BEFORE THE

KENTUCKY PUBLIC SERVICE COMMISSION

IN THE MATTER OF:	)	
	)	
THE APPLICATION OF	)	
DELTA NATURAL GAS COMPANY, INC.	)	**CASE NO. 2007-00089**
TO INCREASE ITS GAS SERVICE RATES	)	

DIRECT TESTIMONY

OF

DR. J. RANDALL WOOLRIDGE

August 14, 2007

Delta Natural Gas Company, Inc.

Direct Testimony of
Dr. J. Randall Woolridge

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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 Office of Attorney General (OAG) to provide an opinion as to the overall fair rate of return or cost of capital for the Delta Natural Gas Company, Inc. ("Delta" or "Company").

Q. **PLEASE REVIEW YOUR COST OF CAPITAL RETURN FINDINGS.**

A. To arrive at an equity cost rate for the Company, I have applied the Discounted Cash Flow Model ("DCF") and the Capital Asset Pricing Model ("CAPM") to a group of gas distribution companies. I have established an equity cost rate of 9.0% for Delta. Utilizing my equity cost rate, capital structure ratios, and senior capital cost rates, I am

recommending an overall fair rate of return of 7.64% for Delta. This recommendation is summarized in Exhibit JRW-1.

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 that began in 2002, these yields had not been this low over an extended period of time since the 1960s. Long-term capital costs are also low due to the decline in the equity risk premium and the *Jobs and Growth Tax Relief Reconciliation Act of 2003* which reduced the tax rates on dividend income and capital gains.

In developing my recommendation, I have reviewed the testimony and recommendations of Delta witnesses Mr. John B. Brown and Mr. Martin J. Blake. The Company's recommended rate of return is too high due to an overstated equity cost rate.

Mr. Brown presents the Company's capital structure ratios and senior capital cost rates. I have adopted these ratios and cost rates. Mr. Blake has recommended an equity cost rate estimate of 12.1%, while my analysis indicates an equity cost rate of 9.0% is appropriate for Delta. We have both used DCF and CAPM approaches to estimating an equity cost rate for the Company. Mr. Blake has also used a Risk Premium study. We have both used the same proxy group of gas distribution companies.

Mr. Blake's equity cost rate recommendation of 12.1% is based primarily on his risk premium results. Nonetheless, there are three primary errors in Mr. Blake's equity cost rate analyses which serve to inflate his equity cost rate recommendation: (1) he makes an inappropriate market value – book value adjustment to his DCF results, (2) his CAPM equity cost rate includes excessive equity premium and size risk premiums, and (3) he employs an overstated equity risk premium in his RP study and does not account for the riskiness of Delta or the gas distribution business.

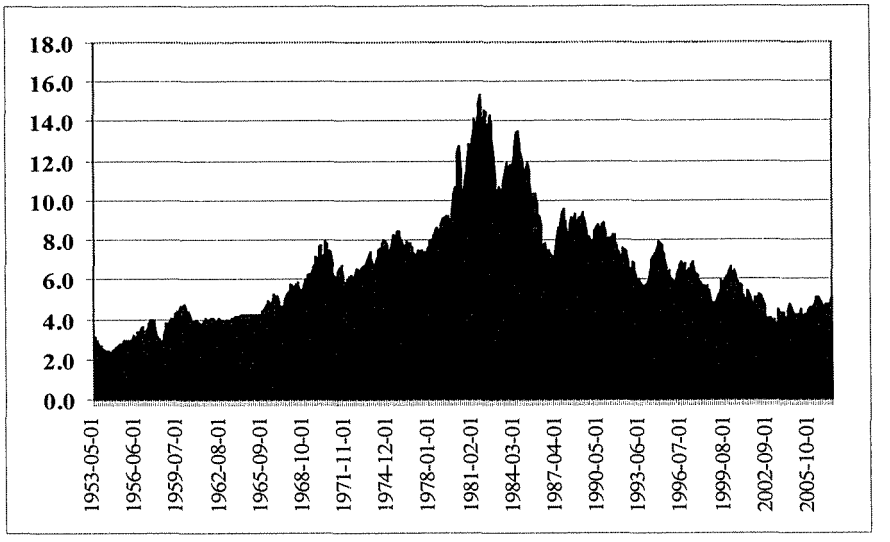
II. CAPITAL COSTS IN TODAY'S MARKETS

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 U.S. 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 in the graph below, prior to the decline in rates that began in the year 2000, the 10-year Treasury yield had not consistently been in the 4-5 percent range over an extended period of time since the 1960s.

Yields on Ten-Year Treasury Bonds

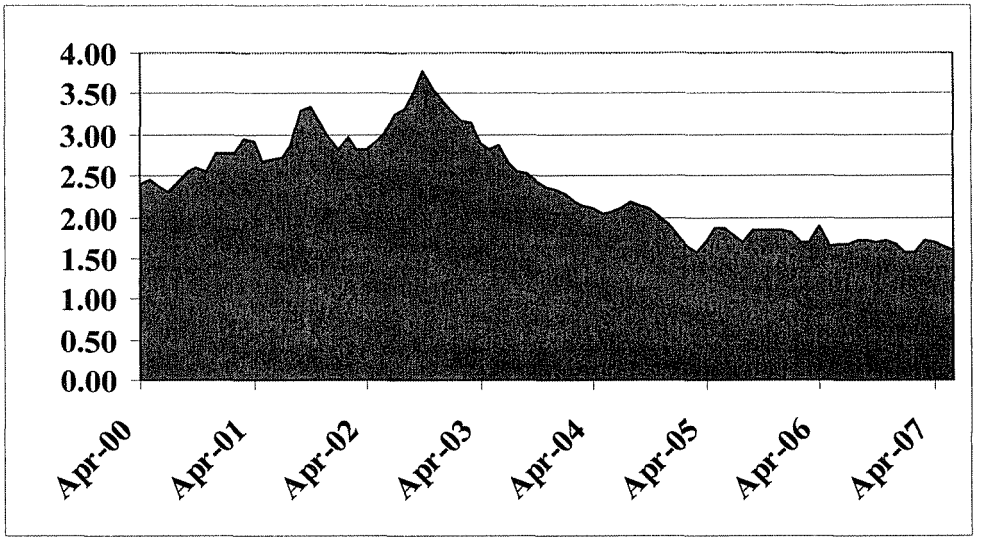
1953-Present



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 securities that are riskier than treasury bonds. 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-rated 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 Treasury 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:

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

> 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.

Numerous other academic studies, which are discussed later in my testimony, come to the same conclusion. 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.
>
> 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 federal 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 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

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

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.

III. COMPARISON GROUP SELECTION

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

A. To develop a fair rate of return recommendation for Delta, I evaluated the return requirements of investors on the common stock of a group of publicly-held natural gas distribution companies.

Q. PLEASE DESCRIBE YOUR GROUP OF GAS DISTRIBUTION COMPANIES.

A. I am using the group of gas distribution companies employed by Delta Witness Mr. Martin J. Blake. These companies include AGL Resources, Delta Natural Gas Company, EnergySouth, Inc., Energy West, Laclede Group, New Jersey Resources, Nicor, Northwest Natural Gas Co., Piedmont Natural Gas Company, South Jersey Industries, and WGL Holdings. Two companies, Peoples Energy and Cascade, have been acquired by other companies and no longer trade in the markets.

Summary financial statistics for the group are provided on page 1 of Exhibit JRW-2. On average, the group has average revenues and net plant of $1610.2M and $1316.9M, respectively, and earns 69% of revenues from regulated gas operations. The group has a mean common equity ratio and earned return on common equity are of 51.4% and 11.8%.

IV. CAPITAL STRUCTURE RATIOS AND DEBT COST RATES

Q. PLEASE REVIEW DELTA'S PROPOSED CAPITAL STRUCTURE RATIOS.

A. Exhibit JRW-3 provides Delta's proposed capital structure. Mr. Brown has proposed a capital structure consisting of 13.43% short-term debt, 46.90% long-term debt, and 39.67% common equity. The average capital structure ratios of the SWC and LWC groups include 5.63% short-term debt, 42.93% long-term debt, and 51.44% common equity. As such, Delta has somewhat less common equity in its capital structure than the average capitalization of the companies in the gas distribution group.

Q. ARE YOU EMPLOYING DELTA'S RECOMMENDED CAPITAL STRUCTURE?

A. Yes.

Q. HAVE YOU ASSESSED THE RISK OF DELTA RELATIVE TO THE GROUP?

A. Yes. On page 2 of Exhibit JRW-2, I have compared Delta to the average of the group for six different risk measures published by *Value Line*. These measures include Beta, Safety, Financial Strength, Stock Price Stability, Price Growth Persistence, and Earnings Predictability. The results suggest that Delta is comparable in risk to the average of the group. Nonetheless, I am making an adjustment to my equity cost rate to reflect the higher degree of financial risk of Delta.

Q. WHAT CAPITAL STRUCTURE RATIOS AND SENIOR CAPITAL COST RATES ARE YOU USING TO ESTIMATE AN OVERALL RATE OF RETURN FOR DELTA?

A. I am adopting Delta's proposed capital structure. I am also employing the Company's proposed short-term debt cost rate of 6.49% and long-term debt cost rate of 6.81%. These ratios and cost rates are summarized below.

Delta Natural Gas Company
Proposed Capital Structure and Senior Capital Cost Rates

Source of Capital	Capitalization Ratio	Cost Rate
Short-Term Debt	13.43%	6.49%
Long-Term Debt	46.90%	6.81%
Common Equity	39.67%	

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.

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

> 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 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]

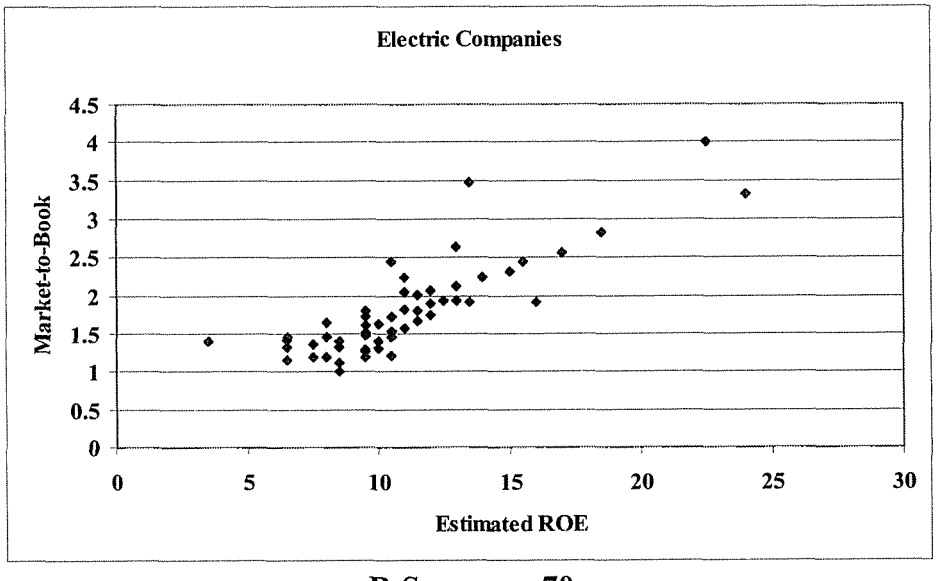
> For a given industry, more profitable firms – those able to generate higher returns per dollar of equity – should have higher market-to-book ratios. Conversely, firms which are unable to generate returns in excess of their cost of equity should sell for less than book value.

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

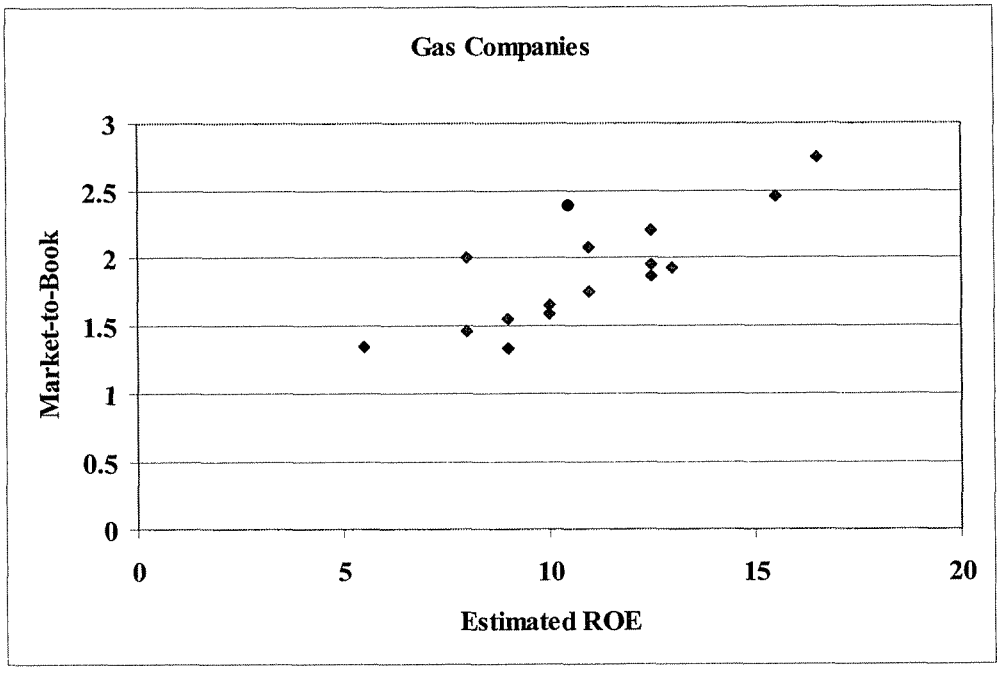
Profitability	*Value*
If ROE > K	*then Market/Book > 1*
If ROE = K	*then Market/Book =1*
If ROE < K	*then Market/Book < 1*

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 natural gas distribution, electric utility 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.

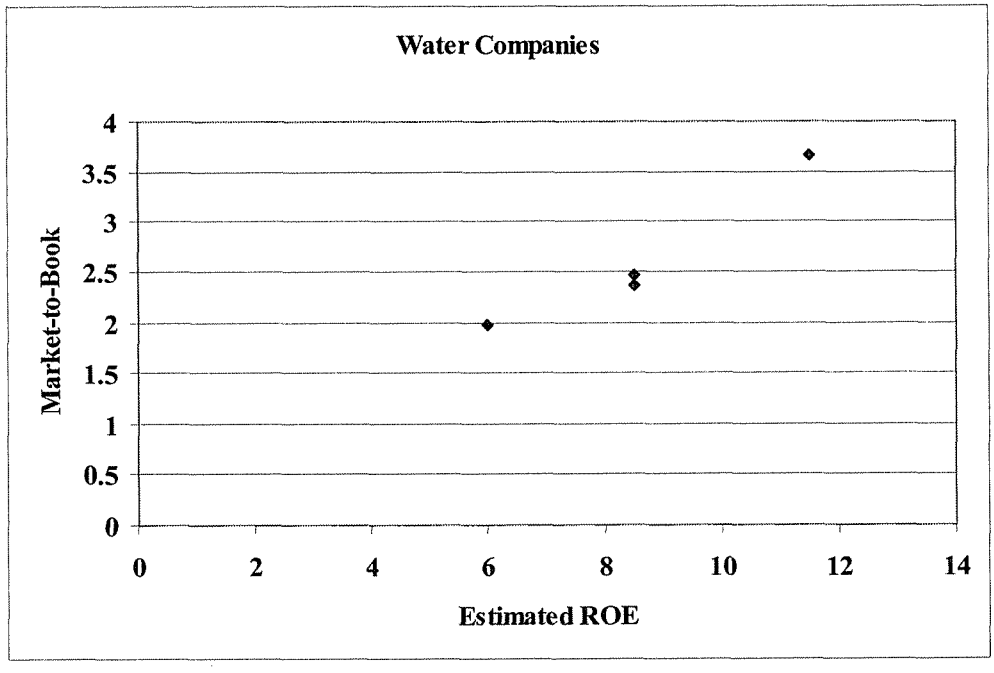
The Relationship Between Estimated ROE and Market-to-Book Ratios
Value Line Electric Companies, Gas Distribution Companies, and Water Utilities



R-Square = .70
N=58



R-Square = .64
N=16



R-Square = .93
N=4

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

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

A. Exhibit JRW-4 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 8.5%, then declined and again hit the 8.0 percent range in the year 2000. They subsequently declined and hovered in the 4.5 to 5.0 percent range between 2003 and 2005. They increased to 6.0% in June of 2006, and have since retreated to the 5.50 percent range. 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 at 3.5% as of 2006.

Average earned returns on common equity and market-to-book ratios are given on page 3 of Exhibit JRW-4. 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 subsequently decreased before recovering in 2005 and 2006. As of 2006, the average was 13.1%. Over the past decade, market-to-book ratios for this group have increased gradually, but with several ups and downs. The

[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.

market-to-book average was 1.75 as of 2001, declined to 1.45 in 2003, and increased to 2.10 as of 2006.

The indicators in Exhibit JRW-4, coupled with the overall decrease in interest rates, suggest that capital costs for the Dow Jones Utilities have decreased over the past decade.

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 NATURAL GAS DISTRIBUTION 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-5 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.[6] The study shows that the investment risk of public utilities is relatively low. The average beta for natural gas distribution companies of 0.73 is in the bottom 10% of the 100 industries in terms of beta. As such, the cost of equity for the natural gas distribution 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.

[6] They may be found on the Internet at http://www.stern.nyu.edu/~adamodar/.

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. Discounted Cash Flow Analysis

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 their 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.[7]

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.

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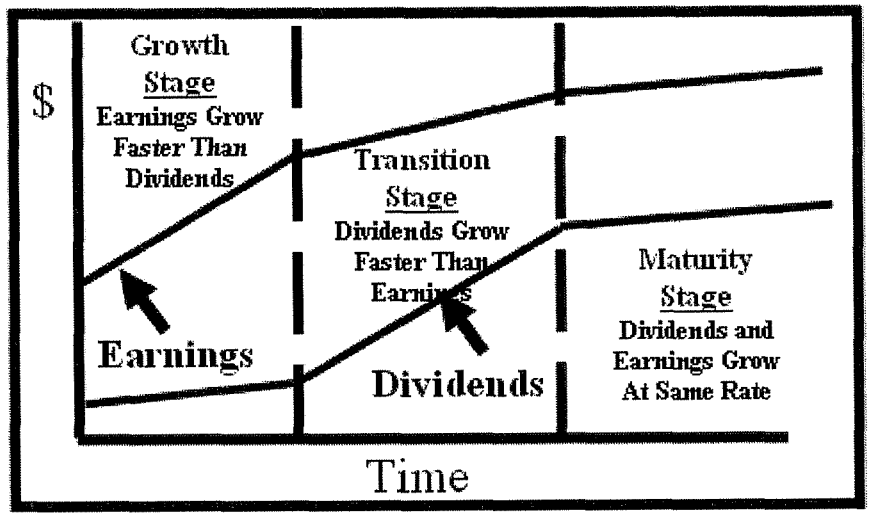
[7] This description comes from William F. Sharp, Gordon J. Alexander, and Jeffrey V. Bailey, *Investments* (Prentice-Hall, 1995), pp. 590-91.

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.

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-6.

A. My DCF analysis is provided in Exhibit JRW-6. 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 NATURAL GAS DISTRIBUTION COMPANIES?

A. The dividend yields on the common stock for the companies in the group are provided on page 2 of Exhibit JRW-6 for the six-month period ending August, 2007. Over this period, the average monthly dividend yields for the group of gas companies was 3.7%. As of August, 2007, 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 August, 2007 dividend yields. Hence, I am employing a DCF dividend yield of 3.75%.

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.[8]

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.

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[8] *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).

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

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 NATURAL GAS DISTRIBUTION COMPANIES?

A. I have analyzed a number of measures of growth for the gas distribution 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-6. 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 2.4% to 6.0%, with an average of 4.5%.

Q. PLEASE SUMMARIZE *VALUE LINE'S* PROJECTED GROWTH RATES FOR THE GROUP OF NATURAL GAS DISTRIBUTION COMPANIES.

A. *Value Line's* projections of EPS, DPS, and BVPS growth for the group are shown on page 4 of Exhibit JRW-6. 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 3.9% to 4.4%, with an average of 4.0%.

Also provided on page 4 of Exhibit JRW-6 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 4.7%.

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 natural gas distribution companies on page 5 of Exhibit JRW-6. The mean/median of the analysts' projected EPS growth rates for the group are 4.8%/5.0%.[9]

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

A. The table below shows the summary DCF growth rate indicators for the group of gas distribution companies. For the group, the average of *Value Line*'s historical mean and median growth rate measures in EPS, DPS, and BVPS is 4.5%. *Value Line*'s average projected growth rate for EPS, DPS, and BVPS is 4.0%. The average internal growth rate is 4.7%, and the mean/median of the projected EPS growth rate for companies in the group are 4.8%/5.0%. These results indicate an expected DCF growth rate in 4.0-5.0 percent range. Given these results, I will use 5.0% which is at the upper end of the range of expectations for the group.

[9] 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	4.5%
Projected *Value Line* Growth in EPS, DPS, and BVPS	4.0%
Internal Growth ROE * Retention rate	4.7%
Projected EPS Growth from First Call, Reuters, and Zacks	4.8%/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:

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

	Dividend Yield	1+ ½ (Growth Adjustment)	DCF Growth Rate	Equity Cost Rate
Gas Group	3.75	1.0250	5.00%	8.8%

These results are summarized on page 1 of Exhibit JRW-6.

C. Capital Asset Pricing Model

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:

$$K = (R_f) + \beta_i * [E(R_m) - (R_f)]$$

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*—(β_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 (β_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. β_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-7.

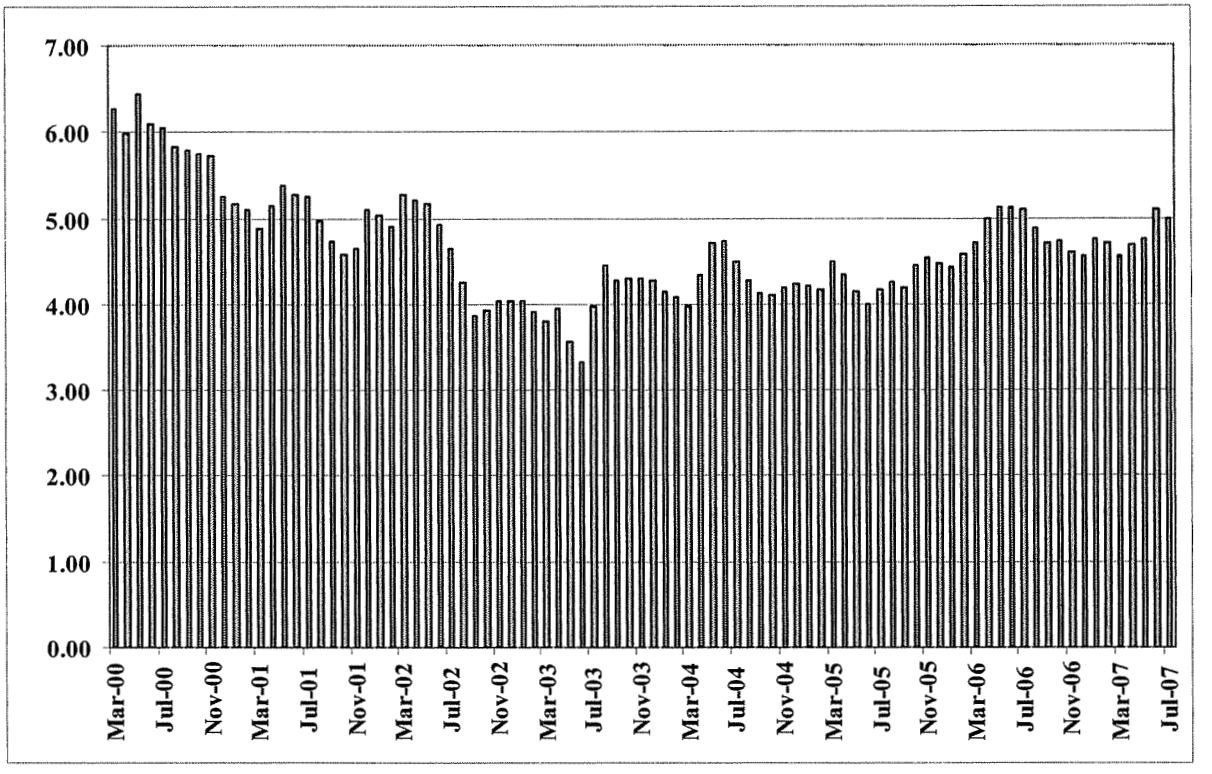
A. Exhibit JRW-7 provides the summary results for my CAPM study. Page 1 shows the results, and the pages following it, contain the supporting data.

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 early 2006 in response to a strong economy and increases in energy, commodity, and consumer prices. In late 2006, long-term interest rates retreated to below 4.5 percent as commodity and energy prices declined and inflationary

pressures have subsided. However, these rates have since rebounded to the 5.0% level as the economy has remained strong.

Ten-Year U.S. Treasury Yields
January 2000-July 2007



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. In recent months, the yields on the 10- and 30- year Treasuries have increased and have been in the 4.75%-5.25% range. As of July 26, 2007, as shown in Table 4-7, the rates on 10- and 30- Treasuries were 4.80% and 4.95%, respectively. Given this recent range and recent movement, I will use 5.25%, which is at the high end of the recent range, as the risk-free rate, or Rf, in my CAPM.

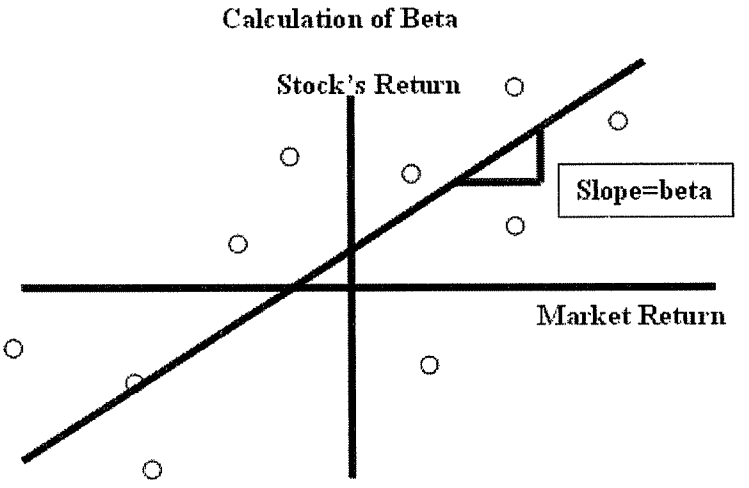
U.S. Treasury Yields
July 26, 2007

NOTES/BONDS	COUPON	MATURITY DATE	CURRENT PRICE/YIELD
2-YEAR	4.625	07/31/2009	100-03¼ / 4.57
3-YEAR	4.500	05/15/2010	99-27 / 4.56
5-YEAR	4.875	06/30/2012	101-02+ / 4.63
10-YEAR	4.500	05/15/2017	97-22 / 4.80
30-YEAR	4.750	02/15/2037	96-26¾ / 4.95

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 gas distribution 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-7, the median beta for the companies in the gas distribution group is 0.78.

Q. PLEASE DISCUSS 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.[10] 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.[11]

[10] The problems with using ex post historical returns as measures of ex ante expectations will be discussed at length later in my testimony.

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

Q. PLEASE BRIEFLY SUMMARIZE SOME OF THE ACADEMIC STUDIES THAT DEVELOPED 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.[12] 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 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

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

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 provides direct support for the findings of Fama and French.[13] 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 increases when the required rate of return decreases. The higher stock prices have produced stock returns that 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.

[13] 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).

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.[14] These authors reviewed the various approaches to estimating the equity risk premium, and the overall results. Page 3 of Exhibit JRW-7 provides a summary of the results of the primary risk premium studies reviewed by Derrig and Orr. In developing page 3 of Exhibit JRW-7, 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.

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

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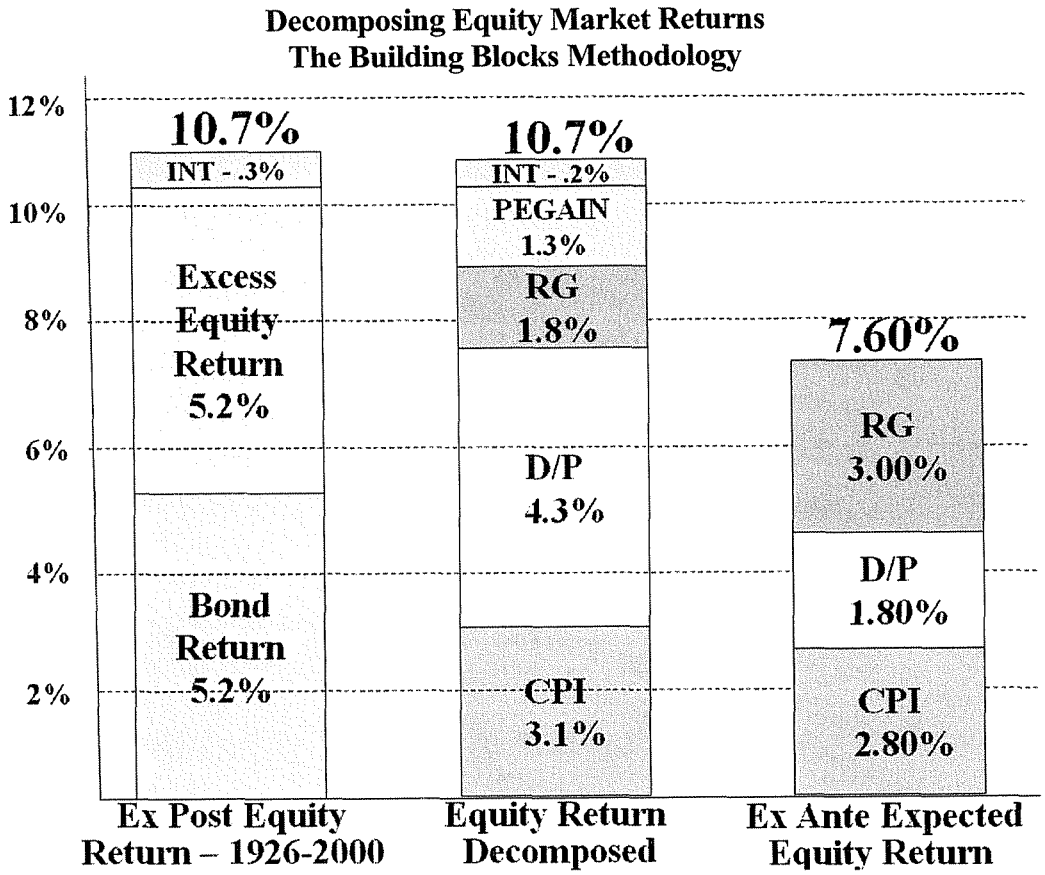
[14] Richard Derrig and Elisha Orr, "Equity Risk Premium: Expectations Great and Small," Working Paper (version 3.0), Automobile Insurers Bureau of Massachusetts, August 28, 2003.

A. Ibbotson and Chen (2002) evaluate the ex post historical mean stock and bond returns in what is called the Building Blocks approach.[15] 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).[16] 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%).

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

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

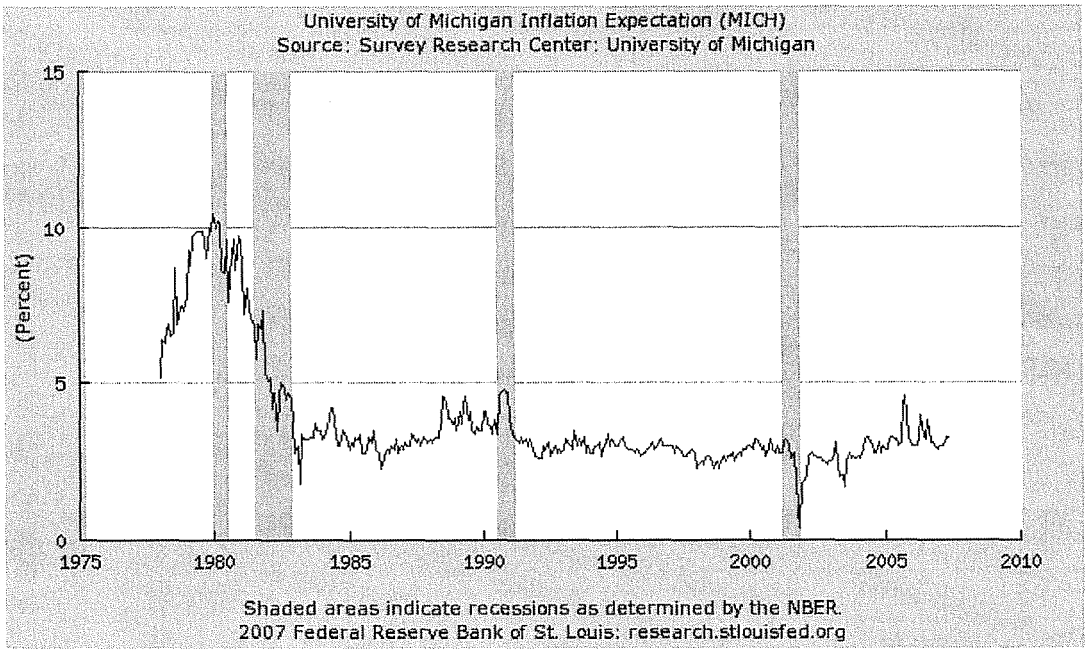


Q. HOW ARE YOU USING THIS METHODOLOGY TO DERIVE AN EX ANTE EXPECTED EQUITY RISK PREMIUM?

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 3.3%.

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*.[17] 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, 2007 survey, published on February 13, 2007, the median long-term (10-year) expected inflation rate as measured by the CPI was 2.35% (see page 4 of Exhibit JRW-7).

Given these results, I will use the average of the University of Michigan and Philadelphia Federal Reserve's surveys (3.3% and 2.35%), or 2.8%.

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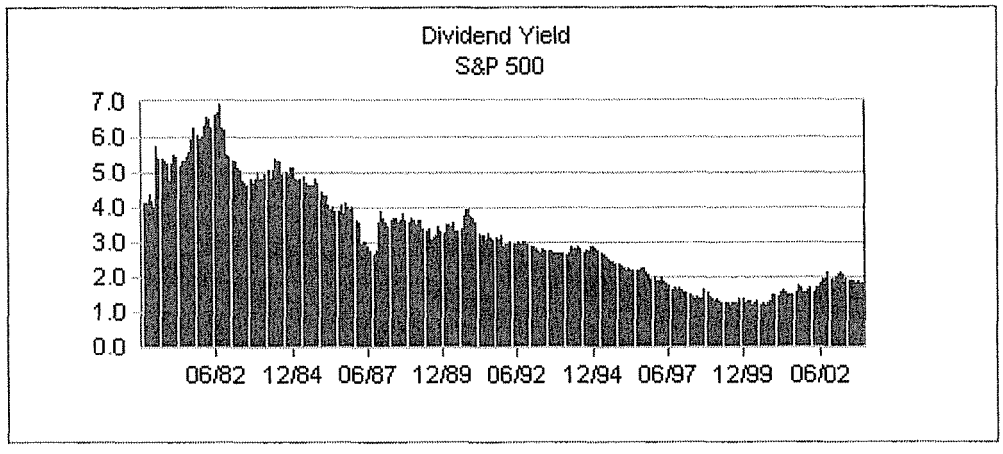
[17]Federal Reserve Bank of Philadelphia, *Survey of Professional Forecasters,* February 13, 2007. The *Survey of Professional Forecasters* was formerly conducted by the American Statistical Association (ASA) and the National Bureau of Economic Research (NBER) and was known as the ASA/NBER survey. The 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 1.8% 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 7.38%. On page 5 of Exhibit JRW-7, 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 1960-2006 period for the S&P 500 is 3.0 %.

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.[18] 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 3.0% (see page 4 of Exhibit JRW-7).

Given these results, I will use the average of the historical S&P EPS real growth and the projected real GDP growth (as reported by the Philadelphia Federal Reserve Survey) -- 3.0% and 3.0% -- or 3.0%, for real earnings growth.

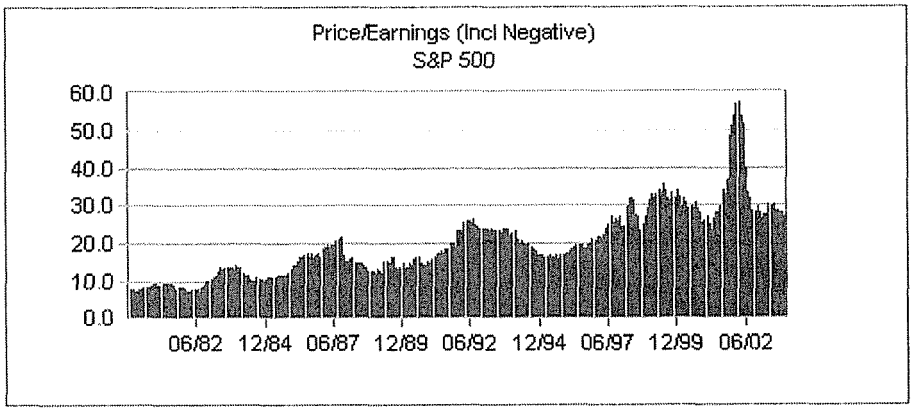
PEGAIN – the repricing gains associated with increases in the P/E ratio accounted for 1.3% of the 10.7% annual stock return in the 1926-2000 period. In estimating an ex ante expected stock market return, one issue is whether investors expect P/E ratios to increase from their current levels. The graph 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 August, 2007 the P/E for the S&P 500, using the trailing 12 months EPS, is 20.4 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 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

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

relative interest rates, 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 42 of my testimony. As shown, my expected market return is 7.60% which is composed of 2.80% expected inflation, 1.80% dividend yield, and 3.00% real earnings growth rate.

Expected Market Return	=	Expected Inflation	+	Dividend Yield	+	Real Earnings Growth
Expected Market Return	=	2.80%	+	1.80%	+	3.0%

Expected Market Return	=	7.6%

Q. GIVEN THAT THE HISTORICAL COMPOUNDED ANNUAL MARKET RETURN IS IN EXCESS OF 10%, WHY DO YOU BELIEVE THAT AN EXPECTED MARKET RETURN OF 7.6% 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, the dividend portion of the return was historically 4.3%, whereas the current dividend yield is only 1.8%. Due to these reasons, lower market returns are expected for the future.

Q. IS YOUR EXPECTED MARKET RETURN OF 7.60% CONSISTENT WITH THE FORECASTS OF MARKET PROFESSIONALS?

A. Yes. In the first quarter, 2007 survey, published on February 13, 2007, the median long-term expected return on the S&P 500 was 7.50% (see page 4 of Exhibit JRW-7). This is clearly consistent with my expected market return of 7.60%.

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 March, 2007 survey, the mean expected return on the S&P 500 over the next ten years is 8.12%.[19]

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 4.95%. 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 = 7.60% - 4.95% = 2.65%

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-7 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

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

premium of these studies is 4.14%, 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.[20] 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 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.[21]

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

[21] 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 2007 CFO survey conducted by John Graham and Campbell Harvey, the average ex ante 10-year equity risk premium was 3.42%.

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-7, the median long-term expected stock and bond returns were 7.50% and 5.00%, respectively. This provides an ex ante equity risk premium of 2.50%.

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 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.[22]

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

A. The results of my CAPM studies for the group of gas distribution companies are provided below:

$$K = (R_f) + \beta i * [E(R_m) - (R_f)]$$

	Risk-Free Rate	Beta	Equity Risk Premium	Equity Cost Rate
Gas Distribution Group	5.25%	0.78	4.14%	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 gas distribution companies are indicated below:

	DCF	CAPM
Gas Distribution Group	8.8%	8.5%

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

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

A. These results suggest that the equity cost rate for the group of gas distribution companies is in the 8.5-8.8 percent range. Giving more weight to the DCF results, an equity cost rate of 8.7% is appropriate for the group.

Q. ARE YOU USING 8.7% FOR DELTA AS YOUR RECOMMENDED EQUITY COST RATE FOR DELTA?

A. No. Whereas my analysis indicates 8.7% is appropriate for the group, Delta's lower common equity ratio suggests that the Company is exposed to a higher degree of financial risk. To account for the higher financial risk, I am recommending an equity cost rate for Delta of 9.0%. This represents a 30 basis point premium for Delta relative to the group. As shown on page 2 of Exhibit JRW-1, this return premium represents the return premium which is required by investors for one full bond rating differential (e.g., the yields on A versus BBB bond ratings).

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 discussed below, 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 than 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 gas distribution companies.

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

A. Page 1 of Exhibit JRW-2 provides financial performance and market valuation statistics for the group of gas distribution companies. The average current return on equity and market-to-book ratios for the group are summarized below:

	Current ROE	Market-to-Book Ratio
Gas Group	11.8%	192

Source: Exhibit JRW-2

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 gas distribution companies.

VI. CRITIQUE OF DELTA'S RATE OF RETURN TESTIMONY

Q. PLEASE EVALUATE THE COMPANY'S RATE OF RETURN POSITION.

A. The Company's proposed rate of return is too high due to an overstated equity cost rate. These issues are addressed below.

Q. PLEASE REVIEW MR. BLAKE'S EQUITY COST RATE APPROACHES.

A. Mr. Blake employs DCF, CAPM, and Risk Premium (RP) equity cost rate approaches.

Q. PLEASE SUMMARIZE MR. BLAKE'S EQUITY COST RATE RESULTS.

A. Mr. Blake's equity cost rate estimates for Delta are summarized in the table below. He concludes that the appropriate equity cost rate for the Company is 12.1% based on the RP approach.

Summary of Mr. Blake's Equity Cost Rate Approaches and Results

Approach	High	Low
DCF (Sustainable Growth)	11.82%	11.41%
DCF (Average Panel Growth)	14.07%	13.43%
CAPM	18.73%	18.73%
Risk Premium	12.1%	12.1%

Q. PLEASE DISCUSS YOUR ISSUES WITH MR. BLAKE'S RECOMMENDED EQUITY COST RATE.

A. Mr. Blake's proposed return on common equity is too high primarily for the following reasons: (1) he makes an inappropriate market value – book value adjustment to his DCF results, (2) his CAPM equity cost rate includes excessive equity premium and size risk premiums, and (3) he employs an overstated equity risk premium in his RP study and does not account for the riskiness of Delta or the gas distribution business

A. DCF Approach

Q. PLEASE SUMMARIZE MR. BLAKE'S DCF ESTIMATES.

A. On pages 18-24 of his testimony and in Exhibits MJB-8 and MJB-9, Mr. Blake develops an equity cost rate by applying a DCF model to Delta. He uses Delta's 2006 dividend (1.20) and Delta's high (26.82) and Low (24.11) stock prices during 2006 and computes two dividend yields. He then estimates equity cost rates using two alternative DCF growth rates: (1) Delta's sustainable growth (br + sv) of 2.37%, and (2) the average projected dividend growth rate of the proxy group of gas companies (3.67%). He then

makes what I call a market value – book value adjustment. He multiplies the DCF equity cost rates times Delta's market capitalization (at the high and low prices) to estimate the expected stockholder return. Finally, he divides the expected stockholder return by Delta's book equity to arrive at the adjusted DCF equity cost rate. Mr. Blake's DCF results are summarized below.

DCF Equity Cost Rate
Delta Natural Gas Company, Inc.

	Delta (High Price) Sustainable Growth	Delta (Low Price) Sustainable Growth	Delta (High Price) Gas Co. Dividend Growth	Delta (Low Price) Gas Co. Dividend Growth
Dividend Yield	4.47%	4.98%	4.47%	4.98%
Growth	2.37%	2.37%	3.67%	3.67%
DCF Result	6.84%	7.35%	8.14%	8.65%
Market/Book Adjustment	X1.73	X1.55	X1.73	X1.55
Adjusted DCF Result	11.82%	11.41%	14.07%	13.43%

Q. PLEASE EXPRESS YOUR CONCERNS WITH MR. BLAKE'S DCF STUDY.

A. The primary error is the market value – book value adjustment.

Q. PLEASE ADDRESS MR. BLAKES'S MARKET VALUE – BOOK VALUE ADJUSTMENT.

A. Mr. Blake claims that this adjustment is needed since (1) market values are greater than book values for utilities, and (2) the overall rate of return is applied to a book value capitalization in the ratemaking process. This adjustment increases his DCF equity cost rate estimates by a factor of approximately 500 basis points. This adjustment is erroneous and unwarranted for the following reasons:

(1) As noted above, the market value of a firm's equity exceeds the book value of equity when the firm is expected to earn more on the book value of investment than investors require. As such, the reason that market values exceed book values is that the company is earning a return on equity in excess of its cost of equity;

(2) The application of allowed rates to book values is a long-standing paradigm of regulation with original cost ratemaking. Investors price utility stocks in the market based on the original cost regulatory construct that has existed for many decades. Investors understand that when rates are set for utilities in the ratemaking process, the overall cost of capital will be determined based on book and not market values. Therefore, Mr. Blake's market value – book value adjustment is inconsistent with the paradigm used by investors in the markets; and

(3) The adjustment is illogical because it works to increase the returns for utilities that have high returns on common equity and decrease the returns for utilities that have low returns on common equity.

In the graphs on pages 14 and 15, I have demonstrated that there is a strong positive relationship between expected returns on common equity and market-to-book ratios for public utilities. Hence, in the context of Mr. Blake's market value – book value adjustment, this means that (1) for a utility with a relatively high market-to-book ratio (e.g., 2.5) and ROE (e.g., 12.0%), the market value – book value adjustment will increase the estimated equity cost rate, while (2) for a utility with a relatively low market-to-book (e.g., 0.5) and ROE (e.g., 5.0%), the market value – book value adjustment will decrease the estimated equity cost rate. Such an adjustment defies logic

because you are increasing the estimated equity cost rate for the high market-to-book utility and decreasing the estimated equity cost rate for the low market-to-book ratio utility. Therefore, the adjustment will result in even higher market-to-book ratios for utilities with relatively high ROEs and even lower market-to-book ratios for utilities with relatively low ROEs.

B. CAPM Analysis

Q. PLEASE DISCUSS MR. BLAKE'S USE OF THE CAPM.

A. On pages 24 to 26 of his testimony and in his Exhibits MJB-12, Mr. Blake applies the CAPM to Delta. The results are summarized below:

CAPM Equity Cost Rate
Delta Natural Gas Company, Inc.

	CAPM
Risk-Free Rate	5.0%
Adjusted Beta	0.55
Market Risk Premium	7.1%
CAPM Result	8.91 %
Size Adjustment	9.83%
Size Adjusted CAPM Result	18.73%

Q. WHAT ARE THE ERRORS IN MR. BLAKE'S CAPM ANALYSES?

A. There are two errors with Mr. Blake's CAPM analysis: (1) his equity risk premium of 7.1% is overstated, and (2) he has adjusted his CAPM results for the size of Delta.

Q. PLEASE REVIEW THE ERRORS IN MR. BLAKE'S EQUITY OR MARKET RISK PREMIUM.

A. The primary error with Mr. Blake's equity risk premium is the use of historical stock and bond returns to develop an equity risk premium. Mr. Blake's historical equity risk premium represents the difference in the arithmetic mean stock returns and bond income returns over the 1926-2005 period.

Q. PLEASE ADDRESS THE BIASES INVOLVED IN THE USE OF HISTORICAL STOCK AND BOND RETURNS TO COMPUTE A FORWARD-LOOKING OR EX ANTE RISK PREMIUM.

A. Using the historical relationship between stock and bond returns to measure an ex ante equity risk premium is erroneous and overstates the true market equity risk premium. The equity risk premium is based on expectations of the future and when past market conditions vary significantly from the present, historic data does not provide a realistic or accurate barometer of expectations of the future. At the present time, using historical returns to measure the ex ante equity risk premium ignores current market conditions and masks the dramatic change in the risk and return relationship between stocks and bonds. This change suggests that the equity risk premium has declined.

Q. PLEASE DISCUSS THE ERRORS IN USING HISTORIC STOCK AND BOND RETURNS TO ESTIMATE AN EQUITY RISK PREMIUM.

A. There are a number of flaws in using historic returns over long time periods to estimate expected equity risk premiums. These issues include:

(A) Biased historical bond returns;

(B) The arithmetic versus the geometric mean return;

(C) Unattainable and biased historical stock returns;

(D) Survivorship bias;

(E) The "Peso Problem;"

(F) Market conditions today are significantly different than the past; and

(G) Changes in risk and return in the markets.

These issues will be addressed in order.

Biased Historical Bond Returns

Q. HOW ARE HISTORICAL BOND RETURNS BIASED?

A. An essential assumption of these studies is that over long periods of time investors' expectations are realized. However, the experienced returns of bondholders in the past violate this critical assumption. Historic bond returns are biased downward as a measure of expectancy because of capital losses suffered by bondholders in the past. As such, risk premiums derived from this data are biased upwards.

The Arithmetic versus the Geometric Mean Return

Q. PLEASE DISCUSS THE ISSUE RELATING TO THE USE OF THE ARITHMETIC VERSUS THE GEOMETRIC MEAN RETURNS IN THE IBBOTSON METHODOLOGY.

A. The measure of investment return has a significant effect on the interpretation of the

risk premium results. When analyzing a single security price series over time (i.e., a time series), the best measure of investment performance is the geometric mean return. Using the arithmetic mean overstates the return experienced by investors. In a study entitled "Risk and Return on Equity: The Use and Misuse of Historical Estimates," Carleton and Lakonishok make the following observation: "The geometric mean measures the changes in wealth over more than one period on a buy and hold (with dividends invested) strategy."[23] Since Mr. Blake's study covers more than one period (and he assumes that dividends are reinvested), he should be employing the geometric mean and not the arithmetic mean.

Q. PLEASE PROVIDE AN EXAMPLE DEMONSTRATING THE PROBLEM WITH USING THE ARITHMETIC MEAN RETURN.

A. To demonstrate the upward bias of the arithmetic mean, consider the following example. Assume that you have a stock (that pays no dividend) that is selling for $100 today, increases to $200 in one year, and then falls back to $100 in two years. The table below shows the prices and returns.

Time Period	Stock Price	Annual Return
0	$100	
1	$200	100%
2	$100	-50%

[23] Willard T. Carleton and Josef Lakonishok, "Risk and Return on Equity: The Use and Misuse of Historical Estimates," *Financial Analysts Journal* (January-February, 1985), pp. 38-47.

The arithmetic mean return is simply (100% + (-50%))/2 = 25% per year. The geometric mean return is $((2 * .50)^{(1/2)}) - 1 = 0\%$ per year. Therefore, the arithmetic mean return suggests that your stock has appreciated at an annual rate of 25%, while the geometric mean return indicates an annual return of 0%. Since after two years, your stock is still only worth $100, the geometric mean return is the appropriate return measure. For this reason, when stock returns and earnings growth rates are reported in the financial press, they are generally reported using the geometric mean. This is because of the upward bias of the arithmetic mean. As further evidence of the appropriate mean return measure, the U.S. Securities and Exchange Commission requires equity mutual funds to report historic return performance using geometric mean and not arithmetic mean returns.[24] Therefore, Mr. Blake's arithmetic mean return measures are biased and should be disregarded.

Unattainable and Biased Historic Stock Returns

Q. YOU NOTE THAT HISTORIC STOCK RETURNS ARE BIASED USING THE IBBOTSON METHODOLOGY. PLEASE ELABORATE.

A. Returns developed using Ibbotson's methodology are computed on stock indexes and therefore (1) cannot be reflective of expectations because these returns are unattainable to investors, and (2) produce biased results. This methodology assumes (a) monthly portfolio rebalancing and (b) reinvestment of interest and dividends. Monthly portfolio rebalancing presumes that investors rebalance their portfolios at the end of each month

[24] U.S. Securities and Exchange Commission, Form N-1A.

in order to have an equal dollar amount invested in each security at the beginning of each month. The assumption would obviously generate extremely high transaction costs and thereby render these returns unattainable to investors. In addition, an academic study demonstrates that the monthly portfolio rebalancing assumption produces biased estimates of stock returns.[25]

Transaction costs themselves provide another bias in historic versus expected returns. The observed stock returns of the past were not the realized returns of investors due to the much higher transaction costs of previous decades. These higher transaction costs are reflected through the higher commissions on stock trades, and the lack of low cost mutual funds like index funds.

Survivorship Bias

Q. HOW DOES SURVIVORSHIP BIAS AFFECT MR. BLAKE'S HISTORIC EQUITY RISK PREMIUM?

A. Using historic data to estimate an equity risk premium suffers from survivorship bias. Survivorship bias results when using returns from indexes like the S&P 500. The S&P 500 includes only companies that have survived. The fact that returns of firms that did not perform so well were dropped from these indexes is not reflected. Therefore these stock returns are upwardly biased because they only reflect the returns from more successful companies.

[25] See Richard Roll, "On Computing Mean Returns and the Small Firm Premium," *Journal of Financial Economics* (1983), pp. 371-86.

The "Peso Problem"

Q. WHAT IS THE "PESO PROBLEM" AND HOW DOES IT AFFECT HISTORIC RETURNS AND EQUITY RISK PREMIUMS?

A. Mr. Blake's use of historic return data also suffers from the so-called "peso problem." The "peso problem" issue was first highlighted by the Nobel laureate, Milton Friedman, and gets its name from conditions related to the Mexican peso market in the early 1970s. This issue involves the fact that past stock market returns were higher than were expected at the time because despite war, depression, and other social, political, and economic events, the US economy survived and did not suffer hyperinflation, invasion, and the calamities of other countries. As such, highly improbable events, which may or may not occur in the future, are factored into stock prices, leading to seemingly low valuations. Higher than expected stock returns are then earned when these events do not subsequently occur. Therefore, the "peso problem" indicates that historic stock returns are overstated as measures of expected returns.

Market Conditions Today are Significantly Different than in the Past

Q. FROM AN EQUITY RISK PREMIUM PERSPECTIVE, PLEASE DISCUSS HOW MARKET CONDITIONS ARE DIFFERENT TODAY.

A. The equity risk premium is based on expectations of the future. When past market conditions vary significantly from the present, historic data does not provide a

realistic or accurate barometer of expectations of the future. As noted previously, stock valuations (as measured by P/E) are relatively high and interest rates are relatively low, on a historic basis. Therefore, given the high stock prices and low interest rates, expected returns are likely to be lower on a going forward basis.

Changes in Risk and Return in the Markets

Q. PLEASE DISCUSS THE NOTION THAT HISTORIC EQUITY RISK PREMIUM STUDIES DO NOT REFLECT THE CHANGE IN RISK AND RETURN IN TODAY'S FINANCIAL MARKETS.

A. The historic equity risk premium methodology is unrealistic in that it makes the explicit assumption that risk premiums do not change over time based on market conditions such as inflation, interest rates, and expected economic growth. Furthermore, using historic returns to measure the equity risk premium masks the dramatic change in the risk and return relationship between stocks and bonds. The nature of the change, as I will discuss below, is that bonds have increased in risk relative to stocks. This change suggests that the equity risk premium has declined in recent years.

Page 1 of Exhibit JRW-8 provides the yields on long-term U.S. Treasury bonds from 1926 to 2006. One very obvious observation from this graph is that interest rates increase dramatically from the mid-1960s until the early 1980s, and since have returned to their 1960 levels. The annual market risk premiums for the 1926 to 2006 period are provided on page 2 of Exhibit JRW-8. The annual market risk premium is defined as the return on common stock minus the return on long-term

Treasury Bonds. There is considerable variability in this series and a clear decline in recent decades. The high was 54% in 1933 and the low was -38% in 1931. Evidence of a change in the relative riskiness of bonds and stocks is provided on page 3 of Exhibit JRW-8 which plots the standard deviation of monthly stock and bond returns since 1930. The plot shows that, whereas stock returns were much more volatile than bond returns from the 1930s to the 1970s, bond returns became more variable than stock returns during the 1980s. In recent years stocks and bonds have become much more similar in terms of volatility, but stocks are still a little more volatile. The decrease in the volatility of stocks relative to bonds over time has been attributed to several stock related factors: the impact of technology on productivity and the new economy; the role of information (see former Federal Reserve Chairman Greenspan's comments referred to earlier in this testimony) on the economy and markets; better cost and risk management by businesses; capital losses suffered bond investors during periods of increasing interest rates; deregulation of the financial system; inflation fears and interest rates; and the increase in the use of debt financing. Further evidence of the greater relative riskiness of bonds is shown on page 4 of Exhibit_(JRW-8), which plots real interest rates (the nominal interest rate minus inflation) from 1926 to 2006. Real rates have been well above historic norms during the past 10-15 years. These high real interest rates reflect the fact that investors view bonds as riskier investments.

The net effect of the change in risk and return has been a significant decrease in the return premium that stock investors require over bond yields. In short, the equity or market risk premium has declined in recent years. This decline has been discovered in

studies by leading academic scholars and investment firms, and has been acknowledged by government regulators. As such, using a historic equity risk premium analysis is simply outdated and not reflective of current investor expectations and investment fundamentals.

Q. DO YOU HAVE ANY OTHER THOUGHTS ON THE USE OF HISTORICAL RETURN DATA TO ESTIMATE AN EQUITY RISK PREMIUM?

A. Yes. Jay Ritter, a Professor of Finance at the University of Florida, identified the use of historical stock and bond return data to estimate a forward-looking equity risk premium as one of the "Biggest Mistakes" taught by the finance profession.[26] His argument is based on the theory behind the equity risk premium, the excessive results produced by historical returns, and the previously-discussed errors of such as survivorship bias in historical data.

Size Adjustment

Q. INITIALLY, PLEASE ADDRESS MR. BLAKE'S ADJUSTMENT FOR THE SIZE OF THE COMPANY.

A. Mr. Blake adjusts his CAPM equity cost rate results (adding 9.83%) to account for the size of the Company. He supports his size premium on the basis of a historical return analysis performed by Ibbotson Associates. As discussed above, there are numerous errors in using historical market returns to compute risk premiums. These

[26] Jay Ritter, "The Biggest Mistakes We Teach," Journal of Financial Research (Summer 2002).

errors provide inflated estimates of expected risk premiums. Among the errors are the well-known survivorship bias (only successful companies survive – poor companies do not survive) and unattainable return bias (the Ibbotson procedure presumes monthly portfolio rebalancing). The net result is that Ibbotson's size premiums are poor measures for any risk adjustment to account for the size of the Company. This observation is further supported by a review of the Ibbotson study. The Ibbotson study used for the explicit size premium is based on the stock returns for companies in the 10^{th} size decile. A review of the Ibbotson document indicates that these companies have betas that are larger than the betas of gas distribution companies. Hence, these size premiums are not associated with the gas distribution industry.

Finally, and most significantly, Professor Annie Wong has tested for a size premium in utilities and concluded that, unlike industrial stocks, utility stocks do not exhibit a significant size premium.[27] As explained by Professor Wong, there are several reasons why such a size premium would not be attributable to utilities. Utilities are regulated closely by state and federal agencies and commissions and hence their financial performance is monitored on an ongoing basis by both the state and federal governments. In addition, public utilities must gain approval from government entities for common financial transactions such as the sale of securities. Furthermore, unlike their industrial counterparts, accounting standards and reporting are fairly standardized for public utilities. Finally, a utility's earnings are predetermined to a certain degree

[27] Annie Wong, "Utility Stocks and the Size Effect: An Empirical Analysis," *Journal of the Midwest Finance Association*, 1993, pp. 95-101.

through the ratemaking process in which performance is reviewed by state commissions and other interested parties. Overall, in terms of regulation, government oversight, performance review, accounting standards, and information disclosure, utilities are much different than industrials, which could account for the lack of a size premium.

C. Risk Premium Analysis

Q. PLEASE DISCUSS MR. BLAKE'S USE OF THE RP MODEL.

A. On pages 24 to 26 of his testimony and in his Exhibits MJB-12, Mr. Blake applies the RP to Delta. The results are summarized below:

Risk Premium Equity Cost Rate
Delta Natural Gas Company, Inc.

	RP
Risk-Free Rate	5.0%
Market Risk Premium	7.1%
RP Result	12.1 %

Q. PLEASE REVIEW THE ERRORS IN MR. BLAKE'S RP ANALYSIS?

A. Mr. Blake's RP analysis is very simplistic and includes two significant errors: (1) his equity risk premium of 7.1% is overstated, and (3) he has not adjusted his RP results for the riskiness of Delta.

Q. WHAT ARE THE ERRORS IN MR. BLAKE'S EQUITY RISK PREMIUM?

A. As in his CAPM, Mr. Blake has employed an equity risk premium of 7.1% which represents the difference in the arithmetic mean stock returns and bond income returns

over the 1926-2005 period. As discussed above, using historical returns to estimate an ex ante equity risk premium is subject too a myriad of empirical biases which result an overstatement of the expected market equity risk premium. Among the errors are the well-known survivorship bias (only successful companies survive – poor companies do not survive) and unattainable return bias (the Ibbotson procedure presumes monthly portfolio rebalancing).

Q. DOES MR. BLAKE'S RP APPROACH ACCOUNT FOR THE RISKINESS OF DELTA?

A. No. As demonstrated in his CAPM analysis, Delta's beta of 0.55 suggests that the Company only has about ½ the relative risk or volatility of the overall market. However, Mr. Blake's RP approach does not account for Delta's lower relative degree of riskiness.

Q. TO CONCLUDE THIS DISCUSSION, PLEASE SUMMARIZE MR. BLAKE'S CAPM AND RP RESULTS IN LIGHT OF THE EVIDENCE ON RISK PREMIUMS IN TODAY'S MARKETS.

A. Mr. Blake's CAPM and RP analyses both employ an equity risk premium of 7.1% which is well in excess of the equity risk premium estimates (a) discovered in recent academic studies by leading finance scholars and (b) employed by leading investment banks, management consulting firms, financial forecasters and corporate CFOs.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

1 **A.** Yes.

Exhibit JRW-1

Delta Natural Gas Company, Inc.
Cost of Capital and Fair Rate of Return
Rate of Return Applicable to Original Cost Rate Base
For the Test Year Ending December 31, 2006

Capital Source	Capitalization Amount	Capitalization Ratio	Cost Rate	Weighted Cost Rate
Short/Current Long-Term Debt	$ 17,146,346	13.43%	6.49%	0.87%
Long-Term Debt	$ 59,870,000	46.90%	6.81%	3.20%
Common Equity	$ 50,633,040	39.67%	9.00%	3.57%
Total	$ 127,649,386	100.00%		7.64%

Exhibit JRW-1
S&P Bond Rating Yield Differentials
Long-Term Public Utility Bonds

USD US Utility (A) 25 Year C03625Y Index		USD US Utility BBB+ 25 Year C03825Y Index		USD US Utility BBB 25 Year C03925Y Index		USD US Utility BBB- 25 Year C04025Y Index	
Date	Px Last	Date	Px Last	Date	Px Last	Date	Px Last
1/31/2006	5.76	1/31/2006	6.03	1/31/2006	6.09	1/31/2006	6.28
2/28/2006	5.68	2/28/2006	5.99	2/28/2006	6.01	2/28/2006	6.10
3/31/2006	6.12	3/31/2006	6.36	3/31/2006	6.42	3/31/2006	6.50
4/28/2006	6.40	4/28/2006	6.65	4/28/2006	6.69	4/28/2006	6.81
5/31/2006	6.41	5/31/2006	6.67	5/31/2006	6.74	5/31/2006	6.79
6/30/2006	6.41	6/30/2006	6.65	6/30/2006	6.72	6/30/2006	6.80
7/31/2006	6.21	7/31/2006	6.53	7/31/2006	6.58	7/31/2006	6.69
8/31/2006	5.99	8/31/2006	6.27	8/31/2006	6.37	8/31/2006	6.49
9/29/2006	5.73	9/29/2006	6.15	9/29/2006	6.24	9/29/2006	6.36
10/31/2006	5.71	10/31/2006	5.95	10/31/2006	6.14	10/31/2006	6.18
11/30/2006	5.55	11/30/2006	5.82	11/30/2006	5.92	11/30/2006	6.03
12/29/2006	5.81	12/29/2006	6.04	12/29/2006	6.16	12/29/2006	6.25
1/31/2007	5.86	1/31/2007	6.12	1/31/2007	6.20	1/31/2007	6.31
2/28/2007	5.64	2/28/2007	5.87	2/28/2007	5.95	2/28/2007	6.04
3/30/2007	5.97	3/30/2007	6.09	3/30/2007	6.18	3/30/2007	6.28
4/30/2007	5.99	4/30/2007	6.07	4/30/2007	6.19	4/30/2007	6.26
5/31/2007	6.19	5/31/2007	6.21	5/31/2007	6.37	5/31/2007	6.44
6/29/2007	6.29	6/29/2007	6.36	6/29/2007	6.50	6/29/2007	6.55
7/31/2007	6.11	7/31/2007	6.24	7/31/2007	6.25	7/31/2007	6.42
Average	5.99	Average	6.21	Average	6.30	Average	6.40

Yield Differential	
A-BBB	31Basis Points

Data Source: Bloomberg

Exhibit JRW-2

Delta Natural Gas Company, Inc.

Summary Financial Statistics

Twelve-Company Natural Gas Distribution Group

Company		S&P Bond Rating	Operating Revenue ($mil)	Percent Gas Revenue	Net Plant ($mil)	Pre-Tax Interest Coverage	Primary Service Area	Common Equity Ratio	Return on Equity	Price/ Earnings Ratio	Market to Book Ratio
AGL Resources	ATG	A-	2550.0	64%	3470.0	5.0	GA,VA,TN	49.0%	12.5%	15.7	190
Atmos Energy	ATO	BBB	5512.9	58%	3711.8	2.8	LA,KY,TX, CO,KS	48.0%	9.4%	15.0	133
Energy West	EWST	NR	65.4	71%	30.4	2.8	MT, WY	50.0%	15.6%	13.8	202
Energy South, Inc.	ENSI	NR	130.6	96%	242.1	4.9	AL	58.0%	12.4%	28.0	335
Delta Natural Gas Company	DGAS	NR	97.0	49%	122.4	2.6	KY	47.0%	8.9%	16.7	148
Laclede Group, Inc.	LG	A	1839.9	59%	776.5	3.1	MI	41.0%	9.9%	16.6	161
New Jersey Resources	NJR	AA-	2836.7	34%	946.5	6.0	NJ, Canada	58.0%	14.6%	15.4	218
Northwest Natural Gas Company	NWN	AA-	1016.9	99%	1396.6	3.4	OR, WA	54.0%	11.3%	17.7	196
Piedmont Natural Gas, Inc.	PNY	A	1728.9	82%	2100.6	4.0	NC, SC, TN	52.0%	11.1%	17.9	201
RGC Resources, Inc.	RGCO	NR	98.0	99%	80.5	3.1	VA, WV	58.0%	9.6%	14.6	135
South Jersey Industries	SJI	A	934.9	65%	827.5	5.4	NJ	51.0%	16.4%	14.5	226
WGL Holdings, Inc.	WGL	AA-	2511.0	57%	2097.4	4.2	VA, MD	51.0%	10.1%	16.3	160
Mean		A+	1610.2	69%	1316.9	3.9		51.4%	11.8%	16.9	192
Median			1372.9	65%	887.0	3.7		51.0%	11.2%	16.0	193

Data Source: AUS *Utility Reports*, July, 2007, *Value Line Investment Sur*vey, June 16, 2007, www.yahoo.com.

Exhibit JRW-2

Delta Natural Gas Company, Inc.

***Value Line* Risk Metrics**

Company	Beta	Safety	Financial Strength	Stock Price Stability	Price Growth Persistence	Earnings Predict
AGL Resources	0.95	2	B++	95	70	75
Atmos Energy	0.80	2	B+	100	35	70
Delta Natural Gas Company	0.50	2	B+	100	50	65
Energy West	0.40	4	C++	25	30	15
Energy South, Inc.	0.65	2	B++	95	80	95
Laclede Group, Inc.	0.90	2	B+	95	50	65
New Jersey Resources	0.80	1	A	100	90	95
Northwest Natural Gas Company	0.75	1	A	100	65	80
Piedmont Natural Gas, Inc.	0.80	2	B++	100	80	80
RGC Resources, Inc.	0.35	3	B+	85	70	50
South Jersey Industries	0.70	2	B++	100	100	90
WGL Holdings, Inc.	0.85	1	A	100	70	65
Mean	0.70	2	B++	91	66	70

Delta Natural Gas Company	0.50	2	B++	100	50	65

Data Source: *Value Line Investment Survey*, June 16, 2007.

Exhibit JRW-2
Delta Natural Gas Company, Inc.
Value Line Risk Metrics

Beta - A relative measure of the historical sensitivity of the stock's price to overall fluctuations in the New York Stock Exchange Composite Index. A Beta of 1.50 indicates a stock tends to rise (or fall) 50% more than the New York Stock Exchange Composite Index. The "Beta coefficient" is derived from a regression analysis of the relationship between weekly percentage changes in the price of a stock and weekly percentage changes in the NYSE Index over a period of five years. In the case of shorter price histories, a smaller time period is used, but two years is the minimum. The Betas are adjusted for their long-term tendency to converge toward 1.00. Additionally, Value Line shows betas computed based on monthly total returns for the trailing three year, five-year and 10-year periods.

Safety Rank - A measurement of potential risk associated with individual common stocks. The Safety Rank is computed by averaging two other Value Line indexes - the Price Stability Index and the Financial strength Rating. Safety Ranks range from 1 (Highest) to 5 (Lowest). Conservative investors should try to limit their purchases to equities ranked 1 (Highest) and 2 (Above Average) for Safety.

Financial Strength Rating - A relative measure of financial strength of the companies reviewed by Value Line. The relative ratings range from A++ (strongest) down to C (weakest), in nine steps.

Price Stability Index - A measure of the stability of a stock's price. It includes sensitivity to the market (see Beta) as well as the stock's inherent volatility. Value Line Stability ratings range from 100 (highest) to 5 (lowest).

Price Growth Persistence - The historic tendency of a stock to show persistent growth compared with the average stock. Expressed as an index ranging from 100 (highest) to 5 (lowest) in increments of 5.

Earnings Predictability Index - A measure of the reliability of an earnings forecast. Predictability is based upon the stability of year-to-year comparisons, with recent years being weighted more heavily that earlier ones. The most reliable forecasts tend to be those with the highest rating (100); the least reliable, the lowest (5). The earnings stability is derived from the standard deviation of percentage changes in quarterly earnings over an eight-year period. Special adjustments are made for comparisons around zero and from plus to minus.

Exhibit JRW-3

Delta Natural Gas Company, Inc.

Capital Structure Ratios

Panel A - Delta Natural Gas Company, Inc. Recommended Capitalization Ratios

	Capitalization	Capitalization Ratios	Capital Cost Rates
Short/Current Long-Term Debt	$ 17,146,346	13.43%	6.49%
Long-Term Debt	59,870,000	46.90%	6.81%
Common Equity	50,633,040	39.67%	
Total Capital	$ 127,649,386	100.00%	

Testimony of Paul Moul

Panel B - Average Capital Structure Ratios
Proxy Group of Twelve Gas Distribution Companies

	Mar-07	Dec-06	Sep-06	Jun-06	Average
Short Term Debt	3.49%	7.85%	6.40%	4.77%	5.63%
Long-Term Debt	42.35%	41.74%	43.85%	43.78%	42.93%
Stockholders' Equity	54.16%	50.41%	49.75%	51.45%	51.44%
Total	100.00%	100.00%	100.00%	100.00%	100.00%

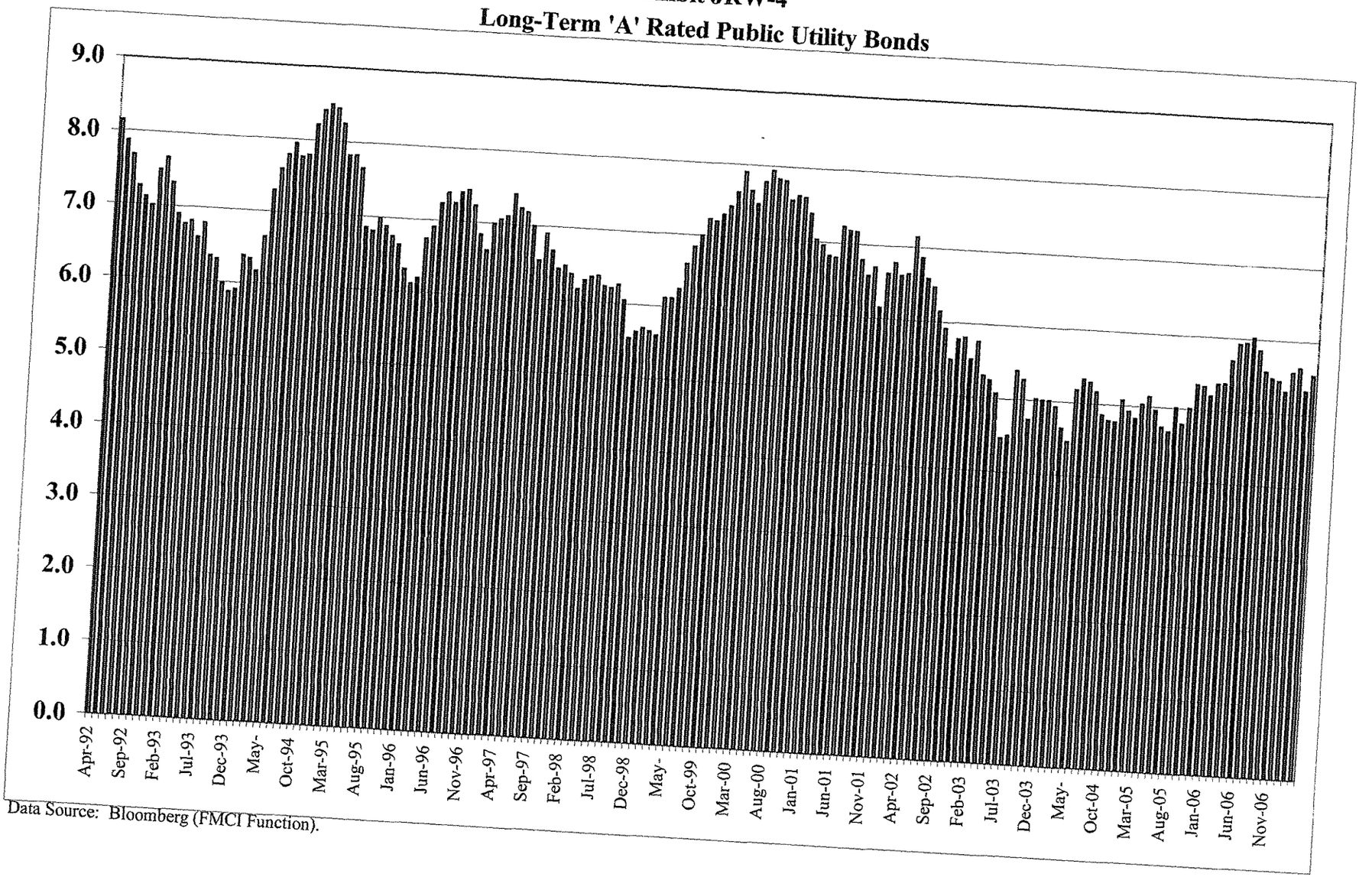
Panel C - OAG Recommended Capital Structure and Senior Capital Cost Rates

	Capitalization	Capitalization Ratios	Capital Cost Rates
Short/Current Long-Term Debt	$ 17,146,346	13.43%	6.49%
Long-Term Debt	59,870,000	46.90%	6.81%
Common Equity	50,633,040	39.67%	
Total (Equal to Rate Base)	$ 127,649,386	100.00%	

Exhibit JRW-3
Delta Natural Gas Company, Inc.
Capital Structure Ratios

ATG		3/31/07	12/31/06	9/30/06	6/30/06	ATG		3/31/07	12/31/06	9/30/06	6/30/06
	Short Term Debt	111,000	539,000	441,000	455,000		Short Term Debt	3.25%	14.30%	12.06%	12.32%
	Long-Term Debt	1,623,000	1,622,000	1,634,000	1,632,000		Long-Term Debt	47.57%	43.02%	44.69%	44.18%
	Stockholders' Equity	1,678,000	1,609,000	1,581,000	1,607,000		Stockholders' Equity	49.18%	42.68%	43.24%	43.50%
	Total	3,412,000	3,770,000	3,656,000	3,694,000		Total	100.00%	100.00%	100.00%	100.00%
ATO		3/31/07	12/31/06	9/30/06	6/30/06	ATO		3/31/07	12/31/06	9/30/06	6/30/06
	Short Term Debt	303,232	457,680	385,602	300,418		Short Term Debt	0.00%	0.00%	0.00%	0.00%
	Long-Term Debt	1,878,331	1,878,733	2,180,362	2,180,752		Long-Term Debt	48.16%	49.45%	56.95%	56.71%
	Stockholders' Equity	2,021,953	1,920,457	1,648,098	1,664,556		Stockholders' Equity	51.84%	50.55%	43.05%	43.29%
	Total	3,900,284	3,799,190	3,828,460	3,845,308		Total	100.00%	100.00%	100.00%	100.00%
EWST		3/31/07	12/31/06	9/30/06	6/30/06	EWST		3/31/07	12/31/06	9/30/06	6/30/06
	Short Term Debt	1,123	6,172	4,012	1,058		Short Term Debt	2.95%	14.26%	9.96%	2.80%
	Long-Term Debt	15,218	17,318	17,495	17,605		Long-Term Debt	40.04%	40.00%	43.42%	46.54%
	Stockholders' Equity	21,667	19,803	18,781	19,165		Stockholders' Equity	57.01%	45.74%	46.62%	50.66%
	Total	38,008	43,293	40,288	37,828		Total	100.00%	100.00%	100.00%	100.00%
ENSI		3/31/07	12/31/06	9/30/06	6/30/06	ENSI		3/31/07	12/31/06	9/30/06	6/30/06
	Short Term Debt	5,746	5,680	5,619	4,957		Short Term Debt	2.94%	2.98%	2.99%	2.62%
	Long-Term Debt	69,492	70,455	71,361	72,863		Long-Term Debt	35.60%	36.99%	37.94%	38.55%
	Stockholders' Equity	119,979	114,339	111,090	111,188		Stockholders' Equity	61.46%	60.03%	59.07%	58.83%
	Total	195,217	190,474	188,070	189,008		Total	100.00%	100.00%	100.00%	100.00%
DGAS		3/31/07	12/31/06	9/30/06	6/30/06	DGAS		3/31/07	12/31/06	9/30/06	6/30/06
	Short Term Debt	1,200	1,200	1,200	1,200		Short Term Debt	1.04%	1.07%	1.08%	1.07%
	Long-Term Debt	58,645	58,670	58,790	58,790		Long-Term Debt	50.83%	52.10%	52.87%	52.21%
	Stockholders' Equity	55,524	52,737	51,205	52,610		Stockholders' Equity	48.13%	46.83%	46.05%	46.72%
	Total	115,369	112,607	111,195	112,600		Total	100.00%	100.00%	100.00%	100.00%
LG		3/31/07	12/31/06	9/30/06	6/30/06	LG		3/31/07	12/31/06	9/30/06	6/30/06
	Short Term Debt	40,160	40,152	159	159		Short Term Debt	4.86%	4.93%	0.02%	0.02%
	Long-Term Debt	355,482	355,462	395,441	395,421		Long-Term Debt	43.05%	43.66%	49.49%	49.28%
	Stockholders' Equity	430,191	418,531	403,424	406,886		Stockholders' Equity	52.09%	51.41%	50.49%	50.70%
	Total	825,833	814,145	799,024	802,466		Total	100.00%	100.00%	100.00%	100.00%
NJR		3/31/07	12/31/06	9/30/06	6/30/06	NJR		3/31/07	12/31/06	9/30/06	6/30/06
	Short Term Debt	238,081	444,089	447,996	272,721		Short Term Debt	18.72%	29.67%	30.13%	21.22%
	Long-Term Debt	381,022	407,553	417,368	416,752		Long-Term Debt	29.96%	27.23%	28.07%	32.43%
	Stockholders' Equity	652,805	645,154	621,662	595,471		Stockholders' Equity	51.32%	43.10%	41.81%	46.34%
	Total	1,271,908	1,496,796	1,487,026	1,284,944		Total	100.00%	100.00%	100.00%	100.00%
NWN		3/31/07	12/31/06	9/30/06	6/30/06	NWN		3/31/07	12/31/06	9/30/06	6/30/06
	Short Term Debt	18,947	68,272	29,500	28,000		Short Term Debt	1.62%	5.71%	2.55%	2.35%
	Long-Term Debt	520,108	528,031	533,469	544,947		Long-Term Debt	44.48%	44.16%	46.17%	45.72%
	Stockholders' Equity	630,367	599,545	592,443	618,910		Stockholders' Equity	53.90%	50.14%	51.28%	51.93%
	Total	1,169,422	1,195,848	1,155,412	1,191,857		Total	100.00%	100.00%	100.00%	100.00%
PNY		3/31/07	12/31/06	9/30/06	6/30/06	PNY		3/31/07	12/31/06	9/30/06	6/30/06
	Short Term Debt				35,000		Short Term Debt	0.00%	0.00%	0.00%	2.20%
	Long-Term Debt	825,000	825,000	825,000	625,000		Long-Term Debt	47.50%	48.30%	47.77%	39.29%
	Stockholders' Equity	912,013	882,925	902,021	930,537		Stockholders' Equity	52.50%	51.70%	52.23%	58.50%
	Total	1,737,013	1,707,925	1,727,021	1,590,537		Total	100.00%	100.00%	100.00%	100.00%
RGCO		3/31/07	12/31/06	9/30/06	6/30/06	RGCO		3/31/07	12/31/06	9/30/06	6/30/06
	Short Term Debt	2,041	11,816	6,613	4,153		Short Term Debt	2.69%	14.13%	8.58%	5.49%
	Long-Term Debt	30,000	30,000	30,000	30,000		Long-Term Debt	39.47%	35.87%	38.91%	39.67%
	Stockholders' Equity	43,960	41,818	40,495	41,478		Stockholders' Equity	57.84%	50.00%	52.52%	54.84%
	Total	76,001	83,634	77,108	75,631		Total	100.00%	100.00%	100.00%	100.00%
SJI		3/31/07	12/31/06	9/30/06	6/30/06	SJI		3/31/07	12/31/06	9/30/06	6/30/06
	Short Term Debt	16,092	44,493	47,441	30,738		Short Term Debt	1.91%	5.21%	5.58%	3.74%
	Long-Term Debt	362,849	365,940	370,671	367,339		Long-Term Debt	43.08%	42.88%	43.57%	44.70%
	Stockholders' Equity	463,289	443,036	432,630	423,774		Stockholders' Equity	55.01%	51.91%	50.85%	51.56%
	Total	842,230	853,469	850,742	821,851		Total	100.00%	100.00%	100.00%	100.00%
WGL		3/31/07	12/31/06	9/30/06	6/30/06	WGL		3/31/07	12/31/06	9/30/06	6/30/06
	Short Term Debt	30,000	31,075	60,994	55,031		Short Term Debt	1.91%	1.91%	3.84%	3.41%
	Long-Term Debt	604,126	605,073	576,139	581,788		Long-Term Debt	38.50%	37.27%	36.30%	36.10%
	Stockholders' Equity	934,855	987,301	949,980	974,729		Stockholders' Equity	59.58%	60.82%	59.86%	60.48%
	Total	1,568,981	1,623,449	1,587,113	1,611,548		Total	100.00%	100.00%	100.00%	100.00%
								3/31/07	12/31/06	9/30/06	6/30/06
							Short Term Debt	3.49%	7.85%	6.40%	4.77%
							Long-Term Debt	42.35%	41.74%	43.85%	43.78%
							Stockholders' Equity	54.16%	50.41%	49.75%	51.45%
							Total	100.00%	100.00%	100.00%	100.00%

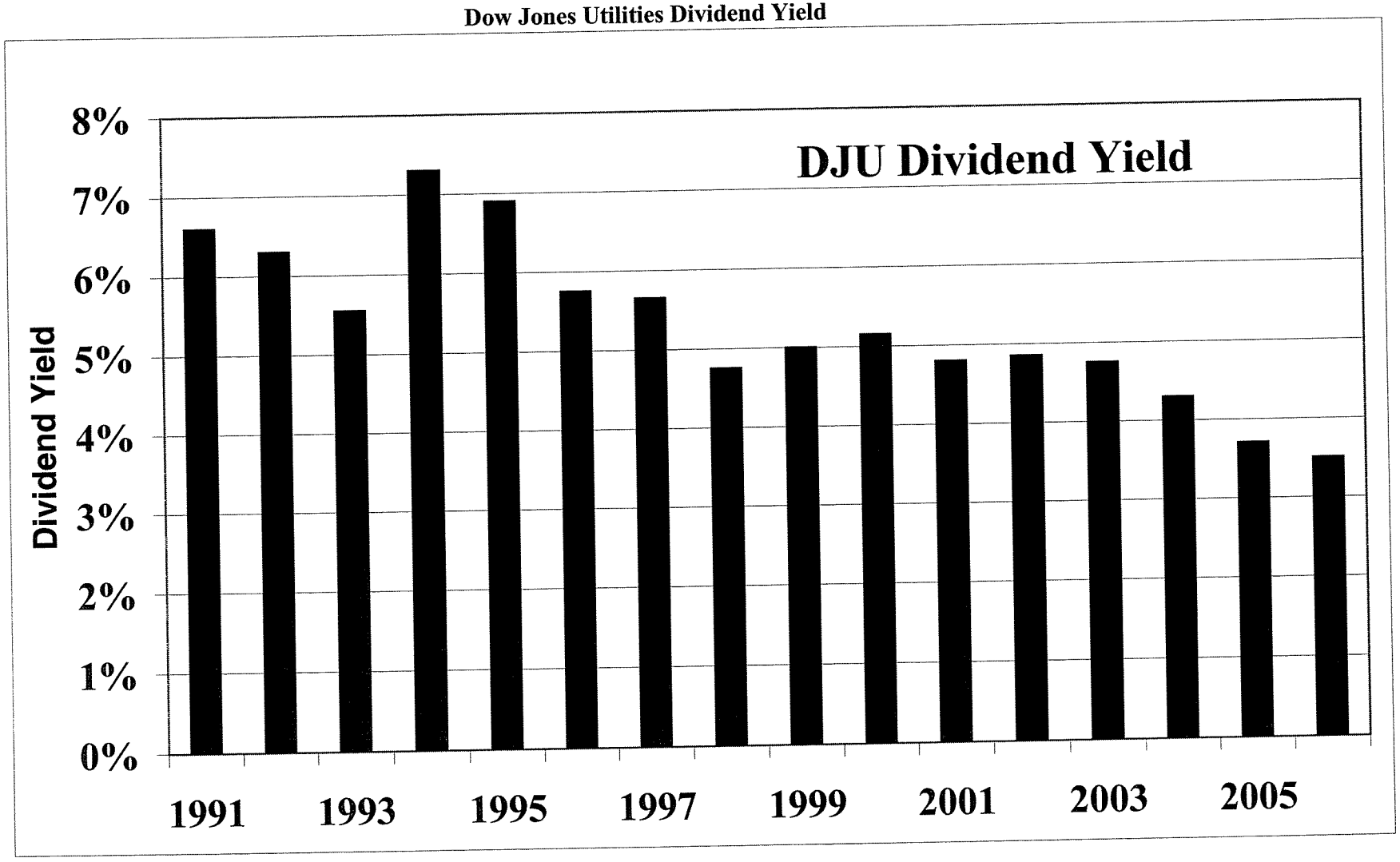
Exhibit JRW-4
Long-Term 'A' Rated Public Utility Bonds



Data Source: Bloomberg (FMCI Function).

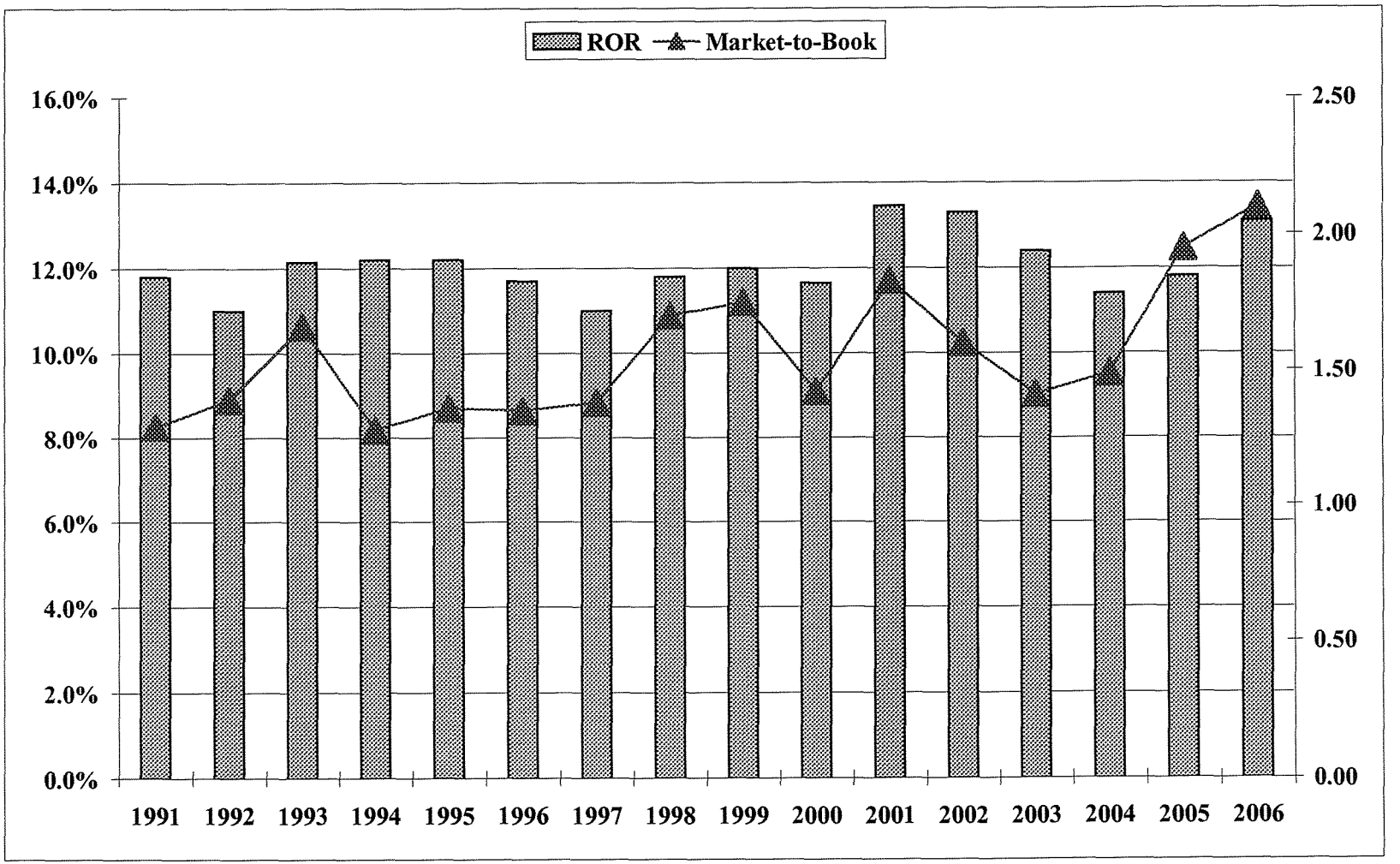
Exhibit JRW-4

Dow Jones Utilities Dividend Yield



Data Source: Value Line Investment Survey

Exhibit JRW-4
Dow Jones Utilities - Market to Book and ROE



Data Source: Value Line Investment Survey

Exhibit JRW-5

Industry Average Betas

Industry Name	Number of Firms	Beta	Industry Name	Number of Firms	Beta	Industry Name	Number of Firms	Beta
Semiconductor Equip	14	2.95	Retail Automotive	15	1.04	Publishing	50	0.89
Semiconductor	124	2.92	Grocery	19	1.04	Petroleum (Producing)	178	0.88
Wireless Networking	73	2.41	Foreign Electronics	10	1.03	Diversified Co.	134	0.87
Power	41	2.39	Office Equip/Supplies	26	1.02	Electric Utility (East)	29	0.87
Telecom. Equipment	136	2.35	Cement & Aggregates	13	1.02	Furn/Home Furnishings	38	0.87
Internet	329	2.30	Information Services	41	1.02	Environmental	96	0.87
E-Commerce	60	2.23	Metal Fabricating	37	1.01	Packaging & Container	36	0.87
Entertainment Tech	31	2.18	Natural Gas (Div.)	34	1.01	Maritime	46	0.86
Computers/Peripherals	148	1.99	Industrial Services	230	1.01	Home Appliance	14	0.84
Computer Software/Svcs	425	1.84	Machinery	139	1.01	Paper/Forest Products	42	0.84
Bank (Foreign)	4	1.78	Utility (Foreign)	6	1.00	Toiletries/Cosmetics	21	0.83
Cable TV	23	1.76	Auto Parts	64	0.99	Insurance (Prop/Cas.)	97	0.83
Coal	16	1.75	Advertising	36	0.99	Restaurant	81	0.80
Precision Instrument	104	1.71	Manuf. Housing/RV	19	0.99	Bank (Midwest)	37	0.79
Drug	334	1.59	Homebuilding	41	0.98	Tobacco	11	0.79
Biotechnology	105	1.56	Chemical (Specialty)	94	0.98	Household Products	31	0.79
Electrical Equipment	94	1.52	Trucking	38	0.98	R.E.I.T.	143	0.77
Steel (Integrated)	16	1.50	Retail (Special Lines)	164	0.98	Hotel/Gaming	84	0.77
Electronics	186	1.49	Building Materials	47	0.98	Newspaper	18	0.76
Telecom. Services	173	1.43	Chemical (Basic)	24	0.98	Investment Co.	20	0.75
Air Transport	56	1.38	Electric Utility (West)	16	0.97	Canadian Energy	14	0.73
Entertainment	101	1.30	Chemical (Diversified)	36	0.97	Natural Gas (Distrib.)	30	0.73
Securities Brokerage	32	1.29	Tire & Rubber	10	0.96	Water Utility	16	0.73
Auto & Truck	31	1.29	Railroad	20	0.96	Food Processing	123	0.72
Human Resources	35	1.22	Petroleum (Integrated)	30	0.96	Bank (Canadian)	7	0.72
Healthcare Information	34	1.22	Retail Building Supply	9	0.95	Food Wholesalers	21	0.72
Investment Co.(Foreign)	15	1.21	Medical Services	186	0.94	Beverage (Soft Drink)	21	0.71
Steel (General)	30	1.16	Retail Store	51	0.94	Beverage (Alcoholic)	27	0.66
Recreation	84	1.12	Electric Util. (Central)	24	0.94	Bank	550	0.59
Medical Supplies	279	1.11	Pharmacy Services	20	0.93	Thrift	248	0.56
Educational Services	37	1.09	Insurance (Life)	40	0.93	**Market**	**7661**	**1.14**
Shoe	24	1.08	Apparel	64	0.93			
Other	1	1.06	Aerospace/Defense	73	0.92			
Oilfield Svcs/Equip.	110	1.05	Precious Metals	67	0.90			
Metals & Mining (Div.)	82	1.04	Financial Svcs. (Div.)	269	0.89			

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

Exhibit JRW-6

Delta Natural Gas Company, Inc.
DCF Equity Cost Rate

Twelve-Company Natural Gas Distribution Group

Dividend Yield*	3.75%
Adjustment Factor	1.025
Adjusted Dividend Yield	3.84%
Growth Rate**	5.00%
Equity Cost Rate	8.8%

* Page 2 of Exhibit JRW-6

** Based on data provided on pages 3-4, Exhibit JRW-6

Exhibit JRW-6

Delta Natural Gas Company, Inc.
Monthly Dividend Yields
March-August 2007

Twelve-Company Natural Gas Distribution Group

Company	Mar	Apr	May	Jun	July	Aug	Mean
AGL Resources	3.9%	4.1%	3.8%	3.8%	4.0%	4.0%	**3.9%**
Atmos Energy	3.9%	4.0%	4.0%	4.0%	4.2%	4.2%	**4.1%**
Delta Natural Gas Company	4.9%	4.9%	4.9%	4.8%	4.7%	4.9%	**4.9%**
Energy West	3.8%	3.8%	4.1%	4.0%	4.0%	4.1%	**4.0%**
Energy South, Inc.	2.3%	2.3%	2.2%	2.1%	2.0%	2.0%	**2.2%**
Laclede Group, Inc.	4.6%	4.9%	4.7%	4.6%	4.5%	4.5%	**4.6%**
New Jersey Resopurces	3.1%	3.1%	3.0%	2.7%	2.9%	3.0%	**3.0%**
Northwest Natural Gas Company	3.3%	3.2%	3.1%	2.8%	2.9%	3.1%	**3.1%**
Piedmont Natural Gas, Inc.	3.6%	3.8%	3.8%	3.7%	3.7%	4.0%	**3.8%**
RGC Resources, Inc.	4.6%	4.4%	4.4%	4.3%	4.2%	4.4%	**4.4%**
South Jersey Industries	2.8%	2.7%	2.6%	2.5%	2.7%	2.8%	**2.7%**
WGL Holdings, Inc.	4.2%	4.4%	4.2%	3.9%	4.1%	4.2%	**4.2%**
Mean	**3.8%**	**3.8%**	**3.7%**	**3.6%**	**3.7%**	**3.8%**	**3.7%**

Data Source: AUS Utility Reports, monthly issues.

Exhibit JRW-6

Delta Natural Gas Company, Inc.

DCF Equity Cost Growth Rate Measures

***Value Line* Historic Growth Rates**

Twelve-Company Natural Gas Distribution Group

Company	Sym	*Value Line* Historic Growth					
		Past 10 Years			Past 5 Years		
		Earnings	Dividends	Book Value	Earnings	Dividends	Book Value
AGL Resources	ATG	7.0%	2.5%	6.5%	15.0%	4.0%	10.5%
Atmos Energy	ATO	3.5%	3.0%	6.5%	10.0%	2.0%	8.5%
Delta Natural Gas Company	DGAS	NA	NA	NA	2.5%	1.0%	4.5%
Energy West	EWST	NA	NA	NA	-13.5%	0.0%	0.0%
Energy South, Inc.	ENSI	NA	NA	NA	8.5%	5.0%	7.0%
Laclede Group, Inc.	LG	3.0%	1.0%	3.0%	6.5%	0.5%	3.5%
New Jersey Resopurces	NJR	7.5%	3.0%	6.5%	8.0%	3.5%	8.5%
Northwest Natural Gas Company	NWN	2.0%	1.0%	4.0%	3.0%	1.5%	3.5%
Piedmont Natural Gas, Inc.	PNY	5.5%	5.5%	6.5%	5.0%	5.0%	6.5%
RGC Resources, Inc.	RGCO	NA	NA	NA	-1.0%	1.5%	3.0%
South Jersey Industries	SJI	8.5%	2.0%	6.0%	9.5%	3.5%	13.5%
WGL Holdings, Inc.	WGL	4.5%	1.5%	4.0%	6.0%	1.5%	3.0%
Mean		**5.2%**	**2.4%**	**5.4%**	**5.0%**	**2.4%**	**6.0%**
Median		**5.2%**	**2.4%**	**6.0%**	**6.0%**	**2.0%**	**6.0%**
		Average of Mean and Median Figures =			**4.5%**		

Data Source: *Value Line Investment Sur*vey, June 16, 2007.

Exhibit JRW-6

Delta Natural Gas Company, Inc.
DCF Equity Cost Growth Rate Measures
Value Line Projected Growth Rates

Twelve-Company Natural Gas Distribution 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
AGL Resources	ATG	3.5%	5.5%	2.5%	14.0%	42.0%	5.9%
Atmos Energy	ATO	6.0%	1.5%	4.5%	9.5%	46.0%	4.4%
Delta Natural Gas Company	DGAS	NA	NA	NA	9.5%	23.0%	2.2%
Energy West	EWST	NA	NA	NA	12.1%	79.0%	9.6%
Energy South, Inc.	ENSI	NA	NA	NA	12.6%	50.0%	6.3%
Laclede Group, Inc.	LG	2.0%	2.5%	5.0%	10.0%	33.0%	3.3%
New Jersey Resopurces	NJR	3.0%	4.0%	7.5%	10.5%	46.0%	4.8%
Northwest Natural Gas Company	NWN	6.5%	5.5%	4.0%	11.5%	40.0%	4.6%
Piedmont Natural Gas, Inc.	PNY	4.0%	4.0%	4.0%	11.5%	31.0%	3.6%
RGC Resources, Inc.	RGCO	NA	NA	NA	8.1%	23.0%	1.9%
South Jersey Industries	SJI	NMF	5.5%	4.5%	16.5%	60.0%	9.9%
WGL Holdings, Inc.	WGL	2.0%	2.5%	3.5%	10.5%	36.0%	3.8%
Mean		**3.9%**	**3.9%**	**4.4%**	**11.4%**	**42.4%**	**5.0%**
Median		**3.5%**	**4.0%**	**4.3%**	**11.0%**	**41.0%**	**4.5%**
Average of Mean and Median Figures =			**4.0%**	**Average of Mean and Median Figures =**			**4.7%**

Data Source: *Value Line Investment Sur*vey, June 16, 2007.

Exhibit JRW-6

Delta Natural Gas Company, Inc.
DCF Equity Cost Growth Rate Measures
Analysts Projected EPS Growth Rate Estimates

Twelve-Company Natural Gas Distribution Group

Company	Sym	Yahoo First Call	Reuters	Zack's	Average
AGL Resources	ATG	4.5%	5.0%	4.5%	4.7%
Atmos Energy	ATO	5.1%	5.4%	5.3%	5.3%
Delta Natural Gas Company	DGAS		3.0%	3.0%	3.0%
Energy West	EWST	NA	NA	NA	
Energy South, Inc.	ENSI	7.0%	7.0%	7.0%	7.0%
Laclede Group, Inc.	LG	3.0%	3.0%	3.0%	3.0%
New Jersey Resources	NJR	5.3%	5.2%	5.0%	5.2%
Northwest Natural Gas Company	NWN	4.8%	5.5%	5.3%	5.2%
Piedmont Natural Gas, Inc.	PNY	4.5%	4.6%	5.3%	4.8%
RGC Resources, Inc.	RGCO	NA	NA	NA	
South Jersey Industries	SJI	7.3%	6.3%	6.5%	6.7%
WGL Holdings, Inc.	WGL	3.3%	3.3%	3.0%	3.2%
Mean		**5.0%**	**4.8%**	**4.8%**	**4.8%**
Median		**4.8%**	**5.1%**	**5.2%**	**5.0%**

Data Sources: www.zacks.com, www.investor.reuters.com, http://quote.yahoo.com. July, *2007.*

Exhibit JRW-7
Delta Natural Gas Company, Inc.
CAPM Equity Cost Rate

Twelve-Company Natural Gas Distribution Group

Risk-Free Interest Rate	**5.25%**
Beta**	**0.78**
Ex Ante Equity Risk Premium***	**4.14%**
CAPM Cost of Equity	**8.5%**

** See page 2 of Exhibit JRW-7
*** See page 3 of Exhibit JRW-7

Exhibit JRW-7

Delta Natural Gas Company, Inc.
CAPM
Beta

Twelve-Company Natural Gas Distribution Group

Company	Ticker	Beta
AGL Resources	ATG	0.95
Atmos Energy	ATO	0.80
Delta Natural Gas Company	DGAS	0.50
Energy West	EWST	0.40
Energy South, Inc.	ENSI	0.65
Laclede Group, Inc.	LG	0.90
New Jersey Resources	NJR	0.80
Northwest Natural Gas Company	NWN	0.75
Piedmont Natural Gas, Inc.	PNY	0.80
RGC Resources, Inc.	RGCO	0.35
South Jersey Industries	SJI	0.70
WGL Holdings, Inc.	WGL	0.85
Mean		0.70
Median		0.78

Data Source: *Value Line Investment Survey, March 16, 2007.*

Exhibit JRW-7

Delta Natural Gas Company, Inc.
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%	5.75%	
		Geometric			5.00%		
	AVERAGE						5.75%
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					2.50%	
	Duke - CFO Magazine CFO Survey					3.42%	
	Welch - Academics		5.00%	5.50%		5.25%	
	AVERAGE						3.72%
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 Chen						
		Arithmetic			6.00%	5.00%	
		Geometric			4.00%		
	Woolridge					2.65%	
	AVERAGE						3.83%
Other Studies							
	McKinsey		3.50%	4.00%		3.75%	
	AVERAGE						3.75%
OVERALL AVERAGE							**4.14%**

Sources:

Ibbotson Associates, SBBI Yearbook, 2007.

Duke University - CFO Magazine Survey of CFOs, March 2007.

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.

Federal Reserve Bank of Philadelphia, *Survey of Professional Forecasters*, February 13, 2007.

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-7

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

TABLE FIVE
LONG-TERM (10 YEAR) FORECASTS

SERIES: CPI INFLATION RATE	
STATISTIC	
MINIMUM	1.690
LOWER QUARTILE	2.200
MEDIAN	2.350
UPPER QUARTILE	2.600
MAXIMUM	4.000
MEAN	2.410
STD. DEV.	0.400
N	46
MISSING	3

SERIES: REAL GDP GROWTH RATE	
STATISTIC	
MINIMUM	2.500
LOWER QUARTILE	2.810
MEDIAN	3.000
UPPER QUARTILE	3.200
MAXIMUM	3.500
MEAN	3.010
STD. DEV.	0.220
N	44
MISSING	5

SERIES: PRODUCTIVITY GROWTH	
STATISTIC	
MINIMUM	1.200
LOWER QUARTILE	2.000
MEDIAN	2.200
UPPER QUARTILE	2.300
MAXIMUM	3.000
MEAN	2.150
STD. DEV.	0.320
N	0
MISSING	11

SERIES: STOCK RETURNS (S&P 500)	
STATISTIC	
MINIMUM	5.000
LOWER QUARTILE	6.400
MEDIAN	7.500
UPPER QUARTILE	8.130
MAXIMUM	15.000
MEAN	7.680
STD. DEV.	2.050
N	32
MISSING	17

SERIES: BOND RETURNS (10-YEAR)	
STATISTIC	
MINIMUM	2.000
LOWER QUARTILE	5.000
MEDIAN	5.000
UPPER QUARTILE	5.200
MAXIMUM	6.000
MEAN	5.000
STD. DEV.	0.600
N	39
MISSING	10

SERIES: BILL RETURNS (3-MONTH)	
STATISTIC	
MINIMUM	3.000
LOWER QUARTILE	4.000
MEDIAN	4.500
UPPER QUARTILE	4.680
MAXIMUM	6.000
MEAN	4.330
STD. DEV.	0.670
N	39
MISSING	10

Source: Philadelphia Federal Researve Bank, Survey of Professional Forecasters, February 13, 2007.
http://www.phil.frb.org/files/spf/spfq107.pdf

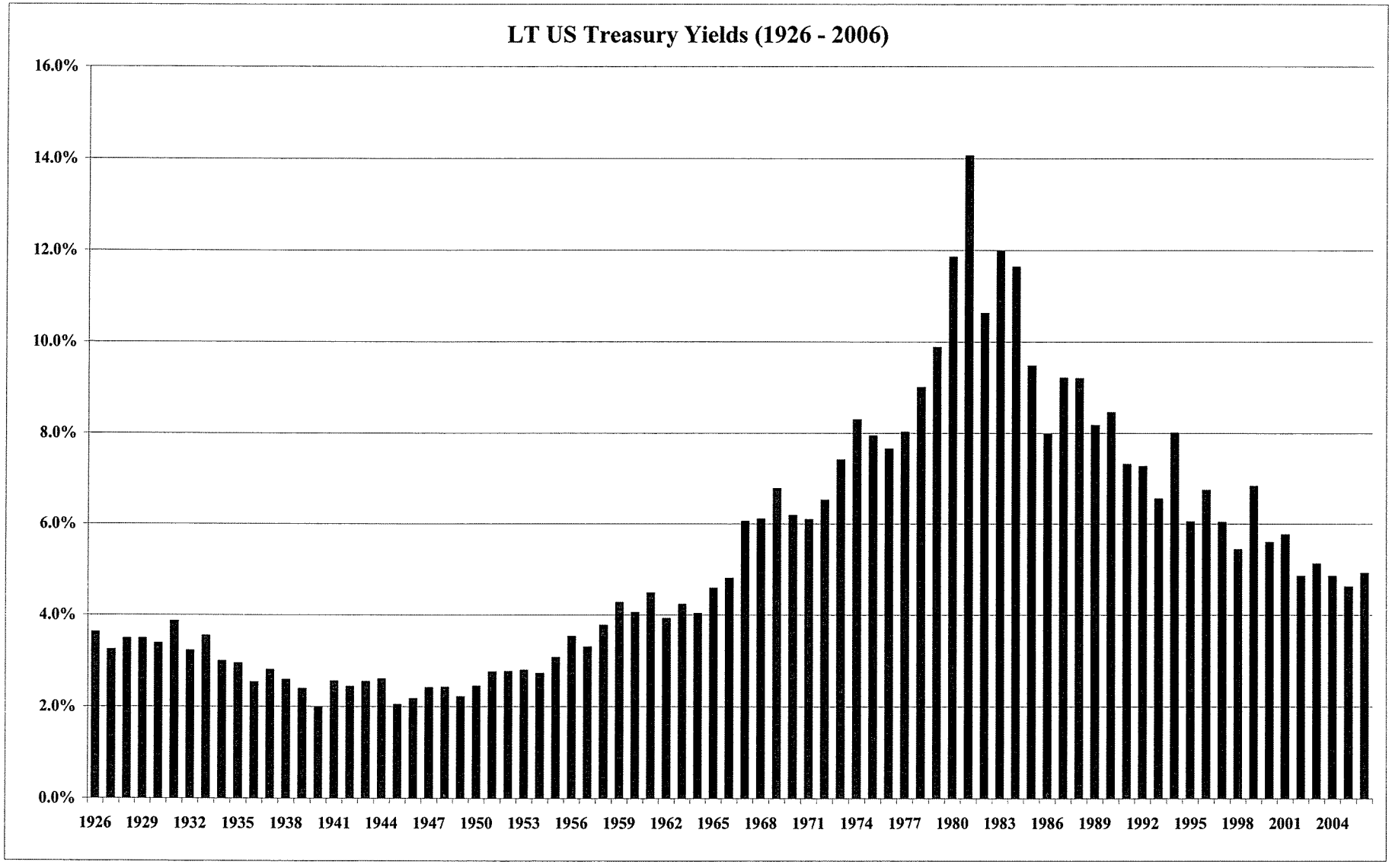
Exhibit JRW-7

Delta Natural Gas Company, Inc.

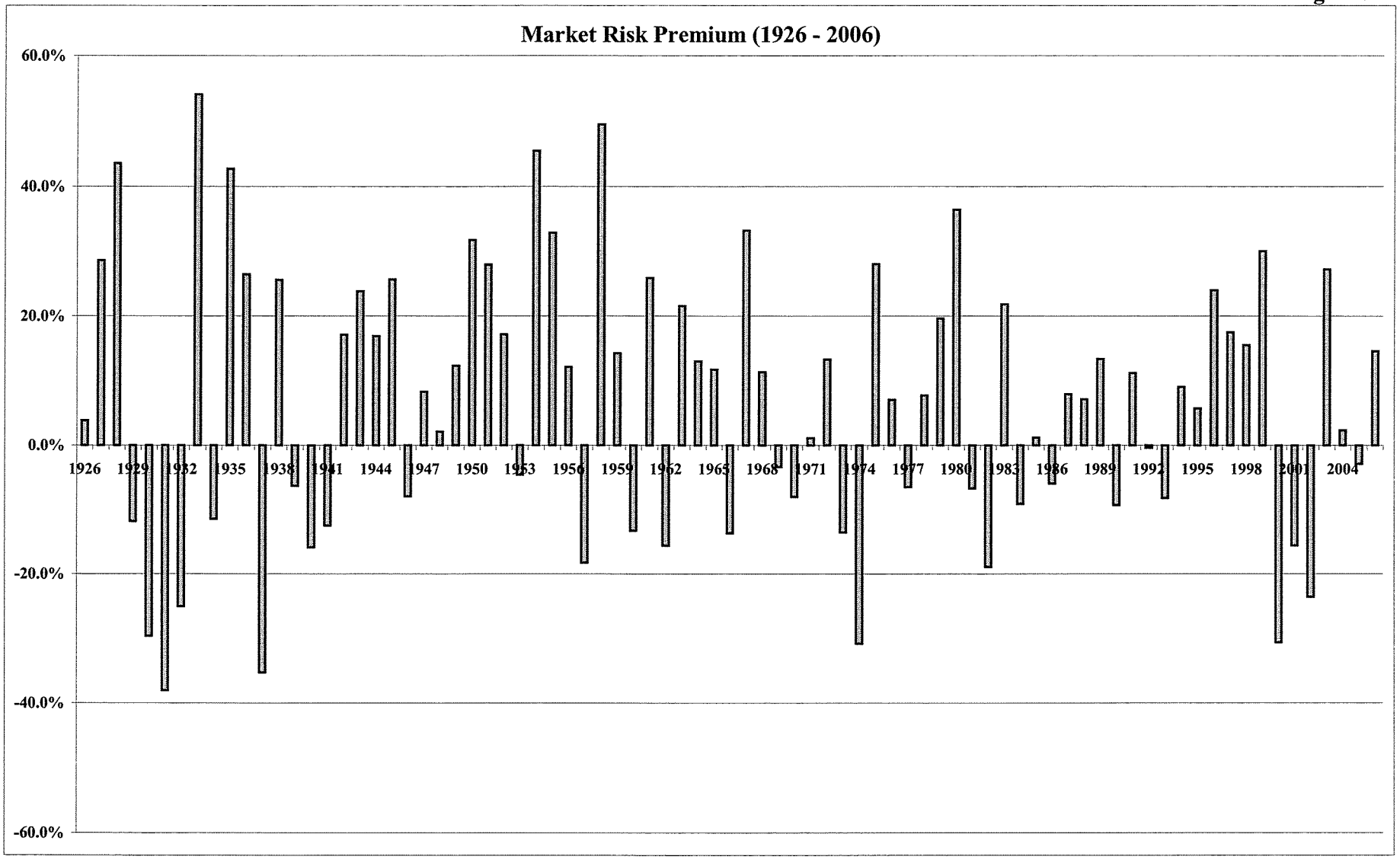
CAPM

Real S&P 500 EPS Growth Rate

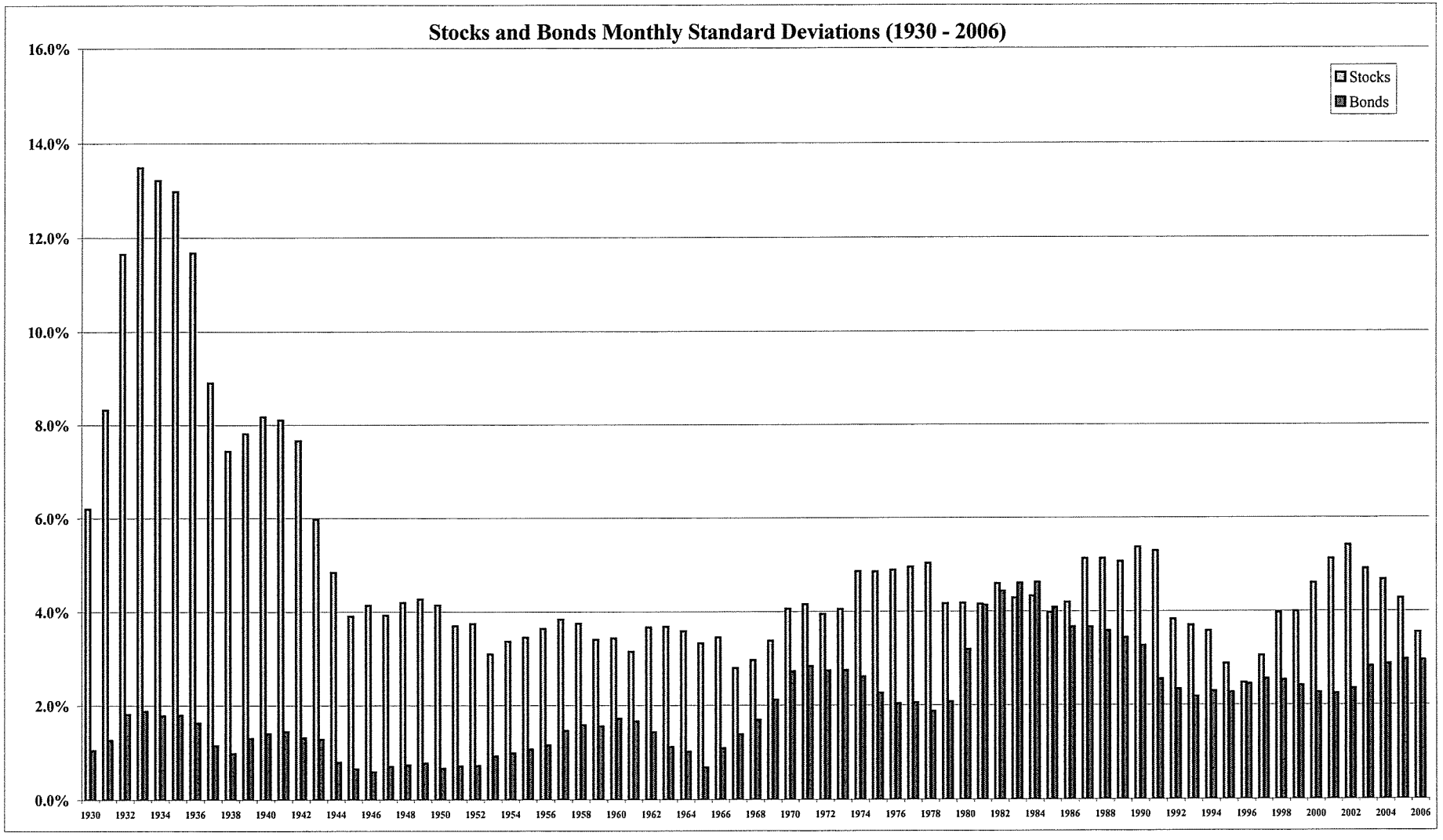
Year	S&P 500 EPS	Annual Inflation CPI	Inflation Adjustment Factor	Real S&P 500 EPS	
1960	3.10	1.40		3.10	
1961	3.37	0.70	1.01	3.35	
1962	3.67	1.30	1.02	3.59	
1963	4.13	1.60	1.04	3.99	
1964	4.76	1.00	1.05	4.55	
1965	5.30	1.90	1.07	4.97	
1966	5.41	3.50	1.10	4.90	
1967	5.46	3.00	1.14	4.80	
1968	5.72	4.70	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	5-Year
2005	68.32	3.52	6.60	10.35	3.00%
2006	81.96	2.50	6.76	12.12	
Data Source: http://pages.stern.nyu.edu/~adamodar/				Real EPS Growth	**3.0%**



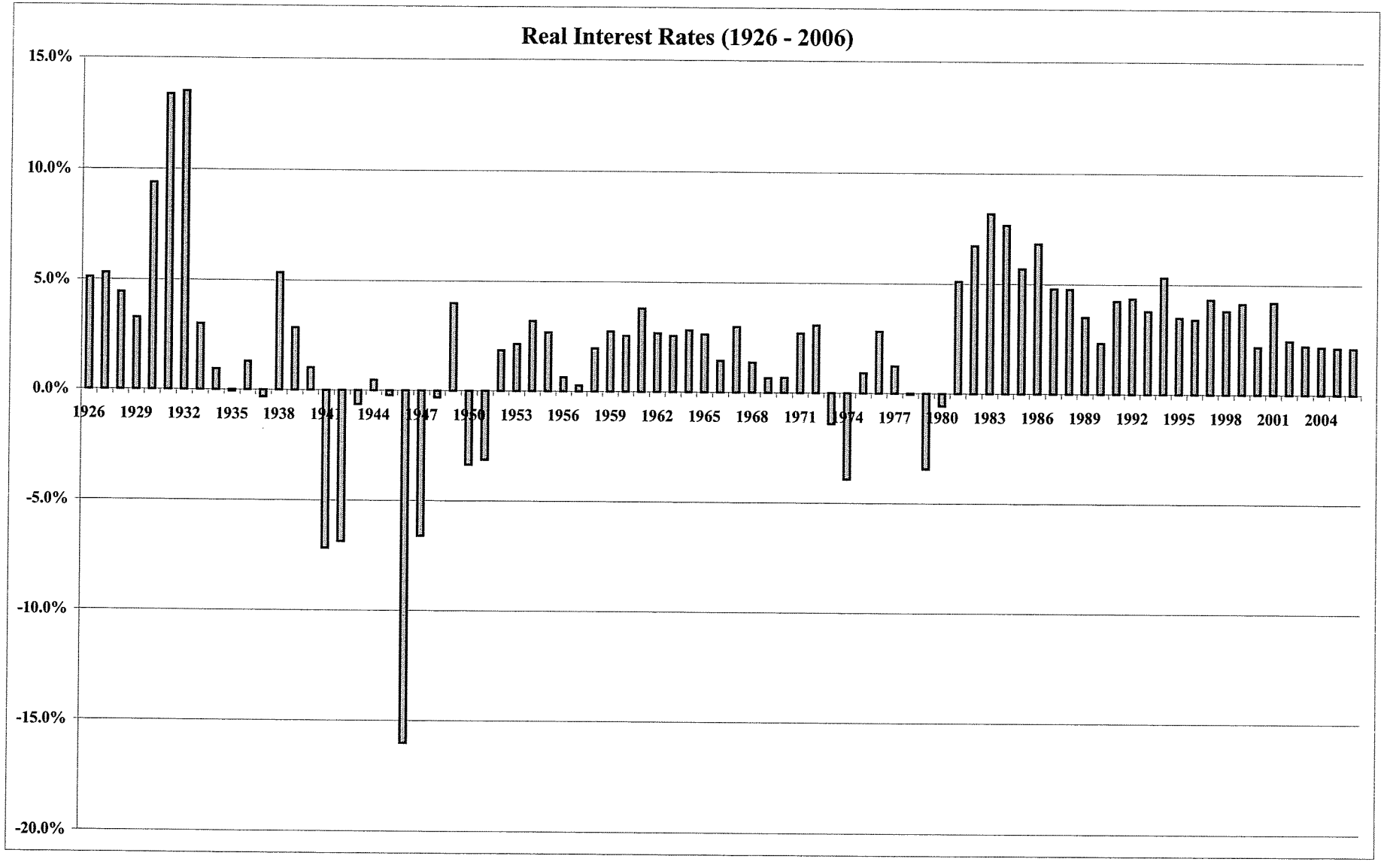
Data Source: Ibbotson Associates, *SBBI Yearbook*, 2007.



Data Source: Ibbotson Associates, *SBBI Yearbook*, 2007.



Data Source: Ibbotson Associates, *SBBI Yearbook*, 2007.



Data Source: Ibbotson Associates, *SBBI Yearbook*, 2007.

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:

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), National Fuel Gas Utility Corporation (R-00049656), T.W. Phillips Gas and Oil Co. (R-00051178), PG Energy (R-00061365), City of Dubois Water Company (Docket No. R-00050671), R-00049165), York Water Company (R-00061322), and Emporium Water Company (R-00061297).

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).

Alaska: Dr. Woolridge prepared testimony for Attorney General's Office of Alaska: Golden Heart Utilities, Inc. and College Utilities Corp. (Water Public Utility Service TA-29-118 and Sewer Public Utility Service TA-82-97).

Arizona: Dr. Woolridge prepared testimony for Utility Division Staff of the Arizona Corporation Commission, Arizona Public Service Company (Docket No. E-01345A-06-0009).

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). Dr. Woolridge prepared testimony for the Staff of the Public Service Commission: Artesian Water Company (R-06-158).

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).

Texas: Dr. Woolridge prepared testimony for the Atmos Cities Steering Committee: Mid-Texas Division of Atmos Energy Corp. (Docket No. 9670).

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), Connecticut Light and Power Company (Docket No. 05-07-18), Birmingham Utilities, Inc. (Docket No. 06-05-10), Connecticut Water Company (Docket No. 06-07-08), and Connecticut Natural Gas Corp. (Docket No. 06-03-04).

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), Carolina Water Service Co. (Docket No. 2006-87-WS), Tega Cay Water Company (Docket No. 2006-97-WS), United Utilities Companies, Inc. Company (Docket No. 2006-107-WS).

Missouri: Dr. Woolridge prepared testimony for the Department of Energy in Missouri: Kansas City Power & Light Company (CASE NO. ER-2006-0314).

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), Kentucky Power Company (Case No. 2005-00341), Union Heat, Light, and Power Company (Case No. 2006-00172),

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 (Docket No. 6988) and Vermont Gas Systems, Inc. (Docket No. 7160).

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

APPLICATION OF DELTA NATURAL GAS CO., INC. FOR AN ADJUSTMENT OF GAS RATES	)))	Case No. 2007-00089

AFFIDAVIT OF DR. J. RANDALL WOOLRIDGE

State of Pennsylvania)
)
County of Centre)

Dr. J. Randall Woolridge, being first duly sworn, states the following: The prepared Pre-Filed Direct Testimony, and the Schedules and Appendix attached thereto constitute the direct testimony of Affiant in the above-styled case. Affiant states that he would give the answers set forth in the Pre-Filed Direct Testimony if asked the questions propounded therein. Affiant further states that, to the best of his knowledge, his statements made are true and correct. Further affiant saith not.

Dr. J. Randall Woolridge

SUBSCRIBED AND SWORN to before me this 13 day of August, 2007.

Mary L. Hart
NOTARY PUBLIC

My Commission Expires:

NOTARIAL SEAL
Mary L. Hart, Notary Public
State College Boro., Centre County
My commission expires August 25, 2009