**Q. Reference: Transcript January 17, 2013**
**Page 44, Line 8 to 12**

**Undertake to file your last case in the United States, including all your written testimony, where you set out a summary of your cost of equity result?**

A. Attachment A provides Dr. Vander Weide's written testimony filed before the Public Service Commission of the State of Missouri on behalf of the Empire District Electric Company in July 2012.

**Attachment A**

Exhibit No.:
Issue: ROE
Witness: Dr. James H. Vander Weide
Type of Exhibit: Direct Testimony
Sponsoring Party: Empire District Electric
Case No. ER-2012-0345
Date Testimony Prepared: May 2012

**Before the Public Service Commission of the State of Missouri**

# Direct Testimony

**of**

**Dr. James H. Vander Weide**

**July 2012**

TABLE OF CONTENTS
DIRECT TESTIMONY OF
DR. JAMES H. VANDER WEIDE
ON BEHALF OF
THE EMPIRE DISTRICT ELECTRIC COMPANY
BEFORE THE
PUBLIC SERVICE COMMISSION OF THE STATE OF MISSOURI

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## I. INTRODUCTION

**Q. PLEASE STATE YOUR NAME, TITLE, AND BUSINESS ADDRESS.**

A. My name is James H. Vander Weide. I am Research Professor of Finance and Economics at Duke University, The Fuqua School of Business. I am also President of Financial Strategy Associates, a firm that provides strategic and financial consulting services to business clients. My business address is 3606 Stoneybrook Drive, Durham, North Carolina 27705.

**Q. PLEASE SUMMARIZE YOUR QUALIFICATIONS.**

A. I graduated from Cornell University with a Bachelor's Degree in Economics and from Northwestern University with a Ph.D. in Finance. After joining the faculty of the School of Business at Duke University, I was named Assistant Professor, Associate Professor, Professor, and then Research Professor. I have published research in the areas of finance and economics and taught courses in these fields at Duke for more than thirty-five years. I am now retired from my teaching duties at Duke.

**Q. HAVE YOU PREVIOUSLY TESTIFIED ON FINANCIAL OR ECONOMIC ISSUES?**

A. Yes. As an expert on financial and economic theory and practice, I have participated in more than four hundred regulatory and legal proceedings before the U.S. Congress, the Federal Energy Regulatory Commission, the National Energy Board (Canada), the Canadian Radio-Television and Telecommunications Commission, the Federal Communications Commission, the National Telecommunications and Information Administration, the public service commissions of forty-three states and five Canadian provinces, the insurance commissions of five states, the Iowa State Board of Tax Review, the National Association of Securities Dealers, and the North Carolina Property Tax Commission. In addition, I have prepared expert testimony in proceedings before the U.S. Tax Court; the U.S. District Court for the District of Nebraska; the U.S. District Court for the District of New Hampshire; the U.S. District Court for the District of Northern Illinois; the U.S. District Court for the Eastern District of North Carolina; the Montana Second Judicial District Court, Silver Bow County; the U.S. District Court for the Northern District of California; the Superior Court, North Carolina; the U.S. Bankruptcy Court for the Southern District of West Virginia; and the U. S. District Court for the Eastern District of Michigan. A summary of my research, teaching, and other professional experience is presented in Appendix 1.

**Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

A. I have been asked by The Empire District Electric Company ("Empire" or "Company") to prepare an independent appraisal of Empire's cost of equity,

and to recommend to the Missouri Public Service Commission (the "Commission") a rate of return on equity for the purpose of ratemaking.

## II. SUMMARY OF TESTIMONY

**Q. HOW DO YOU ESTIMATE EMPIRE'S COST OF EQUITY?**

A. I estimate Empire's cost of equity by applying several standard cost of equity methods to market data for a large proxy group of electric utility companies.

**Q. WHY DO YOU APPLY YOUR COST OF EQUITY METHODS TO A LARGE PROXY GROUP OF ELECTRIC UTILITIES RATHER THAN SOLELY TO EMPIRE?**

A. I apply my cost of equity methods to a large proxy group of electric utilities because standard cost of equity methodologies such as the discounted cash flow ("DCF"), risk premium, and capital asset pricing model ("CAPM") require inputs of quantities that are not easily measured. Since these inputs can only be estimated, there is naturally some degree of uncertainty surrounding the estimate of the cost of equity for each company. However, the uncertainty in the estimate of the cost of equity for an individual company can be greatly reduced by applying cost of equity methodologies to a large sample of proxy companies. Intuitively, unusually high estimates for some individual companies are offset by unusually low estimates for other individual companies. Thus, financial economists invariably apply cost of equity methodologies to a group of proxy companies. In utility regulation, the practice of using a group of proxy companies is further supported by the

United States Supreme Court standard that the utility should be allowed to earn a return on its investment that is commensurate with returns being earned on other investments of similar risk (see *Bluefield Water Works and Improvement Co. v. Public Service Comm'n.* 262 U.S. 679, 692 (1923) and *Federal Power Comm'n v. Hope Natural Gas Co.*, 320 U.S. 561, 603 (1944)).

**Q. WHAT COST OF EQUITY DO YOU FIND FOR YOUR PROXY COMPANIES IN THIS PROCEEDING?**

A. On the basis of my studies, I find that the cost of equity for my proxy companies is 10.6 percent. This conclusion is based on my application of standard cost of equity estimation techniques, including the DCF model, the ex ante risk premium approach, the ex post risk premium approach, and the CAPM, to a broad group of electric utilities, and on the evidence I present in this testimony that the CAPM, as typically applied, significantly underestimates the cost of equity for companies such as my proxy companies with betas significantly less than 1.0.

**Q. WHAT IS YOUR RECOMMENDATION REGARDING EMPIRE'S COST OF EQUITY?**

A. I conservatively recommend that Empire be allowed a rate of return on equity equal to 10.6 percent.

**Q. WHY IS YOUR RECOMMENDED COST OF EQUITY CONSERVATIVE?**

A. My recommendation is conservative in that it does not reflect: (1) Empire's greater business risk compared to the average business risk of the proxy

companies; and (2) the higher financial risk implicit in Empire's rate making capital structure compared to the average financial risk of the proxy companies implicit in the values of debt and equity in their market value capital structures.

**Q. DO YOU HAVE SCHEDULES AND APPENDICES ACCOMPANYING YOUR TESTIMONY?**

A. Yes. I have prepared or supervised the preparation of ten schedules and four appendices that accompany my testimony.

## III. ECONOMIC AND LEGAL PRINCIPLES

**Q. HOW DO ECONOMISTS DEFINE THE REQUIRED RATE OF RETURN, OR COST OF CAPITAL, ASSOCIATED WITH PARTICULAR INVESTMENT DECISIONS SUCH AS THE DECISION TO INVEST IN ELECTRIC GENERATION, TRANSMISSION, AND DISTRIBUTION FACILITIES?**

A. Economists define the required rate of return, or cost of capital, as the return investors expect to receive on alternative investments of comparable risk.

**Q. HOW DOES THE COST OF CAPITAL AFFECT A FIRM'S INVESTMENT DECISIONS?**

A. The goal of a firm is to maximize its value. This goal can be accomplished by accepting all investments in plant and equipment with an expected rate of return greater than the cost of capital. Thus, a firm should continue to invest in plant and equipment only so long as the return on its investment is greater than or equal to its cost of capital.

**Q. HOW DOES THE COST OF CAPITAL AFFECT INVESTORS' WILLINGNESS TO INVEST IN A COMPANY?**

A. The cost of capital measures the return investors can expect on investments of comparable risk. The cost of capital also measures the investor's required rate of return on investment because rational investors will not invest in a particular investment opportunity if the expected return on that opportunity is less than the cost of capital. Thus, the cost of capital is a hurdle rate for both investors and the firm.

**Q. DO ALL INVESTORS HAVE THE SAME POSITION IN THE FIRM?**

A. No. Debt investors have a fixed claim on a firm's assets and income that must be paid prior to any payment to the firm's equity investors. Since the firm's equity investors have a residual claim on the firm's assets and income, equity investments are riskier than debt investments. Thus, the cost of equity exceeds the cost of debt.

**Q. WHAT IS THE OVERALL OR AVERAGE COST OF CAPITAL?**

A. The overall or average cost of capital is a weighted average of the cost of debt and cost of equity, where the weights are the percentages of debt and equity in a firm's capital structure.

**Q. CAN YOU ILLUSTRATE THE CALCULATION OF THE OVERALL OR WEIGHTED AVERAGE COST OF CAPITAL?**

A. Yes. Assume that the cost of debt is 7 percent, the cost of equity is 13 percent, and the percentages of debt and equity in the firm's capital

structure are 50 percent and 50 percent, respectively. Then the weighted average cost of capital is expressed by .50 times 7 percent plus .50 times 13 percent, or 10.0 percent.

**Q. HOW DO ECONOMISTS DEFINE THE COST OF EQUITY?**

A. Economists define the cost of equity as the return investors expect to receive on alternative equity investments of comparable risk. Since the return on an equity investment of comparable risk is not a contractual return, the cost of equity is more difficult to measure than the cost of debt. However, as I have already noted, there is agreement among economists that the cost of equity is greater than the cost of debt. There is also agreement among economists that the cost of equity, like the cost of debt, is both forward looking and market based.

**Q. HOW DO ECONOMISTS MEASURE THE PERCENTAGES OF DEBT AND EQUITY IN A FIRM'S CAPITAL STRUCTURE?**

A. Economists measure the percentages of debt and equity in a firm's capital structure by first calculating the market value of the firm's debt and the market value of its equity. Economists then calculate the percentage of debt by the ratio of the market value of debt to the combined market value of debt and equity, and the percentage of equity by the ratio of the market value of equity to the combined market values of debt and equity. For example, if a firm's debt has a market value of $25 million and its equity has a market value of

$75 million, then its total market capitalization is $100 million, and its capital structure contains 25 percent debt and 75 percent equity.

**Q. WHY DO ECONOMISTS MEASURE A FIRM'S CAPITAL STRUCTURE IN TERMS OF THE MARKET VALUES OF ITS DEBT AND EQUITY?**

A. Economists measure a firm's capital structure in terms of the market values of its debt and equity because: (1) the weighted average cost of capital is defined as the return investors expect to earn on a portfolio of the company's debt and equity securities; (2) investors measure the expected return and risk on their portfolios using market value weights, not book value weights; and (3) market values are the best measures of the amounts of debt and equity investors have invested in the company on a going forward basis.

**Q. WHY DO INVESTORS MEASURE THE EXPECTED RETURN AND RISK ON THEIR INVESTMENT PORTFOLIOS USING MARKET VALUE WEIGHTS RATHER THAN BOOK VALUE WEIGHTS?**

A. Investors measure the expected return and risk on their investment portfolios using market value weights because: (1) the expected return on a portfolio is calculated by comparing the expected value of the portfolio at the end of the investment period to its current value; (2) the risk on a portfolio is calculated by examining the variability of the return on the portfolio at the end of the investment period; and (3) market values are the best measure of the current value of the portfolio. From the investor's point of view, the historical cost, or

book value of their investment, is generally a poor indicator of the portfolio's current value.

**Q. IS THE ECONOMIC DEFINITION OF THE WEIGHTED AVERAGE COST OF CAPITAL CONSISTENT WITH REGULATORS' TRADITIONAL DEFINITION OF THE WEIGHTED AVERAGE COST OF CAPITAL?**

A. No. The economic definition of the weighted average cost of capital is based on the market costs of debt and equity, the market value percentages of debt and equity in a company's capital structure, and the future expected risk of investing in the company. In contrast, regulators have traditionally defined the weighted average cost of capital using the embedded cost of debt and the book values of debt and equity in a company's capital structure.

**Q. ARE THESE ECONOMIC PRINCIPLES REGARDING THE FAIR RETURN FOR CAPITAL RECOGNIZED IN ANY UNITED STATES SUPREME COURT CASES?**

A. Yes. These economic principles, relating to the supply of and demand for capital, are recognized in two United States Supreme Court cases: (1) *Bluefield Water Works and Improvement Co. v. Public Service Comm'n.*; and (2) *Federal Power Comm'n v. Hope Natural Gas Co.* In the *Bluefield Water Works* case, the Court stated:

> A public utility is entitled to such rates as will permit it to earn a return upon the value of the property which it employs for the convenience of the public equal to that generally being made at the same time and in the same general part of the country on investments in other business undertakings which are attended by corresponding risks and uncertainties; but it has no

> constitutional right to profits such as are realized or anticipated in highly profitable enterprises or speculative ventures. The return should be reasonably sufficient to assure confidence in the financial soundness of the utility, and should be adequate, under efficient and economical management, to maintain and support its credit, and enable it to raise the money necessary for the proper discharge of its public duties. [*Bluefield Water Works and Improvement Co. v. Public Service Comm'n.* 262 U.S. 679, 692 (1923)].

The Court clearly recognizes here that: (1) a regulated firm cannot remain financially sound unless the return it is allowed to earn on the value of its property is at least equal to the cost of capital (the principle relating to the demand for capital); and (2) a regulated firm will not be able to attract capital if it does not offer investors an opportunity to earn a return on their investment equal to the return they expect to earn on other investments of the same risk (the principle relating to the supply of capital).

In the *Hope Natural Gas* case, the Court reiterates the financial soundness and capital attraction principles of the *Bluefield* case:

> From the investor or company point of view it is important that there be enough revenue not only for operating expenses but also for the capital costs of the business. These include service on the debt and dividends on the stock... By that standard the return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks. That return, moreover, should be sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain its credit and to attract capital. [*Federal Power Comm'n v. Hope Natural Gas Co.*, 320 U.S. 591, 603 (1944)].

The Court clearly recognizes that the fair rate of return on equity should be: (1) comparable to returns investors expect to earn on other investments of similar risk; (2) sufficient to assure confidence in the company's financial

integrity; and (3) adequate to maintain and support the company's credit and to attract capital.

## IV. BUSINESS AND FINANCIAL RISKS

**Q. HOW DO INVESTORS ESTIMATE THE EXPECTED RATE OF RETURN ON SPECIFIC INVESTMENTS, SUCH AS AN INVESTMENT IN EMPIRE?**

A. Investors estimate the expected rate of return in several steps. First, they estimate the amount of their investment in the company. Second, they estimate the timing and amounts of the cash flows they expect to receive from their investment over the life of the investment. Third, they determine the return, or discount rate, that equates the present value of the expected cash receipts from their investment in the company to the current value of their investment in the company.

**Q. ARE THE RETURNS ON INVESTMENT OPPORTUNITIES, SUCH AS AN INVESTMENT IN EMPIRE, KNOWN WITH CERTAINTY AT THE TIME THE INVESTMENT IS MADE?**

A. No. As discussed above, the return on an investment in Empire depends on the Company's expected future cash flows over the life of the investment. Since the Company's expected future cash flows are uncertain at the time the investment is made, the return on the investment is also uncertain.

**Q. YOU MENTION THAT INVESTORS REQUIRE A RETURN ON INVESTMENT THAT IS EQUAL TO THE RETURN THEY EXPECT TO RECEIVE ON OTHER INVESTMENTS OF SIMILAR RISK. DOES THE**

**REQUIRED RETURN ON AN INVESTMENT DEPEND ON THE RISK OF THAT INVESTMENT?**

A. Yes. Since investors are averse to risk, they require a higher rate of return on investments with greater risk.

**Q. WHAT FUNDAMENTAL RISK DO INVESTORS FACE WHEN THEY INVEST IN A COMPANY SUCH AS EMPIRE?**

A. Investors face the fundamental risk that their realized, or actual, return on investment, will be less than their required return on investment.

**Q. HOW DO INVESTORS MEASURE INVESTMENT RISK?**

A. Investors generally measure investment risk by estimating the probability, or likelihood, of earning less than the required return on investment. For investments with potential returns distributed symmetrically about the expected, or mean, return, investors can also measure investment risk by estimating the variance, or volatility, of the potential return on investment.

**Q. DO INVESTORS DISTINGUISH BETWEEN BUSINESS AND FINANCIAL RISK?**

A. Yes. Business risk is the underlying risk that investors will earn less than their required return on investment when the investment is financed entirely with equity. Financial risk is the additional risk of earning less than the required return when the investment is financed with both fixed-cost debt and equity.

**Q. WHAT ARE THE PRIMARY DETERMINANTS OF AN ELECTRIC UTILITY'S BUSINESS RISK?**

A. The business risk of investing in electric utility companies such as Empire is caused by: (1) demand uncertainty; (2) operating expense uncertainty; (3) investment cost uncertainty; (4) high operating leverage; and (5) regulatory uncertainty.

**Q. WHAT CAUSES THE DEMAND FOR ELECTRICITY TO BE UNCERTAIN?**

A. Electric utilities experience demand uncertainty in both the short run and the long run. Short-run demand uncertainty is caused by the strong dependence of electric demand on the state of the economy and weather patterns. Long-run demand uncertainty is caused by: (a) the sensitivity of demand to changes in rates; (b) the efforts of customers to conserve energy; and (c) the ability of some customers to co-generate their own electricity or purchase electricity from competitors.

**Q. HOW DOES SHORT-RUN DEMAND UNCERTAINTY AFFECT AN ELECTRIC UTILITY'S BUSINESS RISK?**

A. Short-run demand uncertainty affects an electric utility's business risk through its impact on the variability of the company's revenues and its return on investment. The greater the short-run uncertainty in demand the greater is the uncertainty in the company's yearly revenues and return on investment.

**Q. HOW DOES LONG-RUN DEMAND UNCERTAINTY AFFECT AN ELECTRIC UTILITY'S BUSINESS RISK?**

A. Long-run demand uncertainty affects an electric utility's business risk through its impact on the utility's revenues over the life of its plant investments. Long-

run demand uncertainty creates greater risk for electric utilities because investments in electric utility infrastructure are long-lived and irreversible. If demand turns out to be less than expected over the life of the investment, the utility may not be able to generate sufficient revenues over the life of the investment to cover its operating expenses and earn a fair return on its investment.

**Q. DOES EMPIRE EXPERIENCE DEMAND UNCERTAINTY?**

A. Yes. Empire experiences demand uncertainty in both the short run and the long run. The Company experiences short-run demand uncertainty as a result of economic cycles, such as the recent recession, when fewer homes are built, fewer new businesses are started, and factories are running at less than full capacity; and as a result of weather patterns, such as unusually warm winters. Empire experiences long-run demand uncertainty when it invests in major long-lived plant additions that are expected to operate over the next thirty or forty years. If future actual demand turns out to be less than forecast demand, the Company may not generate sufficient revenues to recover its investment and earn a fair return on its investment.

**Q. WHY ARE AN ELECTRIC UTILITY'S OPERATING EXPENSES UNCERTAIN?**

A. Operating expense uncertainty arises as a result of: (a) high volatility in fuel prices or interruptions in fuel supply; (b) variability in maintenance costs and the costs of materials; (c) uncertainty over outages of the company's

generation, transmission, and distribution systems, as well as storm-related expenses; (d) uncertainty regarding the cost of purchased power and the revenues achieved from off-system sales; (e) the prospect of increasing employee health care and pension expenses; and (f) the prospect of increased expenses for security.

**Q. DOES EMPIRE EXPERIENCE OPERATING EXPENSE UNCERTAINTY?**

A. Yes. Empire experiences both the typical operating expense uncertainty associated with its existing operations and the operating expense uncertainty associated with the future operations of major plant additions.

**Q. WHY ARE UTILITY INVESTMENT COSTS UNCERTAIN?**

A. The electric utility business requires large investments in the plant and equipment required to deliver electricity to customers. The future amounts of required investments in plant and equipment are uncertain as a result of: (a) demand uncertainty; (b) the changing economics of alternative generation technologies; (c) uncertainty in environmental regulations and clean air requirements; (d) uncertainty in the costs of construction materials and labor; and (e) uncertainty in the amount of additional investments to ensure the reliability of the company's transmission and distribution networks. Furthermore, the risk of investing in electric utility facilities is increased by the irreversible nature of the company's investments in utility plant and equipment. For example, if an electric utility decides to invest in building a new generation plant, and, as a result of new environmental regulations,

energy produced by the plant becomes uneconomic, the company may not be able to recover its investment.

**Q. WHAT ARE EMPIRE'S ESTIMATED CAPITAL EXPENDITURES FOR THE NEXT SEVERAL YEARS?**

A. Empire states in its 2011 Form 10-K filing that its estimated capital expenditures for the five-year period 2012 through 2016 are $147.2 million, $158.7 million, $164.3 million, $286.5 million, and $138.4 million, respectively (2011 Form 10-K, p. 49).

**Q. EMPIRE'S ESTIMATED CAPITAL EXPENDITURES FOR THE NEXT FIVE YEARS INCLUDE EXPENDITURES REQUIRED TO MEET FEDERAL AND STATE ENVIRONMENTAL REGULATIONS. IS THERE A LIKELIHOOD THAT EMPIRE'S CAPITAL EXPENDITURES MAY BE LARGER THAN THE AMOUNTS THEY HAVE ESTIMATED?**

A. Yes. Empire's estimated capital expenditures include only amounts needed to meet existing environmental laws and regulations, as they are currently interpreted. As Empire states in its 2011 Form 10-K:

> In addition, new environmental laws and regulations, and new interpretations of existing environmental laws and regulations, have been adopted and may in the future be adopted which may substantially increase our future environmental expenditures for both new facilities and our existing facilities. [2011 Form 10-K, p. 20]

**Q. DOES THE COMMISSION STAFF RECOGNIZE THAT ELECTRIC UTILITIES UNDER THE COMMISSION'S JURISDICTION SUCH AS**

**EMPIRE MAY BE SUBJECT TO LARGE ENVIRONMENTAL-RELATED CAPITAL EXPENDITURES OVER THE NEXT SEVERAL YEARS?**

A. Yes. The Commission Staff published a report in May 2011 in which it concludes:

> [T]he overall cost to the electric utilities and potentially their customers related to existing Federal environmental regulation would be in an approximate range of $1,981,000,000 to $3,276,000,000. Future rules could increase this estimate or the range of the estimate. [File No. EW-2012-0065, May 1, 2011, p. 1, *In the Matter of an Investigation of the Cost to Missouri's Electric Utilities Resulting from Compliance with Federal Environmental Regulations*]

**Q. WHAT WERE EMPIRE'S CAPITAL EXPENDITURES OVER THE LAST THREE YEARS, 2009 THROUGH 2011?**

A. Empire's capital expenditures over the last three years, 2009 through 2011, were $155.3 million, $109.2 million, and $102.5 million, respectively (2011 Form 10-K, p. 49).

**Q. HOW DO EMPIRE'S AVERAGE ESTIMATED CAPITAL EXPENDITURES FOR THE FIVE-YEAR PERIOD 2012 THROUGH 2016 COMPARE TO ITS AVERAGE ACTUAL CAPITAL EXPENDITURES OVER THE LAST THREE YEARS?**

A. Empire's average annual capital expenditures for the five-year period 2012 through 2016 are estimated to be forty-five percent higher than its average annual capital expenditures over the last three years, 2009 through 2011 ($179 million average per year compared to $123 million average per year).

**Q. DO GREATER PROJECTED CAPITAL EXPENDITURES INCREASE AN ELECTRIC UTILITY'S INVESTMENT COST UNCERTAINTY?**

A. Yes. Greater projected capital expenditures increase investment cost uncertainty because investments in new generation, transmission, and distribution facilities and investments to satisfy environmental requirements take several years to complete. As investors found during the high electric utility investment period of the 1970s and 1980s, actual costs of building new generation, transmission, and distribution facilities can differ from forecasted costs as a result of changes in environmental regulations, materials costs, capital costs, and unexpected delays.

**Q. DOES EMPIRE DISCUSS THE RISKS OF INVESTING IN LARGE GENERATION PROJECTS IN ITS FORM 10-K FILING?**

A. Yes. As reported in its 2011 Form 10-K filing, the Company discusses some of the risks associated with making large capital investments as follows:

> **The cost and schedule of construction projects may materially change.**
>
> Our capital expenditure budget for the next three years is estimated to be $470.2 million. This includes expenditures for environmental upgrades to our existing facilities and additions to our transmission and distribution systems. There are risks that actual costs may exceed budget estimates, delays may occur in obtaining permits and materials, suppliers and contractors may not perform as required under their contracts, there may be inadequate availability, productivity or increased cost of qualified craft labor, start-up activities may take longer than planned, the scope and timing of projects may change, and other events beyond our control may occur that may materially affect the schedule, budget, cost and performance of projects. To the extent the completion of projects is delayed, we expect that the

> timing of receipt of increases in base rates reflecting our investment in such projects will be correspondingly delayed. Costs associated with these projects will also be subject to prudency review by regulators as part of future rate case filings and all costs may not be allowed recovery. [2011 Form 10-K, p. 20]

**Q. IF MAJOR CAPITAL EXPENDITURES INCREASE AN ELECTRIC UTILITY'S BUSINESS RISKS, WHY DO ELECTRIC UTILITIES UNDERTAKE SUCH EXPENDITURES?**

A. Electric utilities make capital expenditures in order to meet projected load requirements and satisfy new environmental regulations. Empire has been granted a certificated service territory and has the legal obligation to serve the current and future electricity needs of that service territory and to comply with all Federal, state, and local environmental regulations. The investments required to provide this service and meet environmental requirements are a necessary cost of providing utility service.

**Q. YOU NOTE ABOVE THAT HIGH OPERATING LEVERAGE CONTRIBUTES TO THE BUSINESS RISK OF ELECTRIC UTILITIES. WHAT IS OPERATING LEVERAGE?**

A. Operating leverage is the increased sensitivity of a company's earnings to sales variability that arises when some of the company's costs are fixed.

**Q. HOW DO ECONOMISTS MEASURE OPERATING LEVERAGE?**

A. Economists typically measure operating leverage by the ratio of a company's fixed expenses to its operating margin (revenues minus variable expenses).

**Q. WHAT IS THE DIFFERENCE BETWEEN FIXED AND VARIABLE EXPENSES?**

A. Fixed expenses are expenses that do not vary with output (that is, Kwh sold), and variable expenses are expenses that vary directly with output. For electric utilities, fixed expenses include the capacity component of purchased power costs, the fixed component of operating and maintenance costs, depreciation and amortization, and taxes. Fuel expenses are the primary variable cost for electric utilities.

**Q. DO ELECTRIC UTILITIES EXPERIENCE HIGH OPERATING LEVERAGE?**

A. Yes. As noted above, operating leverage increases when a firm's commitment to fixed costs rises in relation to its operating margin on sales. The relatively high degree of fixed costs in the electric utility business arises primarily from: (1) the average electric utility's large investment in fixed plant and equipment; and (2) the relative "fixity" of an electric utility's operating and maintenance costs. High operating leverage causes the average electric utility's operating income to be highly sensitive to demand and revenue fluctuations.

**Q. CAN AN ELECTRIC UTILITY REDUCE ITS OPERATING LEVERAGE BY PURCHASING, RATHER THAN GENERATING, ELECTRICITY?**

A. No. Electric utilities generally purchase power under long-term contracts that include both a fixed capacity charge and a variable charge that depends on the amount of electricity purchased. Since the fixed capacity charge is

designed to recover the seller's fixed costs of generating electricity, electric utilities generally experience the same degree of operating leverage when they purchase power as when they generate power.

**Q. HOW DOES OPERATING LEVERAGE AFFECT A COMPANY'S BUSINESS RISK?**

A. Operating leverage affects a company's business risk through its impact on the variability of the company's profits or income. Generally speaking, the higher a company's operating leverage, the higher is the variability of the company's operating profits.

**Q. WHY DO GREATER PROJECTED CAPITAL EXPENDITURES INCREASE OPERATING LEVERAGE?**

A. Operating leverage increases when a company's fixed costs are high relative to its variable costs. Increased capital expenditures increase operating leverage during the construction phase because investment costs are fixed, the investment period is relatively long, and the company does not generate revenues from its new plant until the plant is placed in service. Capital expenditures also increase operating leverage for a time after new plant is placed in service because revenues do not generally increase in line with investment costs for several years after the plant is placed in service. Thus, the ratio of fixed costs to operating margin increases when capital expenditures increase.

**Q. DOES REGULATION CREATE UNCERTAINTY FOR ELECTRIC UTILITIES?**

A. Yes. Investors' perceptions of the business and financial risks of electric utilities are strongly influenced by their views of the quality of regulation. Investors are painfully aware that regulators in some jurisdictions have been unwilling at times to set rates that allow companies an opportunity to recover their cost of service in a timely manner and earn a fair and reasonable return on investment. As a result of the perceived increase in regulatory risk, investors will demand a higher rate of return for electric utilities operating in those jurisdictions. On the other hand, if investors perceive that regulators will provide a reasonable opportunity for the company to maintain its financial integrity and earn a fair rate of return on its investment, investors will view regulatory risk as minimal.

**Q. ARE YOU FAMILIAR WITH THE CONCEPT OF "REGULATORY LAG?"**

A. Yes. "Regulatory lag" refers to the delay between the time a utility's return on investment either exceeds or falls short of its cost of capital and the time rates are adjusted to narrow the gap between the utility's return on investment and its cost of capital.

**Q. HOW IS A COMPANY'S RETURN ON INVESTMENT MEASURED?**

A. A company's return on investment is equal to the ratio of its operating profits (that is, revenues minus operating expenses) to its investment in plant and equipment.

**Q. WHAT WOULD CAUSE A UTILITY'S RETURN ON INVESTMENT TO BE LESS THAN ITS COST OF CAPITAL?**

A. A utility's return on investment will be less than its cost of capital if either: (1) its operating expenses and investment in plant and equipment are increasing faster than its revenues; or (2) its cost of capital is increasing.

**Q. ARE EMPIRE'S OPERATING EXPENSES AND INVESTMENT IN PLANT AND EQUIPMENT LIKELY TO INCREASE FASTER THAN ITS REVENUES IN THE NEXT FIVE YEARS?**

A. Yes. Since Empire projects that its capital expenditures will be approximately $900 million over the period 2012 to 2016, its operating expenses and investment in plant and equipment are likely to increase faster than its revenues over this period.

**Q. DOES REGULATORY LAG INCREASE A UTILITY'S RISK?**

A. Yes. When a utility invests in new plant and equipment, it incurs the risk that its return on investment will be less than its cost of capital. Regulatory lag increases a utility's risk because it increases the likelihood that the company's return on investment will be less than its cost of capital.

**Q. HOW CAN REGULATORS REDUCE THE RISK OF REGULATORY LAG?**

A. Regulators can reduce the risk of regulatory lag by various means, such as employing fuel adjustment clauses, using forward-looking test years, and including construction work in progress in rate base.

**Q. DOES THE COMMISSION SET RATES BASED ON A FORWARD-LOOKING TEST YEAR?**

A. No. Rates in Missouri are based on an historical test period, adjusted for known and measurable changes for a six-month period beyond the end of the historical test year.

**Q. YOU NOTE THAT FINANCIAL LEVERAGE INCREASES THE RISK OF INVESTING IN ELECTRIC UTILITIES SUCH AS EMPIRE. HOW DO ECONOMISTS MEASURE FINANCIAL LEVERAGE?**

A. Economists generally measure financial leverage by the percentages of debt and equity in a company's market value capital structure. Companies with a high percentage of debt compared to equity are considered to have high financial leverage.

**Q. WHY DOES FINANCIAL LEVERAGE AFFECT THE RISK OF INVESTING IN AN ELECTRIC UTILITY'S STOCK?**

A. High debt leverage is a source of additional risk to utility stock investors because it increases the percentage of the firm's costs that are fixed, and the presence of higher fixed costs increases the variability of the equity investors' return on investment.

**Q. CAN THE RISKS FACING ELECTRIC UTILITIES SUCH AS EMPIRE BE DISTINGUISHED FROM THE RISKS OF INVESTING IN COMPANIES IN OTHER INDUSTRIES?**

A. Yes. The risks of investing in electric utilities such as Empire can be distinguished from the risks of investing in companies in many other industries in several ways. First, the risks of investing in electric utilities are increased because of the greater capital intensity of the electric energy business and the fact that most investments in electric energy facilities are largely irreversible once they are made. Second, unlike returns in competitive industries, the returns from investment in electric utilities such as Empire are largely asymmetric. That is, there is little opportunity for the utility to earn more than its required return, but a significant chance that the utility will earn less than its required return.

**Q. WHAT CONCLUSION DO YOU REACH FROM YOUR ANALYSIS OF BUSINESS AND FINANCIAL RISK?**

A. I conclude that Empire's business and financial risks are increasing and are currently above the average business and financial risk of my proxy companies.

## V. COST OF EQUITY ESTIMATION METHODS

**Q. WHAT METHODS DO YOU USE TO ESTIMATE EMPIRE'S FAIR RATE OF RETURN ON EQUITY?**

A. I use several generally accepted methods for estimating the cost of equity for Empire. These are the Discounted Cash Flow (DCF), the ex ante risk premium, the ex post risk premium, and the capital asset pricing model (CAPM). The DCF method assumes that the current market price of a firm's

stock is equal to the discounted value of all expected future cash flows. The ex ante risk premium method assumes that an investor's current expectations regarding the equity risk premium can be estimated from recent data on the DCF expected rate of return on equity compared to the interest rate on long-term bonds. The ex post risk premium method assumes that an investor's current expectations regarding the equity-debt return differential is equal to the historical record of comparable returns on stock and bond investments. The cost of equity under both risk premium methods is then equal to the interest rate on bond investments plus the risk premium. The CAPM assumes that the investor's required rate of return on equity is equal to a risk-free rate of interest plus the product of a company-specific risk factor, beta, and the expected risk premium on the market portfolio.

**A. DISCOUNTED CASH FLOW METHOD**

**Q. PLEASE DESCRIBE THE DCF MODEL.**

A. The DCF model is derived from the assumption that investors value an asset on the basis of the future cash flows they expect to receive from owning the asset. Thus, investors value an investment in a bond because they expect to receive a sequence of semi-annual coupon payments over the life of the bond and a terminal payment equal to the bond's face value at the time the bond matures. Likewise, investors value an investment in a firm's stock because they expect to receive a sequence of dividend payments and, perhaps, expect to sell the stock at a higher price sometime in the future.

A second fundamental principle of the DCF method is that investors value a dollar received in the future less than a dollar received today. A future dollar is valued less than a current dollar because investors could invest a current dollar in an interest earning account and increase their wealth. This principle is called the time value of money.

Applying the two fundamental DCF principles noted above to an investment in a bond leads to the conclusion that investors value their investment in the bond on the basis of the present value of the bond's future cash flows. Thus, the price of the bond should be equal to:

**EQUATION 1**

$$P_B = \frac{C}{(1+i)} + \frac{C}{(1+i)^2} + \ldots + \frac{C+F}{(1+i)^n}$$

where:

$P_B$ = Bond price;

C = Cash value of the coupon payment (assumed for notational convenience to occur annually rather than semi-annually);

F = Face value of the bond;

i = The rate of interest the investor could earn by investing his money in an alternative bond of equal risk; and

n = The number of periods before the bond matures.

Applying these same principles to an investment in a firm's stock suggests that the price of the stock should be equal to:

**EQUATION 2**

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

where:

$P_S$ = Current price of the firm's stock;

$D_1, D_2 \ldots D_n$ = Expected annual dividend per share on the firm's stock;

$P_n$ = Price per share of stock at the time the investor expects to sell the stock; and

k = Return the investor expects to earn on alternative investments of the same risk, i.e., the investor's required rate of return.

Equation (2) is frequently called the annual discounted cash flow model of stock valuation. Assuming that dividends grow at a constant annual rate, *g*, this equation can be solved for *k*, the cost of equity. The resulting cost of equity equation is $k = D_1/P_s + g$, where *k* is the cost of equity, $D_1$ is the expected next period annual dividend, $P_s$ is the current price of the stock, and *g* is the constant annual growth rate in earnings, dividends, and book value per share. The term $D_1/P_s$ is called the expected dividend yield component of the annual DCF model, and the term *g* is called the expected growth component of the annual DCF model.

**Q. ARE YOU RECOMMENDING THAT THE ANNUAL DCF MODEL BE USED TO ESTIMATE EMPIRE'S COST OF EQUITY?**

A. No. The DCF model assumes that a company's stock price is equal to the present discounted value of all expected future dividends. The annual DCF model is only a correct expression of the present value of future dividends if dividends are paid annually at the end of each year. Since the companies in my proxy group all pay dividends quarterly, the current market price that investors are willing to pay reflects the expected quarterly receipt of dividends. Therefore, a quarterly DCF model should be used to estimate the cost of equity for these firms. The quarterly DCF model differs from the annual DCF model in that it expresses a company's price as the present value of a quarterly stream of dividend payments. A complete analysis of the implications of the quarterly payment of dividends on the DCF model is provided in Appendix 2. For the reasons cited there, I employ the quarterly DCF model throughout my calculations.

**Q. PLEASE DESCRIBE THE QUARTERLY DCF MODEL YOU USE.**

A. The quarterly DCF model I use is described on Schedule JVW-1 and in Appendix 2. The quarterly DCF equation shows that the cost of equity is: the sum of the future expected dividend yield and the growth rate, where the dividend in the dividend yield is the equivalent future value of the four quarterly dividends at the end of the year, and the growth rate is the expected growth in dividends or earnings per share.

**Q. HOW DO YOU ESTIMATE THE QUARTERLY DIVIDEND PAYMENTS IN YOUR QUARTERLY DCF MODEL?**

A. The quarterly DCF model requires an estimate of the dividends, $d_1$, $d_2$, $d_3$, and $d_4$, investors expect to receive over the next four quarters. I estimate the next four quarterly dividends by multiplying the previous four quarterly dividends by the factor, *(1 + the growth rate, g)*.

**Q. CAN YOU ILLUSTRATE HOW YOU ESTIMATE THE NEXT FOUR QUARTERLY DIVIDENDS WITH DATA FOR A SPECIFIC COMPANY?**

A. Yes. In the case of American Electric Power, the first company shown in Schedule 1, the last four quarterly dividends are equal to .46, .47, .47, and .47. Thus dividends $d_1$, $d_2$, $d_3$ and $d_4$ are equal to 0.476, .487, .487, and .487, respectively [.46 x (1 + .0353) = 0.476], and [.47 x (1 + .0353) = 0.487]. As noted previously, the logic underlying this procedure is described in Appendix 2.

**Q. HOW DO YOU ESTIMATE THE GROWTH COMPONENT OF THE QUARTERLY DCF MODEL?**

A. I use the analysts' estimates of future earnings per share ("EPS") growth reported by I/B/E/S Thomson Reuters.

**Q. WHAT ARE THE ANALYSTS' ESTIMATES OF FUTURE EPS GROWTH?**

A. As part of their research, financial analysts working at Wall Street firms periodically estimate EPS growth for each firm they follow. The EPS forecasts for each firm are then published. Investors who are contemplating purchasing

or selling shares in individual companies review the forecasts. These estimates represent three- to five-year forecasts of EPS growth.

**Q. WHAT IS I/B/E/S?**

A. I/B/E/S is a division of Thomson Reuters that reports analysts' EPS growth forecasts for a broad group of companies. The forecasts are expressed in terms of a mean forecast and a standard deviation of forecast for each firm. Investors use the mean forecast as an estimate of future firm performance.

**Q. WHY DO YOU USE THE I/B/E/S GROWTH ESTIMATES?**

A. The I/B/E/S growth rates: (1) are widely circulated in the financial community, (2) include the projections of reputable financial analysts who develop estimates of future EPS growth, (3) are reported on a timely basis to investors, and (4) are widely used by institutional and other investors.

**Q. WHY DO YOU RELY ON ANALYSTS' PROJECTIONS OF FUTURE EPS GROWTH IN ESTIMATING THE INVESTORS' EXPECTED GROWTH RATE RATHER THAN RELYING ON HISTORICAL OR RETENTION GROWTH RATES?**

A. I rely on analysts' projections of future EPS growth rather than historical or retention growth rates because there is considerable empirical evidence that analysts' forecasts are the best estimate of investors' expectation of future long-term growth. The evidence that analysts' forecasts are the best estimate of investors' expectation of future long-term growth is important because the DCF model requires the growth expectations of investors.

**Q. HAVE YOU PERFORMED ANY STUDIES CONCERNING THE USE OF ANALYSTS' FORECASTS AS AN ESTIMATE OF INVESTORS' EXPECTED GROWTH RATE, G?**

A. Yes, I prepared a study in conjunction with Willard T. Carleton, Professor of Finance Emeritus at the University of Arizona, on why analysts' forecasts are the best estimate of investors' expectation of future long-term growth. This study is described in a paper entitled "Investor Growth Expectations and Stock Prices: the Analysts versus History," published in *The Journal of Portfolio Management.*

**Q. PLEASE SUMMARIZE THE RESULTS OF YOUR STUDY.**

A. First, we performed a correlation analysis to identify the historically oriented growth rates which best described a firm's stock price. Then we did a regression study comparing the historical growth rates with the average I/B/E/S analysts' forecasts. In every case, the regression equations containing the average of analysts' forecasts statistically outperformed the regression equations containing the historical growth estimates. These results are consistent with those found by Cragg and Malkiel, the early major research in this area (John G. Cragg and Burton G. Malkiel, *Expectations and the Structure of Share Prices*, University of Chicago Press, 1982). These results are also consistent with the hypothesis that investors use analysts' forecasts, rather than historically oriented growth calculations, in making stock buy and sell decisions. They provide overwhelming evidence that the analysts'

forecasts of future growth are superior to historically-oriented growth measures in predicting a firm's stock price.

**Q. HAS YOUR STUDY BEEN UPDATED?**

A. Yes. Researchers at State Street Financial Advisors updated my study using data through year-end 2003. Their results continue to confirm that analysts' growth forecasts are superior to historically-oriented growth measures in predicting a firm's stock price.

**Q. WHAT PRICE DO YOU USE IN YOUR DCF MODEL?**

A. I use a simple average of the monthly high and low stock prices for each firm for the three-month period ending April 2012. These high and low stock prices were obtained from Thomson Reuters.

**Q. WHY DO YOU USE THE THREE-MONTH AVERAGE STOCK PRICE IN APPLYING THE DCF METHOD?**

A. I use the three-month average stock price in applying the DCF method because stock prices fluctuate daily, while financial analysts' forecasts for a given company are generally changed less frequently, often on a quarterly basis. Thus, to match the stock price with an earnings forecast, it is appropriate to average stock prices over a three-month period.

**Q. DO YOU INCLUDE AN ALLOWANCE FOR FLOTATION COSTS IN YOUR DCF ANALYSIS?**

A. No. Since Empire is seeking to recover its equity flotation costs as an expense over a five-year period, I have not included an allowance for flotation costs in my cost of equity calculations.

**Q. HOW DO YOU APPLY THE DCF APPROACH TO OBTAIN THE COST OF EQUITY CAPITAL FOR EMPIRE?**

A. I apply the DCF approach to the Value Line electric companies shown in Schedule JVW-1.

**Q. HOW DO YOU SELECT YOUR PROXY GROUP OF ELECTRIC COMPANIES?**

A. I select all the companies in Value Line's groups of electric companies that: (1) paid dividends during every quarter of the last two years; (2) did not decrease dividends during any quarter of the past two years; (3) have at least two analysts included in the I/B/E/S mean growth forecast; (4) have an investment grade bond rating and a Value Line Safety Rank of 1, 2, or 3; and (5) are not the subject of a merger offer that has not been completed.

**Q. WHY DO YOU ELIMINATE COMPANIES THAT HAVE EITHER DECREASED OR ELIMINATED THEIR DIVIDEND IN THE PAST TWO YEARS?**

A. The DCF model requires the assumption that dividends will grow at a constant rate into the indefinite future. If a company has either decreased or eliminated its dividend in recent years, an assumption that the company's dividend will grow at the same rate into the indefinite future is questionable.

**Q. WHY DO YOU ELIMINATE COMPANIES THAT HAVE FEWER THAN TWO ANALYSTS INCLUDED IN THE I/B/E/S MEAN FORECASTS?**

A. The DCF model also requires a reliable estimate of a company's expected future growth. For most companies, the I/B/E/S mean growth forecast is the best available estimate of the growth term in the DCF model. However, the I/B/E/S estimate may be less reliable if the mean estimate is based on the inputs of very few analysts. On the basis of my professional judgment, I believe that at least two analysts' estimates are a reasonable minimum number.

**Q. WHY DO YOU ELIMINATE COMPANIES THAT ARE BEING ACQUIRED IN TRANSACTIONS THAT ARE NOT YET COMPLETED?**

A. A merger announcement generally increases the target company's stock price, but not the acquiring company's stock price. Analysts' growth forecasts for the target company, on the other hand, are necessarily related to the company as it currently exists. The use of a stock price that includes the growth-enhancing prospects of potential mergers in conjunction with growth forecasts that do not include the growth-enhancing prospects of potential mergers produces DCF results that tend to distort a company's cost of equity.

**Q. PLEASE SUMMARIZE THE RESULTS OF YOUR APPLICATION OF THE DCF MODEL TO YOUR PROXY COMPANY GROUP.**

A. As shown on Schedule JVW-1, I obtain an average result of 10.2 percent for my proxy company group.

**Q. ARE YOU AWARE THAT THE COMMISSION SOMETIMES GIVES CONSIDERATION TO THE RESULTS OF A MULTI-STAGE DCF MODEL[1]?**

A. Yes.

**Q. DO YOU RECOMMEND THE USE OF A MULTI-STAGE DCF MODEL TO ESTIMATE THE COST OF EQUITY FOR ELECTRIC UTILITIES?**

A. No. I recommend the use of a single-stage DCF model because, as I discuss above, my research indicates that investors use the analysts' growth rates in a single-stage DCF model in making stock buy and sell decisions. In addition, multi-stage models require estimates of growth in each stage as well as estimates of the length of the period to which the various growth rates apply. Recognizing the additional complexities of applying multi-stage models, I believe they should be used only when there is incontrovertible evidence that the results of the single-stage model are less reliable. I am unaware of such evidence for my proxy companies.

**Q. SINCE THE COMMISSION SOMETIMES GIVES CONSIDERATION TO THE RESULTS OF MULTI-STAGE DCF MODELS, HAVE YOU NONETHELESS ESTIMATED THE COST OF EQUITY USING A MULTI-STAGE DCF MODEL?**

A. Yes. I apply a three-stage DCF model to my electric company proxy group, using the same price and dividend information as the data in my preferred

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[1] See, for example, *In the Matter of Union Electric Company, d/b/a AmerenUE's Tariffs to Increase Its Annual Revenues for Electric Service*, Report and Order, Missouri Public Service Commission, Case No. ER-2010-0036, May 28, 2010, at pp. 21-22, para. 22-24.

DCF approach. For the growth rate in the first stage, a five-year period, I use the analysts' estimates of earnings growth. For the second-stage growth rate, I assume that growth will gradually change over a fifteen-year period to the estimate of long-term growth in the economy as a whole. For third-stage growth, I use three estimates of long-term growth. First, I use the 4.52 percent long-term Gross Domestic Product ("GDP") growth forecast of the Energy Information Administration ("EIA"). Second, I use the 5.19 percent long-term growth estimate derived by adding the 3.24 percent long-run historical growth in real GDP based on data from the Bureau of Economic Analysis to the EIA's 1.96 percent estimate of future inflation as measured by the GDP deflator. Third, I use the 6.26 percent historical growth in nominal GDP over the period 1929 through 2011 from the Bureau of Economic Analysis.

**Q. WHAT RESULTS DO YOU OBTAIN FROM YOUR APPLICATION OF A THREE-STAGE DCF MODEL?**

A. I obtain average DCF results in the range 9.5 percent to 10.6 percent (see Schedule JVW-2).

**B. RISK PREMIUM METHOD**

**Q. PLEASE DESCRIBE THE RISK PREMIUM METHOD OF ESTIMATING EMPIRE'S COST OF EQUITY.**

A. The risk premium method is based on the principle that investors expect to earn a return on an equity investment in Empire that reflects a "premium" over and above the return they expect to earn on an investment in a portfolio of

bonds. This equity risk premium compensates equity investors for the additional risk they bear in making equity investments versus bond investments.

**Q. DOES THE RISK PREMIUM APPROACH SPECIFY WHAT DEBT INSTRUMENT SHOULD BE USED TO ESTIMATE THE INTEREST RATE COMPONENT IN THE METHODOLOGY?**

A. No. The risk premium approach can be implemented using virtually any debt instrument. However, the risk premium approach does require that the debt instrument used to estimate the risk premium be the same as the debt instrument used to calculate the interest rate component of the risk premium approach. For example, if the risk premium on equity is calculated by comparing the returns on stocks and the returns on A-rated utility bonds, then the interest rate on A-rated utility bonds must be used to estimate the interest rate component of the risk premium approach.

**Q. DOES THE RISK PREMIUM APPROACH REQUIRE THAT THE SAME COMPANIES BE USED TO ESTIMATE THE STOCK RETURN AS ARE USED TO ESTIMATE THE BOND RETURN?**

A. No. For example, many analysts apply the risk premium approach by comparing the return on a portfolio of stocks to the return on Treasury securities such as long-term Treasury bonds. Clearly, in this widely-accepted application of the risk premium approach, the same companies are not used

to estimate the stock return as are used to estimate the bond return, since the U.S. government is not a company.

**Q. HOW DO YOU MEASURE THE REQUIRED RISK PREMIUM ON AN EQUITY INVESTMENT IN EMPIRE?**

A. I use two methods to estimate the required risk premium on an equity investment in Empire. The first is called the ex ante risk premium method and the second is called the ex post risk premium method.

**1. EX ANTE RISK PREMIUM METHOD**

**Q. PLEASE DESCRIBE YOUR EX ANTE RISK PREMIUM APPROACH FOR MEASURING THE REQUIRED RISK PREMIUM ON AN EQUITY INVESTMENT IN EMPIRE.**

A. My ex ante risk premium method is based on studies of the DCF expected return on a proxy group of electric companies compared to the interest rate on Moody's A-rated utility bonds. Specifically, for each month in my study period, I calculate the risk premium using the equation,

$$RP_{PROXY} = DCF_{PROXY} - I_A$$

where:

$RP_{PROXY}$ = the required risk premium on an equity investment in the proxy group of companies;

$DCF_{PROXY}$ = average DCF estimated cost of equity on a portfolio of proxy companies; and

$I_A$ = the yield to maturity on an investment in A-rated utility bonds.

I then perform a regression analysis to determine if there is a relationship between the calculated risk premium and interest rates. Finally, I use the results of the regression analysis to estimate the investors' required risk premium. To estimate the cost of equity, I then add the required risk premium to the forecasted interest rate on A-rated utility bonds. A detailed description of my ex ante risk premium studies is contained in Appendix 3, and the underlying DCF results and interest rates are displayed in Schedule JVW-3.

**Q. WHAT COST OF EQUITY DO YOU OBTAIN FROM YOUR EX ANTE RISK PREMIUM METHOD?**

A. To estimate the cost of equity using the ex ante risk premium method, one may add the estimated risk premium over the yield on A-rated utility bonds to the forecasted yield to maturity on A-rated utility bonds. As noted above, one could use the yield to maturity on other debt investments to measure the interest rate component of the risk premium approach as long as one uses the yield on the same debt investment to measure the expected risk premium component of the risk premium approach. I choose to use the yield on A-rated utility bonds because it is a frequently-used benchmark for utility bond yields. I obtain the forecasted yield to maturity on A-rated utility bonds, 6.47 percent,

by averaging forecast data from Value Line and Global Insight.[2] My analyses produce an estimated risk premium over the yield on A-rated utility bonds equal to 4.4 percent. Adding an estimated risk premium of 4.4 percent to the 6.5 percent forecasted yield to maturity on A-rated utility bonds produces a cost of equity estimate of 10.9 percent using the ex ante risk premium method.

### 2. EX POST RISK PREMIUM METHOD

**Q. PLEASE DESCRIBE YOUR EX POST RISK PREMIUM METHOD FOR MEASURING THE REQUIRED RISK PREMIUM ON AN EQUITY INVESTMENT IN EMPIRE.**

A. I first perform a study of the comparable returns received by bond and stock investors over the seventy-five years of my study. I estimate the returns on stock and bond portfolios, using stock price and dividend yield data on the S&P 500 and bond yield data on Moody's A-rated Utility Bonds. My study consists of making an investment of one dollar in the S&P 500 and Moody's A-rated utility bonds at the beginning of 1937, and reinvesting the principal plus return each year to 2012. The return associated with each stock portfolio

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2 Value Line Selection & Opinion (February 24, 2012) projects a AAA-rated Corporate bond yield equal to 5.30 percent. The February 2012 average spread between A-rated utility bonds and Aaa-rated Corporate bonds is fifty-one basis points (A-rated utility, 4.36 percent, less Aaa-rated Corporate, 3.85 percent, equals fifty-one basis points). Adding fifty-one basis points to the 5.30 percent Value Line forecast equals a forecast yield of 5.81 percent. Global Insight, February 2012, forecasts a AA-rated utility bonds yield equal to 6.80 percent. The average spread between AA-rated utility and A-rated utility bonds, February 2012, is thirty-four basis points (4.36 percent less 4.02 percent). Adding thirty-four basis points to the Global Insight forecast of 6.80 percent equals a forecast yield for A-rated utility bonds equal to 7.14 percent. The average of the forecasts, (5.81 percent using Value Line data and 7.14 percent using Global Insight data) is 6.47 percent.

is the sum of the annual dividend yield and capital gain (or loss) which accrued to this portfolio during the year(s) in which it was held. The return associated with the bond portfolio, on the other hand, is the sum of the annual coupon yield and capital gain (or loss) which accrued to the bond portfolio during the year(s) in which it was held. The resulting annual returns on the stock and bond portfolios purchased in each year from 1937 to 2012 are shown on Schedule JVW-4. The average annual return on an investment in the S&P 500 stock portfolio is 11.0 percent, while the average annual return on an investment in the Moody's A-rated utility bond portfolio is 6.7 percent. The risk premium on the S&P 500 stock portfolio is, therefore, 4.3 percent.

I also conduct a second study using stock data on the S&P Utilities rather than the S&P 500. As shown on Schedule JVW-5, the S&P Utility stock portfolio shows an average annual return of 10.6 percent per year. Thus, the return on the S&P Utility stock portfolio exceeds the return on the Moody's A–rated utility bond portfolio by 3.8 percent.

**Q. WHY IS IT APPROPRIATE TO PERFORM YOUR EX POST RISK PREMIUM ANALYSIS USING BOTH THE S&P 500 AND THE S&P UTILITIES STOCK INDICES?**

A. I perform my ex post risk premium analysis on both the S&P 500 and the S&P Utilities Stock Indices because I believe electric energy companies today face risks that are somewhere in between the average risk of the S&P Utilities and the S&P 500 Stock Indices over the years 1937 to 2012. Thus, I use the

average of the two historically-based risk premiums as my estimate of the required risk premium for Empire in my ex post risk premium method.

**Q. WHY DO YOU ANALYZE INVESTORS' EXPERIENCES OVER SUCH A LONG TIME FRAME?**

A. Because day-to-day stock price movements can be somewhat random, it is inappropriate to rely on short-run movements in stock prices in order to derive a reliable risk premium. Rather than buying and selling frequently in anticipation of highly volatile price movements, most investors employ a strategy of buying and holding a diversified portfolio of stocks. This buy-and-hold strategy will allow an investor to achieve a much more predictable long-run return on stock investments and at the same time will minimize transaction costs. The situation is very similar to the problem of predicting the results of coin tosses. I cannot predict with any reasonable degree of accuracy the result of a single, or even a few, flips of a balanced coin; but I can predict with a good deal of confidence that approximately fifty heads will appear in one hundred tosses of this coin. Under these circumstances, it is most appropriate to estimate future experience from long-run evidence of investment performance.

**Q. WOULD YOUR STUDY PROVIDE A DIFFERENT RISK PREMIUM IF YOU WERE TO BEGIN WITH A DIFFERENT TIME PERIOD?**

A. Yes. Risk premium results vary somewhat depending on the historical time period chosen. My policy is to go back as far as it is possible to obtain reliable

data. I believe it to be most meaningful to begin after the passage and implementation of the Public Utility Holding Company Act of 1935, which significantly changed the structure of the public utility industry. Since the Public Utility Holding Company Act of 1935 was not implemented until the beginning of 1937, I believe that numbers taken from before this date are not comparable to those taken after. (The repeal of the 1935 Act has not materially impacted the structure of the public utility industry; thus, the Act's repeal does not have any impact on my choice of time period.)

**Q. WHY IS IT NECESSARY TO EXAMINE THE YIELD FROM DEBT INVESTMENTS IN ORDER TO DETERMINE THE INVESTORS' REQUIRED RATE OF RETURN ON EQUITY CAPITAL?**

A. As previously explained, investors expect to earn a return on their equity investment that exceeds currently available bond yields because the return on equity, as a residual return, is less certain than the yield on bonds; and investors must be compensated for this uncertainty. Second, investors' current expectations concerning the amount by which the return on equity will exceed the bond yield will be strongly influenced by historical differences in returns to bond and stock investors. For these reasons, we can estimate investors' current expected returns on equity investments from knowledge of current bond yields and past differences between returns on stocks and bonds.

**Q. IS THERE ANY SIGNIFICANT TREND IN THE EQUITY RISK PREMIUM OVER THE 1937 TO 2012 TIME PERIOD OF YOUR RISK PREMIUM STUDY?**

A. No. Statisticians test for trends in data series by regressing the data observations against time. I perform such a time series regression on my two data sets of historical risk premiums. As shown below, there is no statistically significant trend in my risk premium data. Indeed, the coefficient on the time variable is insignificantly different from zero (if there were a trend, the coefficient on the time variable should be significantly different from zero).

**TABLE 1**
**REGRESSION OUTPUT FOR RISK PREMIUM ON S&P 500**

| LINE NO. | | INTERCEPT | TIME | ADJUSTED R SQUARE | F |
|---|---|---|---|---|---|
| 1 | Coefficient | 3.013 | | 0.024 | 2.83 |
| 2 | T Statistic | 1.706 | | | |

**TABLE 2**
**REGRESSION OUTPUT FOR RISK PREMIUM ON S&P UTILITIES**

| LINE NO. | | INTERCEPT | TIME | ADJUSTED R SQUARE | F |
|---|---|---|---|---|---|
| 1 | Coefficient | 1.990 | | 0.008 | 1.56 |
| 2 | T Statistic | 1.275 | | | |

**Q. DO YOU HAVE ANY OTHER EVIDENCE THAT THERE HAS BEEN NO SIGNIFICANT TREND IN RISK PREMIUM RESULTS OVER TIME?**

A. Yes. The *Ibbotson® SBBI® 2012 Valuation Yearbook* ("SBBI") published by Morningstar, Inc., contains an analysis of "trends" in historical risk premium data. SBBI uses correlation analysis to determine if there is any pattern or

"trend" in risk premiums over time. This analysis also demonstrates that there are no trends in risk premiums over time.

**Q. WHAT IS THE SIGNIFICANCE OF THE EVIDENCE THAT HISTORICAL RISK PREMIUMS HAVE NO TREND OR OTHER STATISTICAL PATTERN OVER TIME?**

A. The significance of this evidence is that the average historical risk premium is a reasonable estimate of the future expected risk premium. As noted in SBBI:

> The significance of this evidence is that the realized equity risk premium next year will not be dependent on the realized equity risk premium from this year. That is, there is no discernible pattern in the realized equity risk premium—it is virtually impossible to forecast next year's realized risk premium based on the premium of the previous year. For example, if this year's difference between the riskless rate and the return on the stock market is higher than last year's, that does not imply that next year's will be higher than this year's. It is as likely to be higher as it is lower. The best estimate of the expected value of a variable that has behaved randomly in the past is the average (or arithmetic mean) of its past values. [*SBBI*, page 58.]

**Q. WHAT CONCLUSIONS DO YOU DRAW FROM YOUR EX POST RISK PREMIUM ANALYSES ABOUT THE REQUIRED RETURN ON AN EQUITY INVESTMENT IN EMPIRE?**

A. My ex post risk premium analyses suggest that investors require an equity return of approximately 3.8 to 4.3 percentage points above the expected yield on A-rated utility bonds. The forecast yield on A-rated utility bonds is 6.5 percent. Adding a 3.8 to 4.3 percentage point risk premium to a yield of 6.5 percent on A-rated utility bonds, I obtain an expected return on equity in

the range 10.3 percent to 10.8 percent, with a midpoint estimate of the ex post risk premium cost of equity equal to 10.6 percent.

### C. CAPITAL ASSET PRICING MODEL

**Q. WHAT IS THE CAPM?**

A. The CAPM is an equilibrium model of the security markets in which the expected or required return on a given security is equal to the risk-free rate of interest, plus the company equity "beta," times the market risk premium:

*Cost of equity = Risk-free rate + Equity beta x Market risk premium*

The risk-free rate in this equation is the expected rate of return on a risk-free government security, the equity beta is a measure of the company's risk relative to the market as a whole, and the market risk premium is the premium investors require to invest in the market basket of all securities compared to the risk-free security.

**Q. HOW DO YOU USE THE CAPM TO ESTIMATE THE COST OF EQUITY FOR YOUR PROXY COMPANIES?**

A. The CAPM requires an estimate of the risk-free rate, the company-specific risk factor or beta, and the expected return on the market portfolio. For my estimate of the risk-free rate, I use the forecasted yield to maturity on 20-year Treasury bonds of 4.9 percent, using forecast data from Value Line and Global Insight.[3] I use the 20-year Treasury bond to estimate the risk-free rate

[3] Value Line forecasts a yield on 10-year Treasury notes equal to 3.5 percent. The current spread between the average February 2012 yield on 10-year Treasury notes (1.97 percent) and 20-year Treasury bonds (2.75 percent) is seventy-eight basis points. Adding seventy-eight basis points to Value Line's 3.5 percent forecast produces a forecasted yield of

because SBBI estimates the risk premium using 20-year Treasury bonds, and one should use the same maturity to estimate the risk-free rate as is used to estimate the risk premium on the market portfolio.

For my estimate of the company-specific risk, or beta, I use the average 0.70 Value Line beta for my proxy electric companies. For my estimate of the expected risk premium on the market portfolio, I use two approaches. First, I estimate the risk premium on the market portfolio using historical risk premium data reported by SBBI. Second, I estimate the risk premium on the market portfolio from the difference between the DCF cost of equity for the S&P 500 and the forecasted yield to maturity on 20-year Treasury bonds.

### 1. HISTORICAL CAPM

**Q. HOW DO YOU ESTIMATE THE EXPECTED RISK PREMIUM ON THE MARKET PORTFOLIO USING HISTORICAL RISK PREMIUM DATA REPORTED BY SBBI?**

A. I estimate the expected risk premium on the market portfolio by calculating the difference between the arithmetic mean return on the S&P 500 from 1926 through 2011 (11.77 percent) and the average income return on 20-year U.S. Treasury bonds over the same period (5.15 percent) (see Ibbotson® SBBI®

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4.28 percent for 20-year Treasury bonds (see Value Line Investment Survey, Selection & Opinion, February 24, 2012). Global Insight forecasts a yield of 4.77 percent on 10-year Treasury notes. Adding the seventy-eight basis point spread between 10-year Treasury notes and 20-year Treasury bonds to the Global Insight forecast of 4.77 percent equals a Global Insight forecast for 20-year Treasury bonds equal to 5.55 percent. The average of the Value Line and Global Insight forecasts (4.28 percent and 5.55 percent, respectively) is 4.91 percent.

2012 Valuation Yearbook, published by Morningstar®). Thus, my historical risk premium method produces a risk premium of 6.6 percent (11.77 – 5.15 = 6.62).

**Q. WHY DO YOU RECOMMEND THAT THE RISK PREMIUM ON THE MARKET PORTFOLIO BE ESTIMATED USING THE ARITHMETIC MEAN RETURN ON THE S&P 500?**

A. As explained in SBBI, the arithmetic mean return is the best approach for calculating the return investors expect to receive in the future:

> The equity risk premium data presented in this book are arithmetic average risk premia as opposed to geometric average risk premia. The arithmetic average equity risk premium can be demonstrated to be most appropriate when discounting future cash flows. For use as the expected equity risk premium in either the CAPM or the building block approach, the arithmetic mean or the simple difference of the arithmetic means of stock market returns and riskless rates is the relevant number. This is because both the CAPM and the building block approach are additive models, in which the cost of capital is the sum of its parts. The geometric average is more appropriate for reporting past performance, since it represents the compound average return. [SBBI, p. 56.]

A discussion of the importance of using arithmetic mean returns in the context of CAPM or risk premium studies is contained in Schedule JVW- 6.

**Q. WHY DO YOU RECOMMEND THAT THE RISK PREMIUM ON THE MARKET PORTFOLIO BE MEASURED USING THE INCOME RETURN ON 20-YEAR TREASURY BONDS RATHER THAN THE TOTAL RETURN ON THESE BONDS?**

A. As discussed above, the CAPM requires an estimate of the risk-free rate of interest. When Treasury bonds are issued, the income return on the bond is

risk free, but the total return, which includes both income and capital gains or losses, is not. Thus, the income return should be used in the CAPM because it is only the income return that is risk free.

**Q. WHAT CAPM RESULT DO YOU OBTAIN WHEN YOU ESTIMATE THE EXPECTED RISK PREMIUM ON THE MARKET PORTFOLIO FROM THE ARITHMETIC MEAN DIFFERENCE BETWEEN THE RETURN ON THE MARKET AND THE YIELD ON 20-YEAR TREASURY BONDS?**

A. Using a risk-free rate equal to 4.91 percent, a beta equal to 0.70, and a risk premium on the market portfolio equal to 6.6 percent, I obtain an historical CAPM estimate of the cost of equity equal to 9.5 percent (4.91 + 0.70 x 6.6 = 9.5), see Schedule JVW-7.

**Q. IS THERE ANY EVIDENCE FROM THE FINANCE LITERATURE THAT THE APPLICATION OF THE HISTORICAL CAPM MAY UNDERESTIMATE THE COST OF EQUITY?**

A. Yes. There is substantial evidence that: (1) the historical CAPM tends to underestimate the cost of equity for companies whose equity beta is less than 1.0; and (2) the CAPM is less reliable the further the estimated beta is from 1.0.

**Q. WHAT IS THE EVIDENCE THAT THE CAPM TENDS TO UNDERESTIMATE THE COST OF EQUITY FOR COMPANIES WITH BETAS LESS THAN 1.0 AND IS LESS RELIABLE THE FURTHER THE ESTIMATED BETA IS FROM 1.0?**

A. The original evidence that the unadjusted CAPM tends to underestimate the cost of equity for companies whose equity beta is less than 1.0 and is less reliable the further the estimated beta is from 1.0 was presented in a paper by Black, Jensen, and Scholes (1972), "The Capital Asset Pricing Model: Some Empirical Tests." Numerous subsequent papers have validated the Black, Jensen, and Scholes findings, including those by Litzenberger and Ramaswamy (1979), Banz (1981), Fama and French (1992), Fama and French (2004), Fama and MacBeth (1973), and Jegadeesh and Titman (1993).[4]

**Q. CAN YOU BRIEFLY SUMMARIZE THESE ARTICLES?**

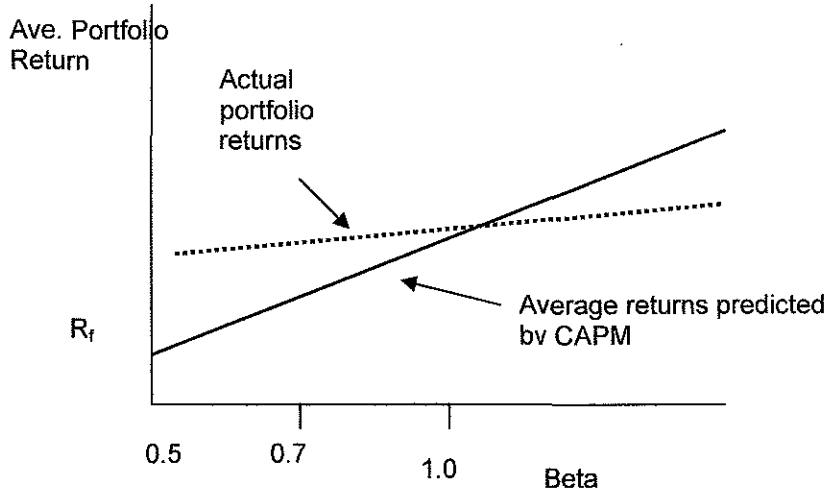
A. Yes. The CAPM conjectures that security returns increase with increases in security betas in line with the equation

$$ER_i = R_f + \beta_i \left[ ER_m - R_f \right],$$

where $ER_i$ is the expected return on security or portfolio $i$, $R_f$ is the risk-free rate, $ER_m - R_f$ is the expected risk premium on the market portfolio, and $\beta_i$ is a measure of the risk of investing in security or portfolio $i$ (see Figure 1 below).

[4] Fischer Black, Michael C. Jensen, and Myron Scholes, "The Capital Asset Pricing Model: Some Empirical Tests," in *Studies in the Theory of Capital Markets*, M. Jensen, ed. New York: Praeger, 1972; Eugene Fama and James MacBeth, "Risk, Return, and Equilibrium: Empirical Tests," *Journal of Political Economy* 81 (1973), pp. 607-36; Robert Litzenberger and Krishna Ramaswamy, "The Effect of Personal Taxes and Dividends on Capital Asset Prices: Theory and Empirical Evidence," *Journal of Financial Economics* 7 (1979), pp. 163-95.; Rolf Banz, "The Relationship between Return and Market Value of Common Stocks," *Journal of Financial Economics* (March 1981), pp. 3-18; Eugene F. Fama and Kenneth R. French, "The Cross-Section of Expected Returns," *Journal of Finance* (June 1992), 47:2, pp. 427-465; Eugene F. Fama and Kenneth R. French, "The Capital Asset Pricing Model: Theory and Evidence," *The Journal of Economic Perspectives* (Summer 2004), 18:3, pp. 25 – 46; Narasimhan Jegadeesh and Sheridan Titman, "Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency," *The Journal of Finance*, Vol. 48, No. 1. (Mar., 1993), pp. 65-91.

**FIGURE 1**
**AVERAGE RETURNS COMPARED TO BETA**
**FOR PORTFOLIOS FORMED ON PRIOR BETA**




Financial scholars have studied the relationship between estimated portfolio betas and the achieved returns on the underlying portfolio of securities to test whether the CAPM correctly predicts achieved returns in the marketplace. They find that the relationship between returns and betas is inconsistent with the relationship posited by the CAPM. As described in Fama and French (1992) and Fama and French (2004), the actual relationship between portfolio betas and returns is shown by the dotted line in Figure 1 above. Although financial scholars disagree on the reasons why the return/beta relationship looks more like the dotted line in Figure 1 than the straight line, they generally agree that the dotted line lies above the straight line for portfolios with betas less than 1.0 and below the straight line for portfolios with betas greater than 1.0. Thus, in practice, scholars generally agree that the CAPM underestimates portfolio returns for companies with betas less than 1.0 and is less reliable the further the estimated beta is from 1.0.

**Q. DO YOU HAVE ADDITIONAL EVIDENCE THAT THE CAPM TENDS TO UNDERESTIMATE THE COST OF EQUITY FOR UTILITY COMPANIES WITH AVERAGE BETAS LESS THAN 1.0?**

A. Yes. As shown in JVW-8, over the period 1937 to 2012, investors in the S&P Utilities Stock Index have earned a risk premium over the yield on long-term Treasury bonds equal to 5.21 percent, while investors in the S&P 500 have earned a risk premium over the yield on long-term Treasury bonds equal to 5.67 percent. According to the CAPM, investors in utility stocks should expect to earn a risk premium over the yield on long-term Treasury securities equal to the average utility beta times the expected risk premium on the S&P 500. Thus, the ratio of the risk premium on the utility portfolio to the risk premium on the S&P 500 should equal the utility beta. However, the average utility beta at the time of my studies is approximately 0.70, whereas the historical ratio of the utility risk premium to the S&P 500 risk premium is 0.92 (5.21 ÷ 5.67 = 0.92). In short, an application of the historical CAPM at this time significantly underestimates the cost of equity for utility companies with an average beta less than 1.0.

**Q. WHAT CONCLUSIONS DO YOU DRAW FROM YOUR REVIEW OF THE CAPM LITERATURE AND THE EVIDENCE THAT UTILITY BETAS ARE SIGNIFICANTLY LESS THAN THE HISTORICAL RATIO OF THE UTILITY RISK PREMIUM TO THE S&P 500 RISK PREMIUM?**

A. I conclude that the CAPM underestimates the cost of equity for companies with betas significantly less than 1.0 and is less reliable the further the estimated beta is from 1.0. I also conclude that stock market activity can greatly affect betas. The significant volatility in the stock market in the last two years has led to a steep drop in utility betas. The drop in utility betas is important because the further the beta is from 1.0, the less reliable are the results of applying the CAPM to low beta companies such as utilities. Given that the average beta for my proxy group of electric utilities is 0.70, I conclude that the cost of equity model results from applying the CAPM should be given little or no weight for the purpose of estimating Empire's cost of equity in this proceeding.

### 2. DCF-BASED CAPM

**Q. HOW DOES YOUR DCF-BASED CAPM DIFFER FROM YOUR HISTORICAL CAPM?**

A. As noted above, my DCF-based CAPM differs from my historical CAPM only in the method I use to estimate the risk premium on the market portfolio. In the historical CAPM, I use historical risk premium data to estimate the risk premium on the market portfolio. In the DCF-based CAPM, I estimate the risk premium on the market portfolio from the difference between the DCF cost of equity for the S&P 500 and the forecasted yield to maturity on 20-year Treasury bonds.

**Q. WHAT RISK PREMIUM DO YOU OBTAIN WHEN YOU CALCULATE THE DIFFERENCE BETWEEN THE DCF-RETURN ON THE S&P 500 AND THE RISK-FREE RATE?**

A. Using this method, I obtain a risk premium on the market portfolio equal to 7.93 percent (see Schedule JVW-9).

**Q. WHAT CAPM RESULT DO YOU OBTAIN WHEN YOU ESTIMATE THE EXPECTED RETURN ON THE MARKET PORTFOLIO BY APPLYING THE DCF MODEL TO THE S&P 500?**

A. Using a risk-free rate of 4.91 percent, a beta of 0.70, and a risk premium on the market portfolio of 8.19 percent, I obtain a CAPM result of 10.6 percent.

**Q. RECOGNIZING THAT THE CAPM UNDERESTIMATES THE COST OF EQUITY FOR COMPANIES SUCH AS YOUR PROXY COMPANIES WITH BETAS SIGNIFICANTLY LESS THAN 1.0, HOW DO YOU RECOMMEND THAT THE COMMISSION CONSIDER YOUR CAPM COST OF EQUITY RESULTS IN THIS PROCEEDING?**

A. Given that the CAPM underestimates the cost of equity for companies such as my proxy companies with betas significantly less than 1.0, I recommend that the Commission give little or no weight to the cost of equity results obtained from my CAPM analyses at this time.

## VI. FAIR RATE OF RETURN ON EQUITY

**Q. BASED ON YOUR APPLICATION OF SEVERAL COST OF EQUITY METHODS TO YOUR PROXY COMPANIES, WHAT IS YOUR**

**CONCLUSION REGARDING YOUR PROXY COMPANIES' COST OF EQUITY?**

A. Based on my application of several cost of equity methods to my proxy companies, I conclude that my proxy companies' cost of equity is 10.6 percent. As shown in the table below, 10.6 percent is the simple average of my DCF, ex ante risk premium, and ex post risk premium results (see Table 3 below).

**TABLE 3**
**COST OF EQUITY MODEL RESULTS**

| METHOD | MODEL RESULT |
|---|---|
| Discounted Cash Flow | 10.2% |
| Ex Ante Risk Premium | 10.9% |
| Ex Post Risk Premium | 10.6% |
| Average | 10.6% |

**Q. DOES YOUR 10.6 PERCENT COST OF EQUITY CONCLUSION FOR YOUR PROXY COMPANIES DEPEND ON THE PERCENTAGES OF DEBT AND EQUITY IN THE PROXY COMPANIES' AVERAGE CAPITAL STRUCTURE?**

A. Yes. My 10.6 percent cost of equity conclusion reflects the financial risk associated with the average market value capital structure of my proxy companies, which has approximately 58 percent equity.

**Q. WHAT CAPITAL STRUCTURE IS EMPIRE RECOMMENDING IN THIS PROCEEDING FOR THE PURPOSE OF RATE MAKING?**

A. Empire is recommending that its adjusted projected consolidated capital structure containing approximately 51 percent common equity be used for rate making purposes in this proceeding.

**Q. HOW DOES EMPIRE'S RECOMMENDED RATE MAKING CAPITAL STRUCTURE IN THIS PROCEEDING COMPARE TO THE AVERAGE CAPITAL STRUCTURE OF YOUR PROXY COMPANIES?**

A. Although Empire's recommended capital structure contains an appropriate mix of debt and equity and is a reasonable capital structure for rate making purposes in this proceeding, this recommended rate making capital structure embodies greater financial risk than is reflected in my cost of equity estimates from my proxy companies.

**Q. WHAT RETURN ON COMMON EQUITY DO YOU RECOMMEND FOR EMPIRE?**

A. I conservatively recommend an ROE of 10.6 percent for Empire. My recommendation is conservative in that it does not reflect: (1) Empire's greater business risk compared to the average business risk of the proxy companies; and (2) the higher financial risk implicit in Empire's rate making capital structure compared to the average financial risk of the proxy companies implicit in the values of debt and equity in their market value capital structures.

**Q. IN PREVIOUS DECISIONS, THE COMMISSION SEEMS TO CONSIDER AVERAGE ALLOWED RATES OF RETURN FOR ELECTRIC UTILITIES IN**

**OTHER JURISDICTIONS AS A TEST OF REASONABLENESS. HOW DOES YOUR RECOMMENDED 10.6 PERCENT RATE OF RETURN ON EQUITY FOR EMPIRE COMPARE TO AVERAGE ALLOWED RATES OF RETURN ON EQUITY FOR INTEGRATED ELECTRIC UTILITIES IN 2011 AND 2012?**

A. My recommendation is very close to the 10.7 percent and 10.5 percent average allowed rates of return for integrated electric utilities in 2012 and 2011, respectively (see Schedule JVW-10).

**Q. DOES THIS CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?**

A. Yes, it does.

## LIST OF ATTACHMENTS

| | |
|---|---|
| Schedule JVW-1 | Summary of Discounted Cash Flow Analysis for Electric Energy Companies |
| Schedule JVW-2 | Summary of Discounted Cash Flow Analysis for Electric Energy Companies Using a Multi-stage DCF Model |
| Schedule JVW-3 | Comparison of the DCF Expected Return on an Investment in Electric Energy Companies to the Interest Rate on Moody's A-Rated Utility Bonds |
| Schedule JVW-4 | Comparative Returns on S&P 500 Stock Index and Moody's A-Rated Bonds 1937—2012 |
| Schedule JVW-5 | Comparative Returns on S&P Utility Stock Index and Moody's A-Rated Bonds 1937—2012 |
| Schedule JVW-6 | Using the Arithmetic Mean to Estimate the Cost of Equity Capital |
| Schedule JVW-7 | Calculation of Capital Asset Pricing Model Cost of Equity Using the SBBI 6.7 Percent Risk Premium |
| Schedule JVW-8 | Comparison of Risk Premia on S&P500 Stock Index and S&P Utilities Index 1937 – 2012 |
| Schedule JVW-9 | Calculation of Capital Asset Pricing Model Cost of Equity Using DCF Estimate of the Expected Rate of Return on the Market Portfolio |
| Schedule JVW-10 | Average Allowed Rates of Return on Equity for Integrated Electric Utilities, 2012, 2011 |
| Appendix 1 | Qualifications of James H. Vander Weide |
| Appendix 2 | Derivation of the Quarterly DCF Model |
| Appendix 3 | Ex Ante Risk Premium Method |
| Appendix 4 | Ex Post Risk Premium Method |

**SUMMARY OF DISCOUNTED CASH FLOW ANALYSIS
FOR ELECTRIC ENERGY COMPANIES**

| LINE NO. | COMPANY | $d_0$ | $P_0$ | GROWTH | MODEL RESULT |
|---|---|---|---|---|---|
| 1 | Amer. Elec. Power | 0.470 | 38.380 | 3.53% | 8.7% |
| 2 | CenterPoint Energy | 0.203 | 19.320 | 4.90% | 9.4% |
| 3 | CMS Energy Corp. | 0.240 | 21.872 | 5.96% | 10.5% |
| 4 | Consol. Edison | 0.605 | 58.328 | 3.45% | 7.8% |
| 5 | Dominion Resources | 0.528 | 50.820 | 5.40% | 9.7% |
| 6 | DTE Energy | 0.588 | 54.734 | 4.30% | 8.9% |
| 7 | Duke Energy | 0.250 | 21.042 | 3.67% | 8.7% |
| 8 | FirstEnergy Corp. | 0.550 | 44.900 | 3.77% | 9.0% |
| 9 | G't Plains Energy | 0.213 | 20.075 | 4.97% | 9.5% |
| 10 | Hawaiian Elec. | 0.310 | 25.565 | 11.37% | 17.1% |
| 11 | NextEra Energy | 0.600 | 61.092 | 5.47% | 9.5% |
| 12 | Northeast Utilities | 0.294 | 36.212 | 6.50% | 9.9% |
| 13 | OGE Energy | 0.393 | 52.648 | 7.65% | 10.9% |
| 14 | Pepco Holdings | 0.270 | 19.180 | 3.70% | 9.8% |
| 15 | Pinnacle West Capital | 0.525 | 47.344 | 5.88% | 10.8% |
| 16 | PNM Resources | 0.145 | 18.272 | 10.95% | 14.3% |
| 17 | Portland General | 0.265 | 24.975 | 4.30% | 8.9% |
| 18 | SCANA Corp. | 0.495 | 44.910 | 4.40% | 9.1% |
| 19 | Sempra Energy | 0.600 | 59.987 | 7.05% | 10.8% |
| 20 | Southern Co. | 0.490 | 44.827 | 5.58% | 10.2% |
| 21 | TECO Energy | 0.220 | 17.709 | 4.56% | 9.9% |
| 22 | Westar Energy | 0.330 | 27.873 | 6.13% | 11.2% |
| 23 | Wisconsin Energy | 0.300 | 34.902 | 6.63% | 10.0% |
| 24 | Xcel Energy Inc. | 0.260 | 26.522 | 5.27% | 9.5% |
| 25 | Average | | | | 10.2% |

Notes:

$d_0$ = Most recent quarterly dividend from Yahoo.

$d_1, d_2, d_3, d_4$ = Next four quarterly dividends, calculated by multiplying the last four quarterly dividends per Value Line by the factor (1 + g).

$P_0$ = Average of the monthly high and low stock prices during the three months ending April 2012 per Thomson Reuters.

g = I/B/E/S forecast of future earnings growth April 2012 from Thomson Reuters.

k = Cost of equity using the quarterly version of the DCF model.

$$k = \frac{d_1(1+k)^{.75} + d_2(1+k)^{.50} + d_3(1+k)^{.25} + d_4}{P_0} + g$$

**SUMMARY OF DISCOUNTED CASH FLOW ANALYSIS
FOR ELECTRIC ENERGY COMPANIES
USING A MULTI-STAGE DCF MODEL**

| COMPANY | PRICE | 1ST STAGE GROWTH | DIVIDEND | DCF RESULT 4.52% TERMINAL GROWTH | DCF RESULT 5.19% TERMINAL GROWTH | DCF RESULT 6.26% TERMINAL GROWTH |
|---|---|---|---|---|---|---|
| Amer. Elec. Power | 38.380 | 3.53% | 1.88 | 9.2% | 9.6% | 10.3% |
| CenterPoint Energy | 19.320 | 4.90% | 0.81 | 9.1% | 9.5% | 10.2% |
| CMS Energy Corp. | 21.872 | 5.96% | 0.96 | 9.7% | 10.1% | 10.8% |
| Consol. Edison | 58.328 | 3.45% | 2.42 | 8.4% | 8.9% | 9.7% |
| Dominion Resources | 50.820 | 5.40% | 2.11 | 9.2% | 9.6% | 10.3% |
| DTE Energy | 54.734 | 4.30% | 2.35 | 8.9% | 9.4% | 10.1% |
| Duke Energy | 21.042 | 3.67% | 1.00 | 9.1% | 9.6% | 10.3% |
| FirstEnergy Corp. | 44.900 | 3.77% | 2.20 | 9.3% | 9.7% | 10.4% |
| G't Plains Energy | 20.075 | 4.97% | 0.85 | 9.1% | 9.6% | 10.3% |
| Hawaiian Elec. | 25.565 | 11.37% | 1.24 | 13.1% | 13.4% | 13.9% |
| NextEra Energy | 61.092 | 5.47% | 2.40 | 9.0% | 9.4% | 10.1% |
| Northeast Utilities | 36.212 | 6.50% | 1.37 | 9.2% | 9.7% | 10.4% |
| OGE Energy | 52.648 | 7.65% | 1.57 | 8.7% | 9.1% | 9.9% |
| Pepco Holdings | 19.180 | 3.70% | 1.08 | 10.0% | 10.4% | 11.1% |
| Pinnacle West Capital | 47.344 | 5.88% | 2.10 | 9.7% | 10.1% | 10.8% |
| PNM Resources | 18.272 | 10.95% | 0.58 | 10.3% | 10.7% | 11.3% |
| Portland General | 24.975 | 4.30% | 1.06 | 8.9% | 9.3% | 10.0% |
| SCANA Corp. | 44.910 | 4.40% | 1.98 | 9.1% | 9.5% | 10.2% |
| Sempra Energy | 59.987 | 7.05% | 2.40 | 9.7% | 10.1% | 10.8% |
| Southern Co. | 44.827 | 5.58% | 1.96 | 9.5% | 10.0% | 10.6% |
| TECO Energy | 17.709 | 4.56% | 0.88 | 9.7% | 10.1% | 10.8% |
| Westar Energy | 27.873 | 6.13% | 1.32 | 10.2% | 10.6% | 11.2% |
| Wisconsin Energy | 34.902 | 6.63% | 1.20 | 8.9% | 9.3% | 10.0% |
| Xcel Energy Inc. | 26.522 | 5.27% | 1.04 | 8.9% | 9.3% | 10.1% |
| **Average** | | | | **9.5%** | **9.9%** | **10.6%** |

Notes:

| | | |
|---|---|---|
| Dividend | = | Most recent annualized dividend. |
| Price | = | Average of the monthly high and low stock prices during the three months ending April 2011 per Thomson Reuters |
| First-stage Growth | = | I/B/E/S forecast of future earnings growth April 2011 from Thomson Reuters |
| Terminal Growth | = | Estimates of long-term GDP growth from Energy Information Administration *Annual Energy Outlook*, 2012 Early Release, Table 20.and Bureau of Economic Analysis, Current Dollar and "Real"Gross Domestic Product). |

http://www.eia.gov/oiaf/aeo/tablebrowser/#release=EARLY2012&subject=5-EARLY2012&table=18-EARLY2012&region=0-0&cases=full2011-d020911a.early2012-d121011b
www.bea.gov/national/xls/gdplev.xls

| LINE | SOURCE | YEAR | $BILLIONS | YEAR | $BILLIONS | ANNUAL GROWTH | NO. OF YEARS |
|---|---|---|---|---|---|---|---|
| 1 | Real GDP – EIA | 2017 | 15,768 | 2035 | 24,639 | 2.51% | 18 |
| 2 | GDP Chain-type Price Index (2005=1) | 2017 | 1.243 | 2035 | 1.762 | 1.96% | 18 |
| **3** | **EIA GDP Growth Estimate** | 2017 | 19,606 | 2035 | 43,413 | **4.52%** | |
| 4 | Bureau of Economic Analysis | 1929 | 976.1 | 2011 | 13,315.1 | 3.24% | 82 |
| **5** | **Growth Estimate—EIA Deflator + Real BEA Historial Growth** | | | | | **5.19%** | |
| **6** | **Bureau of Economic Analysis Historical Nominal GDP Growth** | 1929 | 103.6 | 2011 | 15,094.0 | **6.26%** | 82 |

**COMPARISON OF DCF EXPECTED RETURN
ON AN INVESTMENT IN ELECTRIC ENERGY COMPANIES
TO THE INTEREST RATE ON MOODY'S A-RATED UTILITY BONDS**

| LINE NO. | DATE | DCF | BOND YIELD | RISK PREMIUM |
|---|---|---|---|---|
| 1 | Sep-99 | 0.1124 | 0.0793 | 0.0331 |
| 2 | Oct-99 | 0.1128 | 0.0806 | 0.0322 |
| 3 | Nov-99 | 0.1158 | 0.0794 | 0.0364 |
| 4 | Dec-99 | 0.1200 | 0.0814 | 0.0386 |
| 5 | Jan-00 | 0.1186 | 0.0835 | 0.0351 |
| 6 | Feb-00 | 0.1232 | 0.0825 | 0.0407 |
| 7 | Mar-00 | 0.1274 | 0.0828 | 0.0446 |
| 8 | Apr-00 | 0.1203 | 0.0829 | 0.0374 |
| 9 | May-00 | 0.1194 | 0.0870 | 0.0324 |
| 10 | Jun-00 | 0.1209 | 0.0836 | 0.0373 |
| 11 | Jul-00 | 0.1213 | 0.0825 | 0.0388 |
| 12 | Aug-00 | 0.1197 | 0.0813 | 0.0384 |
| 13 | Sep-00 | 0.1137 | 0.0823 | 0.0314 |
| 14 | Oct-00 | 0.1143 | 0.0814 | 0.0329 |
| 15 | Nov-00 | 0.1164 | 0.0811 | 0.0353 |
| 16 | Dec-00 | 0.1140 | 0.0784 | 0.0356 |
| 17 | Jan-01 | 0.1167 | 0.0780 | 0.0387 |
| 18 | Feb-01 | 0.1176 | 0.0774 | 0.0402 |
| 19 | Mar-01 | 0.1180 | 0.0768 | 0.0412 |
| 20 | Apr-01 | 0.1208 | 0.0794 | 0.0414 |
| 21 | May-01 | 0.1254 | 0.0799 | 0.0455 |
| 22 | Jun-01 | 0.1261 | 0.0785 | 0.0476 |
| 23 | Jul-01 | 0.1269 | 0.0778 | 0.0491 |
| 24 | Aug-01 | 0.1275 | 0.0759 | 0.0516 |
| 25 | Sep-01 | 0.1294 | 0.0775 | 0.0519 |
| 26 | Oct-01 | 0.1286 | 0.0763 | 0.0523 |
| 27 | Nov-01 | 0.1268 | 0.0757 | 0.0511 |
| 28 | Dec-01 | 0.1264 | 0.0783 | 0.0481 |
| 29 | Jan-02 | 0.1246 | 0.0766 | 0.0480 |
| 30 | Feb-02 | 0.1256 | 0.0754 | 0.0502 |
| 31 | Mar-02 | 0.1221 | 0.0776 | 0.0445 |
| 32 | Apr-02 | 0.1201 | 0.0757 | 0.0444 |
| 33 | May-02 | 0.1208 | 0.0752 | 0.0456 |
| 34 | Jun-02 | 0.1225 | 0.0741 | 0.0484 |
| 35 | Jul-02 | 0.1305 | 0.0731 | 0.0574 |
| 36 | Aug-02 | 0.1269 | 0.0717 | 0.0552 |
| 37 | Sep-02 | 0.1241 | 0.0708 | 0.0533 |
| 38 | Oct-02 | 0.1258 | 0.0723 | 0.0535 |
| 39 | Nov-02 | 0.1210 | 0.0714 | 0.0496 |

| LINE NO. | DATE | DCF | BOND YIELD | RISK PREMIUM |
|---|---|---|---|---|
| 40 | Dec-02 | 0.1195 | 0.0707 | 0.0488 |
| 41 | Jan-03 | 0.1166 | 0.0706 | 0.0460 |
| 42 | Feb-03 | 0.1200 | 0.0693 | 0.0507 |
| 43 | Mar-03 | 0.1179 | 0.0679 | 0.0500 |
| 44 | Apr-03 | 0.1138 | 0.0664 | 0.0474 |
| 45 | May-03 | 0.1066 | 0.0636 | 0.0430 |
| 46 | Jun-03 | 0.1019 | 0.0621 | 0.0398 |
| 47 | Jul-03 | 0.1043 | 0.0657 | 0.0386 |
| 48 | Aug-03 | 0.1034 | 0.0678 | 0.0356 |
| 49 | Sep-03 | 0.1000 | 0.0656 | 0.0344 |
| 50 | Oct-03 | 0.0981 | 0.0643 | 0.0338 |
| 51 | Nov-03 | 0.0957 | 0.0637 | 0.0320 |
| 52 | Dec-03 | 0.0919 | 0.0627 | 0.0292 |
| 53 | Jan-04 | 0.0896 | 0.0615 | 0.0281 |
| 54 | Feb-04 | 0.0892 | 0.0615 | 0.0277 |
| 55 | Mar-04 | 0.0888 | 0.0597 | 0.0291 |
| 56 | Apr-04 | 0.0900 | 0.0635 | 0.0265 |
| 57 | May-04 | 0.0935 | 0.0662 | 0.0273 |
| 58 | Jun-04 | 0.0934 | 0.0646 | 0.0288 |
| 59 | Jul-04 | 0.0927 | 0.0627 | 0.0300 |
| 60 | Aug-04 | 0.0940 | 0.0614 | 0.0326 |
| 61 | Sep-04 | 0.0925 | 0.0598 | 0.0327 |
| 62 | Oct-04 | 0.0928 | 0.0594 | 0.0334 |
| 63 | Nov-04 | 0.0894 | 0.0597 | 0.0297 |
| 64 | Dec-04 | 0.0896 | 0.0592 | 0.0304 |
| 65 | Jan-05 | 0.0900 | 0.0578 | 0.0322 |
| 66 | Feb-05 | 0.0893 | 0.0561 | 0.0332 |
| 67 | Mar-05 | 0.0894 | 0.0583 | 0.0311 |
| 68 | Apr-05 | 0.0899 | 0.0564 | 0.0335 |
| 69 | May-05 | 0.0886 | 0.0553 | 0.0333 |
| 70 | Jun-05 | 0.0888 | 0.0540 | 0.0348 |
| 71 | Jul-05 | 0.0877 | 0.0551 | 0.0326 |
| 72 | Aug-05 | 0.0878 | 0.0550 | 0.0328 |
| 73 | Sep-05 | 0.0901 | 0.0552 | 0.0349 |
| 74 | Oct-05 | 0.0911 | 0.0579 | 0.0332 |
| 75 | Nov-05 | 0.0957 | 0.0588 | 0.0369 |
| 76 | Dec-05 | 0.0956 | 0.0580 | 0.0376 |
| 77 | Jan-06 | 0.0957 | 0.0575 | 0.0382 |
| 78 | Feb-06 | 0.1048 | 0.0582 | 0.0466 |
| 79 | Mar-06 | 0.1031 | 0.0598 | 0.0433 |
| 80 | Apr-06 | 0.1050 | 0.0629 | 0.0421 |
| 81 | May-06 | 0.1063 | 0.0642 | 0.0421 |
| 82 | Jun-06 | 0.1093 | 0.0640 | 0.0453 |
| 83 | Jul-06 | 0.1087 | 0.0637 | 0.0450 |
| 84 | Aug-06 | 0.1050 | 0.0620 | 0.0430 |

| LINE NO. | DATE | DCF | BOND YIELD | RISK PREMIUM |
|---|---|---|---|---|
| 85 | Sep-06 | 0.1088 | 0.0600 | 0.0488 |
| 86 | Oct-06 | 0.1052 | 0.0598 | 0.0454 |
| 87 | Nov-06 | 0.1057 | 0.0580 | 0.0477 |
| 88 | Dec-06 | 0.1050 | 0.0581 | 0.0469 |
| 89 | Jan-07 | 0.1075 | 0.0596 | 0.0479 |
| 90 | Feb-07 | 0.1065 | 0.0590 | 0.0475 |
| 91 | Mar-07 | 0.1073 | 0.0585 | 0.0488 |
| 92 | Apr-07 | 0.1021 | 0.0597 | 0.0424 |
| 93 | May-07 | 0.1047 | 0.0599 | 0.0448 |
| 94 | Jun-07 | 0.1101 | 0.0630 | 0.0471 |
| 95 | Jul-07 | 0.1108 | 0.0625 | 0.0483 |
| 96 | Aug-07 | 0.1083 | 0.0624 | 0.0459 |
| 97 | Sep-07 | 0.1056 | 0.0618 | 0.0438 |
| 98 | Oct-07 | 0.1061 | 0.0611 | 0.0450 |
| 99 | Nov-07 | 0.1093 | 0.0597 | 0.0496 |
| 100 | Dec-07 | 0.1110 | 0.0616 | 0.0494 |
| 101 | Jan-08 | 0.1171 | 0.0602 | 0.0569 |
| 102 | Feb-08 | 0.1109 | 0.0621 | 0.0488 |
| 103 | Mar-08 | 0.1144 | 0.0621 | 0.0523 |
| 104 | Apr-08 | 0.1133 | 0.0629 | 0.0504 |
| 105 | May-08 | 0.1138 | 0.0627 | 0.0511 |
| 106 | Jun-08 | 0.1112 | 0.0638 | 0.0474 |
| 107 | Jul-08 | 0.1147 | 0.0640 | 0.0507 |
| 108 | Aug-08 | 0.1165 | 0.0637 | 0.0528 |
| 109 | Sep-08 | 0.1159 | 0.0649 | 0.0510 |
| 110 | Oct-08 | 0.1249 | 0.0756 | 0.0494 |
| 111 | Nov-08 | 0.1280 | 0.0760 | 0.0520 |
| 112 | Dec-08 | 0.1270 | 0.0654 | 0.0616 |
| 113 | Jan-09 | 0.1211 | 0.0639 | 0.0572 |
| 114 | Feb-09 | 0.1237 | 0.0630 | 0.0607 |
| 115 | Mar-09 | 0.1250 | 0.0642 | 0.0607 |
| 116 | Apr-09 | 0.1230 | 0.0648 | 0.0582 |
| 117 | May-09 | 0.1206 | 0.0649 | 0.0557 |
| 118 | Jun-09 | 0.1185 | 0.0620 | 0.0565 |
| 119 | Jul-09 | 0.1142 | 0.0597 | 0.0544 |
| 120 | Aug-09 | 0.1127 | 0.0571 | 0.0556 |
| 121 | Sep-09 | 0.1122 | 0.0553 | 0.0569 |
| 122 | Oct-09 | 0.1122 | 0.0555 | 0.0568 |
| 123 | Nov-09 | 0.1166 | 0.0564 | 0.0602 |
| 124 | Dec-09 | 0.1065 | 0.0579 | 0.0486 |
| 125 | Jan-10 | 0.1082 | 0.0577 | 0.0505 |
| 126 | Feb-10 | 0.1060 | 0.0587 | 0.0473 |
| 127 | Mar-10 | 0.1045 | 0.0584 | 0.0461 |
| 128 | Apr-10 | 0.1081 | 0.0582 | 0.0499 |
| 129 | May-10 | 0.1062 | 0.0552 | 0.0510 |

| LINE NO. | DATE | DCF | BOND YIELD | RISK PREMIUM |
|---|---|---|---|---|
| 130 | Jun-10 | 0.1059 | 0.0546 | 0.0512 |
| 131 | Jul-10 | 0.1049 | 0.0526 | 0.0522 |
| 132 | Aug-10 | 0.1029 | 0.0501 | 0.0528 |
| 133 | Sep-10 | 0.1031 | 0.0501 | 0.0530 |
| 134 | Oct-10 | 0.1017 | 0.0510 | 0.0507 |
| 135 | Nov-10 | 0.1023 | 0.0536 | 0.0487 |
| 136 | Dec-10 | 0.1026 | 0.0557 | 0.0469 |
| 137 | Jan-11 | 0.1018 | 0.0557 | 0.0461 |
| 138 | Feb-11 | 0.1014 | 0.0568 | 0.0446 |
| 139 | Mar-11 | 0.1017 | 0.0556 | 0.0461 |
| 140 | Apr-11 | 0.0994 | 0.0555 | 0.0439 |
| 141 | May-11 | 0.0969 | 0.0532 | 0.0437 |
| 142 | Jun-11 | 0.1017 | 0.0526 | 0.0491 |
| 143 | Jul-11 | 0.0993 | 0.0527 | 0.0466 |
| 144 | Aug-11 | 0.1023 | 0.0469 | 0.0554 |
| 145 | Sep-11 | 0.0991 | 0.0448 | 0.0543 |
| 146 | Oct-11 | 0.1006 | 0.0452 | 0.0554 |
| 147 | Nov-11 | 0.0989 | 0.0425 | 0.0564 |
| 148 | Dec-11 | 0.1000 | 0.0435 | 0.0565 |
| 149 | Jan-12 | 0.0991 | 0.0434 | 0.0557 |
| 150 | Feb-12 | 0.0963 | 0.0436 | 0.0527 |
| 151 | Mar-12 | 0.0960 | 0.0448 | 0.0512 |
| 152 | Apr-12 | 0.0968 | 0.0440 | 0.0528 |

Utility bond yield information from *Mergent Bond Record* (formerly Moody's). See Appendix 3 for a description of my ex ante risk premium approach. DCF results are calculated using a quarterly DCF model as follows:

$d_0$ = Latest quarterly dividend per Value Line, Thomson Reuters
$P_0$ = Average of the monthly high and low stock prices for each month per Thomson Reuters
g = I/B/E/S forecast of future earnings growth for each month.
k = Cost of equity using the quarterly version of the DCF model.

$$k = \left[ \frac{d_0 (1+g)^{\frac{1}{4}}}{P_0} + (1+g)^{\frac{1}{4}} \right]^4 - 1$$

**COMPARATIVE RETURNS ON S&P 500 STOCK INDEX
AND MOODY'S A-RATED UTILITY BONDS 1937 - 2012**

| LINE NO. | YEAR | S&P 500 STOCK PRICE | STOCK DIVIDEND YIELD | STOCK RETURN | A-RATED BOND PRICE | BOND RETURN | RISK PREMIUM |
|---|---|---|---|---|---|---|---|
| 1 | 2012 | 1,300.58 | 0.0214 | | $94.36 | | |
| 2 | 2011 | 1,282.62 | 0.0185 | 3.25% | $77.36 | 27.14% | -23.89% |
| 3 | 2010 | 1,123.58 | 0.0203 | 16.18% | $75.02 | 8.44% | 7.74% |
| 4 | 2009 | 865.58 | 0.0310 | 32.91% | $68.43 | 15.48% | 17.43% |
| 5 | 2008 | 1,378.76 | 0.0206 | -35.16% | $72.25 | 0.24% | -35.40% |
| 6 | 2007 | 1,424.16 | 0.0181 | -1.38% | $72.91 | 4.59% | -5.97% |
| 7 | 2006 | 1,278.72 | 0.0183 | 13.20% | $75.25 | 2.20% | 11.01% |
| 8 | 2005 | 1,181.41 | 0.0177 | 10.01% | $74.91 | 5.80% | 4.21% |
| 9 | 2004 | 1,132.52 | 0.0162 | 5.94% | $70.87 | 11.34% | -5.40% |
| 10 | 2003 | 895.84 | 0.0180 | 28.22% | $62.26 | 20.27% | 7.95% |
| 11 | 2002 | 1,140.21 | 0.0138 | -20.05% | $57.44 | 15.35% | -35.40% |
| 12 | 2001 | 1,335.63 | 0.0116 | -13.47% | $56.40 | 8.93% | -22.40% |
| 13 | 2000 | 1,425.59 | 0.0118 | -5.13% | $52.60 | 14.82% | -19.95% |
| 14 | 1999 | 1,248.77 | 0.0130 | 15.46% | $63.03 | -10.20% | 25.66% |
| 15 | 1998 | 963.35 | 0.0162 | 31.25% | $62.43 | 7.38% | 23.87% |
| 16 | 1997 | 766.22 | 0.0195 | 27.68% | $56.62 | 17.32% | 10.36% |
| 17 | 1996 | 614.42 | 0.0231 | 27.02% | $60.91 | -0.48% | 27.49% |
| 18 | 1995 | 465.25 | 0.0287 | 34.93% | $50.22 | 29.26% | 5.68% |
| 19 | 1994 | 472.99 | 0.0269 | 1.05% | $60.01 | -9.65% | 10.71% |
| 20 | 1993 | 435.23 | 0.0288 | 11.56% | $53.13 | 20.48% | -8.93% |
| 21 | 1992 | 416.08 | 0.0290 | 7.50% | $49.56 | 15.27% | -7.77% |
| 22 | 1991 | 325.49 | 0.0382 | 31.65% | $44.84 | 19.44% | 12.21% |
| 23 | 1990 | 339.97 | 0.0341 | -0.85% | $45.60 | 7.11% | -7.96% |
| 24 | 1989 | 285.41 | 0.0364 | 22.76% | $43.06 | 15.18% | 7.58% |
| 25 | 1988 | 250.48 | 0.0366 | 17.61% | $40.10 | 17.36% | 0.25% |
| 26 | 1987 | 264.51 | 0.0317 | -2.13% | $48.92 | -9.84% | 7.71% |
| 27 | 1986 | 208.19 | 0.0390 | 30.95% | $39.98 | 32.36% | -1.41% |
| 28 | 1985 | 171.61 | 0.0451 | 25.83% | $32.57 | 35.05% | -9.22% |
| 29 | 1984 | 166.39 | 0.0427 | 7.41% | $31.49 | 16.12% | -8.72% |
| 30 | 1983 | 144.27 | 0.0479 | 20.12% | $29.41 | 20.65% | -0.53% |
| 31 | 1982 | 117.28 | 0.0595 | 28.96% | $24.48 | 36.48% | -7.51% |
| 32 | 1981 | 132.97 | 0.0480 | -7.00% | $29.37 | -3.01% | -3.99% |
| 33 | 1980 | 110.87 | 0.0541 | 25.34% | $34.69 | -3.81% | 29.16% |
| 34 | 1979 | 99.71 | 0.0533 | 16.52% | $43.91 | -11.89% | 28.41% |
| 35 | 1978 | 90.25 | 0.0532 | 15.80% | $49.09 | -2.40% | 18.20% |
| 36 | 1977 | 103.80 | 0.0399 | -9.06% | $50.95 | 4.20% | -13.27% |
| 37 | 1976 | 96.86 | 0.0380 | 10.96% | $43.91 | 25.13% | -14.17% |
| 38 | 1975 | 72.56 | 0.0507 | 38.56% | $41.76 | 14.75% | 23.81% |
| 39 | 1974 | 96.11 | 0.0364 | -20.86% | $52.54 | -12.91% | -7.96% |
| 40 | 1973 | 118.40 | 0.0269 | -16.14% | $58.51 | -3.37% | -12.77% |
| 41 | 1972 | 103.30 | 0.0296 | 17.58% | $56.47 | 10.69% | 6.89% |

| LINE NO. | YEAR | S&P 500 STOCK PRICE | STOCK DIVIDEND YIELD | STOCK RETURN | A-RATED BOND PRICE | BOND RETURN | RISK PREMIUM |
|---|---|---|---|---|---|---|---|
| 42 | 1971 | 93.49 | 0.0332 | 13.81% | $53.93 | 12.13% | 1.69% |
| 43 | 1970 | 90.31 | 0.0356 | 7.08% | $50.46 | 14.81% | -7.73% |
| 44 | 1969 | 102.00 | 0.0306 | -8.40% | $62.43 | -12.76% | 4.36% |
| 45 | 1968 | 95.04 | 0.0313 | 10.45% | $66.97 | -0.81% | 11.26% |
| 46 | 1967 | 84.45 | 0.0351 | 16.05% | $78.69 | -9.81% | 25.86% |
| 47 | 1966 | 93.32 | 0.0302 | -6.48% | $86.57 | -4.48% | -2.00% |
| 48 | 1965 | 86.12 | 0.0299 | 11.35% | $91.40 | -0.91% | 12.26% |
| 49 | 1964 | 76.45 | 0.0305 | 15.70% | $92.01 | 3.68% | 12.02% |
| 50 | 1963 | 65.06 | 0.0331 | 20.82% | $93.56 | 2.61% | 18.20% |
| 51 | 1962 | 69.07 | 0.0297 | -2.84% | $89.60 | 8.89% | -11.73% |
| 52 | 1961 | 59.72 | 0.0328 | 18.94% | $89.74 | 4.29% | 14.64% |
| 53 | 1960 | 58.03 | 0.0327 | 6.18% | $84.36 | 11.13% | -4.95% |
| 54 | 1959 | 55.62 | 0.0324 | 7.57% | $91.55 | -3.49% | 11.06% |
| 55 | 1958 | 41.12 | 0.0448 | 39.74% | $101.22 | -5.60% | 45.35% |
| 56 | 1957 | 45.43 | 0.0431 | -5.18% | $100.70 | 4.49% | -9.67% |
| 57 | 1956 | 44.15 | 0.0424 | 7.14% | $113.00 | -7.35% | 14.49% |
| 58 | 1955 | 35.60 | 0.0438 | 28.40% | $116.77 | 0.20% | 28.20% |
| 59 | 1954 | 25.46 | 0.0569 | 45.52% | $112.79 | 7.07% | 38.45% |
| 60 | 1953 | 26.18 | 0.0545 | 2.70% | $114.24 | 2.24% | 0.46% |
| 61 | 1952 | 24.19 | 0.0582 | 14.05% | $113.41 | 4.26% | 9.79% |
| 62 | 1951 | 21.21 | 0.0634 | 20.39% | $123.44 | -4.89% | 25.28% |
| 63 | 1950 | 16.88 | 0.0665 | 32.30% | $125.08 | 1.89% | 30.41% |
| 64 | 1949 | 15.36 | 0.0620 | 16.10% | $119.82 | 7.72% | 8.37% |
| 65 | 1948 | 14.83 | 0.0571 | 9.28% | $118.50 | 4.49% | 4.79% |
| 66 | 1947 | 15.21 | 0.0449 | 1.99% | $126.02 | -2.79% | 4.79% |
| 67 | 1946 | 18.02 | 0.0356 | -12.03% | $126.74 | 2.59% | -14.63% |
| 68 | 1945 | 13.49 | 0.0460 | 38.18% | $119.82 | 9.11% | 29.07% |
| 69 | 1944 | 11.85 | 0.0495 | 18.79% | $119.82 | 3.34% | 15.45% |
| 70 | 1943 | 10.09 | 0.0554 | 22.98% | $118.50 | 4.49% | 18.49% |
| 71 | 1942 | 8.93 | 0.0788 | 20.87% | $117.63 | 4.14% | 16.73% |
| 72 | 1941 | 10.55 | 0.0638 | -8.98% | $116.34 | 4.55% | -13.52% |
| 73 | 1940 | 12.30 | 0.0458 | -9.65% | $112.39 | 7.08% | -16.73% |
| 74 | 1939 | 12.50 | 0.0349 | 1.89% | $105.75 | 10.05% | -8.16% |
| 75 | 1938 | 11.31 | 0.0784 | 18.36% | $99.83 | 9.94% | 8.42% |
| 76 | 1937 | 17.59 | 0.0434 | -31.36% | $103.18 | 0.63% | -31.99% |
| 77 | Average | | | 11.0% | | 6.7% | 4.3% |

See Appendix 4 for an explanation of how stock and bond returns are derived and the source of the data presented.

## COMPARATIVE RETURNS ON S&P UTILITY STOCK INDEX AND MOODY'S A-RATED UTILITY BONDS 1937 - 2012

| LINE NO. | YEAR | S&P UTILITY STOCK PRICE | STOCK DIVIDEND YIELD | STOCK RETURN | A-RATED BOND PRICE | BOND RETURN | RISK PREMIUM |
|---|---|---|---|---|---|---|---|
| 1 | 2012 | | | | $94.36 | | |
| 2 | 2011 | | | 19.99% | $77.36 | 27.14% | -7.15% |
| 3 | 2010 | | | 7.04% | $75.02 | 8.44% | -1.40% |
| 4 | 2009 | | | 10.71% | $68.43 | 15.48% | -4.77% |
| 5 | 2008 | | | -25.90% | $72.25 | 0.24% | -26.14% |
| 6 | 2007 | | | 16.56% | $72.91 | 4.59% | 11.96% |
| 7 | 2006 | | | 20.76% | $75.25 | 2.20% | 18.56% |
| 8 | 2005 | | | 16.05% | $74.91 | 5.80% | 10.25% |
| 9 | 2004 | | | 22.84% | $70.87 | 11.34% | 11.50% |
| 10 | 2003 | | | 23.48% | $62.26 | 20.27% | 3.21% |
| 11 | 2002 | | | -14.73% | $57.44 | 15.35% | -30.08% |
| | | | | | | | |
| 10 | 2002 | 243.79 | 0.0362 | | $57.44 | | |
| 11 | 2001 | 307.70 | 0.0287 | -17.90% | $56.40 | 8.93% | -26.83% |
| 12 | 2000 | 239.17 | 0.0413 | 32.78% | $52.60 | 14.82% | 17.96% |
| 13 | 1999 | 253.52 | 0.0394 | -1.72% | $63.03 | -10.20% | 8.48% |
| 14 | 1998 | 228.61 | 0.0457 | 15.47% | $62.43 | 7.38% | 8.09% |
| 15 | 1997 | 201.14 | 0.0492 | 18.58% | $56.62 | 17.32% | 1.26% |
| 16 | 1996 | 202.57 | 0.0454 | 3.83% | $60.91 | -0.48% | 4.31% |
| 17 | 1995 | 153.87 | 0.0584 | 37.49% | $50.22 | 29.26% | 8.23% |
| 18 | 1994 | 168.70 | 0.0496 | -3.83% | $60.01 | -9.65% | 5.82% |
| 19 | 1993 | 159.79 | 0.0537 | 10.95% | $53.13 | 20.48% | -9.54% |
| 20 | 1992 | 149.70 | 0.0572 | 12.46% | $49.56 | 15.27% | -2.81% |
| 21 | 1991 | 138.38 | 0.0607 | 14.25% | $44.84 | 19.44% | -5.19% |
| 22 | 1990 | 146.04 | 0.0558 | 0.33% | $45.60 | 7.11% | -6.78% |
| 23 | 1989 | 114.37 | 0.0699 | 34.68% | $43.06 | 15.18% | 19.51% |
| 24 | 1988 | 106.13 | 0.0704 | 14.80% | $40.10 | 17.36% | -2.55% |
| 25 | 1987 | 120.09 | 0.0588 | -5.74% | $48.92 | -9.84% | 4.10% |
| 26 | 1986 | 92.06 | 0.0742 | 37.87% | $39.98 | 32.36% | 5.51% |
| 27 | 1985 | 75.83 | 0.0860 | 30.00% | $32.57 | 35.05% | -5.04% |
| 28 | 1984 | 68.50 | 0.0925 | 19.95% | $31.49 | 16.12% | 3.83% |
| 29 | 1983 | 61.89 | 0.0948 | 20.16% | $29.41 | 20.65% | -0.49% |
| 30 | 1982 | 51.81 | 0.1074 | 30.20% | $24.48 | 36.48% | -6.28% |
| 31 | 1981 | 52.01 | 0.0978 | 9.40% | $29.37 | -3.01% | 12.41% |
| 32 | 1980 | 50.26 | 0.0953 | 13.01% | $34.69 | -3.81% | 16.83% |
| 33 | 1979 | 50.33 | 0.0893 | 8.79% | $43.91 | -11.89% | 20.68% |
| 34 | 1978 | 52.40 | 0.0791 | 3.96% | $49.09 | -2.40% | 6.36% |
| 35 | 1977 | 54.01 | 0.0714 | 4.16% | $50.95 | 4.20% | -0.04% |
| 36 | 1976 | 46.99 | 0.0776 | 22.70% | $43.91 | 25.13% | -2.43% |
| 37 | 1975 | 38.19 | 0.0920 | 32.24% | $41.76 | 14.75% | 17.49% |

| LINE NO. | YEAR | S&P UTILITY STOCK PRICE | STOCK DIVIDEND YIELD | STOCK RETURN | A-RATED BOND PRICE | BOND RETURN | RISK PREMIUM |
|---|---|---|---|---|---|---|---|
| 38 | 1974 | 48.60 | 0.0713 | -14.29% | $52.54 | -12.91% | -1.38% |
| 39 | 1973 | 60.01 | 0.0556 | -13.45% | $58.51 | -3.37% | -10.08% |
| 40 | 1972 | 60.19 | 0.0542 | 5.12% | $56.47 | 10.69% | -5.57% |
| 41 | 1971 | 63.43 | 0.0504 | -0.07% | $53.93 | 12.13% | -12.19% |
| 42 | 1970 | 55.72 | 0.0561 | 19.45% | $50.46 | 14.81% | 4.64% |
| 43 | 1969 | 68.65 | 0.0445 | -14.38% | $62.43 | -12.76% | -1.62% |
| 44 | 1968 | 68.02 | 0.0435 | 5.28% | $66.97 | -0.81% | 6.08% |
| 45 | 1967 | 70.63 | 0.0392 | 0.22% | $78.69 | -9.81% | 10.03% |
| 46 | 1966 | 74.50 | 0.0347 | -1.72% | $86.57 | -4.48% | 2.76% |
| 47 | 1965 | 75.87 | 0.0315 | 1.34% | $91.40 | -0.91% | 2.25% |
| 48 | 1964 | 67.26 | 0.0331 | 16.11% | $92.01 | 3.68% | 12.43% |
| 49 | 1963 | 63.35 | 0.0330 | 9.47% | $93.56 | 2.61% | 6.86% |
| 50 | 1962 | 62.69 | 0.0320 | 4.25% | $89.60 | 8.89% | -4.64% |
| 51 | 1961 | 52.73 | 0.0358 | 22.47% | $89.74 | 4.29% | 18.18% |
| 52 | 1960 | 44.50 | 0.0403 | 22.52% | $84.36 | 11.13% | 11.39% |
| 53 | 1959 | 43.96 | 0.0377 | 5.00% | $91.55 | -3.49% | 8.49% |
| 54 | 1958 | 33.30 | 0.0487 | 36.88% | $101.22 | -5.60% | 42.48% |
| 55 | 1957 | 32.32 | 0.0487 | 7.90% | $100.70 | 4.49% | 3.41% |
| 56 | 1956 | 31.55 | 0.0472 | 7.16% | $113.00 | -7.35% | 14.51% |
| 57 | 1955 | 29.89 | 0.0461 | 10.16% | $116.77 | 0.20% | 9.97% |
| 58 | 1954 | 25.51 | 0.0520 | 22.37% | $112.79 | 7.07% | 15.30% |
| 59 | 1953 | 24.41 | 0.0511 | 9.62% | $114.24 | 2.24% | 7.38% |
| 60 | 1952 | 22.22 | 0.0550 | 15.36% | $113.41 | 4.26% | 11.10% |
| 61 | 1951 | 20.01 | 0.0606 | 17.10% | $123.44 | -4.89% | 21.99% |
| 62 | 1950 | 20.20 | 0.0554 | 4.60% | $125.08 | 1.89% | 2.71% |
| 63 | 1949 | 16.54 | 0.0570 | 27.83% | $119.82 | 7.72% | 20.10% |
| 64 | 1948 | 16.53 | 0.0535 | 5.41% | $118.50 | 4.49% | 0.92% |
| 65 | 1947 | 19.21 | 0.0354 | -10.41% | $126.02 | -2.79% | -7.62% |
| 66 | 1946 | 21.34 | 0.0298 | -7.00% | $126.74 | 2.59% | -9.59% |
| 67 | 1945 | 13.91 | 0.0448 | 57.89% | $119.82 | 9.11% | 48.79% |
| 68 | 1944 | 12.10 | 0.0569 | 20.65% | $119.82 | 3.34% | 17.31% |
| 69 | 1943 | 9.22 | 0.0621 | 37.45% | $118.50 | 4.49% | 32.96% |
| 70 | 1942 | 8.54 | 0.0940 | 17.36% | $117.63 | 4.14% | 13.22% |
| 71 | 1941 | 13.25 | 0.0717 | -28.38% | $116.34 | 4.55% | -32.92% |
| 72 | 1940 | 16.97 | 0.0540 | -16.52% | $112.39 | 7.08% | -23.60% |
| 73 | 1939 | 16.05 | 0.0553 | 11.26% | $105.75 | 10.05% | 1.21% |
| 74 | 1938 | 14.30 | 0.0730 | 19.54% | $99.83 | 9.94% | 9.59% |
| 75 | 1937 | 24.34 | 0.0432 | -36.93% | $103.18 | 0.63% | -37.55% |
| 76 | Average | | | 10.6% | | 6.7% | 3.8% |

Note: See Appendix 4 for an explanation of how stock and bond returns are derived and the source of the data presented. Standard & Poor's discontinued its S&P Utilities Index in December 2001 and replaced its utilities stock index with separate indices for electric and natural gas utilities. In this study, the stock returns beginning in 2002 are based on the total returns for the EEI Index of U.S. shareholder-owned electric utilities, as reported by EEI on its website.
http://www.eei.org/whatwedo/DataAnalysis/IndusFinanAnalysis/Pages/QtrlyFinancialUpdates.as

**USING THE ARITHMETIC MEAN TO ESTIMATE THE COST OF EQUITY CAPITAL**

Consider an investment that in a given year generates a return of 30 percent with probability equal to .5 and a return of -10 percent with a probability equal to .5. For each one dollar invested, the possible outcomes of this investment at the end of year one are:

| Ending Wealth | Probability |
|---|---|
| $1.30 | 0.50 |
| $0.90 | 0.50 |

At the end of year two, the possible outcomes are:

| Ending Wealth | | | Probability | Value x Probability |
|---|---|---|---|---|
| (1.30) (1.30) | = | $1.69 | 0.25 | 0.4225 |
| (1.30) (.9) | = | $1.17 | 0.50 | 0.5850 |
| (.9) (.9) | = | $0.81 | 0.25 | 0.2025 |
| Expected Wealth | = | | | $1.21 |

The expected value of this investment at the end of year two is $1.21. In a competitive capital market, the cost of equity is equal to the expected rate of return on an investment. In the above example, the cost of equity is that rate of return which will make the initial investment of one dollar grow to the expected value of $1.21 at the end of two years. Thus, the cost of equity is the solution to the equation:

$$1(1+k)^2 = 1.21 \text{ or}$$

$$k = (1.21/1)^{.5} - 1 = 10\%.$$

The arithmetic mean of this investment is:

$$(30\%)\ (.5) + (-10\%)\ (.5) = 10\%.$$

Thus, the arithmetic mean is equal to the cost of equity capital.

The geometric mean of this investment is:

$$[(1.3)\ (.9)]^{.5} - 1 = .082 = 8.2\%.$$

Thus, the geometric mean is not equal to the cost of equity capital.

The lesson is obvious: for an investment with an uncertain outcome, the arithmetic mean is the best measure of the cost of equity capital.

## CALCULATION OF CAPITAL ASSET PRICING MODEL COST OF EQUITY USING SBBI® 6.6 PERCENT RISK PREMIUM

| Line | FACTOR | VALUE | DESCRIPTION |
|---|---|---|---|
| 1 | Risk-free rate | 4.91% | Forecast long-term Treasury bond yield |
| 2 | Beta | 0.70 | Average Beta Comparable Electric Companies |
| 3 | Risk Premium | 6.6% | Long-horizon SBBI risk premium |
| 4 | Beta x Risk Premium | 4.6% | |
| 5 | CAPM cost of equity | 9.5% | |

Forecast Treasury bond yield using forecast data from Value Line and Global Insight. Beta from Value Line Investment Analyzer, April 2012.

## PROXY COMPANY BETAS

| LINE NO. | COMPANY | VALUE LINE BETA | MARKET CAP $ (MIL) |
|---|---|---|---|
| 1 | Amer. Elec. Power | 0.70 | 18,814 |
| 2 | CenterPoint Energy | 0.80 | 8,705 |
| 3 | CMS Energy Corp. | 0.75 | 6,080 |
| 4 | Consol. Edison | 0.60 | 17,473 |
| 5 | Dominion Resources | 0.70 | 29,969 |
| 6 | DTE Energy | 0.75 | 9,659 |
| 7 | Duke Energy | 0.65 | 28,806 |
| 8 | FirstEnergy Corp. | 0.80 | 19,819 |
| 9 | G't Plains Energy | 0.75 | 2,780 |
| 10 | Hawaiian Elec. | 0.70 | 2,574 |
| 11 | NextEra Energy | 0.75 | 26,605 |
| 12 | Northeast Utilities | 0.70 | 11,646 |
| 13 | OGE Energy | 0.80 | 5,289 |
| 14 | Pepco Holdings | 0.80 | 4,327 |
| 15 | Pinnacle West Capital | 0.70 | 5,275 |
| 16 | PNM Resources | 0.95 | 1,500 |
| 17 | Portland General | 0.75 | 1,944 |
| 18 | SCANA Corp. | 0.70 | 6,047 |
| 19 | Sempra Energy | 0.80 | 15,664 |
| 20 | Southern Co. | 0.55 | 40,106 |
| 21 | TECO Energy | 0.85 | 3,880 |
| 22 | Westar Energy | 0.75 | 3,634 |
| 23 | Wisconsin Energy | 0.65 | 8,453 |
| 24 | Xcel Energy Inc. | 0.65 | 13,176 |
| 25 | Market-weighted Average | 0.70 | |

Company betas from Value Line Investment Analyzer, April 2012; market capitalization from Thomson Reuters.

**COMPARISON OF RISK PREMIA ON**
**S&P500 AND S&P UTILITIES 1937 – 2012**

| YEAR | S&P UTILITIES STOCK RETURN | SP500 STOCK RETURN | 10-YR. TREASURY BOND YIELD | UTILITIES RISK PREMIUM | MARKET RISK PREMIUM |
|---|---|---|---|---|---|
| 2011 | 0.1999 | 0.0325 | 0.0278 | 0.1721 | 0.0047 |
| 2010 | 0.0704 | 0.1618 | 0.0322 | 0.0382 | 0.1296 |
| 2009 | 0.1071 | 0.3291 | 0.0326 | 0.0745 | 0.2965 |
| 2008 | -0.2590 | -0.3519 | 0.0367 | -0.2957 | -0.3886 |
| 2007 | 0.1656 | -0.0127 | 0.0463 | 0.1193 | -0.0590 |
| 2006 | 0.2076 | 0.1320 | 0.0479 | 0.1597 | 0.0841 |
| 2005 | 0.1605 | 0.1001 | 0.0429 | 0.1176 | 0.0572 |
| 2004 | 0.2284 | 0.0594 | 0.0427 | 0.1857 | 0.0167 |
| 2003 | 0.2348 | 0.2822 | 0.0401 | 0.1947 | 0.2421 |
| 2002 | -0.1473 | -0.2005 | 0.0461 | -0.1934 | -0.2466 |
| 2001 | -0.1790 | -0.1347 | 0.0502 | -0.2292 | -0.1849 |
| 2000 | 0.3278 | -0.0513 | 0.0603 | 0.2675 | -0.1116 |
| 1999 | -0.0172 | 0.1546 | 0.0564 | -0.0736 | 0.0982 |
| 1998 | 0.1547 | 0.3125 | 0.0526 | 0.1021 | 0.2599 |
| 1997 | 0.1858 | 0.2768 | 0.0635 | 0.1223 | 0.2133 |
| 1996 | 0.0383 | 0.2702 | 0.0644 | -0.0261 | 0.2058 |
| 1995 | 0.3749 | 0.3493 | 0.0658 | 0.3091 | 0.2835 |
| 1994 | -0.0383 | 0.0105 | 0.0708 | -0.1091 | -0.0603 |
| 1993 | 0.1095 | 0.1156 | 0.0587 | 0.0508 | 0.0569 |
| 1992 | 0.1246 | 0.0750 | 0.0701 | 0.0545 | 0.0049 |
| 1991 | 0.1425 | 0.3165 | 0.0786 | 0.0639 | 0.2379 |
| 1990 | 0.0033 | -0.0085 | 0.0855 | -0.0822 | -0.0940 |
| 1989 | 0.3468 | 0.2276 | 0.0850 | 0.2618 | 0.1426 |
| 1988 | 0.1480 | 0.1761 | 0.0884 | 0.0596 | 0.0877 |
| 1987 | -0.0574 | -0.0213 | 0.0838 | -0.1412 | -0.1051 |
| 1986 | 0.3787 | 0.3095 | 0.0768 | 0.3019 | 0.2327 |
| 1985 | 0.3000 | 0.2583 | 0.1062 | 0.1938 | 0.1521 |
| 1984 | 0.1995 | 0.0741 | 0.1244 | 0.0751 | -0.0503 |
| 1983 | 0.2016 | 0.2012 | 0.1110 | 0.0906 | 0.0902 |
| 1982 | 0.3020 | 0.2896 | 0.1300 | 0.1720 | 0.1596 |
| 1981 | 0.0940 | -0.0700 | 0.1391 | -0.0451 | -0.2091 |
| 1980 | 0.1301 | 0.2534 | 0.1146 | 0.0155 | 0.1388 |
| 1979 | 0.0879 | 0.1652 | 0.0944 | -0.0065 | 0.0708 |
| 1978 | 0.0396 | 0.1580 | 0.0841 | -0.0445 | 0.0739 |
| 1977 | 0.0416 | -0.0906 | 0.0742 | -0.0326 | -0.1648 |
| 1976 | 0.2270 | 0.1096 | 0.0761 | 0.1509 | 0.0335 |
| 1975 | 0.3224 | 0.3856 | 0.0799 | 0.2425 | 0.3057 |
| 1974 | -0.1429 | -0.2086 | 0.0756 | -0.2185 | -0.2842 |
| 1973 | -0.1345 | -0.1614 | 0.0684 | -0.2029 | -0.2298 |
| 1972 | 0.0512 | 0.1758 | 0.0621 | -0.0109 | 0.1137 |

| YEAR | S&P UTILITIES STOCK RETURN | SP500 STOCK RETURN | 10-YR. TREASURY BOND YIELD | UTILITIES RISK PREMIUM | MARKET RISK PREMIUM |
|---|---|---|---|---|---|
| 1971 | -0.0007 | 0.1381 | 0.0616 | -0.0623 | 0.0765 |
| 1970 | 0.1945 | 0.0708 | 0.0735 | 0.1210 | -0.0027 |
| 1969 | -0.1438 | -0.0840 | 0.0667 | -0.2105 | -0.1507 |
| 1968 | 0.0528 | 0.1045 | 0.0565 | -0.0037 | 0.0480 |
| 1967 | 0.0022 | 0.1605 | 0.0507 | -0.0485 | 0.1098 |
| 1966 | -0.0172 | -0.0648 | 0.0492 | -0.0664 | -0.1140 |
| 1965 | 0.0134 | 0.1135 | 0.0428 | -0.0294 | 0.0707 |
| 1964 | 0.1611 | 0.1570 | 0.0419 | 0.1192 | 0.1151 |
| 1963 | 0.0947 | 0.2082 | 0.0400 | 0.0547 | 0.1682 |
| 1962 | 0.0425 | -0.0284 | 0.0395 | 0.0030 | -0.0679 |
| 1961 | 0.2247 | 0.1894 | 0.0388 | 0.1859 | 0.1506 |
| 1960 | 0.2252 | 0.0618 | 0.0412 | 0.1840 | 0.0206 |
| 1959 | 0.0500 | 0.0757 | 0.0433 | 0.0067 | 0.0324 |
| 1958 | 0.3688 | 0.3974 | 0.0332 | 0.3356 | 0.3642 |
| 1957 | 0.0790 | -0.0518 | 0.0365 | 0.0425 | -0.0883 |
| 1956 | 0.0716 | 0.0714 | 0.0318 | 0.0398 | 0.0396 |
| 1955 | 0.1016 | 0.2840 | 0.0282 | 0.0734 | 0.2558 |
| 1954 | 0.2237 | 0.4552 | 0.0240 | 0.1997 | 0.4312 |
| 1953 | 0.0962 | 0.0270 | 0.0281 | 0.0681 | -0.0011 |
| 1952 | 0.1536 | 0.1405 | 0.0248 | 0.1288 | 0.1157 |
| 1951 | 0.1710 | 0.2039 | 0.0241 | 0.1469 | 0.1798 |
| 1950 | 0.0460 | 0.3230 | 0.0205 | 0.0255 | 0.3025 |
| 1949 | 0.2783 | 0.1610 | 0.0193 | 0.2590 | 0.1417 |
| 1948 | 0.0541 | 0.0928 | 0.0215 | 0.0326 | 0.0713 |
| 1947 | -0.1041 | 0.0199 | 0.0185 | -0.1226 | 0.0014 |
| 1946 | -0.0700 | -0.1203 | 0.0174 | -0.0874 | -0.1377 |
| 1945 | 0.5789 | 0.3818 | 0.0173 | 0.5616 | 0.3645 |
| 1944 | 0.2065 | 0.1879 | 0.0209 | 0.1856 | 0.1670 |
| 1943 | 0.3745 | 0.2298 | 0.0207 | 0.3538 | 0.2091 |
| 1942 | 0.1736 | 0.2087 | 0.0211 | 0.1525 | 0.1876 |
| 1941 | -0.2838 | -0.0898 | 0.0199 | -0.3037 | -0.1097 |
| 1940 | -0.1652 | -0.0965 | 0.0220 | -0.1872 | -0.1185 |
| 1939 | 0.1126 | 0.0189 | 0.0235 | 0.0891 | -0.0046 |
| 1938 | 0.1954 | 0.1836 | 0.0255 | 0.1699 | 0.1581 |
| 1937 | -0.3693 | -0.3136 | 0.0269 | -0.3962 | -0.3405 |
| Risk Premium 1937—2012 | | | | 0.0521 | 0.0567 |
| RP Utilities/RP SP500 | | | | 0.92 | |

**CALCULATION OF CAPITAL ASSET PRICING MODEL COST OF EQUITY
USING DCF ESTIMATE OF THE EXPECTED RATE OF RETURN
ON THE MARKET PORTFOLIO**

| LINE | FACTOR | VALUE | DESCRIPTION |
|---|---|---|---|
| 1 | Risk-free rate | 4.91% | Forecast Long-term Treasury bond yield |
| 2 | Beta | 0.70 | Average Beta Comparable Electric Companies |
| 3 | DCF S&P 500 | 13.1% | DCF Cost of Equity S&P 500 (see following) |
| 4 | Risk Premium | 8.19% | |
| 5 | Beta x Risk Premium | 5.73% | |
| 6 | CAPM cost of equity | 10.6% | |

Forecast Treasury bond yield using forecast data from Value Line and Global Insight. Beta from Value Line Investment Analyzer, April 2012.

**SUMMARY OF DISCOUNTED CASH FLOW ANALYSIS
FOR S&P 500 COMPANIES**

| COMPANY | $P_0$ | $D_0$ | GROWTH | COST OF EQUITY |
|---|---|---|---|---|
| 3M | 87.36 | 2.36 | 10.60% | 13.6% |
| ABBOTT LABORATORIES | 58.36 | 2.04 | 8.49% | 12.3% |
| ACCENTURE | 61.47 | 1.35 | 10.60% | 13.0% |
| AETNA | 46.65 | 0.70 | 10.34% | 12.0% |
| AFLAC | 46.03 | 1.32 | 9.27% | 12.4% |
| AGILENT TECHS. | 43.26 | 0.40 | 14.07% | 15.1% |
| ALCOA | 10.12 | 0.12 | 13.11% | 14.5% |
| ALLERGAN | 91.36 | 0.20 | 14.41% | 14.7% |
| ALLSTATE | 31.84 | 0.88 | 9.13% | 12.2% |
| ALTERA | 38.29 | 0.32 | 11.40% | 12.3% |
| AMERICAN EXPRESS | 55.44 | 0.80 | 10.54% | 12.1% |
| AMERISOURCEBERGEN | 38.00 | 0.52 | 13.10% | 14.7% |
| AMGEN | 68.08 | 1.44 | 10.02% | 12.4% |
| ANALOG DEVICES | 39.13 | 1.20 | 8.85% | 12.2% |
| AON CLASS A | 48.50 | 0.63 | 9.42% | 10.8% |
| ASSURANT | 41.19 | 0.72 | 10.33% | 12.3% |
| AUTOMATIC DATA PROC. | 54.74 | 1.58 | 10.03% | 13.2% |
| BALL | 41.20 | 0.40 | 10.74% | 11.8% |
| BANK OF NEW YORK MELLON | 22.69 | 0.52 | 11.12% | 13.7% |
| BEAM | 56.06 | 0.82 | 11.70% | 13.3% |
| BEMIS | 31.90 | 1.00 | 8.10% | 11.5% |
| BOEING | 74.55 | 1.76 | 11.02% | 13.7% |
| CA | 26.96 | 1.00 | 10.67% | 14.8% |
| CARDINAL HEALTH | 42.11 | 0.95 | 11.48% | 14.0% |
| CARNIVAL | 31.13 | 1.00 | 10.40% | 14.0% |
| CF INDUSTRIES HDG. | 184.34 | 1.60 | 12.30% | 13.3% |
| CHESAPEAKE ENERGY | 22.60 | 0.35 | 13.58% | 15.3% |
| CHUBB | 69.29 | 1.64 | 8.88% | 11.5% |
| CINTAS | 38.61 | 0.54 | 12.64% | 14.2% |
| CLOROX | 68.89 | 2.40 | 7.73% | 11.5% |
| CME GROUP | 278.19 | 8.92 | 9.32% | 12.9% |
| COLGATE-PALM. | 95.13 | 2.48 | 8.43% | 11.3% |
| CONOCOPHILLIPS | 56.77 | 2.01 | 7.61% | 11.5% |
| CONSOL EN. | 34.55 | 0.50 | 13.43% | 15.1% |
| COSTCO WHOLESALE | 87.60 | 0.96 | 12.68% | 13.9% |
| COVIDIEN | 53.14 | 0.90 | 9.85% | 11.7% |
| CUMMINS | 117.78 | 1.60 | 12.56% | 14.1% |
| CVS CAREMARK | 44.24 | 0.65 | 11.29% | 12.9% |
| DANAHER | 53.58 | 0.10 | 14.26% | 14.5% |
| DEERE | 82.26 | 1.84 | 10.82% | 13.3% |
| DENTSPLY INTL. | 39.07 | 0.22 | 10.80% | 11.4% |
| DISCOVER FINANCIAL SVS. | 31.41 | 0.40 | 10.50% | 11.9% |
| DOVER | 63.28 | 1.26 | 9.83% | 12.0% |
| DOW CHEMICAL | 33.99 | 1.28 | 10.85% | 15.1% |

| COMPANY | $P_0$ | $D_0$ | GROWTH | COST OF EQUITY |
|---|---|---|---|---|
| E I DU PONT DE NEMOURS | 51.71 | 1.72 | 8.64% | 12.3% |
| EATON | 49.85 | 1.52 | 8.94% | 12.3% |
| EMERSON ELECTRIC | 51.26 | 1.60 | 11.44% | 15.0% |
| EQUIFAX | 43.04 | 0.72 | 12.07% | 14.0% |
| ESTEE LAUDER COS.'A' | 60.22 | 0.52 | 12.40% | 13.4% |
| EXPEDIA | 34.75 | 0.36 | 10.10% | 11.2% |
| EXPEDITOR INTL.OF WASH. | 44.17 | 0.50 | 11.42% | 12.7% |
| FIDELITY NAT.INFO.SVS. | 31.82 | 0.80 | 12.21% | 15.1% |
| FIRST HORIZON NATIONAL | 9.68 | 0.04 | 10.99% | 11.4% |
| FMC | 101.36 | 0.36 | 11.66% | 12.1% |
| GAMESTOP 'A' | 23.29 | 0.60 | 8.10% | 10.9% |
| GANNETT | 14.94 | 0.80 | 5.65% | 11.4% |
| GAP | 24.70 | 0.50 | 9.07% | 11.3% |
| GOLDMAN SACHS GP. | 117.92 | 1.84 | 12.32% | 14.1% |
| HJ HEINZ | 53.01 | 1.92 | 8.32% | 12.3% |
| ILLINOIS TOOL WORKS | 55.83 | 1.44 | 10.88% | 13.8% |
| INGERSOLL-RAND | 39.54 | 0.64 | 11.15% | 13.0% |
| INTEL | 27.42 | 0.84 | 11.80% | 15.3% |
| INTERNATIONAL BUS.MCHS. | 200.58 | 3.40 | 10.58% | 12.5% |
| INTL.GAME TECH. | 15.91 | 0.24 | 13.78% | 15.5% |
| KELLOGG | 52.08 | 1.72 | 8.63% | 12.3% |
| KIMBERLY-CLARK | 73.71 | 2.96 | 6.90% | 11.3% |
| KLA TENCOR | 51.33 | 1.40 | 11.25% | 14.3% |
| KRAFT FOODS | 38.25 | 1.16 | 9.33% | 12.7% |
| KROGER | 23.84 | 0.46 | 10.61% | 12.8% |
| LEGG MASON | 27.15 | 0.44 | 12.77% | 14.6% |
| LIMITED BRANDS | 46.98 | 1.00 | 12.91% | 15.3% |
| LINCOLN NAT. | 24.79 | 0.32 | 9.63% | 11.1% |
| M&T BK. | 83.42 | 2.80 | 8.87% | 12.6% |
| MACY'S | 38.22 | 0.80 | 12.27% | 14.6% |
| MARATHON OIL | 32.24 | 0.68 | 9.20% | 11.5% |
| MARSH & MCLENNAN | 32.25 | 0.88 | 11.98% | 15.1% |
| MCCORMICK & CO NV. | 52.64 | 1.24 | 8.80% | 11.4% |
| MCDONALDS | 98.13 | 2.80 | 9.82% | 13.0% |
| MEAD JOHNSON NUTRITION | 80.21 | 1.20 | 11.86% | 13.5% |
| METLIFE | 37.22 | 0.74 | 9.20% | 11.4% |
| MICROCHIP TECH. | 36.51 | 1.40 | 11.13% | 15.5% |
| MOLEX | 27.27 | 0.88 | 8.60% | 12.1% |
| MONSANTO | 79.48 | 1.20 | 11.32% | 13.0% |
| MOODY'S | 39.59 | 0.64 | 11.23% | 13.0% |
| MURPHY OIL | 58.85 | 1.10 | 13.07% | 15.2% |
| NASDAQ OMX GROUP | 25.79 | 0.52 | 9.85% | 12.1% |
| NEWELL RUBBERMAID | 18.23 | 0.32 | 9.00% | 10.9% |
| NIKE 'B' | 107.97 | 1.44 | 13.03% | 14.5% |
| NISOURCE | 23.90 | 0.92 | 8.37% | 12.6% |
| NOBLE | 37.97 | 0.56 | 11.90% | 13.6% |

| COMPANY | $P_0$ | $D_0$ | GROWTH | COST OF EQUITY |
|---|---|---|---|---|
| NORDSTROM | 53.60 | 1.08 | 11.49% | 13.8% |
| NUCOR | 42.88 | 1.46 | 9.38% | 13.2% |
| OMNICOM GP. | 48.90 | 1.20 | 10.44% | 13.2% |
| ONEOK | 82.68 | 2.44 | 10.72% | 14.0% |
| ORACLE | 29.14 | 0.24 | 11.81% | 12.7% |
| PATTERSON COMPANIES | 32.56 | 0.56 | 10.56% | 12.5% |
| PAYCHEX | 31.44 | 1.28 | 9.92% | 14.5% |
| PEABODY ENERGY | 32.55 | 0.34 | 10.23% | 11.4% |
| PERKINELMER | 26.53 | 0.28 | 11.60% | 12.8% |
| PERRIGO | 102.49 | 0.32 | 14.45% | 14.8% |
| PHILIP MORRIS INTL. | 84.66 | 3.08 | 10.66% | 14.7% |
| PRAXAIR | 110.67 | 2.20 | 11.31% | 13.5% |
| PREC.CASTPARTS | 170.10 | 0.12 | 14.80% | 14.9% |
| PRINCIPAL FINL.GP. | 27.75 | 0.72 | 11.07% | 14.0% |
| PROCTER & GAMBLE | 65.95 | 2.25 | 7.38% | 11.1% |
| PROGRESS ENERGY | 53.12 | 2.48 | 6.24% | 11.3% |
| QUEST DIAGNOSTICS | 58.82 | 0.68 | 10.88% | 12.2% |
| RAYTHEON 'B' | 51.42 | 2.00 | 8.88% | 13.2% |
| REYNOLDS AMERICAN | 40.99 | 2.24 | 6.97% | 12.9% |
| ROCKWELL AUTOMATION | 79.72 | 1.70 | 12.25% | 14.7% |
| ROCKWELL COLLINS | 58.07 | 1.20 | 9.25% | 11.5% |
| ROPER INDS.NEW | 96.38 | 0.55 | 13.40% | 14.0% |
| ROSS STORES | 56.17 | 0.56 | 13.29% | 14.4% |
| RYDER SYSTEM | 53.15 | 1.16 | 10.27% | 12.7% |
| SAFEWAY | 21.22 | 0.58 | 8.08% | 11.1% |
| SARA LEE | 20.82 | 0.46 | 11.68% | 14.2% |
| SCRIPPS NETWORKS INTACT. 'A' | 46.39 | 0.48 | 12.43% | 13.6% |
| SEALED AIR | 19.71 | 0.52 | 8.47% | 11.4% |
| ST.JUDE MEDICAL | 41.71 | 0.92 | 9.50% | 11.9% |
| STAPLES | 15.64 | 0.44 | 9.64% | 12.8% |
| STATE STREET | 43.28 | 0.96 | 9.74% | 12.2% |
| STRYKER | 54.31 | 0.85 | 10.77% | 12.5% |
| SUNTRUST BANKS | 22.99 | 0.20 | 12.00% | 13.0% |
| TARGET | 56.31 | 1.20 | 11.01% | 13.4% |
| TE CONNECTIVITY | 35.75 | 0.72 | 9.91% | 12.1% |
| THE HERSHEY COMPANY | 61.49 | 1.52 | 8.46% | 11.2% |
| THERMO FISHER SCIENTIFIC | 55.37 | 0.52 | 11.75% | 12.8% |
| TIME WARNER | 37.17 | 1.04 | 11.67% | 14.8% |
| TJX COS. | 38.07 | 0.46 | 12.53% | 13.9% |
| TOTAL SYSTEM SERVICES | 22.40 | 0.40 | 10.84% | 12.8% |
| TRAVELERS COS. | 59.36 | 1.84 | 12.10% | 15.6% |
| TYCO INTERNATIONAL | 53.22 | 1.00 | 11.80% | 13.9% |
| UNITED TECHNOLOGIES | 82.43 | 1.92 | 12.02% | 14.7% |
| UNITEDHEALTH GP. | 55.81 | 0.65 | 10.53% | 11.8% |
| UNUM GROUP | 23.56 | 0.42 | 9.33% | 11.3% |
| US BANCORP | 30.23 | 0.78 | 9.93% | 12.8% |

| COMPANY | $P_0$ | $D_0$ | GROWTH | COST OF EQUITY |
|---|---|---|---|---|
| V F | 145.80 | 2.88 | 13.11% | 15.4% |
| WAL MART STORES | 60.11 | 1.59 | 8.44% | 11.3% |
| WALGREEN | 34.07 | 0.90 | 9.30% | 12.2% |
| WALT DISNEY | 42.00 | 0.60 | 12.35% | 14.0% |
| WELLPOINT | 68.32 | 1.15 | 9.71% | 11.6% |
| WELLS FARGO & CO | 32.18 | 0.88 | 11.34% | 14.4% |
| WESTERN UNION | 18.08 | 0.40 | 11.32% | 13.8% |
| WW GRAINGER | 208.48 | 3.20 | 13.63% | 15.4% |
| XL GROUP | 20.90 | 0.44 | 10.00% | 12.3% |
| YUM! BRANDS | 68.22 | 1.14 | 13.26% | 15.2% |
| ZIONS BANCORP. | 19.76 | 0.04 | 14.88% | 15.1% |
| Average | | | | 13.1% |

Notes: In applying the DCF model to the S&P 500, I include in the DCF analysis only those companies in the S&P 500 group which pay a dividend, have a positive growth rate, and have at least three analysts' long-term growth estimates. I also eliminate those twenty-five percent of companies with the highest and lowest DCF results.

$D_0$ = Current dividend per Thomson Reuters.
$P_0$ = Average of the monthly high and low stock prices during the three months ending April 2012 per Thomson Reuters.
g = I/B/E/S forecast of future earnings growth April 2012.
k = Cost of equity using the quarterly version of the DCF model shown below:

$$k = \left[ \frac{d_0(1+g)^{\frac{1}{4}}}{P_0} + (1+g)^{\frac{1}{4}} \right]^4 - 1$$

## AVERAGE ALLOWED RATES OF RETURN ON EQUITY
## DECISIONS TO DATE IN 2012[5]

| STATE | COMPANY | CASE IDENTIFICATION | DATE OF ORDER | ALLOWED RETURN ON EQUITY (%) |
|---|---|---|---|---|
| Virginia | Appalachian Power Co. | C-PUE-2011-00036 | 3-Jan-12 | 11.40 |
| Idaho | PacifiCorp | C-PAC-E-11-12 | 10-Jan-12 | NA |
| South Carolina | Duke Energy Carolinas LLC | D-2011-271-E | 25-Jan-12 | 10.50 |
| North Carolina | Duke Energy Carolinas LLC | D-E-7, Sub 989 | 27-Jan-12 | 10.50 |
| Virginia | Virginia Electric & Power Co. | C-PUE-2011-00042 | 2-Feb-12 | 11.40 |
| Michigan | Indiana Michigan Power Co. | C-U-16801 | 15-Feb-12 | 10.20 |
| Florida | Florida Power Corp. | D-120022-EI | 22-Feb-12 | NA |
| Oregon | Idaho Power Co. | D-UE-233 | 23-Feb-12 | 9.90 |
| Florida | Gulf Power Co. | D-110138-EI | 27-Feb-12 | 10.25 |
| North Dakota | Northern States Power Co. - MN | C-PU-10-657 | 29-Feb-12 | 10.40 |
| Virginia | Virginia Electric & Power Co. | C-PUE-2003-00073 | 16-Mar-12 | 12.40 |
| Virginia | Virginia Electric & Power Co. | C-PUE-2011-00066 | 20-Mar-12 | 11.40 |
| Montana | NorthWestern Energy Division | D-D2008.8.95 | 21-Mar-12 | NA |
| Virginia | Virginia Electric & Power Co. | C-PUE-2011-00067 | 23-Mar-12 | 11.40 |
| Minnesota | Northern States Power Co. - MN | D-E-002/GR-10-971 | 29-Mar-12 | 10.37 |
| Washington | PacifiCorp | D-UE-111190 | 30-Mar-12 | NA |
| Hawaii | Hawaii Electric Light Co | D-2009-0164 | 4-Apr-12 | 10.00 |
| Kansas | Westar Energy Inc. | D-12-WSEE-112-RTS | 18-Apr-12 | NA |
| Colorado | Public Service Co. of CO | D-11AL-947E | 26-Apr-12 | 10.00 |
| **Average** | | | | **10.72** |

[5] Data from RRA, SNL Financial, at April 27, 2012.

## AVERAGE ALLOWED RATES OF RETURN ON EQUITY
## DECISIONS IN 2011

| STATE | COMPANY | CASE IDENTIFICATION | DATE OF ORDER | ALLOWED RETURN ON EQUITY (%) |
|---|---|---|---|---|
| Oklahoma | Public Service Co. of OK | Ca-PUD201000050 | 5-Jan-11 | 10.15 |
| Wisconsin | Madison Gas and Electric Co. | D-3270-UR-117 (elec) | 12-Jan-11 | 10.30 |
| Wisconsin | Wisconsin Public Service Corp. | D-6690-UR-120 (elec) | 13-Jan-11 | 10.30 |
| Pennsylvania | Duquesne Light Co. | D-R-2010-2179522 | 24-Feb-11 | NA |
| Hawaii | Hawaiian Electric Co. | D-2008-0083 | 25-Feb-11 | 10.00 |
| Virginia | Virginia Electric & Power Co. | C-PUE-2010-00054 | 22-Mar-11 | 12.30 |
| Virginia | Virginia Electric & Power Co. | C-PUE-2010-00055 | 22-Mar-11 | 12.30 |
| Washington | PacifiCorp | D-UE-100749 | 25-Mar-11 | 9.80 |
| West Virginia | Appalachian Power Co. | C-10-0699-E-42T | 30-Mar-11 | 10.00 |
| Missouri | Kansas City Power & Light | C-ER-2010-0355 | 12-Apr-11 | 10.00 |
| Minnesota | Otter Tail Power Co. | D-E-017/GR-10-239 | 25-Apr-11 | 10.74 |
| Indiana | Southern Indiana Gas & Elec Co | Ca-43839 | 27-Apr-11 | 10.40 |
| Missouri | KCP&L Greater Missouri Op Co | C-ER-2010-0356 (MPS) | 4-May-11 | 10.00 |
| Missouri | KCP&L Greater Missouri Op Co | C-ER-2010-0356 (L&P) | 4-May-11 | 10.00 |
| California | Pacific Gas and Electric Co. | AP-09-12-020 (elec) | 13-May-11 | 11.35 |
| Missouri | Empire District Electric Co. | C-ER-2011-0004 | 1-Jun-11 | NA |
| North Dakota | MDU Resources Group Inc. | C-PU-10-124 | 8-Jun-11 | 10.75 |
| Arkansas | Oklahoma Gas and Electric Co. | D-10-067-U | 17-Jun-11 | 9.95 |
| Missouri | Union Electric Co. | C-ER-2011-0028 | 13-Jul-11 | 10.20 |
| Montana | MDU Resources Group Inc. | D-D2010.8.82 | 2-Aug-11 | NA |
| New Mexico | Public Service Co. of NM | C-10-00086-UT | 8-Aug-11 | 10.00 |
| Utah | PacifiCorp | D-10-035-124 | 11-Aug-11 | 10.00 |
| Minnesota | Interstate Power & Light Co. | D-E-001/GR-10-276 | 12-Aug-11 | 10.35 |
| Alaska | Alaska Electric Light Power | D-U-10-029 | 2-Sep-11 | 12.88 |
| Wyoming | PacifiCorp | D-20000-384-ER-10 | 22-Sep-11 | 10.00 |
| Idaho | Avista Corp. | C-AVU-E-11-01 | 30-Sep-11 | NA |
| South Carolina | South Carolina Electric & Gas | D-2011-207-E | 30-Sep-11 | 11.00 |
| Wisconsin | Wisconsin Electric Power Co. | D-5-UR-105 (WEP-EL) | 6-Oct-11 | NA |
| Virginia | Kentucky Utilities Co. | PUE-2011-00013 | 12-Oct-11 | 10.30 |
| Michigan | Detroit Edison Co. | C-U-16472 | 20-Oct-11 | 10.50 |
| Virginia | Appalachian Power Co. | C-PUE-2011-00037 | 30-Nov-11 | 10.90 |
| Washington | Avista Corp. | D-UE-110876 | 16-Dec-11 | NA |
| Michigan | Upper Peninsula Power Co. | C-U-16417 | 20-Dec-11 | 10.20 |
| Indiana | Northern IN Public Svc Co. | Ca-43969 | 21-Dec-11 | 10.20 |
| Colorado | Black Hills Colorado Electric | D-11AL-387E | 22-Dec-11 | 9.90 |
| Wisconsin | Northern States Power Co - WI | D-4220-UR-117 (elec) | 22-Dec-11 | 10.40 |
| Nevada | Nevada Power Co. | D-11-06006 | 23-Dec-11 | 10.19 |
| Georgia | Georgia Power Co. | D-32539 (2012 Update) | 28-Dec-11 | NA |

| | | | | |
|---|---|---|---|---|
| New Mexico | Southwestern Public Service Co | C-10-00395-UT | 28-Dec-11 | NA |
| Idaho | Idaho Power Co. | C-IPC-E-11-08 | 30-Dec-11 | NA |
| **Average** | | | | **10.50** |

## QUALIFICATIONS OF JAMES H. VANDER WEIDE, PH.D.

**JAMES H. VANDER WEIDE, Ph.D.**
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James H. Vander Weide is Research Professor of Finance and Economics at Duke University, the Fuqua School of Business. Dr. Vander Weide is also founder and President of Financial Strategy Associates, a consulting firm that provides strategic, financial, and economic consulting services to corporate clients, including cost of capital and valuation studies.

Educational Background and Prior Academic Experience

Dr. Vander Weide holds a Ph.D. in Finance from Northwestern University and a Bachelor of Arts in Economics from Cornell University. He joined the faculty at Duke University and was named Assistant Professor, Associate Professor, Professor, and then Research Professor of Finance and Economics.

Since joining the faculty at Duke, Dr. Vander Weide has taught courses in corporate finance, investment management, and management of financial institutions. He has also taught courses in statistics, economics, and operations research, and a Ph.D. seminar on the theory of public utility pricing. In addition, Dr. Vander Weide has been active in executive education at Duke and Duke Corporate Education, leading executive development seminars on topics including financial analysis, cost of capital, creating shareholder value, mergers and acquisitions, real options, capital budgeting, cash management, measuring corporate performance, valuation, short-run financial planning, depreciation policies, financial strategy, and competitive strategy. Dr. Vander Weide has designed and served as Program Director for several executive education programs, including the Advanced Management Program, Competitive Strategies in Telecommunications, and the Duke Program for Manager Development for managers from the former Soviet Union.

Publications

Dr. Vander Weide has written a book entitled *Managing Corporate Liquidity: An Introduction to Working Capital Management* published by John Wiley and Sons, Inc. He has also written a chapter titled, "Financial Management in the Short Run" for *The Handbook of Modern Finance*; a chapter titled "Principles for Lifetime Portfolio Selection: Lessons from Portfolio Theory" for *The Handbook of Portfolio Construction: Contemporary Applications of Markowitz Techniques;* and written research papers on such topics as portfolio management, capital budgeting, investments, the effect of regulation on the performance of public utilities, and cash management. His articles have been published in *American Economic Review, Financial Management, International Journal of Industrial Organization, Journal of Finance, Journal of Financial and Quantitative Analysis, Journal of Bank Research, Journal of Portfolio Management, Journal of Accounting Research, Journal of Cash Management, Management Science,*

*Atlantic Economic Journal, Journal of Economics and Business,* and *Computers and Operations Research.*

Professional Consulting Experience

Dr. Vander Weide has provided financial and economic consulting services to firms in the telecommunications, electric, gas, insurance, and water industries for more than twenty-five years. He has testified on the cost of capital, competition, risk, incentive regulation, forward-looking economic cost, economic pricing guidelines, depreciation, accounting, valuation, and other financial and economic issues in more than 400 cases before the United States Congress, the Canadian Radio-Television and Telecommunications Commission, the Federal Communications Commission, the National Energy Board (Canada), the National Telecommunications and Information Administration, the Federal Energy Regulatory Commission, the public service commissions of forty-three states, the District of Columbia, four Canadian provinces, the insurance commissions of five states, the Iowa State Board of Tax Review, the National Association of Securities Dealers, and the North Carolina Property Tax Commission. In addition, he has testified as an expert witness in telecommunications-related proceedings before the United States District Court for the District of New Hampshire, United States District Court for the Northern District of California, United States District Court for the Northern District of Illinois, Montana Second Judicial District Court Silver Bow County, the United States Bankruptcy Court for the Southern District of West Virginia, and United States District Court for the Eastern District of Michigan. He also testified as an expert before the United States Tax Court, United States District Court for the Eastern District of North Carolina; United States District Court for the District of Nebraska, and Superior Court of North Carolina. Dr. Vander Weide has testified in thirty states on issues relating to the pricing of unbundled network elements and universal service cost studies and has consulted with Bell Canada, Deutsche Telekom, and Telefónica on similar issues. He has also provided expert testimony on issues related to electric and natural gas restructuring. He has worked for Bell Canada/Nortel on a special task force to study the effects of vertical integration in the Canadian telephone industry and has worked for Bell Canada as an expert witness on the cost of capital. Dr. Vander Weide has provided consulting and expert witness testimony to the following companies:

| **ELECTRIC, GAS, WATER, OIL COMPANIES** | |
|---|---|
| Alcoa Power Generating, Inc. | Kinder Morgan Energy Partners |
| Alliant Energy and subsidiaries | Maritimes & Northeast Pipeline |
| AltaLink, L.P. | MidAmerican Energy and subsidiaries |
| Ameren | National Fuel Gas |
| American Water Works | Nevada Power Company |
| Atmos Energy and subsidiaries | NICOR |
| BP p.l.c. | North Carolina Natural Gas |
| Central Illinois Public Service | North Shore Gas |
| Centurion Pipeline L.P. | Northern Natural Gas Company |
| Citizens Utilities | NOVA Gas Transmission Ltd. |
| Consolidated Natural Gas and subsidiaries | PacifiCorp |
| Dominion Resources and subsidiaries | Peoples Energy and its subsidiaries |

| ELECTRIC, GAS, WATER, OIL COMPANIES | |
|---|---|
| Duke Energy and subsidiaries | PG&E |
| Empire District Electric Company | Progress Energy |
| EPCOR Distribution & Transmission Inc. | PSE&G |
| EPCOR Energy Alberta Inc. | Public Service Company of North Carolina |
| FortisAlberta Inc. | Sempra Energy/San Diego Gas and Electric |
| Hope Natural Gas | South Carolina Electric and Gas |
| Interstate Power Company | Southern Company and subsidiaries |
| Iberdrola Renewables | Tennessee-American Water Company |
| Iowa Southern | The Peoples Gas, Light and Coke Co. |
| Iowa-American Water Company | TransCanada |
| Iowa-Illinois Gas and Electric | Trans Québec & Maritimes Pipeline Inc. |
| Kentucky Power Company | Union Gas |
| Kentucky-American Water Company | United Cities Gas Company |
| Newfoundland Power Inc. | Virginia-American Water Company |
| | Xcel Energy |

| TELECOMMUNICATIONS COMPANIES | |
|---|---|
| ALLTEL and subsidiaries | Phillips County Cooperative Tel. Co. |
| Ameritech (now AT&T new) | Pine Drive Cooperative Telephone Co. |
| AT&T (old) | Roseville Telephone Company (SureWest) |
| Bell Canada/Nortel | SBC Communications (now AT&T new) |
| BellSouth and subsidiaries | Sherburne Telephone Company |
| Centel and subsidiaries | Siemens |
| Cincinnati Bell (Broadwing) | Southern New England Telephone |
| Cisco Systems | Sprint/United and subsidiaries |
| Citizens Telephone Company | Telefónica |
| Concord Telephone Company | Tellabs, Inc. |
| Contel and subsidiaries | The Stentor Companies |
| Deutsche Telekom | U S West (Qwest) |
| GTE and subsidiaries (now Verizon) | Union Telephone Company |
| Heins Telephone Company | United States Telephone Association |
| JDS Uniphase | Valor Telecommunications (Windstream) |
| Lucent Technologies | Verizon (Bell Atlantic) and subsidiaries |
| Minnesota Independent Equal Access Corp. | Woodbury Telephone Company |
| NYNEX and subsidiaries (Verizon) | |
| Pacific Telesis and subsidiaries | |

| INSURANCE COMPANIES |
|---|
| Allstate |
| North Carolina Rate Bureau |
| United Services Automobile Association (USAA) |
| The Travelers Indemnity Company |
| Gulf Insurance Company |

Other Professional Experience

Dr. Vander Weide conducts in-house seminars and training sessions on topics such as creating shareholder value, financial analysis, competitive strategy, cost of capital, real options, financial strategy, managing growth, mergers and acquisitions, valuation, measuring corporate performance, capital budgeting, cash management, and financial planning. Among the firms for whom he has designed and taught tailored programs and training sessions are ABB Asea Brown Boveri, Accenture, Allstate, Ameritech, AT&T, Bell Atlantic/Verizon, BellSouth, Progress Energy/Carolina Power & Light, Contel, Fisons, GlaxoSmithKline, GTE, Lafarge, MidAmerican Energy, New Century Energies, Norfolk Southern, Pacific Bell Telephone, The Rank Group, Siemens, Southern New England Telephone, TRW, and Wolseley Plc. Dr. Vander Weide has also hosted a nationally prominent conference/workshop on estimating the cost of capital. In 1989, at the request of Mr. Fuqua, Dr. Vander Weide designed the Duke Program for Manager Development for managers from the former Soviet Union, the first in the United States designed exclusively for managers from Russia and the former Soviet republics.

Early in his career, Dr. Vander Weide helped found University Analytics, Inc., which was one of the fastest growing small firms in the country. As an officer at University Analytics, he designed cash management models, databases, and software packages that are still used by most major U.S. banks in consulting with their corporate clients. Having sold his interest in University Analytics, Dr. Vander Weide now concentrates on strategic and financial consulting, academic research, and executive education.

**PUBLICATIONS**
**JAMES H. VANDER WEIDE**

The Lock-Box Location Problem: a Practical Reformulation, *Journal of Bank Research*, Summer, 1974, pp. 92-96 (with S. Maier). Reprinted in *Management Science in Banking*, edited by K. J. Cohen and S. E. Gibson, Warren, Gorham and Lamont, 1978.

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*Managing Corporate Liquidity: an Introduction to Working Capital Management*, John Wiley and Sons, 1984 (with S. Maier).

**DERIVATION OF THE QUARTERLY DCF MODEL**

The simple DCF Model assumes that a firm pays dividends only at the end of each year. Since firms in fact pay dividends quarterly and investors appreciate the time value of money, the annual version of the DCF Model generally underestimates the value investors are willing to place on the firm's expected future dividend stream. In these workpapers, we review two alternative formulations of the DCF Model that allow for the quarterly payment of dividends.

When dividends are assumed to be paid annually, the DCF Model suggests that the current price of the firm's stock is given by the expression:

$$P_0 = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \ldots + \frac{D_n + P_n}{(1+k)^n} \quad (1)$$

where

| | | |
|---|---|---|
| $P_0$ | = | current price per share of the firm's stock, |
| $D_1, D_2, \ldots, D_n$ | = | expected annual dividends per share on the firm's stock, |
| $P_n$ | = | price per share of stock at the time investors expect to sell the stock, and |
| k | = | return investors expect to earn on alternative investments of the same risk, i.e., the investors' required rate of return. |

Unfortunately, expression (1) is rather difficult to analyze, especially for the purpose of estimating k. Thus, most analysts make a number of simplifying assumptions. First, they assume that dividends are expected to grow at the constant rate g into the indefinite future. Second, they assume that the stock price at time n is simply the present value of all dividends expected in periods subsequent to n. Third, they assume that the investors' required rate of return, k, exceeds the expected dividend growth rate g. Under

the above simplifying assumptions, a firm's stock price may be written as the following sum:

$$P_0 = \frac{D_0(1+g)}{(1+k)} + \frac{D_0(1+g)^2}{(1+k)^2} + \frac{D_0(1+g)^3}{(1+k)^3} + \ldots , \qquad \textbf{(2)}$$

where the three dots indicate that the sum continues indefinitely.

As we shall demonstrate shortly, this sum may be simplified to:

$$P_0 = \frac{D_0(1+g)}{(k-g)}$$

First, however, we need to review the very useful concept of a geometric progression.

**Geometric Progression**

Consider the sequence of numbers 3, 6, 12, 24,..., where each number after the first is obtained by multiplying the preceding number by the factor 2. Obviously, this sequence of numbers may also be expressed as the sequence 3, 3 x 2, 3 x $2^2$, 3 x $2^3$, etc. This sequence is an example of a geometric progression.

Definition: A geometric progression is a sequence in which each term after the first is obtained by multiplying some fixed number, called the common ratio, by the preceding term.

A general notation for geometric progressions is: a, the first term, r, the common ratio, and n, the number of terms. Using this notation, any geometric progression may be represented by the sequence:

$$a, ar, ar^2, ar^3, \ldots, ar^{n-1}.$$

In studying the DCF Model, we will find it useful to have an expression for the sum of n terms of a geometric progression. Call this sum $S_n$. Then

$$S_n = a + ar + \ldots + ar^{n-1} . \qquad \textbf{(3)}$$

However, this expression can be simplified by multiplying both sides of equation (3) by r and then subtracting the new equation from the old. Thus,

$$rS_n = ar + ar^2 + ar^3 + \ldots + ar^n$$

and

$$S_n - rS_n = a - ar^n \quad ,$$

or

$$(1 - r)\, S_n = a\,(1 - r^n) \ .$$

Solving for $S_n$, we obtain:

$$S_n = \frac{a(1 - r^n)}{(1 - r)} \qquad \textbf{(4)}$$

as a simple expression for the sum of n terms of a geometric progression. Furthermore, if $|r| < 1$, then $S_n$ is finite, and as n approaches infinity, $S_n$ approaches a ÷ (1-r). Thus, for a geometric progression with an infinite number of terms and $|r| < 1$, equation (4) becomes:

$$S = \frac{a}{1 - r} \qquad \textbf{(5)}$$

Application to DCF Model

Comparing equation (2) with equation (3), we see that the firm's stock price (under the DCF assumption) is the sum of an infinite geometric progression with the first term

$$a = \frac{D_0(1 + g)}{(1 + k)}$$

and common factor

$$r = \frac{(1 + g)}{(1 + k)}$$

Applying equation (5) for the sum of such a geometric progression, we obtain

$$S = a \bullet \frac{1}{(1-r)} = \frac{D_0(1+g)}{(1+k)} \bullet \frac{1}{1-\frac{1+g}{1+k}} = \frac{D_0(1+g)}{(1+k)} \bullet \frac{1+k}{k-g} = \frac{D_0(1+g)}{k-g}$$

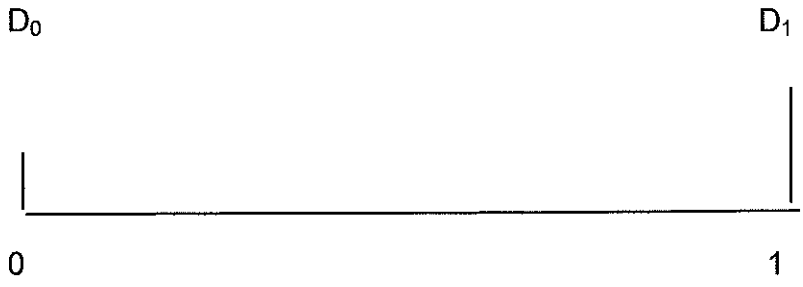
as we suggested earlier.

**Quarterly DCF Model**

The Annual DCF Model assumes that dividends grow at an annual rate of g% per year (see Figure 1).

Figure 1

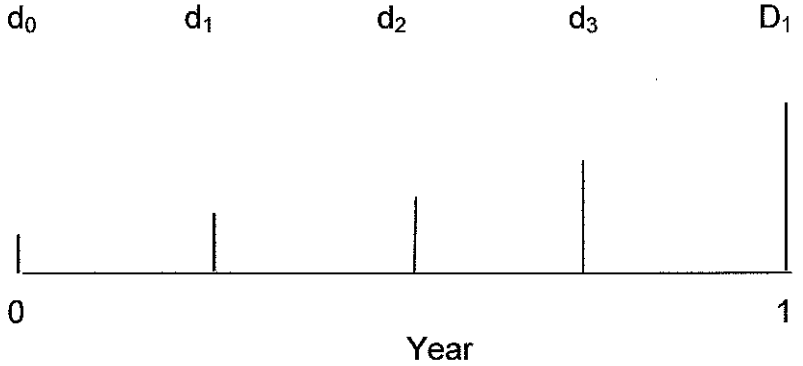
Annual DCF Model




$D_0 = 4d_0$ $D_1 = D_0(1 + g)$

Figure 2

Quarterly DCF Model (Constant Growth Version)




$d_1 = d_0(1+g)^{.25}$ $d_2 = d_0(1+g)^{.50}$

$d_3 = d_0(1+g)^{.75}$ $d_4 = d_0(1+g)$

In the Quarterly DCF Model, it is natural to assume that quarterly dividend payments differ from the preceding quarterly dividend by the factor $(1 + g)^{.25}$, where g is expressed in terms of percent per year and the decimal .25 indicates that the growth has

only occurred for one quarter of the year. (See Figure 2.) Using this assumption, along with the assumption of constant growth and $k > g$, we obtain a new expression for the firm's stock price, which takes account of the quarterly payment of dividends. This expression is:

$$P_0 = \frac{d_0(1+g)^{\frac{1}{4}}}{(1+k)^{\frac{1}{4}}} + \frac{d_0(1+g)^{\frac{2}{4}}}{(1+k)^{\frac{2}{4}}} + \frac{d_0(1+g)^{\frac{3}{4}}}{(1+k)^{\frac{3}{4}}} + \ldots \qquad \textbf{(6)}$$

where $d_0$ is the last quarterly dividend payment, rather than the last annual dividend payment. (We use a lower case d to remind the reader that this is not the annual dividend.)

Although equation (6) looks formidable at first glance, it too can be greatly simplified using the formula [equation (4)] for the sum of an infinite geometric progression. As the reader can easily verify, equation (6) can be simplified to:

$$P_0 = \frac{d_0(1+g)^{\frac{1}{4}}}{(1+k)^{\frac{1}{4}} - (1+g)^{\frac{1}{4}}} \qquad \textbf{(7)}$$

Solving equation (7) for $k$, we obtain a DCF formula for estimating the cost of equity under the quarterly dividend assumption:

$$k = \left[ \frac{d_0(1+g)^{\frac{1}{4}}}{P_0} + (1+g)^{\frac{1}{4}} \right]^4 - 1 \qquad \textbf{(8)}$$

**An Alternative Quarterly DCF Model**

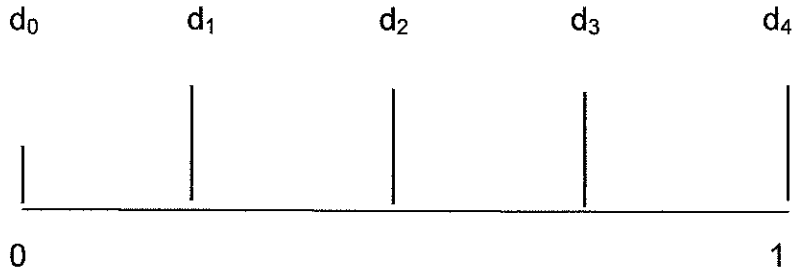
Although the constant growth Quarterly DCF Model [equation (8)] allows for the quarterly timing of dividend payments, it does require the assumption that the firm increases its dividend payments each quarter. Since this assumption is difficult for some analysts to accept, we now discuss a second Quarterly DCF Model that allows for constant quarterly dividend payments within each dividend year.

Assume then that the firm pays dividends quarterly and that each dividend payment is constant for four consecutive quarters. There are four cases to consider, with each case distinguished by varying assumptions about where we are evaluating the firm in relation to the time of its next dividend increase. (See Figure 3.)

## Figure 3

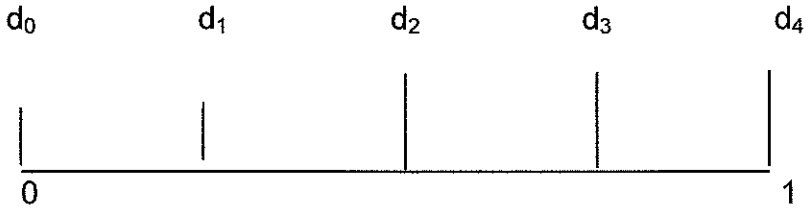
## Quarterly DCF Model (Constant Dividend Version)

### Case 1




$$d_1 = d_2 = d_3 = d_4 = d_0(1+g)$$

### Case 2

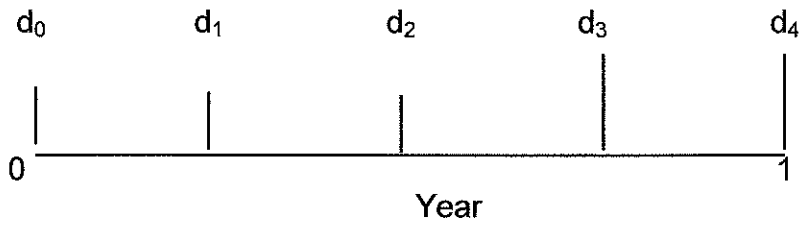



$$d_1 = d_0$$

$$d_2 = d_3 = d_4 = d_0(1+g)$$

**Figure 3 (continued)**

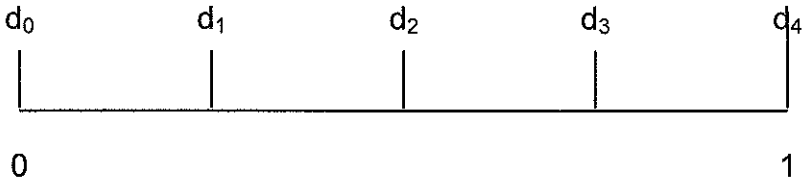
**Case 3**




$$d_1 = d_2 = d_0$$

$$d_3 = d_4 = d_0(1+g)$$

**Case 4**




$$d_1 = d_2 = d_3 = d_0$$

$$d_4 = d_0(1+g)$$

If we assume that the investor invests the quarterly dividend in an alternative investment of the same risk, then the amount accumulated by the end of the year will in all cases be given by

$$D_1^* = d_1 (1+k)^{3/4} + d_2 (1+k)^{1/2} + d_3 (1+k)^{1/4} + d_4$$

where $d_1$, $d_2$, $d_3$ and $d_4$ are the four quarterly dividends. Under these new assumptions, the firm's stock price may be expressed by an Annual DCF Model of the form (2), with the exception that

$$D_1^* = d_1 (1 + k)^{3/4} + d_2 (1 + k)^{1/2} + d_3 (1 + k)^{1/4} + d_4 \qquad \textbf{(9)}$$

is used in place of $D_0(1+g)$. But, we already know that the Annual DCF Model may be reduced to

$$P_o = \frac{D_o (1 + g)}{k - g}$$

Thus, under the assumptions of the second Quarterly DCF Model, the firm's cost of equity is given by

$$k = \frac{D_1^*}{P_o} + g \quad \textbf{(10)}$$

with $D_1^*$ given by (9).

Although equation (10) looks like the Annual DCF Model, there are at least two very important practical differences. First, since $D_1^*$ is always greater than $D_0(1+g)$, the estimates of the cost of equity are always larger (and more accurate) in the Quarterly Model (10) than in the Annual Model. Second, since $D_1^*$ depends on k through equation (9), the unknown "k" appears on both sides of (10), and an iterative procedure is required to solve for k.

## EX ANTE RISK PREMIUM APPROACH

My ex ante risk premium method is based on studies of the DCF expected return on proxy companies compared to the interest rate on Moody's A-rated utility bonds. Specifically, for each month in my study period, I calculate the risk premium using the equation,

$$RP_{PROXY} = DCF_{PROXY} - I_A$$

where:

| | | |
|---|---|---|
| $RP_{PROXY}$ | = | the required risk premium on an equity investment in the proxy group of companies, |
| $DCF_{PROXY}$ | = | average DCF estimated cost of equity on a portfolio of proxy companies; and |
| $I_A$ | = | the yield to maturity on an investment in A-rated utility bonds. |

For my ex ante risk premium analysis, I begin with the Moody's group of twenty-four electric companies shown in Table 1. I use the Moody's group of electric companies because they are a widely followed group of electric utilities, and use of this constant group greatly simplifies the data collection task required to estimate the ex ante risk premium over the months of my study. Simplifying the data collection task is desirable because the ex ante risk premium approach requires that the DCF model be estimated for every company in every month of the study period. The Ex Ante Risk Premium Schedule in my direct testimony displays the average DCF estimated cost of equity on an investment in the portfolio of electric companies and the yield to maturity on A-rated utility bonds in each month of the study.

Previous studies have shown that the ex ante risk premium tends to vary inversely with the level of interest rates, that is, the risk premium tends to increase when interest rates decline, and decrease when interest rates go up. To test whether my studies also indicate that the ex ante risk premium varies inversely with the level of interest rates, I perform a regression analysis of the relationship between the ex ante risk premium and the yield to maturity on A-rated utility bonds, using the equation,

$$RP_{PROXY} = a + (b \times I_A) + e$$

where:

$RP_{PROXY}$ = risk premium on proxy company group;

$I_A$ = yield to maturity on A-rated utility bonds;

e = a random residual; and

a, b = coefficients estimated by the regression procedure.

Regression analysis assumes that the statistical residuals from the regression equation are random. My examination of the residuals revealed that there is a significant probability that the residuals are serially correlated (non-zero serial correlation indicates that the residual in one time period tends to be correlated with the residual in the previous time period). Therefore, I make adjustments to my data to correct for the possibility of serial correlation in the residuals.

The common procedure for dealing with serial correlation in the residuals is to estimate the regression coefficients in two steps. First, a multiple regression analysis is used to estimate the serial correlation coefficient, r. Second, the estimated serial correlation coefficient is used to transform the original variables into new variables whose serial correlation is approximately zero. The regression coefficients are then re-estimated using the transformed variables as inputs in the regression equation. Based on my knowledge of the statistical relationship between the yield to maturity on A-rated utility bonds and the required risk premium, my estimate of the ex ante risk premium on an investment in my proxy electric company group as compared to an investment in A-rated utility bonds is given by the equation:
8.12-(.567x6.47)=4.41

$$RP_{PROXY} = 8.22 - .586 \times I_A.$$
$$(10.67) \quad (-5.16)$$ [6]

Using the 6.47 percent forecasted yield to maturity on A-rated utility bonds,[7] the regression equation produces an ex ante risk premium equal to 4.43 percent (8.22 – 0.586 x 6.47 = 4.43).

---

[6] The t-statistics are shown in parentheses.

[7] Forecasted A-rated utility bond yield determined from forecast data in Value Line Selection & Opinion, February 24, 2012, and Global Insight, February 2012. See Footnote 1 in the direct testimony.

To estimate the cost of equity using the ex ante risk premium method, one may add the estimated risk premium over the forecasted yield on A-rated utility bonds to the yield to maturity on A-rated utility bonds. As described above, my analyses produce an estimated risk premium over the yield on A-rated utility bonds equal to 4.4 percent. Adding an estimated risk premium of 4.4 percent to the 6.5 percent forecasted yield to maturity on A-rated utility bonds produces a cost of equity estimate of 10.9 percent for the electric company proxy group using the ex ante risk premium method.

**TABLE 1**
**MOODY'S ELECTRIC COMPANIES**

American Electric Power
Constellation Energy
Progress Energy
CH Energy Group
Cinergy Corp.
Consolidated Edison Inc.
DPL Inc.
DTE Energy Co.
Dominion Resources Inc.
Duke Energy Corp.
Energy East Corp.
FirstEnergy Corp.
Reliant Energy Inc.
IDACORP. Inc.
IPALCO Enterprises Inc.
NiSource Inc.
OGE Energy Corp.
Exelon Corp.
PPL Corp.
Potomac Electric Power Co.
Public Service Enterprise Group
Southern Company
Teco Energy Inc.
Xcel Energy Inc.

Source of data: *Mergent Public Utility Manual*, August 2002. Of these twenty-four companies, I do not include companies in my ex ante risk premium DCF analysis in months in which there are insufficient data to perform a DCF analysis. In addition, since the beginning period of my study, some companies have disappeared through mergers and acquisitions.

**EX POST RISK PREMIUM APPROACH**

## Source

Stock price and yield information is obtained from Standard & Poor's Security Price publication. Standard & Poor's derives the stock dividend yield by dividing the aggregate cash dividends (based on the latest known annual rate) by the aggregate market value of the stocks in the group. The bond price information is obtained by calculating the present value of a bond due in thirty years with a $4.00 coupon and a yield to maturity of a particular year's indicated Moody's A-rated utility bond yield. The values shown on schedules are the January values of the respective indices. Standard & Poor's discontinued its S&P Utilities Index in December 2001, replacing its utilities stock index with separate indices for electric and natural gas utilities. Thus, to continue my study, I base the stock returns beginning in 2002 on the total returns for the EEI Index of U.S. shareholder-owned electric utilities, as reported by EEI on its website.
http://www.eei.org/whatwedo/DataAnalysis/IndusFinanAnalysis/Pages/QtrlyFinancialUpdates.aspx

## Calculation of Stock and Bond Returns

Sample calculation of "Stock Return" column:

$$\text{Stock Return (2010)} = \left[\frac{\text{Stock Price (2011)} - \text{Stock Price (2010)} + \text{Dividend (2010)}}{\text{Stock Price (2010)}}\right]$$

where Dividend (2010) = Stock Price (2010) x Stock Div. Yield (2010)

Sample calculation of "Bond Return" column:

$$\text{Bond Return (2010)} = \left[\frac{\text{Bond Price (2011)} - \text{Bond Price (2010)} + \text{Interest (2010)}}{\text{Bond Price (2010)}}\right]$$

where Interest = $4.00.

## AFFIDAVIT OF JAMES H. VANDER WEIDE

**STATE OF NORTH CAROLINA )**
**) ss**
**COUNTY OF DURHAM )**

On the 26th day of June 2012, before me appeared James H. Vander Weide, to me personally known, who, being by me first duly sworn, states that he is Research Professor of Finance and Economics at the Fuqua School of Business of Duke University and President of Financial Strategy Associates and acknowledges that he has read the above and foregoing document and believes that the statements therein are true and correct to the best of his information, knowledge and belief.

James H. Vander Weide

James H. Vander Weide

Subscribed and sworn to before me this 26th day of June 2012

Notary Public

My commission expires: March 18th, 2014

CYDNEY J. HILL
Notary Public
My Comm. Exp.
March 18, 2014
ORANGE CO., NC