forecasts to reflect new economic conditions. When economic growth accelerates, the size of the forecast error declines; when economic growth slows, it increases.[3] So as economic growth cycles up and down, the actual earnings S&P 500 companies report occasionally coincide with the analysts' forecasts, as they did, for example, in 1988, from 1994 to 1997, and from 2003 to 2006.

Moreover, analysts have been persistently overoptimistic for the past 25 years, with estimates ranging from 10 to 12 percent a year,[4] compared with actual earnings growth of 6 percent.[5]

Over this time frame, actual earnings growth surpassed forecasts in only two instances, both during the earnings recovery following a recession (Exhibit 2). On average, analysts' forecasts have been almost 100 percent too high.[6]

Capital markets, on the other hand, are notably less giddy in their predictions. Except during the market bubble of 1999–2001, actual price-to-earnings ratios have been 25 percent lower than implied P/E ratios based on analyst forecasts (Exhibit 3). What's more, an actual forward P/E ratio[7] of the S&P 500 as of November 11, 2009—14—is consistent with long-term earnings growth of 5 percent.[8] This assessment is more

reasonable, considering that long-term earnings growth for the market as a whole is unlikely to differ significantly from growth in GDP,[9] as prior McKinsey research has shown.[10] Executives, as the evidence indicates, ought to base their strategic decisions on what they see happening in their industries rather than respond to the pressures of forecasts, since even the market doesn't expect them to do so. ○

[1] Marc H. Goedhart, Brendan Russell, and Zane D. Williams, "Prophets and profits," mckinseyquarterly.com, October 2001.
[2] US Securities and Exchange Commission (SEC) Regulation Fair Disclosure (FD), passed in 2000, prohibits the selective disclosure of material information to some people but not others. The Sarbanes–Oxley Act of 2002 includes provisions specifically intended to help restore investor confidence in the reporting of securities' analysts, including a code of conduct for them and a requirement to disclose knowable conflicts of interest. The Global Settlement of 2003 between regulators and ten of the largest US investment firms aimed to prevent conflicts of interest between their analyst and investment businesses.
[3] The correlation between the absolute size of the error in forecast earnings growth (S&P 500) and GDP growth is –0.55.
[4] Our analysis of the distribution of five-year earnings growth (as of March 2005) suggests that analysts forecast growth of more than 10 percent for 70 percent of S&P 500 companies.
[5] Except 1998–2001, when the growth outlook became excessively optimistic.
[6] We also analyzed trends for three-year earnings-growth estimates based on year-on-year earnings estimates provided by the analysts, where the sample size of analysts' coverage is bigger. Our conclusions on the trend and the gap vis-à-vis actual earnings growth does not change.
[7] Market-weighted and forward-looking earnings-per-share (EPS) estimate for 2010.
[8] Assuming a return on equity (ROE) of 13.5 percent (the long-term historical average) and a cost of equity of 9.5 percent—the long-term real cost of equity (7 percent) and inflation (2.5 percent).
[9] Real GDP has averaged 3 to 4 percent over past seven or eight decades, which would indeed be consistent with nominal growth of 5 to 7 percent given current inflation of 2 to 3 percent.
[10] Timothy Koller and Zane D. Williams, "What happened to the bull market?" mckinseyquarterly.com, November 2001.

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BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF DELAWARE

IN THE MATTER OF THE APPLICATION OF DELMARVA POWER & LIGHT COMPANY FOR A CHANGE IN NATURAL GAS BASE RATES (FILED JULY 2, 2010)	))))	PSC DOCKET NO. 10-237

CERTIFICATE OF SERVICE

Joseph C. Handlon hereby certifies that on October 25, 2010, he caused a copy of the **DIRECT TESTIMONY AND EXHIBITS OF JAMES A. ROTHSCHILD ON BEHALF OF THE STAFF OF THE PUBLIC SERVICE COMMISSION** to be served on all parties in this docket in the manner indicated on the attached service list.

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Dated: October 25, 2010

PSC DOCKET NO. 10-237

SERVICE LIST

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