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Before the Public Service Commission of the State of Missouri

Direct Testimony

of

Dr. James H. Vander Weide

October 2009

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

DIRECT TESTIMONY
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I. INTRODUCTION

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

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

Q. PLEASE SUMMARIZE YOUR QUALIFICATIONS.

A. I received a Bachelor's Degree in Economics from Cornell University and a Ph.D. in Finance from Northwestern University. After joining the faculty of the School of Business at Duke University, I was named Assistant Professor, Associate Professor, and then Professor. I have published research in the areas of finance and economics, taught courses in these fields at Duke over the last 35 years, and taught in numerous executive programs at Duke. I am now retired from my teaching duties at Duke.

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

A. Yes. As an expert on financial and economic theory and practice, I have participated in more than 400 regulatory and legal proceedings before the U.S. Congress, the Canadian Radio-Television and Telecommunications Commission, the Federal Communications Commission, the National Telecommunications and Information Administration, the Federal Energy Regulatory Commission, the National Energy Board (Canada), the Alberta Utilities Board (Canada), the public service commissions of 43 states, the insurance commissions of five states, the Iowa State Board of Tax Review, the National Association of Securities Dealers, and the North Carolina Property Tax Commission. In addition, I have prepared expert testimony in proceedings before the U.S. District Court for the District of Nebraska; the U.S. District Court for the District of New Hampshire; the U.S. District Court for the District of Northern Illinois; the U.S. District Court for the Eastern District of North Carolina; the Montana Second Judicial District Court, Silver Bow County; the U.S. District Court for the Northern District of California; the Superior Court, North Carolina; the U.S. Bankruptcy Court for the Southern District of West Virginia; and the U. S. District Court for the Eastern District of Michigan. My resume is shown in Appendix 1.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

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

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

II. SUMMARY OF TESTIMONY

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

A. I estimate Empire's cost of equity by applying several standard cost of equity estimation techniques, including the discounted cash flow ("DCF") model, the risk premium method, and the Capital Asset Pricing Model ("CAPM") to a large group of comparable companies.

Q. WHY DO YOU APPLY YOUR COST OF EQUITY METHODS TO A LARGE GROUP OF COMPARABLE COMPANIES RATHER THAN SOLELY TO EMPIRE?

A. I apply my cost of equity methods to a large group of comparable companies because standard cost of equity methodologies such as the DCF, risk premium, and CAPM require inputs of quantities that are not easily measured. Since these inputs can only be estimated, there is naturally some degree of uncertainty surrounding the estimate of the cost of equity for each company. However, the uncertainty in the estimate of the cost of equity for an individual company can be greatly reduced by applying cost of equity methodologies to a large sample of 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 methodologies to a group of comparable companies. In utility regulation,

the practice of using a group of comparable companies is further supported by the United States Supreme Court standard that the utility should be allowed to earn a return on its investment that is commensurate with returns being earned on other investments of similar risk.[1]

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

A. On the basis of my studies, and as summarized in the table below, I find that the cost of equity for my comparable companies is equal to 11.0 percent.

TABLE 1
COST OF EQUITY MODEL RESULTS

METHOD	MODEL RESULT
Discounted Cash Flow	11.7%
Risk Premium	11.3%
CAPM	9.9%
Average	11.0%

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

A. I conservatively recommend that Empire be allowed a rate of return on equity equal to 11.0 percent.

Q. WHY IS YOUR RECOMMENDED COST OF EQUITY CONSERVATIVE?

A. My recommendation is conservative in that it does not reflect: (1) Empire's greater business risk compared to the average business risk of the proxy companies; (2) the higher financial risk implicit in Empire's

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1 *See Bluefield Water Works and Improvement Co. v. Public Service Comm'n.* 262 U.S. 679, 692 (1923), and *Federal Power Commission v. Hope Natural Gas Co.*, 320 U.S. at 591, 603 (1944).

rate making capital structure compared to the average financial risk of the proxy companies implicit in the values of debt and equity in their market value capital structures; (3) the small size premium for small market capitalization companies such as Empire; and (4) the evidence that the CAPM underestimates the cost of equity for companies such as utilities with betas less than 1.0.

Q. DO YOU HAVE SCHEDULES ACCOMPANYING YOUR TESTIMONY?

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

III. ECONOMIC AND LEGAL PRINCIPLES

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

A. Economists define the 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 accepting all investments in plant and equipment with an expected rate of return greater than the cost of capital. Thus, a firm

should continue to invest in plant and equipment only so long as the return on its investment is greater than or equal to its cost of capital.

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

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

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

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

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

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

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

A. Yes. Assume that the cost of debt is 7 percent, the cost of equity is 13 percent, and the percentages of debt and equity in the firm's capital structure are 50 percent and 50 percent, respectively. Then the weighted average cost of capital is expressed by .50 times 7 percent plus .50 times 13 percent, or 10.0 percent.

Q. HOW DO ECONOMISTS DEFINE THE COST OF EQUITY?

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

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

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

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

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

A. Economists measure a firm's capital structure in terms of the market values of its debt and equity because: (1) the weighted average cost of capital is defined as the return investors expect to earn on a portfolio of the company's debt and equity securities; (2) investors measure the expected return on a portfolio of securities 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 ON THEIR INVESTMENT PORTFOLIOS USING MARKET VALUE WEIGHTS RATHER THAN BOOK VALUE WEIGHTS?

A. Investors measure the expected return 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; and (2) market values are the best measure of the current value of the portfolio. From the investor's point of view, the historical cost, or book value of their investment, is generally a poor indicator of the portfolio's current value.

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

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

Q. DOES THE REQUIRED RATE OF RETURN ON AN INVESTMENT VARY WITH THE RISK OF THAT INVESTMENT?

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

Q. DO ECONOMISTS AND INVESTORS CONSIDER FUTURE INDUSTRY CHANGES WHEN THEY ESTIMATE THE RISK OF A PARTICULAR INVESTMENT?

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

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

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

> A public utility is entitled to such rates as will permit it to earn a return upon the value of the property which it employs for the convenience of the public equal to that generally being made at the same time and in the same general part of the country on investments in other business undertakings which are attended by corresponding risks and uncertainties; but it has no constitutional right to profits such as are realized or anticipated in highly profitable enterprises or speculative ventures. The return should be reasonably sufficient to assure confidence in the financial soundness of the utility, and should be adequate, under efficient and economical management, to maintain and support its credit, and enable it to raise the money necessary for the proper discharge of its public duties. [*Bluefield Water Works and Improvement Co. v. Public Service Comm'n.* 262 U.S. 679, 692 (1923)].

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

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

> From the investor or company point of view it is important

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

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

IV. BUSINESS AND FINANCIAL RISKS IN THE ELECTRIC ENERGY BUSINESS

Q. WHAT ARE THE PRIMARY BUSINESS AND FINANCIAL RISKS FACING ELECTRIC ENERGY COMPANIES SUCH AS EMPIRE?

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

1. Demand Uncertainty. Demand uncertainty is one of the primary business risks of investing in electric energy companies such as Empire. Demand uncertainty is caused by: (a) the strong dependence of electric demand on the state of the economy and weather patterns; (b) sensitivity of demand to changes in rates; (c) the ability of customers to choose alternative forms of energy, such as natural gas or oil; (d) the ability of some customers to locate facilities in the service areas of

competitors; (e) the ability of some customers to conserve energy or produce their own electricity under cogeneration or self-generation arrangements; and (f) the ability of municipalities to go into the energy business rather than renew the company's franchise. Demand uncertainty is a problem for electric companies because of the need to plan for infrastructure additions many years in advance of demand.

2. Operating Expense Uncertainty. The business risk of electric energy companies is also increased by the inherent uncertainty in the typical electric energy company's operating expenses. Operating expense uncertainty arises as a result of: (a) high volatility in fuel prices or interruptions in fuel supply; (b) uncertainty over plant outages, the cost of purchased power, and the revenues achieved from off system sales; (c) variability in maintenance costs and the costs of other materials, (d) uncertainty over outages of the transmission and distribution systems, as well as storm-related expenses; and (e) the prospect of increased expenses for security.

3. Investment Cost Uncertainty. The electric energy business requires very large investments in the generation, transmission, and distribution facilities required to deliver energy to customers. The future amounts of required investments in these facilities are highly uncertain as a result of: (a) demand uncertainty; (b) the changing economics of alternative generation technologies; (c) uncertainty in environmental regulations and clean air requirements; (d) uncertainty in the costs of

construction materials and labor; (e) uncertainty in the amount of additional investments to ensure the reliability of the company's transmission and distribution networks; (f) uncertainty regarding the regulatory and management structure of the electric transmission network; and (f) uncertainty regarding future decommissioning and dismantlement costs. Furthermore, the risk of investing in electric energy facilities is increased by the irreversible nature of the company's investments in generation, transmission, and distribution facilities. For example, if an electric energy company decides to invest in building a new coal-fired generation plant, and, as a result of new environmental regulations, energy produced by the plant becomes uneconomic, the company may not be able to recover its investment.

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

5. High Degree of Financial Leverage. The large capital requirements for building economically efficient electric generation, transmission, and distribution facilities, along with the traditional regulatory

preference for the use of debt, have encouraged electric utilities to maintain highly debt-leveraged capital structures as compared to non-utility firms. High debt leverage is a source of additional risk to utility stock investors because it increases the percentage of the firm's costs that are fixed, and the presence of higher fixed costs increases the sensitivity of a firm's earnings to variations in revenues.

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

Q. HAVE ANY OF THESE RISK FACTORS CHANGED IN RECENT YEARS?

A. Yes. The risk of investing in electric energy companies has increased as a result of significantly greater macroeconomic uncertainty, projected electric energy company capital expenditures, greater volatility in fuel

prices; greater uncertainty in the cost of satisfying environmental requirements; more volatile purchased power and off system sales prices; greater uncertainty in employee health care and pension expenses; greater uncertainty in the expenses associated with system outages, storm damage, and security; and greater uncertainty about the outcome of proposed climate legislation and renewable energy standards. Factors such as these put pressure on customer rates and therefore increase regulatory risk. The Commission should recognize these higher risks and the correspondingly higher returns required by investors in setting the allowed rate of return for Empire in this proceeding.

Q. HOW DOES GREATER MACROECONOMIC UNCERTAINTY AFFECT THE BUSINESS AND FINANCIAL RISKS OF INVESTING IN ELECTRIC ENERGY COMPANIES SUCH AS EMPIRE?

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

Q. WHY DOES MACROECONOMIC UNCERTAINTY INCREASE DEMAND UNCERTAINTY?

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

Q. HOW DOES INCREASED DEMAND UNCERTAINTY AFFECT THE UNCERTAINTY OF THE FUTURE RETURN ON INVESTMENT FOR EMPIRE?

A. Increased demand uncertainty greatly increases the uncertainty of the future return on investment for Empire because most of the Company's costs are fixed, while its revenues are variable. Thus, greater volatility in revenues produces greater volatility in return on investment.

Q. WHY DOES MACROECONOMIC UNCERTAINTY INCREASE INVESTMENT COST UNCERTAINTY?

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

Q. WHY DOES MACROECONOMIC UNCERTAINTY INCREASE REGULATORY UNCERTAINTY?

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

pressure to restrain rate increases in difficult economic times than in good economic times.

Q. HOW DO GREATER PROJECTED CAPITAL EXPENDITURES AFFECT THE BUSINESS AND FINANCIAL RISKS OF INVESTING IN ELECTRIC ENERGY COMPANIES SUCH AS EMPIRE?

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

Q. WHY DO GREATER PROJECTED CAPITAL EXPENDITURES INCREASE AN ELECTRIC ENERGY COMPANY'S INVESTMENT COST UNCERTAINTY?

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

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

A. As noted above, operating leverage increases when a firm's commitment to fixed costs rises in relation to its operating margin on sales. Increased

capital expenditures increase operating leverage because investment costs are fixed, the investment period is long, and revenues do not generally increase in line with investment costs until the investment is entirely included in rate base. Thus, the ratio of fixed costs to operating margin increases when capital expenditures increase.

Q. WHY DO GREATER PROJECTED CAPITAL EXPENDITURES INCREASE REGULATORY UNCERTAINTY?

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

Q. YOU MENTION THE PROSPECT THAT ELECTRIC ENERGY COMPANIES WILL NEED TO MAKE MAJOR INVESTMENTS IN NEW GENERATION FACILITIES OVER THE NEXT TEN YEARS. WHY ARE INVESTMENTS IN NEW GENERATION FACILITIES ESPECIALLY RISKY?

A. Investment in new generation facilities is especially risky because the required investment is large, illiquid, and irreversible; the investment horizon in unusually long; the investment and operating costs are highly uncertain; and environmental regulations may change significantly over

the life of the investment. In addition, there is no consensus on the best generation option. The natural gas option has a lower investment cost and shorter investment horizon, but fuel costs are highly volatile. The coal and nuclear options have significantly lower long run expected operating costs, but a higher required investment and a longer investment horizon. Renewable energy, though desirable from an environmental standpoint, may be more expensive than other alternatives and may not produce reliable energy in peak periods. The uncertainties associated with all generation options creates additional risks for electric utilities.

V. COST OF EQUITY ESTIMATION METHODS

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

A. I use three generally accepted methods for estimating Empire's fair rate of return on equity. As noted above, they are the DCF, risk premium, and CAPM methods. 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 risk premium method assumes that the investor's required return on an equity investment is equal to the interest rate on a long-term bond plus an additional equity risk premium to compensate the investor for the risks of investing in equities compared to bonds. The CAPM assumes that the investor's required rate of return on equity is equal to a risk-free rate of interest plus the product of a company-specific risk factor, beta, and the expected risk premium on the market portfolio.

A. DISCOUNTED CASH FLOW METHOD

Q. PLEASE DESCRIBE THE DCF MODEL.

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

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

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

EQUATION 1

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

where:

P_B	=	Bond price;
C	=	Cash value of the coupon payment (assumed for notational convenience to occur annually rather than semi-annually);
F	=	Face value of the bond;
i	=	The rate of interest the investor could earn by investing his money in an alternative bond of equal risk; and
n	=	The number of periods before the bond matures.

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

EQUATION 2

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

where:

P_S	=	Current price of the firm's stock;
$D_1, D_2 \ldots D_n$	=	Expected annual dividend per share on the firm's stock;
P_n	=	Price per share of stock at the time the investor expects to sell the stock; and
k	=	Return the investor expects to earn on alternative investments of the same risk, i.e., the investor's required rate of return.

Equation (2) is frequently called the annual discounted cash flow model of stock valuation. Assuming that dividends grow at a constant annual rate, g, this equation can be solved for k, the cost of equity. The resulting

cost of equity equation is $k = D_1/P_s + g$, where k is the cost of equity, D_1 is the expected dividend at the end of the first year, 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 dividend yield component of the annual DCF model, and the term g is called the growth component of the annual DCF model.

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

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

Q. PLEASE DESCRIBE THE QUARTERLY DCF MODEL YOU USE.

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

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

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

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

A. Yes. In the case of American Electric Power, the first company shown in Schedule JVW-1, the last four quarterly dividends are equal to 0.41. Thus dividends, d_1, d_2, d_3, and d_4 are equal to 0.422 [0.41 x (1 + .0303) = 0.422]. (As noted previously, the logic underlying this procedure is described in Appendix 2.)

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

A. I use the analysts' estimates of future earnings per share ("EPS") growth reported by 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 and use them in making stock buy and sell decisions.

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 in conjunction with Willard T. Carleton, Professor of Finance Emeritus at the University of Arizona, on why analysts' forecasts are the best estimate of investors' expectation of future long-term growth. This study is described in a paper entitled "Investor Growth Expectations and Stock Prices: the Analysts versus History," published in the Spring 1988 edition of *The Journal of Portfolio Management*.

Q. PLEASE SUMMARIZE THE RESULTS OF YOUR STUDY.

A. First, we performed a correlation analysis to identify the historically oriented growth rates which best described a firm's stock price. Then we did a regression study comparing the historical 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 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 and retention growth calculations, in making stock buy and sell decisions. They provide overwhelming evidence that the analysts' forecasts of future growth are superior to historically-oriented growth measures in predicting a firm's stock price.

Q. HAS YOUR STUDY BEEN UPDATED TO INCLUDE MORE RECENT DATA?

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

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

A. I use a simple average of the monthly high and low stock prices for each firm for the three-month period ending July 2009. These high and low stock prices were obtained from Thomson Reuters.

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

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

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

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

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

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

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

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

1, 2, or 3; and (5) are not the subject of a merger offer that has not been completed.[2]

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

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

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

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

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2 At this time, I also eliminate two companies with unreasonably low results, Edison and Exelon, with results of 5.5 percent and 7.1 percent, respectively; and two companies with unreasonably high results, TECO and PPL, with results of 16.8 percent and 17.7 percent.

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. HOW DOES THE RISK OF AN EQUITY INVESTMENT IN YOUR PROXY GROUP COMPARE TO THE RISK OF AN EQUITY INVESTMENT IN EMPIRE?

A. An equity investment in my proxy group is less risky than an equity investment in Empire. Many investors use the Value Line Safety Rank as a measure of equity risk. As shown on Schedule JVW-1, the average Value Line Safety Rank for my proxy group of electric companies is 2, on a scale where 1 is the most safe and 5 is the least safe, and the Value Line Safety Rank for Empire is 3. Furthermore, the average S&P bond rating of the electric companies in my proxy group is between BBB+ and A-. The S&P corporate bond rating for Empire is BBB-.

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

A. As shown on Schedule JVW-1, I obtain a DCF result of 11.7 percent for my proxy company group.

B. RISK PREMIUM METHOD

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

A. The risk premium method is based on the principle that investors expect to earn a return on an equity investment in Empire that reflects a "premium" over and above the return they expect to earn on an investment in a portfolio of bonds. This equity risk premium compensates equity investors for the additional risk they bear in making equity investments versus bond investments.

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

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

utility bonds, then the interest rate on A-rated utility bonds must be used to estimate the interest rate component of the risk premium approach.

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

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

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

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

1. Ex Ante Risk Premium Method

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

A. My ex ante risk premium method is based on studies of the DCF expected return on a proxy group of electric companies compared to the interest

rate on Moody's A-rated utility bonds. Specifically, for each month in my study period, I calculate the risk premium using the equation,

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

where:

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

I then perform a regression analysis to determine if there is a relationship between the calculated risk premium and interest rates. Finally, I use the results of the regression analysis to estimate the investors' required risk premium. To estimate the cost of equity, I then add the required risk premium to the forecasted yield to maturity on A-rated utility bonds. A detailed description of my ex ante risk premium studies is contained in Appendix 3, and the underlying DCF results and interest rates are displayed in Schedule JVW-2.

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

A. To estimate the cost of equity using the ex ante risk premium method, one may add the estimated risk premium over the yield on A-rated utility bonds to the forecasted yield to maturity on A-rated utility bonds.[3] The

3 As noted above, one could use the yield to maturity on other debt investments to measure the interest rate component of the risk premium approach as long as one uses the yield on the same debt investment to measure the expected risk premium component of the risk premium approach. I chose to use the yield on A-rated utility bonds because it is a frequently used benchmark for utility bond yields.

forecasted yield to maturity on A-rated utility bonds from Blue Chip on August 1, 2009, is 6.99 percent.[4] My analyses produce an estimated risk premium over the yield on A-rated utility bonds equal to 4.31 percent. Adding an estimated risk premium of 4.31 percent to the 6.99 percent forecasted yield to maturity on A-rated utility bonds produces a cost of equity estimate of 11.3 percent using the ex ante risk premium method.

2. Ex Post Risk Premium Method

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

A. I first perform a study of the returns received by bond and stock investors over the 72 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 2009. The return associated with each stock portfolio is the sum of the annual dividend yield and capital gain (or loss) which accrue to this portfolio during the year(s) in which it was held. The return

4 Forecasted A-rated utility bond yield determined from *Blue Chip Financial Forecasts*, August 1, 2009, using the Blue Chip forecast for Baa-rated corporate bond plus the current spread between A-rated utility and Baa-rated corporate bonds. The average yield on Baa-rated corporate bonds at July 2009 is 6.58 percent; the average yield on A-rated utility bonds at July 2009 is 5.97 percent. The spread between these average yields is 61 basis points. The Blue Chip forecasted yield for Baa-rated corporate bonds for Q4 2010 is 7.6 percent. Subtracting 61 basis points from 7.60 equals 6.99 percent as the forecasted yield on A-rated utility bonds.

associated with the bond portfolio, on the other hand, is the sum of the annual coupon yield and capital gain (or loss) which accrue to the bond portfolio during the year(s) in which it was held. The resulting annual returns on the stock and bond portfolios purchased in each year between 1937 and 2009 are shown on Schedule JVW-3. The average annual return on an investment in the S&P 500 stock portfolio is 10.8 percent, while the average annual return on an investment in the Moody's A-rated utility bond portfolio is 6.3 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 Schedule JVW-4, the S&P Utility stock portfolio showed an average annual return of 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 4.2 percent.

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

A. I perform my ex post risk premium analysis on both the S&P 500 and the S&P Utilities because I believe 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 2009. 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. I note that the spread

between the average risk premium on the S&P 500 and the average risk premium on the S&P Utilities is just 30 basis points.

Q. WHY D0 YOU ANALYZE INVESTORS' EXPERIENCES OVER SUCH A LONG TIME FRAME?

A. Because day-to-day stock price movements can be somewhat random, it is inappropriate to rely on short-run movements in stock prices in order to derive a reliable risk premium. Rather than buying and selling frequently in anticipation of highly volatile price movements, most investors employ a strategy of buying and holding a diversified portfolio of stocks. This buy-and-hold strategy will allow an investor to achieve a much more predictable long-run return on stock investments and at the same time will minimize transaction costs. The situation is very similar to the problem of predicting the results of coin tosses. I cannot predict with any reasonable degree of accuracy the result of a single, or even a few, flips of a balanced coin; but I can predict with a good deal of confidence that approximately 50 heads will appear in 100 tosses of this coin. Under these circumstances, it is most appropriate to estimate future experience from long-run evidence of investment performance.

Q. WOULD YOUR STUDY PROVIDE A DIFFERENT RISK PREMIUM IF YOU STARTED WITH A DIFFERENT TIME PERIOD?

A. Yes. The risk premium results do vary somewhat depending on the historical time period chosen. My policy was to go back as far in history as I could 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. This Act significantly changed the structure of the public utility industry. Since the Public Utility Holding Company Act of 1935 was not implemented until the beginning of 1937, I felt that numbers taken from before this date would not be comparable to those taken after. (The recent repeal of the 1935 Act does not have a material impact on 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, being a residual return, is less certain than the yield on bonds; and investors must be compensated for this uncertainty. Second, the investors' current expectations concerning the amount by which the return on equity will exceed the bond yield will be strongly influenced by historical differences in returns to bond and stock investors. For these reasons, we can estimate investors' current expected returns from an equity investment from knowledge of current bond yields and past differences between returns on stocks and bonds.

Q. HAS THERE BEEN ANY SIGNIFICANT TREND IN THE EQUITY RISK PREMIUM OVER THE 1937 TO 2009 TIME PERIOD OF YOUR RISK PREMIUM STUDY?

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

TABLE 2

REGRESSION OUTPUT FOR RISK PREMIUM ON S&P 500

LINE NO.		INTERCEPT	TIME	ADJUSTED R SQUARE	F
1	Coefficient	3.096	(0.002)	0.023	2.66
2	T Statistic	1.654	(1.630)		

TABLE 3

REGRESSION OUTPUT FOR RISK PREMIUM ON S&P UTILITIES

LINE NO.		INTERCEPT	TIME	ADJUSTED R SQUARE	F
1	Coefficient	1.383	-0.001	-0.006	0.56
2	T Statistic	0.776	-0.751		

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

A. Yes. The *Stocks, Bonds, Bills, and Inflation® 2009 Valuation Edition Yearbook* ("Ibbotson® SBBI®") published by Morningstar, Inc., contains an analysis of "trends" in historical risk premium data. Ibbotson® SBBI® uses correlation analysis to determine if there is any pattern or "trend" in risk

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

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

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

> The significance of this evidence is that the realized equity risk premium next year will not be dependent on the realized equity risk premium from this year. That is, there is no discernable pattern in the realized equity risk premium—it is virtually impossible to forecast next year's realized risk premium based on the premium of the previous year. For example, if this year's difference between the riskless rate and the return on the stock market is higher than last year's, that does not imply that next year's will be higher than this year's. It is as likely to be higher as it is lower. The best estimate of the expected value of a variable that has behaved randomly in the past is the average (or arithmetic mean) of its past values. [Ibbotson® SBBI®, page 61.]

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

A. My studies provide strong evidence that investors today require an equity return of approximately 4.2 to 4.5 percentage points above the expected yield on A-rated utility bonds. The forecast yield on A-rated utility bonds at 2010 is 6.99 percent. Adding a 4.2 to 4.5 percentage point risk premium to a yield of 6.99 percent on A-rated utility bonds, I obtain an expected

return on equity from the ex post risk premium method in the range 11.2 percent to 11.5 percent, with a midpoint of 11.3 percent.

C. CAPITAL ASSET PRICING MODEL

Q. WHAT IS THE CAPM?

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

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

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

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

A. The CAPM requires an estimate of the risk-free rate, the company-specific risk factor or beta, and the expected return on the market portfolio. For my estimate of the risk-free rate, I use the forecasted yield to maturity on 20-year Treasury bonds[5] of 4.97 percent, using data from Blue Chip.[6]

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

For my estimate of the company-specific risk, or beta, I use the average Value Line beta of 0.70 for my proxy companies. For my estimate of the expected risk premium on the market portfolio, I use two approaches. First, I use the Ibbotson® SBBI® 6.5 percent risk premium on the market portfolio, which is measured from the difference between the arithmetic mean return on the S&P 500 (11.7 percent) and the income return on 20-year Treasury bonds (5.2 percent), as reported by Ibbotson® SBBI® (11.7 – 5.2 = 6.5). Second, I estimate the risk premium on the market portfolio from the difference between the DCF cost of equity for the S&P 500 (12.6 percent) and the yield to maturity on 20-year Treasury bonds, (4.97 percent). My second approach produces a risk premium equal to 7.6 percent (12.6 - 4.97 = 7.6).

1. Historical CAPM

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

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

> The equity risk premium data presented in this book are

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6 Forecasted Treasury bond yield determined from *Blue Chip Financial Forecasts*, August 1, 2009, using Blue Chip forecast for 30-yr Treasury bond plus current difference between 30-year and 20-year Treasury bonds. The average July yield on 30-year Treasury bonds is 4.41 percent, and for 20-year Treasury bonds, 4.38 percent, a spread of 3 basis points. The Blue Chip forecasted yield on 30-year Treasury bonds for Q4 2010 is 5.0 percent. Thus, the estimated forecasted yield on 20-year Treasury bonds is 4.97 percent.

> arithmetic average risk premia as opposed to geometric average risk premia. The arithmetic average equity risk premium can be demonstrated to be most appropriate when discounting future cash flows. For use as the expected equity risk premium in either the CAPM or the building block approach, the arithmetic mean or the simple difference of the arithmetic means of stock market returns and riskless rates is the relevant number. This is because both the CAPM and the building block approach are additive models, in which the cost of capital is the sum of its parts. The geometric average is more appropriate for reporting past performance, since it represents the compound average return. [Ibbotson® SBBI®, p. 59.]

A discussion of the importance of using arithmetic mean returns in the context of CAPM or risk premium studies is contained in Schedule JVW-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 an 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. I obtain a CAPM cost of equity estimate of 9.5 percent (see Schedule JVW-6).

2. DCF-Based CAPM

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. I obtain a CAPM result of 10.3 percent (see Schedule JVW-7).

Q. IS THERE ANY EVIDENCE THAT A REASONABLE APPLICATION OF THE CAPM MAY PRODUCE HIGHER COST OF EQUITY RESULTS THAN YOU HAVE JUST REPORTED?

A. Yes. The CAPM tends to underestimate the cost of equity for small market capitalization companies such as some of the electric companies in my proxy group.

Q. DOES THE FINANCE LITERATURE SUPPORT AN ADJUSTMENT TO THE CAPM EQUATION TO ACCOUNT FOR A COMPANY'S SIZE AS MEASURED BY MARKET CAPITALIZATION?

A. Yes. For example, Ibbotson® SBBI® supports such an adjustment. Their estimates of the size premium required to be added to the basic CAPM cost of equity are shown below in Table 4. I note that of the 28 electric utilities in my proxy group, 15 companies have a market capitalization between $1.8 billion and $7.4 billion; and four companies have a market capitalization of less than $1.8 billion. Each of these companies would be eligible for a small company size premium.

TABLE 4
IBBOTSON ESTIMATES OF PREMIUMS FOR COMPANY SIZE[7]

SIZE	SMALLEST MKT. CAP. ($MILLIONS)	PREMIUM
Large-Cap (No Adjustment)	>7,360.271	--
Mid-Cap	1,849.950	0.94%
Low-Cap	453.398	1.74%
Micro-Cap	1.575	3.74%

Q. ARE THERE OTHER REASONS TO BELIEVE THAT THE CAPM MAY PRODUCE COST OF EQUITY ESTIMATES AT THIS TIME THAT ARE UNREASONABLY LOW?

A. Yes. There is substantial evidence in the finance literature that the CAPM tends to underestimate the cost of equity for companies such as utilities whose equity betas are less than 1.0 and to overestimate the cost of equity for companies whose equity beta are greater than 1.0.[8]

Q. CAN YOU BRIEFLY SUMMARIZE THE EVIDENCE THAT THE CAPM UNDERESTIMATES THE REQUIRED RETURNS FOR SECURITIES OR PORTFOLIOS WITH BETAS LESS THAN 1.0 AND OVERESTIMATES REQUIRED RETURNS FOR SECURITIES OR PORTFOLIOS WITH BETAS GREATER THAN 1.0?

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7 Ibbotson® SBBI® 2009 Valuation Yearbook.

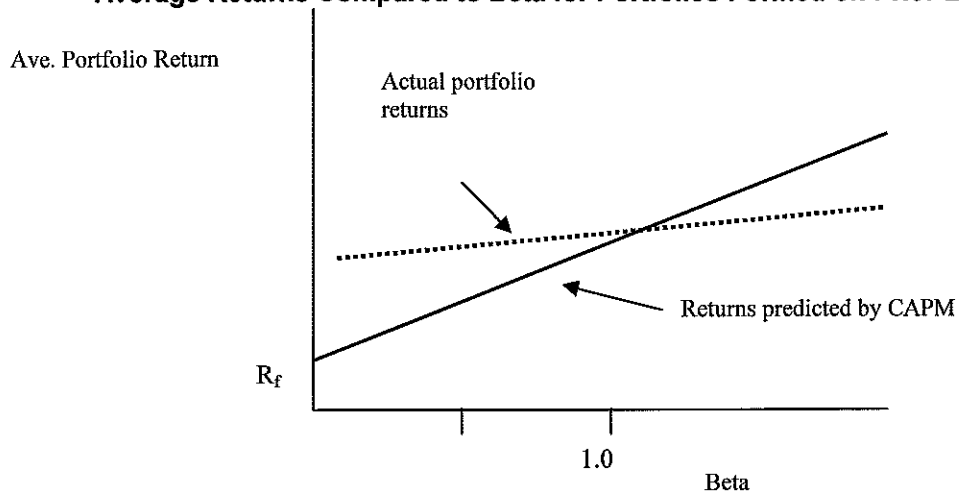
8 *See*, for example, Fischer Black, Michael C. Jensen, and Myron Scholes, "The Capital Asset Pricing Model: Some Empirical Tests," in *Studies in the Theory of Capital Markets*, M. Jensen, ed. New York: Praeger, 1972; Eugene Fama and James MacBeth, "Risk, Return, and Equilibrium: Empirical Tests," *Journal of Political Economy* 81 (1973), pp. 607-36; Robert Litzenberger and Krishna Ramaswamy, "The Effect of Personal Taxes and Dividends on Capital Asset Prices: Theory and Empirical Evidence," *Journal of Financial Economics* 7 (1979), pp. 163-95.; Rolf Banz, "The Relationship between Return and Market Value of Common Stocks," *Journal of Financial Economics* (March 1981), pp. 3-18; and Eugene Fama and Kenneth French, "The Cross-Section of Expected Returns," *Journal of Finance* (June 1992), pp. 427-465.

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

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

where ER_i is the expected return on security or portfolio *i*, R_f is the risk-free rate, $ER_m - R_f$ is the expected risk premium on the market portfolio, and β_i is a measure of the risk of investing in security or portfolio *i*. If the CAPM correctly predicts the relationship between risk and return in the marketplace, then the realized returns on portfolios of securities and the corresponding portfolio betas should lie on the solid straight line with intercept R_f and slope $[R_m - R_f]$ shown below.

Figure 1
Average Returns Compared to Beta for Portfolios Formed on Prior Beta



Financial scholars have found that the relationship between realized 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 the figure above. Although financial scholars disagree on the reasons why the return/beta relationship looks more like the dotted line in the figure 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. WHAT CONCLUSIONS DO YOU REACH FROM YOUR REVIEW OF THE LITERATURE ON THE CAPM TO PREDICT THE RELATIONSHIP BETWEEN RISK AND RETURN IN THE MARKETPLACE?

A. I conclude that the financial literature strongly supports the proposition that the CAPM underestimates the cost of equity for companies such as public utilities with betas less than 1.0.

VI. FAIR RATE OF RETURN ON EQUITY

Q. BASED ON YOUR APPLICATION OF SEVERAL COST OF EQUITY METHODS TO YOUR PROXY COMPANIES, WHAT IS YOUR CONCLUSION REGARDING YOUR PROXY COMPANIES' COST OF EQUITY?

A. Based on my application of several cost of equity methods to my proxy companies, I conclude that my proxy companies' cost of equity is

11.0 percent. As shown below, 11.0 percent is the simple average of the cost of equity results I obtain from my cost of equity models.

TABLE 5
COST OF EQUITY MODEL RESULTS

Method	Model Result
Discounted Cash Flow	11.7%
Risk Premium	11.3%
CAPM	9.9%
Average	11.0%

Q. DOES YOUR 11.0 PERCENT COST OF EQUITY CONCLUSION FOR YOUR PROXY COMPANIES DEPEND ON THE PERCENTAGES OF DEBT AND EQUITY IN YOUR PROXY COMPANIES' AVERAGE CAPITAL STRUCTURE?

A. Yes. My 11.0 percent cost of equity conclusion reflects the financial risk associated with the average market value capital structure of my proxy companies, which has more than 56 percent equity.

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

A. **_____

_____

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

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

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

A. I recommend an ROE of 11.0 percent for Empire. My recommendation is conservative in that it does not reflect: (1) Empire's greater business risk compared to the average business risk of the proxy companies; (2) the higher financial risk implicit in Empire's rate making capital structure compared to the average financial risk of the proxy companies implicit in the values of debt and equity in their market value capital structures; (3) the small size premium for small market capitalization companies such as Empire; and (4) the evidence that the CAPM underestimates the cost of equity for companies such as utilities with betas less than 1.0.

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

A. Yes, it does.

LIST OF ATTACHMENTS

SCHEDULE JVW-1
SUMMARY OF DISCOUNTED CASH FLOW ANALYSIS
FOR ELECTRIC ENERGY COMPANIES

LINE NO.	COMPANY	D_0	P_0	GROWTH	COST OF EQUITY
1	Amer. Elec. Power	0.410	27.922	3.03%	9.3%
2	ALLETE	0.440	28.253	6.00%	12.8%
3	CMS Energy Corp.	0.125	11.923	6.75%	11.1%
4	Dominion Resources	0.438	32.500	6.36%	12.1%
5	DPL Inc.	0.285	22.743	9.32%	15.0%
6	Duke Energy	0.230	14.380	3.50%	10.4%
7	Consol. Edison	0.590	36.937	2.44%	9.2%
8	Entergy Corp.	0.750	74.348	9.02%	13.6%
9	FirstEnergy Corp.	0.550	39.490	6.67%	12.9%
10	FPL Group	0.473	56.427	9.59%	13.3%
11	Hawaiian Elec.	0.310	17.525	4.87%	12.6%
12	Alliant Energy	0.375	24.868	4.60%	11.1%
13	NSTAR	0.375	31.307	6.25%	11.5%
14	Northeast Utilities	0.238	21.588	8.33%	13.1%
15	PG&E Corp.	0.420	37.525	7.07%	11.9%
16	Public Serv. Enterprise	0.333	32.113	5.67%	10.2%
17	Progress Energy	0.620	36.575	5.36%	12.8%
18	Pinnacle West Capital	0.525	28.895	5.67%	13.7%
19	Pepco Holdings	0.270	13.098	3.67%	12.6%
20	Portland General	0.255	18.690	6.99%	12.9%
21	SCANA Corp.	0.470	31.740	5.34%	11.8%
22	Southern Co.	0.438	30.066	4.97%	11.1%
23	Sempra Energy	0.390	48.353	6.61%	10.0%
24	UIL Holdings	0.432	22.626	4.47%	12.8%
25	Vectren Corp.	0.335	23.225	6.42%	12.8%
26	Wisconsin Energy	0.338	40.333	9.03%	12.5%
27	Westar Energy	0.300	18.305	3.32%	10.2%
28	Xcel Energy Inc.	0.245	18.187	6.58%	12.5%
29	Market-weighted Average				11.7%
30	Simple Average				12.0%

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 July 2009 per Thomson Reuters.
g	=	I/B/E/S forecast of future earnings growth July 2009 from Thomson Reuters.
k	=	Cost of equity using the quarterly version of the DCF model.

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

VALUE LINE SAFETY RANK AND
STANDARD & POOR'S BOND RATINGS
FOR PROXY ELECTRIC ENERGY COMPANIES

LINE NO.	COMPANY	SAFETY RANK	S&P BOND RATING	S&P BOND RATING (NUMERICAL)
1	Amer. Elec. Power	3	BBB	7
2	ALLETE	2	BBB+	6
3	CMS Energy Corp.	3	BBB-	8
4	Dominion Resources	2	A-	5
5	DPL Inc.	3	A-	5
6	Duke Energy	2	A-	5
7	Consol. Edison	1	A-	5
8	Entergy Corp.	2	BBB	7
9	FirstEnergy Corp.	2	BBB	7
10	FPL Group	1	A	4
11	Hawaiian Elec.	3	BBB	7
12	Alliant Energy	2	BBB+	6
13	NSTAR	1	A+	3
14	Northeast Utilities	3	BBB	7
15	PG&E Corp.	2	BBB+	6
16	Public Serv. Enterprise	3	BBB	7
17	Progress Energy	2	BBB+	6
18	Pinnacle West Capital	3	BBB-	8
19	Pepco Holdings	3	BBB	7
20	Portland General	2	BBB+	6
21	SCANA Corp.	2	BBB+	6
22	Southern Co.	1	A	4
23	Sempra Energy	2	BBB+	6
24	UIL Holdings[9]	2	BBB-	8
25	Vectren Corp.	2	A-	5
26	Wisconsin Energy	2	BBB+	6
27	Westar Energy	2	BBB-	8
28	Xcel Energy Inc.	2	BBB+	6
29	Market-weighted Average	1.9	BBB+ to A-	5.7

Source of data: Standard & Poor's August 2009; The Value Line Investment Analyzer August 2009.

9 UIL Holdings does not have a Standard & Poor's issuer bond rating, but is rated Baa3 by Moody's.

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

LINE NO.	DATE	DCF	BOND YIELD	RISK PREMIUM
1	Sep-99	0.1138	0.0793	0.0345
2	Oct-99	0.1146	0.0806	0.0340
3	Nov-99	0.1176	0.0794	0.0382
4	Dec-99	0.1224	0.0814	0.0410
5	Jan-00	0.1216	0.0835	0.0381
6	Feb-00	0.1259	0.0825	0.0434
7	Mar-00	0.1298	0.0828	0.0470
8	Apr-00	0.1225	0.0829	0.0396
9	May-00	0.1210	0.0870	0.0340
10	Jun-00	0.1234	0.0836	0.0398
11	Jul-00	0.1244	0.0825	0.0419
12	Aug-00	0.1218	0.0813	0.0405
13	Sep-00	0.1154	0.0823	0.0331
14	Oct-00	0.1156	0.0814	0.0342
15	Nov-00	0.1162	0.0811	0.0351
16	Dec-00	0.1145	0.0784	0.0361
17	Jan-01	0.1179	0.0780	0.0399
18	Feb-01	0.1185	0.0774	0.0411
19	Mar-01	0.1190	0.0768	0.0422
20	Apr-01	0.1254	0.0794	0.0460
21	May-01	0.1280	0.0799	0.0481
22	Jun-01	0.1286	0.0785	0.0501
23	Jul-01	0.1299	0.0778	0.0521
24	Aug-01	0.1305	0.0759	0.0546
25	Sep-01	0.1330	0.0775	0.0555
26	Oct-01	0.1307	0.0763	0.0544
27	Nov-01	0.1311	0.0757	0.0554
28	Dec-01	0.1307	0.0783	0.0524
29	Jan-02	0.1288	0.0766	0.0522
30	Feb-02	0.1299	0.0754	0.0545
31	Mar-02	0.1261	0.0776	0.0485
32	Apr-02	0.1225	0.0757	0.0468
33	May-02	0.1232	0.0752	0.0480
34	Jun-02	0.1230	0.0741	0.0489
35	Jul-02	0.1292	0.0731	0.0561
36	Aug-02	0.1241	0.0717	0.0524
37	Sep-02	0.1259	0.0708	0.0551
38	Oct-02	0.1261	0.0723	0.0538
39	Nov-02	0.1208	0.0714	0.0494

LINE NO.	DATE	DCF	BOND YIELD	RISK PREMIUM
40	Dec-02	0.1179	0.0707	0.0472
41	Jan-03	0.1144	0.0706	0.0438
42	Feb-03	0.1178	0.0693	0.0485
43	Mar-03	0.1140	0.0679	0.0461
44	Apr-03	0.1101	0.0664	0.0437
45	May-03	0.1045	0.0636	0.0409
46	Jun-03	0.1001	0.0621	0.0380
47	Jul-03	0.1007	0.0657	0.0350
48	Aug-03	0.1007	0.0678	0.0329
49	Sep-03	0.0978	0.0656	0.0322
50	Oct-03	0.0963	0.0643	0.0320
51	Nov-03	0.0951	0.0637	0.0314
52	Dec-03	0.0923	0.0627	0.0296
53	Jan-04	0.0898	0.0615	0.0283
54	Feb-04	0.0895	0.0615	0.0280
55	Mar-04	0.0892	0.0597	0.0295
56	Apr-04	0.0902	0.0635	0.0267
57	May-04	0.0939	0.0662	0.0277
58	Jun-04	0.0941	0.0646	0.0295
59	Jul-04	0.0933	0.0627	0.0306
60	Aug-04	0.0939	0.0614	0.0325
61	Sep-04	0.0931	0.0598	0.0333
62	Oct-04	0.0928	0.0594	0.0334
63	Nov-04	0.0887	0.0597	0.0290
64	Dec-04	0.0907	0.0592	0.0315
65	Jan-05	0.0910	0.0578	0.0332
66	Feb-05	0.0907	0.0561	0.0346
67	Mar-05	0.0902	0.0583	0.0319
68	Apr-05	0.0903	0.0564	0.0339
69	May-05	0.0899	0.0553	0.0346
70	Jun-05	0.0904	0.0540	0.0364
71	Jul-05	0.0892	0.0551	0.0341
72	Aug-05	0.0901	0.0550	0.0351
73	Sep-05	0.0929	0.0552	0.0377
74	Oct-05	0.0940	0.0579	0.0361
75	Nov-05	0.0983	0.0588	0.0395
76	Dec-05	0.0989	0.0580	0.0409
77	Jan-06	0.0993	0.0575	0.0418
78	Feb-06	0.1104	0.0582	0.0522
79	Mar-06	0.1089	0.0598	0.0491
80	Apr-06	0.1099	0.0629	0.0470
81	May-06	0.1094	0.0642	0.0452
82	Jun-06	0.1134	0.0640	0.0494
83	Jul-06	0.1129	0.0637	0.0492
84	Aug-06	0.1116	0.0620	0.0496

LINE NO.	DATE	DCF	BOND YIELD	RISK PREMIUM
85	Sep-06	0.1142	0.0600	0.0542
86	Oct-06	0.1132	0.0598	0.0534
87	Nov-06	0.1137	0.0580	0.0557
88	Dec-06	0.1125	0.0581	0.0544
89	Jan-07	0.1116	0.0596	0.0520
90	Feb-07	0.1090	0.0590	0.0500
91	Mar-07	0.1100	0.0585	0.0515
92	Apr-07	0.1055	0.0597	0.0458
93	May-07	0.1089	0.0599	0.0490
94	Jun-07	0.1149	0.0630	0.0519
95	Jul-07	0.1159	0.0625	0.0534
96	Aug-07	0.1149	0.0624	0.0525
97	Sep-07	0.1115	0.0618	0.0497
98	Oct-07	0.1109	0.0611	0.0498
99	Nov-07	0.1089	0.0597	0.0492
100	Dec-07	0.1110	0.0616	0.0494
101	Jan-08	0.1209	0.0602	0.0607
102	Feb-08	0.1122	0.0621	0.0501
103	Mar-08	0.1155	0.0621	0.0534
104	Apr-08	0.1115	0.0629	0.0486
105	May-08	0.1121	0.0627	0.0494
106	Jun-08	0.1103	0.0638	0.0465
107	Jul-08	0.1150	0.0640	0.0510
108	Aug-08	0.1161	0.0637	0.0524
109	Sep-08	0.1104	0.0649	0.0455
110	Oct-08	0.1191	0.0756	0.0435
111	Nov-08	0.1219	0.0760	0.0459
112	Dec-08	0.1218	0.0654	0.0564
113	Jan-09	0.1197	0.0639	0.0558
114	Feb-09	0.1224	0.0630	0.0594
115	Mar-09	0.1253	0.0642	0.0610
116	Apr-09	0.1228	0.0648	0.0579
117	May-09	0.1130	0.0649	0.0481
118	Jun-09	0.1110	0.0620	0.0490
119	Jul-09	0.1108	0.0597	0.0511
120	AVERAGE	0.1115	0.0674	0.0441

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

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

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

SCHEDULE JVW-3
COMPARATIVE RETURNS ON S&P 500 STOCK INDEX
AND MOODY'S A-RATED UTILITY BONDS 1937 - 2006

Line No.	Year	S&P 500 Stock Price	Stock Dividend Yield	Stock Return	A-rated Bond Price	Bond Return
1	2009	865.58	0.0310		$68.43	
2	2008	1,380.33	0.0211	-35.19%	$72.25	0.24%
3	2007	1,424.16	0.0181	-1.27%	$72.91	4.59%
4	2006	1,278.72	0.0183	13.20%	$75.25	2.20%
5	2005	1,181.41	0.0177	10.01%	$74.91	5.80%
6	2004	1,132.52	0.0162	5.94%	$70.87	11.34%
7	2003	895.84	0.0180	28.22%	$62.26	20.27%
8	2002	1,140.21	0.0138	-20.05%	$57.44	15.35%
9	2001	1,335.63	0.0116	-13.47%	$56.40	8.93%
10	2000	1,425.59	0.0118	-5.13%	$52.60	14.82%
11	1999	1,248.77	0.0130	15.46%	$63.03	-10.20%
12	1998	963.35	0.0162	31.25%	$62.43	7.38%
13	1997	766.22	0.0195	27.68%	$56.62	17.32%
14	1996	614.42	0.0231	27.02%	$60.91	-0.48%
15	1995	465.25	0.0287	34.93%	$50.22	29.26%
16	1994	472.99	0.0269	1.05%	$60.01	-9.65%
17	1993	435.23	0.0288	11.56%	$53.13	20.48%
18	1992	416.08	0.0290	7.50%	$49.56	15.27%
19	1991	325.49	0.0382	31.65%	$44.84	19.44%
20	1990	339.97	0.0341	-0.85%	$45.60	7.11%
21	1989	285.41	0.0364	22.76%	$43.06	15.18%
22	1988	250.48	0.0366	17.61%	$40.10	17.36%
23	1987	264.51	0.0317	-2.13%	$48.92	-9.84%
24	1986	208.19	0.0390	30.95%	$39.98	32.36%
25	1985	171.61	0.0451	25.83%	$32.57	35.05%
26	1984	166.39	0.0427	7.41%	$31.49	16.12%
27	1983	144.27	0.0479	20.12%	$29.41	20.65%
28	1982	117.28	0.0595	28.96%	$24.48	36.48%
29	1981	132.97	0.0480	-7.00%	$29.37	-3.01%
30	1980	110.87	0.0541	25.34%	$34.69	-3.81%
31	1979	99.71	0.0533	16.52%	$43.91	-11.89%
32	1978	90.25	0.0532	15.80%	$49.09	-2.40%
33	1977	103.80	0.0399	-9.06%	$50.95	4.20%
34	1976	96.86	0.0380	10.96%	$43.91	25.13%
35	1975	72.56	0.0507	38.56%	$41.76	14.75%
36	1974	96.11	0.0364	-20.86%	$52.54	-12.91%
37	1973	118.40	0.0269	-16.14%	$58.51	-3.37%
38	1972	103.30	0.0296	17.58%	$56.47	10.69%
39	1971	93.49	0.0332	13.81%	$53.93	12.13%
40	1970	90.31	0.0356	7.08%	$50.46	14.81%
41	1969	102.00	0.0306	-8.40%	$62.43	-12.76%
42	1968	95.04	0.0313	10.45%	$66.97	-0.81%
43	1967	84.45	0.0351	16.05%	$78.69	-9.81%

Line No.	Year	S&P 500 Stock Price	Stock Dividend Yield	Stock Return	A-rated Bond Price	Bond Return
44	1966	93.32	0.0302	-6.48%	$86.57	-4.48%
45	1965	86.12	0.0299	11.35%	$91.40	-0.91%
46	1964	76.45	0.0305	15.70%	$92.01	3.68%
47	1963	65.06	0.0331	20.82%	$93.56	2.61%
48	1962	69.07	0.0297	-2.84%	$89.60	8.89%
49	1961	59.72	0.0328	18.94%	$89.74	4.29%
50	1960	58.03	0.0327	6.18%	$84.36	11.13%
51	1959	55.62	0.0324	7.57%	$91.55	-3.49%
52	1958	41.12	0.0448	39.74%	$101.22	-5.60%
53	1957	45.43	0.0431	-5.18%	$100.70	4.49%
54	1956	44.15	0.0424	7.14%	$113.00	-7.35%
55	1955	35.60	0.0438	28.40%	$116.77	0.20%
56	1954	25.46	0.0569	45.52%	$112.79	7.07%
57	1953	26.18	0.0545	2.70%	$114.24	2.24%
58	1952	24.19	0.0582	14.05%	$113.41	4.26%
59	1951	21.21	0.0634	20.39%	$123.44	-4.89%
60	1950	16.88	0.0665	32.30%	$125.08	1.89%
61	1949	15.36	0.0620	16.10%	$119.82	7.72%
62	1948	14.83	0.0571	9.28%	$118.50	4.49%
63	1947	15.21	0.0449	1.99%	$126.02	-2.79%
64	1946	18.02	0.0356	-12.03%	$126.74	2.59%
65	1945	13.49	0.0460	38.18%	$119.82	9.11%
66	1944	11.85	0.0495	18.79%	$119.82	3.34%
67	1943	10.09	0.0554	22.98%	$118.50	4.49%
68	1942	8.93	0.0788	20.87%	$117.63	4.14%
69	1941	10.55	0.0638	-8.98%	$116.34	4.55%
70	1940	12.30	0.0458	-9.65%	$112.39	7.08%
71	1939	12.50	0.0349	1.89%	$105.75	10.05%
72	1938	11.31	0.0784	18.36%	$99.83	9.94%
73	1937	17.59	0.0434	-31.36%	$103.18	0.63%
74	S&P 500 Return 1937--2009		10.8%			
75	A-rated Utility Bond Return		6.3%			
76	Risk Premium		4.5%			

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

SCHEDULE JVW-4
COMPARATIVE RETURNS ON S&P UTILITY STOCK INDEX
AND MOODY'S A-RATED UTILITY BONDS 1937 - 2006

Line No.	Year	S&P Utility Stock Price	Stock Dividend Yield	Stock Return	A-rated Bond Yield	Bond Return
1	2009				$68.43	
2	2008			-25.90%	$72.25	0.24%
3	2007			16.56%	$72.91	4.59%
4	2006			20.76%	$75.25	2.20%
5	2005			16.05%	$74.91	5.80%
6	2004			22.84%	$70.87	11.34%
7	2003			23.48%	$62.26	20.27%
8	2002			-14.73%	$57.44	15.35%
9						
10	2002	243.79	0.0362		$57.44	
11	2001	307.70	0.0287	-17.90%	$56.40	8.93%
12	2000	239.17	0.0413	32.78%	$52.60	14.82%
13	1999	253.52	0.0394	-1.72%	$63.03	-10.20%
14	1998	228.61	0.0457	15.47%	$62.43	7.38%
15	1997	201.14	0.0492	18.58%	$56.62	17.32%
16	1996	202.57	0.0454	3.83%	$60.91	-0.48%
17	1995	153.87	0.0584	37.49%	$50.22	29.26%
18	1994	168.70	0.0496	-3.83%	$60.01	-9.65%
19	1993	159.79	0.0537	10.95%	$53.13	20.48%
20	1992	149.70	0.0572	12.46%	$49.56	15.27%
21	1991	138.38	0.0607	14.25%	$44.84	19.44%
22	1990	146.04	0.0558	0.33%	$45.60	7.11%
23	1989	114.37	0.0699	34.68%	$43.06	15.18%
24	1988	106.13	0.0704	14.80%	$40.10	17.36%
25	1987	120.09	0.0588	-5.74%	$48.92	-9.84%
26	1986	92.06	0.0742	37.87%	$39.98	32.36%
27	1985	75.83	0.0860	30.00%	$32.57	35.05%
28	1984	68.50	0.0925	19.95%	$31.49	16.12%
29	1983	61.89	0.0948	20.16%	$29.41	20.65%
30	1982	51.81	0.1074	30.20%	$24.48	36.48%
31	1981	52.01	0.0978	9.40%	$29.37	-3.01%
32	1980	50.26	0.0953	13.01%	$34.69	-3.81%
33	1979	50.33	0.0893	8.79%	$43.91	-11.89%
34	1978	52.40	0.0791	3.96%	$49.09	-2.40%
35	1977	54.01	0.0714	4.16%	$50.95	4.20%
36	1976	46.99	0.0776	22.70%	$43.91	25.13%
37	1975	38.19	0.0920	32.24%	$41.76	14.75%
38	1974	48.60	0.0713	-14.29%	$52.54	-12.91%
39	1973	60.01	0.0556	-13.45%	$58.51	-3.37%
40	1972	60.19	0.0542	5.12%	$56.47	10.69%
41	1971	63.43	0.0504	-0.07%	$53.93	12.13%
42	1970	55.72	0.0561	19.45%	$50.46	14.81%
43	1969	68.65	0.0445	-14.38%	$62.43	-12.76%
44	1968	68.02	0.0435	5.28%	$66.97	-0.81%

Line No.	Year	S&P Utility Stock Price	Stock Dividend Yield	Stock Return	A-rated Bond Yield	Bond Return
45	1967	70.63	0.0392	0.22%	$78.69	-9.81%
46	1966	74.50	0.0347	-1.72%	$86.57	-4.48%
47	1965	75.87	0.0315	1.34%	$91.40	-0.91%
48	1964	67.26	0.0331	16.11%	$92.01	3.68%
49	1963	63.35	0.0330	9.47%	$93.56	2.61%
50	1962	62.69	0.0320	4.25%	$89.60	8.89%
51	1961	52.73	0.0358	22.47%	$89.74	4.29%
52	1960	44.50	0.0403	22.52%	$84.36	11.13%
53	1959	43.96	0.0377	5.00%	$91.55	-3.49%
54	1958	33.30	0.0487	36.88%	$101.22	-5.60%
55	1957	32.32	0.0487	7.90%	$100.70	4.49%
56	1956	31.55	0.0472	7.16%	$113.00	-7.35%
57	1955	29.89	0.0461	10.16%	$116.77	0.20%
58	1954	25.51	0.0520	22.37%	$112.79	7.07%
59	1953	24.41	0.0511	9.62%	$114.24	2.24%
60	1952	22.22	0.0550	15.36%	$113.41	4.26%
61	1951	20.01	0.0606	17.10%	$123.44	-4.89%
62	1950	20.20	0.0554	4.60%	$125.08	1.89%
63	1949	16.54	0.0570	27.83%	$119.82	7.72%
64	1948	16.53	0.0535	5.41%	$118.50	4.49%
65	1947	19.21	0.0354	-10.41%	$126.02	-2.79%
66	1946	21.34	0.0298	-7.00%	$126.74	2.59%
67	1945	13.91	0.0448	57.89%	$119.82	9.11%
68	1944	12.10	0.0569	20.65%	$119.82	3.34%
69	1943	9.22	0.0621	37.45%	$118.50	4.49%
70	1942	8.54	0.0940	17.36%	$117.63	4.14%
71	1941	13.25	0.0717	-28.38%	$116.34	4.55%
72	1940	16.97	0.0540	-16.52%	$112.39	7.08%
73	1939	16.05	0.0553	11.26%	$105.75	10.05%
74	1938	14.30	0.0730	19.54%	$99.83	9.94%
75	1937	24.34	0.0432	-36.93%	$103.18	0.63%
76	Return 1937—2009	Stocks	10.5%			
77		Bonds	6.3%			
78	Risk Premium		4.2%			

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

SCHEDULE JVW-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:

Ending Wealth	Probability
$1.30	0.50
$0.90	0.50

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

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

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

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

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

The arithmetic mean of this investment is:

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

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

The geometric mean of this investment is:

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

Thus, the geometric mean is not equal to the cost of equity capital.
The lesson is obvious: for an investment with an uncertain outcome, the arithmetic mean is the best measure of the cost of equity capital.

SCHEDULE JVW-6
CALCULATION OF CAPITAL ASSET PRICING MODEL COST OF EQUITY
USING MORNINGSTAR 6.5 PERCENT RISK PREMIUM[10]

1	Risk-free Rate	4.97%	20-year Treasury Bond Yield
2	Beta	0.70	Average Beta Proxy Companies
3	Risk Premium	6.50%	Long-horizon SBBI risk premium
4	Beta x Risk Premium	4.55%	
5	Model Result	9.52%	

10 SBBI® risk premium from Ibbotson® SBBI® 2009 Valuation Yearbook, published by Morningstar®, Value Line beta for comparable companies from Value Line Investment Analyzer August 2009; forecasted Treasury bond yield determined from *Blue Chip Financial Forecasts*, August 1, 2009, using Blue Chip forecast for 30-yr Treasury bond plus current difference between 30-year and 20-year Treasury bonds. The average July yield on 30-year Treasury bonds is 4.41 percent, and for 20-year Treasury bonds, 4.38 percent, a spread of 3 basis points. The Blue Chip forecasted yield on 30-year Treasury bonds for Q4 2010 is 5.0 percent. Thus, the estimated forecasted yield on 20-year Treasury bonds is 4.97 percent.

PROXY COMPANY BETAS

LINE NO.	COMPANY	BETA	MARKET CAP $ (MIL)
1	Amer. Elec. Power	0.75	14,761
2	ALLETE	0.70	1,061
3	CMS Energy Corp.	0.80	2,962
4	Dominion Resources	0.70	20,120
5	DPL Inc.	0.60	2,777
6	Duke Energy	0.65	19,925
7	Consol. Edison	0.65	10,800
8	Entergy Corp.	0.70	15,219
9	FirstEnergy Corp.	0.85	12,559
10	FPL Group	0.75	23,317
11	Hawaiian Elec.	0.70	1,636
12	Alliant Energy	0.70	2,894
13	NSTAR	0.65	3,429
14	Northeast Utilities	0.70	4,030
15	PG&E Corp.	0.55	14,871
16	Public Serv. Enterprise	0.80	16,419
17	Progress Energy	0.65	11,005
18	Pinnacle West Capital	0.75	3,231
19	Pepco Holdings	0.80	3,163
20	Portland General	0.75	1,431
21	SCANA Corp.	0.70	4,306
22	Southern Co.	0.55	24,417
23	Sempra Energy	0.85	12,863
24	UIL Holdings	0.70	716
25	Vectren Corp.	0.75	1,992
26	Wisconsin Energy	0.65	5,024
27	Westar Energy	0.75	2,138
28	Xcel Energy Inc.	0.65	9,087
29	Market-weighted Average	0.70	

Betas from Value Line Investment Analyzer August 2009; market capitalization from Thomson Reuters (see Schedule 1).

SCHEDULE JVW-7
CALCULATION OF CAPITAL ASSET PRICING MODEL COST OF EQUITY
USING DCF ESTIMATE OF THE EXPECTED RATE OF RETURN
ON THE MARKET PORTFOLIO[11]

1	Risk-free Rate	4.97%	20-year Treasury Bond Yield
2	Beta	0.70	Average Beta Proxy Companies
3	DCF S&P 500	12.6%	DCF Cost of Equity S&P 500 (see following)
4	Risk Premium	7.60%	
5	Beta * RP	5.32%	
6	Model Result	10.3%	

[11] Value Line beta for comparable companies from Value Line Investment Analyzer August 2009; forecasted Treasury bond yield determined from *Blue Chip Financial Forecasts*, August 1, 2009, using Blue Chip forecast for 30-yr Treasury bond plus current difference between 30-year and 20-year Treasury bonds. The average July yield on 30-year Treasury bonds is 4.41 percent, and for 20-year Treasury bonds, 4.38 percent, a spread of 3 basis points. The Blue Chip forecasted yield on 30-year Treasury bonds for Q4 2010 is 5.0 percent. Thus, the estimated forecasted yield on 20-year Treasury bonds is 4.97 percent.

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

COMPANY	P_0	D_0	GROWTH	COST OF EQUITY
3M	60.46	2.04	10.13%	13.9%
ABERCROMBIE & FITCH	27.61	0.70	10.98%	13.8%
AETNA	25.61	0.04	12.60%	12.8%
ALLERGAN	47.14	0.20	13.28%	13.8%
ALLSTATE	25.15	0.80	9.20%	12.7%
AMERICAN EXPRESS	25.55	0.72	10.00%	13.1%
AMERISOURCEBERGEN	18.38	0.20	11.57%	12.8%
AON	37.40	0.60	12.35%	14.2%
APPLIED MATS.	11.75	0.24	8.71%	10.9%
ASSURANT	24.26	0.60	8.75%	11.5%
AT&T	24.84	1.64	4.11%	11.2%
BANK OF NEW YORK MELLON	28.69	0.36	11.43%	12.8%
BECTON DICKINSON	67.82	1.32	11.72%	13.9%
BEMIS	25.01	0.90	8.00%	11.9%
BOEING	43.97	1.68	8.29%	12.5%
BRISTOL MYERS SQUIBB	20.23	1.24	7.04%	13.8%
BROWN-FORMAN 'B'	44.95	1.15	8.10%	10.9%
CA	18.01	0.16	9.60%	10.6%
CAMPBELL SOUP	28.57	1.00	8.43%	12.3%
CATERPILLAR	36.63	1.68	9.00%	14.1%
CHUBB	40.82	1.40	8.50%	12.3%
CINTAS	23.53	0.47	11.75%	14.0%
CLOROX	55.64	2.00	9.67%	13.7%
CME GROUP	291.33	4.60	10.92%	12.7%
CMS ENERGY	11.92	0.50	6.75%	11.3%
COCA COLA ENTS.	17.31	0.32	9.20%	11.2%
COLGATE-PALM.	68.42	1.76	9.75%	12.6%
COMCAST 'A'	14.45	0.27	11.25%	13.3%
CONSOL EN.	35.90	0.40	12.03%	13.3%
COSTCO WHOLESALE	47.29	0.72	11.54%	13.2%
CSX	33.21	0.88	9.88%	12.8%
CUMMINS	34.44	0.70	10.33%	12.6%
CVS CAREMARK	31.75	0.30	13.05%	14.1%
DANAHER	60.93	0.12	10.39%	10.6%
DENTSPLY INTL.	30.02	0.20	12.67%	13.4%
DOMINION RES.	32.50	1.75	6.36%	12.2%
DUKE ENERGY	14.38	0.96	3.50%	10.6%
EATON	45.95	2.00	7.25%	12.0%
ENTERGY	74.35	3.00	9.02%	13.5%
ESTEE LAUDER COS.'A'	33.17	0.55	12.00%	13.9%
FAMILY DOLLAR STORES	30.50	0.54	12.15%	14.1%
FEDERATED INVRS.'B'	24.16	0.96	9.00%	13.4%
FIRSTENERGY	39.49	2.20	6.67%	12.7%
FLUOR	47.91	0.50	12.40%	13.6%
FPL GROUP	56.43	1.89	9.59%	13.3%
FRANKLIN RESOURCES	70.83	0.84	10.00%	11.3%
GAP	16.37	0.34	10.00%	12.3%
GENERAL DYNAMICS	55.12	1.52	8.86%	11.9%
GENERAL ELECTRIC	12.66	0.40	9.07%	12.6%
GENUINE PARTS	33.66	1.60	6.00%	11.1%
GOLDMAN SACHS GP.	143.65	1.40	12.40%	13.5%

COMPANY	P_0	D_0	GROWTH	COST OF EQUITY
HARLEY-DAVIDSON	18.41	0.40	9.50%	11.9%
HARRIS	29.42	0.76	11.00%	13.9%
HARTFORD FINL.SVS.GP.	13.78	0.20	9.33%	10.9%
HASBRO	25.19	0.80	9.00%	12.5%
HEWLETT-PACKARD	37.47	0.32	10.07%	11.0%
HOME DEPOT	24.20	0.90	9.88%	14.0%
HONEYWELL INTL.	32.88	1.21	9.38%	13.5%
INTEL	16.61	0.56	10.00%	13.8%
INTERNATIONAL BUS.MCHS.	106.61	2.20	9.92%	12.2%
INTL.GAME TECH.	16.02	0.24	12.50%	14.2%
ITT	43.96	0.85	8.50%	10.6%
JANUS CAPITAL GP.	11.11	0.04	10.67%	11.1%
JOHNSON & JOHNSON	56.35	1.96	8.13%	11.9%
JP MORGAN CHASE & CO.	35.33	0.20	12.00%	12.6%
KB HOME	15.03	0.25	10.50%	12.3%
KELLOGG	45.48	1.50	9.84%	13.5%
KRAFT FOODS	26.03	1.16	8.47%	13.4%
L3 COMMUNICATIONS	72.36	1.40	10.66%	12.8%
LENNAR 'A'	9.43	0.16	8.67%	10.5%
LINCOLN NAT.	16.66	0.04	11.45%	11.7%
LOCKHEED MARTIN	80.81	2.28	10.56%	13.7%
LOWE'S COMPANIES	20.03	0.36	11.75%	13.8%
MCDONALDS	57.06	2.00	8.99%	12.9%
MCKESSON	43.02	0.48	11.27%	12.5%
MEDTRONIC	33.68	0.82	10.54%	13.3%
MICROSOFT	22.15	0.52	10.17%	12.8%
MOLSON COORS BREWING 'B'	43.13	0.96	10.82%	13.3%
MOODY'S	27.52	0.40	9.00%	10.6%
MORGAN STANLEY	27.72	0.20	11.60%	12.4%
NEWELL RUBBERMAID	11.08	0.20	9.80%	11.8%
NIKE 'B'	54.06	1.00	12.11%	14.2%
NISOURCE	11.57	0.92	3.00%	11.4%
NORDSTROM	21.78	0.64	10.00%	13.3%
NORTHEAST UTILITIES	21.59	0.95	8.33%	13.2%
OMNICOM GP.	31.94	0.60	11.63%	13.7%
PACCAR	32.16	0.36	10.25%	11.5%
PARKER-HANNIFIN	44.24	1.00	10.00%	12.5%
PEABODY ENERGY	31.44	0.24	9.67%	10.5%
PENNEY JC	28.39	0.80	10.27%	13.4%
PEOPLES UNITED FINANCIAL	15.78	0.61	9.33%	13.6%
PEPCO HOLDINGS	13.10	1.08	3.67%	12.5%
PERKINELMER	17.12	0.28	11.75%	13.6%
PG&E	37.52	1.68	7.07%	11.9%
PINNACLE WEST CAP.	28.90	2.10	5.67%	13.6%
POLO RALPH LAUREN 'A'	54.40	0.20	13.75%	14.2%
PRAXAIR	73.12	1.60	9.62%	12.0%
PROCTER & GAMBLE	52.00	1.76	9.50%	13.3%
PROGRESS ENERGY	36.58	2.48	5.36%	12.7%
QUEST DIAGNOSTICS	53.12	0.40	12.39%	13.2%
RADIOSHACK	13.91	0.25	9.48%	11.5%
RAYTHEON 'B'	45.34	1.24	11.14%	14.2%
ROCKWELL AUTOMATION	33.22	1.16	8.00%	11.8%
SARA LEE	9.49	0.44	8.43%	13.5%
SCANA	31.74	1.88	5.34%	11.7%
SCHERING-PLOUGH	24.40	0.26	11.10%	12.3%

COMPANY	P_0	D_0	GROWTH	COST OF EQUITY
SHERWIN-WILLIAMS	54.89	1.42	8.83%	11.7%
SOUTHERN	30.07	1.75	4.97%	11.2%
SOUTHWEST AIRLINES	6.99	0.02	12.67%	13.0%
STANLEY WORKS	35.98	1.32	8.00%	12.0%
STATE STREET	44.45	0.04	10.43%	10.5%
STRYKER	39.44	0.40	12.53%	13.7%
T ROWE PRICE GP.	41.15	1.00	10.75%	13.5%
TEXTRON	11.10	0.08	11.40%	12.2%
TIFFANY & CO	27.46	0.68	10.75%	13.5%
TIME WARNER	24.90	0.75	8.06%	11.4%
TJX COS.	30.80	0.48	12.17%	13.9%
TOTAL SYSTEM SERVICES	13.49	0.28	9.38%	11.7%
UNITED PARCEL SER.	51.34	1.80	7.65%	11.5%
UNITED TECHNOLOGIES	52.29	1.54	9.00%	12.2%
VERIZON COMMUNICATIONS	30.23	1.84	4.58%	11.1%
WALGREEN	30.32	0.55	12.00%	14.0%
WELLS FARGO & CO	23.91	0.20	10.75%	11.7%
WESTERN UNION	17.00	0.04	11.64%	11.9%
WINDSTREAM	8.45	1.00	0.82%	13.3%
WISCONSIN ENERGY	40.33	1.35	9.03%	12.7%
WW GRAINGER	81.86	1.84	11.26%	13.8%
XCEL ENERGY	18.19	0.98	6.58%	12.4%
XTO EN.	39.15	0.50	11.40%	12.8%
Market-weighted Average				12.6%

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% 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 July 2009 per Thomson Reuters.
g = I/B/E/S forecast of future earnings growth July 2009.
k = Cost of equity using the quarterly version of the DCF model shown below:

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

APPENDIX 1
QUALIFICATIONS OF JAMES H. VANDER WEIDE

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

Educational Background and Prior Academic Experience

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

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

Publications

Dr. Vander Weide has written a book entitled *Managing Corporate Liquidity: An Introduction to Working Capital Management* published by John Wiley and Sons, Inc. He has also written a chapter titled, "Financial Management in the Short Run" for *The Handbook of Modern Finance*;" a chapter for *The Handbook of Portfolio Construction: Contemporary Applications of Markowitz Techniques,* "Principles for Lifetime Portfolio Selection: Lessons from Portfolio Theory," and written research papers on such topics as portfolio management, capital

budgeting, investments, the effect of regulation on the performance of public utilities, and cash management. His articles have been published in *American Economic Review, Financial Management, International Journal of Industrial Organization, Journal of Finance, Journal of Financial and Quantitative Analysis, Journal of Bank Research, Journal of Portfolio Management, Journal of Accounting Research, Journal of Cash Management, Management Science, Atlantic Economic Journal, Journal of Economics and Business,* and *Computers and Operations Research.*

Professional Consulting Experience

Dr. Vander Weide has provided financial and economic consulting services to firms in the electric, gas, insurance, telecommunications, and water industries for more than 25 years. He has testified on the cost of capital, competition, risk, incentive regulation, forward-looking economic cost, economic pricing guidelines, depreciation, accounting, valuation, and other financial and economic issues in more than 400 cases before the United States Congress, the Canadian Radio-Television and Telecommunications Commission, the Federal Communications Commission, the National Energy Board (Canada), the National Telecommunications and Information Administration, the Federal Energy Regulatory Commission, the Alberta Utilities Board (Canada), the public service commissions of 43 states and the District of Columbia, the insurance commissions of five states, the Iowa State Board of Tax Review, the National Association of Securities Dealers, and the North Carolina Property Tax Commission. In addition, he has testified as an expert witness in proceedings before the United States District Court for the District of New Hampshire; United States District Court for the Northern District of California; United States District Court for the Northern District of Illinois, United States District Court for the District of Nebraska; United States District Court for the Eastern District of North Carolina; Superior Court of North Carolina, the United States Bankruptcy Court for the Southern District of West Virginia; and United States District Court for the Eastern District of Michigan. With respect to implementation of the Telecommunications Act of 1996, Dr. Vander Weide has testified in 30 states on issues relating to the pricing of unbundled network elements and universal service cost studies and has consulted with Bell Canada, Deutsche Telekom, and Telefónica on similar issues. He has also provided expert testimony on issues related to electric and natural gas restructuring. He has worked for Bell Canada/Nortel on a special task force to study the effects of vertical integration in the Canadian telephone industry and has worked for Bell Canada as an expert witness on the cost of capital. Dr. Vander Weide has provided consulting and expert witness testimony to the following companies:

Telecommunications Companies

ALLTEL and its subsidiaries
AT&T (old)
Bell Canada/Nortel
Centel and its subsidiaries
Cisco Systems
Ameritech (now AT&T new)
Verizon (Bell Atlantic) and subsidiaries
BellSouth and its subsidiaries
Cincinnati Bell (Broadwing)
Citizens Telephone Company

Concord Telephone Company
Deutsche Telekom
Heins Telephone Company
JDS Uniphase
Minnesota Independent Equal Access Corp.
Pacific Telesis and its subsidiaries
Pine Drive Cooperative Telephone Co.
Siemens
Sherburne Telephone Company
The Stentor Companies
Telefónica
Woodbury Telephone Company
U S West (Qwest)

Electric, Gas, and Water Companies

Alcoa Power Generating, Inc.
Alliant Energy
AltaLink, L.P.
Ameren
American Water Works
Atmos Energy
Central Illinois Public Service
Citizens Utilities
Consolidated Natural Gas and its subsidiaries
Dominion Resources
Duke Energy
Empire District Electric Company
EPCOR Distribution & Transmission Inc.
EPCOR Energy Alberta Inc.
FortisAlberta Inc.
Interstate Power Company
Iowa-American Water Company
Iowa-Illinois Gas and Electric
Iowa Southern
Kentucky-American Water Company
Kentucky Power Company
MidAmerican Energy and its subsidiaries
Nevada Power Company
NICOR
North Carolina Natural Gas
Northern Natural Gas Company
Contel and its subsidiaries
GTE and subsidiaries (now Verizon)
Lucent Technologies
Tellabs, Inc.
NYNEX and its subsidiaries (Verizon)
Phillips County Cooperative Tel. Co.
Roseville Telephone Company (SureWest)
SBC Communications (now AT&T new)
Southern New England Telephone
Sprint/United and its subsidiaries
Union Telephone Company
United States Telephone Association
Valor Telecommunications (Windstream)

NOVA Gas Transmission Ltd.
North Shore Gas
PacifiCorp
PG&E
Peoples Energy and its subsidiaries
The Peoples Gas, Light and Coke Co.
Progress Energy
Public Service Company of North Carolina
PSE&G
Sempra Energy
South Carolina Electric and Gas
Southern Company and subsidiaries
Tennessee-American Water Company
Trans Québec & Maritimes Pipeline Inc.
United Cities Gas Company
Union Gas

Insurance Companies

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

Other Professional Experience

Dr. Vander Weide conducts in-house seminars and training sessions on topics such as creating shareholder value, financial analysis, competitive strategy, cost of capital, real options, financial strategy, managing growth, mergers and acquisitions, valuation, measuring corporate performance, capital budgeting, cash management, and financial planning. Among the firms for whom he has designed and taught tailored programs and training sessions are ABB Asea Brown Boveri, Accenture, Allstate, Ameritech, AT&T, Bell Atlantic/Verizon, BellSouth, Progress Energy/Carolina Power & Light, Contel, Fisons, GlaxoSmithKline, GTE, Lafarge, MidAmerican Energy, New Century Energies, Norfolk Southern, Pacific Bell Telephone, The Rank Group,

Siemens, Southern New England Telephone, TRW, and Wolseley Plc. Dr. Vander Weide has also hosted a nationally prominent conference/workshop on estimating the cost of capital. In 1989, at the request of Mr. Fuqua, Dr. Vander Weide designed the Duke Program for Manager Development for managers from the former Soviet Union, the first in the United States designed exclusively for managers from Russia and the former Soviet republics.

In the 1970's, Dr. Vander Weide helped found University Analytics, Inc., which at that time was one of the fastest growing small firms in the country. As an officer at University Analytics, he designed cash management models, databases, and software packages that are still used by most major U.S. banks in consulting with their corporate clients. Having sold his interest in University Analytics, Dr. Vander Weide now concentrates on strategic and financial consulting, academic research, and executive education.

PUBLICATIONS
JAMES H. VANDER WEIDE

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

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A Decision Analysis Approach to the Computer Lease-Purchase Decision, *Computers and Operations Research*, Vol. 4, No. 3, September, 1977, pp. 167-172 (with S. Maier).

A Practical Approach to Short-run Financial Planning, *Financial Management*, Winter, 1978 (with S. Maier). Reprinted in *Readings on the Management of Working Capital*, edited by K. V. Smith, West Publishing Company, 1979.

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Recent Developments in Management Science in Banking, *Management Science*, October 1981 (with K. Cohen and S. Maier).

Incentive Considerations in the Reporting of Leveraged Leases, *Journal of Bank Research*, April 1982 (with J. S. Hughes).

A Decision-Support System for Managing a Short-term Financial Instrument Portfolio, *Journal of Cash Management*, March 1982 (with S. Maier).

An Empirical Bayes Estimate of Market Risk, *Management Science*, July 1982 (with S. Maier and D. Peterson).

The Bond Scheduling Problem of the Multi-subsidiary Holding Company, *Management Science*, July 1982 (with K. Baker).

Deregulation and Locational Rents in Banking: a Comment, *Journal of Bank Research*, Summer 1983.

What Lockbox and Disbursement Models Really Do, *Journal of Finance*, May 1983 (with S. Maier).

Financial Management in the Short Run, *Handbook of Modern Finance*, edited by Dennis Logue, published by Warren, Gorham, & Lamont, Inc., New York, 1984.

Measuring Investors' Growth Expectations: Analysts vs. History, *The Journal of Portfolio Management*, Spring 1988 (with W. Carleton).

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SUMMARY EXPERT TESTIMONY
JAMES H. VANDER WEIDE

SPONSOR	JURISDICTION	DATE	DOCKET NO.
Sidley Austin LLP, Tellabs, Inc. Securities Litigation	U.S. District Court Northern Dist. Illinois	Aug-09	C.A. No. 02-C-4356
Duke Energy Carolinas	South Carolina	Jul-09	2009-226-E
MidAmerican Energy Company	Iowa	Jul-09	RPU-2009-0003
Duke Enegy Carolinas	North Carolina	Jun-09	E-7, SUB 909
Empire District Electric Company	Missouri	Jun-09	ER-2008-009
Terasen Gas Inc.	British Columbia Utilities Commission	May-09	
Atmos Energy	Railroad Commission of Texas	Apr-09	GUD-9869
Progress Energy	Florida	Mar-09	090079-EI
North Carolina Rate Bureau (auto)	North Carolina Dept. of Insurance	Jan-09	
EPCOR, FortisAlberta, AltaLink	Alberta Utilities Commission	Nov-08	1578571, ID-85
Trans Québec & Maritimes Pipeline Inc.	Alberta Utilities Commission	Nov-08	1578571, ID-85
Kentucky-American Water Company	Kentucky Public Service Commission	Oct-08	2008-00427
Atmos Energy	Tennessee Regulatory Authority	Oct-08	0800197
North Carolina Rate Bureau (workers compensation)	North Carolina Dept. of Insurance	Aug-08	
Dorsey & Whitney LLP-Williams v. Gannon	Montana 2nd Judicial Dist. Ct. Silver Bow County	Apr-08	DV-02-201
Atmos Energy	Georgia	Mar-08	27163-U
North Carolina Rate Bureau (auto)	North Carolina Dept. of Insurance	Jan-08	
Trans Québec & Maritimes Pipeline Inc.	National Energy Board (Canada)	Dec-07	RH-1-2008
Xcel Energy	North Dakota	Dec-07	PU-07-776
Verizon Southwest	Texas	Nov-07	34723
Empire District Electric Company	Missouri	Oct-07	ER-2008-0093
North Carolina Rate Bureau (workers compensation)	North Carolina Dept. of Insurance	Sep-07	
Verizon North Inc. Contel of the South Inc.	Michigan	Aug-07	Case No. U-15210
Georgia Power Company	Georgia	Jun-07	25060-U
Duke Energy Carolinas	North Carolina	May-07	E-7 Sub 828 et al
MidAmerican Energy Company	Iowa	May-07	SPU-06-5 et al
Morrison & Foerster LLP-JDS Uniphase Securities Litigation	U.S. District Court Northern District California	Feb-07	C-02-1486-CW
North Carolina Rate Bureau (homeowners)	North Carolina Dept. of Insurance	Dec-06	
San Diego Gas & Electric	FERC	Nov-06	ER07-284-000
North Carolina Rate Bureau (workers compensation)	North Carolina Dept. of Insurance	Aug-06	
Union Electric Company d/b/a AmerenUE	Missouri	Jun-06	ER-2007-0002
North Carolina Rate Bureau (homeowners)	North Carolina Dept. of Insurance	May-06	
North Carolina Rate Bureau (dwelling fire)	North Carolina Dept. of Insurance	Mar-06	
Empire District Electric Company	Missouri	Feb-06	ER-2006-0315
PacifiCorp Power & Light Company	Washington	Jan-06	UE-050684
Verizon Maine	Maine	Dec-05	2005-155
Winston & Strawn LLP-Cisco Systems Securities Litigation	U.S. District Court Northern District California	Nov-05	C-01-20418-JW
Dominion Virginia Power	Virginia	Nov-05	PUE-2004-00048
Bryan Cave LLP--Omniplex Comms. v. Lucent Technologies	U.S. District Court Eastern District Missouri	Sep-05	04CV00477 ERW
North Carolina Rate Bureau (workers comp)	North Carolina Dept. of Insurance	Sep-05	
Empire District Electric Company	Kansas	Sep-05	05-EPDE-980-RTS
Verizon Southwest	Texas	Jul-05	29315
PG&E Company	FERC	Jul-05	ER-05-1284
Dominion Hope	West Virginia	Jun-05	05-034-G42T
Empire District Electric Company	Missouri	Jun-05	EO-2005-0263

SPONSOR	JURISDICTION	DATE	DOCKET NO.
Verizon New England	U.S. District Court New Hampshire	May-05	04-CV-65-PB
San Diego Gas & Electric	California	May-05	05-05-012
Progress Energy	Florida	May-05	50078
Verizon Vermont	Vermont	Feb-05	6959
North Carolina Rate Bureau (homeowners)	North Carolina Dept. of Insurance	Feb-05	
Verizon Florida	Florida	Jan-05	050059-TL
Verizon Illinois	Illinois	Jan-05	00-0812
Dominion Resources	North Carolina	Sep-04	E-22 Sub 412
Tennessee-American Water Company	Tennessee	Aug-04	04-00288
Valor Telecommunications of Texas, LP.	New Mexico	Jul-04	3495 Phase C
Alcoa Power Generating Inc.	North Carolina Property Tax Commission	Jul-04	02 PTC 162 and 02 PTC 709
PG&E Company	California	May-04	04-05-21
Verizon Northwest	Washington	Apr-04	UT-040788
Verizon Northwest	Washington	Apr-04	UT-040788
Kentucky-American Water Company	Kentucky	Apr-04	2004-00103
MidAmerican Energy	South Dakota	Apr-04	NG4-001
Empire District Electric Company	Missouri	Apr-04	ER-2004-0570
Interstate Power and Light Company	Iowa	Mar-04	RPU-04-01
North Carolina Rate Bureau (auto)	North Carolina Dept. of Insurance	Feb-04	
Northern Natural Gas Company	FERC	Feb-04	RP04-155-000
Verizon New Jersey	New Jersey	Jan-04	TO00060356
Verizon	FCC	Jan-04	03-173, FCC 03-224
Verizon	FCC	Dec-03	03-173, FCC 03-224
Verizon California Inc.	California	Nov-03	R93-04-003,I93-04-002
Phillips County Telephone Company	Colorado	Nov-03	03S-315T
North Carolina Rate Bureau (homeowners)	North Carolina Dept. of Insurance	Oct-03	
PG&E Company	FERC	Oct-03	ER04-109-000
Allstate Insurance Company	Texas Department of Insurance	Sep-03	2568
Verizon Northwest Inc.	Washington	Jul-03	UT-023003
Empire District Electric Company	Oklahoma	Jul-03	Case No. PUD 200300121
Verizon Virginia Inc.	FCC	Apr-03	CC-00218,00249,00251
North Carolina Rate Bureau (dwelling fire)	North Carolina Dept. of Insurance	Apr-03	
Northern Natural Gas Company	FERC	Apr-03	RP03-398-000
MidAmerican Energy	Iowa	Apr-03	RPU-03-1, WRU-03-25-156
PG&E Company	FERC	Mar-03	ER03666000
Verizon Florida Inc.	Florida	Feb-03	981834-TP/990321-TP
Verizon North	Indiana	Feb-03	42259
San Diego Gas & Electric	FERC	Feb-03	ER03-601000
North Carolina Rate Bureau (auto)	North Carolina Dept. of Insurance	Jan-03	
Gulf Insurance Company	Superior Court, North Carolina	Jan-03	2000-CVS-3558
PG&E Company	FERC	Jan-03	ER03409000
Verizon New England Inc. New Hampshire	New Hampshire	Dec-02	DT 02-110
Verizon Northwest	Washington	Dec-02	UT 020406
PG&E Company	California	Dec-02	
MidAmerican Energy	Iowa	Nov-02	RPU-02-3, 02-8
MidAmerican Energy	Iowa	Nov-02	RPU-02-10
Verizon Michigan	US District Court Eastern District of Michigan	Sep-02	Civil Action No. 00-73208
North Carolina Rate Bureau (workers comp)	North Carolina Dept. of Insurance	Sep-02	
Verizon New England Inc. New Hampshire	New Hampshire	Aug-02	DT 02-110
Interstate Power Company	Iowa Board of Tax Review	Jul-02	832
PG&E Company	California	May-02	A 02-05-022 et al
Verizon New England Inc. Massachusetts	FCC	May-02	EB 02 MD 006
Verizon New England Inc. Rhode Island	Rhode Island	May-02	Docket No. 2681
NEUMEDIA, INC.	US Bankruptcy Court Southern District W. Virginia	Apr-02	Case No. 01-20873

SPONSOR	JURISDICTION	DATE	DOCKET NO.
North Carolina Rate Bureau (homeowners)	North Carolina Dept. of Insurance	Mar-02	
MidAmerican Energy Company	Iowa	Mar-02	RPU 02 2
North Carolina Natural Gas Company	North Carolina	Feb-02	G21 Sub 424
North Carolina Rate Bureau (auto)	North Carolina Dept. of Insurance	Jan-02	
Verizon Pennsylvania	Pennsylvania	Dec-01	R-00016683
Verizon Florida	Florida	Nov-01	99064B-TP
PG&E Company	FERC	Nov-01	ER0166000
Verizon Delaware	Delaware	Oct-01	96-324 Phase II
Florida Power Corporation	Florida	Sep-01	000824-EL
North Carolina Rate Bureau (workers comp)	North Carolina Dept. of Insurance	Sep-01	
Verizon Washington DC	District of Columbia	Jul-01	962
Verizon Virginia	FCC	Jul-01	CC-00218,00249,00251
Sherburne County Rural Telephone Company	Minnesota	Jul-01	P427/CI-00-712
Verizon New Jersey	New Jersey	Jun-01	TO01020095
Verizon Maryland	Maryland	May-01	8879
Verizon Massachusetts	Massachusetts	May-01	DTE 01-20
North Carolina Rate Bureau (auto)	North Carolina Dept. of Insurance	Apr-01	
PG&E Company	FERC	Mar-01	ER011639000
Maupin Taylor & Ellis P.A.	National Association of Securities Dealers	Jan-01	99-05099
USTA	FCC	Oct-00	RM 10011
Verizon New York	New York	Oct-00	98-C-1357
Verizon New Jersey	New Jersey	Oct-00	TO00060356
PG&E Company	FERC	Oct-00	ER0166000
Verizon New Jersey	New Jersey	Sep-00	TO99120934
North Carolina Rate Bureau (workers comp)	North Carolina Dept. of Insurance	Sep-00	
PG&E Company	California	Aug-00	00-05-018
Verizon New York	New York	Jul-00	98-C-1357
PG&E Company	California	May-00	00-05-013
PG&E Company	FERC	Mar-00	ER00-66-000
PG&E Company	FERC	Mar-00	ER99-4323-000
Bell Atlantic	New York	Feb-00	98-C-1357
USTA	FCC	Jan-00	94-1, 96-262
MidAmerican Energy	Iowa	Nov-99	SPU-99-32
PG&E Company	California	Nov-99	99-11-003
PG&E Company	FERC	Nov-99	ER973255,981261,981685
North Carolina Rate Bureau (workers comp)	North Carolina Dept. of Insurance	Sep-99	
MidAmerican Energy	Illinois	Sep-99	99-0534
PG&E Company	FERC	Sep-99	ER99-4323-000
MidAmerican Energy	FERC	Jul-99	ER99-3887
North Carolina Rate Bureau (homeowners)	North Carolina Dept. of Insurance	Jun-99	
Bell Atlantic	Vermont	May-99	6167
Nevada Power Company	FERC	May-99	
Bell Atlantic, GTE, US West	FCC	Apr-99	CC98-166
Nevada Power Company	Nevada	Apr-99	
Bell Atlantic, GTE, US West	FCC	Mar-99	CC98-166
North Carolina Rate Bureau (auto)	North Carolina Dept. of Insurance	Mar-99	
PG&E Company	FERC	Mar-99	ER99-2326-000
MidAmerican Energy	Illinois	Mar-99	099-0310
PG&E Company	FERC	Feb-99	ER99-2358,2087,2351
MidAmerican Energy	US District Court, District of Nebraska	Feb-99	8:97 CV 346
Bell Atlantic, GTE, US West	FCC	Jan-99	CC98-166
The Southern Company	FERC	Jan-99	ER98-1096
Deutsche Telekom	Germany	Nov-98	
Telefonica	Spain	Nov-98	
Cincinnati Bell Telephone Company	Ohio	Oct-98	96899TPALT

SPONSOR	JURISDICTION	DATE	DOCKET NO.
MidAmerican Energy	Iowa	Sep-98	RPU 98-5
MidAmerican Energy	South Dakota	Sep-98	NG98-011
MidAmerican Energy	Iowa	Sep-98	SPU 98-8
GTE Florida Incorporated	Florida	Aug-98	980696-TP
GTE North and South	Illinois	Jun-98	960503
GTE Midwest Incorporated	Missouri	Jun-98	TO98329
GTE North and South	Illinois	May-98	960503
MidAmerican Energy	Iowa Board of Tax Review	May-98	835
San Diego Gas & Electric	California	May-98	98-05-024
GTE Midwest Incorporated	Nebraska	Apr-98	C1416
Carolina Telephone	North Carolina	Mar-98	P100Sub133d
GTE Southwest	Texas	Feb-98	18515
North Carolina Rate Bureau (auto)	North Carolina Dept. of Insurance	Feb-98	P100sub133d
Public Service Electric & Gas	New Jersey	Feb-98	PUC734897N,-734797N,BPUEO97070461,-07070462
GTE North	Minnesota	Dec-97	P999/M97909
GTE Northwest	Oregon	Dec-97	UM874
The Southern Company	FERC	Dec-97	ER981096000
GTE North	Pennsylvania	Nov-97	A310125F0002
Bell Atlantic	Rhode Island	Nov-97	2681
GTE North	Indiana	Oct-97	40618
GTE North	Minnesota	Oct-97	P442,407/5321/CI961541
GTE Southwest	New Mexico	Oct-97	96310TC,96344TC
GTE Midwest Incorporated	Iowa	Sep-97	RPU-96-7
North Carolina Rate Bureau (workers)	North Carolina Dept. of Insurance	Sep-97	
GTE Hawaiian Telephone	Hawaii	Aug-97	7702
The Stentor Companies	Canadian Radio-television and Telecommunications Commission	Jul-97	CRTC97-11
New England Telephone	Vermont	Jul-97	5713
Bell-Atlantic-New Jersey	New Jersey	Jun-97	TX95120631
Nevada Bell	Nevada	May-97	96-9035
New England Telephone	Maine	Apr-97	96-781
GTE North, Inc.	Michigan	Apr-97	U11281
Bell Atlantic-Virginia	Virginia	Apr-97	970005
Cincinnati Bell Telephone	Ohio	Feb-97	96899TPALT
Bell Atlantic - Pennsylvania	Pennsylvania	Feb-97	A310203,213,236,258F002
North Carolina Rate Bureau (auto)	North Carolina Dept. of Insurance	Feb-97	
Bell Atlantic-Washington, D.C.	District of Columbia	Jan-97	962
Pacific Bell, Sprint, US West	FCC	Jan-97	CC 96-45
United States Telephone Association	FCC	Jan-97	CC 96-262
Bell Atlantic-Maryland	Maryland	Jan-97	8731
Bell Atlantic-West Virginia	West Virginia	Jan-97	961516, 1561, 1009TPC,961533TT
Poe, Hoof, & Reinhardt	Durham Cnty Superior Court Kountis vs. Circle K	Jan-97	95CVS04754
Bell Atlantic-Delaware	Delaware	Dec-96	96324
Bell Atlantic-New Jersey	New Jersey	Nov-96	TX95120631
Carolina Power & Light Company	FERC	Nov-96	OA96-198-000
New England Telephone	Massachusetts	Oct-96	DPU 96-73/74,-75, -80/81, -83, -94
New England Telephone	New Hampshire	Oct-96	96-252
Bell Atlantic-Virginia	Virginia	Oct-96	960044
Citizens Utilities	Illinois	Sep-96	96-0200, 96-0240
Union Telephone Company	New Hampshire	Sep-96	95-311
Bell Atlantic-New Jersey	New Jersey	Sep-96	TO-96070519
New York Telephone	New York	Sep-96	95-C-0657, 94-C-0095,91-C-1174
North Carolina Rate Bureau (workers comp)	North Carolina Dept. of Insurance	Sep-96	
MidAmerican Energy Company	Illinois	Sep-96	96-0274
MidAmerican Energy Company	Iowa	Sep-96	RPU96-8

SPONSOR	JURISDICTION	DATE	DOCKET NO.
United States Telephone Association	FCC	Mar-96	AAD-96.28
United States Telephone Association	FCC	Mar-96	CC 94-1 PhaseIV
Bell Atlantic - Maryland	Maryland	Mar-96	8715
Nevada Bell	Nevada	Mar-96	96-3002
North Carolina Rate Bureau (auto)	North Carolina Dept. of Insurance	Mar-96	
Carolina Tel. and Telegraph Co, Central Tel Co	North Carolina	Feb-96	P7 sub 825, P10 sub 479
Oklahoma Rural Telephone Coalition	Oklahoma	Oct-95	PUD950000119
BellSouth	Tennessee	Oct-95	95-02614
Wake County, North Carolina	US District Court, Eastern Dist. NC	Oct-95	594CV643H2
Bell Atlantic - District of Columbia	District of Columbia	Sep-95	814 Phase IV
South Central Bell Telephone Company	Tennessee	Aug-95	95-02614
GTE South	Virginia	Jun-95	95-0019
Roseville Telephone Company	California	May-95	A.95-05-030
Bell Atlantic - New Jersey	New Jersey	May-95	TX94090388
Cincinnati Bell Telephone Company	Ohio	May-95	941695TPACE
North Carolina Rate Bureau (auto)	North Carolina Dept. of Insurance	May-95	727
Northern Illinois Gas	Illinois	May-95	95-0219
South Central Bell Telephone Company	Kentucky	Apr-95	94-121
Midwest Gas	South Dakota	Mar-95	
Virginia Natural Gas, Inc.	Virginia	Mar-95	PUE940054
Hope Gas, Inc.	West Virginia	Mar-95	95-0003G42T
The Peoples Natural Gas Company	Pennsylvania	Feb-95	R-943252
and Coke Co., North Shore Gas, Iowa-Illinois Gas	Illinois	Jan-95	94-0403
and Electric, Central Illinois Public Service,	Illinois	Jan-95	94-0403
Northern Illinois Gas, The Peoples Gas, Light	Illinois	Jan-95	94-0403
United Cities Gas, and Interstate Power	Illinois	Jan-95	94-0403
Cincinnati Bell Telephone Company	Kentucky	Oct-94	94-355
Midwest Gas	Nebraska	Oct-94	
Midwest Power	Iowa	Sep-94	RPU-94-4
Bell Atlantic	FCC	Aug-94	CS 94-28, MM 93-215
Midwest Gas	Iowa	Jul-94	RPU-94-3
Bell Atlantic	FCC	Jun-94	CC 94-1
Nevada Power Company	Nevada	Jun-94	93-11045
Cincinnati Bell Telephone Company	Ohio	Mar-94	93-551-TP-CSS
Cincinnati Bell Telephone Company	Ohio	Mar-94	93-432-TP-ALT
GTE South/Contel	Virginia	Feb-94	PUC9300036
North Carolina Rate Bureau (auto)	North Carolina Dept. of Insurance	Feb-94	689
Bell of Pennsylvania	Pennsylvania	Jan-94	P930715
GTE South	South Carolina	Jan-94	93-504-C
United Telephone-Southeast	Tennessee	Jan-94	93-04818
C&P of VA, GTE South, Contel, United Tel. SE	Virginia	Sep-93	PUC920029
Bell Atlantic, NYNEX, Pacific Companies	FCC	Aug-93	MM 93-215
C&P, Centel, Contel, GTE, & United	Virginia	Aug-93	PUC920029
Chesapeake & Potomac Tel Virginia	Virginia	Aug-93	93-00-
GTE North	Illinois	Jul-93	93-0301
Midwest Power	Iowa	Jul-93	INU-93-1
Midwest Power	South Dakota	Jul-93	EL93-016
Chesapeake & Potomac Tel. Co. DC	District of Columbia	Jun-93	926
Cincinnati Bell	Ohio	Jun-93	93432TPALT
North Carolina Rate Bureau (dwelling fire)	North Carolina Dept. of Insurance	Jun-93	671
North Carolina Rate Bureau (homeowners)	North Carolina Dept. of Insurance	Jun-93	670
Pacific Bell Telephone Company	California	Mar-93	92-05-004
Minnesota Independent Equal Access Corp.	Minnesota	Mar-93	P3007/GR931
South Central Bell Telephone Company	Tennessee	Feb-93	92-13527
South Central Bell Telephone Company	Kentucky	Dec-92	92-523

SPONSOR	JURISDICTION	DATE	DOCKET NO.
Southern New England Telephone Company	Connecticut	Nov-92	92-09-19
Chesapeake & Potomac Tel. Co.CDC	District of Columbia	Nov-92	814
Diamond State Telephone Company	Delaware	Sep-92	PSC 92-47
New Jersey Bell Telephone Company	New Jersey	Sep-92	TO-92030958
Allstate Insurance Company	New Jersey Dept. of Insurance	Sep-92	INS 06174-92
North Carolina Rate Bureau (auto)	North Carolina Dept. of Insurance	Aug-92	650
North Carolina Rate Bureau (workers' comp)	North Carolina Dept. of Insurance	Aug-92	647
Midwest Gas Company	Minnesota	Aug-92	G010/GR92710
Pennsylvania-American Water Company	Pennsylvania	Jul-92	R-922428
Central Telephone Co. of Florida	Florida	Jun-92	920310-TL
C&P of VA, GTE South, Contel, United Tel. SE	Virginia	Jun-92	PUC920029
Chesapeake & Potomac Tel. Co. Maryland	Maryland	May-92	8462
Pacific Bell Telephone Company	California	Apr-92	92-05-004
Iowa Power Inc.	Iowa	Mar-92	RPU-92-2
Contel of Texas	Texas	Feb-92	10646
Southern Bell Telephone Company	Florida	Jan-92	880069-TL
Nevada Power Company	Nevada	Jan-92	92-1067
GTE South	Georgia	Dec-91	4003-U
GTE South	Georgia	Dec-91	4110-U
Allstate Insurance Company (property)	Texas Dept. of Insurance	Dec-91	1846
IPS Electric	Iowa	Oct-91	RPU-91-6
GTE South	Tennessee	Aug-91	91-05738
North Carolina Rate Bureau (workers' comp)	North Carolina Dept. of Insurance	Aug-91	609
Midwest Gas Company	Iowa	Jul-91	RPU-91-5
Pennsylvania-American Water Company	Pennsylvania	Jun-91	R-911909
North Carolina Rate Bureau (auto)	North Carolina Dept. of Insurance	Jun-91	606
Allstate Insurance Company	California Dept. of Insurance	May-91	RCD-2
Nevada Power Company	Nevada	May-91	91-5055
Kentucky Power Company	Kentucky	Apr-91	91-066
Chesapeake & Potomac Tel. Co.CD.C.	District of Columbia	Feb-91	850
Allstate Insurance Company	New Jersey Dept. of Insurance	Jan-91	INS-9536-90
GTE South	South Carolina	Nov-90	90-698-C
Southern Bell Telephone Company	Florida	Oct-90	880069-TL
GTE South	West Virginia	Aug-90	90-522-T-42T
North Carolina Rate Bureau (workers' comp)	North Carolina Dept. of Insurance	Aug-90	R90-08-
The Travelers Indemnity Company	Pennsylvania Dept. of Insurance	Aug-90	R-90-06-23
Chesapeake & Potomac Tel. Co.-Maryland	Maryland	Jul-90	8274
Allstate Insurance Company	Pennsylvania Dept. of Insurance	Jul-90	R90-07-01
Central Tel. Co. of Florida	Florida	Jun-90	89-1246-TL
Citizens Telephone Company	North Carolina	Jun-90	P-12, SUB 89
North Carolina Rate Bureau (auto)	North Carolina Dept. of Insurance	Jun-90	568
Iowa Resources, Inc. and Midwest Energy	Iowa	Jun-90	SPU-90-5
Contel of Illinois	Illinois	May-90	90-0128
Southern New England Tel. Co.	Connecticut	Apr-90	89-12-05
Bell Atlantic	FCC	Apr-90	89-624 II
Pennsylvania-American Water Company	Pennsylvania	Mar-90	R-901652
Bell Atlantic	FCC	Feb-90	89-624
GTE South	Tennessee	Jan-90	
Allstate Insurance Company	California Dept. of Insurance	Jan-90	REB-1002
Bell Atlantic	FCC	Nov-89	87-463 II
Allstate Insurance Company	California Dept. of Insurance	Sep-89	REB-1006
Pacific Bell	California	Mar-89	87-11-0033
Iowa Power & Light	Iowa	Dec-88	RPU-88-10
Pacific Bell	California	Oct-88	88-05-009
Southern Bell	Florida	Apr-88	880069TL
Carolina Independent Telcos.	North Carolina	Apr-88	P-100, Sub 81

SPONSOR	JURISDICTION	DATE	DOCKET NO.
United States Telephone Association	U. S. Congress	Apr-88	
Carolina Power & Light	South Carolina	Mar-88	88-11-E
New Jersey Bell Telephone Co.	New Jersey	Feb-88	87050398
Carolina Power & Light	FERC	Jan-88	ER-88-224-000
Carolina Power & Light	North Carolina	Dec-87	E-2, Sub 537
Bell Atlantic	FCC	Nov-87	87-463
Diamond State Telephone Co.	Delaware	Jul-87	86-20
Central Telephone Co. of Nevada	Nevada	Jun-87	87-1249
ALLTEL	Florida	Apr-87	870076-PU
Southern Bell	Florida	Apr-87	870076-PU
Carolina Power & Light	North Carolina	Apr-87	E-2, Sub 526
So. New England Telephone Co.	Connecticut	Mar-87	87-01-02
Northern Illinois Gas Co.	Illinois	Mar-87	87-0032
Bell of Pennsylvania	Pennsylvania	Feb-87	860923
Carolina Power & Light	FERC	Jan-87	ER-87-240-000
Bell South	NTIA	Dec-86	61091-619
Heins Telephone Company	North Carolina	Oct-86	P-26, Sub 93
Public Service Co. of NC	North Carolina	Jul-86	G-5, Sub 207
Bell Atlantic	FCC	Feb-86	84-800 III
BellSouth	FCC	Feb-86	84-800 III
ALLTEL Carolina, Inc	North Carolina	Feb-86	P-118, Sub 39
ALLTEL Georgia, Inc.	Georgia	Jan-86	3567-U
ALLTEL Ohio	Ohio	Jan-86	86-60-TP-AIR
Western Reserve Telephone Co.	Ohio	Jan-86	85-1973-TP-AIR
New England Telephone & Telegraph	Maine	Dec-85	
ALLTEL-Florida	Florida	Oct-85	850064-TL
Iowa Southern Utilities	Iowa	Oct-85	RPU-85-11
Bell Atlantic	FCC	Sep-85	84-800 II
Pacific Telesis	FCC	Sep-85	84-800 II
Pacific Bell	California	Apr-85	85-01-034
United Telephone Co. of Missouri	Missouri	Apr-85	TR-85-179
South Carolina Generating Co.	FERC	Apr-85	85-204
South Central Bell	Kentucky	Mar-85	9160
New England Telephone & Telegraph	Vermont	Mar-85	5001
Chesapeake & Potomac Telephone Co.	West Virginia	Mar-85	84-747
Chesapeake & Potomac Telephone Co.	Maryland	Jan-85	7851
Central Telephone Co. of Ohio	Ohio	Dec-84	84-1431-TP-AIR
Ohio Bell	Ohio	Dec-84	84-1435-TP-AIR
Carolina Power & Light Co.	FERC	Dec-84	ER85-184000
BellSouth	FCC	Nov-84	84-800 I
Pacific Telesis	FCC	Nov-84	84-800 I
New Jersey Bell	New Jersey	Aug-84	848-856
Southern Bell	South Carolina	Aug-84	84-308-C
Pacific Power & Light Co.	Montana	Jul-84	84.73.8
Carolina Power & Light Co.	South Carolina	Jun-84	84-122-E
Southern Bell	Georgia	Mar-84	3465-U
Carolina Power & Light Co.	North Carolina	Feb-84	E-2, Sub 481
Southern Bell	North Carolina	Jan-84	P-55, Sub 834
South Carolina Electric & Gas	South Carolina	Nov-83	83-307-E
Empire Telephone Co.	Georgia	Oct-83	3343-U
Southern Bell	Georgia	Aug-83	3393-U
Carolina Power & Light Co.	FERC	Aug-83	ER83-765-000
General Telephone Co. of the SW	Arkansas	Jul-83	83-147-U
Heins Telephone Co.	North Carolina	Jul-83	No.26 Sub 88
General Telephone Co. of the NW	Washington	Jul-83	U-82-45
Leeds Telephone Co.	Alabama	Apr-83	18578

SPONSOR	JURISDICTION	DATE	DOCKET NO.
General Telephone Co. of California	California	Apr-83	83-07-02
North Carolina Natural Gas	North Carolina	Apr-83	G21 Sub 235
Carolina Power & Light	South Carolina	Apr-83	82-328-E
Eastern Illinois Telephone Co.	Illinois	Feb-83	83-0072
Carolina Power & Light	North Carolina	Feb-83	E-2 Sub 461
New Jersey Bell	New Jersey	Dec-82	8211-1030
Southern Bell	Florida	Nov-82	820294-TP
United Telephone of Missouri	Missouri	Nov-82	TR-83-135
Central Telephone Co. of NC	North Carolina	Nov-82	P-10 Sub 415
Concord Telephone Company	North Carolina	Nov-82	P-16 Sub 146
Carolina Telephone & Telegraph	North Carolina	Aug-82	P-7, Sub 670
Central Telephone Co. of Ohio	Ohio	Jul-82	82-636-TP-AIR
Southern Bell	South Carolina	Jul-82	82-294-C
General Telephone Co. of the SW	Arkansas	Jun-82	82-232-U
General Telephone Co. of Illinois	Illinois	Jun-82	82-0458
General Telephone Co. of the SW	Oklahoma	Jun-82	27482
Empire Telephone Co.	Georgia	May-82	3355-U
Mid-Georgia Telephone Co.	Georgia	May-82	3354-U
General Telephone Co. of the SW	Texas	Apr-82	4300
General Telephone Co. of the SE	Alabama	Jan-82	18199
Carolina Power & Light Co.	South Carolina	Jan-82	81-163-E
Elmore-Coosa Telephone Co.	Alabama	Nov-81	18215
General Telephone Co. of the SE	North Carolina	Sep-81	P-19, Sub 182
United Telephone Co. of Ohio	Ohio	Sep-81	81-627-TP-AIR
General Telephone Co. of the SE	South Carolina	Sep-81	81-121-C
Carolina Telephone & Telegraph	North Carolina	Aug-81	P-7, Sub 652
Southern Bell	North Carolina	Aug-81	P-55, Sub 794
Woodbury Telephone Co.	Connecticut	Jul-81	810504
Central Telephone Co. of Virginia	Virginia	Jun-81	810030
United Telephone Co. of Missouri	Missouri	May-81	TR-81-302
General Telephone Co. of the SE	Virginia	Apr-81	810003
New England Telephone	Vermont	Mar-81	4546
Carolina Telephone & Telegraph	North Carolina	Aug-80	P-7, Sub 652
Southern Bell	North Carolina	Aug-80	P-55, Sub 784
General Telephone Co. of the SW	Arkansas	Jun-80	U-3138
General Telephone Co. of the SE	Alabama	May-80	17850
Southern Bell	North Carolina	Oct-79	P-55, Sub 777
Southern Bell	Georgia	Mar-79	3144-U
General Telephone Co. of the SE	Virginia	Mar-76	810038
General Telephone Co. of the SW	Arkansas	Feb-76	U-2693, U-2724
General Telephone Co. of the SE	Alabama	Sep-75	17058
General Telephone Co. of the SE	South Carolina	Jun-75	D-18269

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:

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

where

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

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

exceeds the expected dividend growth rate g. Under the above simplifying assumptions, a firm's stock price may be written as the following sum:

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

where the three dots indicate that the sum continues indefinitely.

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

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

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

Geometric Progression

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

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

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

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

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

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

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

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

and

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

or

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

Solving for S_n, we obtain:

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

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

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

Application to DCF Model

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

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

and common factor

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

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

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

as we suggested earlier.

Quarterly DCF Model

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

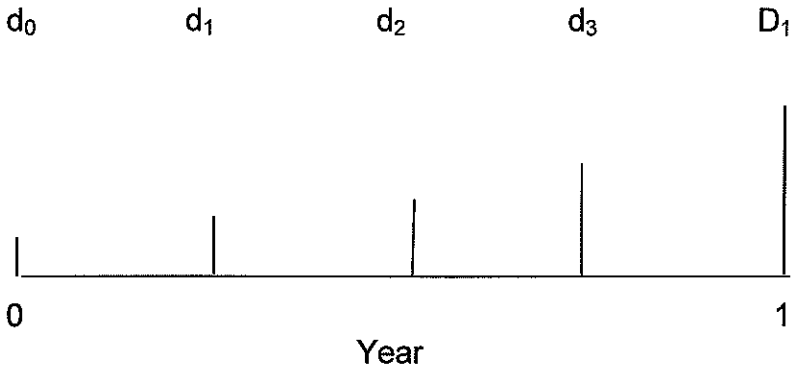
Figure 1

Annual DCF Model

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

Figure 2

Quarterly DCF Model (Constant Growth Version)



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

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

In the Quarterly DCF Model, it is natural to assume that quarterly dividend payments differ from the preceding quarterly dividend by the factor $(1 + g)^{.25}$, where

g is expressed in terms of percent per year and the decimal .25 indicates that the growth has only occurred for one quarter of the year. (See Figure 2.) Using this assumption, along with the assumption of constant growth and $\boldsymbol{k} > \boldsymbol{g}$, we obtain a new expression for the firm's stock price, which takes account of the quarterly payment of dividends. This expression is:

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

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

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

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

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

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

An Alternative Quarterly DCF Model

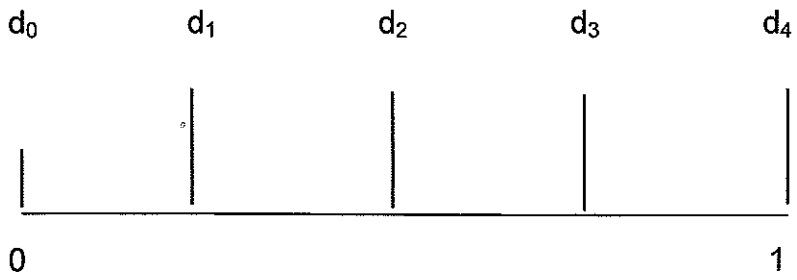
Although the constant growth Quarterly DCF Model [equation (8)] allows for the quarterly timing of dividend payments, it does require the assumption that the firm increases its dividend payments each quarter. Since this assumption is difficult for some analysts to accept, we now discuss a second Quarterly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

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

Figure 3

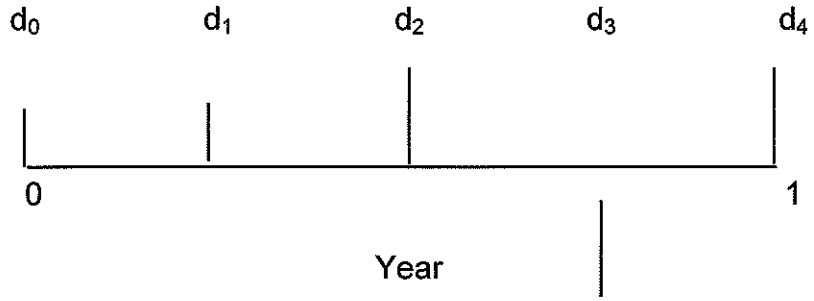
Quarterly DCF Model (Constant Dividend Version)

Case 1



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

Case 2

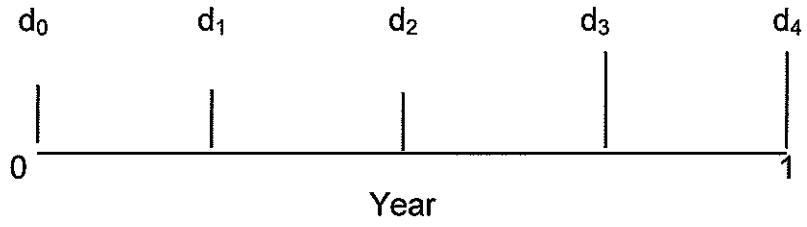


$$d_1 = d_0$$

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

Figure 3 (continued)

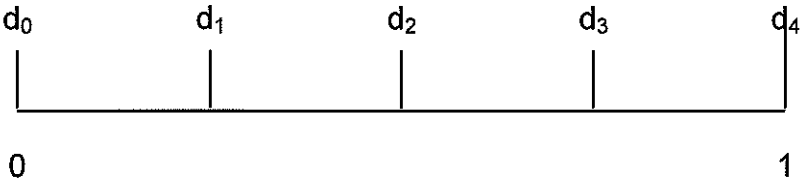
Case 3



$$d_1 = d_2 = d_0$$

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

Case 4



$$d_1 = d_2 = d_3 = d_0$$

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

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

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

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

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

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

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

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

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

with D_1^* given by (9).

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

APPENDIX 3
EX ANTE RISK PREMIUM APPROACH

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

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

where:

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

For my ex ante risk premium analysis, I began with the Moody's group of 24 electric companies shown in Table 1. I used the Moody's group of electric companies 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 was desirable because the ex ante risk premium approach requires that the DCF model be estimated for every company in every month of the study period. The Ex Ante Risk Premium Schedule in my direct testimony displays the average DCF estimated cost of equity on an investment in the portfolio of electric companies and the yield to maturity on A-rated utility bonds in each month of the study.

Previous studies have shown that the ex ante risk premium tends to vary inversely with the level of interest rates, that is, the risk premium tends to increase when interest rates decline, and decrease when interest rates go up. To test whether my studies also indicate that the ex ante risk premium varies inversely with the level of

interest rates, I 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:

$$RP_{PROXY} = 8.49 - .5973 \times I_A.$$

$$(8.22) \quad (-4.10)\ [12]$$

Using the 6.99 percent forecasted yield to maturity on A-rated utility bonds at August 1, 2009, [13] the regression equation produces an ex ante risk premium based on the electric proxy group equal to 4.31 percent (8.49 – .597 x 6.99 = 4.31).

To estimate the cost of equity using the ex ante risk premium method, one may add the estimated risk premium over the forecasted yield on A-rated utility bonds to the yield to maturity on A-rated utility bonds. As described above, my analyses produce an estimated risk premium over the yield on A-rated utility bonds equal to 4.31 percent. Adding an estimated risk premium of 4.31 percent to the 6.99 percent forecasted yield to maturity on A-rated utility bonds produces a cost of equity estimate of 11.3 percent for the electric company proxy group using the ex ante risk premium method.

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

[13] Forecasted A-rated utility bond yield determined from *Blue Chip Financial Forecasts*, August 1, 2009, using the Blue Chip forecast for Baa-rated corporate bond plus the current spread between A-rated utility and Baa-rated corporate bonds. The average yield on Baa-rated corporate bonds at July 2009 is 6.58 percent; the average yield on A-rated utility bonds at July 2009 is 5.97 percent. The spread between these average yields is 61 basis points. The Blue Chip forecasted yield for Baa-rated corporate bonds for Q4 2010 is 7.6 percent. Subtracting 61 basis points from 7.60 equals 6.99 percent as the forecasted yield on A-rated utility bonds.

TABLE 1

MOODY'S ELECTRIC COMPANIES

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

Source of data: Mergent Public Utility Manual, August 2002. Of these 24 companies, I did not include three companies in my ex ante risk premium DCF analysis because there was insufficient data to perform a DCF analysis for most of my study period. Specifically, IPALCO merged with a company that is not in the electric utility industry; Reliant divested its electric utility operations; and CH Energy does not have any I/B/E/S analysts' estimates of long-term growth. In addition, Cinergy is now part of Duke Energy and Energy East has been acquired by Iberdrola S.A.

APPENDIX 4
EX POST RISK PREMIUM APPROACH

Source of Data

Stock price and yield information is obtained from Standard & Poor's Security Price publication. Standard & Poor's derives the stock dividend yield by dividing the aggregate cash dividends (based on the latest known annual rate) by the aggregate market value of the stocks in the group. The bond price information is obtained by calculating the present value of a bond due in 30 years with a $4.00 coupon and a yield to maturity of a particular year's indicated Moody's A-rated Utility bond yield. The values shown on Schedules 3 and 4 are the January values of the respective indices.

Calculation of Stock and Bond Returns

Sample calculation of "Stock Return" column:

$$\text{Stock Return (2008)} = \left[\frac{\text{Stock Price (2009)} - \text{Stock Price (2008)} + \text{Dividend (2008)}}{\text{Stock Price (2008)}}\right]$$

where Dividend (2008) = Stock Price (2008) x Stock Div. Yield (2008)

Sample calculation of "Bond Return" column:

$$\text{Bond Return (2008)} = \left[\frac{\text{Bond Price (2009)} - \text{Bond Price (2008)} + \text{Interest (2008)}}{\text{Bond Price (2008)}}\right]$$

where Interest = $4.00.