Q. Evidence of Dr. Vander Weide: Please provide a copy of Dr. Vander Weide's testimony for Gulf Power Florida of July 11 (Docket No. 110138-EI) noted at p. 90 of 106.

A. A copy of the requested testimony is attached.

Florida Public Service Commission
Docket No. 110138-EI
Testimony and Exhibit of James H. Vander Weide PH.D.

BEFORE THE

FLORIDA PUBLIC SERVICE COMMISSION

DOCKET NO. 110138-EI

TESTIMONY AND EXHIBIT

OF

JAMES H. VANDER WEIDE PH.D.

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GULF POWER

A SOUTHERN COMPANY

DIRECT TESTIMONY OF

JAMES H. VANDER WEIDE, PH.D.

ON BEHALF OF GULF POWER COMPANY

DOCKET NO. 110138-EI

I. INTRODUCTION AND PURPOSE

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 describe your educational background and prior academic experience.

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. A summary of my research, teaching, and other professional experience is presented in Exhibit___(JVW-2, Appendix 1).

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 Canadian Radio-Television and Telecommunications Commission, the Federal Communications Commission, the National Telecommunications and Information Administration, the Federal Energy Regulatory Commission, the National Energy Board (Canada), the public service commissions of forty-three states and 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, 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.

Q. What is the purpose of your testimony?

A. I have been asked by Gulf Power Company ("Gulf Power" or "the Company") to prepare an independent appraisal of Gulf Power's cost of equity and to recommend to the Florida Public Service Commission ("the Commission") a rate of return on equity that is fair, that allows Gulf Power to attract capital on reasonable terms, and that allows Gulf Power to maintain its financial integrity.

II. SUMMARY OF TESTIMONY

Q. How do you estimate Gulf Power's cost of equity?

A. I estimate Gulf Power's cost of equity by applying several standard cost of equity methods to market data for a large group of utility companies of comparable risk.

Q. Why do you apply your cost of equity methods to a large group of comparable risk companies rather than solely to Gulf Power?

A. I apply my cost of equity method to a large group of comparable risk companies 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. The problem of difficult-to-measure inputs is especially acute for Gulf Power because, as a subsidiary of Southern Company, its stock is not publicly traded. 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 comparable risk, or 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 the same 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 10.8 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 companies of comparable risk, and on the evidence I present in this testimony that the CAPM significantly underestimates the cost of equity for companies such as my proxy companies with betas significantly less than 1.0. As noted below, the cost of equity for my proxy companies must be adjusted to reflect the higher financial risk associated with Gulf Power's rate making capital structure compared to the average market-value capital structure of my proxy company group. Making this adjustment produces a cost of equity equal to 11.7 percent.

Q. You note that the cost of equity of your proxy companies needs to be adjusted for financial risk. Why is that adjustment needed?

A. The cost of equity for my proxy companies depends on their financial risk, which is measured by the market values of debt and equity in their capital structures. The financial risk of my proxy companies differs from the financial risk associated with Gulf Power's rate making capital structure. It is both logically and economically inconsistent to apply a cost of equity developed for a sample of companies with a specific degree of financial risk to a capital structure with a different financial risk. One must adjust the cost of equity for my proxy companies upward in order for

investors in Gulf Power to have an opportunity to earn a return on their investment in Gulf Power that is commensurate with returns they could earn on other investments of comparable risk.

Q. How does Gulf Power's financial risk, as reflected in its rate making capital structure, compare to the financial risk of your proxy companies?

A. Gulf Power's rate making capital structure in this proceeding contains 1.29 percent short-term debt, 47.21 percent long-term debt, 5.24 percent preferred equity, and 46.26 percent common equity. The average market value capital structure for my proxy group of companies contains approximately 4.59 percent short-term debt, 39.77 percent long-term debt, 0.56 percent preferred equity, and 55.08 percent common equity. Thus, the financial risk of Gulf Power as reflected in its rate making capital structure is greater than the financial risk embodied in the cost of equity estimates for my proxy companies.

Q. The Commission rejected your financial risk adjustment in Docket No. 090079-EI, on the grounds that you inappropriately mix market value and book value capital structures. Do you agree that your comparison of the market value capital structures of your proxy companies to Gulf Power's rate making or book value capital structure is inappropriate?

A. No. I compare the average market value capital structure of my proxy companies to Gulf Power's recommended book value capital structure because the cost of equity results I obtain from my proxy companies depend on their financial risk as measured in the marketplace. In contrast, Gulf Power's financial risk depends on its rate making, or book value capital structure. As discussed above, it is both logically and

economically inconsistent to apply a cost of equity obtained from a sample of companies with one level of financial risk to a capital structure with a different level of financial risk. My financial risk adjustment appropriately adjusts the cost of equity for my proxy companies to reflect the differences in financial risk reflected in the proxy companies' cost of equity and the financial risk reflected in Gulf Power's rate making capital structure.

Q. Are you aware of examples where regulators have used market value capital structures to estimate the overall cost of capital?

A. Yes. I'm aware of several examples where regulators have used market value capital structures either to adjust the cost of equity for financial risk or to estimate the overall cost of capital. First, the Pennsylvania Public Utility Commission has adopted a financial risk adjustment similar to the adjustment I have recommended here to set the allowed rate of return on equity for electric and water companies. Second, regulatory bodies, including the Federal Communication Commission's (FCC) Wireline Competition Bureau and the public service commission of Massachusetts, have used market value capital structures to estimate the cost of capital in proceedings on the cost of the unbundled network elements local exchange carriers are required to lease to their competitors. Third, the Surface Transportation Board uses a market value capital structure to estimate the cost of capital for railroads. Fourth, some state tax authorities use market value capital structures to calculate the cost of capital that is used to value utilities' properties for the purpose of assessing property taxes, including, for example, Colorado, Iowa, Nevada, and Utah.

Q. What is the fair rate of return on equity for Gulf Power indicated by your cost of equity analysis?

A. Based on my analysis, I recommend that Gulf Power be allowed a fair rate of return on equity equal to 11.7 percent in order to have the same weighted average cost of capital as my proxy companies.

Q. Do you have exhibits accompanying your testimony?

A. Yes. I have prepared or supervised the preparation of Exhibit ___ (JVW-1) consisting of ten schedules and Exhibit ___ (JVW-2) consisting of five 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 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. Does the required rate of return on an investment vary with 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. Do economists and investors consider future industry changes when they estimate the risk of a particular investment?

A. Yes. Economists and investors consider all the risks that a firm might be exposed to over the future life of the company.

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. What are the primary business and financial risks facing electric energy companies such as Gulf Power?

A. The business and financial risks of investing in electric energy companies such as Gulf Power include:

1. Demand Uncertainty. Demand uncertainty is one of the primary business risks of investing in electric energy companies such as Gulf Power. Demand uncertainty is caused by: (a) the strong dependence of electric demand on the state of the economy and weather patterns; (b) the sensitivity of demand to changes in rates; (c) the ability of customers to choose alternative forms of energy, such as natural gas or oil; (d) the ability of some customers to locate facilities in the service areas of competitors; (e) the ability of some customers to conserve energy or produce their own electricity under cogeneration or self-generation arrangements; and (f) the ability of municipalities to go into the energy business rather than renew the company's franchise. Demand uncertainty is a problem for electric companies because of the need to plan for infrastructure additions many years in advance of demand.

2. Operating Expense Uncertainty. The business risk of electric energy companies is also increased by the inherent uncertainty in the typical electric energy company's operating expenses. Operating expense uncertainty arises as a result of: (a) the prospect of increasing employee health care and pension expenses; (b) uncertainty over plant outages, the cost of purchased power, and the revenues

achieved from off system sales; (c) variability in maintenance costs and the costs of other materials; (d) uncertainty over outages of the transmission and distribution systems, as well as storm-related expenses; (e) the prospect of increased expenses for security; and (f) high volatility in fuel prices or interruptions in fuel supply.

3. Investment Cost Uncertainty. The electric energy business requires very large investments in the generation, transmission, and distribution facilities required to deliver energy to customers. The future amounts of required investments in these facilities are highly 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; (e) uncertainty in the amount of additional investments to ensure the reliability of the company's transmission and distribution networks; and (f) uncertainty regarding future decommissioning and dismantlement costs. Furthermore, the risk of investing in electric energy facilities is increased by the irreversible nature of the company's investments in generation, transmission, and distribution facilities. For example, if an electric energy company 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.

4. High Operating Leverage. The electric energy business requires a large commitment to fixed costs in relation to the operating margin on sales, a situation known as high operating leverage. The relatively high degree of fixed costs in the electric energy business arises from the average electric energy company's large investment in fixed generation, transmission, and distribution facilities. High

operating leverage causes the average electric energy company's operating income to be highly sensitive to demand and revenue fluctuations.

5. High Degree of Financial Leverage. The large capital requirements for building economically efficient electric generation, transmission, and distribution facilities, along with the traditional regulatory preference for the use of debt, have encouraged electric utilities to maintain highly debt-leveraged capital structures as compared to non-utility firms. 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 sensitivity of a firm's earnings to variations in revenues.

6. Regulatory Uncertainty. Investors' perceptions of the business and financial risks of electric energy companies 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 energy companies operating in those states. 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. Have any of these risk factors changed in recent years?

A. Yes. The risk of investing in electric energy companies has increased as a result of significantly greater macroeconomic uncertainty; projected electric energy company

capital expenditures; greater volatility in fuel prices; greater uncertainty in the cost of satisfying environmental requirements; more volatile purchased power and off system sales prices; greater uncertainty in employee health care and pension expenses; greater uncertainty with regard to legislative mandates related to generation mix, such as renewable portfolio standards; and greater uncertainty in the expenses associated with system outages, storm damage, and security. Each of these factors puts pressure on customer rates and therefore increases regulatory risk.

Q. How does greater macroeconomic uncertainty affect the business and financial risks of investing in electric energy companies such as Gulf Power?

A. Greater macroeconomic uncertainty increases the business and financial risks of investing in electric energy companies such as Gulf Power by fundamentally increasing demand uncertainty, investment uncertainty, and regulatory uncertainty.

Q. Why does macroeconomic uncertainty increase demand uncertainty?

A. Macroeconomic uncertainty increases demand uncertainty because the demand for electric energy services depends on the state of the economy. The greater the uncertainty regarding the state of the economy, the greater will be the uncertainty regarding the demand for energy services.

Q. How does increased demand uncertainty affect the uncertainty of the future return on investment for Gulf Power?

A. Increased demand uncertainty greatly increases the uncertainty of the future return on investment for Gulf Power because most of the Company's costs are fixed, while its

revenues are variable. Thus, greater volatility in revenues produces greater volatility in return on investment.

Q. Why does macroeconomic uncertainty increase investment cost uncertainty?

A. Increased macroeconomic uncertainty greatly increases the uncertainty of investment costs for electric companies like Gulf Power because it increases the uncertainty regarding: the demand for electric energy; the economics of alternative generating technologies; the cost of environmental regulations; the cost of construction materials and labor; and the amount of additional investment required to ensure the reliability of the company's transmission and distribution networks.

Q. Why does macroeconomic uncertainty increase regulatory uncertainty?

A. Regulatory uncertainty arises because investors are not certain that regulators will be willing to set rates that allow companies an opportunity to recover their costs of service and earn a fair and reasonable return on investment. Regulatory uncertainty increases in difficult economic times because investors recognize that regulators are likely to face greater pressure to restrain rate increases in difficult economic times than in good economic times.

Q. How do greater projected capital expenditures affect the business and financial risks of investing in electric energy companies such as Gulf Power?

A. Greater projected capital expenditures increase the business and financial risks of investing in electric energy companies such as Gulf Power by increasing investment cost uncertainty, operating leverage, and regulatory uncertainty.

Q. Why do greater projected capital expenditures increase an electric energy company's investment cost uncertainty?

A. Greater projected capital expenditures increase investment cost uncertainty because investments in new generation, transmission, and distribution facilities take many years to complete. As investors found during the last electric energy investment boom of the 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. Why do greater projected capital expenditures increase operating leverage?

A. As noted above, operating leverage increases when a firm's commitment to fixed costs rises in relation to its operating margin on sales. Increased capital expenditures increase operating leverage because investment costs are fixed, the investment period is long, and revenues do not generally increase in line with investment costs until the investment is entirely included in rate base. Thus, the ratio of fixed costs to operating margin increases when capital expenditures increase.

Q. Why do greater projected capital expenditures increase regulatory uncertainty?

A. As noted above, regulatory uncertainty arises because investors are aware that regulators in some states have been unwilling at times to set rates that allow a company an opportunity to recover its cost of service, including the cost of capital. Regulatory uncertainty is most pronounced when rates are projected to increase. Greater projected capital expenditures increase regulatory uncertainty because they frequently cause rates to increase.

Q. Is the Company projecting significant capital expenditures over the next several years?

A. Yes. The Company's construction program is currently estimated to include a planned investment of $384.6 million in 2011, $423.6 million in 2012, and $421.7 million in 2013.

Q. Can the risks facing Gulf Power and other electric energy companies be distinguished from the risks of investing in companies in other industries?

A. Yes. The risks of investing in electric energy companies such as Gulf Power can be distinguished from the risks of investing in companies in many other industries in several ways. First, the risks of investing in electric energy companies 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 the electric energy business are largely asymmetric. That is, there is little opportunity for electric energy companies to earn more than their required return, and a significant chance that they will earn less than their required return.

V. COST OF EQUITY ESTIMATION METHODS

Q. What methods do you use to estimate Gulf Power's fair rate of return on equity?

A. I use several generally accepted methods for estimating the cost of equity for Gulf Power. 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 based on 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

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

where:

P_S = Current price of the firm's stock;

$D_1, D_2...D_n$ = 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 Gulf Power'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 Exhibit___(JVW-2, 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 Exhibit ___(JVW-1, Schedule 1) and in Exhibit___(JVW-2, 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 ALLETE, the first company shown in Exhibit___(JVW-1, Schedule 1), the last four quarterly dividends are each equal to .44. Thus dividends

d_1, d_2, d_3 and d_4 are equal to 0.463 [.44 x (1 + .0533) = 0.463]. As noted previously, the logic underlying this procedure is described in Exhibit___(JVW-2, 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 to include more recent data?

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 December 2010. 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. Yes. I include a five percent allowance for flotation costs in my DCF calculations. A complete explanation of the need for flotation costs is contained in Exhibit___(JVW-2, Appendix 3).

Q. Please explain your inclusion of flotation costs.

A. All firms that have sold securities in the capital markets have incurred some level of flotation costs, including underwriters' commissions, legal fees, printing expense, etc. These costs are withheld from the proceeds of the stock sale or are paid separately, and must be recovered over the life of the equity issue. Costs vary depending upon the size of the issue, the type of registration method used and other factors, but in general these costs range between three and five percent of the proceeds from the issue [see Lee, Inmoo, Scott Lochhead, Jay Ritter, and Quanshui Zhao, "The Costs of Raising Capital," *The Journal of Financial Research,* Vol. XIX No 1 (Spring 1996), 59-74, and Clifford W. Smith, "Alternative Methods for Raising Capital," *Journal of Financial Economics* 5 (1977) 273-307]. In addition to these costs, for large equity issues (in relation to outstanding equity shares), there is likely to be a decline in price associated with the sale of shares to the public. On average, the decline due to market pressure has been estimated at two to three percent [see Richard H. Pettway, "The Effects of New Equity Sales upon Utility Share Prices," *Public Utilities Fortnightly,* May 10, 1984, 35—39]. Thus, the total flotation cost, including both issuance expense and market pressure, could range anywhere from five to eight percent of the

proceeds of an equity issue. I believe a combined five percent allowance for flotation costs is a conservative estimate that should be used in applying the DCF model in this proceeding.

Q. Is a flotation cost adjustment only appropriate if a company issues stock during the test year?

A. As described in Exhibit___(JVW-2, Appendix 3), a flotation cost adjustment is required whether or not a company issues new stock during the test year. Previously incurred flotation costs have not been recovered in previous rate cases; rather, they are a permanent cost associated with past issues of common stock. Just as an adjustment is made to the embedded cost of debt to reflect previously incurred debt issuance costs (regardless of whether additional bond issuances were made in the test year), so should an adjustment be made to the cost of equity regardless of whether a company issues stock during the test year.

Q. Does an allowance for recovery of flotation costs associated with stock sales in prior years constitute retroactive rate-making?

A. No. An adjustment for flotation costs on equity is not meant to recover any cost that is properly assigned to prior years. In fact, the adjustment allows a company to recover only the current carrying costs associated with flotation expenses incurred at the time stock sales were made. The original flotation costs themselves will never be recovered, because the stock is assumed to have an infinite life.

Q. How do you apply the DCF approach to obtain the cost of equity capital for Gulf Power?

A. I apply the DCF approach to the Value Line electric companies shown in Exhibit___(JVW-1, Schedule 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 three 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 three 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 three 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 Exhibit___(JVW-1, Schedule 1), I obtain a market-weighted average DCF result of 10.7 percent and a simple average result of 11.4 percent for my proxy company group.

B. RISK PREMIUM METHOD

Q. Please describe the risk premium method of estimating Gulf Power'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 Gulf Power 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 Gulf Power?

A. I use two methods to estimate the required risk premium on an equity investment in Gulf Power. 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 Gulf Power.

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 Exhibit___(JVW-2, Appendix 4), and the underlying DCF results and interest rates are displayed in Exhibit___(JVW-1, Schedule 2).

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. The forecasted yield to maturity on A-rated utility bonds, 6.15 percent, is obtained by adding the fifty-five-basis point spread between the average December 2010 yield on AAA-rated corporate bonds (5.02 percent) and A-rated utility bonds (5.57 percent) to Value Line's forecasted 5.6 percent yield on AAA-rated corporate bonds (see Value Line Selection & Opinion, November 26, 2010, pp. 2534-2535). My analyses produce an estimated risk premium over the yield on A-rated utility bonds equal to 4.90 percent. Adding an estimated risk premium of 4.90 percent to the 6.15 percent forecasted yield to maturity on A-rated utility bonds produces a cost of equity estimate of 11.0 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 Gulf Power.

A. I first perform a study of the comparable returns received by bond and stock investors over the seventy-three 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 2010. The return associated with each stock portfolio 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 between 1937 and 2010 are shown on Exhibit___(JVW-1, Schedule 3). The average annual return on an investment in the S&P 500 stock portfolio is 11.06 percent, while the average annual return on an investment in the Moody's A-rated utility bond portfolio is 6.42 percent. The risk premium on the S&P 500 stock portfolio is, therefore, 4.64 percent.

I also conduct a second study using stock data on the S&P Utilities rather than the S&P 500. As shown on Exhibit___(JVW-1, Schedule 4, the S&P Utility stock portfolio shows an average annual return of 10.5 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 4.1 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 2010. Thus, I use the average of the two historically-based risk premiums as my estimate of the required risk premium for Gulf Power 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 50 heads will appear in 100 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. This is because the return on equity, being a residual return, is less certain than the yield on bonds and investors must be compensated for this uncertainty. Second, the 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 from an equity investment 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 2010 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	2.691	(0.001)	0.015	2.07
2	T Statistic	1.465	(1.440)		

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

LINE NO.		INTERCEPT	TIME	ADJUSTED R SQUARE	F
1	Coefficient	1.784	(0.001)	0.002	1.12
2	T Statistic	1.085	(1.060)		

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® 2010 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 discernable 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 Gulf Power?

A. My studies provide strong evidence that investors today require an equity return of approximately 4.1 to 4.6 percentage points above the expected yield on A-rated utility bonds. The forecast yield on A-rated utility bonds at 2010 is 6.15 percent. Adding a 4.1 to 4.6 percentage point risk premium to a yield of 6.15 percent on A-rated utility bonds, I obtain an expected return on equity in the range 10.2 percent to 10.8 percent, with a midpoint of 10.5 percent. Adding a twenty-six basis-point allowance for flotation costs, I obtain an estimate of 10.8 percent as the ex post risk premium cost of equity for Gulf Power. I determine the flotation cost allowance by calculating the difference in my DCF results with and without a flotation cost allowance.

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 4.8 percent, using data from Value Line. I use the 20-year Treasury bond to estimate the risk-free rate 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. Value Line projects a yield on long-term Treasury bonds at 2012 equal to 4.7 percent. The current spread between the average December yield on 30-year Treasury bonds (4.42 percent) and 20-year Treasury bonds (4.17 percent) is twenty-five basis points. Subtracting twenty-five basis points from the 4.7 percent forecasted yield on long-term Treasury bonds produces a forecasted yield of 4.45 percent for 20-year Treasury bonds (see Value Line Investment Survey, Selection & Opinion, November 26, 2010, p. 2534 – 2535).

For my estimate of the company-specific risk, or beta, I use the average 0.67 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 2009 (11.8 percent) and the average income return on 20-year U.S. Treasury bonds over the same period (5.2 percent) (*see* Ibbotson® SBBI® 2010 Valuation Yearbook, p. 23, published by Morningstar®). Thus, my historical risk premium method produces a risk premium of 6.7 percent (11.8 – 5.2 = 6.7) (apparent discrepancy due to rounding).

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 Exhibit___(JVW-1, Schedule 5).

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 4.45 percent, a beta equal to 0.67, a risk premium on the market portfolio equal to 6.7 percent, and a flotation cost allowance of 26 basis points, I obtain an historical CAPM estimate of the cost of equity equal to 9.2 percent (4.45 + 0.67 x 6.7 +0.26= 9.2), see Exhibit___(JVW-1, Schedule 6).

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).[1]

Q. Can you briefly summarize these articles?

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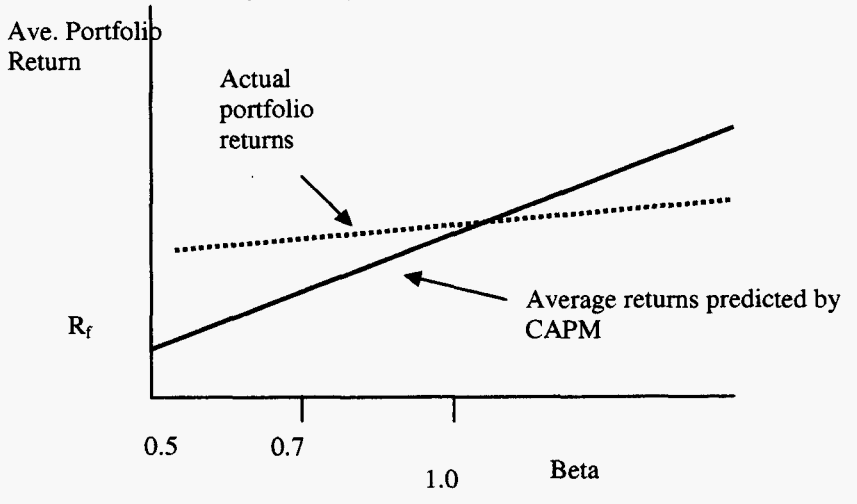
[1] Fischer Black, Michael C. Jensen, and Myron Scholes, "The Capital Asset Pricing Model: Some Empirical Tests," in *Studies in the Theory of Capital Markets*, M. Jensen, ed. New York: Praeger, 1972; Eugene Fama and James MacBeth, "Risk, Return, and Equilibrium: Empirical Tests," *Journal of Political 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.

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 β_i is a measure of the risk of investing in security or portfolio i (see Figure 1 below).

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 Exhibit___(JVW-1, Schedule 7), over the period 1937 through 2009, investors in the S&P Utilities Stock Index have earned a risk premium over the yield on long-term Treasury bonds equal to 5.06 percent, while investors in the S&P 500 have earned a risk premium over the yield on long-term Treasury bonds equal to 5.64 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 0.67, whereas the historical ratio of the utility risk premium to the S&P 500 risk premium is 0.90 (5.06 ÷ 5.64 = 0.90). 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 0.67, 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 Gulf Power'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 8.85 percent [see Exhibit___(JVW-1, Schedule 8)].

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 4.45 percent, a beta of 0.67, a risk premium on the market portfolio of 8.85 percent, and a flotation cost allowance of 26 basis points, I obtain a CAPM result of 10.7 percent (apparent discrepancy due to rounding).

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 10.8 percent. As shown in the table below, 10.8 percent is the simple average of my DCF, ex ante risk premium, and ex post risk premium results.

TABLE 3
COST OF EQUITY MODEL RESULTS

METHOD	MODEL RESULT
Discounted Cash Flow	10.7%
Ex Ante Risk Premium	11.0%
Ex Post Risk Premium	10.8%
Average	10.8%

Q. Does your conclusion that the cost of equity for your proxy group is 10.8 percent depend on the percentages of debt and equity in your proxy companies' average capital structure?

A. Yes. The 10.8 percent cost of equity results for my proxy group reflects the financial risk associated with the average market value capital structure of my comparable company group. If Gulf Power's ratemaking, or book value capital structure, is used to set rates, the cost of equity for Gulf Power will necessarily be higher than the cost of equity for the proxy group because the financial risk associated with Gulf Power's book value capital structure is greater than the financial risk reflected in the cost of equity estimate for my proxy company group (See Section II above for a discussion of why investors use market value capital structure weights to assess a company's financial risk).

Q. What are the percentages of debt and equity in your proxy companies' composite capital structures?

A. As shown in Exhibit___(JVW-1, Schedule 9), my electric company group has a composite capital structure containing approximately 4.59 percent short-term debt, 39.77 percent long-term debt, 0.56 percent preferred equity, and 55.08 percent common equity.

Q. How does Gulf Power's rate making capital structure for the purpose of rate setting in this proceeding compare to the average capital structure of your proxy companies?

A. Gulf Power's rate making capital structure contains 1.29 percent short-term debt, 47.21 percent long-term debt, 5.24 percent preferred equity, and 46.26 percent common equity. Although this capital structure contains an appropriate mix of debt and equity and is a reasonable capital structure for ratemaking purposes, from an investor's viewpoint, Gulf Power's ratemaking capital structure embodies greater financial risk than is reflected in my cost of equity estimates from my proxy companies.

Q. You discuss above that the cost of equity depends on a company's capital structure. Is there any way to adjust the 10.8 percent cost of equity for your proxy companies to reflect the higher financial risk of Gulf Power's rate making capital structure in this proceeding?

A. Yes. Since my proxy groups are similar in risk to Gulf Power, Gulf Power should have the same weighted average cost of capital as my proxy companies. One may easily determine the cost of equity Gulf Power would need in order to have the same weighted average cost of capital as my proxy companies.

Q. Do you perform such a calculation?

A. Yes. I adjust the 10.8 percent average cost of equity for my proxy groups by recognizing that to attract capital, Gulf Power must have the same weighted average cost of capital as my proxy group. My analysis, which is shown on Exhibit __

(JVW-1, Schedule 10), indicates that Gulf Power would require a fair rate of return on equity equal to 11.7 percent in order to have the same weighted average cost of capital as my proxy companies.

Q. What cost of equity do you recommend in this proceeding?

A. I recommend a cost of equity equal to 11.7 percent.

Q. Does this conclude your pre-filed direct testimony?

A. Yes, it does.

AFFIDAVIT

STATE OF NORTH CAROLINA)
)
COUNTY OF DURHAM)

Docket No. 110138-EI

Before me the undersigned authority, personally appeared James H. Vander Weide, who being first duly sworn, deposes, and says that he is President of Financial Strategy Associates, that the foregoing is true and correct to the best of his knowledge, information, and belief. He is personally known to me.

James H. Vander Weide, Ph.D.

Sworn to and subscribed before me this 6th day of July, 2011.

Notary Public, State of North Carolina

Commission No. _____

My Commission Expires 11/18/2012

JONNA H. WALTON NOTARY PUBLIC ROWAN COUNTY, NC

LIST OF ATTACHMENTS

Exhibit___(JVW-1, Schedule 1)	Summary of Discounted Cash Flow Analysis for Electric Energy Companies
Exhibit___(JVW-1, Schedule 2)	Comparison of the DCF Expected Return on an Investment in Electric Energy Companies to the Interest Rate on Moody's A-Rated Utility Bonds
Exhibit___(JVW-1, Schedule 3)	Comparative Returns on S&P 500 Stock Index and Moody's A-Rated Bonds 1937—2010
Exhibit___(JVW-1, Schedule 4)	Comparative Returns on S&P Utility Stock Index and Moody's A-Rated Bonds 1937—2010
Exhibit___(JVW-1, Schedule 5)	Using the Arithmetic Mean to Estimate the Cost of Equity Capital
Exhibit___(JVW-1, Schedule 6)	Calculation of Capital Asset Pricing Model Cost of Equity Using the SBBI 6.7 Percent Risk Premium
Exhibit___(JVW-1, Schedule 7)	Comparison of Risk Premia on S&P500 Stock Index and S&P Utilities Index 1937 – 2010
Exhibit___(JVW-1, Schedule 8)	Calculation of Capital Asset Pricing Model Cost of Equity Using DCF Estimate of the Expected Rate of Return on the Market Portfolio
Exhibit___(JVW-1, Schedule 9)	Capital Structure of Proxy Electric Company Group and Value Line Electric Utilities
Exhibit___(JVW-1, Schedule 10)	Illustration of Calculation of Cost of Equity Required for the Company to Have the Same Weighted Average Cost of Capital As the Value Line Electric Utilities
Exhibit___(JVW-2, Appendix 1)	Qualifications of James H. Vander Weide
Exhibit___(JVW-2, Appendix 2)	Derivation of the Quarterly DCF Model
Exhibit___(JVW-2, Appendix 3)	Adjusting for Flotation Costs in Determining a Public Utility's Allowed Rate of Return on Equity
Exhibit___(JVW-2, Appendix 4)	Ex Ante Risk Premium Method
Exhibit___(JVW-2, Appendix 5)	Ex Post Risk Premium Method

SUMMARY OF DISCOUNTED CASH FLOW ANALYSIS
FOR ELECTRIC ENERGY COMPANIES

Line No.	Company	d_0	P_0	Growth	Cost of Equity
1	ALLETE	0.440	36.436	5.33%	10.9%
2	Alliant Energy	0.395	36.600	8.20%	13.4%
3	Amer. Elec. Power	0.420	36.320	3.92%	9.1%
4	CenterPoint Energy	0.195	16.075	6.84%	12.5%
5	Consol. Edison	0.595	49.058	4.27%	9.8%
6	Dominion Resources	0.458	43.240	3.50%	8.2%
7	Duke Energy	0.245	17.811	4.40%	10.6%
8	Hawaiian Elec.	0.310	22.510	8.03%	14.6%
9	IDACORP, Inc.	0.300	36.702	4.67%	8.4%
10	Integrys Energy	0.680	50.752	7.93%	14.3%
11	NextEra Energy	0.500	52.872	6.61%	11.0%
12	Pepco Holdings	0.270	18.792	7.00%	13.8%
13	PG&E Corp.	0.455	47.253	6.49%	10.9%
14	Pinnacle West Capital	0.525	41.360	6.50%	12.5%
15	Portland General	0.260	21.283	5.40%	11.0%
16	Progress Energy	0.620	44.288	3.58%	9.9%
17	SCANA Corp.	0.475	40.953	4.78%	10.1%
18	Sempra Energy	0.390	52.273	6.63%	10.1%
19	Southern Co.	0.455	37.907	5.39%	10.9%
20	TECO Energy	0.205	17.398	7.10%	12.6%
21	UIL Holdings	0.432	29.480	3.43%	10.0%
22	Westar Energy	0.310	25.093	7.80%	13.6%
23	Wisconsin Energy	0.400	59.285	10.07%	13.3%
24	Xcel Energy Inc.	0.253	23.620	6.45%	11.4%
25	Market-weighted Average				10.7%
26	Average				11.4%

Notes:

d_0 = Most recent quarterly dividend.
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 December 2010 per Thomson Reuters.
FC = Flotation cost allowance (five percent) as a percent of stock price.
g = I/B/E/S forecast of future earnings growth December 2010 from Thomson Reuters.
k = Cost of equity using the quarterly version of the DCF model.

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

**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	0.1167	0.0793	0.0374
2	Oct-99	0.1175	0.0806	0.0369
3	Nov-99	0.1206	0.0794	0.0412
4	Dec-99	0.1256	0.0814	0.0442
5	Jan-00	0.1247	0.0835	0.0412
6	Feb-00	0.1292	0.0825	0.0467
7	Mar-00	0.1334	0.0828	0.0506
8	Apr-00	0.1256	0.0829	0.0427
9	May-00	0.1240	0.0870	0.0370
10	Jun-00	0.1264	0.0836	0.0428
11	Jul-00	0.1275	0.0825	0.0450
12	Aug-00	0.1245	0.0813	0.0432
13	Sep-00	0.1178	0.0823	0.0355
14	Oct-00	0.1181	0.0814	0.0367
15	Nov-00	0.1185	0.0811	0.0374
16	Dec-00	0.1168	0.0784	0.0384
17	Jan-01	0.1204	0.0780	0.0424
18	Feb-01	0.1209	0.0774	0.0435
19	Mar-01	0.1213	0.0768	0.0445
20	Apr-01	0.1276	0.0794	0.0482
21	May-01	0.1302	0.0799	0.0503
22	Jun-01	0.1308	0.0785	0.0523
23	Jul-01	0.1322	0.0778	0.0544
24	Aug-01	0.1328	0.0759	0.0569
25	Sep-01	0.1355	0.0775	0.0580
26	Oct-01	0.1333	0.0763	0.0570
27	Nov-01	0.1336	0.0757	0.0579
28	Dec-01	0.1333	0.0783	0.0550
29	Jan-02	0.1313	0.0766	0.0547
30	Feb-02	0.1326	0.0754	0.0572
31	Mar-02	0.1285	0.0776	0.0509
32	Apr-02	0.1249	0.0757	0.0492
33	May-02	0.1257	0.0752	0.0505
34	Jun-02	0.1255	0.0741	0.0514
35	Jul-02	0.1321	0.0731	0.0590
36	Aug-02	0.1268	0.0717	0.0551
37	Sep-02	0.1287	0.0708	0.0579
38	Oct-02	0.1291	0.0723	0.0568
39	Nov-02	0.1237	0.0714	0.0523
40	Dec-02	0.1207	0.0707	0.0500

Line No.	Date	DCF	Bond Yield	Risk Premium
41	Jan-03	0.1171	0.0706	0.0465
42	Feb-03	0.1208	0.0693	0.0515
43	Mar-03	0.1169	0.0679	0.0490
44	Apr-03	0.1129	0.0664	0.0465
45	May-03	0.1070	0.0636	0.0434
46	Jun-03	0.1025	0.0621	0.0404
47	Jul-03	0.1033	0.0657	0.0376
48	Aug-03	0.1034	0.0678	0.0356
49	Sep-03	0.1004	0.0656	0.0348
50	Oct-03	0.0988	0.0643	0.0345
51	Nov-03	0.0977	0.0637	0.0340
52	Dec-03	0.0947	0.0627	0.0320
53	Jan-04	0.0921	0.0615	0.0306
54	Feb-04	0.0918	0.0615	0.0303
55	Mar-04	0.0914	0.0597	0.0317
56	Apr-04	0.0925	0.0635	0.0290
57	May-04	0.0964	0.0662	0.0302
58	Jun-04	0.0965	0.0646	0.0319
59	Jul-04	0.0957	0.0627	0.0330
60	Aug-04	0.0962	0.0614	0.0348
61	Sep-04	0.0955	0.0598	0.0357
62	Oct-04	0.0951	0.0594	0.0357
63	Nov-04	0.0909	0.0597	0.0312
64	Dec-04	0.0930	0.0592	0.0338
65	Jan-05	0.0932	0.0578	0.0354
66	Feb-05	0.0929	0.0561	0.0368
67	Mar-05	0.0924	0.0583	0.0341
68	Apr-05	0.0925	0.0564	0.0361
69	May-05	0.0920	0.0553	0.0367
70	Jun-05	0.0925	0.0540	0.0385
71	Jul-05	0.0912	0.0551	0.0361
72	Aug-05	0.0921	0.0550	0.0371
73	Sep-05	0.0949	0.0552	0.0397
74	Oct-05	0.0961	0.0579	0.0382
75	Nov-05	0.1004	0.0588	0.0416
76	Dec-05	0.1010	0.0580	0.0430
77	Jan-06	0.1014	0.0575	0.0439
78	Feb-06	0.1125	0.0582	0.0543
79	Mar-06	0.1110	0.0598	0.0512
80	Apr-06	0.1122	0.0629	0.0493
81	May-06	0.1117	0.0642	0.0475
82	Jun-06	0.1156	0.0640	0.0516
83	Jul-06	0.1151	0.0637	0.0514
84	Aug-06	0.1137	0.0620	0.0517
85	Sep-06	0.1164	0.0600	0.0564

Line No.	Date	DCF	Bond Yield	Risk Premium
86	Oct-06	0.1153	0.0598	0.0555
87	Nov-06	0.1158	0.0580	0.0578
88	Dec-06	0.1145	0.0581	0.0564
89	Jan-07	0.1136	0.0596	0.0540
90	Feb-07	0.1110	0.0590	0.0520
91	Mar-07	0.1120	0.0585	0.0535
92	Apr-07	0.1073	0.0597	0.0476
93	May-07	0.1107	0.0599	0.0508
94	Jun-07	0.1169	0.0630	0.0539
95	Jul-07	0.1179	0.0625	0.0554
96	Aug-07	0.1169	0.0624	0.0545
97	Sep-07	0.1135	0.0618	0.0517
98	Oct-07	0.1129	0.0611	0.0518
99	Nov-07	0.1108	0.0597	0.0511
100	Dec-07	0.1129	0.0616	0.0513
101	Jan-08	0.1229	0.0602	0.0627
102	Feb-08	0.1143	0.0621	0.0522
103	Mar-08	0.1178	0.0621	0.0557
104	Apr-08	0.1137	0.0629	0.0508
105	May-08	0.1142	0.0627	0.0515
106	Jun-08	0.1123	0.0638	0.0486
107	Jul-08	0.1172	0.0640	0.0532
108	Aug-08	0.1184	0.0637	0.0547
109	Sep-08	0.1128	0.0649	0.0479
110	Oct-08	0.1219	0.0756	0.0463
111	Nov-08	0.1247	0.0760	0.0487
112	Dec-08	0.1246	0.0654	0.0592
113	Jan-09	0.1225	0.0639	0.0586
114	Feb-09	0.1254	0.0630	0.0623
115	Mar-09	0.1288	0.0642	0.0645
116	Apr-09	0.1261	0.0648	0.0613
117	May-09	0.1164	0.0649	0.0515
118	Jun-09	0.1143	0.0620	0.0523
119	Jul-09	0.1140	0.0597	0.0543
120	Aug-09	0.1078	0.0571	0.0507
121	Sep-09	0.1076	0.0553	0.0523
122	Oct-09	0.1076	0.0555	0.0522
123	Nov-09	0.1100	0.0564	0.0536
124	Dec-09	0.1034	0.0579	0.0455
125	Jan-10	0.1043	0.0577	0.0466
126	Feb-10	0.1050	0.0587	0.0463
127	Mar-10	0.1035	0.0584	0.0451
128	Apr-10	0.1083	0.0582	0.0501
129	May-10	0.1056	0.0552	0.0504
130	Jun-10	0.1065	0.0546	0.0519

Line No.	Date	DCF	Bond Yield	Risk Premium
131	Jul-10	0.1042	0.0526	0.0515
132	Aug-10	0.1020	0.0501	0.0519
133	Sep-10	0.1023	0.0501	0.0522
134	Oct-10	0.1011	0.0510	0.0500
135	Nov-10	0.1015	0.0536	0.0479
136	Dec-10	0.1018	0.0557	0.0461

Utility bond yield information from *Mergent Bond Record* (formerly Moody's). See Appendix 4 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
FC	=	Flotation cost allowance (five percent) as a percentage of stock price
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.

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

COMPARATIVE RETURNS ON S&P 500 STOCK INDEX AND MOODY'S A-RATED UTILITY BONDS 1937 - 2010

Line No.	Year	S&P 500 Stock Price	Stock Dividend Yield	Stock Return	A-rated Bond Price	Bond Return
1	2010	1,123.58	0.0203		$75.02	
2	2009	865.58	0.0310	32.91%	$68.43	15.48%
3	2008	1,380.33	0.0211	-35.19%	$72.25	0.24%
4	2007	1,424.16	0.0181	-1.27%	$72.91	4.59%
5	2006	1,278.72	0.0183	13.20%	$75.25	2.20%
6	2005	1,181.41	0.0177	10.01%	$74.91	5.80%
7	2004	1,132.52	0.0162	5.94%	$70.87	11.34%
8	2003	895.84	0.0180	28.22%	$62.26	20.27%
9	2002	1,140.21	0.0138	-20.05%	$57.44	15.35%
10	2001	1,335.63	0.0116	-13.47%	$56.40	8.93%
11	2000	1,425.59	0.0118	-5.13%	$52.60	14.82%
12	1999	1,248.77	0.0130	15.46%	$63.03	-10.20%
13	1998	963.35	0.0162	31.25%	$62.43	7.38%
14	1997	766.22	0.0195	27.68%	$56.62	17.32%
15	1996	614.42	0.0231	27.02%	$60.91	-0.48%
16	1995	465.25	0.0287	34.93%	$50.22	29.26%
17	1994	472.99	0.0269	1.05%	$60.01	-9.65%
18	1993	435.23	0.0288	11.56%	$53.13	20.48%
19	1992	416.08	0.0290	7.50%	$49.56	15.27%
20	1991	325.49	0.0382	31.65%	$44.84	19.44%
21	1990	339.97	0.0341	-0.85%	$45.60	7.11%
22	1989	285.41	0.0364	22.76%	$43.06	15.18%
23	1988	250.48	0.0366	17.61%	$40.10	17.36%
24	1987	264.51	0.0317	-2.13%	$48.92	-9.84%
25	1986	208.19	0.0390	30.95%	$39.98	32.36%
26	1985	171.61	0.0451	25.83%	$32.57	35.05%
27	1984	166.39	0.0427	7.41%	$31.49	16.12%
28	1983	144.27	0.0479	20.12%	$29.41	20.65%
29	1982	117.28	0.0595	28.96%	$24.48	36.48%
30	1981	132.97	0.0480	-7.00%	$29.37	-3.01%
31	1980	110.87	0.0541	25.34%	$34.69	-3.81%
32	1979	99.71	0.0533	16.52%	$43.91	-11.89%
33	1978	90.25	0.0532	15.80%	$49.09	-2.40%
34	1977	103.80	0.0399	-9.06%	$50.95	4.20%
35	1976	96.86	0.0380	10.96%	$43.91	25.13%
36	1975	72.56	0.0507	38.56%	$41.76	14.75%
37	1974	96.11	0.0364	-20.86%	$52.54	-12.91%
38	1973	118.40	0.0269	-16.14%	$58.51	-3.37%
39	1972	103.30	0.0296	17.58%	$56.47	10.69%
40	1971	93.49	0.0332	13.81%	$53.93	12.13%
41	1970	90.31	0.0356	7.08%	$50.46	14.81%
42	1969	102.00	0.0306	-8.40%	$62.43	-12.76%

Line No.	Year	S&P 500 Stock Price	Stock Dividend Yield	Stock Return	A-rated Bond Price	Bond Return
43	1968	95.04	0.0313	10.45%	$66.97	-0.81%
44	1967	84.45	0.0351	16.05%	$78.69	-9.81%
45	1966	93.32	0.0302	-6.48%	$86.57	-4.48%
46	1965	86.12	0.0299	11.35%	$91.40	-0.91%
47	1964	76.45	0.0305	15.70%	$92.01	3.68%
48	1963	65.06	0.0331	20.82%	$93.56	2.61%
49	1962	69.07	0.0297	-2.84%	$89.60	8.89%
50	1961	59.72	0.0328	18.94%	$89.74	4.29%
51	1960	58.03	0.0327	6.18%	$84.36	11.13%
52	1959	55.62	0.0324	7.57%	$91.55	-3.49%
53	1958	41.12	0.0448	39.74%	$101.22	-5.60%
54	1957	45.43	0.0431	-5.18%	$100.70	4.49%
55	1956	44.15	0.0424	7.14%	$113.00	-7.35%
56	1955	35.60	0.0438	28.40%	$116.77	0.20%
57	1954	25.46	0.0569	45.52%	$112.79	7.07%
58	1953	26.18	0.0545	2.70%	$114.24	2.24%
59	1952	24.19	0.0582	14.05%	$113.41	4.26%
60	1951	21.21	0.0634	20.39%	$123.44	-4.89%
61	1950	16.88	0.0665	32.30%	$125.08	1.89%
62	1949	15.36	0.0620	16.10%	$119.82	7.72%
63	1948	14.83	0.0571	9.28%	$118.50	4.49%
64	1947	15.21	0.0449	1.99%	$126.02	-2.79%
65	1946	18.02	0.0356	-12.03%	$126.74	2.59%
66	1945	13.49	0.0460	38.18%	$119.82	9.11%
67	1944	11.85	0.0495	18.79%	$119.82	3.34%
68	1943	10.09	0.0554	22.98%	$118.50	4.49%
69	1942	8.93	0.0788	20.87%	$117.63	4.14%
70	1941	10.55	0.0638	-8.98%	$116.34	4.55%
71	1940	12.30	0.0458	-9.65%	$112.39	7.08%
72	1939	12.50	0.0349	1.89%	$105.75	10.05%
73	1938	11.31	0.0784	18.36%	$99.83	9.94%
74	1937	17.59	0.0434	-31.36%	$103.18	0.63%
75	Average	Stocks		11.06%		
76		Bonds		6.42%		
77		Risk Premium		4.64%		

See Appendix 5 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 - 2010

Line No.	Year	S&P Utility Stock Price	Stock Dividend Yield	Stock Return	A-rated Bond Yield	Bond Return
1	2010				$75.02	
2	2009			10.71%	$68.43	15.48%
3	2008			-25.90%	$72.25	0.24%
4	2007			16.56%	$72.91	4.59%
5	2006			20.76%	$75.25	2.20%
6	2005			16.05%	$74.91	5.80%
7	2004			22.84%	$70.87	11.34%
8	2003			23.48%	$62.26	20.27%
9	2002			-14.73%	$57.44	15.35%
10						
11	2002	243.79	0.0362		$57.44	
12	2001	307.70	0.0287	-17.90%	$56.40	8.93%
13	2000	239.17	0.0413	32.78%	$52.60	14.82%
14	1999	253.52	0.0394	-1.72%	$63.03	-10.20%
15	1998	228.61	0.0457	15.47%	$62.43	7.38%
16	1997	201.14	0.0492	18.58%	$56.62	17.32%
17	1996	202.57	0.0454	3.83%	$60.91	-0.48%
18	1995	153.87	0.0584	37.49%	$50.22	29.26%
19	1994	168.70	0.0496	-3.83%	$60.01	-9.65%
20	1993	159.79	0.0537	10.95%	$53.13	20.48%
21	1992	149.70	0.0572	12.46%	$49.56	15.27%
22	1991	138.38	0.0607	14.25%	$44.84	19.44%
23	1990	146.04	0.0558	0.33%	$45.60	7.11%
24	1989	114.37	0.0699	34.68%	$43.06	15.18%
25	1988	106.13	0.0704	14.80%	$40.10	17.36%
26	1987	120.09	0.0588	-5.74%	$48.92	-9.84%
27	1986	92.06	0.0742	37.87%	$39.98	32.36%
28	1985	75.83	0.0860	30.00%	$32.57	35.05%
29	1984	68.50	0.0925	19.95%	$31.49	16.12%
30	1983	61.89	0.0948	20.16%	$29.41	20.65%
31	1982	51.81	0.1074	30.20%	$24.48	36.48%
32	1981	52.01	0.0978	9.40%	$29.37	-3.01%
33	1980	50.26	0.0953	13.01%	$34.69	-3.81%
34	1979	50.33	0.0893	8.79%	$43.91	-11.89%
35	1978	52.40	0.0791	3.96%	$49.09	-2.40%
36	1977	54.01	0.0714	4.16%	$50.95	4.20%
37	1976	46.99	0.0776	22.70%	$43.91	25.13%
38	1975	38.19	0.0920	32.24%	$41.76	14.75%
39	1974	48.60	0.0713	-14.29%	$52.54	-12.91%
40	1973	60.01	0.0556	-13.45%	$58.51	-3.37%

Line No.	Year	S&P Utility Stock Price	Stock Dividend Yield	Stock Return	A-rated Bond Yield	Bond Return
41	1972	60.19	0.0542	5.12%	$56.47	10.69%
42	1971	63.43	0.0504	-0.07%	$53.93	12.13%
43	1970	55.72	0.0561	19.45%	$50.46	14.81%
44	1969	68.65	0.0445	-14.38%	$62.43	-12.76%
45	1968	68.02	0.0435	5.28%	$66.97	-0.81%
46	1967	70.63	0.0392	0.22%	$78.69	-9.81%
47	1966	74.50	0.0347	-1.72%	$86.57	-4.48%
48	1965	75.87	0.0315	1.34%	$91.40	-0.91%
49	1964	67.26	0.0331	16.11%	$92.01	3.68%
50	1963	63.35	0.0330	9.47%	$93.56	2.61%
51	1962	62.69	0.0320	4.25%	$89.60	8.89%
52	1961	52.73	0.0358	22.47%	$89.74	4.29%
53	1960	44.50	0.0403	22.52%	$84.36	11.13%
54	1959	43.96	0.0377	5.00%	$91.55	-3.49%
55	1958	33.30	0.0487	36.88%	$101.22	-5.60%
56	1957	32.32	0.0487	7.90%	$100.70	4.49%
57	1956	31.55	0.0472	7.16%	$113.00	-7.35%
58	1955	29.89	0.0461	10.16%	$116.77	0.20%
59	1954	25.51	0.0520	22.37%	$112.79	7.07%
60	1953	24.41	0.0511	9.62%	$114.24	2.24%
61	1952	22.22	0.0550	15.36%	$113.41	4.26%
62	1951	20.01	0.0606	17.10%	$123.44	-4.89%
63	1950	20.20	0.0554	4.60%	$125.08	1.89%
64	1949	16.54	0.0570	27.83%	$119.82	7.72%
65	1948	16.53	0.0535	5.41%	$118.50	4.49%
66	1947	19.21	0.0354	-10.41%	$126.02	-2.79%
67	1946	21.34	0.0298	-7.00%	$126.74	2.59%
68	1945	13.91	0.0448	57.89%	$119.82	9.11%
69	1944	12.10	0.0569	20.65%	$119.82	3.34%
70	1943	9.22	0.0621	37.45%	$118.50	4.49%
71	1942	8.54	0.0940	17.36%	$117.63	4.14%
72	1941	13.25	0.0717	-28.38%	$116.34	4.55%
73	1940	16.97	0.0540	-16.52%	$112.39	7.08%
74	1939	16.05	0.0553	11.26%	$105.75	10.05%
75	1938	14.30	0.0730	19.54%	$99.83	9.94%
76	1937	24.34	0.0432	-36.93%	$103.18	0.63%
77	Average	Stocks		10.5%		
78		Bonds		6.4%		
79		Risk Premium		4.1%		

Note: See Appendix 5 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.aspx

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® 6.7 PERCENT RISK PREMIUM

LINE NO	Risk-free rate	4.45%	Forecast long-term Treasury bond yield
1	Beta	0.67	Average Beta Comparable Electric Companies
2	Risk Premium	6.7%	Long-horizon SBBI risk premium
3	Beta x Risk Premium	4.52%	
4	Flotation	0.26%	
5	CAPM cost of equity	9.2%	

Forecast Treasury bond yield from Value Line Selection & Opinion, November 26, 2010; SBBI® risk premium from *2010 Ibbotson® SBBI® Valuation Yearbook*, Value Line beta for proxy companies from Value Line Investment Analyzer.

PROXY COMPANY BETAS

Line No.	Company	Beta	Market Cap $ (Mil)
1	ALLETE	0.70	1,338
2	Alliant Energy	0.70	4,129
3	Amer. Elec. Power	0.70	17,357
4	CenterPoint Energy	0.80	6,623
5	Consol. Edison	0.65	14,329
6	Dominion Resources	0.70	25,445
7	Duke Energy	0.65	23,497
8	Hawaiian Elec.	0.70	2,212
9	IDACORP, Inc.	0.70	1,785
10	Integrys Energy	0.90	3,740
11	NextEra Energy	0.75	21,670
12	Pepco Holdings	0.80	4,070
13	PG&E Corp.	0.55	18,509
14	Pinnacle West Capital	0.70	4,496
15	Portland General	0.75	1,649
16	Progress Energy	0.60	12,844
17	SCANA Corp.	0.70	5,122
18	Sempra Energy	0.85	12,428
19	Southern Co.	0.55	31,777
20	TECO Energy	0.85	3,852
21	UIL Holdings	0.70	1,500
22	Westar Energy	0.75	2,816
23	Wisconsin Energy	0.65	6,773
24	Xcel Energy Inc.	0.65	10,813
25	Market-weighted Average	0.67	
26	Average	0.71	

Company betas from Value Line Investment Analyzer, December 2010; market capitalization from Thomson Reuters.

COMPARISON OF RISK PREMIA ON
S&P500 AND S&P UTILITIES 1937 – 2010

Year	S&P Utilities Stock Return	Sp500 Stock Return	10-Yr. Treasury Bond Yield	Utilities Risk Premium	Market Risk Premium
2009	10.71	32.91	3.26	7.45	29.65
2008	-25.90	-35.19	3.67	-29.57	-38.85
2007	16.56	-1.27	4.63	11.93	-5.90
2006	20.76	13.20	4.79	15.97	8.41
2005	16.05	10.01	4.29	11.76	5.72
2004	22.84	5.94	4.27	18.57	1.66
2003	23.48	28.22	4.01	19.47	24.21
2002	-14.73	-20.05	4.61	-19.34	-24.66
2001	-17.90	-13.47	5.02	-22.92	-18.49
2000	32.78	-5.13	6.03	26.76	-11.16
1999	-1.72	15.46	5.64	-7.36	9.82
1998	15.47	31.25	5.26	10.20	25.98
1997	18.58	27.68	6.35	12.23	21.33
1996	3.83	27.02	6.44	-2.60	20.58
1995	37.49	34.93	6.58	30.91	28.35
1994	-3.83	1.05	7.08	-10.91	-6.03
1993	10.95	11.56	5.87	5.07	5.68
1992	12.46	7.50	7.01	5.45	0.49
1991	14.25	31.65	7.86	6.39	23.79
1990	0.33	-0.85	8.55	-8.21	-9.40
1989	34.68	22.76	8.50	26.18	14.26
1988	14.80	17.61	8.84	5.96	8.76
1987	-5.74	-2.13	8.38	-14.13	-10.52
1986	37.87	30.95	7.68	30.18	23.27
1985	30.00	25.83	10.62	19.38	15.20
1984	19.95	7.41	12.44	7.51	-5.03
1983	20.16	20.12	11.10	9.06	9.02
1982	30.20	28.96	13.00	17.19	15.96
1981	9.40	-7.00	13.91	-4.52	-20.91
1980	13.01	25.34	11.46	1.55	13.88
1979	8.79	16.52	9.44	-0.65	7.08
1978	3.96	15.80	8.41	-4.45	7.39
1977	4.16	-9.06	7.42	-3.26	-16.48
1976	22.70	10.96	7.61	15.09	3.35
1975	32.24	38.56	7.99	24.26	30.57
1974	-14.29	-20.86	7.56	-21.85	-28.42
1973	-13.45	-16.14	6.84	-20.30	-22.98
1972	5.12	17.58	6.21	-1.09	11.37
1971	-0.07	13.81	6.16	-6.23	7.65
1970	19.45	7.08	7.35	12.10	-0.27

Year	S&P Utilities Stock Return	Sp500 Stock Return	10-Yr. Treasury Bond Yield	Utilities Risk Premium	Market Risk Premium
1969	-14.38	-8.40	6.67	-21.06	-15.07
1968	5.28	10.45	5.65	-0.37	4.81
1967	0.22	16.05	5.07	-4.85	10.98
1966	-1.72	-6.48	4.92	-6.65	-11.41
1965	1.34	11.35	4.28	-2.94	7.07
1964	16.11	15.70	4.19	11.92	11.51
1963	9.47	20.82	4.00	5.47	16.81
1962	4.25	-2.84	3.95	0.31	-6.78
1961	22.47	18.94	3.88	18.59	15.05
1960	22.52	6.18	4.12	18.41	2.07
1959	5.00	7.57	4.33	0.67	3.24
1958	36.88	39.74	3.32	33.57	36.43
1957	7.90	-5.18	3.65	4.25	-8.82
1956	7.16	7.14	3.18	3.98	3.96
1955	10.16	28.40	2.82	7.35	25.58
1954	22.37	45.52	2.40	19.97	43.12
1953	9.62	2.70	2.81	6.80	-0.11
1952	15.36	14.05	2.48	12.88	11.57
1951	17.10	20.39	2.41	14.69	17.98
1950	4.60	32.30	2.05	2.55	30.25
1949	27.83	16.10	1.93	25.90	14.17
1948	5.41	9.28	2.15	3.26	7.13
1947	-10.41	1.99	1.85	-12.26	0.14
1946	-7.00	-12.03	1.74	-8.74	-13.77
1945	57.89	38.18	1.73	56.17	36.45
1944	20.65	18.79	2.09	18.56	16.70
1943	37.45	22.98	2.07	35.38	20.91
1942	17.36	20.87	2.11	15.26	18.76
1941	-28.38	-8.98	1.99	-30.36	-10.96
1940	-16.52	-9.65	2.20	-18.73	-11.85
1939	11.26	1.89	2.35	8.91	-0.46
1938	19.54	18.36	2.55	16.99	15.81
1937	-36.93	-31.36	2.69	-39.62	-34.05
Risk Premium 1937--2010				**5.06**	**5.64**
RP Utilities/RP SP500				**0.90**	

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

Line No.			
	Risk-free rate	4.45%	Forecast Long-term Treasury bond yield
1	Beta	0.67	Average Beta Comparable Electric Companies
2	DCF S&P 500	13.3%	DCF Cost of Equity S&P 500 (see following)
3	Risk Premium	8.85%	
4	Beta x Risk Premium	5.97%	
5	Flotation cost	0.26%	
5	CAPM cost of equity	10.7%	

Forecast Treasury bond yield from Value Line Selection & Opinion, November 26, 2010, beta from Value Line Investment Analyzer.

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

Line No.	Company	P_0	D_0	Growth	Cost of Equity
1	AMERISOURCEBERGEN	32.32	0.40	12.84%	14.2%
2	ABBOTT LABORATORIES	49.59	1.76	9.59%	13.5%
3	ACE	60.23	1.30	9.00%	11.4%
4	ANALOG DEVICES	34.83	0.88	11.57%	14.4%
5	AUTOMATIC DATA PROC.	44.81	1.44	10.45%	14.0%
6	AFLAC	54.47	1.20	12.28%	14.8%
7	ALLERGAN	69.44	0.20	14.53%	14.9%
8	ASSURANT	38.50	0.64	9.00%	10.8%
9	ALLSTATE	30.90	0.80	9.00%	11.8%
10	AIR PRDS.& CHEMS.	85.89	1.96	10.10%	12.6%
11	AIRGAS	66.19	1.00	13.16%	14.9%
12	AVON PRODUCTS	30.41	0.88	10.75%	14.0%
13	AMERICAN EXPRESS	42.26	0.72	11.00%	12.9%
14	BOEING	67.05	1.68	9.00%	11.8%
15	BAXTER INTL.	50.10	1.24	9.74%	12.5%
16	BEST BUY	41.39	0.60	11.39%	13.0%
17	C R BARD	86.16	0.72	10.74%	11.7%
18	BECTON DICKINSON	78.05	1.64	9.86%	12.2%
19	FRANKLIN RESOURCES	115.16	1.00	11.80%	12.8%
20	BEMIS	32.11	0.92	8.68%	11.8%
21	CONAGRA FOODS	22.14	0.92	7.74%	12.3%
22	CARDINAL HEALTH	35.49	0.78	12.57%	15.1%
23	CHUBB	58.17	1.48	8.71%	11.5%
24	COCA COLA ENTS.	25.50	0.48	11.03%	13.1%
25	CH ROBINSON WWD.	73.61	1.16	13.70%	15.5%
26	COLGATE-PALM.	77.46	2.12	9.12%	12.1%
27	CLOROX	64.85	2.20	9.17%	12.9%
28	COMCAST 'A'	20.26	0.38	12.09%	14.2%
29	CME GROUP	291.21	4.60	13.29%	15.1%
30	CMS ENERGY	18.44	0.84	6.00%	10.9%
31	CENTERPOINT EN.	16.08	0.78	6.84%	12.1%
32	ROCKWELL COLLINS	58.42	0.96	9.50%	11.3%
33	COSTCO WHOLESALE	66.54	0.82	13.32%	14.7%
34	CSX	61.19	1.04	13.43%	15.4%
35	CINTAS	27.84	0.49	10.72%	12.7%
36	CVS CAREMARK	31.77	0.35	10.06%	11.3%
37	DEERE	76.73	1.40	9.75%	11.8%
38	QUEST DIAGNOSTICS	50.72	0.40	11.94%	12.8%
39	WALT DISNEY	36.21	0.40	11.43%	12.7%
40	DUN & BRADSTREET DEL.	76.62	1.40	9.53%	11.5%
41	DARDEN RESTAURANTS	47.12	1.28	12.29%	15.4%
42	DEVRY	45.76	0.24	13.00%	13.6%
43	ECOLAB	49.33	0.70	13.22%	14.8%
44	EQUIFAX	33.88	0.64	10.20%	12.3%
45	ESTEE LAUDER COS.'A'	73.33	0.75	13.00%	14.2%
46	EOG RES.	94.28	0.62	14.33%	15.1%
47	EATON	92.89	2.32	10.50%	13.3%
48	EXPEDITOR INTL.OF WASH.	51.43	0.40	14.37%	15.3%
49	EXPEDIA	27.12	0.28	14.26%	15.4%
50	FEDEX	90.07	0.48	13.19%	13.8%
51	FIDELITY NAT.INFO.SVS.	27.60	0.20	12.73%	13.5%

Line No.	Company	P_0	D_0	Growth	Cost of Equity
52	FLUOR	55.66	0.50	11.30%	12.3%
53	FORTUNE BRANDS	57.47	0.76	14.00%	15.5%
54	GENERAL MILLS	36.40	1.12	7.70%	11.1%
55	CORNING	18.43	0.20	10.67%	11.9%
56	GAP	20.27	0.40	10.94%	13.1%
57	HARTFORD FINL.SVS.GP.	24.50	0.20	14.10%	15.0%
58	HJ HEINZ	49.02	1.80	6.97%	11.0%
59	HELMERICH & PAYNE	44.89	0.24	10.87%	11.5%
60	THE HERSHEY COMPANY	48.16	1.28	8.95%	11.9%
61	INTERNATIONAL BUS.MCHS.	143.02	2.60	11.28%	13.3%
62	INTEL	20.68	0.63	11.80%	15.2%
63	ITT	48.16	1.00	10.75%	13.1%
64	PENNEY JC	32.03	0.80	10.43%	13.2%
65	NORDSTROM	40.53	0.80	10.93%	13.1%
66	KELLOGG	49.93	1.62	8.51%	12.1%
67	KRAFT FOODS	31.29	1.16	8.44%	12.5%
68	COCA COLA	62.62	1.76	8.67%	11.8%
69	KROGER	22.27	0.42	9.02%	11.1%
70	LEGG MASON	33.16	0.24	11.66%	12.5%
71	LOCKHEED MARTIN	70.06	3.00	8.08%	12.8%
72	LINCOLN NAT.	25.35	0.20	12.77%	13.7%
73	MCDONALDS	78.03	2.44	10.07%	13.6%
74	MEDTRONIC	35.35	0.90	8.84%	11.6%
75	METLIFE	40.52	0.74	13.27%	15.4%
76	MCGRAW-HILL	36.13	0.94	11.60%	14.5%
77	MEAD JOHNSON NUTRITION	59.67	0.90	10.85%	12.5%
78	MCCORMICK & CO NV.	44.29	1.12	9.17%	12.0%
79	MARSH & MCLENNAN	25.49	0.84	10.85%	14.5%
80	3M	86.20	2.10	11.92%	14.7%
81	MORGAN STANLEY	25.74	0.20	11.50%	12.4%
82	MICROSOFT	26.23	0.64	11.26%	14.0%
83	M&T BK.	80.38	2.80	8.00%	11.8%
84	NISOURCE	17.34	0.92	6.93%	12.7%
85	NORTHROP GRUMMAN	62.84	1.88	11.02%	14.4%
86	NORFOLK SOUTHERN	61.45	1.44	12.70%	15.4%
87	NATIONAL SEMICON.	13.63	0.40	7.63%	10.8%
88	NORTHEAST UTILITIES	31.22	1.02	7.33%	10.9%
89	NYSE EURONEXT	29.24	1.20	10.60%	15.2%
90	ONEOK	50.88	1.92	7.93%	12.1%
91	PEOPLES UNITED FINANCIAL	12.89	0.62	7.67%	12.9%
92	PACCAR	53.07	0.48	13.33%	14.4%
93	PATTERSON COMPANIES	29.14	0.40	12.90%	14.5%
94	PEPSICO	65.37	1.92	8.63%	11.9%
95	PRINCIPAL FINL.GP.	28.62	0.55	13.35%	15.5%
96	PROCTER & GAMBLE	62.76	1.93	8.77%	12.2%
97	PALL	45.22	0.64	11.90%	13.5%
98	PINNACLE WEST CAP.	41.36	2.10	6.50%	12.0%
99	PEPCO HOLDINGS	18.79	1.08	7.00%	13.3%
100	PRUDENTIAL FINL.	54.26	1.15	9.99%	12.3%
101	PRAXAIR	92.55	1.80	11.52%	13.7%
102	QWEST COMMS.INTL.	6.86	0.32	6.00%	11.0%
103	ROBERT HALF INTL.	27.87	0.52	13.33%	15.5%

Line No.	Company	P_0	D_0	Growth	Cost of Equity
104	POLO RALPH LAUREN 'A'	103.07	0.40	14.36%	14.8%
105	ROSS STORES	60.96	0.64	13.61%	14.8%
106	RAYTHEON 'B'	46.61	1.50	8.00%	11.5%
107	SPECTRA ENERGY	24.03	1.04	9.97%	14.8%
108	SEALED AIR	23.55	0.52	9.14%	11.6%
109	SARA LEE	15.14	0.46	11.05%	14.5%
110	SAFEWAY	22.38	0.48	12.23%	14.7%
111	STRYKER	51.39	0.72	10.79%	12.4%
112	AT&T	28.64	1.72	6.01%	12.5%
113	TECO ENERGY	17.40	0.82	7.10%	12.2%
114	INTEGRYS ENERGY GROUP	50.75	2.72	7.93%	13.8%
115	TARGET	55.67	1.00	13.07%	15.1%
116	TORCHMARK	57.94	0.64	10.13%	11.4%
117	T ROWE PRICE GP.	57.47	1.08	12.40%	14.5%
118	TRAVELERS COS.	54.83	1.44	8.33%	11.2%
119	TEXAS INSTS.	30.72	0.52	10.00%	11.9%
120	TYCO INTERNATIONAL	38.93	0.86	11.80%	14.3%
121	UNUM GROUP	22.58	0.37	12.25%	14.1%
122	UNITED TECHNOLOGIES	75.40	1.70	10.05%	12.6%
123	V F	84.48	2.52	10.04%	13.4%
124	VIACOM 'B'	38.23	0.60	13.33%	15.1%
125	VULCAN MATERIALS	40.27	1.00	9.50%	12.2%
126	VERIZON COMMUNICATIONS	33.15	1.95	6.51%	12.9%
127	WISCONSIN ENERGY	59.29	1.60	10.07%	13.1%
128	WASTE MAN.	35.72	1.26	9.57%	13.5%
129	WAL MART STORES	54.23	1.21	10.68%	13.2%
130	WESTERN UNION	18.15	0.28	12.45%	14.2%
131	XCEL ENERGY	23.62	1.01	6.45%	11.1%
132	EXXON MOBIL	68.53	1.76	12.07%	15.0%
133	DENTSPLY INTL.	32.18	0.20	11.10%	11.8%
134	YUM! BRANDS	49.58	1.00	12.40%	14.7%
135	Market-weighted Average				13.3%

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 December 2010 per Thomson Reuters.
g = I/B/E/S forecast of future earnings growth December 2010.
k = Cost of equity using the quarterly version of the DCF model shown below:

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

CAPITAL STRUCTURE OF PROXY COMPANY GROUP

Line No.	Company	Short-Term Debt	Long-Term Debt	Preferred Equity	Market Cap $ (Mil)	Total Capital	%Short	%Long	%Preferred	%Equity
1	ALLETE	7	696	0	1,338	2,041	0%	34%	0%	66%
2	Alliant Energy	292	2,405	244	4,129	7,069	4%	34%	3%	58%
3	Amer. Elec. Power	1,867	15,757	61	17,357	35,042	5%	45%	0%	50%
4	CenterPoint Energy	958	9,119	0	6,623	16,700	6%	55%	0%	40%
5	Consol. Edison	731	9,854	0	14,329	24,914	3%	40%	0%	58%
6	Dominion Resources	2,432	15,481	257	25,445	43,615	6%	35%	1%	58%
7	Duke Energy	902	16,113	0	23,497	40,512	2%	40%	0%	58%
8	Hawaiian Elec.	42	1,365	34	2,212	3,653	1%	37%	1%	61%
9	IDACORP, Inc.	63	1,410	0	1,785	3,258	2%	43%	0%	55%
10	Integrys Energy	339	2,395	51	3,740	6,525	5%	37%	1%	57%
11	NextEra Energy	2,589	16,300	0	21,670	40,559	6%	40%	0%	53%
12	Pepco Holdings	1,066	4,947	0	4,070	10,083	11%	49%	0%	40%
13	PG&E Corp.	1,561	11,208	252	18,509	31,530	5%	36%	1%	59%
14	Pinnacle West Capital	431	3,371	0	4,496	8,298	5%	41%	0%	54%
15	Portland General	186	1,558	0	1,649	3,393	5%	46%	0%	49%
16	Progress Energy	546	12,144	93	12,844	25,627	2%	47%	0%	50%
17	SCANA Corp.	363	4,483	0	5,122	9,968	4%	45%	0%	51%
18	Sempra Energy	1,191	7,460	179	12,428	21,258	6%	35%	1%	58%
19	Southern Co.	1,752	18,131	1,082	31,777	52,742	3%	34%	2%	60%
20	TECO Energy	163	3,202	0	3,852	7,216	2%	44%	0%	53%
21	UIL Holdings	58	674	0	1,500	2,232	3%	30%	0%	67%
22	Westar Energy	244	2,600	21	2,816	5,682	4%	46%	0%	50%
23	Wisconsin Energy	1,121	3,876	30	6,773	11,800	9%	33%	0%	57%
24	Xcel Energy Inc.	1,003	7,889	105	10,813	19,809	5%	40%	1%	55%
25	Composite	19,907	172,435	2,410	238,774	433,525	4.59%	39.77%	0.56%	55.08%

Source of data: Value Line Investment Analyzer, January 2011.

**ILLUSTRATION OF CALCULATION OF COST OF EQUITY
REQUIRED FOR THE COMPANY TO HAVE THE SAME WEIGHTED AVERAGE COST OF CAPITAL
AS THE PROXY COMPANY GROUP**

	Cost Rate	Source of Data	After-Tax Cost Rate
Tax Rate	39%		
Cost of Short-term Debt	0.19%		0.12%
Cost of Long-term Debt	5.57%		3.40%
Cost of Preferred	5.79%		5.79%
Cost of Equity	10.8%		

Capital Structure Proxy Companies			
Capital Source	Percent	After-tax Cost Rate	Weighted Cost
Short-term Debt	4.59%	0.12%	0.005%
Long-term Debt	39.77%	3.40%	1.351%
Preferred Stock	0.56%	5.79%	0.032%
Common Equity	55.08%	10.80%	5.948%
Total	100.00%		7.337%

Company Capital Structure			
Capital Source	Percent	After-tax Cost Rate	Weighted Cost
Short-term Debt	1.29%	0.12%	0.001%
Long-term Debt	47.21%	3.40%	1.604%
Preferred Stock	5.24%	5.79%	0.303%
Sum of Wtd. Cost of Debt and Preferred	53.74%		1.909%

(1) Ave. WACC Proxy Companies	7.34%
(2) Wtd. Cost of Debt and Preferred	1.91%
(1) Less (2)	5.43%
Cost of Equity (5.43 ÷ 0.4626 = 11.7)	11.7%

Weighted Average Cost of Capital			
Capital Source	Percent	After-tax Cost Rate	Weighted Cost
Short-term Debt	1.29%	0.12%	0.001%
Long-term Debt	47.21%	3.40%	1.604%
Preferred Stock	5.24%	5.79%	0.303%
Common Equity	46.26%	11.7%	5.428%
Total	100.00%		7.337%

QUALIFICATIONS OF 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
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

ELECTRIC, GAS, WATER, OIL COMPANIES	
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
	Virginia-American Water Company

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.

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JAMES H. VANDER WEIDE

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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:

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

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

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

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

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

Solving for S_n, we obtain:

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

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:

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

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).

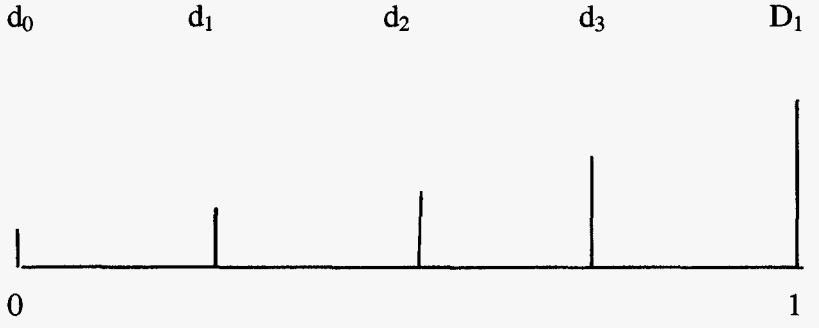
Figure 1

Annual DCF Model

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

Figure 2

Quarterly DCF Model (Constant Growth Version)



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

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

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:

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

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:

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

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

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

An Alternative Quarterly DCF Model

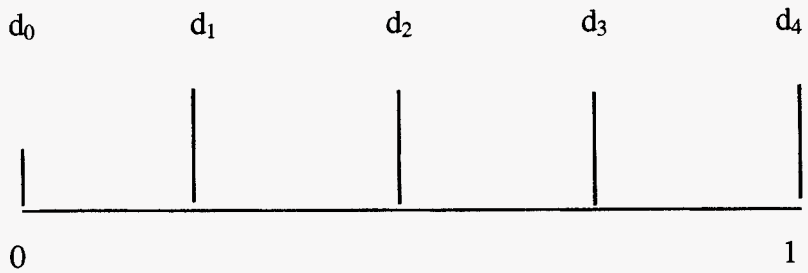
Although the constant growth Quarterly DCF Model [equation (8)] allows for the quarterly timing of dividend payments, it does require the assumption that the firm increases its dividend payments each quarter. Since this assumption is difficult for some analysts to accept, we now discuss a second Quarterly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

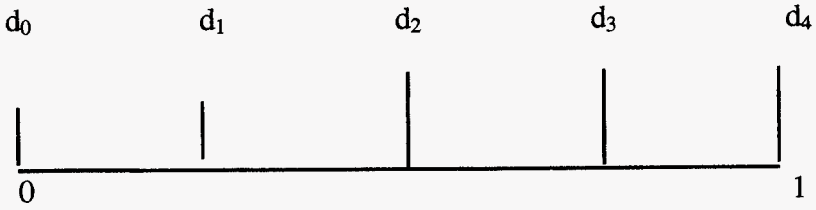
Case 1



Year

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

Case 2



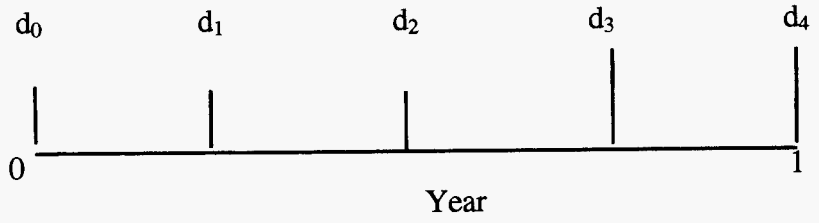
Year

$$d_1 = d_0$$

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

Figure 3 (continued)

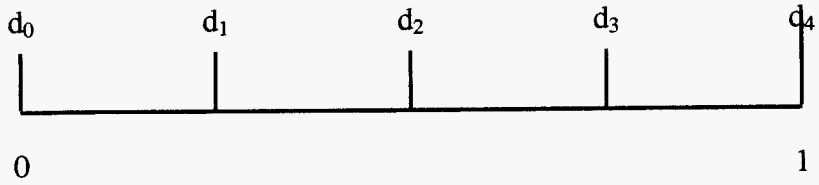
Case 3



$$d_1 = d_2 = d_0$$

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

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

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

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

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

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

$$k = \frac{D_1^*}{P_0} + g \quad \textbf{(10)}$$

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.

ADJUSTING FOR FLOTATION COSTS IN DETERMINING A PUBLIC UTILITY'S ALLOWED RATE OF RETURN ON EQUITY

Introduction

Regulation of public utilities is guided by the principle that utility revenues should be sufficient to allow recovery of all prudently incurred expenses, including the cost of capital. As set forth in the 1944 *Hope Natural Gas* Case [*Federal Power Comm'n v. Hope Natural Gas Co.* 320 U. S. 591 (1944) at 603], the U. S. Supreme Court states:

> 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.

Since the flotation costs arising from the issuance of debt and equity securities are an integral component of capital costs, this standard requires that the company's revenues be sufficient to fully recover flotation costs.

Despite the widespread agreement that flotation costs should be recovered in the regulatory process, several issues still need to be resolved. These include:

1. How is the term "flotation costs" defined? Does it include only the out-of-pocket costs associated with issuing securities (e. g., legal fees, printing costs, selling and underwriting expenses), or does it also include the reduction in a security's price that frequently accompanies flotation (i. e., market pressure)?
2. What should be the time pattern of cost recovery? Should a company be allowed to recover flotation costs immediately, or should flotation costs be recovered over the life of the issue?
3. For the purposes of regulatory accounting, should flotation costs be included as an expense? As an addition to rate base? Or as an additional element of a firm's allowed rate of return?
4. Do existing regulatory methods for flotation cost recovery allow a firm ***full*** recovery of flotation costs?

In this paper, I review the literature pertaining to the above issues and discuss my own views regarding how this literature applies to the cost of equity for a regulated firm.

Definition of Flotation Cost

The value of a firm is related to the future stream of net cash flows (revenues minus expenses measured on a cash basis) that can be derived from its assets. In the process of acquiring assets, a firm incurs certain expenses which reduce its value. Some of these expenses or costs are directly associated with revenue production in one period (e. g., wages, cost of goods sold),

others are more properly associated with revenue production in many periods (e. g., the acquisition cost of plant and equipment). In either case, the word "cost" refers to any item that reduces the value of a firm.

If this concept is applied to the act of issuing new securities to finance asset purchases, many items are properly included in issuance or flotation costs. These include: (1) compensation received by investment bankers for underwriting services, (2) legal fees, (3) accounting fees, (4) engineering fees, (5) trustee's fees, (6) listing fees, (7) printing and engraving expenses, (8) SEC registration fees, (9) Federal Revenue Stamps, (10) state taxes, (11) warrants granted to underwriters as extra compensation, (12) postage expenses, (13) employees' time, (14) market pressure, and (15) the offer discount. The finance literature generally divides these flotation cost items into three categories, namely, underwriting expenses, issuer expenses, and price effects.

Magnitude of Flotation Costs

The finance literature contains several studies of the magnitude of the flotation costs associated with new debt and equity issues. These studies differ primarily with regard to the time period studied, the sample of companies included, and the source of data. The flotation cost studies generally agree, however, that for large issues, underwriting expenses represent approximately one and one-half percent of the proceeds of debt issues and three to five percent of the proceeds of seasoned equity issues. They also agree that issuer expenses represent approximately 0.5 percent of both debt and equity issues, and that the announcement of an equity issue reduces the company's stock price by at least two to three percent of the proceeds from the stock issue. Thus, total flotation costs represent approximately two percent[2] of the proceeds from debt issues, and five and one-half to eight and one-half percent of the proceeds of equity issues.

Lee *et. al.* [14] is an excellent example of the type of flotation cost studies found in the finance literature. The Lee study is a comprehensive recent study of the underwriting and issuer costs associated with debt and equity issues for both utilities and non-utilities. The results of the Lee *et. al.* study are reproduced in Tables 1 and 2. Table 1 demonstrates that the total underwriting and issuer expenses for the 1,092 debt issues in their study averaged 2.24 percent of the proceeds of the issues, while the total underwriting and issuer costs for the 1,593 seasoned equity issues in their study averaged 7.11 percent of the proceeds of the new issue. Table 1 also demonstrates that the total underwriting and issuer costs of seasoned equity offerings, as a percent of proceeds, decline with the size of the issue. For issues above $60 million, total underwriting and issuer costs amount to from three to five percent of the amount of the proceeds.

Table 2 reports the total underwriting and issuer expenses for 135 utility debt issues and 136 seasoned utility equity issues. Total underwriting and issuer expenses for utility bond offerings averaged 1.47 percent of the amount of the proceeds and for seasoned utility equity offerings averaged 4.92 percent of the amount of the proceeds. Again, there are some economies of scale associated with larger equity offerings. Total underwriting and issuer expenses for equity offerings in excess of 40 million dollars generally range from three to four percent of the proceeds.

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[2] The two percent flotation cost on debt only recognizes the cost of newly-issued debt. When interest rates decline, many companies exercise the call provisions on higher cost debt and reissue debt at lower rates. This process involves reacquisition costs that are not included in the academic studies. If reacquisition costs were included in the academic studies, debt flotation costs could increase significantly.

The results of the Lee study for large equity issues are consistent with results of earlier studies by Bhagat and Frost [4], Mikkelson and Partch [17], and Smith [24]. Bhagat and Frost found that total underwriting and issuer expenses average approximately four and one-half percent of the amount of proceeds from negotiated utility offerings during the period 1973 to 1980, and approximately three and one-half percent of the amount of the proceeds from competitive utility offerings over the same period. Mikkelson and Partch found that total underwriting and issuer expenses average five and one-half percent of the proceeds from seasoned equity offerings over the 1972 to 1982 period. Smith found that total underwriting and issuer expenses for larger equity issues generally amount to four to five percent of the proceeds of the new issue.

The finance literature also contains numerous studies of the decline in price associated with sales of large blocks of stock to the public. These articles relate to the price impact of: (1) initial public offerings; (2) the sale of large blocks of stock from one investor to another; and (3) the issuance of seasoned equity issues to the general public. All of these studies generally support the notion that the announcement of the sale of large blocks of stock produces a decline in a company's share price. The decline in share price for initial public offerings is significantly larger than the decline in share price for seasoned equity offerings; and the decline in share price for public utilities is less than the decline in share price for non-public utilities. A comprehensive study of the magnitude of the decline in share price associated specifically with the sale of new equity by public utilities is reported in Pettway [19], who found the market pressure effect for a sample of 368 public utility equity sales to be in the range of two to three percent. This decline in price is a real cost to the utility, because the proceeds to the utility depend on the stock price on the day of issue.

In addition to the price decline associated with the announcement of a new equity issue, the finance literature recognizes that there is also a price decline associated with the actual issuance of equity securities. In particular, underwriters typically sell seasoned new equity securities to investors at a price lower than the closing market price on the day preceding the issue. The Rules of Fair Practice of the National Association of Securities Dealers require that underwriters not sell shares at a price above the offer price. Since the offer price represents a binding constraint to the underwriter, the underwriter tends to set the offer price slightly below the market price on the day of issue to compensate for the risk that the price received by the underwriter may go down, but can not increase. Smith provides evidence that the offer discount tends to be between 0.5 and 0.8 percent of the proceeds of an equity issue. I am not aware of any similar studies for debt issues.

In summary, the finance literature provides strong support for the conclusion that total underwriting and issuer expenses for public utility debt offerings represent approximately two percent of the amount of the proceeds, while total underwriting and issuer expenses for public utility equity offerings represent at least four to five percent of the amount of the proceeds. In addition, the finance literature supports the conclusion that the cost associated with the decline in stock price at the announcement date represents approximately two to three percent as a result of a large public utility equity issue.

Time Pattern Of Flotation Cost Recovery

Although flotation costs are incurred only at the time a firm issues new securities, there is no reason why an issuing firm ought to recognize the expense only in the current period. In fact, if assets purchased with the proceeds of a security issue produce revenues over many years, a

sound argument can be made in favor of recognizing flotation expenses over a reasonably lengthy period of time. Such recognition is certainly consistent with the generally accepted accounting principle that the time pattern of expenses match the time pattern of revenues, and it is also consistent with the normal treatment of debt flotation expenses in both regulated and unregulated industries.

In the context of a regulated firm, it should be noted that there are many possible time patterns for the recovery of flotation expenses. However, if it is felt that flotation expenses are most appropriately recovered over a period of years, then it should be recognized that investors must also be compensated for the passage of time. That is to say, the value of an investor's capital will be reduced if the expenses are merely distributed over time, without any allowance for the time value of money.

Accounting For Flotation Cost In A Regulatory Setting

In a regulatory setting, a firm's revenue requirements are determined by the equation:

Revenue Requirement = Total Expenses + Allowed Rate of Return x Rate Base

Thus, there are three ways in which an issuing firm can account for and recover its flotation expenses: (1) treat flotation expenses as a current expense and recover them immediately; (2) include flotation expenses in rate base and recover them over time; and (3) adjust the allowed rate of return upward and again recover flotation expenses over time. Before considering methods currently being used to recover flotation expenses in a regulatory setting, I shall briefly consider the advantages and disadvantages of these three basic recovery methods.
Expenses. Treating flotation costs as a current expense has several advantages. Because it allows for recovery at the time the expense occurs, it is not necessary to compute amortized balances over time and to debate which interest rate should be applied to these balances. A firm's stockholders are treated fairly, and so are the firm's customers, because they pay neither more nor less than the actual flotation expense. Since flotation costs are relatively small compared to the total revenue requirement, treatment as a current expense does not cause unusual rate hikes in the year of flotation, as would the introduction of a large generating plant in a state that does not allow Construction Work in Progress in rate base.

On the other hand, there are two major disadvantages of treating flotation costs as a current expense. First, since the asset purchased with the acquired funds will likely generate revenues for many years into the future, it seems unfair that current ratepayers should bear the full cost of issuing new securities, when future ratepayers share in the benefits. Second, this method requires an estimate of the underpricing effect on each security issue. Given the difficulties involved in measuring the extent of underpricing, it may be more accurate to estimate the average underpricing allowance for many securities than to estimate the exact figure for one security.

Rate Base. In an article in *Public Utilities Fortnightly*, Bierman and Hass [5] recommend that flotation costs be treated as an intangible asset that is included in a firm's rate base along with the assets acquired with the stock proceeds. This approach has many advantages. For ratepayers, it provides a better match between benefits and expenses: the future ratepayers who benefit from the financing costs contribute the revenues to recover these costs. For investors, if the allowed rate of return is equal to the investors' required rate of return, it is also theoretically

fair since they are compensated for the opportunity cost of their investment (including both the time value of money and the investment risk).

Despite the compelling advantages of this method of cost recovery, there are several disadvantages that probably explain why it has not been used in practice. First, a firm will only recover the proper amount for flotation expenses if the rate base is multiplied by the appropriate cost of capital. To the extent that a commission under or over estimates the cost of capital, a firm will under or over recover its flotation expenses. Second, it is may be both legally and psychologically difficult for commissioners to include an intangible asset in a firm's rate base. According to established legal doctrine, assets are to be included in rate base only if they are "used and useful" in the public service. It is unclear whether intangible assets such as flotation expenses meet this criterion.

Rate of Return. The prevailing practice among state regulators is to treat flotation expenses as an additional element of a firm's cost of capital or allowed rate of return. This method is similar to the second method above (treatment in rate base) in that some part of the initial flotation cost is amortized over time. However, it has a disadvantage not shared by the rate base method. If flotation cost is included in rate base, it is fairly easy to keep track of the flotation cost on each new equity issue and see how it is recovered over time. Using the rate of return method, it is not possible to track the flotation cost for specific issues because the flotation cost for a specific issue is never recorded. Thus, it is not clear to participants whether a current allowance is meant to recover (1) flotation costs actually incurred in a test period, (2) expected future flotation costs, or (3) past flotation costs. This confusion never arises in the treatment of debt flotation costs. Because the exact costs are recorded and explicitly amortized over time, participants recognize that current allowances for debt flotation costs are meant to recover some fraction of the flotation costs on all past debt issues.

Existing Regulatory Methods

Although most state commissions prefer to let a regulated firm recover flotation expenses through an adjustment to the allowed rate of return, there is considerable controversy about the magnitude of the required adjustment. The following are some of the most frequently asked questions: (1) Should an adjustment to the allowed return be made every year, or should the adjustment be made only in those years in which new equity is raised? (2) Should an adjusted rate of return be applied to the entire rate base, or should it be applied only to that portion of the rate base financed with paid-in capital (as opposed to retained earnings)? (3) What is the appropriate formula for adjusting the rate of return?

This section reviews several methods of allowing for flotation cost recovery. Since the regulatory methods of allowing for recovery of debt flotation costs is well known and widely accepted, I will begin my discussion of flotation cost recovery procedures by describing the widely accepted procedure of allowing for debt flotation cost recovery.

Debt Flotation Costs

Regulators uniformly recognize that companies incur flotation costs when they issue debt securities. They typically allow recovery of debt flotation costs by making an adjustment to both the cost of debt and the rate base (see Brigham [6]). Assume that: (1) a regulated company issues $100 million in bonds that mature in 10 years; (2) the interest rate on these bonds is seven

percent; and (3) flotation costs represent four percent of the amount of the proceeds. Then the cost of debt for regulatory purposes will generally be calculated as follows:

$$\text{Cost of Debt} = \frac{\text{Interest expense + Amortization of flotation costs}}{\text{Principal value - Unamortized flotation costs}}$$
$$= \frac{\$7{,}000{,}000 + \$400{,}000}{\$100{,}000{,}000 - \$4{,}000{,}000}$$
$$= 7.71\%$$

Thus, current regulatory practice requires that the cost of debt be adjusted upward by approximately 71 basis points, in this example, to allow for the recovery of debt flotation costs. This example does not include losses on reacquisition of debt. The flotation cost allowance would increase if losses on reacquisition of debt were included.

The logic behind the traditional method of allowing for recovery of debt flotation costs is simple. Although the company has issued $100 million in bonds, it can only invest $96 million in rate base because flotation costs have reduced the amount of funds received by $4 million. If the company is not allowed to earn a 71 basis point higher rate of return on the $96 million invested in rate base, it will not generate sufficient cash flow to pay the seven percent interest on the $100 million in bonds it has issued. Thus, proper regulatory treatment is to increase the required rate of return on debt by 71 basis points.

Equity Flotation Costs

The finance literature discusses several methods of recovering equity flotation costs. Since each method stems from a specific model, (i. e., set of assumptions) of a firm and its cash flows, I will highlight the assumptions that distinguish one method from another.

Arzac and Marcus. Arzac and Marcus [2] study the proper flotation cost adjustment formula for a firm that makes continuous use of retained earnings and external equity financing and maintains a constant capital structure (debt/equity ratio). They assume at the outset that underwriting expenses and underpricing apply only to new equity obtained from external sources. They also assume that a firm has previously recovered all underwriting expenses, issuer expenses, and underpricing associated with previous issues of new equity.

To discuss and compare various equity flotation cost adjustment formulas, Arzac and Marcus make use of the following notation:

k	=	an investors' required return on equity
r	=	a utility's allowed return on equity base
S	=	value of equity in the absence of flotation costs
S_f	=	value of equity net of flotation costs
K_t	=	equity base at time t
E_t	=	total earnings in year t
D_t	=	total cash dividends at time t

b	=	$(E_t-D_t) \div E_t$ = retention rate, expressed as a fraction of earnings
h	=	new equity issues, expressed as a fraction of earnings
m	=	equity investment rate, expressed as a fraction of earnings, $m = b + h < 1$
f	=	flotation costs, expressed as a fraction of the value of an issue.

Because of flotation costs, Arzac and Marcus assume that a firm must issue a greater amount of external equity each year than it actually needs. In terms of the above notation, a firm issues $hE_t \div (1\text{-}f)$ to obtain hE_t in external equity funding. Thus, each year a firm loses:

Equation 3

$$L = \frac{hE_t}{1-f} - hE_t = \frac{f}{1-f} \times hE_t$$

due to flotation expenses. The present value, V, of all future flotation expenses is:

Equation 4

$$V = \sum_{t=1}^{\infty} \frac{fhE_t}{(1-f)(1+k)^t} = \frac{fh}{1-f} \times \frac{rK_0}{k-mr}$$

To avoid diluting the value of the initial stockholder's equity, a regulatory authority needs to find the value of r, a firm's allowed return on equity base, that equates the value of equity net of flotation costs to the initial equity base ($S_f = K_0$). Since the value of equity net of flotation costs equals the value of equity in the absence of flotation costs minus the present value of flotation costs, a regulatory authority needs to find that value of *r* that solves the following equation:

$$S_f = S - L$$

This value is:

Equation 5

$$r = \frac{k}{1 - \frac{fh}{1-f}}$$

To illustrate the Arzac-Marcus approach to adjusting the allowed return on equity for the effect of flotation costs, suppose that the cost of equity in the absence of flotation costs is 12 percent. Furthermore, assume that a firm obtains external equity financing each year equal to 10 percent of its earnings and that flotation expenses equal 5 percent of the value of each issue. Then, according to Arzac and Marcus, the allowed return on equity should be:

$$r = \frac{.12}{1 - \frac{(.05).(.1)}{.95}} = .1206 = 12.06\%$$

Summary. With respect to the three questions raised at the beginning of this section, it is evident that Arzac and Marcus believe the flotation cost adjustment should be applied each year, since continuous external equity financing is a fundamental assumption of their model. They also believe that the adjusted rate of return should be applied to the entire equity-financed portion of the rate base because their model is based on the assumption that the flotation cost adjustment mechanism will be applied to the entire equity financed portion of the rate base. Finally, Arzac and Marcus recommend a flotation cost adjustment formula, Equation (3), that implicitly excludes recovery of financing costs associated with financing in previous periods and includes only an allowance for the fraction of equity financing obtained from external sources.

Patterson. The Arzac-Marcus flotation cost adjustment formula is significantly different from the conventional approach (found in many introductory textbooks) which recommends the adjustment equation:

Equation 6

$$r = \frac{D_t}{P_{t-1}(1-f)} + g$$

where P_{t-1} is the stock price in the previous period and g is the expected dividend growth rate. Patterson [18] compares the Arzac-Marcus adjustment formula to the conventional approach and reaches the conclusion that the Arzac-Marcus formula effectively expenses issuance costs as they are incurred, while the conventional approach effectively amortizes them over an assumed infinite life of the equity issue. Thus, the conventional formula is similar to the formula for the recovery of debt flotation costs: it is not meant to compensate investors for the flotation costs of future issues, but instead is meant to compensate investors for the flotation costs of previous issues. Patterson argues that the conventional approach is more appropriate for rate making purposes because the plant purchased with external equity funds will yield benefits over many future periods.

Illustration. To illustrate the Patterson approach to flotation cost recovery, assume that a newly organized utility sells an initial issue of stock for $100 per share, and that the utility plans to finance all new investments with retained earnings. Assume also that: (1) the initial dividend per share is six dollars; (2) the expected long-run dividend growth rate is six percent; (3) the flotation cost is five percent of the amount of the proceeds; and (4) the payout ratio is 51.28 percent. Then, the investor's required rate of return on equity is [k = (D/P) + g = 6 percent + 6 percent = 12 percent]; and the flotation-cost-adjusted cost of equity is [6 percent (1/.95) + 6 percent = 12.316 percent].

The effects of the Patterson adjustment formula on the utility's rate base, dividends, earnings, and stock price are shown in Table 3. We see that the Patterson formula allows earnings and dividends to grow at the expected six percent rate. We also see that the present value of expected future dividends, $100, is just sufficient to induce investors to part with their money. If the present value of expected future dividends were less than $100, investors would not have been willing to invest $100 in the firm. Furthermore, the present value of future dividends will

only equal $100 if the firm is allowed to earn the 12.316 percent flotation-cost-adjusted cost of equity on its entire rate base.

Summary. Patterson's opinions on the three issues raised in this section are in stark contrast to those of Arzac and Marcus. He believes that: (1) a flotation cost adjustment should be applied in every year, regardless of whether a firm issues any new equity in each year; (2) a flotation cost adjustment should be applied to the entire equity-financed portion of the rate base, including that portion financed by retained earnings; and (3) the rate of return adjustment formula should allow a firm to recover an appropriate fraction of all previous flotation expenses.

Conclusion

Having reviewed the literature and analyzed flotation cost issues, I conclude that:

Definition of Flotation Cost: A regulated firm should be allowed to recover both the total underwriting and issuance expenses associated with issuing securities and the cost of market pressure.

Time Pattern of Flotation Cost Recovery. Shareholders are indifferent between the alternatives of immediate recovery of flotation costs and recovery over time, as long as they are fairly compensated for the opportunity cost of their money. This opportunity cost must include both the time value of money and a risk premium for equity investments of this nature.

Regulatory Recovery of Flotation Costs. The Patterson approach to recovering flotation costs is the only rate-of-return-adjustment approach that meets the *Hope* case criterion that a regulated company's revenues must be sufficient to allow the company an opportunity to recover all prudently incurred expenses, including the cost of capital. The Patterson approach is also the only rate-of-return-adjustment approach that provides an incentive for investors to invest in the regulated company.

Implementation of a Flotation Cost Adjustment. As noted earlier, prevailing regulatory practice seems to be to allow the recovery of flotation costs through an adjustment to the required rate of return. My review of the literature on this subject indicates that there are at least two recommended methods of making this adjustment: the Patterson approach and the Arzac-Marcus approach. The Patterson approach assumes that a firm's flotation expenses on new equity issues are treated in the same manner as flotation expenses on new bond issues, i. e., they are amortized over future time periods. If this assumption is true (and I believe it is), then the flotation cost adjustment should be applied to a firm's entire equity base, including retained earnings. In practical terms, the Patterson approach produces an increase in a firm's cost of equity of approximately thirty basis points. The Arzac-Marcus approach assumes that flotation costs on new equity issues are recovered entirely in the year in which the securities are sold. Under the Arzac-Marcus assumption, a firm should not be allowed any adjustments for flotation costs associated with previous flotations. Instead, a firm should be allowed only an adjustment on future security sales as they occur. Under reasonable assumptions about the rate of new equity sales, this method produces an increase in the cost of equity of approximately six basis points. Since the Arzac-Marcus approach does not allow the company to recover the entire amount of its flotation cost, I recommend that this approach be rejected and the Patterson approach be accepted.

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TABLE 1
DIRECT COSTS AS A PERCENTAGE OF GROSS PROCEEDS
FOR EQUITY (IPOS AND SEOS) AND STRAIGHT AND CONVERTIBLE BONDS[3]

EQUITIES

		IPOs				SEOs			
Line No.	Proceeds ($ in millions)	No. of Issues	Gross Spreads	Other Direct Expenses	Total Direct Costs	No. of Issues	Gross Spreads	Other Direct Expenses	Total Direct Costs
1	2-9.99	337	9.05%	7.91%	16.96%	167	7.72%	5.56%	13.28%
2	10-19.99	389	7.24%	4.39%	11.63%	310	6.23%	2.49%	8.72%
3	20-39.99	533	7.01%	2.69%	9.70%	425	5.60%	1.33%	6.93%
4	40-59.99	215	6.96%	1.76%	8.72%	261	5.05%	0.82%	5.87%
5	60-79.99	79	6.74%	1.46%	8.20%	143	4.57%	0.61%	5.18%
6	80-99.99	51	6.47%	1.44%	7.91%	71	4.25%	0.48%	4.73%
7	100-199.99	106	6.03%	1.03%	7.06%	152	3.85%	0.37%	4.22%
8	200-499.99	47	5.67%	0.86%	6.53%	55	3.26%	0.21%	3.47%
9	500 and up	10	5.21%	0.51%	5.72%	9	3.03%	0.12%	3.15%
10	**Total/Average**	**1,767**	**7.31%**	**3.69%**	**11.00%**	**1,593**	**5.44%**	**1.67%**	**7.11%**

Bonds

		Convertible Bonds				Straight Bonds			
Line No.	Proceeds ($ in millions)	No. of Issues	Gross Spreads	Other Direct Expenses	Total Direct Costs	No. of Issues	Gross Spreads	Other Direct Expenses	Total Direct Costs
1	2-9.99	4	6.07%	2.68%	8.75%	32	2.07%	2.32%	4.39%
2	10-19.99	14	5.48%	3.18%	8.66%	78	1.36%	1.40%	2.76%
3	20-39.99	18	4.16%	1.95%	6.11%	89	1.54%	0.88%	2.42%
4	40-59.99	28	3.26%	1.04%	4.30%	90	0.72%	0.60%	1.32%
5	60-79.99	47	2.64%	0.59%	3.23%	92	1.76%	0.58%	2.34%
6	80-99.99	13	2.43%	0.61%	3.04%	112	1.55%	0.61%	2.16%
7	100-199.99	57	2.34%	0.42%	2.76%	409	1.77%	0.54%	2.31%
8	200-499.99	27	1.99%	0.19%	2.18%	170	1.79%	0.40%	2.19%
9	500 and up	3	2.00%	0.09%	2.09%	20	1.39%	0.25%	1.64%
10	**Total/Average**	**211**	**2.92%**	**0.87%**	**3.79%**	**1,092**	**1.62%**	**0.62%**	**2.24%**

[3] Inmoo Lee, Scott Lochhead, Jay Ritter, and Quanshui Zhao, "The Costs of Raising Capital," *Journal of Financial Research* Vol 19 No 1 (Spring 1996) pp. 59-74.

Notes:

Closed-end funds and unit offerings are excluded from the sample. Rights offerings for SEOs are also excluded. Bond offerings do not include securities backed by mortgages and issues by Federal agencies. Only firm commitment offerings and non-shelf-registered offerings are included.
Gross Spreads as a percentage of total proceeds, including management fee, underwriting fee, and selling concession.
Other Direct Expenses as a percentage of total proceeds, including management fee, underwriting fee, and selling concession.
Total Direct Costs as a percentage of total proceeds (total direct costs are the sum of gross spreads and other direct expenses).

Table 2
Direct Costs of Raising Capital 1990—1994
Utility versus Non-Utility Companies[4]

Equities

	Non-Utilities	IPOs			SEOs		
Line No.	Proceeds ($ in millions)	No. of Issues	Gross Spreads	Total Direct Costs	No. Of Issues	Gross Spreads	Total Direct Costs
1	2-9.99	332	9.04%	16.97%	154	7.91%	13.76%
2	10-19.99	388	7.24%	11.64%	278	6.42%	9.01%
3	20-39.99	528	7.01%	9.70%	399	5.70%	7.07%
4	40-59.99	214	6.96%	8.71%	240	5.17%	6.02%
5	60-79.99	78	6.74%	8.21%	131	4.68%	5.31%
6	80-99.99	47	6.46%	7.88%	60	4.35%	4.84%
7	100-199.99	101	6.01%	7.01%	137	3.97%	4.36%
8	200-499.99	44	5.65%	6.49%	50	3.27%	3.48%
9	500 and up	10	5.21%	5.72%	8	3.12%	3.25%
10	**Total/Average**	1,742	7.31%	11.01%	1,457	5.57%	7.32%
11	**Utilities Only**						
12	2-9.99	5	9.40%	16.54%	13	5.41%	7.68%
13	10-19.99	1	7.00%	8.77%	32	4.59%	6.21%
14	20-39.99	5	7.00%	9.86%	26	4.17%	4.96%
15	40-59.99	1	6.98%	11.55%	21	3.69%	4.12%
16	60-79.99	1	6.50%	7.55%	12	3.39%	3.72%
17	80-99.99	4	6.57%	8.24%	11	3.68%	4.11%
18	100-199.99	5	6.45%	7.96%	15	2.83%	2.98%
19	200-499.99	3	5.88%	7.00%	5	3.19%	3.48%
20	500 and up	0			1	2.25%	2.31%
21	**Total/Average**	25	7.15%	10.14%	136	4.01%	4.92%

[4] Lee *et al, op. cit.*

Table 2 (continued)
Direct Costs of Raising Capital 1990—1994
Utility versus Non-Utility Companies[5]

Bonds

	Non- Utilities	Convertible Bonds			Straight Bonds		
Line No.	Proceeds ($ in millions)	No. of Issues	Gross Spreads	Total Direct Costs	No. of Issues	Gross Spreads	Total Direct Costs
1	2-9.99	4	6.07%	8.75%	29	2.07%	4.53%
2	10-19.99	12	5.54%	8.65%	47	1.70%	3.28%
3	20-39.99	16	4.20%	6.23%	63	1.59%	2.52%
4	40-59.99	28	3.26%	4.30%	76	0.73%	1.37%
5	60-79.99	47	2.64%	3.23%	84	1.84%	2.44%
6	80-99.99	12	2.54%	3.19%	104	1.61%	2.25%
7	100-199.99	55	2.34%	2.77%	381	1.83%	2.38%
8	200-499.99	26	1.97%	2.16%	154	1.87%	2.27%
9	500 and up	3	2.00%	2.09%	19	1.28%	1.53%
10	**Total/Average**	203	2.90%	3.75%	957	1.70%	2.34%
11	**Utilities Only**						
12	2-9.99	0			3	2.00%	3.28%
13	10-19.99	2	5.13%	8.72%	31	0.86%	1.35%
14	20-39.99	2	3.88%	5.18%	26	1.40%	2.06%
15	40-59.99	0			14	0.63%	1.10%
16	60-79.99	0			8	0.87%	1.13%
17	80-99.99	1	1.13%	1.34%	8	0.71%	0.98%
18	100-199.99	2	2.50%	2.74%	28	1.06%	1.42%
19	200-499.99	1	2.50%	2.65%	16	1.00%	1.40%
20	500 and up	0			1	3.50%	na[6]
21	**Total/Average**	8	3.33%	4.66%	135	1.04%	1.47%

Notes:
Total proceeds raised in the United States, excluding proceeds from the exercise of over allotment options.
Gross spreads as a percentage of total proceeds (including management fee, underwriting fee, and selling concession).
Other direct expenses as a percentage of total proceeds (including registration fee and printing, legal, and auditing costs).

[5] Lee *et al, op. cit.*

[6] Not available because of missing data on other direct expenses.

Table 3
Illustration of Patterson Approach to Flotation Cost Recovery

Line No.	Time Period	Rate Base	Earnings @ 12.32%	Earnings @ 12.00%	Dividends	Amortization Initial FC
1	0	95.00				
2	1	100.70	11.70	11.40	6.00	0.3000
3	2	106.74	12.40	12.08	6.36	0.3180
4	3	113.15	13.15	12.81	6.74	0.3371
5	4	119.94	13.93	13.58	7.15	0.3573
6	5	127.13	14.77	14.39	7.57	0.3787
7	6	134.76	15.66	15.26	8.03	0.4015
8	7	142.84	16.60	16.17	8.51	0.4256
9	8	151.42	17.59	17.14	9.02	0.4511
10	9	160.50	18.65	18.17	9.56	0.4782
11	10	170.13	19.77	19.26	10.14	0.5068
12	11	180.34	20.95	20.42	10.75	0.5373
13	12	191.16	22.21	21.64	11.39	0.5695
14	13	202.63	23.54	22.94	12.07	0.6037
15	14	214.79	24.96	24.32	12.80	0.6399
16	15	227.67	26.45	25.77	13.57	0.6783
17	16	241.33	28.04	27.32	14.38	0.7190
18	17	255.81	29.72	28.96	15.24	0.7621
19	18	271.16	31.51	30.70	16.16	0.8078
20	19	287.43	33.40	32.54	17.13	0.8563
21	20	304.68	35.40	34.49	18.15	0.9077
22	21	322.96	37.52	36.56	19.24	0.9621
23	22	342.34	39.77	38.76	20.40	1.0199
24	23	362.88	42.16	41.08	21.62	1.0811
25	24	384.65	44.69	43.55	22.92	1.1459
26	25	407.73	47.37	46.16	24.29	1.2147
27	26	432.19	50.21	48.93	25.75	1.2876
28	27	458.12	53.23	51.86	27.30	1.3648
29	28	485.61	56.42	54.97	28.93	1.4467
30	29	514.75	59.81	58.27	30.67	1.5335
31	30	545.63	63.40	61.77	32.51	1.6255
32	Present Value@12%		195.00	190.00	100.00	5.00

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 24 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:

$$RP_{PROXY} = \underset{(8.77)}{8.17} - \underset{(-3.90)}{.5316 \times I_A}.$$ [7]

Using the 6.15 percent forecasted yield to maturity on A-rated utility bonds,[8] the regression equation produces an ex ante risk premium equal to 4.90 percent (8.17 – 0.5316 x 6.15 = 4.90).

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

[8] Forecasted A-rated utility bond yield determined from Value Line Selection & Opinion, November 26, 2010, p. 2534. See Footnote 4 above.

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 4.90 percent. Adding an estimated risk premium of 4.90 percent to the 6.15 percent forecasted yield to maturity on A-rated utility bonds produces a cost of equity estimate of 11.0 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, several 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 30 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 3 and 4 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 based 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:

$$\text{Stock Return (2009)} = \left[\frac{\text{Stock Price (2010)} - \text{Stock Price (2009)} + \text{Dividend (2009)}}{\text{Stock Price (2009)}}\right]$$

where Dividend (2009) = Stock Price (2009) x Stock Div. Yield (2009)

Sample calculation of "Bond Return" column:

$$\text{Bond Return (2009)} = \left[\frac{\text{Bond Price (2010)} - \text{Bond Price (2009)} + \text{Interest (2009)}}{\text{Bond Price (2009)}}\right]$$

where Interest = $4.00.