Gulf Power

Robert L. McGee, Jr.
Regulatory & Pricing Manager

One Energy Place
Pensacola, FL 32520-0780
850 444 6530 tel
850 444 6026 fax
rlmcgee@southernco.com

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VIA ELECTRONIC FILING

Ms. Carlotta Stauffer
Commission Clerk
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, Florida 32399-0850

Re: Petition for an increase in rates by Gulf Power Company, Docket No. 160186-EI

Re: Petition for approval of 2016 depreciation and dismantlement studies, approval of proposed depreciation rates and annual dismantlement accruals and Plant Smith Units 1 and 2 regulatory asset amortization by Gulf Power Company, Docket No. 160170-EI

Dear Ms. Stauffer:

Attached is the Direct Testimony and Exhibits of Gulf Power Company Witness James H. Vander Weide, Ph.D.

(Document 19 of 29)

Sincerely,

Robert L. McGee, Jr.

Robert L. McGee, Jr.
Regulatory & Pricing Manager

BEFORE THE

FLORIDA PUBLIC SERVICE COMMISSION

DOCKET NO. 160186-EI

Gulf Power

TESTIMONY AND EXHIBIT

OF

JAMES H. VANDER WEIDE, Ph.D.

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GULF POWER COMPANY

Before the Florida Public Service Commission
Prepared Direct Testimony of
James H. Vander Weide, Ph.D.
Docket No. 160186-EI
In Support of Rate Relief
Date of Filing: October 12, 2016

I. INTRODUCTION AND PURPOSE

Q. Please state your name, title, and business address.

A. My name is James H. Vander Weide. I am 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 five hundred regulatory and legal proceedings before the public service commissions of forty-five states and four Canadian provinces, the Federal Energy Regulatory Commission, the National Energy Board (Canada), the Federal Communications Commission, the Canadian Radio-Television and Telecommunications Commission, the United States Congress, the National Telecommunications and Information Administration, 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 United States District Court for the District of Nebraska; the United States District Court for the District of New Hampshire; the United States District Court for the District of Northern Illinois; the United States District Court for the Eastern District of North Carolina; the Montana Second Judicial District Court, Silver Bow County; the United States District Court for the Northern District of California; the Superior Court, North Carolina; the United States Bankruptcy Court for the Southern District of West Virginia; the United States District Court for the Eastern District of Michigan; and the Supreme Court of the State of New York.

Q. What is the purpose of your testimony?

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

II. SUMMARY OF TESTIMONY

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

A. I estimate the cost of equity for Gulf 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?

A. I apply my cost of equity methods to a large group of comparable risk companies because standard cost of equity methods 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 because Gulf does not have publicly-traded stock. Because 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 methods to a large sample of comparable 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 methods to a group of comparable companies. In utility regulation, the practice of using a group of comparable companies, called the comparable company approach, 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 *Hope Natural Gas Co*., 320 U.S. 561, 603 (1944).

Q. What cost of equity do you find for your comparable companies in this proceeding?

A. On the basis of my studies, I find that the cost of equity for my comparable companies is 10.4 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 business risk. As noted below, the cost of equity for my proxy companies must be adjusted to reflect the higher financial risk associated with Gulf's rate making capital structure compared to the financial risk associated with the average market-value capital structure of my proxy company group. Making this adjustment produces a cost of equity for Gulf equal to 11.0 percent. I therefore conclude that Gulf's fair rate of return on equity is equal to 11.0 percent.

Q. You have adjusted the cost of equity of your proxy companies to reflect the higher financial risk in Gulf's rate making capital structure. 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 is less than the financial risk associated with Gulf's recommended rate making capital structure because Gulf's recommended rate making capital structure contains a higher percentage of debt and a lower percentage of equity than the average market value capital structure of the proxy group. 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 to have an opportunity to earn a return on their investment in Gulf that is commensurate with returns they could earn on other investments of comparable risk.

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

A. Gulf's rate making capital structure in this proceeding contains 40.77 percent long-term debt, 5.27 percent preferred stock, and 53.96 percent common equity. The current average market value capital structure for my proxy group of companies contains approximately 35.06 percent long-term debt, 0.19 percent preferred stock, and

64.74 percent common equity. Because current market values of equity are at historically high levels, I have also examined the average market value capital structure for the Value Line electric utilities over a ten-year period; and I find that the average market value capital structure for the Value Line electric utilities contains approximately 39.49 percent long-term debt, 0.51 percent preferred stock, and 60.0 percent equity. Thus, the financial risk of Gulf 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. What is the fair rate of return on equity for Gulf indicated by your cost of equity analysis?

A. My analysis indicates that Gulf would require a fair rate of return on equity equal to 11.0 percent.

Q. Do you have exhibits accompanying your testimony?

A. Yes. I have prepared or supervised the preparation of Exhibit JVW-1 consisting of 10 schedules and Exhibit JVW-2 consisting of five appendices that accompany my testimony. The information contained in my exhibits is true and correct to the best of my knowledge and belief.

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 utility plant and equipment?

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 the value of the firm. This goal can be accomplished by investing only in that plant and equipment with an expected rate of return that is equal to or 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 required rate of return on investment because rational investors will not invest if they expect a return that 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 0.50 times 7 percent plus 0.50 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 value 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 twenty-five percent debt and seventy-five 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 of a portfolio is calculated by examining the variability of the end-of-period return on the portfolio about the expected value; 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 the investment, is generally a poor indicator of the portfolio's current market value and irrelevant for the purpose of assessing the required return and risk on their portfolios. If they were to sell their investments, they would receive market value, not historical cost. Thus, the return can only be measured in terms of market values.

Q. Is the economic definition of the weighted average cost of capital consistent with regulators' traditional definition of the 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. Will investors have an opportunity to earn a fair return on the value of their equity investment in the company if regulators calculate the weighted average cost of capital using the book value of equity in the company's capital structure?

A. No. Investors will only have an opportunity to earn a fair return on the value of their equity investment if regulators either: (1) calculate the weighted average cost of capital using the market value of equity in the company's capital structure; or (2) adjust the cost of equity for the difference between the financial risk reflected in the market value capital structures of the proxy companies and the financial risk reflected in the company's ratemaking capital structure.

Q. Are the 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. of W. Va.*; and (2) *Federal Power Comm'n v. Hope Natural Gas Co*. In *Bluefield Water Works*, 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 *Bluefield Water Works*:

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

The Court clearly recognizes that the fair rate of return on equity should be: (1) comparable to returns investors expect to earn on other investments of similar risk; (2) sufficient to assure confidence in the company's financial integrity; and (3) adequate to maintain and support the company's credit and to attract capital.

IV. BUSINESS AND FINANCIAL RISKS

Q. How do investors estimate the expected rate of return on specific investments, such as an investment in Gulf?

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

Q. Are the returns on investment opportunities, such as an investment in Gulf, known with certainty at the time the investment is made?

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

Q. You note that investors require a return on investment that is equal to the return they expect to receive on other investments of similar risk. Does the required return on an investment depend on the risk of that investment?

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

Q. What fundamental risk do investors face when they invest in a company such as Gulf?

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

Q. How do investors measure investment risk?

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

Q. Do investors distinguish between business and financial risk?

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

Q. What are the primary determinants of an electric utility's business risk?

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

Q. What causes the demand for electricity to be uncertain?

A. Electric utilities experience demand uncertainty in both the short run and the long run. Short-run demand uncertainty is caused by the strong dependence of electric demand on the state of the economy and weather patterns. Long-run demand uncertainty is caused by: (1) the sensitivity of demand to changes in rates; (2) the efforts of customers to conserve energy; (3) the potential development of new energy efficient technologies and appliances; (4) the improved economics of distributed generation; (5) the ability of some customers to co-generate their own electricity or purchase electricity from competitors; and (6) the uncertain impact of changing governmental regulations and subsidies on the price of electricity.

Q. How does short-run demand uncertainty affect an electric utility's business risk?

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

Q. How does long-run demand uncertainty affect an electric utility's business risk?

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

Q. Does Gulf experience demand uncertainty?

A. Yes. Gulf experiences demand uncertainty in both the short run and the long run. The Company experiences short-run demand uncertainty as a result of economic cycles, such as times of economic uncertainty, when fewer homes are built, fewer new businesses are started, and factories are running at less than full capacity; and as a result of weather patterns, such as unusually warm winters and cool summers. Gulf experiences long-run demand uncertainty when it invests in major long-lived plant additions or replacements that are expected to remain in service over the next thirty or forty years.

Q. Why are an electric utility's operating expenses uncertain?

A. Operating expense uncertainty arises as a result of factors such as: (1) high volatility in fuel prices or interruptions in fuel supply; (2) variability in maintenance costs and the costs of materials; (3) uncertainty over outages of the company's generation, transmission, and distribution systems, as well as storm-related expenses; (4) uncertainty regarding the cost of purchased power and the revenues achieved from off-system sales; (5) the prospect of increasing employee health care and pension expenses; and (6) the prospect of increased expenses for security.

Q. Does Gulf experience operating expense uncertainty?

A. Yes. Gulf experiences typical operating expense uncertainty associated with its existing operations. However, volatility in fuel prices is partially mitigated by the existence of a fuel adjustment clause in Florida.

Q. Why are utility investment costs uncertain?

A. The electric utility business requires large investments in the plant and equipment required to deliver electricity to customers. The future amounts of required investments in plant and equipment are uncertain as a result of: (1) demand uncertainty; (2) the changing economics of alternative generation technologies; (3) uncertainty in environmental regulations and clean air requirements; (4) uncertainty in the costs of construction materials and labor; and (5) uncertainty in the amount of additional investments to ensure the reliability of the company’s transmission and distribution networks. Furthermore, the risk of investing in electric utility facilities is increased by the irreversible nature of the company’s investments in utility plant and equipment. For example, if an electric utility decides to invest in new distribution plant to serve a new neighborhood, and, as a result of a changing economy, fewer housing units are built in the neighborhood, the company may not be able to earn a fair return on equity, including both a return of and a return on capital.

Q. You note above that high operating leverage contributes to the business risk of electric utilities. What is operating leverage?

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

Q. How do economists measure operating leverage?

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

Q. What is the difference between fixed and variable expenses?

A. Fixed expenses are expenses that do not vary with output (that is, kilowatt hours sold), and variable expenses are expenses that vary directly with output. For electric utilities, fixed expenses include the capacity component of purchased power costs, the fixed component of operating and maintenance costs, depreciation and amortization, and taxes. Fuel expenses, including fuel transportation, are the primary variable cost for electric utilities. For utilities with large renewable energy generation portfolios, the variability in wind or solar energy production and the limited term of production tax credits is an additional variable cost.

Q. Do electric utilities experience high operating leverage?

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

Q. Can an electric utility reduce its operating leverage by purchasing, rather than generating, electricity?

A. No. Electric utilities generally purchase power under long-term contracts that include both a fixed capacity charge and a variable charge that depends on the amount of electricity purchased. Since the fixed capacity charge is designed to recover the seller's fixed costs of generating electricity, electric utilities generally experience the same degree of operating leverage when they purchase power as when they generate power.

Q. How does operating leverage affect a company's business risk?

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

Q. Does regulation create uncertainty for electric utilities?

A. Yes. Investors' perceptions of the business and financial risks of electric utilities are strongly influenced by their views of the quality of regulation.

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

Q. You note that financial leverage increases the risk of investing in electric utilities such as Gulf. How do economists measure financial leverage?

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

Q. Why does financial leverage affect the risk of investing in an electric utility's stock?

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

Q. Can the risks facing electric utilities such as Gulf be distinguished from the risks of investing in companies in other industries?

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

V. COST OF EQUITY ESTIMATION METHODS

Q. What methods do you use to estimate Gulf's cost of equity?

A. I use several generally accepted methods for estimating the cost of equity for Gulf. These are the DCF, the ex ante risk premium, the ex post risk premium, and the 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 expectations regarding the equity risk premium can be estimated from 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 expectations regarding the equity-debt return differential are influenced by 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 expected interest rate on bond investments plus the expected risk premium. The CAPM assumes that the investor's required rate of return on equity is equal to an expected 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 because they expect to receive a sequence of cash flows 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

$$P_B = C/(1+i) + C/(1+i)^2 + \cdots + (C+F)/(1+i)^n$$

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

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

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'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. Because the companies in my comparable 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 employed the quarterly DCF model throughout my calculations, even though the results of the quarterly DCF model for my companies are approximately equal to the results of a properly applied annual DCF model (in which the end-of-year dividend is estimated by multiplying the current annual dividend by the factor one plus the growth rate).

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 equal to 0.505, 0.505, 0.505, and 0.520. Thus dividends d_1, d_2, and d_3 are equal to 0.535 [.505 x (1 + .06) = 0.535] and d_4 is equal to 0.551 [0.52 x (1 + .06) = 0.551]. (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 looking at past historical growth rates?

A. I rely on analysts' projections of future EPS growth because there is considerable empirical evidence that investors use analysts' forecasts to estimate future earnings growth.

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 with Willard T. Carleton, Professor Emeritus of Finance at the University of Arizona, which is described in a paper entitled "Investor Growth Expectations and Stock Prices: Analysts vs. History," published in the Spring 1988 edition of *The Journal of Portfolio Management*.

Q. Please summarize the results of your study.

A. We performed a correlation analysis to identify the historically oriented growth rates which best described a firm's stock price. We then performed a regression study comparing the historical growth rates and retention 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 and retention 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 decisions to buy and sell stock. The results provide overwhelming evidence that the analysts' forecasts of future growth are superior to historically-oriented growth measures in predicting a firm's stock price. I note that researchers at State Street Financial Advisors updated my study in 2004, and their results continue to confirm that analysts' growth forecasts are superior to historically-oriented growth measures in predicting a company'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 March 2016. 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 the costs of underwriters' commissions, legal fees, and printing expense, for example. 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 Inmoo Lee, 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 in price associated with new stock issuances 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 stock price decline, generally ranges 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 (see Exhibit JVW-1, Schedule 1).

Q. How do you apply the DCF approach to estimate the required return on equity for Gulf?

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

Q. How do you select your electric utility company group?

A. I select all the electric utilities followed by Value Line 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 an available positive I/B/E/S long-term 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 are the subject of a merger offer that has not been completed?

A. A merger announcement can sometimes have a significant impact on a company's stock price because of anticipated merger-related cost savings and new market opportunities. Analysts' growth forecasts, on the other hand, are necessarily related to companies as they currently exist, and do not reflect investors' views of the potential cost savings and new market opportunities associated with mergers. The use of a stock price that includes the value 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 company group.

A. As shown on JVW-1, Schedule 1, I obtain an average DCF result of 9.7 percent for my electric utility group.

B. RISK PREMIUM METHOD

Q. Please describe the risk premium method of estimating the cost of equity.

A. The risk premium method is based on the principle that investors expect to earn a return on an equity investment that reflects a "premium" above the interest rate they expect to earn on an investment in 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 to the interest rate 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 income 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 United States government is not a company.

Q. How do you measure the required risk premium on an equity investment in your group of publicly-traded electric utilities?

A. I use two methods to estimate the required risk premium on an equity investment in publicly-traded electric utilities. 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 electric utilities.

A. My ex ante risk premium method is based on studies of the DCF expected return on a group of electric utilities compared to the interest rate on Moody's A-rated utility bonds. Specifically, for each month in my study period, I calculated 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 regression analyses to determine if there is a relationship between the calculated risk premium and interest rates. 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. From your regression analyses, do you find that there is a relationship between the calculated equity risk premium and interest rates?

A. Yes. My regression analyses confirm that there is an inverse relationship between the calculated equity risk premium and interest rates. Specifically, my analyses indicate that when the yield to maturity on A-rated utility bonds declines by 100 basis points, the required equity risk premium increases by 60 basis points; and when the yield on A-rated utility bonds increases by 100 basis points, the required equity risk premium declines by 60 basis points (*see* Appendix 4, p. 3).

Q. How do you use the regression analyses to estimate the cost of equity in your ex ante risk premium method?

A. To estimate the cost of equity, I add the estimated 4.7 percent required equity risk premium obtained from my regression analyses to the forecasted interest rate on A-rated utility bonds.

Q. What cost of equity estimate do you obtain using your ex ante risk premium method?

A. I obtain a cost of equity estimate of 10.9 percent using my ex ante risk premium method. This cost of equity estimate is the sum of the estimated 4.7 percent equity risk premium from my regression analyses and the 6.2 percent forecasted yield to maturity on A-rated utility bonds.

Q. How do you obtain the expected yield on A-rated utility bonds?

A. I obtain the expected yield to maturity on A-rated utility bonds, 6.2 percent, by averaging forecast data from Value Line and the U.S. Energy Information Administration (EIA). Value Line Selection & Opinion (March 4, 2016) projects a Aaa-rated Corporate bond yield equal to 5.6 percent. The March 2016 average spread between A-rated utility bonds and Aaa-rated Corporate bonds is 34 basis points (A-rated utility, 4.16 percent, less Aaa-rated Corporate, 3.82 percent, equals 34 basis points). Adding 34 basis points to the 5.6 percent Value Line Aaa Corporate bond forecast equals a forecast yield of 5.94 percent for the A-rated utility bonds. The EIA forecasts an AA-rated utility bond yield equal to 6.21 percent. The average spread between AA-rated utility and A-rated utility bonds at March 2016 is 23 basis points (4.16 percent less 3.93 percent). Adding 23 basis points to EIA's 6.21 percent AA-utility bond yield forecast equals a forecast yield for A-rated utility bonds equal to 6.44 percent. The average of the forecasts (5.9 percent using Value Line data and 6.44 percent using EIA data) is 6.2 percent.

Q. Why do you use a forecasted yield to maturity on A-rated utility bonds rather than a current yield to maturity?

A. I use a forecasted yield to maturity on A-rated utility bonds rather than a current yield to maturity because the fair rate of return standard requires that a company have an opportunity to earn its required return on its investment during the forward-looking period during which rates will be in effect. Because current interest rates are depressed as a result of the

Federal Reserve's efforts to stimulate the economy by keeping interest rates low, current interest rates at this time are likely a poor indicator of expected future interest rates. Economists project that future interest rates will be higher than current interest rates as the Federal Reserve allows interest rates to rise in order to prevent inflation. Thus, the use of forecasted interest rates is consistent with the fair rate of return standard, whereas the use of current interest rates at this time is not.

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 electric utilities.

A. I first perform a study of the comparable returns received by bond and stock investors over the 79 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 2016. 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 from 1937 to 2016 are shown on Exhibit JVW-1, Schedule 3. The average annual return on an investment in the S&P 500 stock portfolio is 11.1 percent, while the average annual return on an investment in the Moody's A-rated utility bond portfolio is 6.6 percent. The risk premium on the S&P 500 stock portfolio is, therefore, 4.5 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 average annual return on an investment in the S&P Utility stock portfolio is 10.5 percent per year. Thus, the return on the S&P Utility stock portfolio exceeded the return on the Moody's A-rated utility bond portfolio by 3.9 percent (10.5 – 6.6 = 3.9).

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 because I believe electric utilities today face risks that are somewhere in between the average risk of the S&P Utilities and the S&P 500 over the years 1937 to 2016. Thus, I use the average of the two historically-based risk premiums as my estimate of the required risk premium in my ex post risk premium method.

Q. Would your study provide a different risk premium if you started with a different time period?

A. Yes. The risk premium results vary somewhat depending on the historical time period chosen. My policy is to go back as far in history as I can get reliable data. I thought it would be most meaningful to begin after the passage and implementation of the Public Utility Holding Company Act of 1935 (the 1935 Act). This Act significantly changed the structure of the public utility industry. Because the 1935 Act was not implemented until the beginning of 1937, I concluded that data prior to 1937 should not be used in my study. (The repeal of the 1935 Act has not materially impacted the structure of the public utility industry; thus, the Act's repeal does not have any impact on my choice of time period.)

Q. Why is it necessary to examine the yield from debt investments in order to determine the investors' required rate of return on equity capital?

A. As previously explained, investors expect to earn a return on their equity investment that exceeds currently available bond yields because the return on equity, as a residual return, is less certain than the yield on bonds; and investors must be compensated for this uncertainty. Investors' expectations concerning the amount by which the return on equity will exceed the bond yield may be influenced by historical differences in returns to bond and stock investors. Thus, we can estimate investors' expected returns from an equity investment based on information about past differences between returns on stocks and bonds. In interpreting this information, investors would also recognize that risk premiums increase when interest rates are low.

Q. What conclusions do you draw from your ex post risk premium analyses about the required return on an equity investment in electric utilities?

A. My studies provide strong evidence that investors today require an equity return of at least 3.9 to 4.5 percentage points above the expected yield on A-rated utility bonds. As discussed above, the forecast yield on A-rated utility bonds is 6.2 percent. Adding a 3.9 to 4.5 percentage point risk premium to a yield of 6.2 percent on A-rated utility bonds, I obtain an expected return on equity in the range 10.1 percent to 10.7 percent, with a midpoint of 10.4 percent. Adding a twenty-basis-point allowance for flotation costs, I obtain an estimate of 10.6 percent as the ex post risk premium cost of equity. (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 a forecasted yield to maturity on 20-year Treasury bonds of 4.2 percent, obtained using data from Value Line and EIA. For my estimate of the company-specific risk, or beta, I use both the current average 0.75 Value Line beta for my group of electric utilities and the 0.90 beta estimated from the relationship between the historical risk premium on utilities and the historical risk premium on the market portfolio. 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 in the *2016 Valuation Handbook* for the years 1926 through 2015, data which are consistent with the data previously reported by Ibbotson® 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.

Q. How do you obtain the forecasted yield to maturity on 20-year Treasury bonds?

A. As noted above, I use data from Value Line and EIA to obtain a forecasted yield to maturity on 20-year Treasury bonds. Value Line forecasts a yield on 10-year Treasury notes equal to 3.5 percent. The spread between the average March 2016 yield on 10-year Treasury notes (1.89 percent) and 20-year Treasury bonds (2.28 percent) is 39 basis points. Adding 39 basis points to Value Line's 3.5 percent forecasted yield on 10-year Treasury notes produces a forecasted yield of 3.89 percent for 20-year Treasury bonds (see Value Line Investment Survey, Selection & Opinion, March 4, 2016). EIA forecasts a yield of 4.11 percent on 10-year Treasury notes. Adding the 39 basis point spread between 10-year Treasury notes and 20-year Treasury bonds to the EIA forecast of 4.11 percent for 10-year Treasury notes produces an EIA forecast for 20-year Treasury bonds equal to 4.5 percent. The average of the forecasts is 4.2 percent (3.89 percent using Value Line data and 4.5 percent using EIA data).

1. Historical CAPM

Q. How do you estimate the expected risk premium on the market portfolio using historical risk premium data developed by Ibbotson® SBBI®?

A. I estimate the expected risk premium on the market portfolio by calculating the difference between the arithmetic mean total return on the S&P 500 from 1926 to 2016 (12.0 percent) and the average income return on 20-year U.S. Treasury bonds over the same period (5.1 percent). Thus, my historical risk premium method produces a risk premium of 6.9 percent (12.0 – 5.1 = 6.9).

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. I recommend that the risk premium on the market portfolio be estimated using the arithmetic mean return on the S&P 500 because, in my opinion, the arithmetic mean return is the best approach for calculating the return investors expect to receive in the future. For an investment which has an uncertain outcome, the arithmetic mean is the best historically-based measure of the return investors expect to receive in the future. 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 4.2 percent, an electric utility beta equal to 0.75, a risk premium on the market portfolio equal to 6.9 percent, and a flotation cost allowance equal to twenty basis points, I obtain an historical CAPM estimate of the cost of equity equal to 9.6 percent for my electric utility group (4.2 + 0.75 x 6.9 + 0.20= 9.6) (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, “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).

Q. Can you briefly summarize these articles?

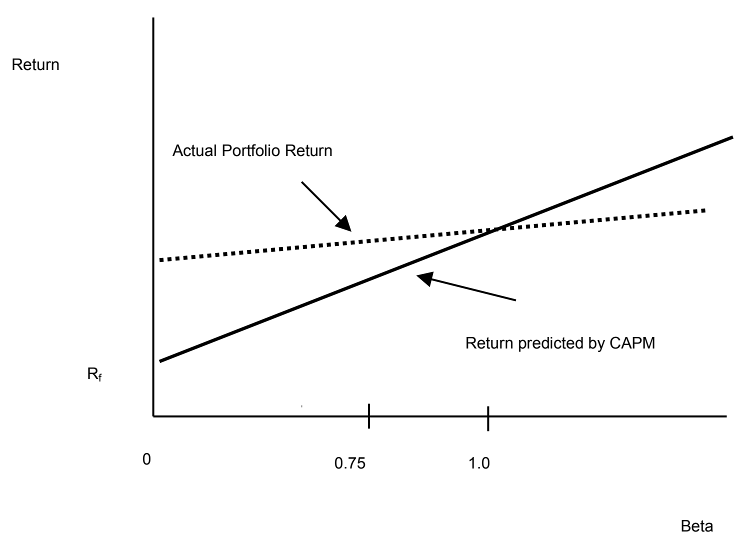
A. Yes. The CAPM conjectures that security returns increase with increases in security betas in line with the equation:

$$ER_i = R_f + \beta_i \lfloor ER_m - R_f \rfloor,$$

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



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 solid line, they generally agree that the dotted line lies above the solid line for portfolios with betas less than 1.0 and below the solid 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 overestimates portfolio returns for portfolios with betas greater than 1.0.

Q. Do you have additional evidence that the CAPM tends to underestimate the cost of equity for utilities with average betas less than 1.0?

A. Yes. As shown in Exhibit JVW-1, Schedule 7, over the period 1937 to 2016, investors in the S&P Utilities Stock Index have earned a risk premium over the yield on long-term Treasury bonds equal to 5.34 percent, while investors in the S&P 500 have earned a risk premium over the yield on long-term Treasury bonds equal to 5.92 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 0.75, whereas the historical ratio of the utility risk premium to the S&P 500 risk premium is 0.90 (5.34 ÷ 5.92 = 0.90). In short, the current 0.75 measured beta for electric utilities underestimates the cost of equity for electric utilities, providing further support for the conclusion that the CAPM underestimates the cost of equity for electric utilities at this time.

Q. Can you adjust for the tendency of the CAPM to underestimate the cost of equity for companies with betas less than 1.0?

A. Yes. I can implement the CAPM using the 0.90 beta I discuss above, which I obtain by comparing the historical returns on utilities to historical returns on the S&P 500.

Q. What CAPM result do you obtain when you use a beta equal to 0.90 rather than an electric utility beta equal to 0.75?

A. I obtain a CAPM result equal to 10.6 percent using a risk free rate equal to 4.2 percent, a beta equal to 0.90, the historical market risk premium equal to 6.9 percent, and a flotation cost allowance of 20 basis points (4.2 + 0.90 x 6.9+ 0.20= 10.6). (See Exhibit JVW-1, Schedule 8.)

Q. What is the average of your two historical CAPM results?

A. The average of my two historical CAPM results is 10.1 percent (9.6 percent + 10.6 percent) ÷ 2 = 10.1 percent). I use 10.1 percent as my estimate of the historical CAPM cost of equity.

2. DCF-Based CAPM

Q. How does your DCF-Based CAPM differ from your historical CAPM?

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

Q. What risk premium do you obtain when you calculate the difference between the DCF-return on the S&P 500 and the risk-free rate?

A. Using this method, I obtain a risk premium on the market portfolio equal to 7.7 percent (This value is obtained by subtracting the forecasted risk-free rate, 4.2 percent, from the DCF estimate of the market return, 11.9 percent (11.9 – 4.2 = 7.7). (See Exhibit JVW-1, Schedule 9.)

Q. What CAPM result do you obtain when you estimate the expected return on the market portfolio by applying the DCF model to the S&P 500?

A. Using a risk-free rate of 4.2 percent, an electric utility beta of 0.75, a risk premium on the market portfolio of 7.7 percent, and a flotation cost allowance equal to twenty basis points, I obtain a CAPM result of 10.2 percent for my electric utility group. Using a risk-free rate of 4.2 percent, an electric utility beta of 0.90, a risk premium on the market portfolio of 7.7 percent, and a flotation cost allowance of twenty basis points, I obtain a CAPM result of 11.4 percent for my electric utility group. The average of these two results is 10.8 percent (10.2 percent + 11.4 percent) ÷ 2 = 10.8 percent). I use 10.8 percent as my estimate of the DCF-based CAPM cost of equity.

VI. CONCLUSION REGARDING THE FAIR RATE OF RETURN ON EQUITY

Q. What is the fair rate of return on equity?

A. The fair rate of return on equity is a forward-looking return on equity that provides the regulated company with an opportunity to earn a return on its investment over the period in which rates are in effect that is commensurate with returns that investors expect to earn on other investments of similar risk, as I discuss above. Because the fair rate of return is a forward-looking return, the estimate of the fair return requires consideration of investors' expectations for a reasonably long period into the future.

Q. Based on your application of several cost of equity methods to your proxy company groups, what is your conclusion regarding the fair rate of return on equity for your comparable companies?

A. Based on my application of several cost of equity methods, I conclude that the fair rate of return on equity for my comparable companies is in the range 9.7 percent to 10.9 percent, with an average equal to 10.4 percent (see TABLE 1 below).

TABLE 1

COST OF EQUITY MODEL RESULTS

Model	Model Result
Discounted Cash Flow	9.7%
Ex Ante Risk Premium	10.9%
Ex Post Risk Premium	10.6%
CAPM – Historical	10.1%
CAPM - DCF Based	10.8%
Average	10.4%

Q. Does your 10.4 percent fair rate of return on equity conclusion for your proxy companies depend on the percentages of debt and equity in the proxy companies' average capital structure?

A. Yes. My 10.4 percent fair rate of return on equity conclusion reflects the financial risk associated with the average market value capital structure of my proxy companies, which has approximately 65 percent equity.

Because market conditions are at historically high levels, I have also examined the average market value capital structure of the Value Line electric utilities over the last ten years; and, as noted above, I find that the average market value capital structure of the Value Line electric utilities contains approximately 60 percent equity.

Q. What capital structure is Gulf recommending in this proceeding for the purpose of ratemaking?

A. Gulf is recommending that a capital structure containing 40.77 percent long-term debt, 5.27 percent preferred stock, and 53.96 percent common equity be used for rate making purposes in this proceeding.

Q. How does the financial risk reflected in Gulf's recommended rate making capital structure in this proceeding compare to the financial risk reflected in the cost of equity estimates for your proxy companies?

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

Q. You discuss above that the cost of equity depends on a company's capital structure. Is there a way to adjust the 10.4 percent cost of equity for your proxy companies to reflect the higher financial risk of Gulf's rate making capital structure in this proceeding?

A. Yes. Because my proxy groups are similar in business risk to Gulf, Gulf should have the same weighted average cost of capital as my proxy companies. One may easily determine the cost of equity Gulf 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 10.4 percent average cost of equity for my proxy groups by recognizing that to attract capital, Gulf 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 would require a fair rate of return on equity equal to 11.0 percent in order to have the same weighted average cost of capital as my proxy companies.

Q. What return on common equity do you recommend for Gulf?
A. I recommend a return on common equity equal 11.0 percent for Gulf. My recommendation is conservative in that it does not reflect the higher average percentage of equity in the market value capital structure of my proxy companies in today's market environment compared to the average market value of equity in the capital structure of the Value Line electric utilities over the last ten years.

Q. Does this conclude your pre-filed direct testimony?
A. Yes, it does.

AFFIDAVIT

STATE OF NORTH CAROLINA)
)
COUNTY OF DURHAM)

Docket No. 160186-EI

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

s/ James H. Vander Weide

James H. Vander Weide, Ph.D.
President

Sworn to and subscribed before me this 3rd day of October, 2016.

Tochukwu Chime Ukpabi

Notary Public, State of North Carolina

Commission No. ____________________

My Commission Expires 10-04-2016

TOCHUKWU CHIME UKPABI
My Commission Expires
NOTARY
PUBLIC
10-04-16
DURHAM COUNTY, NC

Exhibit

LIST OF SCHEDULES AND APPENDICES

EXHIBIT JVW-1 SCHEDULE 1
SUMMARY OF DISCOUNTED CASH FLOW ANALYSIS
FOR ELECTRIC UTILITIES

LINE	COMPANY	MOST RECENT QUARTERLY DIVIDEND (d_0)	STOCK PRICE P_0	DIVIDEND	FORECAST OF FUTURE EARNINGS GROWTH	DCF MODEL RESULT
1	ALLETE	0.520	52.903	2.239	6.00%	10.5%
2	Alliant Energy	0.588	66.997	2.478	6.65%	10.5%
3	Amer. Elec. Power	0.560	61.449	2.341	4.25%	8.3%
4	Ameren Corp.	0.425	45.850	1.826	5.60%	9.8%
5	Black Hills	0.420	52.720	1.770	5.00%	8.5%
6	CenterPoint Energy	0.258	18.561	1.083	4.22%	10.4%
7	CMS Energy Corp.	0.310	38.872	1.315	7.24%	10.8%
8	Dominion Resources	0.700	70.255	2.907	6.00%	10.4%
9	DTE Energy	0.730	84.452	3.120	4.95%	8.8%
10	Duke Energy	0.825	75.440	3.478	3.29%	8.1%
11	Eversource Energy	0.445	54.240	1.863	5.98%	9.6%
12	G't Plains Energy	0.263	28.760	1.129	6.87%	11.0%
13	NextEra Energy	0.870	111.725	3.517	6.77%	10.1%
14	NorthWestern Corp.	0.500	57.324	2.103	5.00%	8.9%
15	PG&E Corp.	0.455	55.543	2.014	6.60%	10.4%
16	Pinnacle West Capital	0.625	67.987	2.616	4.13%	8.2%
17	PNM Resources	0.220	31.763	0.931	8.91%	12.0%
18	Portland General	0.300	38.184	1.320	6.16%	9.8%
19	PPL Corp.	0.380	35.216	1.624	4.16%	9.0%
20	SCANA Corp.	0.575	64.250	2.408	5.40%	9.3%
21	Sempra Energy	0.755	95.600	3.235	8.58%	12.1%
22	Southern Co.	0.543	48.465	2.318	3.48%	8.5%
23	Vectren Corp.	0.400	44.339	1.691	5.00%	9.0%
24	WEC Energy Group	0.495	55.675	2.012	6.80%	10.6%
25	Westar Energy	0.380	44.251	1.603	6.00%	9.8%
26	Xcel Energy Inc.	0.340	38.373	1.406	4.84%	8.7%
27	Average					9.7%

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 March 2016 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 March 2016 from Thomson Reuters
k	=	Cost of equity using the quarterly version of the DCF model

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

In my analysis, I also eliminate outlier results, including results that are less than one hundred basis points above forecasted bond yields for the companies' ratings or results that exceed 17.7 percent. The forecasted A-rated utility bond yield at the time of Dr. Vander Weide's studies is 6.2 percent, the forecasted BBB+-rated utility bond yield is 6.7 percent, and the forecasted yield on BBB-rated utility bonds is 7.2 percent.

EXHIBIT JVW-1 SCHEDULE 2
COMPARISON OF DCF EXPECTED RETURN ON AN INVESTMENT IN ELECTRIC UTILITY STOCKS TO THE INTEREST RATE ON MOODY'S A-RATED UTILITY BONDS

In this analysis, I compute an electric utility equity risk premium by comparing the DCF estimated cost of equity for an electric utility proxy group to the interest rate on A-rated utility bonds. For each month in my September 1999 through March 2016 study period:

DCF	=	Average DCF-estimated cost of equity on a portfolio of proxy companies;
Bond Yield	=	Yield to maturity on an investment in A-rated utility bonds; and
Risk Premium	=	DCF – Bond yield.

A more detailed description of my *ex ante* risk premium method is contained in Appendix 4.

LINE	Date	DCF	Bond Yield	Risk Premium
1	Sep-99	0.1157	0.0793	0.0364
2	Oct-99	0.1161	0.0806	0.0355
3	Nov-99	0.1192	0.0794	0.0398
4	Dec-99	0.1236	0.0814	0.0422
5	Jan-00	0.1221	0.0835	0.0386
6	Feb-00	0.1269	0.0825	0.0444
7	Mar-00	0.1313	0.0828	0.0485
8	Apr-00	0.1237	0.0829	0.0408
9	May-00	0.1227	0.0870	0.0357
10	Jun-00	0.1242	0.0836	0.0406
11	Jul-00	0.1247	0.0825	0.0422
12	Aug-00	0.1228	0.0813	0.0415
13	Sep-00	0.1164	0.0823	0.0341
14	Oct-00	0.1170	0.0814	0.0356
15	Nov-00	0.1191	0.0811	0.0380
16	Dec-00	0.1166	0.0784	0.0382
17	Jan-01	0.1194	0.0780	0.0414
18	Feb-01	0.1203	0.0774	0.0429
19	Mar-01	0.1207	0.0768	0.0439
20	Apr-01	0.1233	0.0794	0.0439
21	May-01	0.1279	0.0799	0.0480
22	Jun-01	0.1285	0.0785	0.0500
23	Jul-01	0.1295	0.0778	0.0517
24	Aug-01	0.1302	0.0759	0.0543
25	Sep-01	0.1321	0.0775	0.0546
26	Oct-01	0.1313	0.0763	0.0550
27	Nov-01	0.1296	0.0757	0.0539
28	Dec-01	0.1292	0.0783	0.0509
29	Jan-02	0.1274	0.0766	0.0508

LINE	Date	DCF	Bond Yield	Risk Premium
30	Feb-02	0.1285	0.0754	0.0531
31	Mar-02	0.1248	0.0776	0.0472
32	Apr-02	0.1227	0.0757	0.0470
33	May-02	0.1236	0.0752	0.0484
34	Jun-02	0.1254	0.0741	0.0513
35	Jul-02	0.1337	0.0731	0.0606
36	Aug-02	0.1300	0.0717	0.0583
37	Sep-02	0.1272	0.0708	0.0564
38	Oct-02	0.1291	0.0723	0.0568
39	Nov-02	0.1242	0.0714	0.0528
40	Dec-02	0.1226	0.0707	0.0519
41	Jan-03	0.1195	0.0706	0.0489
42	Feb-03	0.1233	0.0693	0.0540
43	Mar-03	0.1212	0.0679	0.0533
44	Apr-03	0.1170	0.0664	0.0506
45	May-03	0.1095	0.0636	0.0459
46	Jun-03	0.1047	0.0621	0.0426
47	Jul-03	0.1072	0.0657	0.0415
48	Aug-03	0.1064	0.0678	0.0386
49	Sep-03	0.1029	0.0656	0.0373
50	Oct-03	0.1009	0.0643	0.0366
51	Nov-03	0.0985	0.0637	0.0348
52	Dec-03	0.0946	0.0627	0.0319
53	Jan-04	0.0921	0.0615	0.0306
54	Feb-04	0.0916	0.0615	0.0301
55	Mar-04	0.0912	0.0597	0.0315
56	Apr-04	0.0925	0.0635	0.0290
57	May-04	0.0962	0.0662	0.0300
58	Jun-04	0.0961	0.0646	0.0315
59	Jul-04	0.0953	0.0627	0.0326
60	Aug-04	0.0966	0.0614	0.0352
61	Sep-04	0.0951	0.0598	0.0353
62	Oct-04	0.0953	0.0594	0.0359
63	Nov-04	0.0918	0.0597	0.0321
64	Dec-04	0.0920	0.0592	0.0328
65	Jan-05	0.0925	0.0578	0.0347
66	Feb-05	0.0917	0.0561	0.0356
67	Mar-05	0.0918	0.0583	0.0335

LINE	Date	DCF	Bond Yield	Risk Premium
68	Apr-05	0.0924	0.0564	0.0360
69	May-05	0.0910	0.0553	0.0356
70	Jun-05	0.0911	0.0540	0.0371
71	Jul-05	0.0899	0.0551	0.0348
72	Aug-05	0.0900	0.0550	0.0350
73	Sep-05	0.0923	0.0552	0.0371
74	Oct-05	0.0934	0.0579	0.0355
75	Nov-05	0.0981	0.0588	0.0393
76	Dec-05	0.0980	0.0580	0.0400
77	Jan-06	0.0980	0.0575	0.0405
78	Feb-06	0.1071	0.0582	0.0489
79	Mar-06	0.1055	0.0598	0.0457
80	Apr-06	0.1075	0.0629	0.0446
81	May-06	0.1087	0.0642	0.0445
82	Jun-06	0.1117	0.0640	0.0477
83	Jul-06	0.1110	0.0637	0.0473
84	Aug-06	0.1072	0.0620	0.0452
85	Sep-06	0.1111	0.0600	0.0511
86	Oct-06	0.1074	0.0598	0.0476
87	Nov-06	0.1078	0.0580	0.0498
88	Dec-06	0.1071	0.0581	0.0490
89	Jan-07	0.1096	0.0596	0.0500
90	Feb-07	0.1085	0.0590	0.0495
91	Mar-07	0.1094	0.0585	0.0509
92	Apr-07	0.1042	0.0597	0.0445
93	May-07	0.1068	0.0599	0.0469
94	Jun-07	0.1123	0.0630	0.0493
95	Jul-07	0.1130	0.0625	0.0505
96	Aug-07	0.1104	0.0624	0.0480
97	Sep-07	0.1078	0.0618	0.0460
98	Oct-07	0.1084	0.0611	0.0473
99	Nov-07	0.1116	0.0597	0.0519
100	Dec-07	0.1132	0.0616	0.0516
101	Jan-08	0.1193	0.0602	0.0591
102	Feb-08	0.1133	0.0621	0.0512
103	Mar-08	0.1170	0.0621	0.0549
104	Apr-08	0.1159	0.0629	0.0530
105	May-08	0.1162	0.0627	0.0535
106	Jun-08	0.1136	0.0638	0.0499
107	Jul-08	0.1172	0.0640	0.0532

LINE	Date	DCF	Bond Yield	Risk Premium
108	Aug-08	0.1191	0.0637	0.0554
109	Sep-08	0.1185	0.0649	0.0536
110	Oct-08	0.1280	0.0756	0.0524
111	Nov-08	0.1312	0.0760	0.0552
112	Dec-08	0.1301	0.0654	0.0647
113	Jan-09	0.1241	0.0639	0.0602
114	Feb-09	0.1269	0.0630	0.0639
115	Mar-09	0.1286	0.0642	0.0644
116	Apr-09	0.1266	0.0648	0.0617
117	May-09	0.1242	0.0649	0.0593
118	Jun-09	0.1220	0.0620	0.0600
119	Jul-09	0.1174	0.0597	0.0577
120	Aug-09	0.1158	0.0571	0.0587
121	Sep-09	0.1152	0.0553	0.0599
122	Oct-09	0.1153	0.0555	0.0598
123	Nov-09	0.1196	0.0564	0.0633
124	Dec-09	0.1095	0.0579	0.0516
125	Jan-10	0.1112	0.0577	0.0535
126	Feb-10	0.1091	0.0587	0.0504
127	Mar-10	0.1076	0.0584	0.0492
128	Apr-10	0.1111	0.0582	0.0529
129	May-10	0.1093	0.0552	0.0541
130	Jun-10	0.1088	0.0546	0.0541
131	Jul-10	0.1078	0.0526	0.0552
132	Aug-10	0.1057	0.0501	0.0557
133	Sep-10	0.1059	0.0501	0.0558
134	Oct-10	0.1044	0.0510	0.0534
135	Nov-10	0.1051	0.0536	0.0514
136	Dec-10	0.1053	0.0557	0.0497
137	Jan-11	0.1044	0.0557	0.0487
138	Feb-11	0.1041	0.0568	0.0473
139	Mar-11	0.1044	0.0556	0.0488
140	Apr-11	0.1020	0.0555	0.0465
141	May-11	0.0994	0.0532	0.0462
142	Jun-11	0.1043	0.0526	0.0517
143	Jul-11	0.1019	0.0527	0.0492
144	Aug-11	0.1050	0.0469	0.0581
145	Sep-11	0.1016	0.0448	0.0568
146	Oct-11	0.1032	0.0452	0.0580
147	Nov-11	0.1014	0.0425	0.0589

LINE	Date	DCF	Bond Yield	Risk Premium
148	Dec-11	0.1024	0.0435	0.0589
149	Jan-12	0.1016	0.0434	0.0582
150	Feb-12	0.0974	0.0436	0.0538
151	Mar-12	0.0971	0.0448	0.0523
152	Apr-12	0.0994	0.0440	0.0554
153	May-12	0.0981	0.0420	0.0561
154	Jun-12	0.0962	0.0408	0.0554
155	Jul-12	0.0963	0.0393	0.0570
156	Aug-12	0.0972	0.0400	0.0572
157	Sep-12	0.0968	0.0402	0.0566
158	Oct-12	0.0978	0.0391	0.0587
159	Nov-12	0.0935	0.0384	0.0551
160	Dec-12	0.0962	0.0400	0.0562
161	Jan-13	0.0968	0.0415	0.0553
162	Feb-13	0.0956	0.0418	0.0538
163	Mar-13	0.0976	0.0420	0.0556
164	Apr-13	0.0966	0.0400	0.0566
165	May-13	0.0970	0.0417	0.0553
166	Jun-13	0.0990	0.0453	0.0537
167	Jul-13	0.0978	0.0468	0.0510
168	Aug-13	0.0958	0.0473	0.0485
169	Sep-13	0.0950	0.0480	0.0470
170	Oct-13	0.0925	0.0470	0.0455
171	Nov-13	0.0931	0.0477	0.0454
172	Dec-13	0.0931	0.0481	0.0450
173	Jan-14	0.0922	0.0463	0.0459
174	Feb-14	0.0944	0.0453	0.0491
175	Mar-14	0.0983	0.0451	0.0532
176	Apr-14	0.0970	0.0441	0.0529
177	May-14	0.0983	0.0426	0.0557
178	Jun-14	0.0972	0.0429	0.0543
179	Jul-14	0.0966	0.0423	0.0543
180	Aug-14	0.0978	0.0413	0.0565
181	Sep-14	0.0962	0.0424	0.0538
182	Oct-14	0.1013	0.0406	0.0607
183	Nov-14	0.0995	0.0409	0.0586
184	Dec-14	0.0984	0.0395	0.0589
185	Jan-15	0.0972	0.0358	0.0614
186	Feb-15	0.0983	0.0367	0.0616
187	Mar-15	0.0985	0.0374	0.0611

LINE	Date	DCF	Bond Yield	Risk Premium
188	Apr-15	0.1005	0.0375	0.0630
189	May-15	0.0983	0.0417	0.0566
190	Jun-15	0.0963	0.0439	0.0524
191	Jul-15	0.0956	0.0440	0.0516
192	Aug-15	0.0966	0.0425	0.0541
193	Sep-15	0.0941	0.0439	0.0502
194	Oct-15	0.0937	0.0429	0.0508
195	Nov-15	0.0938	0.0440	0.0498
196	Dec-15	0.0941	0.0435	0.0506
197	Jan-16	0.0981	0.0427	0.0554
198	Feb-16	0.0977	0.0411	0.0566
199	Mar-16	0.0974	0.0416	0.0558

Notes: 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
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

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

EXHIBIT JVW-1 SCHEDULE 3
COMPARATIVE RETURNS ON S&P 500 STOCK INDEX
AND MOODY'S A-RATED UTILITY BONDS 1937 – 2016

LINE	YEAR	S&P 500 STOCK PRICE	STOCK DIVIDEND YIELD	STOCK RETURN	A-RATED BOND PRICE	BOND RETURN	RISK PREMIUM
1	2016	1,918.60	0.0222		$95.48		
2	2015	2,028.18	0.0208	-3.32%	$107.65	-7.59%	4.26%
3	2014	1,822.36	0.0210	13.39%	$89.89	24.20%	-10.81%
4	2013	1,481.11	0.0220	25.24%	$97.45	-3.65%	28.89%
5	2012	1,300.58	0.0214	16.02%	$94.36	7.52%	8.50%
6	2011	1,282.62	0.0185	3.25%	$77.36	27.14%	-23.89%
7	2010	1,123.58	0.0203	16.18%	$75.02	8.44%	7.74%
8	2009	865.58	0.0310	32.91%	$68.43	15.48%	17.43%
9	2008	1,378.76	0.0206	-35.16%	$72.25	0.24%	-35.40%
10	2007	1,424.16	0.0181	-1.38%	$72.91	4.59%	-5.97%
11	2006	1,278.72	0.0183	13.20%	$75.25	2.20%	11.01%
12	2005	1,181.41	0.0177	10.01%	$74.91	5.80%	4.21%
13	2004	1,132.52	0.0162	5.94%	$70.87	11.34%	-5.40%
14	2003	895.84	0.0180	28.22%	$62.26	20.27%	7.95%
15	2002	1,140.21	0.0138	-20.05%	$57.44	15.35%	-35.40%
16	2001	1,335.63	0.0116	-13.47%	$56.40	8.93%	-22.40%
17	2000	1,425.59	0.0118	-5.13%	$52.60	14.82%	-19.95%
18	1999	1,248.77	0.0130	15.46%	$63.03	-10.20%	25.66%
19	1998	963.35	0.0162	31.25%	$62.43	7.38%	23.87%
20	1997	766.22	0.0195	27.68%	$56.62	17.32%	10.36%
21	1996	614.42	0.0231	27.02%	$60.91	-0.48%	27.49%
22	1995	465.25	0.0287	34.93%	$50.22	29.26%	5.68%
23	1994	472.99	0.0269	1.05%	$60.01	-9.65%	10.71%
24	1993	435.23	0.0288	11.56%	$53.13	20.48%	-8.93%
25	1992	416.08	0.0290	7.50%	$49.56	15.27%	-7.77%
26	1991	325.49	0.0382	31.65%	$44.84	19.44%	12.21%
27	1990	339.97	0.0341	-0.85%	$45.60	7.11%	-7.96%
28	1989	285.41	0.0364	22.76%	$43.06	15.18%	7.58%
29	1988	250.48	0.0366	17.61%	$40.10	17.36%	0.25%
30	1987	264.51	0.0317	-2.13%	$48.92	-9.84%	7.71%
31	1986	208.19	0.0390	30.95%	$39.98	32.36%	-1.41%
32	1985	171.61	0.0451	25.83%	$32.57	35.05%	-9.22%
33	1984	166.39	0.0427	7.41%	$31.49	16.12%	-8.72%
34	1983	144.27	0.0479	20.12%	$29.41	20.65%	-0.53%
35	1982	117.28	0.0595	28.96%	$24.48	36.48%	-7.51%
36	1981	132.97	0.0480	-7.00%	$29.37	-3.01%	-3.99%

LINE	YEAR	S&P 500 STOCK PRICE	STOCK DIVIDEND YIELD	STOCK RETURN	A-RATED BOND PRICE	BOND RETURN	RISK PREMIUM
37	1980	110.87	0.0541	25.34%	$34.69	-3.81%	29.16%
38	1979	99.71	0.0533	16.52%	$43.91	-11.89%	28.41%
39	1978	90.25	0.0532	15.80%	$49.09	-2.40%	18.20%
40	1977	103.80	0.0399	-9.06%	$50.95	4.20%	-13.27%
41	1976	96.86	0.0380	10.96%	$43.91	25.13%	-14.17%
42	1975	72.56	0.0507	38.56%	$41.76	14.75%	23.81%
43	1974	96.11	0.0364	-20.86%	$52.54	-12.91%	-7.96%
44	1973	118.40	0.0269	-16.14%	$58.51	-3.37%	-12.77%
45	1972	103.30	0.0296	17.58%	$56.47	10.69%	6.89%
46	1971	93.49	0.0332	13.81%	$53.93	12.13%	1.69%
47	1970	90.31	0.0356	7.08%	$50.46	14.81%	-7.73%
48	1969	102.00	0.0306	-8.40%	$62.43	-12.76%	4.36%
49	1968	95.04	0.0313	10.45%	$66.97	-0.81%	11.26%
50	1967	84.45	0.0351	16.05%	$78.69	-9.81%	25.86%
51	1966	93.32	0.0302	-6.48%	$86.57	-4.48%	-2.00%
52	1965	86.12	0.0299	11.35%	$91.40	-0.91%	12.26%
53	1964	76.45	0.0305	15.70%	$92.01	3.68%	12.02%
54	1963	65.06	0.0331	20.82%	$93.56	2.61%	18.20%
55	1962	69.07	0.0297	-2.84%	$89.60	8.89%	-11.73%
56	1961	59.72	0.0328	18.94%	$89.74	4.29%	14.64%
57	1960	58.03	0.0327	6.18%	$84.36	11.13%	-4.95%
58	1959	55.62	0.0324	7.57%	$91.55	-3.49%	11.06%
59	1958	41.12	0.0448	39.74%	$101.22	-5.60%	45.35%
60	1957	45.43	0.0431	-5.18%	$100.70	4.49%	-9.67%
61	1956	44.15	0.0424	7.14%	$113.00	-7.35%	14.49%
62	1955	35.60	0.0438	28.40%	$116.77	0.20%	28.20%
63	1954	25.46	0.0569	45.52%	$112.79	7.07%	38.45%
64	1953	26.18	0.0545	2.70%	$114.24	2.24%	0.46%
65	1952	24.19	0.0582	14.05%	$113.41	4.26%	9.79%
66	1951	21.21	0.0634	20.39%	$123.44	-4.89%	25.28%
67	1950	16.88	0.0665	32.30%	$125.08	1.89%	30.41%
68	1949	15.36	0.0620	16.10%	$119.82	7.72%	8.37%
69	1948	14.83	0.0571	9.28%	$118.50	4.49%	4.79%
70	1947	15.21	0.0449	1.99%	$126.02	-2.79%	4.79%
71	1946	18.02	0.0356	-12.03%	$126.74	2.59%	-14.63%
72	1945	13.49	0.0460	38.18%	$119.82	9.11%	29.07%
73	1944	11.85	0.0495	18.79%	$119.82	3.34%	15.45%
74	1943	10.09	0.0554	22.98%	$118.50	4.49%	18.49%
75	1942	8.93	0.0788	20.87%	$117.63	4.14%	16.73%
76	1941	10.55	0.0638	-8.98%	$116.34	4.55%	-13.52%
77	1940	12.30	0.0458	-9.65%	$112.39	7.08%	-16.73%

LINE	YEAR	S&P 500 STOCK PRICE	STOCK DIVIDEND YIELD	STOCK RETURN	A-RATED BOND PRICE	BOND RETURN	RISK PREMIUM
78	1939	12.50	0.0349	1.89%	$105.75	10.05%	-8.16%
79	1938	11.31	0.0784	18.36%	$99.83	9.94%	8.42%
80	1937	17.59	0.0434	-31.36%	$103.18	0.63%	-31.99%
81	Average			11.1%		6.6%	4.5%

Note: See Appendix 5 for an explanation of how stock and bond returns are derived and the source of the data presented.

EXHIBIT JVW-1 SCHEDULE 4
COMPARATIVE RETURNS ON S&P UTILITY STOCK INDEX
AND MOODY'S A-RATED UTILITY BONDS 1937 – 2016

LINE	YEAR	S&P UTILITY STOCK PRICE	STOCK DIVIDEND YIELD	STOCK RETURN	A-RATED BOND PRICE	BOND RETURN	RISK PREMIUM
1	2016				$95.48		
2	2015			-3.90%	$107.65	-7.59%	3.69%
3	2014			28.91%	$89.89	24.20%	4.71%
4	2013			13.01%	$97.45	-3.65%	16.66%
5	2012			2.09%	$94.36	7.52%	-5.43%
6	2011			19.99%	$77.36	27.14%	-7.15%
7	2010			7.04%	$75.02	8.44%	-1.40%
8	2009			10.71%	$68.43	15.48%	-4.77%
9	2008			-25.90%	$72.25	0.24%	-26.14%
10	2007			16.56%	$72.91	4.59%	11.96%
11	2006			20.76%	$75.25	2.20%	18.56%
12	2005			16.05%	$74.91	5.80%	10.25%
13	2004			22.84%	$70.87	11.34%	11.50%
14	2003			23.48%	$62.26	20.27%	3.21%
15	2002			-14.73%	$57.44	15.35%	-30.08%
16	2001	307.70	0.0287	-17.90%	$56.40	8.93%	-26.83%
17	2000	239.17	0.0413	32.78%	$52.60	14.82%	17.96%
18	1999	253.52	0.0394	-1.72%	$63.03	-10.20%	8.48%
19	1998	228.61	0.0457	15.47%	$62.43	7.38%	8.09%
20	1997	201.14	0.0492	18.58%	$56.62	17.32%	1.26%
21	1996	202.57	0.0454	3.83%	$60.91	-0.48%	4.31%
22	1995	153.87	0.0584	37.49%	$50.22	29.26%	8.23%
23	1994	168.70	0.0496	-3.83%	$60.01	-9.65%	5.82%
24	1993	159.79	0.0537	10.95%	$53.13	20.48%	-9.54%
25	1992	149.70	0.0572	12.46%	$49.56	15.27%	-2.81%
26	1991	138.38	0.0607	14.25%	$44.84	19.44%	-5.19%
27	1990	146.04	0.0558	0.33%	$45.60	7.11%	-6.78%
28	1989	114.37	0.0699	34.68%	$43.06	15.18%	19.51%
29	1988	106.13	0.0704	14.80%	$40.10	17.36%	-2.55%
30	1987	120.09	0.0588	-5.74%	$48.92	-9.84%	4.10%
31	1986	92.06	0.0742	37.87%	$39.98	32.36%	5.51%
32	1985	75.83	0.0860	30.00%	$32.57	35.05%	-5.04%
33	1984	68.50	0.0925	19.95%	$31.49	16.12%	3.83%
34	1983	61.89	0.0948	20.16%	$29.41	20.65%	-0.49%
35	1982	51.81	0.1074	30.20%	$24.48	36.48%	-6.28%
36	1981	52.01	0.0978	9.40%	$29.37	-3.01%	12.41%
37	1980	50.26	0.0953	13.01%	$34.69	-3.81%	16.83%
38	1979	50.33	0.0893	8.79%	$43.91	-11.89%	20.68%

LINE	YEAR	S&P UTILITY STOCK PRICE	STOCK DIVIDEND YIELD	STOCK RETURN	A-RATED BOND PRICE	BOND RETURN	RISK PREMIUM
39	1978	52.40	0.0791	3.96%	$49.09	-2.40%	6.36%
40	1977	54.01	0.0714	4.16%	$50.95	4.20%	-0.04%
41	1976	46.99	0.0776	22.70%	$43.91	25.13%	-2.43%
42	1975	38.19	0.0920	32.24%	$41.76	14.75%	17.49%
43	1974	48.60	0.0713	-14.29%	$52.54	-12.91%	-1.38%
44	1973	60.01	0.0556	-13.45%	$58.51	-3.37%	-10.08%
45	1972	60.19	0.0542	5.12%	$56.47	10.69%	-5.57%
46	1971	63.43	0.0504	-0.07%	$53.93	12.13%	-12.19%
47	1970	55.72	0.0561	19.45%	$50.46	14.81%	4.64%
48	1969	68.65	0.0445	-14.38%	$62.43	-12.76%	-1.62%
49	1968	68.02	0.0435	5.28%	$66.97	-0.81%	6.08%
50	1967	70.63	0.0392	0.22%	$78.69	-9.81%	10.03%
51	1966	74.50	0.0347	-1.72%	$86.57	-4.48%	2.76%
52	1965	75.87	0.0315	1.34%	$91.40	-0.91%	2.25%
53	1964	67.26	0.0331	16.11%	$92.01	3.68%	12.43%
54	1963	63.35	0.0330	9.47%	$93.56	2.61%	6.86%
55	1962	62.69	0.0320	4.25%	$89.60	8.89%	-4.64%
56	1961	52.73	0.0358	22.47%	$89.74	4.29%	18.18%
57	1960	44.50	0.0403	22.52%	$84.36	11.13%	11.39%
58	1959	43.96	0.0377	5.00%	$91.55	-3.49%	8.49%
59	1958	33.30	0.0487	36.88%	$101.22	-5.60%	42.48%
60	1957	32.32	0.0487	7.90%	$100.70	4.49%	3.41%
61	1956	31.55	0.0472	7.16%	$113.00	-7.35%	14.51%
62	1955	29.89	0.0461	10.16%	$116.77	0.20%	9.97%
63	1954	25.51	0.0520	22.37%	$112.79	7.07%	15.30%
64	1953	24.41	0.0511	9.62%	$114.24	2.24%	7.38%
65	1952	22.22	0.0550	15.36%	$113.41	4.26%	11.10%
66	1951	20.01	0.0606	17.10%	$123.44	-4.89%	21.99%
67	1950	20.20	0.0554	4.60%	$125.08	1.89%	2.71%
68	1949	16.54	0.0570	27.83%	$119.82	7.72%	20.10%
69	1948	16.53	0.0535	5.41%	$118.50	4.49%	0.92%
70	1947	19.21	0.0354	-10.41%	$126.02	-2.79%	-7.62%
71	1946	21.34	0.0298	-7.00%	$126.74	2.59%	-9.59%
72	1945	13.91	0.0448	57.89%	$119.82	9.11%	48.79%
73	1944	12.10	0.0569	20.65%	$119.82	3.34%	17.31%
74	1943	9.22	0.0621	37.45%	$118.50	4.49%	32.96%
75	1942	8.54	0.0940	17.36%	$117.63	4.14%	13.22%
76	1941	13.25	0.0717	-28.38%	$116.34	4.55%	-32.92%
77	1940	16.97	0.0540	-16.52%	$112.39	7.08%	-23.60%
78	1939	16.05	0.0553	11.26%	$105.75	10.05%	1.21%
79	1938	14.30	0.0730	19.54%	$99.83	9.94%	9.59%

LINE	YEAR	S&P UTILITY STOCK PRICE	STOCK DIVIDEND YIELD	STOCK RETURN	A-RATED BOND PRICE	BOND RETURN	RISK PREMIUM
80	1937	24.34	0.0432	-36.93%	$103.18	0.63%	-37.55%
81	Average			10.5%		6.6%	3.9%

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

EXHIBIT JVW-1 SCHEDULE 5
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:

END OF YEAR 1	*WEALTH AFTER ONE YEAR*	*PROBABILITY*
	$1.30	0.5
	$0.90	0.5

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

END OF YEAR 2	*WEALTH AFTER TWO YEARS*		*VALUE*	*PROBABILITY*	*WEALTH X PROBABILITY*
	(1.30) (1.30)	=	$ 1.69	0.25	$ 0.4225
	(1.30) (.9)	=	$ 1.17	0.25	$ 0.2925
	(.9) (1.30)	=	$ 1.17	0.25	$ 0.2925
	(.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.

EXHIBIT JVW-1 SCHEDULE-6
CALCULATION OF CAPITAL ASSET PRICING MODEL COST OF EQUITY
USING AN HISTORICAL 6.9 PERCENT RISK PREMIUM

Line		Value	Description
1	Risk-free Rate	4.2%	Long-term Treasury bond yield forecast
2	Beta	0.75	Average Beta Electric Utilities
3	Risk Premium	6.9%	Long-horizon SBBI risk premium
4	Beta x Risk Premium	5.2%	
5	Flotation	0.20%	
6	Model Result	9.6%	

Historical Ibbotson® SBBI® risk premium including years 1926 through year end 2015 from 2016 Valuation Handbook. Value Line beta for comparable companies from Value Line Investment Analyzer. Treasury bond yield forecast from data in Value Line Selection & Opinion, March 4, 2016, and Energy Information Administration, March 2016, determined as follows. Value Line forecasts a yield on 10-year Treasury notes equal to 3.5 percent. The spread between the average March 2016 yield on 10-year Treasury notes (1.89 percent) and 20-year Treasury bonds (2.28 percent) is 39 basis points. Adding 39 basis points to Value Line's 3.5 percent forecasted yield on 10-year Treasury notes produces a forecasted yield of 3.89 percent for 20-year Treasury bonds (see Value Line Investment Survey, Selection & Opinion, March 4, 2016). EIA forecasts a yield of 4.11 percent on 10-year Treasury notes. Adding the 39 basis point spread between 10-year Treasury notes and 20-year Treasury bonds to the EIA forecast of 4.11 percent for 10-year Treasury notes produces an EIA forecast for 20-year Treasury bonds equal to 4.5 percent. The average of the forecasts is 4.2 percent (3.89 percent using Value Line data and 4.5 percent using EIA data).

PROXY COMPANY BETAS

	COMPANY	VALUE LINE BETA
1	ALLETE	0.80
2	Alliant Energy	0.80
3	Amer. Elec. Power	0.70
4	Ameren Corp.	0.75
5	Black Hills	0.90
6	CenterPoint Energy	0.85
7	CMS Energy Corp.	0.75
8	Dominion Resources	0.70
9	DTE Energy	0.75
10	Duke Energy	0.65
11	Eversource Energy	0.75
12	G't Plains Energy	0.80
13	NextEra Energy	0.70
14	NorthWestern Corp.	0.70
15	PG&E Corp.	0.70
16	Pinnacle West Capital	0.75
17	PNM Resources	0.80
18	Portland General	0.80
19	PPL Corp.	0.70
20	SCANA Corp.	0.75
21	Sempra Energy	0.85
22	Southern Co.	0.60
23	Vectren Corp.	0.80
24	WEC Energy Group	0.70
25	Westar Energy	0.75
26	Xcel Energy Inc.	0.65
27	Average	0.75

Data from Value Line Investment Analyzer.

EXHIBIT JVW-1 SCHEDULE-7
COMPARISON OF RISK PREMIUMS ON
S&P500 AND S&P UTILITIES 1937 – 2016

YEAR	S&P UTILITIES STOCK RETURN	SP500 STOCK RETURN	10-YR. TREASURY BOND YIELD	UTILITIES RISK PREMIUM	MARKET RISK PREMIUM
2015	-0.0390	-0.0332	0.0214	-0.0604	-0.0546
2014	0.2891	0.1339	0.0254	0.2637	0.1085
2013	0.1301	0.2524	0.0235	0.1066	0.2289
2012	0.0209	0.1602	0.0180	0.0029	0.1422
2011	0.1999	0.0325	0.0278	0.1721	0.0047
2010	0.0704	0.1618	0.0322	0.0382	0.1296
2009	0.1071	0.3291	0.0326	0.0745	0.2965
2008	-0.2590	-0.3516	0.0367	-0.2957	-0.3883
2007	0.1656	-0.0138	0.0463	0.1193	-0.0601
2006	0.2076	0.1320	0.0479	0.1597	0.0841
2005	0.1605	0.1001	0.0429	0.1176	0.0572
2004	0.2284	0.0594	0.0427	0.1857	0.0167
2003	0.2348	0.2822	0.0401	0.1947	0.2421
2002	-0.1473	-0.2005	0.0461	-0.1934	-0.2466
2001	-0.1790	-0.1347	0.0502	-0.2292	-0.1849
2000	0.3278	-0.0513	0.0603	0.2675	-0.1116
1999	-0.0172	0.1546	0.0564	-0.0736	0.0982
1998	0.1547	0.3125	0.0526	0.1021	0.2599
1997	0.1858	0.2768	0.0635	0.1223	0.2133
1996	0.0383	0.2702	0.0644	-0.0261	0.2058
1995	0.3749	0.3493	0.0658	0.3091	0.2835
1994	-0.0383	0.0105	0.0708	-0.1091	-0.0603
1993	0.1095	0.1156	0.0587	0.0508	0.0569
1992	0.1246	0.0750	0.0701	0.0545	0.0049
1991	0.1425	0.3165	0.0786	0.0639	0.2379
1990	0.0033	-0.0085	0.0855	-0.0822	-0.0940
1989	0.3468	0.2276	0.0850	0.2618	0.1426
1988	0.1480	0.1761	0.0884	0.0596	0.0877
1987	-0.0574	-0.0213	0.0838	-0.1412	-0.1051
1986	0.3787	0.3095	0.0768	0.3019	0.2327
1985	0.3000	0.2583	0.1062	0.1938	0.1521
1984	0.1995	0.0741	0.1244	0.0751	-0.0503

YEAR	S&P UTILITIES STOCK RETURN	SP500 STOCK RETURN	10-YR. TREASURY BOND YIELD	UTILITIES RISK PREMIUM	MARKET RISK PREMIUM
1983	0.2016	0.2012	0.1110	0.0906	0.0902
1982	0.3020	0.2896	0.1300	0.1720	0.1596
1981	0.0940	-0.0700	0.1391	-0.0451	-0.2091
1980	0.1301	0.2534	0.1146	0.0155	0.1388
1979	0.0879	0.1652	0.0944	-0.0065	0.0708
1978	0.0396	0.1580	0.0841	-0.0445	0.0739
1977	0.0416	-0.0906	0.0742	-0.0326	-0.1648
1976	0.2270	0.1096	0.0761	0.1509	0.0335
1975	0.3224	0.3856	0.0799	0.2425	0.3057
1974	-0.1429	-0.2086	0.0756	-0.2185	-0.2842
1973	-0.1345	-0.1614	0.0684	-0.2029	-0.2298
1972	0.0512	0.1758	0.0621	-0.0109	0.1137
1971	-0.0007	0.1381	0.0616	-0.0623	0.0765
1970	0.1945	0.0708	0.0735	0.1210	-0.0027
1969	-0.1438	-0.0840	0.0667	-0.2105	-0.1507
1968	0.0528	0.1045	0.0565	-0.0037	0.0480
1967	0.0022	0.1605	0.0507	-0.0485	0.1098
1966	-0.0172	-0.0648	0.0492	-0.0664	-0.1140
1965	0.0134	0.1135	0.0428	-0.0294	0.0707
1964	0.1611	0.1570	0.0419	0.1192	0.1151
1963	0.0947	0.2082	0.0400	0.0547	0.1682
1962	0.0425	-0.0284	0.0395	0.0030	-0.0679
1961	0.2247	0.1894	0.0388	0.1859	0.1506
1960	0.2252	0.0618	0.0412	0.1840	0.0206
1959	0.0500	0.0757	0.0433	0.0067	0.0324
1958	0.3688	0.3974	0.0332	0.3356	0.3642
1957	0.0790	-0.0518	0.0365	0.0425	-0.0883
1956	0.0716	0.0714	0.0318	0.0398	0.0396
1955	0.1016	0.2840	0.0282	0.0734	0.2558
1954	0.2237	0.4552	0.0240	0.1997	0.4312
1953	0.0962	0.0270	0.0281	0.0681	-0.0011
1952	0.1536	0.1405	0.0248	0.1288	0.1157
1951	0.1710	0.2039	0.0241	0.1469	0.1798
1950	0.0460	0.3230	0.0205	0.0255	0.3025
1949	0.2783	0.1610	0.0193	0.2590	0.1417
1948	0.0541	0.0928	0.0215	0.0326	0.0713
1947	-0.1041	0.0199	0.0185	-0.1226	0.0014
1946	-0.0700	-0.1203	0.0174	-0.0874	-0.1377

YEAR	S&P UTILITIES STOCK RETURN	SP500 STOCK RETURN	10-YR. TREASURY BOND YIELD	UTILITIES RISK PREMIUM	MARKET RISK PREMIUM
1945	0.5789	0.3818	0.0173	0.5616	0.3645
1944	0.2065	0.1879	0.0209	0.1856	0.1670
1943	0.3745	0.2298	0.0207	0.3538	0.2091
1942	0.1736	0.2087	0.0211	0.1525	0.1876
1941	-0.2838	-0.0898	0.0199	-0.3037	-0.1097
1940	-0.1652	-0.0965	0.0220	-0.1872	-0.1185
1939	0.1126	0.0189	0.0235	0.0891	-0.0046
1938	0.1954	0.1836	0.0255	0.1699	0.1581
1937	-0.3693	-0.3136	0.0269	-0.3962	-0.3405
Risk Premium 1937 to 2016				0.0534	0.0592
RP Utilities/RP SP500				0.90	

EXHIBIT JVW-1 SCHEDULE-8
CALCULATION OF CAPITAL ASSET PRICING MODEL COST OF EQUITY
USING AN HISTORICAL 6.9 PERCENT RISK PREMIUM AND A 0.90 UTILITY BETA

LINE			
1	Risk-free Rate	4.2%	Long-term Treasury bond yield forecast
2	Beta	0.90	Utility Beta (see Schedule 7)
3	Risk Premium	6.9%	Long-horizon historical risk premium
4	Beta x Risk Premium	6.2%	
5	Flotation	0.2%	
6	Model Result	10.6%	

Historical Ibbotson® SBBI® risk premium including years 1926 through year end 2015 from 2016 Valuation Handbook. Value Line beta for comparable companies from Value Line Investment Analyzer. Treasury bond yield forecast from data in Value Line Selection & Opinion, March 4, 2016, and Energy Information Administration, March 2016, determined as follows. Value Line forecasts a yield on 10-year Treasury notes equal to 3.5 percent. The spread between the average March 2016 yield on 10-year Treasury notes (1.89 percent) and 20-year Treasury bonds (2.28 percent) is 39 basis points. Adding 39 basis points to Value Line's 3.5 percent forecasted yield on 10-year Treasury notes produces a forecasted yield of 3.89 percent for 20-year Treasury bonds (see Value Line Investment Survey, Selection & Opinion, March 4, 2016). EIA forecasts a yield of 4.11 percent on 10-year Treasury notes. Adding the 39 basis point spread between 10-year Treasury notes and 20-year Treasury bonds to the EIA forecast of 4.11 percent for 10-year Treasury notes produces an EIA forecast for 20-year Treasury bonds equal to 4.5 percent. The average of the forecasts is 4.2 percent (3.89 percent using Value Line data and 4.5 percent using EIA data).

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EXHIBIT JVW-1 SCHEDULE 9
CALCULATION OF CAPITAL ASSET PRICING MODEL COST OF EQUITY USING DCF ESTIMATE OF THE EXPECTED RATE OF RETURN ON THE MARKET PORTFOLIO

LINE		VALUE	DESCRIPTION
1	Risk-free Rate	4.2%	Long-term Treasury bond yield forecast
2	Beta	0.75	Average Value Line Beta Electric Utilities
3	DCF S&P 500	11.9%	DCF Cost of Equity S&P 500 (see following)
4	Risk Premium	7.7%	
5	Beta * Risk Premium	5.8%	
6	Flotation	0.20%	
7	Model Result	10.2%	

LINE		VALUE	DESCRIPTION
1	Risk-free Rate	4.2%	Long-term Treasury bond yield forecast
2	Beta	0.90	Utility Beta
3	DCF S&P 500	11.9%	DCF Cost of Equity S&P 500 (see following)
4	Risk Premium	7.7%	
5	Beta * Risk Premium	7.0%	
6	Flotation	0.20%	
7	Model Result	11.4%	

Value Line beta for comparable companies from Value Line Investment Analyzer; historical beta per Schedule 7.
Historical Ibbotson® SBBI® risk premium including years 1926 through year end 2015 from 2016 Valuation Handbook.
Value Line beta for comparable companies from Value Line Investment Analyzer. Treasury bond yield forecast from data in Value Line Selection & Opinion, March 4, 2016, and Energy Information Administration, March 2016, determined as follows. Value Line forecasts a yield on 10-year Treasury notes equal to 3.5 percent. The spread between the average March 2016 yield on 10-year Treasury notes (1.89 percent) and 20-year Treasury bonds (2.28 percent) is 39 basis points. Adding 39 basis points to Value Line's 3.5 percent forecasted yield on 10-year Treasury notes produces a forecasted yield of 3.89 percent for 20-year Treasury bonds (see Value Line Investment Survey, Selection & Opinion, March 4, 2016). EIA forecasts a yield of 4.11 percent on 10-year Treasury notes. Adding the 39 basis point spread between 10-year Treasury notes and 20-year Treasury bonds to the EIA forecast of 4.11 percent for 10-year Treasury notes produces an EIA forecast for 20-year Treasury bonds equal to 4.5 percent. The average of the forecasts is 4.2 percent (3.89 percent using Value Line data and 4.5 percent using EIA data).

EXHIBIT JVW-1 SCHEDULE 9 (CONTINUED)
SUMMARY OF DISCOUNTED CASH FLOW ANALYSIS
FOR S&P 500 COMPANIES

	COMPANY	STOCK PRICE (P_0)	D_0	FORECAST OF FUTURE EARNINGS GROWTH	MODEL RESULT	MARKET CAP$ (MILS)
1	3M	152.72	4.44	8.09%	11.3%	99,220
2	ABBOTT LABORATORIES	39.34	1.04	9.48%	12.4%	59,357
3	ACCENTURE CLASS A	103.08	2.20	9.86%	12.2%	67,719
4	ADT	34.57	0.88	7.14%	9.9%	6,816
5	ADV.AUTO PARTS	149.21	0.24	12.48%	12.7%	11,581
6	AETNA	106.01	1.00	9.10%	10.1%	38,648
7	AGILENT TECHS.	37.96	0.46	11.12%	12.5%	12,878
8	AIR PRDS.& CHEMS.	130.83	3.44	9.77%	12.7%	30,398
9	AIRGAS	140.38	2.40	7.90%	9.8%	10,249
10	ALLEGION	61.03	0.48	12.87%	13.8%	6,186
11	ALLSTATE	62.02	1.32	7.51%	9.8%	25,422
12	ALTRIA GROUP	60.36	2.26	8.40%	12.5%	122,038
13	AMERICAN EXPRESS	57.32	1.16	8.07%	10.3%	57,577
14	AMERICAN WATER WORKS	65.10	1.36	7.60%	9.9%	12,455
15	AMETEK	47.53	0.36	9.83%	10.7%	11,695
16	AMGEN	148.18	4.00	8.04%	11.0%	108,399
17	ANTHEM	132.14	2.60	9.70%	11.9%	36,681
18	AON CLASS A	93.01	1.20	9.03%	10.4%	27,548
19	APPLE	99.59	2.08	11.60%	13.9%	586,617
20	AT&T	36.59	1.92	5.10%	10.7%	240,635
21	AUTOMATIC DATA PROC.	83.33	2.12	10.40%	13.2%	40,640
22	AVERY DENNISON	63.92	1.48	10.09%	12.7%	6,235
23	BANK OF NEW YORK MELLON	36.21	0.68	11.70%	13.8%	40,221
24	BAXTER INTL.	38.06	0.46	11.20%	12.6%	21,853
25	BLACKROCK	314.33	9.16	9.77%	13.0%	56,058
26	BORGWARNER	34.12	0.52	8.29%	9.9%	8,207
27	C R BARD	188.28	0.96	9.80%	10.4%	14,182
28	CF INDUSTRIES HDG.	33.16	1.20	5.77%	9.6%	8,170
29	CH ROBINSON WWD.	67.62	1.72	7.97%	10.7%	10,788
30	CHURCH & DWIGHT CO.	86.48	1.42	8.58%	10.4%	11,799
31	CIGNA	137.66	0.04	10.54%	10.6%	35,312
32	CINTAS	85.44	1.05	12.54%	13.9%	9,637
33	CISCO SYSTEMS	25.57	1.04	8.24%	12.7%	141,855
34	CMS ENERGY	38.87	1.24	7.24%	10.7%	11,603
35	COACH	36.37	1.35	8.78%	12.9%	11,030
36	COSTCO WHOLESALE	151.59	1.60	8.72%	9.9%	67,541
37	DANAHER	88.39	0.64	11.20%	12.0%	64,371
38	DISCOVER FINANCIAL SVS.	47.65	1.12	7.32%	9.9%	20,511
39	DOMINION RESOURCES	70.26	2.80	6.00%	10.3%	44,486
40	DOVER	59.32	1.68	9.85%	13.0%	10,174
41	DOW CHEMICAL	47.06	1.84	7.82%	12.1%	57,662

	COMPANY	STOCK PRICE (P_0)	D_0	FORECAST OF FUTURE EARNINGS GROWTH	MODEL RESULT	MARKET CAP$ (MILS)
42	DR PEPPER SNAPPLE GROUP	91.16	2.12	8.00%	10.5%	17,197
43	EATON	54.35	2.28	7.71%	12.3%	28,907
44	ECOLAB	106.44	1.40	12.44%	13.9%	31,921
45	EMC	25.43	0.46	9.88%	11.9%	51,654
46	EMERSON ELECTRIC	48.02	1.90	5.50%	9.7%	35,204
47	ESTEE LAUDER COS.'A'	88.73	1.20	11.33%	12.8%	20,849
48	EXPEDITOR INTL.OF WASH.	45.32	0.72	7.95%	9.7%	8,900
49	FASTENAL	42.42	1.20	10.74%	13.9%	14,120
50	FLUOR	46.34	0.84	8.12%	10.1%	7,611
51	FMC	37.18	0.66	9.13%	11.1%	5,525
52	GARMIN	37.29	2.04	6.57%	12.5%	8,238
53	GENERAL DYNAMICS	131.56	3.04	9.57%	12.1%	41,129
54	GENERAL ELECTRIC	29.40	0.92	8.16%	11.6%	287,468
55	HANESBRANDS	28.44	0.44	11.93%	13.7%	11,350
56	HERSHEY	89.03	2.33	7.21%	10.0%	14,299
57	ILLINOIS TOOL WORKS	92.28	2.20	8.25%	10.9%	36,331
58	INGERSOLL-RAND	54.34	1.28	7.35%	9.9%	15,668
59	INTEL	30.75	1.04	10.00%	13.8%	151,073
60	INTERNATIONAL BUS.MCHS.	131.97	5.20	7.25%	11.5%	141,288
61	INVESCO	29.00	1.08	7.37%	11.4%	12,849
62	J M SMUCKER	125.61	2.68	10.10%	12.5%	15,548
63	JP MORGAN CHASE & CO.	58.10	1.76	7.50%	10.8%	215,628
64	JUNIPER NETWORKS	24.55	0.40	11.74%	13.6%	10,074
65	KANSAS CITY SOUTHERN	76.99	1.32	8.50%	10.4%	9,477
66	KEYCORP	11.22	0.30	10.01%	13.0%	9,300
67	KOHL'S	47.02	2.00	6.50%	11.1%	8,934
68	KROGER	38.69	0.42	10.00%	11.2%	37,127
69	L BRANDS	89.36	2.40	9.15%	12.1%	24,910
70	LAM RESEARCH	73.16	1.20	10.26%	12.1%	12,594
71	LOCKHEED MARTIN	213.34	6.60	8.23%	11.6%	66,822
72	LYONDELLBASELL INDS.CL.A	80.05	3.12	6.23%	10.4%	38,138
73	M&T BANK	108.08	2.80	10.00%	12.9%	17,674
74	MARSH & MCLENNAN	55.53	1.24	11.25%	13.8%	31,195
75	MCDONALDS	119.53	3.56	9.50%	12.8%	111,042
76	MCGRAW HILL FINANCIAL	89.30	1.44	11.73%	13.5%	25,473
77	MCKESSON	162.42	1.12	9.49%	10.2%	34,674
78	MEAD JOHNSON NUTRITION	74.00	1.65	7.62%	10.0%	15,300
79	METLIFE	42.24	1.50	8.50%	12.4%	48,341
80	MICROSOFT	52.33	1.44	9.23%	12.3%	432,322
81	MONDELEZ INTERNATIONAL CL.A	40.79	0.68	9.10%	10.9%	63,500
82	MONSANTO	90.70	2.16	8.91%	11.5%	40,918
83	NASDAQ	61.88	1.28	8.88%	11.1%	10,792
84	NETAPP	24.29	0.72	8.66%	11.9%	7,707
85	NEWELL RUBBERMAID	39.09	0.76	8.80%	10.9%	11,428
86	NEXTERA ENERGY	111.73	3.48	6.75%	10.1%	54,503

	COMPANY	STOCK PRICE (P_0)	D_0	FORECAST OF FUTURE EARNINGS GROWTH	MODEL RESULT	MARKET CAP$ (MILS)
87	NIELSEN	48.24	1.12	10.53%	13.1%	19,122
88	NIKE 'B'	59.95	0.64	12.62%	13.8%	85,286
89	NORFOLK SOUTHERN	75.30	2.36	9.23%	12.7%	24,691
90	NORTHERN TRUST	62.17	1.44	9.77%	12.3%	14,904
91	PAYCHEX	50.37	1.68	9.60%	13.3%	19,529
92	PERKINELMER	47.47	0.28	9.11%	9.8%	5,235
93	PERRIGO	137.63	0.58	12.80%	13.3%	18,790
94	PFIZER	30.06	1.20	5.63%	9.9%	181,670
95	PHILIP MORRIS INTL.	90.89	4.08	6.92%	11.8%	153,418
96	PPG INDUSTRIES	97.58	1.44	10.54%	12.2%	29,183
97	PRAXAIR	103.44	3.00	6.68%	9.8%	32,269
98	PROCTER & GAMBLE	80.57	2.65	6.13%	9.7%	223,803
99	PROGRESSIVE OHIO	31.76	0.89	6.66%	9.7%	20,090
100	PRUDENTIAL FINL.	69.19	2.80	7.52%	11.9%	32,592
101	QUEST DIAGNOSTICS	66.95	1.60	10.02%	12.7%	9,862
102	RAYTHEON 'B'	122.97	2.93	8.63%	11.2%	36,654
103	REGIONS FINL.NEW	7.98	0.24	7.73%	11.0%	10,370
104	ROCKWELL COLLINS	86.54	1.32	8.99%	10.7%	11,990
105	ROSS STORES	55.18	0.54	11.30%	12.4%	23,487
106	SCRIPPS NETWORKS INTACT. 'A'	59.16	1.00	10.77%	12.7%	6,205
107	SEAGATE TECH.	32.36	2.52	4.10%	12.4%	10,354
108	SEALED AIR	43.53	0.64	8.87%	10.5%	9,261
109	SEMPRA EN.	95.60	3.02	8.58%	12.1%	25,688
110	ST.JUDE MEDICAL	54.48	1.24	11.14%	13.7%	15,329
111	STANLEY BLACK & DECKER	97.12	2.20	10.07%	12.6%	15,246
112	STRYKER	98.47	1.52	9.56%	11.3%	38,551
113	SYMANTEC	19.27	0.60	7.24%	10.6%	12,216
114	SYSCO	42.90	1.24	8.51%	11.7%	26,034
115	T ROWE PRICE GROUP	69.01	2.16	7.47%	10.9%	18,128
116	TEXAS INSTRUMENTS	52.65	1.52	10.00%	13.2%	56,898
117	TEXTRON	34.76	0.08	12.45%	12.7%	9,409
118	THERMO FISHER SCIENTIFIC	131.98	0.60	9.57%	10.1%	54,783
119	TIFFANY & CO	66.69	1.60	8.03%	10.6%	8,990
120	TJX	72.24	1.04	10.24%	11.8%	51,165
121	TOTAL SYSTEM SERVICES	43.41	0.40	12.68%	13.7%	8,301
122	UNION PACIFIC	77.02	2.20	9.09%	12.2%	70,320
123	UNITED PARCEL SER.'B'	96.43	3.12	9.57%	13.2%	71,603
124	UNITED TECHNOLOGIES	92.81	2.56	8.99%	12.0%	82,702
125	V F	61.12	1.48	10.48%	13.2%	28,116
126	VIACOM 'B'	40.16	1.60	8.46%	12.8%	14,371
127	WALT DISNEY	95.50	1.42	11.87%	13.5%	162,504
128	WASTE MANAGEMENT	54.71	1.64	6.72%	10.0%	26,136
129	WEC ENERGY GROUP	55.68	1.98	6.77%	10.6%	18,687
130	WELLS FARGO & CO	48.79	1.50	9.45%	12.9%	251,497
131	WESTERN UNION	17.80	0.64	6.50%	10.4%	9,416

	COMPANY	STOCK PRICE (P_0)	D_0	FORECAST OF FUTURE EARNINGS GROWTH	MODEL RESULT	MARKET CAP$ (MILS)
132	ZIMMER BIOMET HDG.	98.47	0.96	10.80%	11.9%	20,599
133	ZIONS BANCORP.	22.76	0.24	10.62%	11.8%	5,115
134	ZOETIS	42.72	0.38	12.73%	13.7%	19,747
135	MARKET-WEIGHTED AVERAGE				11.9%	

Notes: In applying the DCF model to the S&P 500, I included 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 eliminated those 25 percent of companies with the highest and lowest DCF results, a decision which had no impact on my CAPM estimate of the cost of equity.

D_0 = Current dividend per Thomson Reuters
P_0 = Average of the monthly high and low stock prices during the three months ending March 2016 per Thomson Reuters
g = I/B/E/S forecast of future earnings growth March 2016
k = Cost of equity using the quarterly version of the DCF model shown below:

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

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 COMPARABLE ELECTRIC UTILITIES

10-YR. AVERAGE WEIGHTED AVERAGE COST OF CAPITAL - VALUE LINE ELECTRIC UTILITIES			
Capital Source	% of Total	After-tax Cost Rate	Weighted Cost
Long-term Debt	39.49%	2.68%	1.06%
Preferred Stock	0.51%	6.15%	0.03%
Common Equity	60.00%	10.4%	6.24%
Total	100.00%		7.33%
Weighted Cost of Debt and Preferred – Company			
Capital Source	% of Total	After-tax Cost Rate	Weighted Cost
Long-term Debt	40.77%	2.68%	1.09%
Preferred Stock	5.27%	6.15%	0.32%
Total Weighted Cost of Debt and Preferred	46.04%		1.42%
Cost of Equity Required to Achieve Equivalent WACC			
(1) Average WACC Proxy Companies	7.33%		
(2) Weighted Cost of Debt, Preferred	1.42%		
(1) Less (2)	5.91%		
Cost of Equity (5.91 ÷ 53.96 = 11.0)	11.0%		
Capital Source	% of Total	After-tax Cost Rate	Weighted Cost
Long-term Debt	40.77%	2.68%	1.09%
Preferred Stock	5.27%	6.15%	0.32%
Common Equity	53.96%	11.0%	5.91%
Total	100.00%		7.33%
Notes:			
	Before-tax Cost	After-tax Cost	Source
Tax rate	39%		
A-rated long-term debt	4.4%	2.68%	Company
Preferred Stock	6.15%	6.15%	Company
Cost of equity	10.4%		Cost of equity proxy group
Adjusted cost of equity:	11.0%		

APPENDIX 1

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

3606 STONEYBROOK DRIVE
DURHAM, NC 27705
TEL. 919.383.6659 OR 919.383.1057
JIM.VANDERWEIDE@DUKE.EDU

James H. Vander Weide is President of Financial Strategy Associates, a consulting firm that provides financial and economic consulting services, including cost of capital and valuation studies, to corporate clients. Dr. Vander Weide holds a Ph.D. in Finance from Northwestern University and a Bachelor of Arts in Economics from Cornell University. After receiving his Ph.D. in Finance, Dr. Vander Weide joined the faculty at Duke University, the Fuqua School of Business, and was named Assistant Professor, Associate Professor, Professor, and then Research Professor of Finance and Economics.

As a Professor at Duke University and the Fuqua School of Business, Dr. Vander Weide has published research in the areas of finance and economics and taught courses in corporate finance, investment management, management of financial institutions, statistics, economics, operations research, and the theory of public utility pricing. 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, capital budgeting, measuring corporate performance, and valuation. In addition, Dr. Vander Weide 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. He is now retired from his teaching responsibilities at Duke.

As an expert financial economist and industry expert, Dr. Vander Weide has participated in approximately five hundred regulatory and legal proceedings, appearing in U.S. courts and federal and state or provincial proceedings in the United States and Canada. He has testified as an expert witness on the cost of capital, competition, risk, incentive regulation, forward-looking economic cost, economic pricing guidelines, valuation, and other financial and economic issues. His clients include investor-owned electric, gas, and water utilities, natural gas pipelines, oil pipelines, telecommunications companies, and insurance companies.

Publications

Dr. Vander Weide has 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, Journal of Finance, Journal of Financial and Quantitative Analysis, Management Science, Financial*

Management, Journal of Portfolio Management, International Journal of Industrial Organization, Journal of Bank Research, Journal of Accounting Research, Journal of Cash Management, Atlantic Economic Journal, Journal of Economics and Business, and *Computers and Operations Research*. He has written a book entitled *Managing Corporate Liquidity: An Introduction to Working Capital Management* published by John Wiley and Sons, Inc.; and he has written a chapter titled "Financial Management in the Short Run" for *The Handbook of Modern Finance*, and a chapter titled "Principles for Lifetime Portfolio Selection: Lessons from Portfolio Theory" for *The Handbook of Portfolio Construction: Contemporary Applications of Markowitz Techniques. The Handbook of Portfolio Construction* is a peer-reviewed collection of research papers by notable scholars on portfolio optimization, published in 2010 in honor of Nobel Prize winner Harry Markowitz.

Professional Consulting Experience

Dr. Vander Weide has provided financial and economic consulting services to firms in the electric, gas, insurance, oil and gas pipeline, telecommunications, and water industries for more than thirty years. He has testified on the cost of capital, competition, risk, incentive regulation, forward-looking economic cost, economic pricing guidelines, valuation, and other financial and economic issues in approximately five hundred cases before the Federal Energy Regulatory Commission, the National Energy Board (Canada), the Federal Communications Commission, the Canadian Radio-Television and Telecommunications Commission, the National Telecommunications and Information Administration, the United States Tax Court, the public service commissions of forty-five states and the District of Columbia, four Canadian provinces, the insurance commissions of five states, the Iowa State Board of Tax Review, and the North Carolina Property Tax Commission. In addition, he has testified as an expert witness in proceedings before numerous federal district courts, including 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; the U. S. District Court for the Eastern District of Michigan; and the Supreme Court of the State of New York. Dr. Vander Weide testified in thirty states on issues relating to the pricing of unbundled network elements and universal service cost studies and consulted with Bell Canada, Deutsche Telekom, and Telefónica on similar issues. Dr. Vander Weide has provided consulting and expert witness testimony to the following companies:

ELECTRIC, GAS, PIPELINE, WATER COMPANIES	
Alcoa Power Generating, Inc.	MidAmerican Energy and subsidiaries
Alliant Energy and subsidiaries	National Fuel Gas
AltaLink, L.P.	Nevada Power Company
Ameren	Newfoundland Power Inc.
American Water Works and subsidiaries	NICOR
Atmos Energy and subsidiaries	North Carolina Natural Gas
BP p.l.c.	North Shore Gas
Buckeye Partners, L.P.	Northern Natural Gas Company
Central Illinois Public Service	NOVA Gas Transmission Ltd.
Citizens Utilities	PacifiCorp
Consolidated Edison and subsidiaries	Peoples Energy and its subsidiaries
Consolidated Natural Gas and subsidiaries	PG&E
Dominion Resources and subsidiaries	Plains All American Pipeline, L.P.
Duke Energy and subsidiaries	Progress Energy and subsidiaries
Empire District Electric and subsidiaries	PSE&G
EPCOR Distribution & Transmission Inc.	Public Service Company of North Carolina
EPCOR Energy Alberta Inc.	Sempra Energy/San Diego Gas and Electric
FortisAlberta Inc.	South Carolina Electric and Gas
FortisBC Utilities	Southern Company and subsidiaries
Hope Natural Gas	Spectra Energy
Iberdrola Renewables	Tennessee-American Water Company
Interstate Power Company	The Peoples Gas, Light and Coke Co.
Iowa Southern	Trans Québec & Maritimes Pipeline Inc.
Iowa-American Water Company	TransCanada
Iowa-Illinois Gas and Electric	Union Gas
Kentucky Power Company	United Cities Gas Company
Kentucky-American Water Company	Virginia-American Water Company
Kinder Morgan Energy Partners	West Virginia-American Water Company
Maritimes & Northeast Pipeline	Westcoast Energy Inc.
	Wisconsin Energy Corporation
	Xcel Energy

TELECOMMUNICATIONS COMPANIES	
ALLTEL and subsidiaries	Phillips County Cooperative Tel. Co.
Ameritech (now AT&T new)	Pine Drive Cooperative Telephone Co.
AT&T (old)	Roseville Telephone Company (SureWest)
Bell Canada/Nortel	SBC Communications (now AT&T new)
BellSouth and subsidiaries	Sherburne Telephone Company
Centel and subsidiaries	Siemens
Cincinnati Bell (Broadwing)	Southern New England Telephone
Cisco Systems	Sprint/United and subsidiaries

TELECOMMUNICATIONS COMPANIES	
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 has conducted 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., one of the fastest growing small firms in the country at that time. As an officer at University Analytics, he designed cash management models, databases, and software 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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APPENDIX 2
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:

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

where

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

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

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

where the three dots indicate that the sum continues indefinitely.

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

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

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

Geometric Progression

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

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

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

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

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

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

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

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

or

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

Solving for S_n, we obtain:

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

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

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

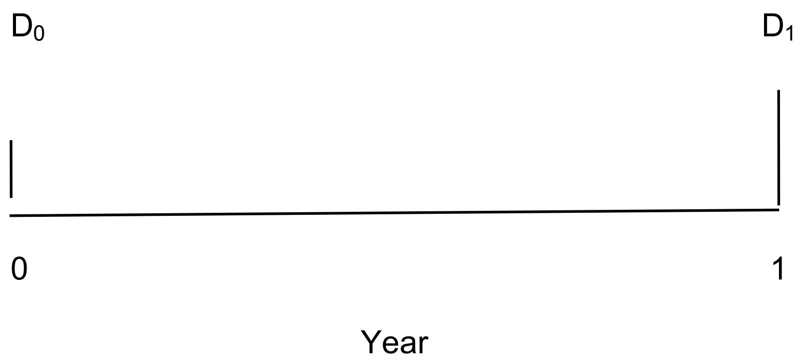
as we suggested earlier.

Quarterly DCF Model

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

Figure 1

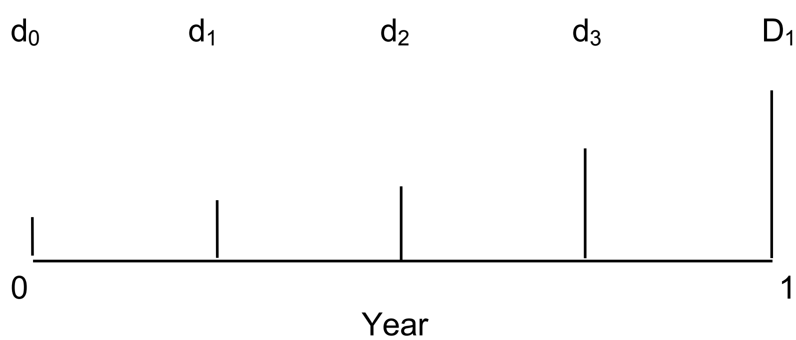
Annual DCF Model



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

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:

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

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

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

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

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

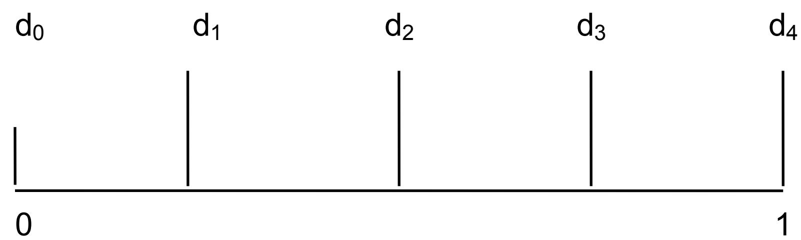
Although the constant growth Quarterly DCF Model [equation (8)] allows for the quarterly timing of dividend payments, it does require the assumption that the firm increases its dividend payments each quarter. Since this assumption is difficult for some analysts to accept, we now discuss a second Quarterly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

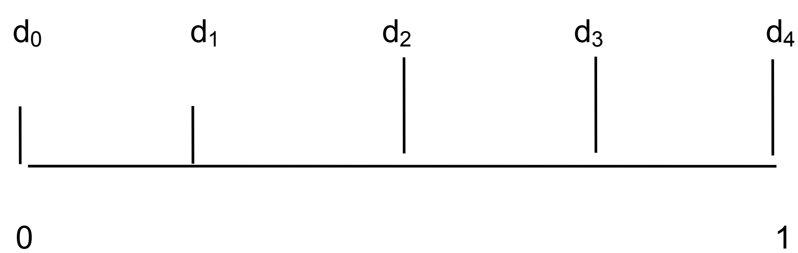
Case 1



Year

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

Case 2



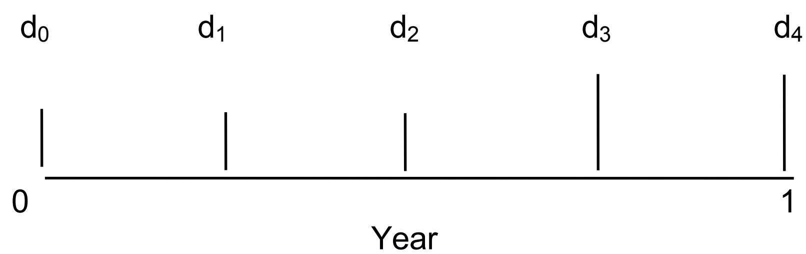
Year

$$d_1 = d_0$$

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

<u>Figure 3</u> (continued)

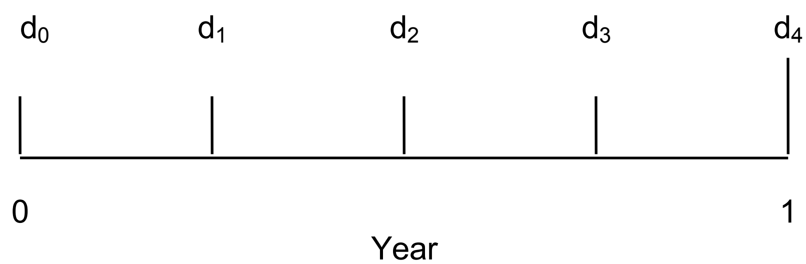
<u>Case 3</u>



$d_1 = d_2 = d_0$

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

<u>Case 4</u>



$d_1 = d_2 = d_3 = d_0$

$d_4 = d_0(1+g)$

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

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

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

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

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

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

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

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

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.

APPENDIX 3
ADJUSTING FOR FLOTATION COSTS IN DETERMINING
A PUBLIC UTILITY'S ALLOWED RATE OF RETURN ON EQUITY

I. 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?
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.

II. 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.

III. 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 difference between the offering price and the last reported sales price is at least two to three percent of the proceeds from the stock issue. (Underwriters set the public offering price at a value less than the most recent market price in order to reduce the risk that they would have to sell the equity at a loss.) Thus, total flotation costs represent approximately two percent[1] 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 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.

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.

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[1] 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 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. Because the offer price represents a binding constraint to the underwriter, the underwriter tends to set the offer price slightly below the last reported market price to compensate for the risk that the price received by the underwriter may go down, but cannot increase.

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.

IV. 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.

V. 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.

VI. 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:

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

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.

VII. 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 twenty to 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
Offered by Domestic Operating Companies 1990—1994[2]

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%**

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).

[2] 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.

Table 2
Direct Costs of Raising Capital 1990—1994
Utility versus Non-Utility Companies[3]

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%

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

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

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[5]
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).

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

[5] 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

APPENDIX 4
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.

Electric Company Ex Ante Risk Premium Analysis. For my ex ante risk premium electric proxy group DCF analysis for the years 1999 through 2015, I begin with the Moody's group of twenty-four electric utilities shown in Table 1. I use the Moody's group of electric utilities because they are a widely followed group of electric utilities, and use of this constant group greatly simplified 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. However, because many of the companies that were formerly included in the Moody's electric utility group have been eliminated due to mergers and acquisitions, and it is desirable to have a larger set of companies in the analysis than are now available in the Moody's group, beginning in January 2016 I use the same proxy group of electric utilities in my ex ante risk premium analysis as are used in my discounted cash flow analysis. The Ex Ante Risk Premium exhibit in my direct testimony displays the average DCF estimated cost of equity on an investment in the portfolio of electric utilities 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 performed 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 made 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:

$$RP_{PROXY} = 8.41 - .60 \times I_A.$$

$$= (13.80) \qquad (-6.20)$$ [6]

Using the forecast 6.2 percent yield to maturity on A-rated utility bonds, the regression equation produces an ex ante risk premium based on the electric proxy group equal to 4.7 percent (8.41 – .60 x 6.2 = 4.7).

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 yield to maturity on A-rated utility bonds. The forecast yield on A-rated utility bonds is 6.2 percent. As noted above, my analyses produce an estimated risk premium over the yield on A-rated utility bonds equal to 4.7 percent. Adding an estimated risk premium of 4.7 percent to the 6.2 percent average yield to maturity on A-rated utility bonds produces a cost of equity estimate of 10.9 percent for the electric company proxy group using the ex ante risk premium method.

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

TABLE 1
MOODY'S ELECTRIC UTILITIES

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, companies have been eliminated due to mergers and acquisitions.

APPENDIX 5
EX POST RISK PREMIUM APPROACH

Source

Stock price and yield information is obtained from Standard & Poor's Security Price publication. Standard & Poor's derives the stock dividend yield by dividing the aggregate cash dividends (based on the latest known annual rate) by the aggregate market value of the stocks in the group. The bond price information is obtained by calculating the present value of a bond due in thirty years with a $4.00 coupon and a yield to maturity of a particular year's indicated Moody's A-rated utility bond yield. The values shown in the schedules are the January values of the respective indices.

Calculation of Stock and Bond Returns

Sample calculation of "Stock Return" column:

$$\text{Stock Return}\,(2015) = \left[\frac{\text{Stock Price}\,(2016) - \text{Stock Price}\,(2015) + \text{Dividend}\,(2015)}{\text{Stock Price}\,(2015)}\right]$$

where Dividend (2015) = Stock Price (2015) x Stock Div. Yield (2015)

Sample calculation of "Bond Return" column:

$$\text{Bond Return}\,(2015) = \left[\frac{\text{Bond Price}\,(2016) - \text{Bond Price}\,(2015) + \text{Interest}\,(2015)}{\text{Bond Price}\,(2015)}\right]$$

where Interest = $4.00.