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MISSOURI PUBLIC SERVICE COMMISSION

CASE NO. ER-2007-0002

DIRECT TESTIMONY

OF

JAMES H. VANDER WEIDE, PH.D.

ON

BEHALF OF

UNION ELECTRIC COMPANY
d/b/a AMERENUE

St. Louis, Missouri
July 2006

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DIRECT TESTIMONY

OF

DR. JAMES H. VANDER WEIDE

CASE NO. ER-2007-0002

I. INTRODUCTION AND SUMMARY

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 the Fuqua School of Business of Duke University. 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.

Q. Would you please describe your educational background and prior academic experience.

A. I graduated from Cornell University with a Bachelor's Degree in Economics and from Northwestern University with a Ph.D. in Finance. After joining the faculty of the School of Business at Duke University, I was named Assistant Professor, Associate Professor, and then Professor.

Since joining the faculty I have taught courses in corporate finance, investment management, and management of financial institutions. I have taught a graduate seminar on the theory of public utility pricing and lectured in executive development seminars on the cost of capital, financial analysis, capital budgeting, mergers and acquisitions, cash management, short-run financial planning, and competitive strategy. I have also served as Academic Program Director of executive education programs at the

Fuqua School of Business, including the Duke Advanced Management Program, the Duke Executive Program in Telecommunications, the Duke Competitive Strategies in Telecommunications Program, and the Duke Program for Manager Development for managers from the former Soviet Union.

I have conducted seminars and training sessions on financial analysis, financial strategy, cost of capital, cash management, depreciation policies, and short-run financial planning for a wide variety of U.S. and international companies, including ABB, Allstate, Ameritech, AT&T, Bell Atlantic, BellSouth, Carolina Power & Light, Contel, Fisons, Glaxo Wellcome, GTE, Lafarge, MidAmerican Energy, New Century Energies, Norfolk Southern, Pacific Bell Telephone, Progress Energy, Inc, The Rank Group, Siemens, Southern New England Telephone, TRW, and Wolseley Plc.

In addition to my teaching and executive education activities, I have written research papers on such topics as portfolio management, the cost of capital, capital budgeting, the effect of regulation on the performance of public utilities, the economics of universal service requirements, and cash management. My 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 Accounting Research, Journal of Cash Management, Management Science, The Journal of Portfolio Management, Atlantic Economic Journal, Journal of Economics and Business, and Computers and Operations Research.* I have written a book titled *Managing Corporate Liquidity: an Introduction to Working Capital Management*, and a chapter for *The Handbook of Modern Finance*, "Financial Management in the Short Run."

Q. Have you previously testified on financial or economic issues?

A. Yes. As an expert on financial and economic theory, I have 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 approximately 370 cases 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 public service commissions of 40 states, the insurance commissions of five states, the Iowa State Board of Tax Review, the North Carolina Property Tax Commission, and the National Association of Securities Dealers. In addition, I have testified as an expert witness in proceedings before the U.S. District Court, Northern District of California; U.S. District Court, District of Nebraska; U.S. District Court, Eastern District of North Carolina; Superior Court, North Carolina; the U.S. Bankruptcy Court, Southern District of West Virginia; and the U. S. District Court for the Eastern District of Michigan. In Missouri, I testified on the required rate of return on equity for the Empire District Electric Company in Case No. ER-2004-0570; and I recently filed rate of return on equity testimony for Empire in Case No. ER-2006-0315.

Q. What is the purpose of your testimony?

A. I have been asked by Union Electric Company d/b/a AmerenUE ("AmerenUE" or "the Company") to prepare an independent appraisal of AmerenUE's cost of equity, and to recommend to the Missouri Public Service Commission ("the Commission") a rate of return on equity that is fair, that allows AmerenUE to attract capital

on reasonable terms, and that allows AmerenUE to maintain its financial integrity. A summary of my testimony is included as Attachment A.

Q. How did you estimate AmerenUE's cost of equity?

A. I estimated AmerenUE's cost of equity in two steps. First, I applied several standard cost of equity methods to market data for groups of companies of comparable risk. Second, I adjusted the average cost of equity for my comparable companies for the difference between the financial risk of those companies in the marketplace and the financial risk implied by AmerenUE's filed capital structure. The Commission recognized the need to adjust for such differences in financial risks in the recent Empire rate case, Case No. ER-2004-0570.

Q. Why did you apply your cost of equity methods to groups of comparable companies rather than solely to AmerenUE?

A. First, as this Commission has stated, "returns for [a utility's] shareholders must be commensurate with returns in other enterprises with corresponding risks."[1] In setting out this rule, the Commission cited fundamental principles:

> 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. ... 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.[2]

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[1] *In the Matter of the Tariff Filing of the Empire District Electric Company to Implement a General Rate Increase for Retail Electric Service Provided to Customers in its Missouri Service Area,* Case No. ER-2004-0570, at 44-45 (March 10, 2005) ("*Empire District*").

[2] *Empire District,* at 40 (quoting *Federal Power Comm'n v. Hope Natural Gas Co.*, 320 U.S. 591, 603 (1943)).

Second, as a practical matter, standard cost of equity methodologies such as the discounted cash flow ("DCF"), risk premium, and capital asset pricing model ("CAPM") require inputs of quantities that are not easily measured.[3] 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 reasonably 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, called the comparable company approach, is further supported by the United States Supreme Court standard that the utility should be allowed to earn a return on its investment that is commensurate with returns being earned on other investments of the same risk.[4]

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 11.5 percent. This conclusion is based on my application of three standard cost of equity estimation techniques, the DCF model, the risk premium approach, and the CAPM, to a broad group of companies of comparable risk. As noted below, the cost of equity for these comparable companies must be

[3] The problem of difficult-to-measure inputs is especially acute for AmerenUE because, as a subsidiary of Ameren Corporation ("Ameren"), its stock is not publicly traded.

[4] *See Bluefield Water Works and Improvement Co. v. Public Service Comm'n.* 262 U.S. 679, 692 (1923) and *Hope Natural Gas Co.*, 320 U.S. at 603.

adjusted to reflect the higher financial risk associated with AmerenUE's filed capital structure, which yields an AmerenUE cost of equity of 12.2%.

Cost of Equity Model Results

Method	Cost of Equity
Discounted Cash Flow	10.7%
Ex Ante Risk Premium	11.0%
Ex Post Risk Premium	11.4%
Historical CAPM	11.7%
DCF CAPM	12.8%
Average All Cost of Equity Methods	11.5%
Cost of Equity Reflecting Higher Financial Risk of AmerenUE Filed Capital Structure	12.2%

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

A. The cost of equity for my comparable companies depends on their financial risk, which is measured by the market values of debt and equity in their capital structures. This financial risk of the sample companies differs from the financial risk associated with AmerenUE's filed capital structure.

Q. How does AmerenUE's financial risk, as reflected in its filed capital structure, compare to the financial risk of your comparable companies?

A. AmerenUE's filed capital structure in this proceeding embodies greater financial risk than the financial risk embodied in the cost of equity estimates for my comparable companies. Thus, the cost of equity for my comparable companies will have to be adjusted upward so that investors in AmerenUE will have an opportunity to earn a return on their investment in AmerenUE that is commensurate with returns they could earn on other investments of comparable risk.

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

A. My analysis indicates that AmerenUE would require a fair rate of return on equity equal to 12.2 percent in order to have the same weighted average cost of capital as my comparable companies.

Q. Do you have exhibits accompanying your testimony?

A. Yes. I have prepared or supervised the preparation of one attachment, eleven schedules, and three appendices that accompany my testimony.

II. 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 values 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% debt and 75% equity.

Q. Why do economists measure a firm's capital structure in terms of the market values of its debt and equity?

A. Economists measure a firm's capital structure in terms of the market values of its debt and equity because: (1) the weighted average cost of capital is defined as the return investors expect to earn on a portfolio of the company's debt and equity securities;

(2) investors measure the expected return and risk on their portfolios using market value weights, not book value weights; and (3) market values are the best measures of the amounts of debt and equity investors have invested in the company on a going forward basis.

Q. Why do investors measure the return on their investment portfolios using market value weights rather than book value weights?

A. Investors measure the return on their investment portfolios using market value weights because market values are the best measure of the amounts the investors currently have invested in each security in the portfolio. From the point of view of investors, the historical cost or book value of their investment is entirely irrelevant to the current risk and return on their portfolios because if they were to sell their investments, they would receive market value, not historical cost. Thus, the return can only be measured in terms of market values.

Q. Is the economic definition of the weighted average cost of capital consistent with regulators' traditional definition of the average cost of capital?

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

Q. 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 the underlying economic concepts of the required return on capital also reflected in the standards governing ratemaking?

A. Yes. Well-established principles mandate that the required rate of return on investment in a public utility must be equal to the rate of return investors expect to receive on other investments of similar risk. In the *Bluefield Water Works* case, for example, the United States Supreme 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.[5]

[5] 262 U.S. at 692. *See also Hope Natural Gas Co.*, 320 U.S. at 603.

The Court clearly recognizes here 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.

Q. Has the Commission recognized these principles in setting allowed rates of return on equity in Missouri?

A. Yes. As the Commission recently put it:

> The Commission is of the opinion that it must draw primary guidance in the evaluation of the expert testimony from the Supreme Court's *Hope* and *Bluefield* decisions. Pursuant to those decisions, returns for Empire's shareholders must be commensurate with returns in other enterprises with corresponding risks. Just and reasonable rates must include revenue sufficient to cover operating expenses, service debt and pay a dividend commensurate with the risk involved. The language of *Hope* and *Bluefield* unmistakably requires a comparative method, based on a quantification of risk.[6]

Q. The Commission has recognized that the comparable company approach is mandated by Supreme Court precedents. What is the comparable company approach to estimating a company's cost of equity?

A. The comparable company approach determines a company's cost of equity by first identifying a group of publicly-traded companies of similar risk and then estimating the cost of equity for the companies in the comparable group.

Q. Have you employed the comparable company approach to estimate AmerenUE's cost of equity in this proceeding?

A. Yes. My application of the comparable company approach is the same as the approach the Commission accepted in Case No. ER-2004-0570.

[6] *Empire District*, at 43-44.

III. BUSINESS AND FINANCIAL RISKS IN THE ELECTRIC ENERGY BUSINESS

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

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

1. Demand Uncertainty. Demand uncertainty is one of the primary business risks of investing in electric energy companies such as AmerenUE. Demand uncertainty is caused by: (a) the strong dependence of electric demand on the state of the economy and weather patterns; (b) the ability of customers to choose alternative forms of energy, such as natural gas or oil; (c) the ability of some customers to locate facilities in the service areas of competitors; (d) the ability of some customers to conserve energy or produce their own electricity under cogeneration or self-generation arrangements; and (e) 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 Uncertainty. The business risk of electric energy companies is also increased by the inherent uncertainty in the typical electric energy company's operations. Operating uncertainty arises as a result of: (a) high volatility in fuel prices or interruptions in fuel supply; (b) the prospect of rising employee health care and pension expenses; (c) uncertainty over plant outages, the cost of purchased power, and the revenues achieved from off-system sales; (d) variability in maintenance costs and the costs of other materials, (e) uncertainty over outages of the

transmission and distribution systems, as well as storm-related expenses; and (f) the prospect of increased expenses for security.

3. Investment 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 prospect that Congress or state legislatures will pass stricter environmental regulations and clean air requirements; (c) the prospect of needing to incur additional investments to insure the reliability of the company's transmission and distribution networks; (d) uncertainty regarding the regulatory and management structure of the electric transmission network; and (e) uncertainty regarding future decommissioning 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 make a major capital expenditure in a coal-fired generation plant, and, as a result of new environmental regulations, energy produced by the plant becomes uneconomic, there is little the company can do 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. The use of financial leverage also reduces the firm's interest coverage and increases vulnerability to variations in earnings.

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 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. In recent years, the risk of investing in electric energy companies has increased as a result of significantly greater volatility in fuel prices, increased competition in

the industry, more volatile purchased power and off-system sales prices, greater uncertainty in employee health care and pension expenses, greater uncertainty in the cost of satisfying environmental regulations, and greater uncertainty in the expenses associated with system outages, storm damage and security. These risks are exacerbated by the prospect that the typical electric utility will face higher capital expenditures, including investment required for environmental compliance. The Commission should recognize these additional risks and the correspondingly higher returns required by investors in setting AmerenUE's allowed rate of return in this proceeding.

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

A. Yes. The risks of investing in electric energy companies such as AmerenUE can be distinguished by the higher capital intensity of the electric energy business and the irreversibility of most investments in electric energy facilities.

IV. COST OF EQUITY ESTIMATION METHODS

Q. What methods did you use to estimate AmerenUE's fair rate of return on equity?

A. I used three generally accepted methods for estimating AmerenUE'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 ("DCF") 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 next period annual dividend, P_s is the current price of the stock,

and g is the constant annual growth rate in earnings, dividends, and book value per share. The term D_1/P_s is called the dividend yield component of the annual DCF model, and the term g is called the growth component of the annual DCF model.

Q. Have you utilized the annual DCF model in estimating AmerenUE'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 theoretically 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 comparable group all pay dividends quarterly, the current market price that investors are willing to pay reflects the expected quarterly receipt of dividends. Therefore, I have utilized a quarterly DCF model in estimating the cost of equity for these firms, as previously accepted by the Commission.[7] 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 1. For the reasons cited there, I employed the quarterly DCF model throughout my calculations, even though as a practical matter 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 used.

A. The quarterly DCF model I used is described on Schedule JVW-1 and in Appendix 1. The quarterly DCF equation shows that the cost of equity is: the sum of the

[7] *See Empire District,* at 23.

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 did 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 estimated 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 estimated the next four quarterly dividends with data for a specific company?

A. Yes. In the case of Alliant Energy, the first company shown in Schedule JVW-1, the last four quarterly dividends are equal to .263, .263, .288, and .288. Thus dividends, d_1, d_2, d_3, and d_4 are equal to .2812 and .3074 [.263 x (1 + .0693) = .2812], and [.288 x (1+.0693) =.3074]. (As noted previously, the logic underlying this procedure is described in Appendix 1.)

Q. How did you estimate the growth component of the quarterly DCF model?

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

Q. What are the analysts' estimates of future EPS growth?

A. As part of their research, financial analysts working at Wall Street firms periodically estimate EPS growth for each firm they follow. The EPS forecasts for each firm

are then published. Investors who are contemplating purchasing or selling shares in individual companies review the forecasts. These estimates represent three- to five-year forecasts of EPS growth.

Q. What is I/B/E/S?

A. I/B/E/S is a firm 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 did 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 did 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 relied 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, Karl Eller Professor of Finance 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 Historical Growth Extrapolation," 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 growth rates with the average I/B/E/S analysts' forecasts. In every case, the regression equations containing the average of analysts' forecasts statistically outperformed the regression equations containing the historical growth estimates. These results are consistent with those found by Cragg and Malkiel, the early major research in this area (John G. Cragg and Burton G. Malkiel, *Expectations and the Structure of Share Prices*, University of Chicago Press, 1982). These results are also consistent with the hypothesis that investors use analysts' forecasts, rather than historically oriented growth calculations, in making stock buy and sell decisions. They provide overwhelming evidence that the analysts' forecasts of future growth are superior to historically-oriented growth measures in predicting a firm's stock price.

Q. Has your study been updated to include more recent data?

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

Indeed, I used analysts' growth forecasts in the return on equity recommendation that was accepted by the Commission in the *Empire District* case.[8]

Q. What price did you use in your DCF model?

A. I used a simple average of the monthly high and low stock prices for each firm for the three-month period ending April 2006. These high and low stock prices were obtained from Thomson Financial.

Q. Why did you use the three-month average stock price in applying the DCF method?

A. I used 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. How did you apply the DCF approach to obtain the cost of equity capital for AmerenUE?

A. I applied the DCF approach to the Value Line electric companies shown in Schedule JVW-1 and to the Value Line natural gas companies shown in Schedule JVW-2.

Q. How did you select your comparable group of electric companies?

A. I selected 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

[8] *See Empire District,* at 45-46.

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) have not announced a merger.

Q. Why did 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 did you eliminate companies that have fewer than three analysts included in the I/B/E/S mean forecasts?

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

Q. Why did you eliminate companies that have announced mergers that are not yet 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. (At this time, however, the inclusion of merger companies would have increased my DCF result by approximately 49 basis points.)

Q. Is your electric company comparable group similar in risk to AmerenUE?

A. Yes. 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 comparable 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 Ameren, AmerenUE's parent, is 1. The average S&P bond rating of the electric companies in my comparable group is approximately BBB+. The S&P bond rating for AmerenUE is BBB+.

Q. Please summarize the results of your application of the DCF model to the Value Line electric company comparable group.

A. As shown on Schedule JVW-1, I obtain a DCF result of 10.61 percent for my electric company comparable group. Given investors' perceptions that the risk of investing in electric utilities has increased in recent years, I believe that the DCF result for the Value Line electric companies understates AmerenUE's true cost of equity. However, to be conservative, I will consider this result, along with my other cost of equity results, when I reach my conclusion regarding AmerenUE's cost of equity.

Q. Does the DCF model produce an economically reasonable estimate of AmerenUE's cost of equity at this time?

A. No. The DCF results for the electric utilities have displayed considerable volatility over the last several years. In contrast to the general pattern of equity costs varying within a more narrow range than interest rates, the DCF result for the electric utilities has varied within a much wider range than interest rates over the last six years, 443 basis points for DCF results versus 330 basis points for interest rates. Furthermore, the standard deviation of the DCF results is 149 basis points, as compared to the standard deviation of interest rates of just 94 basis points. The high volatility of DCF results for electric utilities compared to interest rates suggests that the DCF model is not providing an accurate indication of the electric utilities' cost of equity at this time.

Q. As noted above, you also applied the DCF model to a comparable group of natural gas companies. Why did you apply the DCF model to a comparable group of natural gas companies?

A. I applied the DCF model to a comparable group of natural gas companies in addition to a group of electric companies because the natural gas companies are similar in risk to the electric companies, and, as a group, are experiencing less industry restructuring than the electric companies.[9] In addition, it is useful to examine the cost of equity results for a group of similar companies from a closely associated industry in order to test the reasonableness of the results obtained by applying cost of equity methodologies to electric companies. Financial theory does not require that companies be in exactly the same industry to be comparable in risk.

[9] The DCF model is based on the assumption that companies operate in a relatively stable environment. When companies are experiencing dramatic industry restructuring, the basic stability assumptions of the DCF model may not apply.

Q. What natural gas companies did you include in your comparable group of natural gas companies?

A. I selected all the companies in Value Line's groups of natural gas companies that have regulated natural gas businesses and otherwise meet the same criteria as described above for the electric companies. The natural gas companies in my DCF group and the average DCF result are shown on Schedule JVW-2.

Q. How are your comparable natural gas companies similar to AmerenUE?

A. Like AmerenUE, my comparable natural gas companies: (1) employ a capital-intensive physical network that connects the customer to the source of energy; (2) sell transmission and/or distribution services at regulated rates to customers whose energy demand is primarily dependent on the state of the economy and the weather; (3) procure energy in energy markets with highly variable prices; and (4) are regulated by public utility commissions that have traditionally viewed electric and natural gas utilities as being comparable in risk.

Q. Do you have any empirical evidence that the natural gas companies in your comparable group are similar in risk to AmerenUE?

A. Yes. The average Value Line Safety Rank for my comparable group of natural gas companies is 2, on a scale where 1 is the most safe and 5 is the least safe, compared to the Safety Rank of 1 for AmerenUE's parent, Ameren (see Schedule JVW-2). In addition, the average S&P bond rating for my natural gas companies is approximately A-. In contrast, as noted above, AmerenUE's S&P bond rating is BBB+.

Q. Please summarize the results of your application of the DCF method to the Value Line natural gas companies.

A. My application of the DCF method to the Value Line natural gas companies produces an average DCF result of 10.84 percent, as shown on Schedule JVW-2.

Q. What cost of equity do you obtain from your DCF method?

A. The DCF method using the electric company comparable group produced a cost of equity estimate of 10.6 percent, and using the natural gas company comparable group, a cost of equity estimate of 10.8 percent. Averaging these estimates produces a cost of equity estimate of 10.7 percent using the DCF method.

B. RISK PREMIUM METHOD

Q. Please describe the risk premium method of estimating AmerenUE'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 AmerenUE 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 did you measure the required risk premium on an equity investment in AmerenUE?

A. I used two methods to estimate the required risk premium on an equity investment in AmerenUE. 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 AmerenUE.

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

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

where:

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

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

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

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

Q. What cost of equity do you obtain from your ex ante risk premium method using the comparable group of electric companies?

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 yield to maturity on A-rated utility bonds. At May 1, 2006, the forecasted yield to maturity on A-rated utility bonds for 2007 was 6.64 percent.[10] My analyses produce an estimated risk premium over the yield on A-rated utility bonds equal to 4.24 percent. Adding an estimated risk premium of 4.24 percent to the 2007 forecasted 6.64 percent average yield to maturity on

[10] This estimate is obtained from data supplied by Blue Chip, May 1, 2006, which forecasts an average Baa-rated corporate bond yield in 2007 of 7.03 percent (Blue Chip does not provide a forecast for A-rated utility bonds). To estimate the forecasted yield on A-rated utility bonds, I compared the current average yield on A-rated utility bonds to the current average yield on Baa-rated corporate bonds. The difference between the average yield on Moody's Baa-rated corporate bonds in April 2006, 6.68 percent, and the April average for Moody's A-rated utility bond, 6.29 percent, is 39 basis points. Subtracting 39 basis points from the forecasted 7.03 percent yield on Baa-rated corporate bonds produces a forecasted yield on A-rated utility bonds of 6.64 percent.

A-rated utility bonds produces a cost of equity estimate of 10.88 percent using the ex ante risk premium method.

Q. Have you also applied your ex ante risk premium approach to a comparable group of natural gas companies?

A. Yes. Following the same procedure as described in Appendix 2, I applied my ex ante risk premium approach to my comparable group of natural gas companies compared to the interest rate on A-rated utility bonds. The underlying DCF results and interest rates for this study are displayed in Schedule JVW-4.

Q. What cost of equity do you obtain from your ex ante risk premium method using the comparable group of natural gas companies?

A. For the natural gas company comparable group, my analyses produce an estimated risk premium over the yield on A-rated utility bonds equal to 4.43 percent. Adding an estimated risk premium of 4.43 percent to the 6.64 percent forecasted yield to maturity on A-rated utility bonds produces a cost of equity estimate of 11.07 percent using the ex ante risk premium method.

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

A. The ex ante risk premium method using the electric company comparable group produced a cost of equity estimate of 10.9 percent, and using the natural gas company comparable group, a cost of equity estimate of 11.1 percent. Averaging these estimates produces a cost of equity estimate of 11.0 percent using the ex ante risk premium method.

2. Ex Post Risk Premium Method

Q. Please describe your ex post risk premium method for measuring the required risk premium on an equity investment in AmerenUE.

A. I first performed a study of the comparable returns received by bond and stock investors over the 69 years of my study. I estimated 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 consisted 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 2006. The return associated with each stock portfolio is the sum of the annual dividend yield and capital gain (or loss) which accrued to this portfolio during the year(s) in which it was held. The return associated with the bond portfolio, on the other hand, is the sum of the annual coupon yield and capital gain (or loss) which accrued to the bond portfolio during the year(s) in which it was held. The resulting annual returns on the stock and bond portfolios purchased in each year between 1937 and 2006 are shown on Schedule JVW-5. The average annual return on an investment in the S&P 500 stock portfolio was 11.56 percent, while the average annual return on an investment in the Moody's A-rated utility bond portfolio was 6.47 percent. The risk premium on the S&P 500 stock portfolio is, therefore, 5.10 percent.

I also conducted a second study using stock data on the S&P Utilities rather than the S&P 500. As shown on Schedule JVW-6, the S&P Utility stock portfolio showed an average annual return of 10.92 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 4.45 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 have performed my ex post risk premium analysis on both the S&P 500 and the S&P Utilities as upper and lower bounds for the required risk premium on an equity investment in AmerenUE because I believe electric energy companies today face risks that are somewhere in between the average risk of the S&P Utilities and the S&P 500 over the years 1937 to 2006. Specifically, the risk premium on the S&P Utilities, 4.45 percent, represents a lower bound for the required risk premium on an equity investment in AmerenUE because AmerenUE is currently more risky than an investment in the average utility in the S&P Utilities index over the entire period 1937 to the present. On the other hand, the risk premium on the S&P 500, 5.10 percent, represents an upper bound because an investment in AmerenUE is less risky than an investment in the S&P 500 over the period 1937 to the present. I use the average of the two risk premiums as my estimate of the required risk premium for AmerenUE in my ex post risk premium method.

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

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

estimate investors' current expected returns from an equity investment from knowledge of current bond yields and past differences between returns on stocks and bonds.

Q. Has there been any significant trend in the equity risk premium over the 1937 to 2006 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 in Tables 1 and 2, there is no statistically significant trend in my risk premium data. Indeed, the coefficient on the time variable is insignificantly different from zero (if there were a trend, the coefficient on the time variable should be significantly different from zero).

TABLE 1
Regression Output For Risk Premium On S&P 500

Line No.		Intercept	Time	Adjusted R Square	F
1	Coefficient	2.350	-0.001	0.005	1.370
2	T Statistic	0.354	-1.171		

TABLE 2
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	0.564
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 Ibbotson Associates' *2006 Yearbook* contains an analysis of "trends" in risk premium data. Ibbotson Associates uses correlation analysis to determine if there is any pattern or "trend" in risk premiums over time. They also conclude 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 good estimate of the future expected risk premium. As Ibbotson notes:

> 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 Associates' *SBBI Valuation Edition 2006 Yearbook*, page 75.]

Q. You noted that Ibbotson Associates also provides risk premium data. How do the Ibbotson Associates' risk premiums compare to your risk premiums?

A. Ibbotson Associates obtains a 7.1 percent risk premium on the S&P 500 versus 20-year Treasury bonds. Since the yield on 20-year Treasury bonds is currently approximately 100 basis points less than the yield on A - rated utility bonds, the Ibbotson Associates' data would indicate an approximate 6.1 percent risk premium on the S&P 500 over A - rated utility bonds. As shown on Schedules JVW-5 and JVW-6, my studies produce a risk premium over A - rated utility bonds in the range of 4.45 percent to 5.10 percent.

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

A. My studies provide strong evidence that investors today require an equity return of approximately 4.45 to 5.10 percentage points above the expected yield on A-rated utility bonds. The forecasted interest rate on Moody's A - rated utility bonds for 2007 is

6.64 percent. Adding a 4.45 to 5.10 percentage point risk premium to an expected yield of 6.64 percent on A-rated utility bonds, I obtain an expected return on equity in the range 11.1 percent to 11.7 percent, with a midpoint of 11.4 percent.

C. CAPITAL ASSET PRICING MODEL ("CAPM")

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 comparable 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 long-term Treasury bonds of 5.39 percent, using data from Blue Chip.[11] For my estimate of the company-specific risk, or beta, I use the average 0.90 Value Line beta for my comparable electric companies and the

[11] Blue Chip provides a forecasted yield for 30-year Treasury bonds rather than for the 20-year Treasury bond. To obtain a forecasted yield for the 20-year Treasury bond, I compared the current average yield in April 2006 for the 30-year Treasury bond, 5.06 percent, to the average yield for the 20-year Treasury bond, 5.22 percent. I added the difference between the current yields on the 30-year and 20-year Treasury bonds, 16 basis points, to Blue Chip's average forecasted yield for 30-year Treasury bonds in 2007, 5.23 percent, to obtain a forecasted yield of 5.39 percent for the 20-year Treasury bond.

average 0.88 Value line beta for my natural gas companies. For my estimate of the expected risk premium on the market portfolio, I use two approaches. First, I estimate the risk premium on the market portfolio from the difference between the arithmetic mean return on the S&P 500 and the income return on 20-year Treasury bonds as reported by Ibbotson Associates' *2006 Yearbook,* 7.1 percent. Second, I estimate the risk premium on the market portfolio from the difference between the DCF cost of equity for the S&P 500, 13.75 percent, and the forecasted yield to maturity on 20-year Treasury bonds, 5.39 percent. My second approach produces a risk premium equal to 8.35 percent.

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 Ibbotson Associates explains in *Stocks, Bonds, Bills, and Inflation Valuation Edition 2006 Yearbook*, the arithmetic mean return is the best approach for calculating the return investors expect to receive in the future:

> The equity risk premium data presented in this book are arithmetic average risk premia as opposed to geometric average risk premia. The arithmetic average equity risk premium can be demonstrated to be most appropriate when discounting future cash flows. For use as the expected equity risk premium in either the CAPM or the building block approach, the arithmetic mean or the simple difference of the arithmetic means of stock market returns and riskless rates is the relevant number. This is because both the CAPM and the building block approach are additive models, in which the cost of capital is the sum of its parts. The geometric average is more appropriate for reporting past performance, since it represents the compound average return. [Ibbotson Associates, *op. cit.*, p. 77.]

A discussion of the importance of using arithmetic mean returns in the context of CAPM or risk premium studies is contained in Schedule JVW-7.

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. For my electric company comparable group, I obtain a CAPM cost of equity estimate of 11.78 percent, and for my natural gas company comparable group, 11.64 percent (see Schedule JVW-8).

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 12.91 percent for my electric company group, and for my gas company group, a result of 12.74 percent (see Schedule JVW-9).

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. There is substantial evidence that the CAPM tends to underestimate the cost of equity for companies whose equity beta is less than 1.0 and to overestimate the cost of equity for companies whose equity beta is greater than 1.0.

Q. What is the evidence that the CAPM tends to underestimate the cost of equity for companies with betas less than 1.0?

A. The original evidence that the unadjusted CAPM tends to underestimate the cost of equity for companies whose equity beta is less than 1.0 and to overestimate the cost of equity for companies whose equity beta is greater than 1.0 was presented in a paper by Black, Jensen, and Scholes, "The Capital Asset Pricing Model: Some Empirical Tests." Numerous subsequent papers have validated the Black, Jensen, and Scholes findings, including those by Litzenberger and Ramaswamy, Banz, Fama and French, and Fama and MacBeth.[12]

V. FAIR RATE OF RETURN ON EQUITY

Q. Based on your application of several cost of equity methods to your comparable companies, what is your conclusion regarding your comparable companies' cost of equity?

A. Based on my application of several cost of equity methods to my comparable companies, I conclude that my comparable companies' cost of equity is 11.5 percent. As

[12] 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.

shown in Table 3 below, 11.5 percent is the simple average of the cost of equity results I obtain from my cost of equity models.

TABLE 3
Cost of Equity Model Results

Method	Cost of Equity
Discounted Cash Flow	10.7%
Ex Ante Risk Premium	11.0%
Ex Post Risk Premium	11.4%
Historical CAPM	11.7%
DCF CAPM	12.8%
Average All Cost of Equity Methods	11.5%

Q. Does your 11.5 percent cost of equity conclusion for your comparable groups depend on the percentages of debt and equity in your comparable companies' average capital structure?

A. Yes. The 11.5 percent cost of equity for my comparable groups reflects the financial risk associated with my comparable companies' average capital structures, where the capital structure weights are measured in terms of market values.[13] Since financial leverage, that is, the use of debt financing, increases the risk of investing in the comparable companies' equity, the cost of equity would be higher for a capital structure containing more leverage.

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

A. As shown in Schedule JVW-10, my electric company group has an average capital structure containing 38.11 percent debt, 0.73 percent preferred stock, and 61.16 percent common equity; and my natural gas company group has an average capital

[13] See Section II above for a discussion of why investors use market value capital structure weights to assess a company's financial risk.

structure containing 27.88 percent debt, 0.08 percent preferred equity, and 72.05 percent equity. I have also examined capital structure data for a large group of electric companies over the last five years. These data show that over this period of time, the average capital structure for this large group of electric utilities contains 40.84 percent debt, 1.84 percent preferred, and 57.32 percent equity.

Q. How does AmerenUE's filed capital structure for the purpose of rate setting in this proceeding compare to the average capital structure of your comparable companies?

A. AmerenUE's filed capital structure contains 45.420 percent long-term debt, 0.099 percent short-term debt, 2.040 percent preferred stock, and 52.441 percent common equity. Although this capital structure contains an appropriate mix of debt and equity and is a reasonable capital structure for ratemaking purposes, from an investor's viewpoint, AmerenUE's ratemaking capital structure embodies greater financial risk than is reflected in my cost of equity estimates from my comparable companies.

Q. You noted earlier that the cost of equity depends on a company's capital structure. Is there any way to adjust the 11.5 percent cost of equity for your comparable companies to reflect the higher financial risk embodied in AmerenUE's filed capital structure in this proceeding?

A. Yes. Since my comparable groups are comparable in risk to AmerenUE, AmerenUE should have the same weighted average cost of capital as my comparable companies. It is a simple matter to determine what cost of equity AmerenUE should have in order to have the same weighted average cost of capital as my comparable companies.

Q. Have you performed such a calculation?

A. Yes. I adjusted the 11.5 percent average cost of equity for my comparable groups by recognizing that to attract capital, AmerenUE must have the same weighted average cost of capital as my comparable group. As shown in Schedule JVW-11, my analysis indicates that AmerenUE would require a fair rate of return on equity equal to 12.2 percent in order to have the same weighted average cost of capital as my comparable companies.

Q. Are you aware that, unlike most of your comparable companies, AmerenUE does not have a fuel adjustment clause?

A. Yes.

Q. Would a fuel adjustment clause reduce AmerenUE's investment risk?

A. Yes. Assuming all else equal, a fuel adjustment clause would reduce AmerenUE's investment risk because it would provide greater assurance that AmerenUE would recover its fuel costs on a timely basis.

Q. Is the lower risk of a fuel adjustment clause already reflected in your cost of equity analyses?

A. Yes. Since my comparable companies generally operate under fuel adjustment clauses, my cost of equity analyses already reflect the lower risk of having such a clause.

Q. Would a higher rate of return on equity be appropriate if a fuel adjustment clause is not implemented as part of this proceeding?

A. Yes.

Q. Does this conclude your testimony?

A. Yes, it does.

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of Union Electric Company d/b/a AmerenUE d/b/a AmerenUE for Authority to File Tariffs Increasing Rates for Electric Service Provided to Customers in the Company's Missouri Service Area.	)))))	Case No. ER-2007- 0002

AFFIDAVIT OF JAMES H. VANDER WEIDE

STATE OF NORTH CAROLINA)
) ss
COUNTY OF DURHAM)

James H. Vander Weide, being first duly sworn on his oath, states:

1. My name is James H. Vander Weide. I work in the City of Durham, North Carolina, and I am Research Professor of Finance and Economics at the Fuqua School of Business, Duke University.

2. Attached hereto and made a part hereof for all purposes is my Direct Testimony on behalf of Union Electric Company d/b/a AmerenUE consisting of 44 pages, Attachment A, Schedules JVW-1 through JVW-11 and Appendixes JVW-1 through JVW-3 which has been prepared in written form for introduction into evidence in the above-referenced docket.

3. I hereby swear and affirm that my answers contained in the attached testimony to the questions therein propounded are true and correct.

James H. Vander Weide
James H. Vander Weide, Ph.D.

Subscribed and sworn to before me this 26 day of June 2006.

Meghan McNulty
Notary Public

My commission expires:
Sept. 25, 2007

LIST OF ATTACHMENTS

EXECUTIVE SUMMARY

James H. Vander Weide, Ph.D.

Research Professor of Finance and Economics, The Fuqua School of Business, Duke University

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The purpose of my testimony is to provide an independent appraisal of the cost of equity of Union Electric Company d/b/a AmerenUE ("AmerenUE") and to recommend a rate of return on equity for AmerenUE that is fair, that allows AmerenUE to attract capital on reasonable terms, and that allows AmerenUE to maintain its financial integrity. This is important because in recent years the risk of investing in electric energy companies has increased as a result of significantly greater volatility in fuel prices, increased competition in the industry, more volatile purchased power and off-system sales prices, greater uncertainty in employee health care and benefit expenses, greater uncertainty in the cost of satisfying environmental regulations, and greater uncertainty in the expenses associated with system outages, storm damage, and security. With such increasing risk, investors demand an increased return on their investment.

I estimated AmerenUE's cost of equity in two steps. As the Commission stated in the recent Empire rate case, Case No. ER-2004-0570, "returns for [a utility's] shareholders must be commensurate with returns in other enterprises with corresponding risks." Accordingly, for my first step I applied several standard cost of equity methods, including the discounted cash flow model, the risk premium approach, and the capital asset pricing model, to market data for groups of companies of comparable risk.

In addition, in the Empire case the Commission recognized the need to adjust the results of that analysis for differences in financial risks manifested by the different capital

structures of the utility that is the subject of the ratemaking and of the comparable companies to which it is compared. Thus, in my second step I adjusted the average cost of equity for my comparable companies for the difference between the financial risk of those companies in the marketplace and the financial risk implied by AmerenUE's filed capital structure.

My analysis indicates that AmerenUE would require a fair rate of return on equity equal to 12.2 percent in order to have the same weighted average cost of capital as my comparable companies. My analysis is summarized on the following table:

Cost of Equity Model Results

Method	Cost of Equity
Discounted Cash Flow	10.7%
Ex Ante Risk Premium	11.0%
Ex Post Risk Premium	11.4%
Historical CAPM	11.7%
DCF CAPM	12.8%
Average All Cost of Equity Methods	11.5%
Cost of Equity Reflecting Higher Financial Risk of AmerenUE Filed Capital Structure	12.2%

Schedule JVW-1

SUMMARY OF DISCOUNTED CASH FLOW ANALYSIS FOR ELECTRIC ENERGY COMPANIES

Line No.	Company	D_0	P_0	Growth	Market Cap $ (Mil)	Cost of Equity
1	Alliant Energy	0.288	31.882	6.93%	3,827	10.77%
2	Amer. Elec. Power	0.370	35.117	2.93%	13,170	7.27%
3	Ameren Corp.	0.635	50.202	5.00%	10,181	10.52%
4	Consol. Edison	0.575	44.473	3.44%	10,513	8.93%
5	Dominion Resources	0.690	72.960	10.50%	25,931	14.81%
6	DTE	0.515	41.498	4.33%	7,207	9.70%
7	Duke Energy	0.310	28.598	5.26%	26,764	9.85%
8	Empire	0.320	22.277	3.00%	594	9.12%
9	Energy East Corp.	0.290	24.562	4.33%	3,580	9.30%
10	Entergy Corp.	0.540	70.012	8.40%	15,078	11.89%
11	FirstEnergy Corp.	0.450	49.913	4.60%	17,043	8.28%
12	G't Plains Energy	0.415	28.437	2.65%	2,114	8.84%
13	Hawaiian Elec.	0.310	26.702	3.63%	2,180	8.60%
14	IDACORP Inc.	0.300	32.293	4.67%	1,458	8.69%
15	MDU Resources	0.190	35.019	8.25%	4,412	10.66%
16	NiSource Inc.	0.230	20.460	3.37%	5,752	8.16%
17	Northeast Utilities	0.175	19.658	8.50%	2,624	12.47%
18	NSTAR	0.303	28.462	5.00%	2,895	9.53%
19	OGE Energy	0.333	28.452	2.67%	2,704	7.61%
20	Otter Tail Corp.	0.288	29.433	4.75%	872	8.90%
21	Pepco Holdings	0.260	23.192	5.50%	4,323	10.27%
22	Pinnacle West Capital	0.500	40.558	6.20%	3,994	11.52%
23	PNM Resources	0.220	24.292	9.96%	1,752	13.86%
24	PPL Corp.	0.275	30.157	9.09%	11,070	12.89%
25	Progress Energy	0.605	43.847	3.50%	10,713	9.34%
26	Puget Energy Inc.	0.250	21.060	4.00%	2,401	9.11%
27	SCANA Corp.	0.420	39.908	4.50%	4,447	8.80%
28	Sempra Energy	0.300	46.790	5.88%	11,656	8.61%
29	Southern Co.	0.373	33.115	4.67%	23,679	9.56%
30	TXU Corp.	0.413	49.153	10.88%	27,074	14.16%
31	Vectren	0.305	26.473	3.33%	2,053	8.12%
32	Wisconsin Energy	0.230	40.123	7.56%	4,610	10.03%
33	WPS Resources	0.565	51.597	6.83%	1,974	11.69%
34	Xcel Energy Inc.	0.215	18.562	4.29%	7,414	9.29%
35	Market Weighted Average					10.61%

Notes:

d_0	=	Most recent quarterly dividend.
d1,d2,d3,d4	=	Next four quarterly dividends, calculated by multiplying the last four quarterly dividends per Value Line by the factor (1 + g).
P_0	=	Average of the monthly high and low stock prices during the three months ending April 2006 per Thomson Financial.
g	=	I/B/E/S forecast of future earnings growth April 2006 from Thomson financial.
k	=	Cost of equity using the quarterly version of the DCF model.

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

RISK RATINGS
OF COMPARABLE ELECTRIC ENERGY COMPANIES

Company	Safety Rank	S&P BOND RATING March 2006	S&P BOND RATING March 2006 (Numerical)
Alliant Energy	3	BBB+	6
Amer. Elec. Power	3	BBB	7
Ameren Corp.	1	BBB+	6
Consol. Edison	1	A	4
Dominion Resources	2	BBB	7
DTE	3	BBB	7
Duke Energy	2	BBB	7
Empire	3	BBB-	8
Energy East Corp.	2	BBB+	6
Entergy Corp.	2	BBB	7
FirstEnergy Corp.	3	BBB	7
G't Plains Energy	2	BBB	7
Hawaiian Elec.	2	BBB	7
IDACORP Inc.	3	BBB+	6
MDU Resources	1	BBB+	6
NiSource Inc.	3	BBB	7
Northeast Utilities	3	BBB	7
NSTAR	1	A+	3
OGE Energy	2	BBB+	6
Otter Tail Corp.	2	BBB+	6
Pepco Holdings	3	BBB+	6
Pinnacle West Capital	1	BBB-	8
PNM Resources	2	BBB	7

Company	Safety Rank	S&P BOND RATING March 2006	S&P BOND RATING March 2006 (Numerical)
PPL Corp.	3	BBB	7
Progress Energy	2	BBB	7
Puget Energy Inc.	3	BBB-	8
SCANA Corp.	2	A-	5
Sempra Energy	2	BBB+	6
Southern Co.	1	A	4
TXU Corp.	3	BBB-	8
Vectren	2	A-	3
Wisconsin Energy	2	BBB+	6
WPS Resources	2	A	4
Xcel Energy Inc.	2	BBB	7
Market Weighted Average	2	BBB+	6

Source of data: Standard & Poor's, May 2006, http://www2.standardandpoors.com/; The Value Line Investment Analyzer May 2006.

SCHEDULE JVW-2
SUMMARY OF DISCOUNTED CASH FLOW ANALYSIS
FOR NATURAL GAS COMPANIES

Line No.	Company	d_0	P_0	Growth	Market Cap $ (Mil)	Cost of Equity
1	AGL Resources	0.370	35.452	4.43%	2,766	8.55%
2	Atmos Energy	0.315	26.467	5.40%	2,159	10.57%
3	Equitable Resources	0.210	36.042	9.80%	4,279	12.48%
4	New Jersey Resources	0.360	44.517	5.25%	1,232	8.61%
5	NICOR Inc.	0.465	40.673	3.10%	1,788	7.95%
6	Northwest Nat. Gas	0.345	34.468	5.38%	966	9.68%
7	ONEOK Inc.	0.300	30.940	6.42%	3,244	10.49%
8	Peoples Energy	0.545	36.498	4.53%	1,412	11.03%
9	Questar Corp.	0.225	74.460	11.57%	6,972	12.98%
10	South Jersey	0.225	27.728	5.30%	775	8.73%
11	WGL Holdings Inc.	0.338	30.218	3.75%	1,440	8.48%
12	Market Weighted Average					10.84%

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 April 2006 per Thomson Financial.

g = I/B/E/S forecast of future earnings growth April 2006 from Thomson Financial.

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

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

RISK RATINGS
OF COMPARABLE GAS COMPANIES

Line No.	Company	Safety Rank	S&P BOND RATING March 2006	S&P BOND RATING March 2006 (Numerical)
1	AGL Resources	2	A-	5
2	Atmos Energy	2	BBB	7
3	Equitable Resources	2	A-	5
4	New Jersey Resources	2	*A+*	3
5	NICOR Inc.	3	AA	1
6	Northwest Nat. Gas	1	AA-	2
7	ONEOK Inc.	3	BBB	7
8	Peoples Energy	2	A-	5
9	Questar Corp.	2	*A-*	5
10	South Jersey Inds.	2	*BBB+*	6
11	WGL Holdings Inc.	1	AA-	2
12	Market Weighted Average	2	A-	4.8

Source of data: Standard & Poor's, May 2006; http://www2.standardandpoors.com/; The Value Line Investment Analyzer May 2006.

SCHEDULE JVW-3

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

Line No.	Date	DCF	A-Rated 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	0.1211	0.0741	0.0470
35	Jul-02	0.1292	0.0731	0.0561

Line No.	Date	DCF	A-Rated Bond Yield	Risk Premium
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
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	0.0939	0.0646	0.0293
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
77	Nov-05	0.0983	0.0588	0.0395
78	Dec-05	0.0989	0.0580	0.0409
79	Jan-06	0.0994	0.0575	0.0419
80	Feb-06	0.1104	0.0582	0.0522

Line No.	Date	DCF	A-Rated Bond Yield	Risk Premium
81	Mar-06	0.1089	0.0598	0.0491
82	Apr-06	0.1095	0.0629	0.0466

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 Financial
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.

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

SCHEDULE JVW-4
COMPARISON OF DCF EXPECTED RETURN ON AN INVESTMENT IN NATURAL GAS COMPANIES
TO THE INTEREST RATE ON MOODY'S A-RATED UTILITY BONDS

Line No.	Date	DCF	A-Rated Bond Yield	Risk Premium
1	Jun-98	0.1081	0.0703	0.0378
2	Jul-98	0.1105	0.0703	0.0402
3	Aug-98	0.1176	0.0700	0.0476
4	Sep-98	0.1229	0.0693	0.0536
5	Oct-98	0.1229	0.0696	0.0533
6	Nov-98	0.1171	0.0703	0.0468
7	Dec-98	0.1133	0.0691	0.0442
8	Jan-99	0.1148	0.0697	0.0451
9	Feb-99	0.1189	0.0709	0.0480
10	Mar-99	0.1215	0.0726	0.0489
11	Apr-99	0.1221	0.0722	0.0499
12	May-99	0.1193	0.0747	0.0446
13	Jun-99	0.1185	0.0774	0.0411
14	Jul-99	0.1197	0.0771	0.0426
15	Aug-99	0.1194	0.0791	0.0403
16	Sep-99	0.1200	0.0793	0.0407
17	Oct-99	0.1208	0.0806	0.0402
18	Nov-99	0.1223	0.0794	0.0429
19	Dec-99	0.1262	0.0814	0.0448
20	Jan-00	0.1284	0.0835	0.0449
21	Feb-00	0.1327	0.0825	0.0502
22	Mar-00	0.1314	0.0828	0.0486
23	Apr-00	0.1292	0.0829	0.0463
24	May-00	0.1264	0.0870	0.0394
25	Jun-00	0.1264	0.0836	0.0428
26	Jul-00	0.1289	0.0825	0.0464
27	Aug-00	0.1265	0.0813	0.0452
28	Sep-00	0.1237	0.0823	0.0414
29	Oct-00	0.1241	0.0814	0.0427
30	Nov-00	0.1217	0.0811	0.0406
31	Dec-00	0.1199	0.0784	0.0415
32	Jan-01	0.1221	0.0780	0.0441
33	Feb-01	0.1229	0.0774	0.0455
34	Mar-01	0.1242	0.0768	0.0474
35	Apr-01	0.1216	0.0794	0.0422
36	May-01	0.1282	0.0799	0.0483
37	Jun-01	0.1287	0.0785	0.0502

Line No.	Date	DCF	A-Rated Bond Yield	Risk Premium
38	Jul-01	0.1309	0.0778	0.0531
39	Aug-01	0.1308	0.0759	0.0549
40	Sep-01	0.1215	0.0775	0.0440
41	Oct-01	0.1226	0.0763	0.0463
42	Nov-01	0.1233	0.0757	0.0476
43	Dec-01	0.1216	0.0783	0.0433
44	Jan-02	0.1194	0.0766	0.0428
45	Feb-02	0.1200	0.0754	0.0446
46	Mar-02	0.1138	0.0776	0.0362
47	Apr-02	0.1104	0.0757	0.0347
48	May-02	0.1102	0.0752	0.0350
49	Jun-02	0.1110	0.0741	0.0369
50	Jul-02	0.1186	0.0731	0.0455
51	Aug-02	0.1175	0.0717	0.0458
52	Sep-02	0.1212	0.0708	0.0504
53	Oct-02	0.1196	0.0723	0.0473
54	Nov-02	0.1164	0.0714	0.0450
55	Dec-02	0.1163	0.0707	0.0456
56	Jan-03	0.1167	0.0706	0.0461
57	Feb-03	0.1182	0.0693	0.0489
58	Mar-03	0.1155	0.0679	0.0476
59	Apr-03	0.1130	0.0664	0.0466
60	May-03	0.1085	0.0636	0.0449
61	Jun-03	0.1076	0.0621	0.0455
62	Jul-03	0.1077	0.0657	0.0420
63	Aug-03	0.1086	0.0678	0.0408
64	Sep-03	0.1072	0.0656	0.0416
65	Oct-03	0.1069	0.0643	0.0426
66	Nov-03	0.1035	0.0637	0.0398
67	Dec-03	0.1016	0.0627	0.0389
68	Jan-04	0.1037	0.0615	0.0422
69	Feb-04	0.1017	0.0615	0.0402
70	Mar-04	0.1014	0.0597	0.0417
71	Apr-04	0.1018	0.0635	0.0383
72	May-04	0.1021	0.0662	0.0359
73	Jun-04	0.1013	0.0646	0.0367
74	Jul-04	0.0989	0.0627	0.0362
75	Aug-04	0.0986	0.0614	0.0372
76	Sep-04	0.0956	0.0598	0.0358
77	Oct-04	0.0954	0.0594	0.0360
78	Nov-04	0.0942	0.0597	0.0345
79	Dec-04	0.0950	0.0592	0.0358

Line No.	Date	DCF	A-Rated Bond Yield	Risk Premium
80	Jan-05	0.0969	0.0578	0.0391
81	Feb-05	0.0958	0.0561	0.0397
82	Mar-05	0.0958	0.0583	0.0375
83	Apr-05	0.0969	0.0564	0.0405
84	May-05	0.0961	0.0553	0.0408
85	Jun-05	0.0958	0.0540	0.0418
86	Jul-05	0.0948	0.0551	0.0397
87	Aug-05	0.0951	0.0550	0.0401
88	Sep-05	0.0963	0.0552	0.0411
89	Oct-05	0.0971	0.0579	0.0392
90	Nov-05	0.1030	0.0588	0.0442
91	Dec-05	0.1026	0.0580	0.0446
92	Jan-06	0.0963	0.0575	0.0388
93	Feb-06	0.1108	0.0582	0.0526
94	Mar-06	0.1111	0.0598	0.0513
95	Apr-06	0.1082	0.0629	0.0453

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 Financial
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.

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

SCHEDULE JVW-5

COMPARATIVE RETURNS ON S&P 500 STOCK INDEX AND MOODY'S A-RATED BONDS 1937—2005

	S&P 500	Stock		A-rated	
	Stock	Dividend	Stock	Bond	Bond
Year	Price	Yield	Return	Price	Return
2006	1278.72	0.0183		$75.25	
2005	1181.41	0.0177	10.01%	$74.91	5.80%
2004	1,132.52	0.0162	5.94%	$70.87	11.34%
2003	895.84	0.0180	28.22%	$62.26	20.27%
2002	1,140.21	0.0138	-20.05%	$57.44	15.35%
2001	1,335.63	0.0116	-13.47%	$56.40	8.93%
2000	1,425.59	0.0118	-5.13%	$52.60	14.82%
1999	1,248.77	0.0130	15.46%	$63.03	-10.20%
1998	963.35	0.0162	31.25%	$62.43	7.38%
1997	766.22	0.0195	27.68%	$56.62	17.32%
1996	614.42	0.0231	27.02%	$60.91	-0.48%
1995	465.25	0.0287	34.93%	$50.22	29.26%
1994	472.99	0.0269	1.05%	$60.01	-9.65%
1993	435.23	0.0288	11.56%	$53.13	20.48%
1992	416.08	0.0290	7.50%	$49.56	15.27%
1991	325.49	0.0382	31.65%	$44.84	19.44%
1990	339.97	0.0341	-0.85%	$45.60	7.11%
1989	285.41	0.0364	22.76%	$43.06	15.18%
1988	250.48	0.0366	17.61%	$40.10	17.36%
1987	264.51	0.0317	-2.13%	$48.92	-9.84%
1986	208.19	0.0390	30.95%	$39.98	32.36%
1985	171.61	0.0451	25.83%	$32.57	35.05%
1984	166.39	0.0427	7.41%	$31.49	16.12%
1983	144.27	0.0479	20.12%	$29.41	20.65%
1982	117.28	0.0595	28.96%	$24.48	36.48%
1981	132.97	0.0480	-7.00%	$29.37	-3.01%
1980	110.87	0.0541	25.34%	$34.69	-3.81%
1979	99.71	0.0533	16.52%	$43.91	-11.89%
1978	90.25	0.0532	15.80%	$49.09	-2.40%
1977	103.80	0.0399	-9.06%	$50.95	4.20%
1976	96.86	0.0380	10.96%	$43.91	25.13%
1975	72.56	0.0507	38.56%	$41.76	14.75%
1974	96.11	0.0364	-20.86%	$52.54	-12.91%
1973	118.40	0.0269	-16.14%	$58.51	-3.37%
1972	103.30	0.0296	17.58%	$56.47	10.69%
1971	93.49	0.0332	13.81%	$53.93	12.13%
1970	90.31	0.0356	7.08%	$50.46	14.81%

	S&P 500	Stock		A-rated	
	Stock	Dividend	Stock	Bond	Bond
Year	Price	Yield	Return	Price	Return
1969	102.00	0.0306	-8.40%	$62.43	-12.76%
1968	95.04	0.0313	10.45%	$66.97	-0.81%
1967	84.45	0.0351	16.05%	$78.69	-9.81%
1966	93.32	0.0302	-6.48%	$86.57	-4.48%
1965	86.12	0.0299	11.35%	$91.40	-0.91%
1964	76.45	0.0305	15.70%	$92.01	3.68%
1963	65.06	0.0331	20.82%	$93.56	2.61%
1962	69.07	0.0297	-2.84%	$89.60	8.89%
1961	59.72	0.0328	18.94%	$89.74	4.29%
1960	58.03	0.0327	6.18%	$84.36	11.13%
1959	55.62	0.0324	7.57%	$91.55	-3.49%
1958	41.12	0.0448	39.74%	$101.22	-5.60%
1957	45.43	0.0431	-5.18%	$100.70	4.49%
1956	44.15	0.0424	7.14%	$113.00	-7.35%
1955	35.60	0.0438	28.40%	$116.77	0.20%
1954	25.46	0.0569	45.52%	$112.79	7.07%
1953	26.18	0.0545	2.70%	$114.24	2.24%
1952	24.19	0.0582	14.05%	$113.41	4.26%
1951	21.21	0.0634	20.39%	$123.44	-4.89%
1950	16.88	0.0665	32.30%	$125.08	1.89%
1949	15.36	0.0620	16.10%	$119.82	7.72%
1948	14.83	0.0571	9.28%	$118.50	4.49%
1947	15.21	0.0449	1.99%	$126.02	-2.79%
1946	18.02	0.0356	-12.03%	$126.74	2.59%
1945	13.49	0.0460	38.18%	$119.82	9.11%
1944	11.85	0.0495	18.79%	$119.82	3.34%
1943	10.09	0.0554	22.98%	$118.50	4.49%
1942	8.93	0.0788	20.87%	$117.63	4.14%
1941	10.55	0.0638	-8.98%	$116.34	4.55%
1940	12.30	0.0458	-9.65%	$112.39	7.08%
1939	12.50	0.0349	1.89%	$105.75	10.05%
1938	11.31	0.0784	18.36%	$99.83	9.94%
1937	17.59	0.0434	-31.36%	$103.18	0.63%
Return 1937—2005	Stocks	11.56%			
	Bonds	6.47%			
Risk Premium		5.10%			

Note: See Appendix 3 for an explanation of how stock and bond returns are derived and the source of the data presented.

SCHEDULE JVW-6

COMPARATIVE RETURNS ON S&P UTILITY STOCK INDEX AND MOODY'S A-RATED BONDS 1937—2005

Year	Utility Stock Price	Stock Dividend Yield	Stock Return	A-rated Bond Price	Bond Rate of Return
2006	198.94	0.0345		$75.25	
2005	167.77	0.0356	22.14%	$74.91	5.80%
2004	139.79	0.0342	23.44%	$70.87	11.34%
2003	114.11	0.0508	27.58%	$62.26	20.27%
2002	142.14	0.0454	-15.18%	$57.44	15.35%
2002	243.79	0.0362		$57.44	
2001	307.70	0.0287	-17.90%	$56.40	8.93%
2000	239.17	0.0413	32.78%	$52.60	14.82%
1999	253.52	0.0394	-1.72%	$63.03	-10.20%
1998	228.61	0.0457	15.47%	$62.43	7.38%
1997	201.14	0.0492	18.58%	$56.62	17.32%
1996	202.57	0.0454	3.83%	$60.91	-0.48%
1995	153.87	0.0584	37.49%	$50.22	29.26%
1994	168.70	0.0496	-3.83%	$60.01	-9.65%
1993	159.79	0.0537	10.95%	$53.13	20.48%
1992	149.70	0.0572	12.46%	$49.56	15.27%
1991	138.38	0.0607	14.25%	$44.84	19.44%
1990	146.04	0.0558	0.33%	$45.60	7.11%
1989	114.37	0.0699	34.68%	$43.06	15.18%
1988	106.13	0.0704	14.80%	$40.10	17.36%
1987	120.09	0.0588	-5.74%	$48.92	-9.84%
1986	92.06	0.0742	37.87%	$39.98	32.36%
1985	75.83	0.0860	30.00%	$32.57	35.05%
1984	68.50	0.0925	19.95%	$31.49	16.12%
1983	61.89	0.0948	20.16%	$29.41	20.65%
1982	51.81	0.1074	30.20%	$24.48	36.48%
1981	52.01	0.0978	9.40%	$29.37	-3.01%
1980	50.26	0.0953	13.01%	$34.69	-3.81%
1979	50.33	0.0893	8.79%	$43.91	-11.89%
1978	52.40	0.0791	3.96%	$49.09	-2.40%
1977	54.01	0.0714	4.16%	$50.95	4.20%
1976	46.99	0.0776	22.70%	$43.91	25.13%
1975	38.19	0.0920	32.24%	$41.76	14.75%
1974	48.60	0.0713	-14.29%	$52.54	-12.91%
1973	60.01	0.0556	-13.45%	$58.51	-3.37%
1972	60.19	0.0542	5.12%	$56.47	10.69%
1971	63.43	0.0504	-0.07%	$53.93	12.13%
1970	55.72	0.0561	19.45%	$50.46	14.81%

Year	Utility Stock Price	Stock Dividend Yield	Stock Return	A-rated Bond Price	Bond Rate of Return
1969	68.65	0.0445	-14.38%	$62.43	-12.76%
1968	68.02	0.0435	5.28%	$66.97	-0.81%
1967	70.63	0.0392	0.22%	$78.69	-9.81%
1966	74.50	0.0347	-1.72%	$86.57	-4.48%
1965	75.87	0.0315	1.34%	$91.40	-0.91%
1964	67.26	0.0331	16.11%	$92.01	3.68%
1963	63.35	0.0330	9.47%	$93.56	2.61%
1962	62.69	0.0320	4.25%	$89.60	8.89%
1961	52.73	0.0358	22.47%	$89.74	4.29%
1960	44.50	0.0403	22.52%	$84.36	11.13%
1959	43.96	0.0377	5.00%	$91.55	-3.49%
1958	33.30	0.0487	36.88%	$101.22	-5.60%
1957	32.32	0.0487	7.90%	$100.70	4.49%
1956	31.55	0.0472	7.16%	$113.00	-7.35%
1955	29.89	0.0461	10.16%	$116.77	0.20%
1954	25.51	0.0520	22.37%	$112.79	7.07%
1953	24.41	0.0511	9.62%	$114.24	2.24%
1952	22.22	0.0550	15.36%	$113.41	4.26%
1951	20.01	0.0606	17.10%	$123.44	-4.89%
1950	20.20	0.0554	4.60%	$125.08	1.89%
1949	16.54	0.0570	27.83%	$119.82	7.72%
1948	16.53	0.0535	5.41%	$118.50	4.49%
1947	19.21	0.0354	-10.41%	$126.02	-2.79%
1946	21.34	0.0298	-7.00%	$126.74	2.59%
1945	13.91	0.0448	57.89%	$119.82	9.11%
1944	12.10	0.0569	20.65%	$119.82	3.34%
1943	9.22	0.0621	37.45%	$118.50	4.49%
1942	8.54	0.0940	17.36%	$117.63	4.14%
1941	13.25	0.0717	-28.38%	$116.34	4.55%
1940	16.97	0.0540	-16.52%	$112.39	7.08%
1939	16.05	0.0553	11.26%	$105.75	10.05%
1938	14.30	0.0730	19.54%	$99.83	9.94%
1937	24.34	0.0432	-36.93%	$103.18	0.63%
Return 1937—2005	Stocks	10.92%			
	Bonds	6.47%			
Risk Premium	,	4.45%			

Note: See Appendix 3 for an explanation of how stock and bond returns are derived and the source of the data presented. In 2002, S&P discontinued its S&P Utilities stock index, and S&P no longer reports dividend yields for electric utilities. Thus, for this study, the utility stock returns beginning in 2002 are computed based on the companies contained in the S&P electric company index, as listed in the *S&P Security Price Record*. The dividend yields for these stocks are the January dividend yields reported by Value Line.

SCHEDULE JVW-7

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-8

CALCULATION OF CAPITAL ASSET PRICING MODEL COST OF EQUITY USING IBBOTSON ASSOCIATES' 7.1 PERCENT RISK PREMIUM

Risk-free Rate	5.39%	*Long-term Treasury bond yield*
Beta	0.90	*Average Beta Comparable Electric Companies*
Risk Premium	7.10%	*Long-horizon Ibbotson risk premium*
Beta x Risk Premium	6.39%	
CAPM cost of equity	11.78%	

Risk-free Rate	5.39%	*Long-term Treasury bond yield*
Beta	0.88	*Average Beta Comparable Gas Companies*
Risk Premium	7.10%	*Long-horizon Ibbotson risk premium*
Beta x Risk Premium	6.25%	
CAPM cost of equity	11.64%	

Ibbotson risk premium from *Stocks, Bonds, Bills, and Inflation: SBBI 2006 Yearbook Valuation Edition*; Value Line beta for comparable companies from The Value Line Investment Analyzer, May 2006.

COMPARABLE COMPANY BETAS

Company	Market Cap $ (Mil)	Beta
Alliant Energy	3,827	0.85
Amer. Elec. Power	13,170	1.20
Ameren Corp.	10,181	0.75
Consol. Edison	10,513	0.65
Dominion Resources	25,931	0.95
DTE	7,207	0.70
Duke Energy	26,764	1.20
Empire	594	0.75
Energy East Corp.	3,580	0.85
Entergy Corp.	15,078	0.85
FirstEnergy Corp.	17,043	0.75
G't Plains Energy	2,114	0.90
Hawaiian Elec.	2,180	0.70
IDACORP Inc.	1,458	0.95
MDU Resources	4,412	0.95
NiSource Inc.	5,752	0.80
Northeast Utilities	2,624	0.80
NSTAR	2,895	0.75
OGE Energy	2,704	0.75
Otter Tail Corp.	872	0.60
Pepco Holdings	4,323	0.90
Pinnacle West Capital	3,994	0.95
PNM Resources	1,752	0.95
PPL Corp.	11,070	1.00
Progress Energy	10,713	0.80
Puget Energy Inc.	2,401	0.80
SCANA Corp.	4,447	0.80
Sempra Energy	11,656	1.05
Southern Co.	23,679	0.65
TXU Corp.	27,074	1.05
Vectren	2,053	0.80
Wisconsin Energy	4,610	0.75
WPS Resources	1,974	0.75
Xcel Energy Inc.	7,414	0.85
Market-weighted average		0.90

Company Name	Market Cap $ (Mil)	Beta
AGL Resources	2,766	0.90
Atmos Energy	2,159	0.70
Equitable Resources	4,279	0.85
New Jersey Resources	1,232	0.80
NICOR Inc.	1,788	1.15
Northwest Nat. Gas	966	0.70
ONEOK Inc.	3,244	1.00
Peoples Energy	1,412	0.85
Questar Corp.	6,972	0.90
South Jersey	775	0.65
WGL Holdings Inc.	1,440	0.80
Market-weighted average		0.88

Data from Value Line Investment Analyzer May 2006.

SCHEDULE JVW-9

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

Risk-free rate	5.39%	*Long-term Treasury bond yield*
Beta	0.90	*Average Beta Comparable Electric Companies*
DCF S&P 500	13.75%	*DCF Cost of Equity S&P 500 (see following)*
Risk Premium	8.35%	
Beta x Risk Premium	7.52%	
CAPM cost of equity	12.91%	

Risk-free rate	5.39%	*Long-term Treasury bond yield*
Beta	0.88	*Average Beta Comparable Gas Companies*
DCF S&P 500	13.75%	*DCF Cost of Equity S&P 500 (see following)*
Risk Premium	8.35%	
Beta x Risk Premium	7.35%	
CAPM cost of equity	12.74%	

Average Treasury bond yield April 2006 from Federal Reserve; forecasted Treasury bond yield 2007 from Blue Chip (see Footnote 5 above).

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

COMPANY	P_0	D_0	Growth	Cost of Equity	Market Cap $ (mils)
3M	76.12	1.84	11.06%	13.91%	64,499
ABBOTT LABS.	43.01	1.18	8.88%	12.06%	65,761
ACE	53.92	0.92	11.67%	13.69%	17,991
AIR PRDS.& CHEMS.	65.18	1.36	10.45%	12.90%	15,254
ALBERTO CULVER	44.87	0.46	11.80%	13.01%	4,143
ALCOA	31.29	0.60	11.00%	13.26%	29,392
ALLSTATE	53.43	1.40	9.80%	12.86%	36,435
ALTRIA GROUP INCO.	71.87	3.20	8.17%	13.33%	152,681
AMER.STANDARD	40.90	0.72	12.25%	14.34%	8,852
AMERICAN EXPRESS	53.08	0.48	12.46%	13.53%	66,599
AMERICAN INTL.GP.	66.06	0.60	13.08%	14.16%	169,453
AMERIPRISE FINL.	45.16	0.44	10.68%	11.82%	12,292
AMERISOURCEBERGEN	45.84	0.10	13.13%	13.39%	9,019
ANADARKO PETROLEUM	102.86	0.72	11.17%	11.99%	24,155
APACHE	69.33	0.40	11.25%	11.93%	23,465
AT&T	26.94	1.33	6.69%	12.34%	101,688
AUTOMATIC DATA PROC.	45.59	0.74	12.44%	14.37%	25,547
AVERY DENNISON	60.13	1.56	11.00%	14.06%	6,860
AVON PRODUCTS	30.04	0.70	10.86%	13.60%	14,691
BALL	42.14	0.40	12.50%	13.63%	4,169
BANK OF AMERICA	45.35	2.00	8.86%	14.00%	232,068
BANK OF NEW YORK CO.	34.68	0.84	11.00%	13.86%	27,062
BAUSCH & LOMB	63.61	0.52	13.82%	14.80%	2,625
BAXTER INTL.	37.71	0.58	11.16%	12.97%	24,448
BB & T	40.08	1.52	8.97%	13.39%	22,991
BECTON DICKINSON	63.58	0.86	11.49%	13.09%	15,592
BEMIS	31.28	0.76	10.67%	13.53%	3,298
BLACK & DECKER	87.36	1.52	10.43%	12.47%	7,244
BOEING	76.84	1.20	13.16%	15.03%	66,725
BRISTOL MYERS SQUIBB	23.93	1.12	7.27%	12.65%	49,721
CAPITAL ONE FINL.	84.77	0.11	13.36%	13.51%	26,088
CARDINAL HEALTH	71.93	0.24	13.28%	13.68%	28,418
CATERPILLAR	73.51	1.00	11.67%	13.28%	50,811
CBS 'B'	24.92	0.64	9.32%	12.31%	18,016
CENTERPOINT EN.	12.46	0.60	8.00%	13.58%	3,736
CHESAPEAKE ENERGY	31.63	0.20	13.25%	14.01%	11,836
CHUBB	48.52	1.00	10.19%	12.60%	21,380
CINCINNATI FIN.	43.45	1.34	10.33%	13.96%	7,424

COMPANY	P_0	D_0	Growth	Cost of Equity	Market Cap $ (mils)
CITIGROUP	47.14	1.96	9.85%	14.74%	249,315
CITIZENS COMMS.	13.17	1.00	4.48%	13.09%	4,362
CLEAR CHL.COMMS.	28.79	0.75	11.24%	14.32%	14,745
CLOROX	61.60	1.16	10.10%	12.30%	9,634
COCA COLA	41.79	1.24	8.63%	12.06%	98,848
COLGATE-PALM.	56.25	1.28	10.00%	12.66%	30,468
COMERICA	56.79	2.36	7.69%	12.48%	9,257
COMPASS BANCSHARES	50.95	1.56	9.59%	13.17%	6,793
COSTCO WHOLESALE	53.06	0.46	12.75%	13.78%	25,649
COUNTRYWIDE FINL.	35.92	0.60	10.95%	12.91%	24,518
DANAHER	62.32	0.08	14.35%	14.50%	19,643
DARDEN RESTAURANTS	40.76	0.40	12.20%	13.36%	5,869
DOLLAR GENERAL	17.51	0.20	13.70%	15.07%	5,508
DOMINION RES.	72.96	2.76	10.50%	14.97%	26,016
DOW CHEMICALS	41.67	1.50	10.68%	14.93%	39,287
DU PONT E I DE NEMOURS	41.89	1.48	10.32%	14.48%	40,571
EATON	71.58	1.40	11.25%	13.56%	11,413
EL PASO	12.61	0.16	12.67%	14.18%	8,510
ELI LILLY	55.44	1.60	9.65%	13.02%	59,799
EMERSON ELECTRIC	82.72	1.78	12.36%	14.93%	34,949
ENTERGY	70.01	2.16	8.40%	11.96%	15,792
ESTEE LAUDER COS.'A'	37.07	0.40	11.83%	13.11%	4,714
EXELON	55.01	1.60	9.50%	12.89%	36,099
FAMILY DOLLAR STORES	25.71	0.42	11.50%	13.43%	3,883
FEDERATED DEPT.STRS.	72.16	1.00	12.14%	13.78%	21,429
FEDERATED INVRS.'B'	38.04	0.60	10.97%	12.82%	3,742
FIFTH THIRD BANCORP	39.12	1.52	9.05%	13.58%	22,458
FIRST DATA	46.35	0.24	12.58%	13.19%	36,583
FIRST HORIZON NATIONAL	40.35	1.80	7.63%	12.77%	5,375
FORTUNE BRANDS	79.30	1.44	11.40%	13.54%	11,752
FRANK.RES.	97.48	0.48	13.25%	13.84%	24,086
GAP	18.30	0.32	12.47%	14.55%	15,442
GENERAL ELECTRIC	33.60	1.00	11.36%	14.89%	359,680
GENWORTH FINANCIAL	33.18	0.30	10.78%	11.84%	12,774
GOLDEN WEST FINL.	69.82	0.32	12.73%	13.27%	22,172
GOODRICH	42.50	0.80	12.26%	14.50%	5,492
H & R BLOCK	22.47	0.50	11.25%	13.88%	7,498
HARLEY-DAVIDSON	51.23	0.72	11.34%	13.00%	13,856
HARTFORD FINL.SVS.GP.	83.82	1.60	10.98%	13.23%	27,863
HASBRO	20.75	0.48	10.40%	13.11%	3,508
HCA	46.55	0.68	11.61%	13.34%	16,982

COMPANY	P_0	D_0	Growth	Cost of Equity	Market Cap $ (mils)
HEALTH MAN.AS.A	21.29	0.24	13.50%	14.85%	4,986
HEWLETT-PACKARD	32.83	0.32	12.83%	13.99%	91,839
HILTON HOTELS	25.17	0.16	13.71%	14.47%	10,324
HOME DEPOT	41.36	0.60	13.33%	15.07%	84,566
HONEYWELL INTL.	41.85	0.91	10.78%	13.34%	35,187
HUNTINGTON BCSH.	23.64	1.00	7.50%	12.37%	6,007
ILLINOIS TOOL WKS.	92.59	1.32	12.36%	14.06%	28,850
IMS HEALTH	25.47	0.12	11.51%	12.06%	5,415
INGERSOLL-RAND	42.45	0.64	12.80%	14.60%	14,327
INTERNATIONAL BUS.MACH.	81.79	1.10	10.59%	12.16%	129,053
INTL.GAME TECH.	35.93	0.50	13.35%	15.02%	12,789
ITT INDUSTRIES	54.18	0.44	12.64%	13.61%	10,386
JANUS CAPITAL GP.	21.73	0.04	13.68%	13.90%	4,180
JOHNSON & JOHNSON	58.67	1.32	10.27%	12.91%	174,427
JOHNSON CONTROLS	73.50	1.12	12.86%	14.68%	15,835
JP MORGAN CHASE & CO.	41.95	1.36	9.89%	13.69%	158,174
KELLOGG	44.49	1.16	9.09%	12.12%	18,178
KEYCORP	36.76	1.38	7.73%	12.05%	15,485
L3 COMMUNICATIONS	84.20	0.75	12.35%	13.41%	9,908
LEHMAN BROS.HDG.	72.97	0.64	12.41%	13.45%	40,465
LENNAR 'A'	58.53	0.64	13.25%	14.56%	6,999
LIMITED BRANDS	24.21	0.60	11.29%	14.22%	10,110
LINCOLN NAT.	55.71	1.52	10.92%	14.14%	16,589
LIZ CLAIBORNE	37.74	0.22	11.50%	12.19%	4,105
LOCKHEED MARTIN	73.83	1.20	11.04%	12.95%	32,780
M&T BK.	113.46	2.40	9.60%	12.06%	13,344
MARSH & MCLENNAN	30.15	0.68	10.92%	13.58%	16,777
MARSHALL & ILSLEY	43.92	1.08	9.82%	12.69%	11,406
MATTEL	17.08	0.50	9.17%	12.57%	6,290
MBIA	59.26	1.24	10.33%	12.78%	7,991
MCCORMICK & CO NV.	33.15	0.72	9.34%	11.86%	4,148
MCGRAW-HILL	54.98	0.73	11.65%	13.22%	20,437
MCKESSON	52.34	0.24	13.59%	14.14%	14,875
MELLON FINL.	35.85	0.88	10.89%	13.78%	15,592
MEREDITH	53.73	0.64	12.50%	13.92%	1,999
MERRILL LYNCH & CO.	77.14	1.00	13.15%	14.70%	72,136
METLIFE	50.19	0.52	10.59%	11.80%	39,490
MICROSOFT	26.87	0.36	12.51%	14.11%	246,359
MOLSON COORS BREWING 'B'	66.43	1.28	10.97%	13.24%	4,610
MOODYS	66.97	0.28	14.58%	15.09%	17,958
MORGAN STANLEY	62.04	1.08	12.40%	14.47%	68,871

COMPANY	P_0	D_0	Growth	Cost of Equity	Market Cap $ (mils)
MOTOROLA	22.05	0.16	11.95%	12.81%	53,367
NAT.CITY	35.35	1.48	8.10%	12.94%	22,851
NATIONAL SEMICON.	28.42	0.12	13.75%	14.26%	10,122
NEWELL RUBBERMAID	25.28	0.84	9.00%	12.86%	7,527
NORDSTROM	39.94	0.42	13.63%	14.89%	10,245
NORTHERN TRUST	53.72	0.92	12.07%	14.10%	12,834
NORTHROP GRUMMAN	66.65	1.04	12.56%	14.42%	22,998
OMNICOM GP.	83.56	1.00	11.87%	13.29%	16,093
PARKER-HANNIFIN	79.99	0.92	13.00%	14.37%	9,704
PEPSICO	58.31	1.04	10.76%	12.85%	96,241
PINNACLE WEST CAP.	40.56	2.00	6.20%	11.82%	3,970
PNC FINL.SVS.GP.	68.17	2.20	9.20%	12.96%	21,073
PPG INDUSTRIES	62.23	1.92	9.29%	12.88%	11,097
PPL	30.16	1.10	9.09%	13.34%	11,042
PRAXAIR	54.58	1.00	11.49%	13.66%	18,137
PRINCIPAL FINL.GP.	49.09	0.65	12.25%	13.82%	14,341
PROCTER & GAMBLE	59.08	1.24	11.02%	13.49%	191,459
PRUDENTIAL FINL.	76.40	0.78	12.47%	13.68%	38,674
PUB.SER.ENTER.GP.	66.37	2.28	8.50%	12.48%	15,748
PULTE HOMES	38.59	0.16	13.19%	13.68%	9,628
REGIONS FINL.NEW	35.02	1.40	8.00%	12.62%	16,661
ROHM & HAAS	50.12	1.16	10.99%	13.72%	11,267
SABRE HDG.	23.76	0.40	10.00%	11.96%	3,044
SAFECO	51.41	1.00	9.78%	12.05%	6,398
SCRIPPS E W	46.83	0.44	12.67%	13.79%	5,853
SEALED AIR	56.47	0.60	11.60%	12.85%	4,388
SNAP-ON	38.90	1.08	11.67%	14.97%	2,420
ST.PAUL TRAVELERS	42.76	0.92	9.87%	12.38%	30,489
STANLEY WORKS	50.73	1.16	12.00%	14.72%	4,351
STATE STREET	61.61	0.76	12.36%	13.83%	21,895
SUNTRUST BANKS	73.61	2.44	9.18%	13.04%	28,036
T ROWE PRICE GP.	78.20	1.12	12.70%	14.41%	11,179
TECO ENERGY	16.54	0.76	8.68%	14.03%	3,329
TEKTRONIX	33.01	0.24	12.00%	12.86%	2,954
TEXTRON	89.41	1.55	11.67%	13.72%	11,712
THE HERSHEY COMPANY	52.02	0.98	10.09%	12.29%	9,502
TIFFANY & CO	36.85	0.32	12.60%	13.63%	4,974
TIME WARNER	17.34	0.20	13.02%	14.40%	76,874
TJX COS.	24.76	0.28	13.00%	14.35%	11,123
TYCO INTL.	26.11	0.40	12.86%	14.69%	53,105
UNITED TECHNOLOGIES	59.01	1.06	10.91%	13.02%	63,493

COMPANY	P_0	D_0	Growth	Cost of Equity	Market Cap $ (mils)
US BANCORP	30.60	1.32	9.79%	14.86%	57,064
UST	40.81	2.28	6.25%	12.64%	7,118
V F	57.16	1.16	10.00%	12.37%	6,741
WACHOVIA	56.25	2.04	9.97%	14.23%	92,866
WAL MART STORES	46.26	0.67	13.22%	14.96%	187,650
WALT DISNEY	27.38	0.27	13.21%	14.39%	53,846
WASHINGTON MUTUAL	43.25	2.04	9.25%	14.78%	44,711
WASTE MAN.	34.51	0.88	10.67%	13.67%	20,420
WELLS FARGO & CO	64.57	2.08	11.04%	14.85%	115,117
WENDY'S INTL.	60.66	0.68	12.05%	13.38%	7,063
WRIGLEY WILLIAM JR.	47.20	1.28	10.75%	13.95%	8,880
XL CAP.'A'	66.01	1.52	11.70%	14.43%	11,831
YUM! BRANDS	49.49	0.46	11.42%	12.51%	14,255
ZIONS BANCORP.	82.09	1.44	10.50%	12.55%	8,791
Market Weighted Average				13.75%	

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. To be conservative, I also eliminated those 25% of companies with the highest and lowest DCF results (the result for all companies in the S&P 500 was 13.77%.).

D_0	=	Current dividend per Thomson Financial.
P_0	=	Average of the monthly high and low stock prices during the three months ending April 2006 per Thomson Financial.
g	=	I/B/E/S forecast of future earnings growth April 2006.
k	=	Cost of equity using the quarterly version of the DCF model shown below:

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

SCHEDULE JVW-10

AVERAGE MARKET VALUE CAPITAL STRUCTURE FOR ELECTRIC AND GAS COMPANY COMPARABLE GROUPS

Line No.	Company	Long-Term Debt	Preferred Equity	Market Cap $ (Mil)	Total Capital	% Long-term Debt	% Preferred	% Equity
1	Alliant Energy	1,915	244	3,827	5,985	32.0%	4.1%	63.9%
2	Amer. Elec. Power	11,073	61	13,170	24,304	45.6%	0.3%	54.2%
3	Ameren Corp.	5,354	214	10,181	15,749	34.0%	1.4%	64.6%
4	Consol. Edison	7,398	213	10,513	18,124	40.8%	1.2%	58.0%
5	Dominion Resources	14,653	257	25,931	40,841	35.9%	0.6%	63.5%
6	DTE	7,080	0	7,207	14,287	49.6%	0.0%	50.4%
7	Duke Energy	14,547	0	26,764	41,311	35.2%	0.0%	64.8%
8	Empire	410	0	594	1,004	40.8%	0.0%	59.2%
9	Energy East Corp.	3,667	25	3,580	7,272	50.4%	0.3%	49.2%
10	Entergy Corp.	8,825	446	15,078	24,349	36.2%	1.8%	61.9%
11	FirstEnergy Corp.	8,155	184	17,043	25,382	32.1%	0.7%	67.1%
12	G't Plains Energy	1,141	39	2,114	3,294	34.6%	1.2%	64.2%
13	Hawaiian Elec.	1,033	34	2,180	3,247	31.8%	1.1%	67.1%
14	IDACORP Inc.	1,024	0	1,458	2,482	41.2%	0.0%	58.8%
15	MDU Resources	1,105	15	4,412	5,532	20.0%	0.3%	79.8%
16	NiSource Inc.	5,271	81	5,752	11,105	47.5%	0.7%	51.8%
17	Northeast Utilities	4,337	116	2,624	7,077	61.3%	1.6%	37.1%
18	NSTAR	2,402	43	2,895	5,340	45.0%	0.8%	54.2%
19	OGE Energy	1,351	0	2,704	4,054	33.3%	0.0%	66.7%
20	Otter Tail Corp.	258	16	872	1,146	22.5%	1.4%	76.1%
21	Pepco Holdings	4,839	46	4,323	9,208	52.6%	0.5%	46.9%
22	Pinnacle West Capital	2,609	0	3,994	6,602	39.5%	0.0%	60.5%
23	PNM Resources	1,746	12	1,752	3,510	49.8%	0.3%	49.9%
24	PPL Corp.	6,044	51	11,070	17,165	35.2%	0.3%	64.5%
25	Progress Energy	10,446	93	10,713	21,252	49.2%	0.4%	50.4%
26	Puget Energy Inc.	2,421	2	2,401	4,824	50.2%	0.0%	49.8%
27	SCANA Corp.	2,948	114	4,447	7,509	39.3%	1.5%	59.2%
28	Sempra Energy	4,823	195	11,656	16,674	28.9%	1.2%	69.9%
29	Southern Co.	12,846	596	23,679	37,121	34.6%	1.6%	63.8%
30	TXU Corp.	11,332	0	27,074	38,406	29.5%	0.0%	70.5%
31	Vectren	1,198	0	2,053	3,251	36.8%	0.0%	63.2%
32	Wisconsin Energy	3,031	30	4,610	7,672	39.5%	0.4%	60.1%
33	WPS Resources	867	51	1,974	2,892	30.0%	1.8%	68.2%
34	Xcel Energy Inc.	5,898	105	7,414	13,417	44.0%	0.8%	55.3%
35		172,046	3,282	276,057	451,386	38.1%	0.7%	61.2%

Source of data: Value Line Investment Analyzer May 2006.

AVERAGE MARKET VALUE CAPITAL STRUCTURE FOR ELECTRIC AND GAS COMPANY COMPARABLE GROUPS

Line No.	Company	Long-Term Debt	Preferred Equity	Market Cap $ (Mil)	Total Capital	% Long-term Debt	% Preferred	% Equity
1	AGL Resources	1,615	0	2,766	4,381	36.9%	0.0%	63.1%
2	Atmos Energy	2,183	0	2,159	4,342	50.3%	0.0%	49.7%
3	Equitable Resources	618	0	4,279	4,897	12.6%	0.0%	87.4%
4	New Jersey Resources	317	0	1,232	1,549	20.5%	0.0%	79.5%
5	NICOR Inc.	486	1	1,788	2,275	21.4%	0.0%	78.6%
6	Northwest Nat. Gas	484	0	966	1,450	33.4%	0.0%	66.6%
7	ONEOK Inc.	2,024	0	3,244	5,269	38.4%	0.0%	61.6%
8	Peoples Energy	896	0	1,412	2,307	38.8%	0.0%	61.2%
9	Questar Corp.	933	0	6,972	7,905	11.8%	0.0%	88.2%
10	South Jersey	319	0	775	1,094	29.2%	0.0%	70.8%
11	WGL Holdings Inc.	584	28	1,440	2,053	28.5%	1.4%	70.2%
12	Market Weighted Average	10,459	29	27,033	37,521	27.88%	0.08%	72.05%

Source of data: Value Line Investment Analyzer May 2006.

Average Capital Structure Weights Electric Companies 2002 – 2006

Year	Long-term Debt	Preferred Equity	Market Cap $ (Mil)	Total Capital	% Debt	% Preferred	% Equity
2002	162,110	11,890	240,966	414,966	39.07%	2.87%	58.07%
2003	194,805	10,803	193,264	398,872	48.84%	2.71%	48.45%
2004	200,877	10,777	263,049	474,702	42.32%	2.27%	55.41%
2005	216,264	6,644	322,119	545,027	39.68%	1.22%	59.10%
2006	208,010	4,077	358,719	570,806	36.44%	0.71%	62.84%
Composite	982,064	44,191	1,378,118	2,404,373	40.84%	1.84%	57.32%

Data from The Value Line Investment Analyzer February each year for a group of 37 publicly-traded electric companies followed by Value Line.

SCHEDULE JVW-11

ILLUSTRATION OF CALCULATION OF COST OF EQUITY REQUIRED FOR AMERENUE TO HAVE THE SAME WEIGHTED AVERAGE COST OF CAPITAL AS THE COMPARABLE GROUPS

	Cost Rate	Source of Data	After-Tax Cost Rate
Tax Rate	39%		
Cost of Debt	6.64%	*Forecast Yield A-rated bonds*	3.84%
Cost of Preferred	7.24%	*Value Line Forecast*	7.24%
Cost of Equity	11.5%	*Average Cost of Equity (See Table 4)*	

5-yr. Average Electric Company Capital Structure			
Capital Source	Percent	After-tax Cost Rate	Weighted Cost
Long-term Debt	40.84%	3.84%	1.567%
Preferred Stock	1.84%	7.24%	0.133%
Common Equity	57.32%	11.50%	6.592%
Total	100.00%		8.292%

Capital Source	Percent	After-tax Cost Rate	Weighted Cost
Long-term Debt	45.46%	3.84%	1.744%
Preferred Stock	2.04%	7.24%	0.148%
Sum of Wtd. Cost of Debt and Preferred			1.892%

(1) Ave. WACC Comparable Electric Companies	8.292%
(2) Wtd. Cost of Debt and Preferred	1.892%
(1) Less (2)	6.400%
Divide difference by % Equity in Capital Structure= Cost of Equity	12.19%

Weighted Average Cost of Capital AmerenUE			
Capital Source	Percent	After-tax Cost Rate	Weighted Cost
Long-term Debt	45.46%	3.84%	1.755%
Preferred Stock	2.04%	7.24%	0.149%
Common Equity	52.49%	12.19%	6.400%
Total	100.00%		8.292%

APPENDIX JVW-1

DERIVATION OF THE QUARTERLY DCF MODEL

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

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

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

where

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

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

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

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

where the three dots indicate that the sum continues indefinitely.

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

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

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

Geometric Progression

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

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

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

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

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

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

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

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

and

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

or

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

Solving for S_n, we obtain:

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

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

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

Application to DCF Model

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

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

and common factor

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

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

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

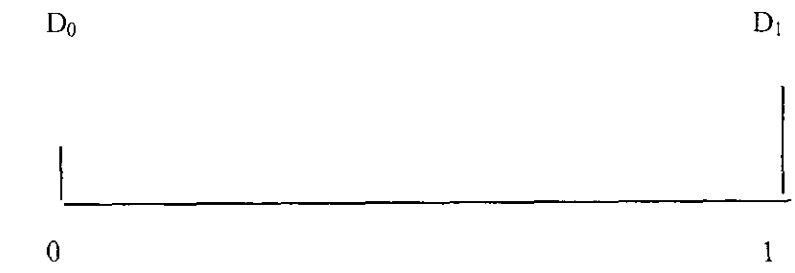
as we suggested earlier.

Quarterly DCF Model

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

Figure 1

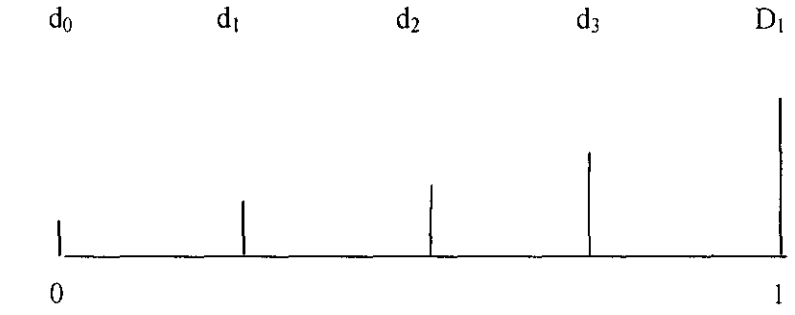
Annual DCF Model



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

Figure 2

Quarterly DCF Model (Constant Growth Version)



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

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

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

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

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

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

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

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

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

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

An Alternative Quarterly DCF Model

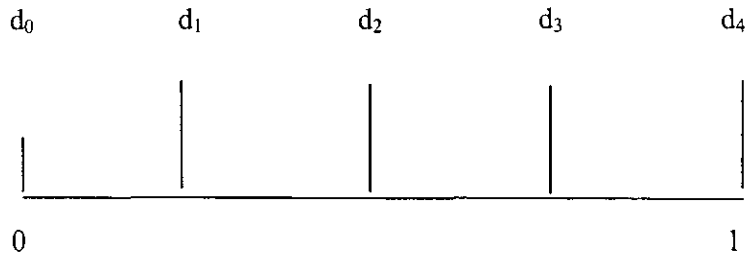
Although the constant growth Quarterly DCF Model [equation (8)] allows for the quarterly timing of dividend payments, it does require the assumption that the firm increases its dividend payments each quarter. Since this assumption is difficult for some analysts to accept, we now discuss a second Quarterly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

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

Figure 3

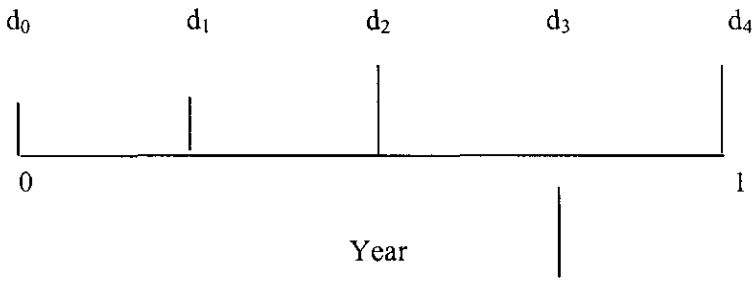
Quarterly DCF Model (Constant Dividend Version)

Case 1



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

Case 2

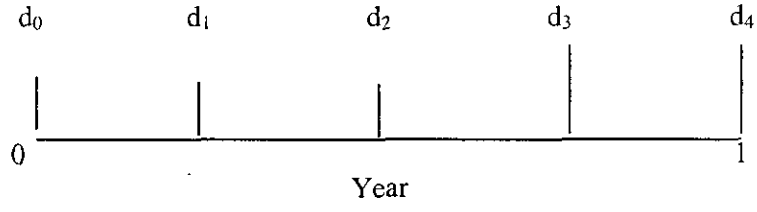


$$d_1 = d_0$$

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

Figure 3 (continued)

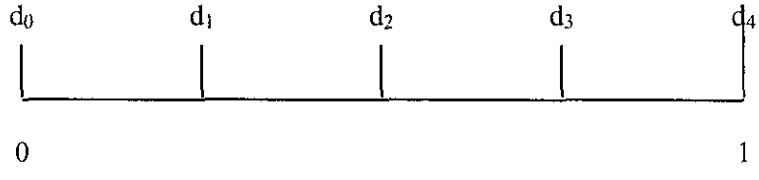
Case 3



$d_1 = d_2 = d_0$

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

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

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

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

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

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

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

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 JVW-2

EX ANTE RISK PREMIUM APPROACH

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

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

where:

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

Electric Company Ex Ante Risk Premium Analysis. For my ex ante risk premium electric proxy group DCF analysis, 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:

$$RP_{PROXY} = 7.55 - .4988 \times I_A.$$

Using the 2007 forecasted 6.64 percent yield to maturity on A-rated utility bonds estimated using Blue Chip data as of May 1, 2006,[14] the regression equation produces an ex ante risk premium cost of equity based on the electric proxy group equal to 4.24 percent (7.55 – .4988 x 6.64 = 4.24).

To estimate the cost of equity using the ex ante risk premium method, one may add the estimated risk premium over the yield on A-rated utility bonds to the yield to maturity on A-rated utility bonds. As noted above, the forecasted yield on A-rated utility bonds is 6.64 percent. My analyses produce an estimated risk premium over the yield on A-rated utility bonds equal to 4.24 percent. Adding an estimated risk premium of 4.24 percent to the 6.64 percent forecasted yield to maturity on A-rated utility bonds produces a cost of equity estimate of 10.9 percent for the electric company proxy group using the ex ante risk premium method.

Natural Gas Company Ex Ante Risk Premium Analysis. My second ex ante risk premium study was applied to a natural gas proxy group and followed the procedures described above. To select my ex ante risk premium natural gas proxy group of companies, I used the same criteria that I use when estimating the DCF cost of equity, namely, I selected all the companies in Value Line's groups of natural gas 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) have not announced a merger. The LDC Ex Ante Risk Premium Schedule in my direct testimony displays the results of my ex ante risk premium study, showing the average DCF estimated cost of equity

[14] As noted above, my estimated of the forecasted yield on A-rated utility bonds is obtained from Blue Chip data on the forecasted yield for Baa-rated corporate bonds in 2007 (Blue Chip provides a forecasted yield on Baa-rated corporate bonds, but does not provide a forecasted yield on A-rated utility bonds). To estimate the forecasted yield on A-rated utility bonds, I compared the current average yield on A-rated utility bonds to the current average yield on Baa-rated corporate bonds. As of May 1, 2006, Blue Chip forecasted an interest rate for Baa-rated corporate bonds for the first three quarters of 2007 of 7.03 percent. The difference between the average yield on Moody's Baa-rated corporate bonds in April 2006, 6.68 percent, and the April average for Moody's A-rated utility bond, 6.29 percent, is 39 basis points. Subtracting 39 basis points from the forecasted 7.03 percent yield on Baa-rated corporate bonds produces a forecasted yield on A-rated utility bonds of 6.64 percent.

on an investment in the portfolio of natural gas companies and the yield to maturity on A-rated utility bonds in each month.[15]

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 natural gas companies as compared to an investment in A-rated utility bonds is given by the equation:

$$RP_{PROXY} = 5.88 - .2184 \times I_A.$$

Using the 6.64 percent forecasted yield to maturity on A-rated utility bonds for 2007, the regression equation produces an ex ante risk premium for the natural gas company proxy group equal to 4.43 percent (5.88 – .2184 x 6.64 = 4.43).

To estimate the cost of equity using the ex ante risk premium method, one may add the estimated risk premium over the yield on A-rated utility bonds to the yield to maturity on A-rated utility bonds. As noted above, the forecasted yield on A-rated utility bonds in 2007 is 6.64 percent. As also noted above, my analyses produce an estimated risk premium over the yield on A-rated utility bonds equal to 4.43 percent. Adding an estimated risk premium of 4.43 percent to the 6.64 percent average yield to maturity on A-rated utility bonds produces a cost of equity estimate of 11.1 percent for the natural gas proxy group using the ex ante risk premium method.

[15] My two ex ante risk premium studies cover slightly different time periods, with the natural gas company risk premium study extending over a longer period of time, because I began doing an ex ante study using natural gas companies before I began performing a similar study for the electric companies.

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.

APPENDIX JVW-3

RISK PREMIUM APPROACH

Source

Stock price and yield information is obtained from Standard & Poor's Security Price publication. Standard & Poor's derives the stock dividend yield by dividing the aggregate cash dividends (based on the latest known annual rate) by the aggregate market value of the stocks in the group. The bond price information is obtained by calculating the present value of a bond due in 30 years with a $4.00 coupon and a yield to maturity of a particular year's indicated Moody's A-rated Utility bond yield. The values shown on Schedules JVW-5 and JVW-6 are the January values of the respective indices.

Calculation of Stock and Bond Returns

Sample calculation of "Stock Return" column:

$$\text{Stock Return (2005)} = \left[\frac{\text{Stock Price (2006)} - \text{Stock Price (2005)} + \text{Dividend (2005)}}{\text{Stock Price (2005)}}\right]$$

where Dividend (2005) = Stock Price (2005) x Stock Div. Yield (2005)

Sample calculation of "Bond Return" column:

$$\text{Bond Return (2005)} = \left[\frac{\text{Bond Price (2006)} - \text{Bond Price (2005)} + \text{Interest (2005)}}{\text{Bond Price (2005)}}\right]$$

where Interest = $4.00.