Exhibit No.:
Issues: Cost of Capital
Witness: Dr. J. Randall Woolridge
Type of Exhibit: Direct Testimony
Sponsoring party: State of Missouri
Case No.: ER-2007-0002
Direct Testimony Date: December 15, 2006

MISSOURI PUBLIC SERVICE COMMISSION

CASE NO. ER-2007-0002

DIRECT TESTIMONY
OF
J. RANDALL WOOLRIDGE

ON BEHALF OF

STATE OF MISSOURI

Jefferson City, Missouri
December 2006

Union Electric Company

Direct Testimony of
J. Randall Woolridge

TABLE OF CONTENTS

LIST OF EXHIBIT

Q. PLEASE STATE YOUR FULL NAME, ADDRESS, AND OCCUPATION.

A. My name is J. Randall Woolridge and my business address is 120 Haymaker Circle, State College, PA 16801. I am a Professor of Finance and the Goldman, Sachs & Co. and Frank P. Smeal Endowed University Fellow in Business Administration at the University Park Campus of the Pennsylvania State University. I am also the Director of the Smeal College Trading Room and President of the Nittany Lion Fund, LLC. A summary of my educational background, research, and related business experience is provided in Appendix A.

I. SUBJECT OF TESTIMONY AND SUMMARY OF RECOMMENDATIONS

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. I have been asked by the State of Missouri to provide an opinion as to the overall fair rate of return or cost of capital for Union Electric Company ("UE" or "Company"). I have also been asked to evaluate UE's rate of return testimony in this proceeding.

Q. PLEASE SUMMARIZE YOUR TESTIMONY AND FINDINGS CONCERNING THE RATE OF RETURN THAT SHOULD BE UTILIZED IN SETTING RATES FOR UE'S ELECTRIC UTILITY OPERATIONS IN THIS PROCEEDING.

A. I have independently arrived at a cost of capital for UE. I have established an equity cost rate of 9.0% for UE by applying the Discounted Cash Flow Model ("DCF") and the Capital Asset Pricing Model ("CAPM") to a group of publicly-held electric utility

companies. Utilizing my equity cost rate, capital structure ratios, and senior capital cost rates. I am recommending an overall fair rate of return of 7.308% for UE. This recommendation is summarized in Exhibit_(JRW-1) and the reflected on the table below:

Capital Source	Capitalization Ratio	Cost Rate	Weighted Cost Rate
Short Term Debt	0.795%	5.36%	0.043%
Long Term Debt	44.964%	5.473%	2.461%
Preferred Stock	2.017%	5.189%	0.105%
Common Equity	52.224%	9.000%	4.700%
Total Capitalization	100.00%		7.308%

As discussed in my testimony, my recommendation is consistent with the current economic environment. Long-term capital costs are at historical low levels. The yields on long-term Treasury bonds have been in the 4-5 percent range for several years. Prior to this cyclical decline in rates, these yields had not been consistently this low since the 1960s. Long-term capital costs are also low due to the decline in the equity risk premium and 2003 *Jobs and Growth Tax Relief Reconciliation Act of 2003* which reduced the tax rates on dividend income and capital gains.

I have adopted the Company's proposed capital structure and have used the Company's proposed senior capital cost rates. The major area of contention in this case is the proposed equity cost rate or return on common equity for UE. In developing my return on equity recommendation, I have reviewed the testimonies and equity cost rate recommendations of UE witnesses Dr. James H. Vander Weide and Ms. Kathleen C. McShane. Dr. Vander Weide and Ms. McShane recommend equity

cost rates of 12.2% and 12.0%, respectively, for UE. The fact that their recommendations are quite similar is not surprising. Overall, their equity cost rate approaches and results and, in fact, the testimonies themselves of the two Company witnesses are amazingly similar.

I have employed Discounted Cash Flow (DCF) and Capital Asset Pricing Model (CAPM) approaches. I have used Dr. Vander Weide's comparable group of thirty-four electric utility companies to estimate an equity cost rate for UE. In my DCF approach, I have used the average of the six-month and current dividend yields and I have employed a growth rate which is determined from an evaluation of historic and projected growth rate in dividends, book value, and earnings per share.

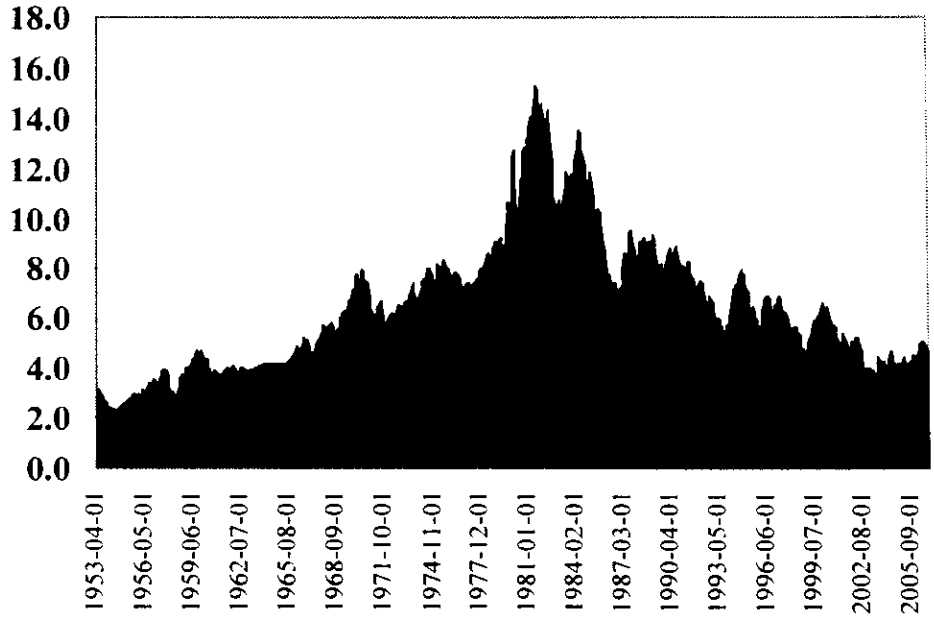
The CAPM approach requires an estimate of the risk-free interest rate, beta, and the equity risk premium. I have reviewed the recent range of interest rates in arriving at a risk-free rate of interest, and I have used the betas from the *Value Line Investment Survey*. As to the equity risk premium, I highlight in my testimony that there are three procedures for estimating an equity risk premium – historic returns, surveys, and expected return models. I use an equity risk premium of 4.20% which (1) uses all three approaches to estimating an equity premium and (2) employs the results of many studies of the equity risk premium. As I note, my equity risk premium is consistent with the equity risk premiums (1) discovered in recent academic studies by leading finance scholars, (2) employed by leading investment banks and management consulting firms, and (3) found in surveys of financial forecasters and corporate CFOs.

II. CAPITAL COSTS IN TODAY'S MARKETS

Q. PLEASE DISCUSS CAPITAL COSTS IN TODAY'S MARKETS.

A. Long-term capital cost rates for U.S. corporations are currently at their lowest levels in more than four decades. Corporate capital cost rates are determined by the level of interest rates and the risk premium demanded by investors to buy the debt and equity capital of corporate issuers. The base level of interest rates in the US economy is indicated by the rates on ten-year U.S. Treasury bonds. The rates are provided in the graph below from 1953 to the present. As indicated, prior to the decline in rates that began in the year 2000, the 10-year Treasury had not been in the 4-5 percent range since the 1960s.

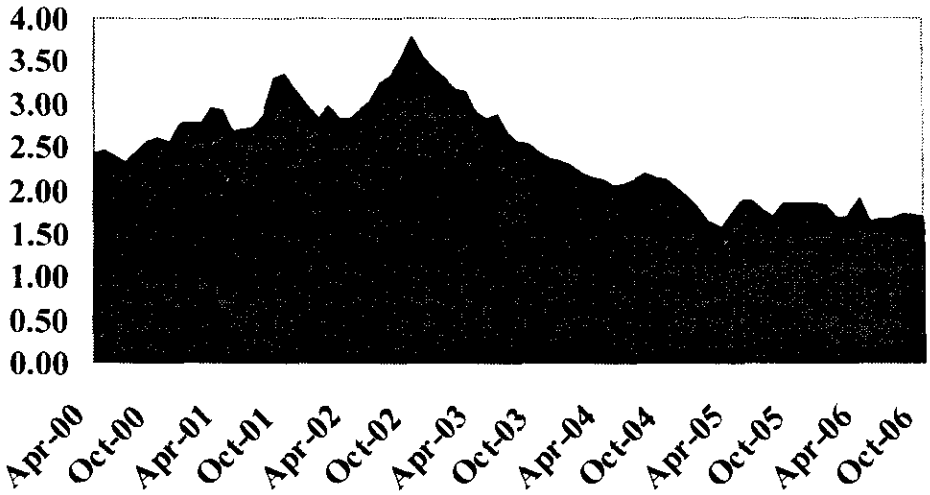
Yields on Ten-Year Treasury Bonds
1953-Present



Source: http://research.stlouisfed.org/fred2/data/GS10.txt

The second base component of the corporate capital cost rates is the risk premium. The risk premium is the return premium required by investors to purchase riskier securities. Risk premiums for bonds are the yield differentials between different bond classes as rated by agencies such as Moody's, and Standard and Poor's. The graph below provides the yield differential between Baa-rate corporate bonds and 10-year Treasuries. This yield differential peaked at 350 basis points (BPs) in 2002 and has declined significantly since that time. This is an indication that the market price of risk has declined and therefore the risk premium has declined in recent years.

Corporate Bond Yield Spreads
Baa-Rated Corporate Bond Yield Minus Ten-Year Treasury Bond Yield



Source: http://www.treas.gov/offices/domestic-finance/debt-management/interest-rate/index.html

The equity risk premium is the return premium required to purchase stocks as opposed to bonds. Since the equity risk premium is not readily observable in the markets (as are bond risk premiums), and there are alternative approaches to estimating the equity premium, it is the subject of much debate. One way to estimate

the equity risk premium is to compare the mean returns on bonds and stocks over long historical periods. Measured in this manner, the equity risk premium has been in the 5-7 percent range. But recent studies by leading academics indicate the forward-looking equity risk premium is in the 3-4 percent range. These authors indicate that historical equity risk premiums are upwardly biased measures of expected equity risk premiums. Jeremy Siegel, a Wharton finance professor and author of the book *Stocks for the Long Term*, published a study entitled "The Shrinking Equity Risk Premium."[1] He concludes:

> The degree of the equity risk premium calculated from data estimated from 1926 is unlikely to persist in the future. The real return on fixed-income assets is likely to be significantly higher than estimated on earlier data. This is confirmed by the yields available on Treasury index-linked securities, which currently exceed 4%. Furthermore, despite the acceleration in earnings growth, the return on equities is likely to fall from its historical level due to the very high level of equity prices relative to fundamentals.

Even Alan Greenspan, the former Chairman of the Federal Reserve Board, indicated in an October 14, 1999, speech on financial risk that the fact that equity risk premiums have declined during the past decade is "not in dispute." His assessment focused on the relationship between information availability and equity risk premiums.

> There can be little doubt that the dramatic improvements in information technology in recent years have altered our approach to risk. Some analysts perceive that information technology has permanently lowered equity premiums and, hence, permanently raised the prices of the collateral that underlies all financial assets.

---

[1] Jeremy J. Siegel, "The Shrinking Equity Risk Premium," *The Journal of Portfolio Management* (Fall, 1999), p. 15.

> The reason, of course, is that information is critical to the evaluation of risk. The less that is known about the current state of a market or a venture, the less the ability to project future outcomes and, hence, the more those potential outcomes will be discounted.
>
> The rise in the availability of real-time information has reduced the uncertainties and thereby lowered the variances that we employ to guide portfolio decisions. At least part of the observed fall in equity premiums in our economy and others over the past five years does not appear to be the result of ephemeral changes in perceptions. It is presumably the result of a permanent technology-driven increase in information availability, which by definition reduces uncertainty and therefore risk premiums. This decline is most evident in equity risk premiums. It is less clear in the corporate bond market, where relative supplies of corporate and Treasury bonds and other factors we cannot easily identify have outweighed the effects of more readily available information about borrowers.[2]

In sum, the relatively low interest rates in today's markets as well as the lower risk premiums required by investors indicate that capital costs for U.S. companies are the lowest in decades. In addition, the 2003 tax law further lowered capital cost rates for companies.

Q. HOW DID THE *JOBS AND GROWTH TAX RELIEF RECONCILIATION ACT OF 2003* REDUCE THE COST OF CAPITAL FOR COMPANIES?

A. On May 28, 2003, President Bush signed the *Jobs and Growth Tax Relief Reconciliation Act of 2003*. The primary purpose of this legislation was to reduce taxes to enhance economic growth. A primary component of the new tax law was a significant reduction in the taxation of corporate dividends for individuals. Dividends have been described as "double-taxed." First, corporations pay taxes on the income

[2] Alan Greenspan, "Measuring Financial Risk in the Twenty-First Century," Office of the Comptroller of the Currency Conference, October 14, 1999.

they earn before they pay dividends to investors, then investors pay taxes on the dividends that they receive from corporations. One of the implications of the double taxation of dividends is that, all else equal, it results in a higher cost of raising capital for corporations. The tax legislation reduced the effect of double taxation of dividends by lowering the tax rate on dividends from the 30 percent range (the average tax bracket for individuals) to 15 percent.

Overall, the 2003 tax law reduced the pre-tax return requirements of investors, thereby reducing corporations' cost of equity capital. This is because the reduction in the taxation of dividends for individuals enhances their after-tax returns and thereby reduces their pre-tax required returns. This reduction in pre-tax required returns (due to the lower tax on dividends) effectively reduces the cost of equity capital for companies. The 2003 tax law also reduced the tax rate on long-term capital gains from 20% to 15%. The magnitude of the reduction in corporate equity cost rates is debatable, but my assessment indicates that it could be as large as 100 basis points (See Exhibit_JRW-2).

III. COMPARISON GROUP SELECTION

Q. PLEASE DESCRIBE YOUR APPROACH TO DEVELOPING A FAIR RATE OF RETURN RECOMMENDATION FOR UE.

A. To develop a fair rate of return recommendation for UE. I have evaluated the return requirements of investors on the common stock of a group of publicly-held electric utility companies.

Q. PLEASE DESCRIBE YOUR GROUP OF ELECTRIC UTILITY COMPANIES.

A. I am using the group of electric utility companies employed by Dr. Vander Weide. This group includes thirty-four electric utilities covered by the *Value Line Investment Survey*. This group is rather large and includes companies with business operations outside of the regulated electric business as well as most of the companies used by Ms. McShane in her equity cost rate analysis. Nonetheless, it should provide a suitable indicator of the equity cost rate for UE.

Summary financial statistics for the group are provided on page 1 of Exhibit_JRW-3. On average, the group has average operating revenues and net plant of $7,085M and $10,679M, respectively, and receives 60% of revenues from regulated electric service. The group has an average common equity ratio of 43.9%, and the current average earned return on common equity of 10.8%.

IV. CAPITAL STRUCTURE RATIOS AND DEBT COST RATES

Q. WHAT CAPITAL STRUCTURE RATIOS HAVE BEEN PROPOSED BY UE?

A. UE's proposed capitalization is provided in Panel A of Exhibit JRW-4. This capitalization has a common equity ratio of 52.224%. In Panel B of page Exhibit_(JRW-4), I show the average capital structure ratios of the proxy group of

electric utility companies. The average common equity ratio for this group over the past year is 48.27%, and that excludes short-term debt. I do not believe that the difference in financial risk, as indicated by the common equity ratios for UE and the group, is beyond a zone of reasonableness. Therefore, I have elected to adopt UE's proposed capital structure, with the caveat that recognition must be made of the lower degree of financial risk for UE.

Q. WHAT SENIOR CAPITAL COST RATES ARE YOU EMPLOYING FOR UE?

A. I am using UE's proposed senior capital cost rates.

V. THE COST OF COMMON EQUITY CAPITAL

A. Overview

Q. WHY MUST AN OVERALL COST OF CAPITAL OR FAIR RATE OF RETURN BE ESTABLISHED FOR A PUBLIC UTILITY?

A. In a competitive industry, the return on a firm's common equity capital is determined through the competitive market for its goods and services. Due to the capital requirements needed to provide utility services, however, and to the economic benefit to society from avoiding duplication of these services, some public utilities are monopolies. It is not appropriate to permit monopoly utilities to set their own prices because of the lack of competition and the essential nature of the services. Thus, regulation seeks to establish prices which are fair to consumers and at the same time are sufficient to meet the operating and capital costs of the utility, i.e., provide an adequate return on capital to attract investors.

Q. PLEASE PROVIDE AN OVERVIEW OF THE COST OF CAPITAL IN THE CONTEXT OF THE THEORY OF THE FIRM.

A. The total cost of operating a business includes the cost of capital. The cost of common equity capital is the expected return on a firm's common stock that the marginal investor would deem sufficient to compensate for risk and the time value of money. In equilibrium, the expected and required rates of return on a company's common stock are equal.

Normative economic models of the firm, developed under very restrictive assumptions, provide insight into the relationship between firm performance or profitability, capital costs, and the value of the firm. Under the economist's ideal model of perfect competition where entry and exit is costless, products are undifferentiated, and there are increasing marginal costs of production, firms produce up to the point where price equals marginal cost. Over time, a long-run equilibrium is established where price equals average cost, including the firm's capital costs. In equilibrium, total revenues equal total costs, and because capital costs represent investors' required return on the firm's capital, actual returns equal required returns and the market value and the book value of the firm's securities must be equal.

In the real world, firms can achieve competitive advantage due to product market imperfections. Most notably, companies can gain competitive advantage through product differentiation (adding real or perceived value to products) and by achieving economies of scale (decreasing marginal costs of production). Competitive advantage allows firms to price products above average cost and thereby earn accounting profits greater than those required to cover capital costs. When these

profits are in excess of that required by investors, or when a firm earns a return on equity in excess of its cost of equity, investors respond by valuing the firm's equity in excess of its book value.

James M. McTaggart, founder of the international management consulting firm Marakon Associates, has described this essential relationship between the return on equity, the cost of equity, and the market-to-book ratio in the following manner:[3]

> Fundamentally, the value of a company is determined by the cash flow it generates over time for its owners, and the minimum acceptable rate of return required by capital investors. This "cost of equity capital" is used to discount the expected equity cash flow, converting it to a present value. The cash flow is, in turn, produced by the interaction of a company's return on equity and the annual rate of equity growth. High return on equity (ROE) companies in low-growth markets, such as Kellogg, are prodigious generators of cash flow, while low ROE companies in high-growth markets, such as Texas Instruments, barely generate enough cash flow to finance growth.
>
> A company's ROE over time, relative to its cost of equity, also determines whether it is worth more or less than its book value. If its ROE is consistently greater than the cost of equity capital (the investor's minimum acceptable return), the business is economically profitable and its market value will exceed book value. If, however, the business earns an ROE consistently less than its cost of equity, it is economically unprofitable and its market value will be less than book value.

As such, the relationship between a firm's return on equity, cost of equity, and market-to-book ratio is relatively straightforward. A firm which earns a return on equity above its cost of equity will see its common stock sell at a price above its book

[3] James M. McTaggart, "The Ultimate Poison Pill: Closing the Value Gap," *Commentary* (Spring 1988), p. 2.

value. Conversely, a firm which earns a return on equity below its cost of equity will see its common stock sell at a price below its book value.

Q. PLEASE PROVIDE ADDITIONAL INSIGHTS INTO THE RELATIONSHIP BETWEEN RETURN ON EQUITY AND MARKET-TO-BOOK RATIOS?

A. This relationship is discussed in a classic Harvard Business School case study entitled "A Note on Value Drivers." On page 2 of that case study, the author describes the relationship very succinctly:[4]

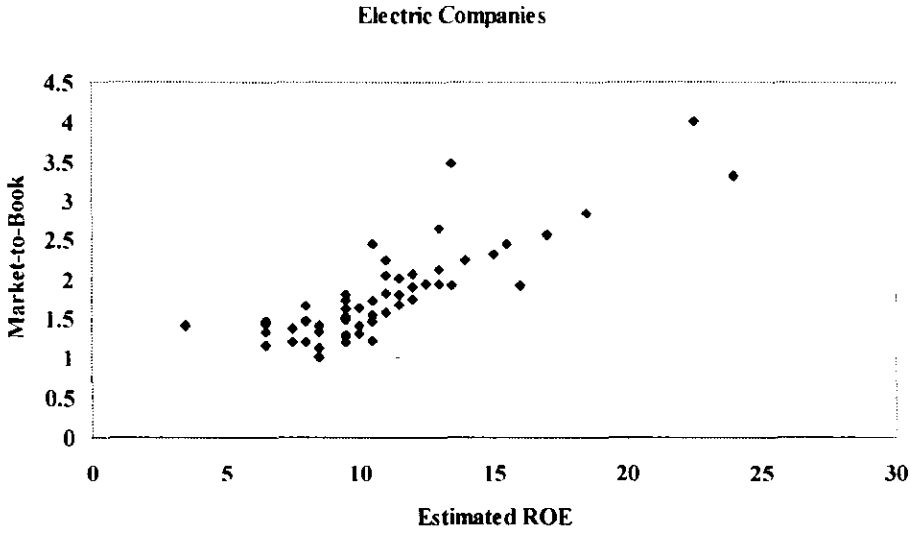
> For a given industry, more profitable firms – those able to generate higher returns per dollar of equity – should have higher market-to-book ratios. Conversely, firms which are unable to generate returns in excess of their cost of equity should sell for less than book value.

Profitability	*Value*
If ROE > K	*then Market/Book > 1*
If ROE = K	*then Market/Book =1*
If ROE < K	*then Market/Book < 1*

To assess the relationship by industry, as suggested above, I have performed a regression study between estimated return on equity and market-to-book ratios using electric utility, natural gas distribution, and water utility companies. I used all companies in these three industries which are covered by *Value Line* and who have estimated return on equity and market-to-book ratio data. The results are presented below.

[4] Benjamin Esty, "A Note on Value Drivers," Harvard Business School, Case No. 9-297-082, April 7, 1997.

The Relationship Between Estimated ROE and Market-to-Book Ratios Value Line Electric Companies, Gas Distribution Companies, and Water Utilities

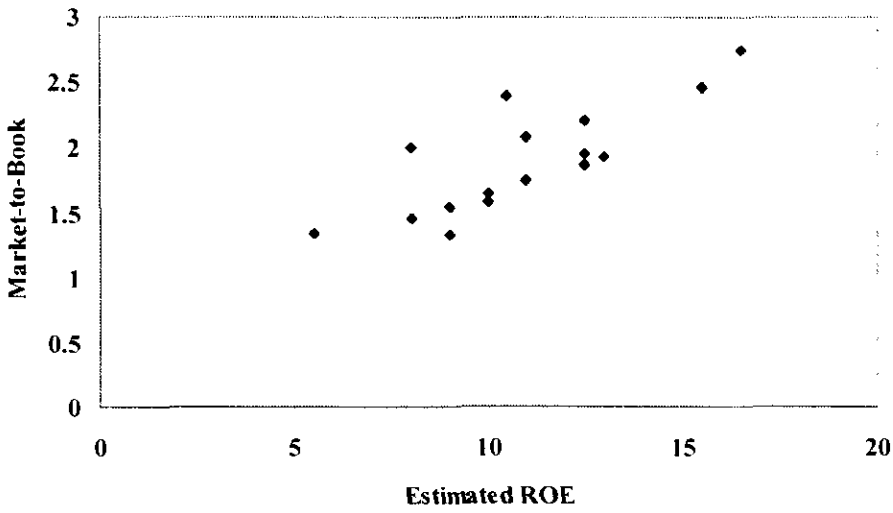


R-Square = .70
N=58

The average R-squares for the electric, gas, and water companies are 0.70, 0.64, and 0.93. This demonstrates the strong relationship of ROEs and market-to-book ratios.[5]

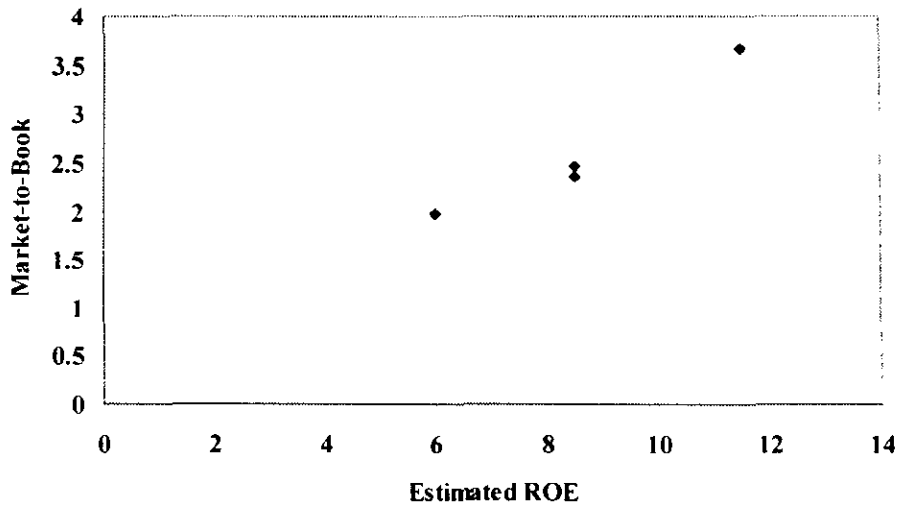
[5] R-square measures the percent of variation in one variable (e.g., market-to-book ratios) explained by another variable (e.g., expected return on equity). R-squares vary between zero and 1.0, with values closer to 1.0 indicating a higher relationship between two variables.

Gas Companies



R-Square = .64
N=16

Water Companies



R-Square = .93
N=4

Q. WHAT ECONOMIC FACTORS HAVE AFFECTED THE COST OF EQUITY CAPITAL FOR PUBLIC UTILITIES?

A. Exhibit_JRW-5 provides indicators of public utility equity cost rates over the past decade. Page 1 shows the yields on 10-year, 'A' rated public utility bonds. These yields peaked in the 1990s at 10%, and have generally declined since that time. They hovered in the 4.5 to 5.0 percent range between 2003 and 2005, and have since increased to the 5.5%. Page 2 provides the dividend yields for the fifteen utilities in the Dow Jones Utilities Average over the past decade. These yields peaked in 1994 at 7.2%. Since that time they have declined and were below 4.0% as of 2005.

Average earned returns on common equity and market-to-book ratios are given on page 3 of Exhibit_JRW-5. Over the past decade, earned returns on common equity have consistently been in the 10.0-13.0 percent range. The high point was 13.45% in 2001, and they have decreased since that time. As of 2005, the average was 11.75%. Over the past decade, market-to-book ratios for this group have increased gradually, but with several ups and downs. The market-to-book average was 1.75 as of 2001, declined to 1.45 in 2003, and increased to 1.95 as of 2005.

The indicators in Exhibit_JRW-5, coupled with the overall decrease in interest rates, suggest that capital costs for the Dow Jones Utilities have decreased over the past decade. Specifically for the equity cost rate, the increase in the market-to-book ratios, coupled with a slightly lower average return on equity, suggests a decline in the overall equity cost rate.

Q. WHAT FACTORS DETERMINE INVESTORS' EXPECTED OR REQUIRED RATE OF RETURN ON EQUITY?

A. The expected or required rate of return on common stock is a function of market-wide, as well as company-specific, factors. The most important market factor is the time value of money as indicated by the level of interest rates in the economy. Common stock investor requirements generally increase and decrease with like changes in interest rates. The perceived risk of a firm is the predominant factor that influences investor return requirements on a company-specific basis. A firm's investment risk is often separated into business and financial risk. Business risk encompasses all factors that affect a firm's operating revenues and expenses. Financial risk results from incurring fixed obligations in the form of debt in financing its assets.

Q. HOW DOES THE INVESTMENT RISK OF ELECTRIC UTILITY COMPANIES COMPARE WITH THAT OF OTHER INDUSTRIES?

A. Due to the essential nature of their service as well as their regulated status, public utilities are exposed to a lesser degree of business risk than other, non-regulated businesses. The relatively low level of business risk allows public utilities to meet much of their capital requirements through borrowing in the financial markets, thereby incurring greater than average financial risk. Nonetheless, the overall investment risk of public utilities is below most other industries. Exhibit_JRW-6 provides an assessment of investment risk for 100 industries as measured by beta, which according to modern capital market theory is the only relevant measure of

investment risk that need be of concern for investors. These betas come from the *Value Line Investment Survey* and are compiled by Aswath Damodoran of New York University. They may be found on the Internet at http:// www.stern.nyu.edu/~adamodar. The study shows that the investment risk of public utilities is relatively low. The study shows that the investment risk of public utilities is relatively low. The average beta for electric utilities is in the bottom third of the 100 industries in terms of beta. As such, the cost of equity for the electric utility industry is among the lowest of all industries in the U.S.

Q. HOW CAN THE EXPECTED OR REQUIRED RATE OF RETURN ON COMMON EQUITY CAPITAL BE DETERMINED?

A. The costs of debt and preferred stock are normally based on historical or book values and can be determined with a great degree of accuracy. The cost of common equity capital, however, cannot be determined precisely and must instead be estimated from market data and informed judgment. This return to the stockholder should be commensurate with returns on investments in other enterprises having comparable risks.

According to valuation principles, the present value of an asset equals the discounted value of its expected future cash flows. Investors discount these expected cash flows at their required rate of return that, as noted above, reflects the time value of money and the perceived riskiness of the expected future cash flows. As such, the cost of common equity is the rate at which investors discount expected cash flows associated with common stock ownership.

Models have been developed to ascertain the cost of common equity capital for a firm. Each model, however, has been developed using restrictive economic assumptions. Consequently, judgment is required in selecting appropriate financial valuation models to estimate a firm's cost of common equity capital, in determining the data inputs for these models, and in interpreting the models' results. All of these decisions must take into consideration the firm involved as well as conditions in the economy and the financial markets.

Q. HOW DO YOU PLAN TO ESTIMATE THE COST OF EQUITY CAPITAL FOR THE COMPANY?

A. I rely primarily on the DCF model to estimate the cost of equity capital. Given the investment valuation process and the relative stability of the utility business, I believe that the DCF model provides the best measure of equity cost rates for public utilities. I have also performed a CAPM study, but I give these results less weight because I believe that risk premium studies, of which the CAPM is one form, provide a less reliable indication of equity cost rates for public utilities.

B. <u>Discounted Cash Flow Analysis</u>

Q. BRIEFLY DESCRIBE THE THEORY BEHIND THE TRADITIONAL DCF MODEL.

A. According to the discounted cash flow model, the current stock price is equal to the discounted value of all future dividends that investors expect to receive from investment in the firm. As such, stockholders' returns ultimately result from current

as well as future dividends. As owners of a corporation, common stockholders are entitled to a pro-rata share of the firm's earnings. The DCF model presumes that earnings that are not paid out in the form of dividends are reinvested in the firm so as to provide for future growth in earnings and dividends. The rate at which investors discount future dividends, which reflects the timing and riskiness of the expected cash flows, is interpreted as the market's expected or required return on the common stock. Therefore this discount rate represents the cost of common equity. Algebraically, the DCF model can be expressed as:

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

where P is the current stock price, D_n is the dividend in year n, and k is the cost of common equity.

Q. IS THE DCF MODEL CONSISTENT WITH VALUATION TECHNIQUES EMPLOYED BY INVESTMENT FIRMS?

A. Yes. Virtually all investment firms use some form of the DCF model as a valuation technique. One common application for investment firms is called the three-stage DCF or dividend discount model ("DDM"). The stages in a three-stage DCF model are discussed below. This model presumes that a company's dividend payout progresses initially through a growth stage, then proceeds through a transition stage, and finally assumes a steady-state stage. The dividend-payment stage of a firm depends on the profitability of its internal investments, which, in turn, is largely a

function of the life cycle of the product or service. These stages are depicted in the graphic below labeled the Three-Stage DCF Model.[6]

1. Growth stage: Characterized by rapidly expanding sales, high profit margins, and abnormally high growth in earnings per share. Because of highly profitable expected investment opportunities, the payout ratio is low. Competitors are attracted by the unusually high earnings, leading to a decline in the growth rate.

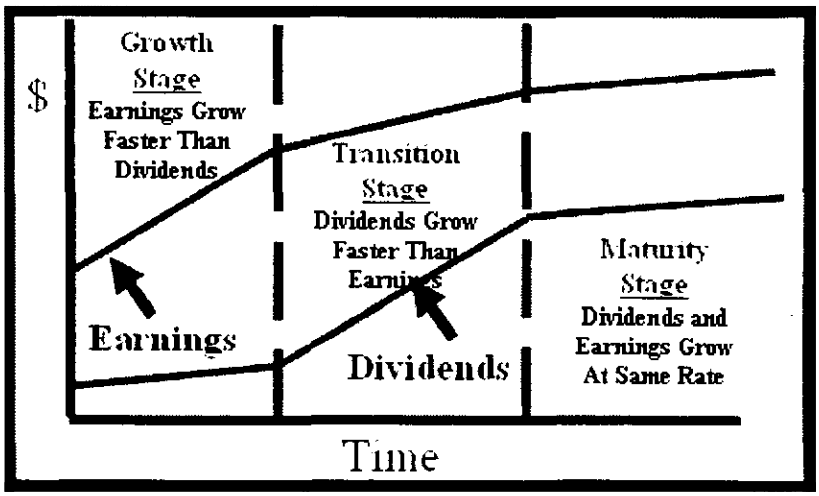
2. Transition stage: In later years, increased competition reduces profit margins and earnings growth slows. With fewer new investment opportunities, the company begins to pay out a larger percentage of earnings.

3. Maturity (steady-state) stage: Eventually the company reaches a position where its new investment opportunities offer, on average, only slightly attractive returns on equity. At that time its earnings growth rate, payout ratio, and return on equity stabilize for the remainder of its life. The constant-growth DCF model is appropriate when a firm is in the maturity stage of the life cycle.

In using this model to estimate a firm's cost of equity capital, dividends are projected into the future using the different growth rates in the alternative stages, and then the equity cost rate is the discount rate that equates the present value of the future dividends to the current stock price.

[6] This description comes from William F. Sharp, Gordon J. Alexander, and Jeffrey V. Bailey, *Investments* (Prentice-Hall, 1995), pp. 590-91.

Three-Stage DCF Model



Q. HOW DO YOU ESTIMATE STOCKHOLDERS' EXPECTED OR REQUIRED RATE OF RETURN USING THE DCF MODEL?

A. Under certain assumptions, including a constant and infinite expected growth rate, and constant dividend/earnings and price/earnings ratios, the DCF model can be simplified to the following:

$$P = \frac{D_1}{k - g}$$

where D_1 represents the expected dividend over the coming year and g is the expected growth rate of dividends. This is known as the constant-growth version of the DCF

model. To use the constant-growth DCF model to estimate a firm's cost of equity, one solves for k in the above expression to obtain the following:

$$k = \frac{D_1}{P} + g$$

The economics of the public utility business indicate that the industry is in the steady-state or constant-growth stage of a three-stage DCF. The economics include the relative stability of the utility business, the maturity of the demand for public utility services, and the regulated status of public utilities (especially the fact that their returns on investment are effectively set through the ratemaking process). The DCF valuation procedure for companies in this stage is the constant-growth DCF. In the constant-growth version of the DCF model, the current dividend payment and stock price are directly observable. Therefore, the primary problem and controversy in applying the DCF model to estimate equity cost rates entails estimating investors' expected dividend growth rate.

Q. WHAT FACTORS SHOULD ONE CONSIDER WHEN APPLYING THE DCF METHODOLOGY?

A. One should be sensitive to several factors when using the DCF model to estimate a firm's cost of equity capital. In general, one must recognize the assumptions under which the DCF model was developed in estimating its components (the dividend yield and expected growth rate). The dividend yield can be measured precisely at any point in time, but tends to vary somewhat over time. Estimation of expected growth is considerably more difficult. One must consider recent firm performance, in

conjunction with current economic developments and other information available to investors, to accurately estimate investors' expectations.

Q. PLEASE DISCUSS EXHIBIT_JRW-7.

A. My DCF analysis is provided in Exhibit_JRW-7. The DCF summary is on page 1 of this Exhibit and the supporting data and analysis for the dividend yield and expected growth rate are provided on the following pages.

Q. WHAT DIVIDEND YIELDS ARE YOU EMPLOYING IN YOUR DCF ANALYSIS FOR YOUR GROUP OF ELECTRIC UTILITY COMPANIES?

A. The dividend yields on the common stock for the companies in the group are provided on page 2 of Exhibit_JRW-7 for the six-month period ending December, 2006. Over this period, the average monthly dividend yields for the group of electric utility companies was 4.0%. As of December, 2006, the mean dividend yields for the group was 3.8%. For the DCF dividend yields for the group, I use the average of the six month and December, 2006 dividend yields. Hence, I am employing a DCF dividend yield of 3.9%.

Q. PLEASE DISCUSS THE APPROPRIATE ADJUSTMENT TO THE SPOT DIVIDEND YIELD.

A. According to the traditional DCF model, the dividend yield term relates to the dividend yield over the coming period. As indicated by Professor Myron Gordon, who is commonly associated with the development of the DCF model for popular use, this is obtained by: (1) multiplying the expected dividend over the coming quarter by

4. and (2) dividing this dividend by the current stock price to determine the appropriate dividend yield for a firm, which pays dividends on a quarterly basis.[7]

In applying the DCF model, some analysts adjust the current dividend for growth over the coming year as opposed to the coming quarter. This can be complicated because firms tend to announce changes in dividends at different times during the year. As such, the dividend yield computed based on presumed growth over the coming quarter as opposed to the coming year can be quite different. Consequently, it is common for analysts to adjust the dividend yield by some fraction of the long-term expected growth rate.

The appropriate adjustment to the dividend yield is further complicated in the regulatory process when the overall cost of capital is applied to a projected rate base. The net effect of this application is an overstatement of the equity cost rate estimate derived from the DCF model. In the context of the constant-growth DCF model, both the adjusted dividend yield and the growth component are overstated. The overstatement results from applying an equity cost rate computed using current market data to a future or test-year-end rate base which includes growth associated with the retention of earnings during the year. In other words, an equity cost rate times a future, yet to be achieved rate base, results in an inflated dividend yield and growth rate.

Q. GIVEN THIS DISCUSSION, WHAT ADJUSTMENT FACTOR WILL YOU USE FOR YOUR DIVIDEND YIELD?

[7] *Petition for Modification of Prescribed Rate of Return*, Federal Communications Commission, Docket No. 79-05, Direct Testimony of Myron J. Gordon and Lawrence I. Gould at 62 (April 1980).

A. I will adjust the dividend yield by one-half (1/2) the expected growth so as to reflect growth over the coming year.

Q. PLEASE DISCUSS THE GROWTH RATE COMPONENT OF THE DCF MODEL.

A. There is much debate as to the proper methodology to employ in estimating the growth component of the DCF model. By definition, this component is investors' expectation of the long-term dividend growth rate. Presumably, investors use some combination of historical and/or projected growth rates for earnings and dividends per share and for internal or book value growth to assess long-term potential.

Q. WHAT GROWTH DATA HAVE YOU REVIEWED FOR THE GROUP OF ELECTRIC UTILITY COMPANIES?

A. I have analyzed a number of measures of growth for the electric utility companies. I have reviewed *Value Line's* historical and projected growth rate estimates for earnings per share (EPS), dividends per share (DPS), and book value per share (BVPS). In addition, I have utilized the average EPS growth rate forecasts of Wall Street analysts as provided by Zacks, Reuters, and First Call. These services solicit five-year earning growth rate projections from securities analysts and compile and publish the averages of these forecasts on the Internet. Finally, I have also assessed prospective growth as measured by prospective earnings retention rates and earned returns on common equity.

Q. PLEASE DISCUSS HISTORICAL GROWTH IN EARNINGS AND DIVIDENDS AS WELL AS INTERNAL GROWTH.

A. Historical growth rates for EPS, DPS, and BVPS are readily available to virtually all investors and presumably an important ingredient in forming expectations concerning future growth. However, one must use historical growth numbers as measures of investors' expectations with caution. In some cases, past growth may not reflect future growth potential. Also, employing a single growth rate number (for example, for five or ten years), is unlikely to accurately measure investors' expectations due to the sensitivity of a single growth rate figure to fluctuations in individual firm performance as well as overall economic fluctuations (i.e., business cycles). However, one must appraise the context in which the growth rate is being employed. According to the conventional DCF model, the expected return on a security is equal to the sum of the dividend yield and the expected long-term growth in dividends. Therefore, to best estimate the cost of common equity capital using the conventional DCF model, one must look to long-term growth rate expectations.

Internally generated growth is a function of the percentage of earnings retained within the firm (the earnings retention rate) and the rate of return earned on those earnings (the return on equity). The internal growth rate is computed as the retention rate times the return on equity. Internal growth is significant in determining long-run earnings and, therefore, dividends. Investors recognize the importance of internally generated growth and pay premiums for stocks of companies that retain earnings and earn high returns on internal investments.

Q. PLEASE DISCUSS THE HISTORICAL GROWTH OF THE COMPANIES IN THE GROUP AS PROVIDED IN THE *VALUE LINE INVESTMENT SURVEY.*

A. Historic growth rates for the companies in the group, as published in the *Value Line Investment Survey*, are provided on page 3 of Exhibit_JRW-7. Due to the presence of outliers among the historic growth rate figures, both the mean and medians are used in the analysis. The historical growth measures in EPS, DPS, and BVPS for the group, as measured by the means and medians, range from -0.50% to 3.5%, with an average of 1.7%.

Q. PLEASE SUMMARIZE *VALUE LINE'S* PROJECTED GROWTH RATES FOR THE GROUP OF ELECTRIC UTILITY COMPANIES.

A. *Value Line's* projections of EPS, DPS, and BVPS growth for the group are shown on page 4 of Exhibit_JRW-7. As above, due to the presence of outliers, both the mean and medians are used in the analysis. For the group, the central tendency measures range from 4.0% to 6.3%, with an average of 5.0%.

Also provided on page 4 of Exhibit_JRW-7 is prospective internal growth for the group as measured by *Value Line*'s average projected retention rate and return on shareholders' equity. The average prospective internal growth rate for the group is 4.4%.

Q. PLEASE ASSESS GROWTH FOR THE GROUP AS MEASURED BY ANALYSTS' FORECASTS OF EXPECTED 5-YEAR GROWTH IN EPS.

A. Zacks, First Call, and Reuters collect, summarize, and publish Wall Street analysts' five-year EPS growth rate forecasts for companies. These forecasts are provided for the companies in the group of electric utility companies on page 5 of Exhibit_JRW-7. The mean and median of the analysts' projected EPS growth rates for the group are 5.9% and 5.0%, respectively.[8]

Q. PLEASE SUMMARIZE YOUR ANALYSIS OF THE HISTORICAL AND PROSPECTIVE GROWTH OF THE ELECTRIC UTILITY COMPANY GROUP.

A. The table below shows the summary DCF growth rate indicators for the group of electric utility companies. For the group, the average of *Value Line*'s historical mean and median growth rate measures in EPS, DPS, and BVPS is 1.7%. *Value Line*'s average projected growth rate for EPS, DPS, and BVPS is 5.0%. The average internal growth rate is 4.4%, and the mean/median projected EPS growth rate for companies in the group is 5.9%/5.0%. Given these results, and giving more weight to the projected growth measures, an expected growth rate of 5.0 percent range is reasonable for the group.

[8] Since there is considerable overlap in analyst coverage between the three services, and not all of the companies have forecasts from the different services, I have averaged the expected five-year EPS growth rates from the three services for each company to arrive at an expected EPS growth rate by company.

DCF Growth Rate Indicators

Growth Rate Indicator	Proxy Group
Historic *Value Line* Growth in EPS, DPS, and BVPS	2.9%
Projected *Value Line* Growth in EPS, DPS, and BVPS	4.0%
Internal Growth ROE * Retention rate	3.7%
Mean/Median Projected EPS Growth from First Call, Reuters, and Zacks	5.9/5.0%%

Q. BASED ON THE ABOVE ANALYSIS, WHAT ARE YOUR INDICATED COMMON EQUITY COST RATES FROM THE DCF MODEL FOR THE GROUP?

A. My DCF-derived equity cost rate for the group are:

$$\text{DCF Equity Cost Rate (k)} = \frac{D}{P} + g$$

DCF Equity Cost Rate (k) =	Dividend Yield	½ Growth Adjustment	DCF Growth Rate	Equity Cost Rate
Electric Group	3.9%	1.0250	5.00%	9.00%

These results are summarized on page 1 of Exhibit_JRW-7.

C. Capital Asset Pricing Model Results

Q. PLEASE DISCUSS THE CAPITAL ASSET PRICING MODEL (CAPM).

A. The CAPM is a risk premium approach to gauging a firm's cost of equity capital. According to the risk premium approach, the cost of equity is the sum of the interest rate on a risk-free bond (R_f) and a risk premium (RP), as in the following:

$$k = R_f + RP$$

The yield on long-term Treasury securities is normally used as R_f. Risk premiums are measured in different ways. The CAPM is a theory of the risk and expected returns of common stocks. In the CAPM, two types of risk are associated with a stock: firm-specific risk or unsystematic risk; and market or systematic risk, which is measured by a firm's beta. The only risk that investors receive a return for bearing is systematic risk.

According to the CAPM, the expected return on a company's stock, which is also the equity cost rate (K), is equal to:

$$K = (R_f) + ß_{ibm} * [E(R_m) - (R_f)]$$

Where:

- K represents the estimated rate of return on the stock;
- $E(R_m)$ represents the expected return on the overall stock market. Frequently, the 'market' refers to the S&P 500;
- (R_f) represents the risk-free rate of interest;
- $[E(R_m) - (R_f)]$ represents the expected equity or market risk premium—the excess return that an investor expects to receive above the risk-free rate for investing in risky stocks; and
- *Beta*—($ß_i$) is a measure of the systematic risk of an asset.

To estimate the required return or cost of equity using the CAPM requires three inputs: the risk-free rate of interest (R_f), the beta ($ß_i$), and the expected equity or market risk premium, $[E(R_m) - (R_f)]$. R_f is the easiest of the inputs to measure – it is the yield on long-term Treasury bonds. $ß_i$, the measure of systematic risk, is a little

more difficult to measure because there are different opinions about what adjustments, if any, should be made to historical betas due to their tendency to regress to 1.0 over time. And finally, an even more difficult input to measure is the expected equity or market risk premium, $[E(R_m) - (R_f)]$. I will discuss each of these inputs, with most of the discussion focusing on the expected equity risk premium.

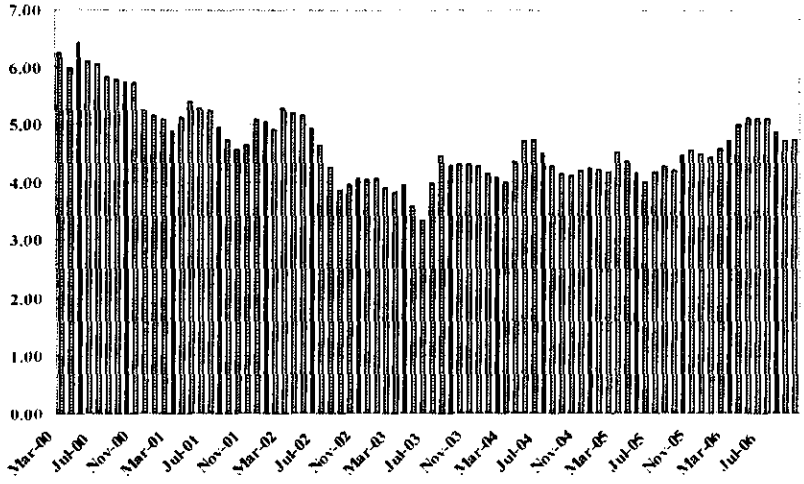
Q. PLEASE DISCUSS EXHIBIT_JRW-8.

A. Exhibit_JRW-8 provides the summary results for my CAPM study. Page 1 shows the results, and the pages following it, contain the supporting data.

Q. PLEASE DISCUSS THE RISK-FREE INTEREST RATE.

A. The yield on long-term Treasury bonds has usually been viewed as the risk-free rate of interest in the CAPM. The yield on long-term Treasury bonds, in turn, has been considered to be the yield on Treasury bonds with 30-year maturities. However, when the Treasury's issuance of 30-year bonds was interrupted for a period of time in recent years, the yield on 10-year Treasury bonds replaced the yield on 30-year Treasury bonds as the benchmark long-term Treasury rate. The 10-year Treasury yields over the past five years are shown in the chart below. These rates hit a 60-year low in the summer of 2003 at 3.33%. They increased with the rebounding economy and fluctuated in the 4.0-4.50 percent range over the past three years until advancing to 5.0% in recent months in response to a strong economy and increases in energy, commodity, and consumer prices. In the last six months, however, long-term interest rates have retreated to below 5.0 percent as commodity and energy prices have declined and inflationary pressures have subsided.

Ten-Year U.S. Treasury Yields
January 2000-October 2006



Source: http://www.federalreserve.gov/releases/h15/current/h15.pdf

Q. WHAT RISK-FREE INTEREST RATE ARE YOU USING IN YOUR CAPM?

A. With the growing budget deficit, the U.S. Treasury has decided to again begin issuing a 30-year bond. As such, the market may again begin to focus on its yield as the benchmark for long-term capital costs in the U.S. Over 2006, the yields on the 10- and 30- year Treasuries have increased and have been in the 4.50%-5.25% range. As of December 4, 2006, as shown in the table below, the rates on 10- and 30- Treasuries were 4.43% and 4.55%, respectively. Given this recent range and movement, I will use 4.75% as the risk-free rate, or R_f, in my CAPM.

U.S. Treasury Yields
December 4, 2006

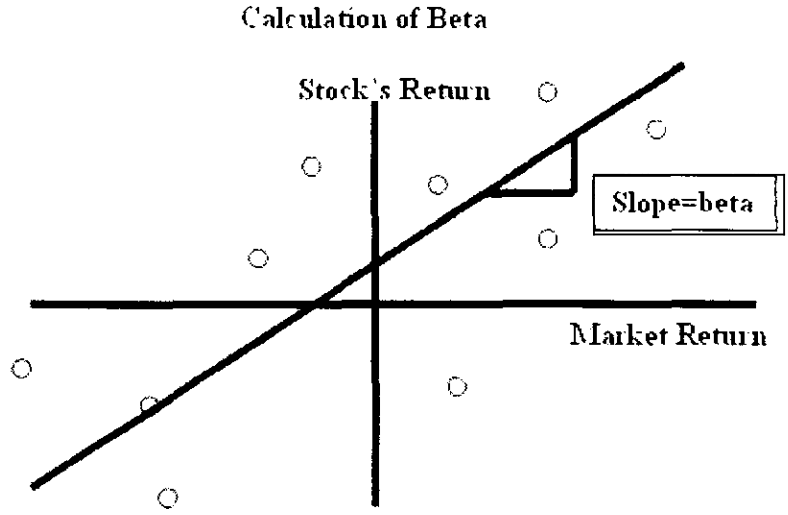
NOTES/BONDS

	COUPON	MATURITY DATE	CURRENT PRICE/YIELD
2-YEAR	4.625	11/30/2008	100-06+ / 4.52
3-YEAR	4.625	11/15/2009	100-17¾ / 4.42
5-YEAR	4.500	11/30/2011	100-16½ / 4.38
10-YEAR	4.625	11/15/2016	101-17½ / 4.43
30-YEAR	4.500	02/15/2036	99-08½ / 4.55

Source: www.bloomberg.com

Q. WHAT BETAS ARE YOU EMPLOYING IN YOUR CAPM?

A. Beta (ß) is a measure of the systematic risk of a stock. The market, usually taken to be the S&P 500, has a beta of 1.0. The beta of a stock with the same price movement as the market also has a beta of 1.0. A stock whose price movement is greater than that of the market, such as a technology stock, is riskier than the market and has a beta greater than 1.0. A stock with below average price movement, such as that of a regulated public utility, is less risky than the market and has a beta less than 1.0. Estimating a stock's beta involves running a linear regression of a stock's return on the market return as in the following:



The slope of the regression line is the stock's ß. A steeper line indicates the stock is more sensitive to the return on the overall market. This means that the stock has a higher ß and greater than average market risk. A less steep line indicates a lower ß and less market risk.

Numerous online investment information services, such as Yahoo and Reuters, provide estimates of stock betas. Usually these services report different betas for the same stock. The differences are usually due to (1) the time period over which the ß is measured and (2) any adjustments that are made to reflect the fact that betas tend to regress to 1.0 over time. In estimating an equity cost rate for the group of electric utility companies, I am using the betas for the companies as provided in the *Value Line Investment Survey*. As shown on page 2 of Exhibit_JRW-8, the average beta for the group is 0.89.

Q. WHAT DOES A BETA OF 0.89 INDICATE ABOUT THE RISKINESS OF THE ELECTRIC UTILITY GROUP?

A. Since the overall market beta is 1.0, a beta of 0.89 indicates that the group is slightly less risky than the overall market.

Q. PLEASE DISCUSS THE OPPOSING VIEWS REGARDING THE EQUITY RISK PREMIUM.

A. The equity or market risk premium—$[E(R_m) - R_f]$: is equal to the expected return on the stock market (e.g., the expected return on the S&P 500 ($E(R_m)$) minus the risk-free rate of interest (R_f). The equity premium is the difference in the expected total return between investing in equities and investing in "safe" fixed-income assets, such as long-term government bonds. However, while the equity risk premium is easy to define conceptually, it is difficult to measure because it requires an estimate of the expected return on the market.

Q. PLEASE DISCUSS THE ALTERNATIVE APPROACHES TO ESTIMATING THE EQUITY RISK PREMIUM.

A. The table below highlights the primary approaches to, and issues in, estimating the expected equity risk premium. The traditional way to measure the equity risk premium was to use the difference between historical average stock and bond returns. In this case, historical stock and bond returns, also called ex post returns, were used as the measures of the market's expected return (known as the ex ante or forward-looking expected return). This type of historical evaluation of stock and bond returns is often called the "Ibbotson approach" after Professor Roger Ibbotson who popularized this method of using historical financial market returns as measures of expected returns. Most historical assessments of the equity risk premium suggest an

equity risk premium of 5-7 percent above the rate on long-term Treasury bonds. However, this can be a problem because (1) ex post returns are not the same as ex ante expectations, (2) market risk premiums can change over time, increasing when investors become more risk-averse, and decreasing when investors become less risk-averse, and (3) market conditions can change such that ex post historical returns are poor estimates of ex ante expectations.

Risk Premium Approaches

	Historical Ex Post Excess Returns	Surveys	Ex Ante Models and Market Data
Means of Assessing the Equity-Bond Risk Premium	**Historical average is a popular proxy for the ex ante premium – but likely to be misleading**	**Investor and expert surveys can provide direct estimates of prevailing expected returns/premiums**	**Current financial market prices (simple valuation ratios or DCF-based measures) can give most objective estimates of feasible ex ante equity-bond risk premium**
Problems/Debated Issues	**Time variation in required returns and systematic selection and other biases have boosted valuations over time, and have exaggerated realized excess equity returns compared with ex ante expected premiums**	**Limited survey histories and questions of survey representativeness.** **Surveys may tell more about hoped-for expected returns than about objective required premiums due to irrational biases such as extrapolation.**	**Assumptions needed for DCF inputs, notably the trend earnings growth rate, make even these models' outputs subjective.** **The range of views on the growth rate, as well as the debate on the relevant stock and bond yields, leads to a range of premium estimates.**

Source: Antti Ilmanen, Expected Returns on Stocks and Bonds," *Journal of Portfolio Management*, (Winter 2003).

The use of historical returns as market expectations has been criticized in numerous academic studies. The general theme of these studies is that the large equity risk premium discovered in historical stock and bond returns cannot be justified by the fundamental data. These studies, which fall under the category "Ex Ante Models and Market Data," compute ex ante expected returns using market data to arrive at an expected equity risk premium. These studies have also been called "Puzzle Research" after the famous study by Mehra and Prescott in which the authors

first questioned the magnitude of historical equity risk premiums relative to fundamentals.[9]

Q. PLEASE BRIEFLY SUMMARIZE SOME OF THE ACADEMIC STUDIES THAT DEVELOP EX ANTE EQUITY RISK PREMIUMS.

A. Two of the most prominent studies of ex ante expected equity risk premiums were by Eugene Fama and Ken French (2002) and James Claus and Jacob Thomas (2001). The primary debate in these studies revolves around two related issues: (1) the size of expected equity risk premium, which is the return equity investors require above the yield on bonds; and (2) the fact that estimates of the ex ante expected equity risk premium using fundamental firm data (earnings and dividends) are much lower than estimates using historical stock and bond return data. Fama and French (2002), two of the most preeminent scholars in finance, use dividend and earnings growth models to estimate expected stock returns and ex ante expected equity risk premiums.[10] They compare these results to actual stock returns over the period 1951-2000. Fama and French estimate that the expected equity risk premium from DCF models using dividend and earnings growth to be between 2.55% and 4.32%. These figures are much lower than the ex post historical equity risk premium produced from the average stock and bond return over the same period, which is 7.40%.

Fama and French conclude that the ex ante equity risk premium estimates using DCF models and fundamental data are superior to those using ex post historical

---

[9] Rahnish Mehra and Edward Prescott, "The Equity Premium: A Puzzle," *Journal of Monetary Economics* (1985).

[10] Eugene F. Fama and Kenneth R. French, "The Equity Premium," *The Journal of Finance*, (April 2002).

stock returns for three reasons: (1) the estimates are more precise (a lower standard error); (2) the Sharpe ratio, which is measured as the [(expected stock return – risk-free rate)/standard deviation], is constant over time for the DCF models but varies considerably over time and more than doubles for the average stock-bond return model; and (3) valuation theory specifies relationships between the market-to-book ratio, return on investment, and cost of equity capital that favor estimates from fundamentals. They also conclude that the high average stock returns over the past 50 years were the result of low expected returns and that the average equity risk premium has been in the 3-4 percent range.

The study by Claus and Thomas of Columbia University provides direct support for the findings of Fama and French.[11] These authors compute ex ante expected equity risk premiums over the 1985-1998 period by (1) computing the discount rate that equates market values with the present value of expected future cash flows, and (2) then subtracting the risk-free interest rate. The expected cash flows are developed using analysts' earnings forecasts. The authors conclude that over this period the ex ante expected equity risk premium is in the range of 3.0%. Claus and Thomas note that, over this period, ex post historical stock returns overstate the ex ante expected equity risk premium because, as the expected equity risk premium has declined, stock prices have risen. In other words, from a valuation perspective, the present value of expected future returns increase when the required rate of return decreases. The higher stock prices have produced stock returns that

[11] James Claus and Jacob Thomas, "Equity Risk Premia as Low as Three Percent? Empirical Evidence from Analysts' Earnings Forecasts for Domestic and International Stock Market," *Journal of Finance*. (October 2001).

have exceeded investors' expectations and therefore ex post historical equity risk premium estimates are biased upwards as measures of ex ante expected equity risk premiums.

Q. PLEASE PROVIDE A SUMMARY OF THE EX ANTE EQUITY RISK PREMIUM STUDIES.

A. Richard Derrig and Elisha Orr (2003) completed the most comprehensive paper to date which summarizes and assesses the many risk premium studies.[12] These authors reviewed the various approaches to estimating the equity risk premium, and the overall results. Page 3 of Exhibit_JRW-8 provides a summary of the results of the primary risk premium studies reviewed by Derrig and Orr. In developing page 3 of Exhibit_JRW-8, I have (1) updated the results of the studies that have been updated by the various authors, (2) included the results of several additional studies and surveys, and (3) included the results of the "Building Blocks" approach to estimating the equity risk premium, including a study I performed which is presented below.

On page 3, the risk premium studies listed under the 'Social Security' and 'Puzzle Research' sections are primarily ex ante expected equity risk premium studies (as discussed above). Most of these studies are performed by leading academic scholars in finance and economics. Also provided are the results of studies by Ibbotson and Chen and myself which use the Building Blocks approach.

[12] Richard Derrig and Elisha Orr, "Equity Risk Premium: Expectations Great and Small," Working Paper (version 3.0), Automobile Insurers Bureau of Massachusetts, August 28, 2003

Q. PLEASE DISCUSS YOUR DEVELOPMENT OF AN EX ANTE EXPECTED EQUITY RISK PREMIUM COMPUTED USING THE BUILDING BLOCKS METHODOLOGY.

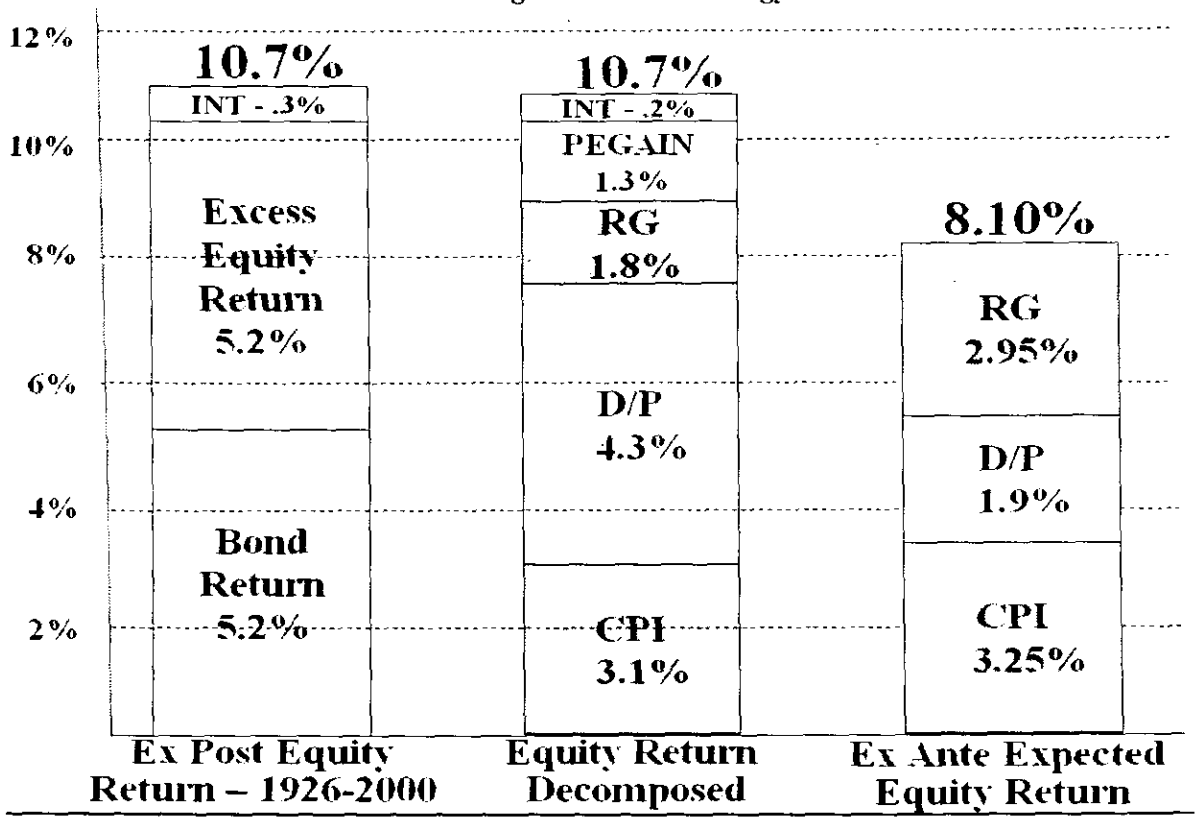
A. Ibbotson and Chen (2002) evaluate the ex post historical mean stock and bond returns in what is called the Building Blocks approach.[13] They use 75 years of data and relate the compounded historical returns to the different fundamental variables employed by different researchers in building ex ante expected equity risk premiums. Among the variables included were inflation, real EPS and DPS growth, ROE and book value growth, and P/E ratios. By relating the fundamental factors to the ex post historical returns, the methodology bridges the gap between the ex post and ex ante equity risk premiums. Ilmanen (2003) illustrates this approach using the geometric returns and five fundamental variables – inflation (CPI), dividend yield (D/P), real earnings growth (RG), repricing gains (PEGAIN) and return interaction/reinvestment (INT).[14] This is shown in the graph below. The first column breaks the 1926-2000 geometric mean stock return of 10.7% into the different return components demanded by investors: the historical Treasury bond return (5.2%), the excess equity return (5.2%), and a small interaction term (0.3%). This 10.7% annual stock return over the 1926-2000 period can then be broken down into the following fundamental elements: inflation (3.1%), dividend yield (4.3%), real earnings growth (1.8%), repricing gains (1.3%) associated with higher P/E ratios, and a small interaction term (0.2%).

---

[13] Roger Ibbotson and Peng Chen, "Long Run Returns: Participating in the Real Economy," *Financial Analysts Journal*, January 2003.

[14] Antti Ilmanen, Expected Returns on Stocks and Bonds," *Journal of Portfolio Management*, (Winter 2003), p. 11.

Decomposing Equity Market Returns
The Building Blocks Methodology

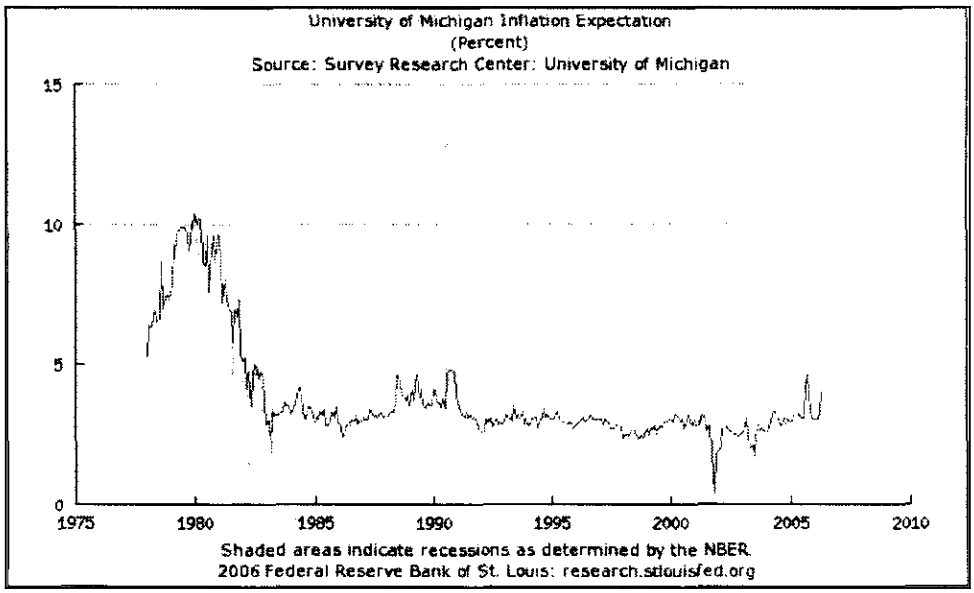


Q. HOW ARE YOU USING THIS METHODOLOGY TO DERIVE AN EX ANTE EXPECTED EQUITY RISK PREMIUM?

A. The third column in the graph above shows current inputs to estimate an ex ante expected market return. These inputs include the following:

CPI – To assess expected inflation, I have employed expectations of the short-term and long-term inflation rate. The graph below shows the expected annual inflation rate according to consumers, as measured by the CPI, over the coming year. This survey is published monthly by the University of Michigan Survey Research Center. In the most recent report, the expected one-year inflation rate was 4.0%.

Expected Inflation Rate
University of Michigan Consumer Research
(Data Source: http://research.stlouisfed.org/fred2/series/MICH/98)



Longer term inflation forecasts are available in the Federal Reserve Bank of Philadelphia's publication entitled *Survey of Professional Forecasters*.[15] This survey of professional economists has been published for almost 50 years. While this survey is published quarterly, only the first quarter survey includes long-term forecasts of GDP growth, inflation, and market returns. In the first quarter, 2006 survey, published on February 13, 2006, the median long-term (10-year) expected inflation rate as measured by the CPI was 2.50% (see page 4 of Exhibit_JRW-8).

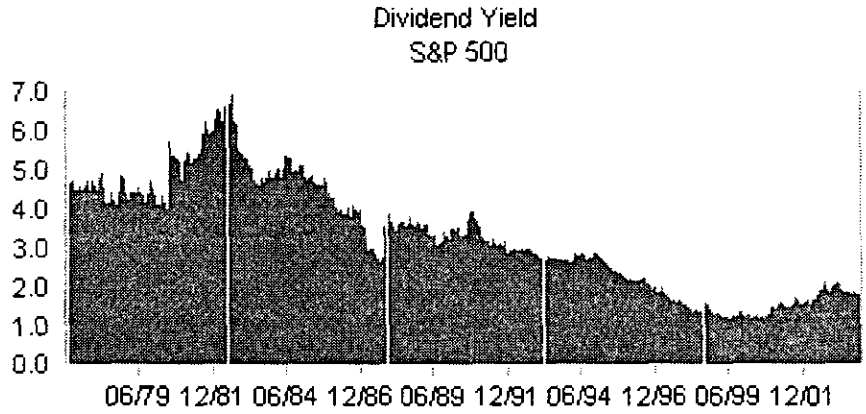
Given these results, I will use the average of the University of Michigan and Philadelphia Federal Reserve's surveys (4.0% and 2.50%), or 3.25%.

[15] Federal Reserve Bank of Philadelphia, *Survey of Professional Forecasters*, February 13, 2006. The *Survey of Professional Forecasters* was formerly conducted by the American Statistical Association (ASA) and the National Bureau of Economic Research (NBER) and was known as the ASA/NBER survey. The survey, which began in 1968, is conducted each quarter. The Federal Reserve Bank of Philadelphia, in cooperation with the NBER, assumed responsibility for the survey in June 1990.

D/P – As shown in the graph below, the dividend yield on the S&P 500 has decreased gradually over the past decade. Today, it is far below its norm of 4.3% over the 1926-2000 time period. Whereas the S&P dividend yield bottomed out at less than 1.4% in 2000, it is currently at 1.9% which I use in the ex ante risk premium analysis.

S&P 500 Dividend Yield

(Data Source: http://www.barra.com/Research/fund_charts.asp)



RG – To measure expected real growth in earnings, I use (1) the historical real earnings growth rate for the S&P 500, and (2) expected real GDP growth. The S&P 500 was created in 1960. It includes 500 companies which come from ten different sectors of the economy. Over the 1960-2005 period, nominal growth in EPS for the S&P 500 was 7.11%. On page 5 of Exhibit_JRW-8, real EPS growth is computed using the CPI as a measure of inflation. As indicated by Ibbotson and Chen, real earnings growth over the 1926-2000 period was 1.8%. The real growth figure over 1960-2005 period for the S&P 500 is 2.71 %.

The second input for expected real earnings growth is expected real GDP growth. The rationale is that over the long-term, corporate profits have averaged a

relatively consistent 5.50% of US GDP.[16] Real GDP growth, according to McKinsey, has averaged 3.5% over the past 80 years. Expected GDP growth, according to the Federal Reserve Bank of Philadelphia's *Survey of Professional Forecasters*, is 3.2% (see page 4 of Exhibit_JRW-8).

Given these results, I will use the average of the historical S&P EPS real growth and the historical real GDP growth (and as supported by the Philadelphia Federal Reserve survey of expected GDP growth) (2.71% and 3.2%), or 2.95%, for real earnings growth.

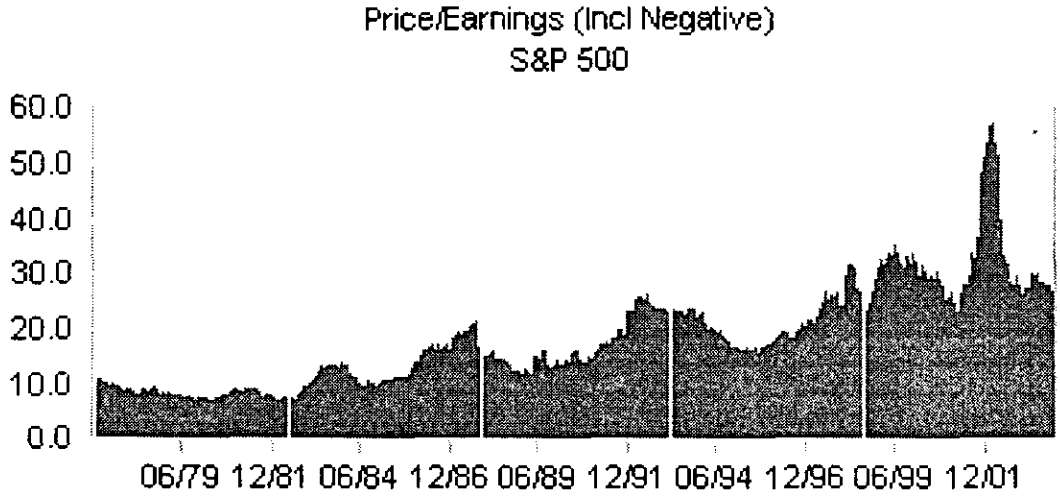
PEGAIN – the repricing gains associated with increases in the P/E ratio accounted for 1.3% of the 10.7% annual stock return in the 1926-2000 period. In estimating an ex ante expected stock market return, one issue is whether investors expect P/E ratios to increase from their current levels. The graph below shows the P/E ratios for the S&P 500 over the past 25 years. The run-up and eventual peak in P/Es is most notable in the chart. The relatively low P/E ratios (in the range of 10) over two decades ago are also quite notable. As of December, 2006 the P/E for the S&P 500, using the trailing 12 months EPS, is 20.5 according to www.investor.reuters.com.

Given the current economic and capital markets environment, I do not believe that investors expect even higher P/E ratios. Therefore, a PEGAIN would not be appropriate in estimating an ex ante expected stock market return. There are two primary reasons for this. First, the average historical S&P 500 P/E ratio is 15 – thus the current P/E exceeds this figure. Second, as previously noted, interest rates are at a

[16] Marc. H. Goedhart, et al. "The Real Cost of Equity," *McKinsey on Finance* (Autumn 2002), p.14.

cyclical low not seen in almost 50 years. This is a primary reason for the high current P/Es. Given the current market environment with relatively high P/E ratios and low relative interest rate, investors are not likely to expect to get stock market gains from lower interest rates and higher P/E ratios.

S&P 500 P/E Ratios
(Data Source: http://www.barra.com/Research/fund_charts.asp)



Q. GIVEN THIS DISCUSSION, WHAT IS YOUR EX ANTE EXPECTED MARKET RETURN AND EQUITY RISK PREMIUM USING THE "BUILDING BLOCKS METHODOLOGY"?

A. My expected market return is represented by the last column on the right in the graph entitled "Decomposing Equity Market Returns: The Building Blocks Methodology" set forth on page 43 of my testimony. As shown on page 44, my expected market return is 8.10% which is composed of 3.25% expected inflation, 1.90% dividend yield, and 2.95% real earnings growth rate.

Expected Inflation	Dividend Yield	Real Earnings Growth Rate	Expected Market Return
3.25%	1.90%	2.95%	8.10%

Q. GIVEN THAT THE HISTORICAL COMPOUNDED ANNUAL MARKET RETURN IS IN EXCESS OF 10%, WHY DO YOU BELIEVE THAT YOUR EXPECTED MARKET RETURN OF 8.10% IS REASONABLE?

A. As discussed above in the development of the expected market return, stock prices are relatively high at the present time in relation to earnings and dividends and interest rates are relatively low. Hence, it is unlikely that investors are going to experience high stock market returns due to higher P/E ratios and/or lower interest rates. In addition, as shown in the decomposition of equity market returns, whereas the dividend portion of the return was historically 4.3%, the current dividend yield is only 1.9%. Due to these reasons, lower market returns are expected for the future.

Q. IS YOUR EXPECTED MARKET RETURN OF 8.10% CONSISTENT WITH THE FORECASTS OF MARKET PROFESSIONALS?

A. Yes. In the 2006 survey, published on February 13, 2006, the median long-term expected return on the S&P 500 was 7.00 (see page 4 of Exhibit_JRW-8). This is clearly consistent with my expected market return of 8.10%.

Q. IS YOUR EXPECTED MARKET RETURN CONSISTENT WITH THE EXPECTED MARKET RETURNS OF CORPORATE CHIEF FINANCIAL OFFICERS (CFOS)?

A. Yes. John Graham and Campbell Harvey of Duke University conduct an annual survey of corporate CFOs. The survey is a joint project of Duke University and *CFO Magazine*. In the 2006 survey, the average expected return on the S&P 500 over the next ten years is 8.05%.[17]

Q. GIVEN THIS EXPECTED MARKET RETURN, WHAT IS YOUR EX ANTE EQUITY RISK PREMIUM USING THE BUILDING BLOCKS METHODOLOGY?

A. As shown above, the current 30-year treasury yield is 4.55%. My ex ante equity risk premium is simply the expected market return from the Building Blocks methodology minus this risk-free rate:

Ex Ante Equity Risk Premium = 8.10% - 4.55% = 3.55%

Q. GIVEN THIS DISCUSSION, HOW ARE YOU MEASURING AN EXPECTED EQUITY RISK PREMIUM IN THIS PROCEEDING?

A. As discussed above, page 3 of Exhibit_JRW-8 provides a summary of the results of a variety of the equity risk premium studies. These include the results of (1) the study of historical risk premiums as provided by Ibbotson, (2) ex ante equity risk premium studies (studies commissioned by the Social Security Administration as well as those labeled 'Puzzle Research'), (3) equity risk premium surveys of CFOs, Financial Forecasters, as well as academics, (4) Building Block approaches to the equity risk premium, and (5) other miscellaneous studies. The overall average equity risk

[17] The survey results are available at www.cfosurvey.org.

premium of these studies is 4.20%, which I will use as the equity risk premium in my CAPM study.

Q. IS YOUR EX ANTE EQUITY RISK PREMIUM CONSISTENT WITH THE EQUITY RISK PREMIUMS OF LEADING INVESTMENT FIRMS?

A. Yes. One of the first studies in this area was by Stephen Einhorn, one of Wall Street's leading investment strategists.[18] His study showed that the market or equity risk premium had declined to the 2.0 to 3.0 percent range by the early 1990s. Among the evidence he provided in support of a lower equity risk premium is the inverse relationship between real interest rates (observed interest rates minus inflation) and stock prices. He noted that the decline in the market risk premium has led to a significant change in the relationship between interest rates and stock prices. One implication of this development was that stock prices had increased higher than would be suggested by the historical relationship between valuation levels and interest rates.

The equity risk premiums of some of the other leading investment firms today support the result of the academic studies. An article in *The Economist* indicated that some other firms like J.P. Morgan are estimating an equity risk premium for an average risk stock in the 2.0 to 3.0 percent range above the interest rate on U.S. Treasury Bonds.[19]

---

[18] Steven G. Einhorn, "The Perplexing Issue of Valuation: Will the Real Value Please Stand Up?" *Financial Analysts Journal* (July-August 1990), pp. 11-16.

[19] For example, see "Welcome to Bull Country," *The Economist* (July 18, 1998), pp. 21-3, and "Choosing the Right Mixture " *The Economist* (February 27, 1999), pp. 71-2.

Q. IS YOUR EX ANTE EQUITY RISK PREMIUM CONSISTENT WITH THE EQUITY RISK PREMIUMS USED BY CORPORATE CHIEF FINANCIAL OFFICERS (CFOS)?

A. Yes. In the previously-referenced 2006 CFO survey conducted by John Graham and Campbell Harvey, the average ex ante 10-year equity risk premium was 3.05%.[20]

Q. IS YOUR EX ANTE EQUITY RISK PREMIUM CONSISTENT WITH THE EX ANTE EQUITY RISK PREMIUMS OF PROFESSIONAL FORECASTERS?

A. Yes. The financial forecasters in the previously-referenced Federal Reserve Bank of Philadelphia survey project both stock and bond returns. As shown on page 4 of Exhibit_JRW-8, the median long-term expected stock and bond returns were 7.00% and 5.00%, respectively. This provides an ex ante equity risk premium of 2.00%.

Q. IS YOUR EX ANTE EQUITY RISK PREMIUM CONSISTENT WITH THE EQUITY RISK PREMIUMS USED BY THE LEADING CONSULTING FIRMS?

A. Yes. McKinsey & Co. is widely recognized as the leading management consulting firm in the world. They recently published a study entitled "The Real Cost of Equity" in which they developed an ex ante equity risk premium for the US. In reference to the decline in the equity risk premium, as well as what is the appropriate equity risk

[20] The survey results are available at www.cfosurvey.org.

premium to employ for corporate valuation purposes, the McKinsey authors concluded the following:

> We attribute this decline not to equities becoming less risky (the inflation-adjusted cost of equity has not changed) but to investors demanding higher returns in real terms on government bonds after the inflation shocks of the late 1970s and early 1980s. We believe that using an equity risk premium of 3.5 to 4 percent in the current environment better reflects the true long-term opportunity cost of equity capital and hence will yield more accurate valuations for companies.[21]

Q. WHAT EQUITY COST RATE IS INDICATED BY YOUR CAPM ANALYSIS?

A. The results of my CAPM study for the group of electric utility companies are provided below:

$$K = (R_f) + \beta_{ibm} * [E(R_m) - (R_f)]$$

	Risk-Free Rate	Beta	Equity Risk Premium	Equity Cost Rate
Electric Group	4.75%	0.89	4.20%	8.5%

D. Equity Cost Rate Summary

Q. PLEASE SUMMARIZE YOUR EQUITY COST RATE STUDY.

A. The results for my DCF and CAPM analyses for the group of electric utility companies are indicated below:

	DCF	CAPM
Electric Group	9.0%	8.5%

[21] Marc H. Goedhart, et al, "The Real Cost of Equity," *McKinsey on Finance* (Autumn 2002), p. 15.

Q. GIVEN THESE RESULTS, WHAT IS YOUR ESTIMATED EQUITY COST RATE FOR UE?

A. Giving these results, I conclude that the equity cost rate for the group of electric utility companies is in the 8.50 – 9.00% percent range. To account for any unique risks of UE, I recommend an equity cost rate at the upper end of this range. Hence, I am utilizing an equity cost rate of 9.0% in this proceeding. This appears to be particularly fair given UE's lower degree of financial risk as indicated by its higher common equity ratio.

Q. ISN'T THIS RATE OF RETURN LOW BY HISTORICAL STANDARDS?

A. Yes it is, and appropriately so. My rate of return is low by historical standards for three reasons. First, as discussed above, current capital costs are very low by historical standards, with interest rates at a cyclical low not seen since the 1960s. Second, the 2003 tax law, which reduces the tax rates on dividend income and capital gains, lowers the pre-tax return required by investors. And third, as previously discussed, the equity or market risk premium has declined.

Q. FINALLY, PLEASE DISCUSS YOUR RATE OF RETURN IN LIGHT OF RECENT YIELDS ON 'A' RATED PUBLIC UTILITY BONDS.

A. In recent months the yields on long-term public utility bonds have been in the 6.00 percent range. My rate of return may appear to be too low given these yields. However, as previously noted, my recommendation must be viewed in the context of the significant decline in the market or equity risk premium. As a result, the return

premium that equity investors require over bond yields is much lower today. This decline was previously reviewed in my discussion of capital costs in today's markets.

Q. HOW DO YOU TEST THE REASONABLENESS OF YOUR COST OF EQUITY AND OVERALL RATE OF RETURN RECOMMENDATION?

A. To test the reasonableness of my 9.0% equity cost rate recommendation, I examine the relationship between the return on common equity and the market-to-book ratios for the companies in the group of electric utility companies.

Q. WHAT DO THE RETURNS ON COMMON EQUITY AND MARKET-TO-BOOK RATIOS FOR THE GROUP OF ELECTRIC UTILITY COMPANIES INDICATE ABOUT THE REASONABLENESS OF YOUR 9.0% RECOMMENDATION?

A. Exhibit_JRW-3 provides financial performance and market valuation statistics for the group of electric utility companies. The average current return on equity and market-to-book ratios for the group are summarized below:

	Current ROE	Market-to-Book Ratio
Electric Group	10.8 %	179.9

Source: Exhibit_JRW-3.

These results clearly indicate that, on average, these companies are earning returns on equity above their equity cost rates. As such, this observation provides evidence that my recommended equity cost rate of 9.0% is reasonable and fully consistent with the financial performance and market valuation of the group of electric utility companies.

Q. DOES THIS CONCLUE YOUR TESTIMONY?

A. Yes.

APPENDIX A

EDUCATIONAL BACKGROUND, RESEARCH, AND RELATED BUSINESS EXPERIENCE

J. RANDALL WOOLRIDGE

J. Randall Woolridge is a Professor of Finance and the Goldman, Sachs & Co. and Frank P. Smeal Endowed Faculty Fellow in Business Administration in the College of Business Administration of the Pennsylvania State University in University Park, PA. In addition, Professor Woolridge is Director of the Smeal College Trading Room and President and CEO of the Nittany Lion Fund, LLC.

Professor Woolridge received a Bachelor of Arts degree in Economics from the University of North Carolina, a Master of Business Administration degree from the Pennsylvania State University, and a Doctor of Philosophy degree in Business Administration (major area-finance, minor area-statistics) from the University of Iowa. At Iowa he received a Graduate Fellowship and was awarded membership in Beta Gamma Sigma, a national business honorary society. He has taught Finance courses at the University of Iowa, Cornell College, and the University of Pittsburgh, as well as the Pennsylvania State University. These courses include corporation finance, commercial and investment banking, and investments at the undergraduate, graduate, and executive MBA levels.

Professor Woolridge's research has centered on the theoretical and empirical foundations of corporation finance and financial markets and institutions. He has published over 35 articles in the best academic and professional journals in the field, including the *Journal of Finance*, the *Journal of Financial Economics*, and the *Harvard Business Review*. His research has been cited extensively in the business press. His work has been featured in the *New York Times*, *Forbes*, *Fortune*, *The Economist*, *Financial World*, *Barron's*, *Wall Street Journal*, *Business Week*, *Washington Post*, *Investors' Business Daily*, *Worth Magazine*, *USA Today*, and other publications. In addition, Dr. Woolridge has appeared as a guest on CNN's *Money Line* and CNBC's *Morning Call* and *Business Today*.

The second edition of Professor Woolridge's popular stock valuation book, *The StreetSmart Guide to Valuing a Stock* (McGraw-Hill, 2003), was released in its second edition. He has also co-authored *Spinoffs and Equity Carve-Outs: Achieving Faster Growth and Better Performance* (Financial Executives Research Foundation, 1999) as well as a new textbook entitled Applied Principles of *Finance* (Kendall Hunt, 2006). Dr. Woolridge is a founder and a managing director of www.valuepro.net - a stock valuation website.

Professor Woolridge has also consulted with and prepared research reports for major corporations, financial institutions, and investment banking firms, and government agencies. In addition, he has directed and participated in over 500 university- and company- sponsored professional development programs for executives in 25 countries in North and South America.

Europe, Asia, and Africa.

Dr. Woolridge has prepared testimony and/or provided consultation services in the following cases (as of December 31, 2005):

Pennsylvania: Dr. Woolridge has prepared testimony on behalf of the Pennsylvania Office of Consumer Advocate in the following cases before the Pennsylvania Public Utility Commission: Bell Telephone Company (R-811819), Peoples Natural Gas Company (R-832315), Pennsylvania Power Company (R-832409), Western Pennsylvania Water Company (R-832381), Pennsylvania Power Company (R-842740), Pennsylvania Gas and Water Company (R-850178), Metropolitan Edison Company (R-860384), Pennsylvania Electric Company (R-860413), North Penn Gas Company (R-860535), Philadelphia Electric Company (R-870629), Western Pennsylvania Water Company (R-870825), York Water Company (R-870749), Pennsylvania-American Water Company (R-880916), Equitable Gas Company (R-880971), the Bloomsburg Water Co. (R-891494), Columbia Gas of Pennsylvania, Inc. (R-891468), Pennsylvania-American Water Company (R-90562), Breezewood Telephone Company (R-901666), York Water Company (R-901813), Columbia Gas of Pennsylvania, Inc. (R-901873), National Fuel Electric utility Company (R-911912), Pennsylvania-American Water Company (R-911909), Borough of Media Water Fund (R-912150), UGI Utilities, Inc. - Electric Utility Division (R-922195), Dauphin Consolidated Water Supply Company - General Waterworks of Pennsylvania, Inc, (R-932604), National Fuel Electric utility Company (R-932548), Commonwealth Telephone Company (I-920020), Conestoga Telephone and Telegraph Company (I-920015), Peoples Natural Gas Company (R-932866), Blue Mountain Consolidated Water Company (R-932873), National Fuel Gas Company (R-942991), UGI - Gas Division (R-953297), UGI - Electric Division (R-953534), Pennsylvania-American Water Company (R-973944), Pennsylvania-American Water Company (R-994638), Philadelphia Suburban Water Company (R-994868;R-994877;R-994878; R-9948790), Philadelphia Suburban Water Company (R-994868), Wellsboro Electric Company (R-00016356), Philadelphia Suburban Water Company (R-00016750), National Fuel Electric utility Company (R-00038168), Pennsylvania-American Water Company (R-00038304), York Water Company (R-00049165), Valley Energy Company (R-00049345), Wellsboro Electric Company (R-00049313), and National Fuel Gas utility Corporation (R-00049656).

New Jersey: Dr. Woolridge prepared testimony for the New Jersey Department of the Public Advocate, Division of Rate Counsel: New Jersey-American Water Company (R-91081399J), New Jersey-American Water Company (R-92090908J), and Environmental Disposal Corp (R-94070319).

Hawaii: Dr. Woolridge prepared testimony for the Hawaii Office of the Consumer Advocate: East Honolulu Community Services, Inc. (Docket No. 7718).

Delaware: Dr. Woolridge prepared testimony for the Delaware Division of Public Advocate: Artesian Water Company (R-00-649).

Ohio: Dr. Woolridge prepared testimony for the Ohio Office of Consumers' Council: SBC Ohio (Case No. 02-1280-TP-UNC R-00-649), and Cincinnati Gas & Electric Company (Case No. 05-0059-EL-AIR).

New York: Dr. Woolridge prepared testimony for the County of Nassau in New York State: Long Island Lighting Company (PSC Case No. 942354).

Florida: Dr. Woolridge prepared testimony for the Office of Peoples Counsel in Florida: Florida Power & Light Co. (Docket No. 050045-EL).

Connecticut: Dr. Woolridge prepared testimony for the Office of Consumer Counsel in Connecticut: United Illuminating (Docket No. 96-03-29), Yankee Gas Company (Docket No. 04-06-01), Southern Connecticut Gas Company (Docket No. 03-03-17), the United Illuminating Company (Docket No. 05-06-04).

California: Dr. Woolridge prepared testimony for the Office of Ratepayer Advocate in California: San Gabriel Valley Water Company (Docket No. 05-08-021).

South Carolina: Dr. Woolridge prepared testimony for the Office of Regulatory Staff in South Carolina: South Carolina Electric and Gas Company (Docket No. 2005-113-G).

Kentucky: Dr. Woolridge prepared testimony for the Office of Attorney General in Kentucky: Kentucky-American Water Company (Case No. 2004-00103), Union Heat, Light, and Power Company (Case No. 2004-00042), and Kentucky Power Company (Case No. 2005-00341).

Washington, D.C.: Dr. Woolridge prepared testimony for the Office of the People's Counsel in the District of Columbia: Potomac Electric Power Company (Formal Case No. 939).

Washington: Dr. Woolridge consulted with trial staff of the Washington Utilities and Transportation Commission on the following cases: Puget Energy Corp. (Docket Nos. UE-011570 and UG-011571); and Avista Corporation (Docket No. UE-011514).

Kansas: Dr. Woolridge prepared testimony on behalf of the Kansas Citizens' Utility Ratepayer Board Utilities in the following cases: Western Resources Inc. (Docket No. 01-WSRE-949-GIE), UtiliCorp (Docket No. 02-UTCG701-CIG), and Westar Energy, Inc. (Docket No. 05-WSEE-981-RTS).

FERC: Dr. Woolridge has prepared testimony on behalf of the Pennsylvania Office of Consumer Advocate in the following cases before the Federal Energy Regulatory Commission: National Fuel Gas Supply Corporation (RP-92-73-000) and Columbia Gulf Transmission Company (RP97-52-000).

Vermont: Dr. Woolridge prepared testimony for the Department of Public Service in the Central Vermont Public Service Case (Docket No. 6988).

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of the Application of Union	)	
Electric Company to Modify Its Tariff to	)	Case No. ER-2007-0002
Begin the Implementation of Its Regulatory Plan	)	

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA	)	
	)	**SS.**
COUNTY OF CENTRE	)	

BEFORE ME, the undersigned notary public, this day personally appeared J. RANDALL WOOLRIDGE, to me known, who being duly sworn according to law, deposes and says:

"My name is J. Randall Woolridge. I am of legal age and a resident of the Commonwealth of Pennsylvania. I certify that the foregoing testimony and exhibits, offered by me on behalf of the State of Missouri, are true and correct to the best of my knowledge and belief."

J. Randall Woolridge

SUBSCRIBED AND SWORN to before me, a notary public, on this 13 day of December, 2006.

Mary L. Hart

Notary Public in the Commonwealth of Pennsylvania

My Commission Expires:

NOTARIAL SEAL
Mary L. Hart, Notary Public
State College Boro., Centre County
My Commission Expires Aug. 25, 2009

Exhibit_(JRW-1)

Union Electric Company
Cost of Capital

As of June 30, 2006

Capital Source	Capitalization Ratio	Cost Rate	Weighted Cost Rate
Short-Term Debt	0.795%	5.360%	0.043%
Long-Term Debt	44.964%	5.473%	2.461%
Preferred Stock	2.017%	5.189%	0.105%
Common Equity	52.224%	9.000%	4.700%
Total	100.00%		7.308%

The Impact of the 2003 Tax Legislation
On the Cost of Equity Capital

On May 28, 2003, President Bush signed the *Jobs and Growth Tax Relief Reconciliation Act of 2003.* The primary purpose of this legislation was to reduce taxes to enhance economic growth. A primary component of the new tax law was a significant reduction in the taxation of corporate dividends for individuals. Dividends have been described as "double-taxed." First, corporations pay taxes on the income they earn before they pay dividends to investors, then investors pay taxes on the dividends that they receive from corporations. One of the implications of the double taxation of dividends is that, all else equal, it results in a high cost of raising capital for corporations.

The new tax legislation reduces the double taxation of dividends by lowering the tax rate on dividends from the 30 percent range (the average tax bracket for individuals) to 15 percent. This reduction in the taxation of dividends for individuals enhances their after-tax returns and thereby reduces their pre-tax required returns. This reduction in pre-tax required returns (due to the lower tax on dividends) effectively reduces the cost of equity capital for companies. The new tax law also reduced the tax rate on long-term capital gains from 20% to 15%.

To demonstrate the effect of the new legislation, assume that a utility has a 10% expected return – 5.0% in dividends and 5.0% in capital gains. The new tax law reduces the double-taxation by reducing the tax rate on dividends from the 30 percent range (the marginal tax bracket for the average individual taxpayer) to 15 percent. The table below

illustrates the effect of the new tax law. Panel A shows that under the old tax law a 10.0% pre-tax return provided for a 7.5% after tax return. Panel B shows that under the new tax law, with tax rates of 15% on both dividends and capital gains, the 10% pre-tax return is worth 8.5% on an after-tax basis. In Panel C, I have held the after-tax return constant (at 7.5%) to illustrate the effect of the new tax law on required pre-tax returns. Assuming that the entire after-tax 1% return difference (7.5% to 8.5%) is attributed to the lower taxation of dividends, the 10.0% pre-tax return under the new law is now only 8.82%. In other words, to generate an after-tax return of 7.5%, the new tax law reduced the required pre-tax return from 10.0% to 8.82%.

The Impact of the New Tax Law on Pre- and After- Tax Returns

Panel A
Old Tax Law
10% Pre-Tax Return - 5% Dividend Yield & 5% Capital Gain
Tax Rates - Dividends 30% & Capital Gains 20%

	Pre-Tax Return	Tax Rate	After-Tax Return
Dividends	5.00%	30.00%	3.50%
Capital Gain	5.00%	20.00%	4.00%
Total	10.00%		7.50%

Panel B
New Tax Law
10% Pre-Tax Return - 5% Dividend Yield & 5% Capital Gain
Tax Rates - Dividends 15% & Capital Gains 15%

	Pre-Tax Return	Tax Rate	After-Tax Return
Dividends	5.00%	15.00%	4.25%
Capital Gain	5.00%	15.00%	4.25%
Total	10.00%		8.50%

Panel C
The Effect of the New Tax Law on Pre-Tax Returns
7.50% After-Tax Return - 3.25% Dividend Yield & 4.25% Capital Gain
Tax Rates - Dividends 15% & Capital Gains 15%

	Pre-Tax Return	Tax Rate	After-Tax Return
Dividends	3.82%	15.00%	3.25%
Capital Gain	5.00%	15.00%	4.25%
Total	8.82%		7.50%

Exhibit_(JRW-3)
Union Electric Company
Electric Utility Proxy Group
Summary Financial Statistics

Company		S&P Bond Rating	Operating Revenue ($mil)	Percent Electric Revenue	Net Plant ($mil)	Pre-Tax Interest Coverage	Primary Service Area	Common Equity Ratio*	Return on Equity	Price/ Earnings Ratio	Market to Book Ratio
Alliant Energy Co.	LNT	A-	3,408.7	71%	4,490.1	5.6	WI	54.0%	4.6%	39.6	179
Ameren	AEE	BBB	6,919.0	79%	13,920.0	4.0	MO, IL	50.0%	8.2%	22.4	175
American Elec. Pwr.	AEP	BBB	12,399.0	95%	25,398.0	3.5	TX, OH,WV	44.0%	11.7%	15.5	171
Con. Edison	ED	A-	12,355.0	64%	20,468.0	3.4	NY	46.0%	10.2%	15.8	159
Dominion Resources	D	BBB-	18,172.0	31%	29,519.0	3.4	WV,OH,PA	39.0%	8.5%	28.4	229
DTE Energy Co.	DTE	BBB-	9,302.0	57%	11,058.0	2.4	MI	40.0%	10.6%	16.0	141
Duke Energy	DUK	BBB	13,318.0	47%	40,895.0	3.5	NC, SC,OH,IN	54.0%	10.8%	15.2	153
Empire District	EDE	BBB+	402.1	93%	985.2	2.8	MO, KS	47.0%	7.1%	20.6	155
Energy East Copr.	EAS	BBB+	5,388.7	56%	5,791.9	2.8	NY	42.0%	8.8%	14.8	127
Entergy	ETR	BBB-	10,978.7	81%	19,308.0	4.3	TX,MS,AR,AL	47.0%	11.6%	19.2	216
FirstEnergy	FE	BBB	12,109.8	80%	14,420.0	4.0	OH,PA, NJ	44.0%	11.9%	18.0	204
Great Plains Energy	GXP	BBB	2,629.5	44%	2,918.6	3.8	KS,MO	51.0%	12.5%	15.8	85
Hawaiian Electric	HE	BBB	2,400.6	83%	2,320.6	3.8	HI	28.0%	11.1%	16.8	187
IDACORP	IDA	A-	976.1	98%	2,351.7	2.7	ID	49.0%	7.7%	21.8	160
MDU Resources	MDU	A-	3,870.1	5%	3,271.1	7.7	ND,MT,SD,WY,NM	58.0%	15.0%	16.3	318
NiSource Inc.	NI	BBB	8,141.3	16%	9,147.3	2.1	US, Can	45.0%	5.3%	23.8	128
Northeast Utilities	NU	BBB	7,399.5	71%	5,887.0	1.5	NH, MA	42.0%	NM	NM	158
NSTAR	NST	A+	3,490.4	79%	3,829.9	2.9	MA	34.0%	13.8%	18.2	244
OGE Energy	OGE	BBB+	5,378.7	34%	3,696.9	4.6	AR,OK	51.0%	17.9%	16.5	230
Otter Tail Corp.	OTTR	BBB+	1,116.6	29%	712.0	6.3	MN,ND,SD	59.0%	12.2%	15.6	186
Pepco Holdings	POM	BBB+	8,417.1	79%	7,431.2	2.6	MD, DE, VA	38.0%	10.3%	13.3	136
Pinnacle West	PNW	BBB-	3,242.5	75%	7,745.2	2.6	AZ	52.0%	7.1%	35.1	144
PNM Resources	PNM	BBB	2,446.1	78%	3,637.2	2.8	NM	34.0%	6.0%	25.3	150
PPL Corp.	PPL	BBB+	6,566.0	68%	11,233.0	3.4	PA	40.0%	18.9%	15.0	263
Progress Energy	PGN	BBB	10,607.0	80%	14,707.0	2.2	Nc, SC,FL	42.0%	8.5%	17.1	146
Puget Energy, Inc.	PSD	BBB	2,773.4	61%	4,815.9	2.3	WA	43.0%	8.3%	15.5	132
SCANA Corp.	SCG	A-	4,952.0	39%	6,911.0	2.9	SC	44.0%	12.1%	14.4	167
Sempra Energy	SRE	A+	12,608.0	43%	12,385.0	4.4	CA	57.0%	16.1%	13.8	204
Southern Co.	SO	A	14,320.8	98%	29,961.5	3.8	GA, FL,AL,MS	42.0%	14.2%	17.4	245
TXU Corp.	TXU	BBB-	10,881.0	22%	17,524.0	5.7	TX	4.0%	NM	8.5	NM
Vectren Corp.	VVC	A	2,116.6	20%	2,305.5	3.2	OH,IN	42.0%	11.4%	4.8	188
Wisconsin Energy	WEC	A-	3,993.7	62%	6,677.9	3.3	WI,MI	42.0%	11.9%	16.7	192
WPS Resources	WPS	A-	7,690.1	14%	2,276.5	6.1	WI	44.0%	12.1%	12.5	166
Xcel Energy Inc.	XEL	A-	10,130.3	75%	15,086.3	2.5	MN,WI,MD,SD	43.0%	10.0%	16.4	190
Mean			**7,085.3**	**60%**	**10,679.0**	**3.6**		**43.9%**	**10.8%**	**18.1**	**179.9**
Median			**6,919.0**	**64%**	**7,431.2**	**3.4**		**44.0%**	**10.8%**	**16.5**	**173.0**

Data Source: AUS *Utility Reports*, November, 2006; *Value Line Investment Survey* - 2006

Exhibit_(JRW-4)

Union Electric Company

Capital Structure Ratios

Union Proposed Capital Structure

Type of Capital	Ratios	Cost Rate
Short-Term Debt	0.795%	5.360%
Long-Term Debt	44.964%	5.473%
Preferred Stock	2.017%	5.189%
Common Equity	52.224%	
Total	100.00%	

Capital Structure - Electric Utility Proxy Group

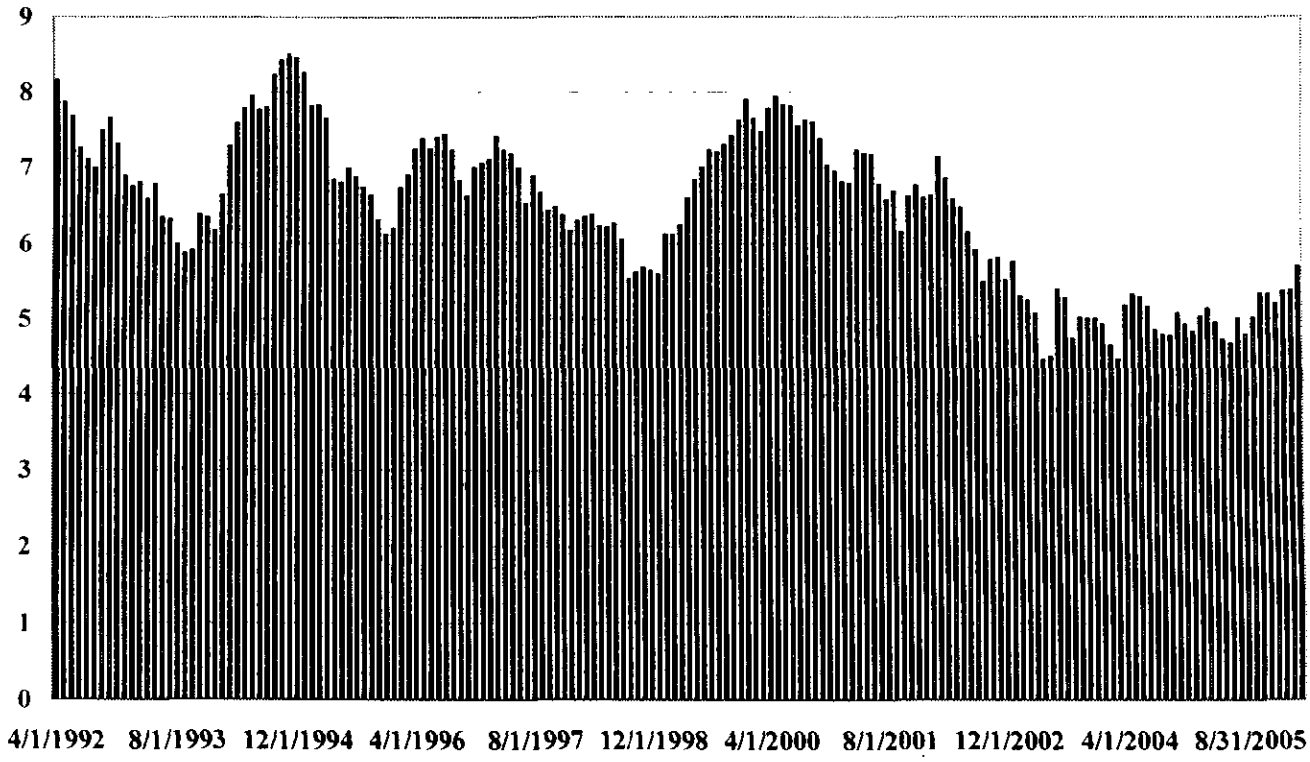
Average Of All Companies Ratios	2006 2th Quarter	2006 1st Quarter	2005 4th Quarter	2005 3rd Quarter
Long-Term Debt	49.96%	50.51%	51.20%	50.89%
Preferred Stock	1.03%	1.24%	1.03%	1.06%
Common Equity	49.01%	48.25%	47.77%	48.05%
Totals	100.00%	100.00%	100.00%	100.00%

Data Source: Bloomberg

Average Ratios - Last Four Quarters	
Long-Term Debt	50.64%
Preferred Stock	1.09%
Common Equity	48.27%
Totals	100.00%

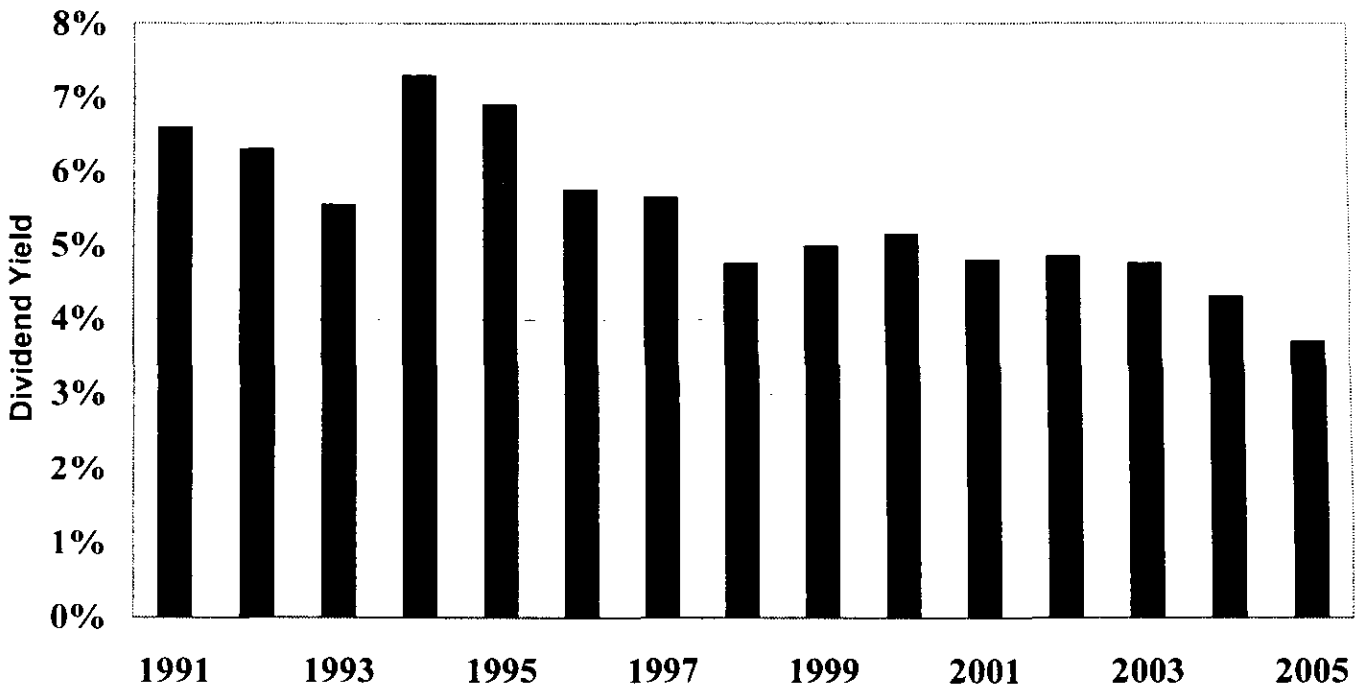
Exhibit_(JRW-5)

Long-Term 'A' Rated Public Utility Bonds



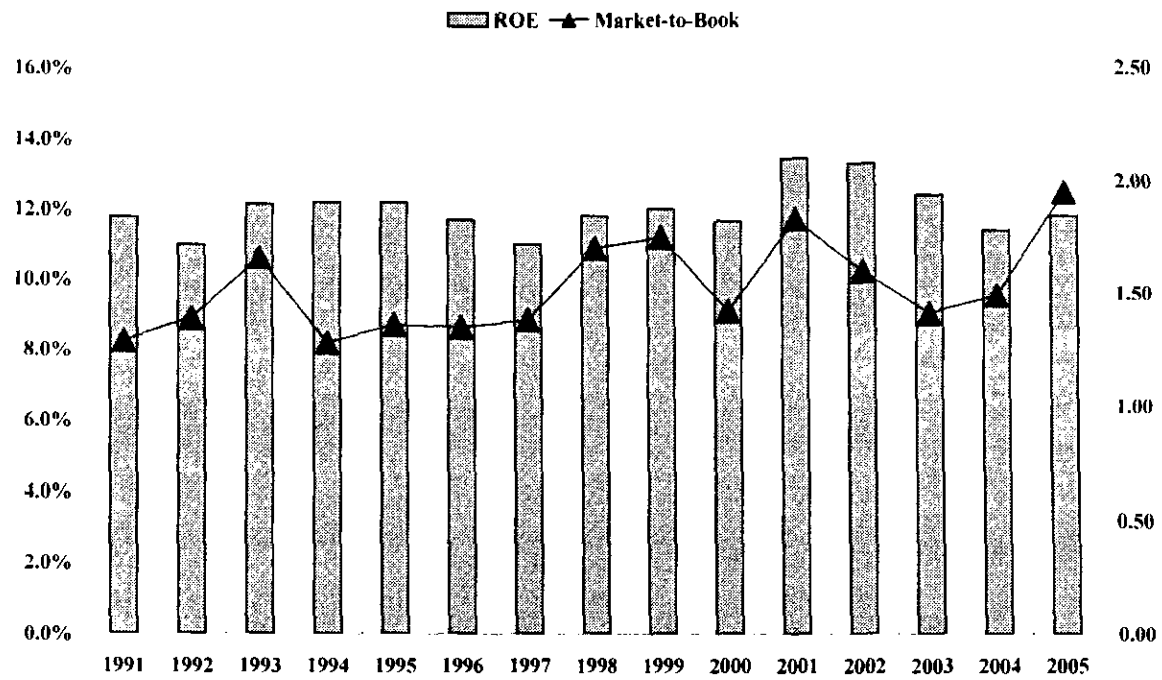
Data Source: Bloomberg (FMCI Function).

Exhibit_(JRW-5)
Dow Jones Utilities Dividend Yield



Data Source: *Value Line Investment Survey*

Exhibit_(JRW-5)
Dow Jones Utilities - Market to Book and ROE



Data Source: *Value Line Investment Survey*

Exhibit_(JRW-6)

Industry Average Betas

Industry Name	Number of Firms	Beta	Industry Name	Number of Firms	Beta	Industry Name	Number of Firms	Beta
E-Commerce	59	3.04	Manuf. Housing/RV	16	1.08	Paper/Forest Products	40	0.82
Semiconductor	121	2.97	Retail (Special Lines)	177	1.08	Hotel/Gaming	76	0.82
Semiconductor Equip	14	2.91	Medical Supplies	261	1.04	Diversified Co.	118	0.82
Internet	306	2.78	Foreign Electronics	11	1.03	Toiletries/Cosmetics	20	0.82
Telecom. Equipment	122	2.61	Metals & Mining (Div.)	77	1.03	Packaging & Container	37	0.82
Wireless Networking	66	2.60	Chemical (Basic)	18	1.03	Electric Util. (Central)	25	0.81
Entertainment Tech	32	2.47	Oilfield Svcs/Equip.	98	1.02	Pharmacy Services	15	0.81
Power	25	2.23	Shoe	22	1.02	Electric Utility (East)	29	0.80
Computers/Peripherals	138	2.23	Retail Store	46	0.99	Household Products	26	0.79
Computer Software/Svcs	395	2.06	Retail Automotive	14	0.98	Bank (Canadian)	7	0.76
Foreign Telecom.	20	1.88	Industrial Services	207	0.97	Environmental	91	0.76
Cable TV	22	1.82	Medical Services	184	0.96	Financial Svcs. (Div.)	244	0.75
Precision Instrument	104	1.81	Building Materials	45	0.96	Bank (Midwest)	39	0.75
Telecom. Services	146	1.69	Natural Gas (Div.)	36	0.96	Publishing	47	0.74
Electronics	175	1.65	Utility (Foreign)	5	0.95	Insurance (Life)	43	0.73
Biotechnology	87	1.63	Steel (General)	26	0.94	Investment Co.	21	0.73
Electrical Equipment	91	1.59	Homebuilding	34	0.92	Railroad	18	0.73
Drug	306	1.59	Coal	12	0.92	Maritime	39	0.72
Advertising	34	1.56	Furn/Home Furnishings	36	0.92	Canadian Energy	11	0.72
Bank (Foreign)	4	1.51	Electric Utility (West)	15	0.90	Cement & Aggregates	12	0.71
Entertainment	86	1.47	Chemical (Specialty)	92	0.90	Natural Gas (Distrib.)	29	0.70
Air Transport	45	1.40	Apparel	60	0.90	Insurance (Prop/Cas.)	84	0.70
Healthcare Information	35	1.38	Petroleum (Integrated)	30	0.90	Restaurant	82	0.68
Securities Brokerage	31	1.36	Retail Building Supply	10	0.89	R.E.I.T.	122	0.67
Human Resources	30	1.26	Metal Fabricating	41	0.88	Petroleum (Producing)	148	0.67
Investment Co.(Foreign)	15	1.26	Trucking	37	0.88	Precious Metals	62	0.67
Auto & Truck	29	1.23	Information Services	36	0.86	Tobacco	11	0.66
Auto Parts	58	1.22	Home Appliance	15	0.86	Water Utility	16	0.64
Tire & Rubber	13	1.19	Grocery	23	0.86	Food Processing	110	0.61
Steel (Integrated)	14	1.14	Newspaper	19	0.86	Beverage (Soft Drink)	19	0.61
Office Equip/Supplies	27	1.10	Aerospace/Defense	70	0.84	Food Wholesalers	21	0.60
Educational Services	38	1.09	Chemical (Diversified)	33	0.84	Beverage (Alcoholic)	22	0.56
Recreation	74	1.08	Machinery	134	0.83	Bank	487	0.55
						Thrift	221	0.49
						Market	**7113**	**1.15**

Data Source: http://pages.stern.nyu.edu/~adamodar/

Exhibit_(JRW-7)

Union Electric Company
Discounted Cash Flow Analysis

Electric Utility Proxy Group

Dividend Yield*	3.90%
Adjustment Factor	1.025
Adjusted Dividend Yield	4.00%
Growth Rate**	5.00%
Equity Cost Rate	9.00%

* Page 2 of Exhibit_(JRW-7)

** Based on data provided on pages 3-5, Exhibit_(JRW-7)

Exhibit_(JRW-7)

Union Electric Company
Monthly Dividend Yields
July - December 2006

Electric Utility Proxy Group

Company	July	Aug	Sep	Oct	Nov	Dec	Mean
Alliant Energy Co.	3.40%	3.40%	3.30%	3.20%	3.00%	2.90%	**3.2%**
Ameren	5.10%	5.10%	4.90%	4.80%	4.70%	4.70%	**4.9%**
American Elec. Pwr.	4.40%	4.40%	4.10%	4.10%	3.60%	3.80%	**4.1%**
Con. Edison	5.20%	5.20%	5.10%	5.00%	4.80%	4.80%	**5.0%**
Dominion Resources	3.80%	3.80%	3.50%	3.60%	3.50%	3.40%	**3.6%**
DTE Energy Co.	5.10%	5.10%	5.00%	5.10%	4.60%	4.40%	**4.9%**
Duke Energy	4.30%	4.30%	4.10%	4.10%	4.00%	3.90%	**4.1%**
Empire District	6.20%	6.20%	5.60%	5.70%	5.40%	5.30%	**5.7%**
Energy East Copr.	4.90%	4.90%	4.60%	4.90%	4.90%	4.90%	**4.9%**
Entergy	3.10%	3.10%	2.80%	2.80%	2.50%	2.40%	**2.8%**
FirstEnergy	3.40%	3.40%	3.20%	3.20%	3.10%	3.10%	**3.2%**
Great Plains Energy	6.00%	6.00%	5.50%	5.40%	5.20%	5.10%	**5.5%**
Hawaiian Electric	4.60%	4.60%	4.60%	4.60%	4.50%	4.60%	**4.6%**
IDACORP	3.60%	3.60%	3.20%	3.20%	3.10%	3.00%	**3.3%**
MDU Resources	2.20%	2.20%	2.10%	2.30%	2.30%	2.10%	**2.2%**
NiSource Inc.	4.30%	4.30%	4.30%	4.30%	4.00%	3.90%	**4.2%**
Northeast Utilities	3.70%	3.70%	3.30%	3.20%	3.10%	2.80%	**3.3%**
NSTAR	4.40%	4.40%	3.80%	3.70%	3.50%	3.50%	**3.9%**
OGE Energy	4.10%	4.10%	3.70%	3.80%	3.50%	3.40%	**3.8%**
Otter Tail Corp.	4.40%	4.40%	3.90%	3.80%	3.90%	3.70%	**4.0%**
Pepco Holdings	4.60%	4.60%	4.20%	4.30%	4.10%	4.10%	**4.3%**
Pinnacle West	5.10%	5.10%	4.50%	4.50%	4.20%	4.40%	**4.6%**
PNM Resources	3.40%	3.40%	3.10%	3.10%	3.10%	2.90%	**3.2%**
PPL Corp.	3.50%	3.50%	3.20%	3.30%	3.20%	3.20%	**3.3%**
Progress Energy	5.70%	5.70%	5.50%	5.60%	5.30%	5.10%	**5.5%**
Puget Energy, Inc.	4.80%	4.80%	4.50%	4.50%	4.20%	4.10%	**4.5%**
SCANA Corp.	4.50%	4.50%	4.10%	4.20%	4.00%	4.00%	**4.2%**
Sempra Energy	2.70%	2.70%	2.50%	2.40%	2.20%	2.20%	**2.5%**
Southern Co.	4.80%	4.80%	4.60%	4.50%	4.30%	4.30%	**4.6%**
TXU Corp.	2.90%	2.90%	4.90%	4.80%	4.60%	4.60%	**4.1%**
Vectren Corp.	4.70%	4.70%	4.50%	4.70%	4.30%	4.40%	**4.6%**
Wisconsin Energy	2.30%	2.30%	2.20%	2.20%	2.20%	2.00%	**2.2%**
WPS Resources	4.70%	4.70%	4.50%	4.50%	4.40%	4.30%	**4.5%**
Xcel Energy Inc.	4.60%	4.60%	4.30%	4.30%	4.10%	3.90%	**4.3%**
Mean	4.25%	4.25%	4.04%	4.05%	3.86%	3.80%	**4.0%**

Data Source *AUS Utility Reports*, monthly issues.

Exhibit_(JRW-7)

Union Electric Company

DCF Equity Cost Growth Rate Measures

Value Line Historic Growth Rates

Electric Utility Proxy Group

Company	Sym	*Value Line* Historic Growth					
		Past 10 Years			Past 5 Years		
		Earnings	Dividends	Book Value	Earnings	Dividends	Book Value
Alliant Energy Co.	LNT	-1.50%	-6.00%	1.00%	-1.00%	-12.50%	-2.50%
Ameren	AEE	0.50%	0.50%	3.00%	0.50%	--	5.00%
American Elec. Pwr.	AEP	-0.50%	-4.50%	-0.50%	3.50%	-9.00%	-3.50%
Con. Edison	ED	-0.50%	1.50%	2.50%	-2.00%	1.00%	2.50%
Dominion Resources	D	3.00%	0.50%	2.00%	9.00%	0.50%	3.50%
DTE Energy Co.	DTE	-0.50%	--	3.50%	-2.00%	--	3.50%
Duke Energy	DUK	-1.00%	1.50%	4.00%	-6.50%	0.50%	6.00%
Empire District	EDE	-1.50%	--	2.00%	-0.50%	--	2.00%
Energy East Copr.	EAS	3.50%	1.50%	4.50%	-2.50%	5.00%	6.00%
Entergy	ETR	6.50%	0.50%	3.00%	10.00%	7.50%	4.50%
FirstEnergy	FE	2.00%	1.50%	5.50%	--	2.50%	6.00%
Great Plains Energy	GXP	3.00%	1.00%	0.50%	6.00%	--	1.00%
Hawaiian Electric	HE	1.50%	0.50%	2.00%	1.00%	--	3.00%
IDACORP	IDA	-2.50%	-3.00%	2.50%	-11.00%	-6.00%	3.00%
MDU Resources	MDU	12.00%	4.00%	10.50%	12.50%	5.00%	12.50%
NiSource Inc.	NI	1.50%	3.00%	7.50%	--	1.00%	7.00%
Northeast Utilities	NU	-6.50%	-10.00%	-0.50%	--	30.50%	3.00%
NSTAR	NST	4.50%	1.50%	3.00%	4.00%	1.00%	2.00%
OGE Energy	OGE	2.00%	--	2.50%	-2.00%	--	1.50%
Otter Tail Corp.	OTTR	3.50%	2.50%	6.50%	2.00%	2.00%	7.50%
Pepco Holdings	POM	--	--	--	-1.00%	--	0.50%
Pinnacle West	PNW	2.00%	11.00%	5.00%	-4.50%	6.50%	4.00%
PNM Resources	PNM	4.00%	--	6.00%	-1.00%	5.00%	4.50%
PPL Corp.	PPL	7.00%	--	3.00%	8.80%	8.50%	12.00%
Progress Energy	PGN	3.50%	3.00%	6.50%	4.50%	3.00%	6.50%
Puget Energy, Inc.	PSD	-3.50%	-6.00%	-1.00%	-7.58%	-11.50%	0.50%
SCANA Corp.	SCG	4.00%	0.50%	4.00%	7.00%	2.00%	3.00%
Sempra Energy	SRE	6.50%	-3.50%	5.00%	16.00%	-5.00%	10.50%
Southern Co.	SO	2.50%	2.00%	1.00%	2.00%	1.00%	-1.00%
TXU Corp.	TXU	-1.50%	-8.50%	-12.00%	-4.50%	-12.00%	-24.00%
Vectren Corp.	VVC	--	--	--	4.00%	3.50%	4.50%
Wisconsin Energy	WEC	1.50%	-5.00%	3.00%	7.50%	-11.00%	5.00%
WPS Resources	WPS	4.50%	2.00%	4.50%	11.00%	2.00%	8.50%
Xcel Energy Inc.	XEL	-3.50%	-5.00%	-1.00%	-5.50%	-11.00%	-4.50%
Mean		**1.8%**	**-0.5%**	**2.8%**	**1.9%**	**0.4%**	**3.0%**
Median		**2.0%**	**0.5%**	**3.0%**	**1.0%**	**1.0%**	**3.5%**
		Average of Mean and Median Figures =			**1.7%**		

Data Source: *Value Line Investment Survey, September, 2006.*

Exhibit_(JRW-7)

Union Electric Company
DCF Equity Cost Growth Rate Measures
Value Line Projected Growth Rates

Electric Utility Proxy Group

Company	Sym	*Value Line* Projected Growth Est'd. '03-'05 to '09-'11			*Value Line* Internal Growth		
		Earnings	Dividends	Book Value	Return on Equity	Retention Rate	Internal Growth
Alliant Energy Co.	LNT	4.50%	6.00%	4.50%	9.00%	39.00%	3.51%
Ameren	AEE	1.50%	0.00%	3.00%	9.50%	23.00%	2.19%
American Elec. Pwr.	AEP	5.00%	4.00%	6.00%	11.50%	45.00%	5.18%
Con. Edison	ED	2.00%	1.00%	2.50%	9.00%	21.00%	1.89%
Dominion Resources	D	16.00%	3.50%	10.00%	16.00%	65.00%	10.40%
DTE Energy Co.	DTE	3.00%	0.50%	1.50%	10.00%	40.00%	4.00%
Duke Energy	DUK	9.50%	5.00%	5.50%	9.50%	30.00%	2.85%
Empire District	EDE	9.50%	0.00%	2.50%	10.50%	29.00%	3.05%
Energy East Copr.	EAS	4.00%	5.00%	2.50%	9.00%	28.00%	2.52%
Entergy	ETR	5.00%	6.00%	5.50%	10.00%	49.00%	4.90%
FirstEnergy	FE	12.50%	5.50%	6.50%	12.50%	50.00%	6.25%
Great Plains Energy	GXP	-0.50%	0.00%	5.00%	11.00%	25.00%	2.75%
Hawaiian Electric	HE	3.00%	0.00%	2.50%	10.50%	32.00%	3.36%
IDACORP	IDA	7.50%	-2.00%	4.50%	8.00%	50.00%	4.00%
MDU Resources	MDU	8.00%	7.00%	10.50%	11.50%	66.00%	7.59%
NiSource Inc.	NI	3.50%	0.50%	3.00%	8.00%	41.00%	3.28%
Northeast Utilities	NU	8.50%	6.50%	1.50%	8.50%	44.00%	3.74%
NSTAR	NST	7.50%	8.00%	6.00%	15.00%	42.00%	6.30%
OGE Energy	OGE	4.00%	2.00%	6.00%	11.00%	37.00%	4.07%
Otter Tail Corp.	OTTR	4.00%	3.00%	4.50%	10.00%	31.00%	3.10%
Pepco Holdings	POM	8.00%	3.00%	3.00%	10.50%	46.00%	4.83%
Pinnacle West	PNW	7.00%	5.00%	4.00%	9.00%	35.00%	3.15%
PNM Resources	PNM	6.00%	8.50%	5.50%	8.00%	45.00%	3.60%
PPL Corp.	PPL	11.00%	13.50%	8.00%	21.00%	49.00%	10.29%
Progress Energy	PGN	-1.50%	2.00%	3.00%	8.50%	12.00%	1.02%
Puget Energy, Inc.	PSD	5.00%	1.50%	4.00%	8.50%	40.00%	3.40%
SCANA Corp.	SCG	3.50%	4.50%	5.00%	11.00%	39.00%	4.29%
Sempra Energy	SRE	5.50%	4.50%	12.00%	12.00%	71.00%	8.52%
Southern Co.	SO	3.50%	4.00%	5.00%	14.00%	30.00%	4.20%
TXU Corp.	TXU	33.00%	32.00%	28.00%	40.50%	52.00%	21.06%
Vectren Corp.	VVC	1.50%	2.00%	3.00%	10.00%	25.00%	2.50%
Wisconsin Energy	WEC	6.50%	4.50%	6.00%	11.00%	66.00%	7.26%
WPS Resources	WPS	2.00%	1.50%	6.00%	9.50%	41.00%	3.90%
Xcel Energy Inc.	XEL	6.00%	5.50%	3.50%	11.00%	37.00%	4.07%
Mean		**6.3%**	**4.5%**	**5.6%**	**11.6%**	**40.44%**	**4.9%**
Median		**5.0%**	**4.0%**	**4.8%**	**10.3%**	**40.00%**	**3.9%**
Average of Mean and Median Figures =			**5.0%**		**11.8%**	**Average =**	**4.4%**

Data Source: ***Value Line Investment Survey, September, 2006***

Exhibit_(JRW-7)

Union Electric Company
DCF Equity Cost Growth Rate Measures
Analysts Projected EPS Growth Rate Estimates

Electric Utility Proxy Group

Company	Sym	Yahoo First Call	Reuters	Zack's	Average
Alliant Energy Co.	LNT	5.00%	--	4.00%	4.50%
Ameren	AEE	4.00%	--	6.10%	5.05%
American Elec. Pwr.	AEP	4.00%	4.27%	3.90%	4.06%
Con. Edison	ED	3.00%	3.51%	3.60%	3.37%
Dominion Resources	D	12.00%	11.50%	9.60%	11.03%
DTE Energy Co.	DTE	4.50%	6.00%	4.50%	5.00%
Duke Energy	DUK	5.00%	--	5.90%	5.45%
Empire District	EDE	6.00%	6.00%	--	6.00%
Energy East Copr.	EAS	4.00%	--	4.50%	4.25%
Entergy	ETR	8.00%	8.50%	8.50%	8.33%
FirstEnergy	FE	5.00%	6.17%	5.70%	5.62%
Great Plains Energy	GXP	2.00%	--	3.50%	2.75%
Hawaiian Electric	HE	3.00%	4.63%	6.50%	4.71%
IDACORP	IDA	5.00%	4.67%	4.70%	4.79%
MDU Resources	MDU	7.00%	6.97%	8.00%	7.32%
NiSource Inc.	NI	3.50%	3.43%	3.30%	3.41%
Northeast Utilities	NU	12.00%	9.20%	10.50%	10.57%
NSTAR	NST	7.00%	5.50%	5.80%	6.10%
OGE Energy	OGE	6.20%	--	5.00%	5.60%
Otter Tail Corp.	OTTR	5.50%	4.33%	5.00%	4.94%
Pepco Holdings	POM	4.00%	5.50%	4.80%	4.77%
Pinnacle West	PNW	6.00%	6.10%	6.80%	6.30%
PNM Resources	PNM	12.00%	11.45%	8.30%	10.58%
PPL Corp.	PPL	10.50%	10.33%	9.20%	10.01%
Progress Energy	PGN	4.00%	3.66%	3.70%	3.79%
Puget Energy, Inc.	PSD	4.00%	4.67%	7.00%	5.22%
SCANA Corp.	SCG	4.50%	4.35%	4.70%	4.52%
Sempra Energy	SRE	4.30%	6.44%	5.40%	5.38%
Southern Co.	SO	5.00%	4.70%	4.70%	4.80%
TXU Corp.	TXU	13.50%	12.33%	10.00%	11.94%
Vectren Corp.	VVC	3.50%	4.00%	4.00%	3.83%
Wisconsin Energy	WEC	8.00%	7.66%	7.40%	7.69%
WPS Resources	WPS	4.50%	--	4.50%	4.50%
Xcel Energy Inc.	XEL	5.50%	5.14%	4.30%	4.98%
Mean		5.91%	6.33%	5.86%	5.9%
Median		5.00%	5.50%	5.00%	5.0%

Data Sources: www.zacks.com, www.investor.reuters.com, http://quote.yahoo.com. Nov 28*h*

Exhibit_(JRW-8)

Union Electric Company
Capital Asset Pricing Model

Electric Utility Proxy Group

Risk-Free Interest Rate	**4.75%**
Beta*	**0.89**
Ex Ante Equity Risk Premium**	**4.20%**
CAPM Cost of Equity	**8.5%**

* See page 2 of Exhibit_(JRW-8)

** See page 3 of Exhibit_(JRW-8)

Exhibit_(JRW-8)

Union Electric Company
Beta

Electric Utility Proxy Group

Company		Beta
Alliant Energy Co.	LNT	0.90
Ameren	AEE	0.75
American Elec. Pwr.	AEP	1.25
Con. Edison	ED	0.75
Dominion Resources	D	1.00
DTE Energy Co.	DTE	0.75
Duke Energy	DUK	1.30
Empire District	EDE	0.80
Energy East Copr.	EAS	0.90
Entergy	ETR	0.85
FirstEnergy	FE	0.80
Great Plains Energy	GXP	0.90
Hawaiian Electric	HE	0.70
IDACORP	IDA	1.00
MDU Resources	MDU	1.00
NiSource Inc.	NI	0.90
Northeast Utilities	NU	0.90
NSTAR	NST	0.80
OGE Energy	OGE	0.75
Otter Tail Corp.	OTTR	0.65
Pepco Holdings	POM	0.90
Pinnacle West	PNW	1.00
PNM Resources	PNM	1.00
PPL Corp.	PPL	0.95
Progress Energy	PGN	0.90
Puget Energy, Inc.	PSD	0.80
SCANA Corp.	SCG	0.85
Sempra Energy	SRE	1.10
Southern Co.	SO	0.70
TXU Corp.	TXU	1.10
Vectren Corp.	VVC	0.85
Wisconsin Energy	WEC	0.80
WPS Resources	WPS	0.80
Xcel Energy Inc.	XEL	0.90
Mean		0.89

Data Source: *Value Line Investment Survey, September , 2006.*

Exhibit_(JRW-8)

Union Electric Company
Capital Asset Pricing Model
Equity Risk Premium

Category	Study Authors		Range Low	Range High	Mean of Range	Mean	Category Average
Historic							
	Ibbotson	Arithmetic			6.50%	5.70%	
		Geometric			4.90%		
	AVERAGE						5.70%
Puzzle Research							
	Claus Thomas					3.00%	
	Arnott and Bernstein					2.40%	
	Constantinides					6.90%	
	Cornell		3.50%	7.00%	5.25%		
	Dimson, Marsh, and Staunton	Arithmetic	2.50%	4.00%	3.81%	4.35%	
		Geometric	3.50%	5.25%			
	Fama French		2.55%	4.32%		3.44%	
	Harris & Marston					7.14%	
	Siegel	Geometric				2.50%	
	AVERAGE						4.25%
Surveys							
	Survey of Financial Forecasters					2.00%	
	Graham and Harvey - CFOs					3.80%	
	Welch - Academics		5.00%	5.50%		5.25%	
	AVERAGE						3.68%
Social Security							
	Office of Chief Actuary		4.00%	4.70%			
	John Campbell		2.00%	3.50%			
	Peter Diamond		3.00%	4.80%			
	John Shoven		3.00%	3.50%		3.56%	
	AVERAGE						3.56%
Building Block							
	Ibbotson and Peng						
		Arithmetic			6.00%	5.00%	
		Geometric			4.00%		
	Woolridge					3.55%	
	AVERAGE						4.28%
Other Studies							
	McKinsey		3.50%	4.00%		3.75%	
	AVERAGE						3.75%
OVERALL AVERAGE							**4.20%**

Sources

Ibbotson Associates, SBBI Yearbook, 2006

James Claus and Jacob Thomas, "Equity Risk Premia as Low as Three Percent? Empirical Evidence from Analysts' Earnings Forecasts for Domestic and International Stock Market," *Journal of Finance* (October 2001)

Eugene F. Fama and Kenneth R. French, "The Equity Premium," *The Journal of Finance* , April 2002

Elroy Dimson, Paul Marsh, and Mike Staunton, "New Evidence puts Risk Premium in Context," *Corporate Finance* (March 2003)

Ivo Welch, "The Equity Risk Premium Consensus Forecast Revisited," (September 2001) Cowles Foundation Discussion Paper No. 1325

John R. Graham and Campbell Harvey, "Expectations of Equity Risk Premia, Volatility, and Asymmetry," Duke University Working Paper, 2003

Federal Reserve Bank of Philadelphia, *Survey of Professional Forecasters*, February 13, 2006

Marc H. Goedhart, Timothy M. Koller, and Zane D. Williams, "The Real Cost of Equity," *McKinsey on Finance* (Autumn 2002), p. 14

Roger Ibbotson and Peng Chen, "Long Run Returns: Participating in the Real Economy," *Financial Analysts Journal* , January 2003

Exhibit_(JRW-8)

Survey of Professional Forecasters
Philadelphia Federal Reserve Bank
Long-Term Forecasts

TABLE FIVE
LONG-TERM (10 YEAR) FORECASTS

SERIES: CPI INFLATION RATE	
STATISTIC	
MINIMUM	1.750
LOWER QUARTILE	2.300
MEDIAN	2.500
UPPER QUARTILE	2.725
MAXIMUM	3.700
MEAN	2.512
STD. DEV.	0.354
N	49
MISSING	4

SERIES: REAL GDP GROWTH RATE	
STATISTIC	
MINIMUM	2.500
LOWER QUARTILE	3.000
MEDIAN	3.200
UPPER QUARTILE	3.400
MAXIMUM	4.250
MEAN	3.189
STD. DEV.	0.301
N	49
MISSING	4

SERIES: PRODUCTIVITY GROWTH	
STATISTIC	
MINIMUM	1.600
LOWER QUARTILE	2.170
MEDIAN	2.437
UPPER QUARTILE	2.600
MAXIMUM	3.500
MEAN	2.404
STD. DEV.	0.355
N	46
MISSING	7

SERIES: STOCK RETURNS (S&P 500)	
STATISTIC	
MINIMUM	5.000
LOWER QUARTILE	6.000
MEDIAN	7.000
UPPER QUARTILE	8.000
MAXIMUM	15.000
MEAN	7.340
STD. DEV.	1.800
N	41
MISSING	12

SERIES: BOND RETURNS (10-YEAR)	
STATISTIC	
MINIMUM	4.000
LOWER QUARTILE	4.842
MEDIAN	5.000
UPPER QUARTILE	5.500
MAXIMUM	7.200
MEAN	5.146
STD. DEV.	0.579
N	44
MISSING	9

SERIES: BILL RETURNS (3-MONTH)	
STATISTIC	
MINIMUM	2.800
LOWER QUARTILE	3.985
MEDIAN	4.250
UPPER QUARTILE	4.575
MAXIMUM	5.500
MEAN	4.200
STD. DEV.	0.631
N	44
MISSING	9

Source: Philadelphia Federal Researve Bank. Survey of Professional Forecasters. February 13, 2006.
http://www.phil.frb.org/files/spf/spfq106.pdf

Exhibit_(JRW-8)

Union Electric Company
CAPM
Real S&P 500 EPS Growth Rate

Year	S&P 500 EPS	Annual Inflation CPI	Inflation Adjustment Factor	Real S&P 500 EPS	
1960	3.10	1.40		3.10	
1961	3.37	0.70	1.01	3.35	
1962	3.67	1.30	1.02	3.59	
1963	4.13	1.60	1.04	3.99	
1964	4.76	1.00	1.05	4.55	
1965	5.30	1.90	1.07	4.97	
1966	5.41	3.50	1.10	4.90	
1967	5.46	3.00	1.14	4.80	
1968	5.72	4.70	1.19	4.81	
1969	6.10	6.20	1.26	4.83	10-Year
1970	5.51	5.60	1.34	4.13	2.89%
1971	5.57	3.30	1.38	4.04	
1972	6.17	3.40	1.43	4.33	
1973	7.96	8.70	1.55	5.13	
1974	9.35	12.30	1.74	5.37	
1975	7.71	6.90	1.86	4.14	
1976	9.75	4.90	1.95	4.99	
1977	10.87	6.70	2.08	5.22	
1978	11.64	9.00	2.27	5.13	
1979	14.55	13.30	2.57	5.66	10-Year
1980	14.99	12.50	2.89	5.18	2.30%
1981	15.18	8.90	3.15	4.82	
1982	13.82	3.80	3.27	4.23	
1983	13.29	3.80	3.40	3.91	
1984	16.84	3.90	3.53	4.77	
1985	15.68	3.80	3.66	4.28	
1986	14.43	1.10	3.70	3.90	
1987	16.04	4.40	3.87	4.15	
1988	22.77	4.40	4.04	5.64	
1989	24.03	4.60	4.22	5.69	10-Year
1990	21.73	6.10	4.48	4.85	-0.65%
1991	19.10	3.10	4.62	4.14	
1992	18.13	2.90	4.75	3.81	
1993	19.82	2.70	4.88	4.06	
1994	27.05	2.70	5.01	5.40	
1995	35.35	2.50	5.14	6.88	
1996	35.78	3.30	5.31	6.74	
1997	39.56	1.70	5.40	7.33	
1998	38.23	1.60	5.48	6.97	
1999	45.17	2.70	5.63	8.02	10-Year
2000	52.00	3.40	5.82	8.93	6.29%
2001	44.23	1.60	5.92	7.48	
2002	47.24	2.40	6.06	7.80	
2003	54.15	1.90	6.17	8.77	
2004	67.01	3.26	6.37	10.51	
2005	68.32	3.52	6.60	10.35	

Data Source: http://pages.stern.nyu.edu/~adamodar/

Real EPS Growth	2.71%