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Before the Public Service Commission
of the State of Missouri

Direct Testimony

of

Dr. James H. Vander Weide

June 2009

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

I. INTRODUCTION AND SUMMARY

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

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

Q. PLEASE SUMMARIZE YOUR QUALIFICATIONS.

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

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

A. Yes. As an expert on financial and economic theory and practice, I have participated in more than 400 regulatory and legal proceedings before the

U.S. Congress, the Canadian Radio-Television and Telecommunications Commission, the Canadian National Energy Board, the Alberta Utilities Commission (Canada), the Federal Communications Commission, the National Telecommunications and Information Administration, the Federal Energy Regulatory Commission, the public service commissions of 42 states, the insurance commissions of five states, the Iowa State Board of Tax Review, the National Association of Securities Dealers, and the North Carolina Property Tax Commission. In addition, I have testified as an expert witness in proceedings before the U.S. District Court for the District of Nebraska; the U.S. District Court for the District of New Hampshire; the U.S. District Court for the Eastern District of North Carolina; the U.S. District Court for the Northern District of California; the Superior Court, North Carolina; the U.S. Bankruptcy Court for the Southern District of West Virginia; and the U. S. District Court for the Eastern District of Michigan. My resume is shown in Appendix 1.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. I have been asked by The Empire District Gas Company ("EDG" or "the Company") to prepare an independent appraisal of EDG's cost of equity, and to recommend to the Missouri Public Service Commission ("the Commission") a rate of return on equity for the purpose of rate making.

II. SUMMARY OF TESTIMONY

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

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

Q. WHY DO YOU APPLY YOUR COST OF EQUITY METHODS TO A GROUP OF COMPARABLE COMPANIES?

A. I apply my cost of equity methods to a group of comparable companies because standard cost of equity methodologies such as the discounted cash flow ("DCF"), risk premium, and capital asset pricing model ("CAPM") require inputs of quantities that are not easily measured. Since these inputs can only be estimated, there is naturally some degree of uncertainty surrounding the estimate of the cost of equity for each company. However, the uncertainty in the estimate of the cost of equity for an individual company can be reduced by applying cost of equity methodologies to a sample of comparable companies. Intuitively, unusually high estimates for some individual companies are offset by unusually low estimates for other individual companies. Thus, financial economists invariably apply cost of equity methodologies to a group of comparable companies. In utility regulation, the practice of using a group of comparable companies is further supported by the United States Supreme Court standard that the utility should be allowed to earn a return

on its investment that is commensurate with returns being earned on other investments of similar risk.[1]

Q. IS IT POSSIBLE TO APPLY YOUR COST OF EQUITY METHODS DIRECTLY TO EDG?

A. No. Since EDG is a wholly-owned subsidiary of The Empire District Electric Company and thus, is not publicly traded, it is not possible to apply cost of equity methods directly to EDG.

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

A. On the basis of my studies, and as summarized in the table below, I find that the cost of equity for my comparable companies is equal to 11.3 percent.

TABLE 1
COST OF EQUITY MODEL RESULTS

Method	Cost of Equity
Discounted Cash Flow	11.2%
Ex Ante Risk Premium	10.9%
Ex Post Risk Premium	10.6%
Historical CAPM	10.8%
DCF CAPM	12.7%
Average	11.3%

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

A. I conservatively recommend that EDG be allowed a rate of return on equity equal to 11.3 percent.

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

Q. WHY IS YOUR RECOMMENDED COST OF EQUITY CONSERVATIVE?

A. My recommended cost of equity is conservative because the financial risk of my comparable companies is less than the financial risk implied by EDG's rate making capital structure.

Q. DO YOU HAVE SCHEDULES AND APPENDICES ACCOMPANYING YOUR TESTIMONY?

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

III. ECONOMIC AND LEGAL PRINCIPLES

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

A. Economists define the cost of capital as the return investors expect to receive on alternative investments of comparable risk.

Q. HOW DOES THE COST OF CAPITAL AFFECT A FIRM'S INVESTMENT DECISIONS?

A. The goal of a firm is to maximize the value of the firm. This goal can be accomplished by accepting all investments in plant and equipment with an expected rate of return greater than the cost of capital. Thus, a firm should continue to invest in plant and equipment only so long as the return on its investment is greater than or equal to its cost of capital.

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

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

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

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

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

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

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

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

average cost of capital is expressed by .50 times 7 percent plus .50 times 13 percent, or 10.0 percent.

Q. HOW DO ECONOMISTS DEFINE THE COST OF EQUITY?

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

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

A. Economists measure the percentages of debt and equity in a firm's capital structure by first calculating the market value of the firm's debt and the market value of its equity. Economists then calculate the percentage of debt by the ratio of the market value of debt to the combined market value of debt and equity, and the percentage of equity by the ratio of the market value of equity to the combined market values of debt and equity. For example, if a firm's debt has a market value of $25 million and its equity has a market value of $75 million, then its total market capitalization is $100 million, and its capital structure contains 25 percent debt and 75 percent equity.

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

A. Economists measure a firm's capital structure in terms of the market values of its debt and equity because: (1) the weighted average cost of capital is defined as the return investors expect to earn on a portfolio of the company's debt and equity securities; (2) investors measure the expected return on a portfolio of securities using market value weights, not book value weights; and (3) market values are the best measures of the amounts of debt and equity investors have invested in the company on a going forward basis.

Q. WHY DO INVESTORS MEASURE THE EXPECTED RETURN ON THEIR INVESTMENT PORTFOLIOS USING MARKET VALUE WEIGHTS RATHER THAN BOOK VALUE WEIGHTS?

A. Investors measure the expected return on their investment portfolios using market value weights because: (1) the expected return on a portfolio is calculated by comparing the expected value of the portfolio at the end of the investment period to its current value; and (2) market values are the best measure of the current value of the portfolio. From the investor's point of view, the historical cost, or book value of their investment, is generally a poor indicator of the portfolio's current value.

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

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

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

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

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

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

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

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

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

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

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

IV. BUSINESS AND FINANCIAL RISKS IN THE NATURAL GAS DISTRIBUTION BUSINESS

Q. WHAT BUSINESS AND FINANCIAL RISKS DID YOU CONSIDER IN YOUR ASSESSMENT OF EDG'S COST OF EQUITY?

A. I considered both the general business and financial risks associated with the state of the U.S. economy ("macroeconomic risks") and the specific business and financial risks associated with investing in the natural gas distribution business.

A. MACROECONOMIC RISKS

Q. PLEASE DESCRIBE THE CURRENT U.S. ECONOMIC ENVIRONMENT?

A. The U. S. economy is in the midst of the largest housing, employment, credit, and financial crisis since World War II. During the last year, housing construction has virtually halted, housing prices have collapsed, foreclosures have increased, banks have either failed or announced multi-billion dollar write-offs, unemployment has increased, and investor confidence in the health of the economy is at record lows.

Q. HOW HAVE INVESTORS RESPONDED TO THE DETERIORATING U.S. ECONOMIC CONDITIONS?

A. Investors have responded by increasing their aversion to risk, reducing their leverage, increasing their demand for liquidity, and increasing their required rates of return on risky investments.

Q. WHAT EFFECT HAS THE INCREASED AVERSION TO RISK, REDUCTION IN LEVERAGE, INCREASED DEMAND FOR LIQUIDITY,

AND INCREASED REQUIRED RATES OF RETURN ON RISKY STOCK AND BOND INVESTMENTS HAD ON STOCK PRICES AND INTEREST RATES?

A. These factors have caused stock prices to decline by the highest percentage since The Great Depression and caused interest rates on all but the safest bond investments to increase. The S&P 500 has declined by approximately 40 percent in the past year and by approximately 50 percent since mid-2007. The stock market has not experienced declines of this magnitude since the early 1930s. Interest rates on Baa-rated utility bonds have increased from approximately 6 percent in early 2007 to approximately 8 percent in March 2009, while interest rates on high yield corporate bonds have been at double digit levels since September 2008.

Q. WHY HAVE REQUIRED RATES OF RETURN ON EQUITY INVESTMENTS AND CORPORATE BONDS INCREASED EVEN THOUGH MORTGAGE INTEREST RATES AND INTEREST RATES ON TREASURY BONDS HAVE DECLINED?

A. Investor required rates of return on equity and bond investments have increased because the economic environment is significantly more volatile and uncertain than it was prior to September 2008, and business risk is always greater in a volatile economic environment than in a stable economic environment. Declining equity values and increased capital market volatility have also made investors wary of investing in equities and

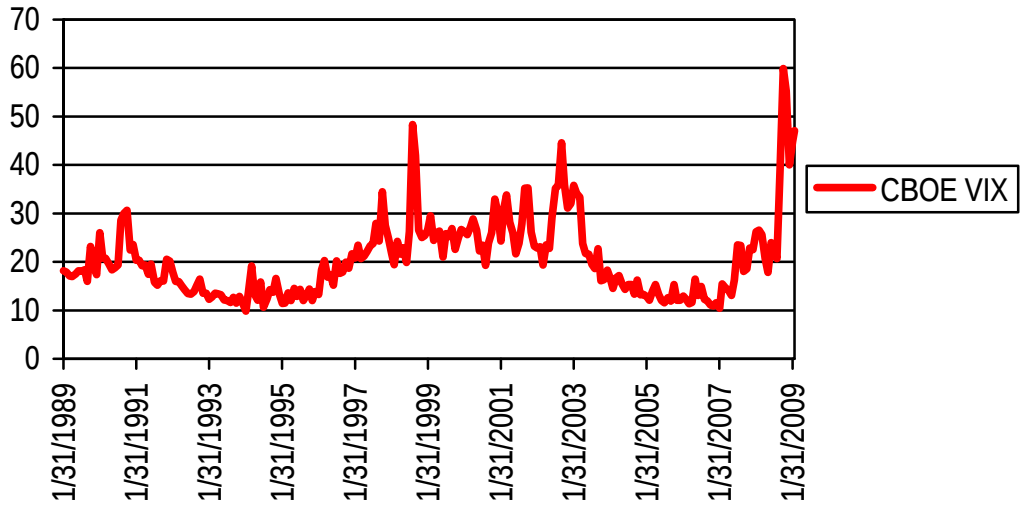
risky debt. Therefore, investors are demanding a higher return from these investments in recognition of the increased risk. Investors have fled from equities and risky debt to Treasuries in order to reduce their risk, putting downward pressure on Treasury rates and upward pressure on business capital costs.

Government intervention has also caused downward pressure on Treasury bonds and personal lending rates. Specifically, the government is providing cash to banks and begun to serve as a guarantor of mortgage debt in an effort to encourage spending and restart the housing industry. However, as noted above, corporate borrowing costs are higher than they were prior to the recession.

Q. HAVE INCREASED RISK AVERSION, REDUCED DEMAND FOR LEVERAGE, INCREASED DEMAND FOR LIQUIDITY, AND INCREASED REQUIRED RATES OF RETURN ON RISKY STOCK AND BOND INVESTMENTS ALSO INCREASED STOCK MARKET VOLATILITY?

A. Yes. Economists generally use the Chicago Board Options Exchange ("CBOE") volatility index to measure stock market volatility. The CBOE volatility index is at its highest levels since the late 1980s.

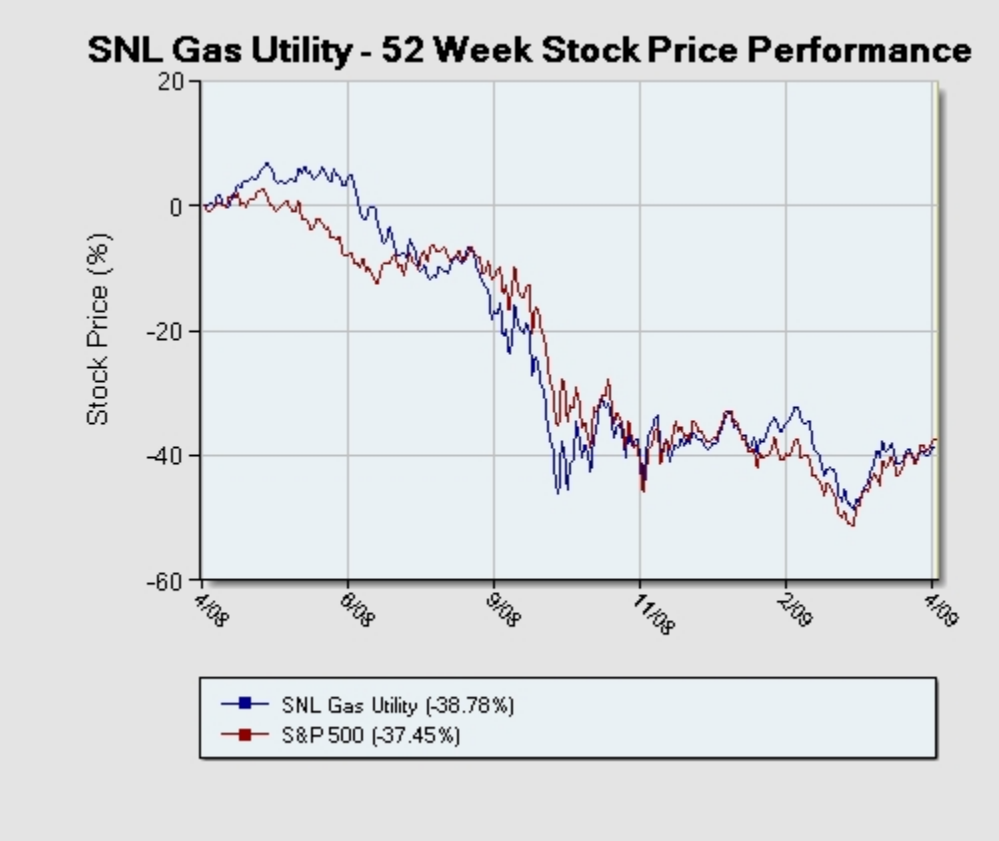
FIGURE 1
CBOE VOLATILITY INDEX JANUARY 1989-FEBRUARY 2009



Q. IS THERE EVIDENCE THAT INVESTORS HAVE VIEWED UTILITY STOCKS AS A SAFE HAVEN FROM VOLATILE MARKET CONDITIONS?

A. No. To the contrary, the SNL gas utility index, for example, has declined to approximately the same extent as the S&P 500 during the past year.

FIGURE 2
COMPARATIVE STOCK PRICE PERFORMANCE OF THE
SNL GAS UTILITY INDEX AND THE S&P 500
APRIL 2008 – APRIL 2009



B. BUSINESS AND FINANCIAL RISKS OF INVESTING IN NATURAL GAS DISTRIBUTION COMPANIES

Q. WHAT ARE THE MAJOR FACTORS THAT AFFECT BUSINESS RISK IN THE NATURAL GAS DISTRIBUTION BUSINESS?

A. Business risk in the natural gas distribution business is affected by the following economic factors:

1. High Operating Leverage. The natural gas distribution business is a business that requires a large commitment to fixed costs in relation to variable costs, a situation called high operating leverage. The relatively high degree of fixed costs in the natural gas distribution industry

arises because of the average natural gas company's large investment in fixed distribution and peaking facilities. High operating leverage causes the average natural gas company's net income to be highly sensitive to sales fluctuations because most of the company's costs are fixed, whereas its revenues are variable.

2. Demand Uncertainty. The business risk of the natural gas distribution business is increased by the high degree of demand uncertainty in the industry. Demand uncertainty is caused by: (a) the strong dependence of natural gas demand on the state of the economy and the weather; (b) the ability of customers to switch to alternative sources of energy in response to relative price differentials in these sources of energy; (c) the ability of some retail customers to purchase natural gas from competitive suppliers; and (d) rapidly changing prices for natural gas and alternate sources of energy.

3. Supply Uncertainty. The business risk of the natural gas distribution industry is further increased by the need to assure adequate distribution and peaking capacity to meet customer needs on any given day of the year.

4. Investment Uncertainty. The natural gas distribution business requires large investments in long-lived gas distribution and peaking facilities that are largely sunk once the investment is made. Future amounts of required investment in these facilities are highly uncertain as a result of the inherent uncertainty in forecasting energy

requirements for many years into the future, high volatility in fuel prices, and uncertainty in environmental regulations.

5. Peak Demand. The need to invest substantial sums in expensive fixed plant is further exacerbated by the peak nature of natural gas demand. The peak demand for natural gas is unusually high relative to average sales in non-peak periods.

V. COST OF EQUITY ESTIMATION METHODS

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

A. I used three methods for estimating EDG's fair rate of return on equity. As noted above, they are the DCF, risk premium, and CAPM methods. The DCF method assumes that the current market price of a firm's stock is equal to the discounted value of all expected future cash flows. The risk premium method assumes that the investor's required return on an equity investment is equal to the interest rate on a long-term bond plus an additional equity risk premium to compensate the investor for the risks of investing in equities compared to bonds. The CAPM assumes that the investor's required rate of return on equity is equal to a risk-free rate of interest plus the product of a company-specific risk factor, beta, and the expected risk premium on the market portfolio.

A. DISCOUNTED CASH FLOW METHOD

Q. PLEASE DESCRIBE THE DCF MODEL.

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

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

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

EQUATION 1

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

where:

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

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

EQUATION 2

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

where:

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

Equation (2) is frequently called the annual discounted cash flow model of stock valuation. Assuming that dividends grow at a constant annual rate, g, this equation can be solved for k, the cost of equity. The resulting cost of equity equation is $k = D_1/P_s + g$, where k is the cost of equity, D_1 is the expected next period annual dividend, Ps is the current price of the stock, and g is the constant annual growth rate in earnings, dividends, and book value per share. The term D_1/P_s is called the dividend yield

component of the annual DCF model, and the term g is called the growth component of the annual DCF model.

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

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

Q. PLEASE DESCRIBE THE QUARTERLY DCF MODEL YOU USED.

A. The quarterly DCF model I used is described on Schedule JHV-1 and in Appendix 2. The quarterly DCF equation shows that the cost of equity is:

the sum of the future expected dividend yield and the growth rate, where the dividend in the dividend yield is the equivalent future value of the four quarterly dividends at the end of the year, and the growth rate is the expected growth in dividends or earnings per share.

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

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

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

A. Yes. In the case of AGL Resources, the first company shown in Schedule JHV-1, the last four quarterly dividends are equal to 0.42, 0.42, 0.42, and 0.43. Thus dividends, d_1, d_2, and d_3, are equal to 0.438 [0.42 x (1 + .0425)], and and d_4 is equal to 0.448 [0.43 x (1+ .0425 = 0.448]. (As noted previously, the logic underlying this procedure is described in Appendix 2.)

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

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

Q. WHAT ARE THE ANALYSTS' ESTIMATES OF FUTURE EPS GROWTH?

A. As part of their research, financial analysts working at Wall Street firms periodically estimate EPS growth for each firm they follow. The EPS forecasts for each firm are then published. Investors who are contemplating purchasing or selling shares in individual companies review the forecasts and use them in making stock buy and sell decisions.

Q. WHAT IS I/B/E/S?

A. I/B/E/S is a division of Thomson Reuters that reports analysts' EPS growth forecasts for a broad group of companies. The forecasts are expressed in terms of a mean forecast and a standard deviation of forecast for each firm. Investors use the mean forecast as an estimate of future firm performance.

Q. WHY DO YOU USE THE I/B/E/S GROWTH ESTIMATES?

A. The I/B/E/S growth rates: (1) are widely circulated in the financial community, (2) include the projections of reputable financial analysts who develop estimates of future EPS growth, (3) are reported on a timely basis to investors, and (4) are widely used by institutional and other investors.

Q. WHY DO YOU RELY ON ANALYSTS' PROJECTIONS OF FUTURE EPS GROWTH IN ESTIMATING THE INVESTORS' EXPECTED GROWTH RATE RATHER THAN LOOKING AT PAST HISTORICAL GROWTH RATES?

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

Q. HAVE YOU PERFORMED ANY STUDIES CONCERNING THE USE OF ANALYSTS' FORECASTS AS AN ESTIMATE OF INVESTORS' EXPECTED GROWTH RATE, G?

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

Q. PLEASE SUMMARIZE THE RESULTS OF YOUR STUDY.

A. First, we performed a correlation analysis to identify the historically oriented growth rates which best described a firm's stock price. Then we did a regression study comparing the historical growth rates with the average I/B/E/S analysts' forecasts. In every case, the regression equations containing the average of analysts' forecasts statistically outperformed the regression equations containing the historical growth estimates. These results are consistent with those found by Cragg and Malkiel, the early major research in this area (John G. Cragg and Burton G. Malkiel, *Expectations and the Structure of Share Prices*, University of Chicago Press, 1982). These results are also consistent with the hypothesis that investors use analysts' forecasts, rather than historically oriented growth calculations, in making stock buy and sell decisions. They provide overwhelming evidence that the analysts' forecasts of future

growth are superior to historically-oriented growth measures in predicting a firm's stock price.

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

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

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

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

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

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

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

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

Q. WHAT COMPARABLE COMPANIES DO YOU USE IN YOUR DCF ANALYSIS?

A. I apply the DCF model to the Value Line natural gas companies shown in Schedule JHV-1.

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

A. I select all the companies in Value Line's groups of natural gas companies that: (1) paid dividends during every quarter of the last two years; (2) did not decrease dividends during any quarter of the past two years; (3) had at least two analysts included in the I/B/E/S mean growth forecast; (4) have an investment grade bond rating and a Value Line Safety Rank of 1, 2, or 3; and (5) are not the subject of a merger offer that has not been completed.

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

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

company's dividend will grow at the same rate into the indefinite future is questionable.

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

A. The DCF model also requires a reliable estimate of a company's expected future growth. For most companies, the I/B/E/S mean growth forecast is the best available estimate of the growth term in the DCF model. However, the I/B/E/S estimate may be less reliable if the mean estimate is based on the inputs of very few analysts. On the basis of my professional judgment, I normally specify that the I/B/E/S long-term earnings growth forecast must include the forecasts of at least three analysts. However, using data through February 2009, there are only four natural gas companies with growth forecasts from at least three analysts. In this study, therefore, I also include results for companies that had growth forecasts based on two analysts' growth forecasts

Q. WHY DO YOU ELIMINATE COMPANIES THAT ARE THE SUBJECT OF A MERGER OFFER THAT HAS NOT BEEN COMPLETED?

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

includes the value of potential mergers in conjunction with growth forecasts that do not include the growth enhancing prospects of potential mergers produces DCF results that tend to distort a company's cost of equity.

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

A. My application of the DCF model to my proxy company group produces a DCF result of 11.2 percent (see Schedule JHV-1).

B. RISK PREMIUM METHOD

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

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

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

A. No. The risk premium approach can be implemented using virtually any debt instrument. However, the risk premium approach does require that the debt instrument used to estimate the risk premium be the same as the

debt instrument used to calculate the interest rate component of the risk premium approach. For example, if the risk premium on equity is calculated by comparing the returns on stocks and the returns on A-rated utility bonds, then the interest rate on A-rated utility bonds must be used to estimate the interest rate component of the risk premium approach.

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

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

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

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

1. Ex Ante Risk Premium Method

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

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

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

where:

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

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

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

A. To estimate the cost of equity using the ex ante risk premium method, one may add the estimated risk premium over the yield on A-rated utility bonds

to the forecasted yield to maturity on A-rated utility bonds.[2] The forecasted yield to maturity on A-rated utility bonds, 6.32 percent, is obtained by adding the February spread between A-rated and AA-rated utility bonds to the Global Insight forecast of the yield to maturity on AA-rated utility bonds for 2010. My analyses produce an estimated risk premium over the yield on A-rated utility bonds equal to 4.56 percent. Adding an estimated risk premium of 4.56 percent to the 6.32 percent yield to maturity on A-rated utility bonds produces a cost of equity estimate of 10.9 percent using the ex ante risk premium method.

2. Ex Post Risk Premium Method

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

A. I first perform a study of the comparable returns received by bond and stock investors over the 72 years of my study. I estimate the returns on stock and bond portfolios, using stock price and dividend yield data on the S&P 500 and bond yield data on Moody's A-rated Utility Bonds. My study consists of making an investment of one dollar in the S&P 500 and Moody's A-rated utility bonds at the beginning of 1937, and reinvesting the principal plus return each year to 2009. The return associated with each

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

stock portfolio is the sum of the annual dividend yield and capital gain (or loss) which accrued to this portfolio during the year(s) in which it was held. The return associated with the bond portfolio, on the other hand, is the sum of the annual coupon yield and capital gain (or loss) which accrued to the bond portfolio during the year(s) in which it was held. The resulting annual returns on the stock and bond portfolios purchased in each year between 1937 and 2009 are shown on Schedule JHV-3. The average annual return on an investment in the S&P 500 stock portfolio is 10.8 percent, while the average annual return on an investment in the Moody's A-rated utility bond portfolio is 6.3 percent. The risk premium on the S&P 500 stock portfolio is, therefore, 4.5 percent.

I also conduct a second study using stock data on the S&P Utilities rather than the S&P 500. As shown on Schedule JHV-4, the S&P Utility stock portfolio shows an average annual return of 10.5 percent per year. Thus, the return on the S&P Utility stock portfolio exceeds the return on the Moody's A–rated utility bond portfolio by 4.2 percent.

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

A. I perform my ex post risk premium analysis on both the S&P 500 and the S&P Utilities because I believe utilities today face risks that are somewhere in between the average risk of the S&P Utilities and the S&P 500 over the years 1937 to 2009. Thus, I use the average of the two

historically-based risk premiums as my estimate of the required risk premium in my ex post risk premium method. I note that the spread between the average risk premium on the S&P 500 and the average risk premium on the S&P Utilities is just 30 basis points.

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

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

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

A. Yes. The risk premium results do vary somewhat depending on the historical time period chosen. My policy is to go back as far in history as I can to obtain reliable data. I believe it is most meaningful to begin after the passage and implementation of the Public Utility Holding Company Act of 1935. This Act significantly changed the structure of the public utility industry. Since the Public Utility Holding Company Act of 1935 was not implemented until the beginning of 1937, I believe that numbers taken from before this date are not comparable to those taken after. (The repeal of the 1935 Act has not had a material impact on the structure of the public utility industry; thus, the Act's repeal does not have any impact on my choice of time period.)

Q. WHY IS IT NECESSARY TO EXAMINE THE YIELD FROM DEBT INVESTMENTS IN ORDER TO DETERMINE THE INVESTORS' REQUIRED RATE OF RETURN ON EQUITY CAPITAL?

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

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

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

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

TABLE 2

REGRESSION OUTPUT FOR RISK PREMIUM ON S&P 500

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

TABLE 3

REGRESSION OUTPUT FOR RISK PREMIUM ON S&P UTILITIES

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

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

A. Yes. The *Stocks, Bonds, Bills, and Inflation® 2009 Valuation Edition Yearbook* ("Ibbotson SBBI") published by Morningstar, Inc. contains an

analysis of "trends" in historical risk premium data. Ibbotson SBBI uses correlation analysis to determine if there is any pattern or "trend" in risk premiums over time. This analysis also demonstrates that there are no trends in risk premiums over time.

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

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

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

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

A. My studies provide strong evidence that investors today require an equity return of approximately 4.2 to 4.5 percentage points above the expected yield on A-rated utility bonds. The forecast yield on A-rated utility bonds at 2010 is 6.32 percent. Adding a 4.2 to 4.5 percentage point risk premium

to a yield of 6.3 percent on A-rated utility bonds, I obtain an expected return on equity from the ex post risk premium method in the range 10.5 percent to 10.8 percent, with a midpoint of 10.6 percent.

C. CAPITAL ASSET PRICING MODEL

Q. WHAT IS THE CAPM?

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

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

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

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

A. The CAPM requires an estimate of the risk-free rate, the company-specific risk factor or beta, and the expected return on the market portfolio. For my estimate of the risk-free rate, I use the forecasted yield to maturity on 20-year Treasury bonds[3] of 4.80 percent, using data from Bloomberg.[4]

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

For my estimate of the company-specific risk, or beta, I use the average Value Line beta of 0.93 for my proxy companies. For my estimate of the expected risk premium on the market portfolio, I use two approaches. First, I use Ibbotson SBBI's 6.5 percent risk premium on the market portfolio, which is measured from the difference between the arithmetic mean return on the S&P 500 (11.7 percent) and the income return on 20-year Treasury bonds (5.2 percent), as reported by Ibbotson SBBI (11.7 – 5.2 = 6.5). Second, I estimate the risk premium on the market portfolio from the difference between the DCF cost of equity for the S&P 500 (13.4 percent) and the yield to maturity on 20-year Treasury bonds, (4.8 percent). My second approach produces a risk premium equal to 8.6 percent (13.4 - 4.8 = 8.6).

1. Historical CAPM

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

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

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[4] Bloomberg provides a forecasted yield for 30-year Treasury bonds rather than for the 20-year Treasury bond. To obtain a forecasted yield for the 20-year Treasury bond, I compare the current average yield at February 2009 for the 20-year Treasury bond, 3.83 percent, to the average yield for the 10-year Treasury bond, 2.87 percent. I add the difference between the current yields on the 30-year and 20-year Treasury bonds, 96 basis points, to Bloomberg's average forecasted yield for 10-year Treasury bonds in 2010, 3.84 percent, to obtain a forecasted yield of 4.80 percent for the 20-year Treasury bond.

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

A discussion of the importance of using arithmetic mean returns in the context of CAPM or risk premium studies is contained in Schedule JHV-5.

Q. WHY DO YOU RECOMMEND THAT THE RISK PREMIUM ON THE MARKET PORTFOLIO BE MEASURED USING THE INCOME RETURN ON 20-YEAR TREASURY BONDS RATHER THAN THE TOTAL RETURN ON THESE BONDS?

A. As discussed above, the CAPM requires an estimate of the risk-free rate of interest. When Treasury bonds are issued, the income return on the bond is risk free, but the total return, which includes both an income and capital gains or losses, is not. Thus, the income return should be used in the CAPM because it is only the income return that is risk free.

Q. WHAT CAPM RESULT DO YOU OBTAIN WHEN YOU ESTIMATE THE EXPECTED RISK PREMIUM ON THE MARKET PORTFOLIO FROM THE ARITHMETIC MEAN DIFFERENCE BETWEEN THE RETURN ON THE MARKET AND THE YIELD ON 20-YEAR TREASURY BONDS?

A. I obtain a CAPM cost of equity estimate of 10.8 percent (see Schedule JHV-6).

2. DCF-Based CAPM

Q. WHAT CAPM RESULT DO YOU OBTAIN WHEN YOU ESTIMATE THE EXPECTED RETURN ON THE MARKET PORTFOLIO BY APPLYING THE DCF MODEL TO THE S&P 500?

A. I obtain a CAPM result of 12.7 percent (see Schedule JHV-7).

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

A. Yes. The CAPM tends to underestimate the cost of equity for small market capitalization companies such as my natural gas proxy companies.

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

A. Yes. For example, Ibbotson SBBI supports such an adjustment. Their estimates of the size premium required to be added to the basic CAPM cost of equity are shown below in Table 4.

TABLE 4
IBBOTSON ESTIMATES OF PREMIUMS FOR COMPANY SIZE[5]

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

VI. FAIR RATE OF RETURN ON EQUITY

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

A. Based on my application of several cost of equity methods to my proxy companies, I conclude that my proxy companies' cost of equity is 11.3 percent. As shown below, 11.3 percent is the simple average of the cost of equity results I obtain from my cost of equity models.

TABLE 5
COST OF EQUITY MODEL RESULTS

Method	Cost of Equity
Discounted Cash Flow	11.2%
Ex Ante Risk Premium	10.9%
Ex Post Risk Premium	10.6%
Historical CAPM	10.8%
DCF CAPM	12.7%
Average	11.3%

Q. DOES YOUR 11.3 PERCENT COST OF EQUITY CONCLUSION FOR YOUR PROXY COMPANIES DEPEND ON THE PERCENTAGES OF

[5] 2009 Ibbotson® SBBI® Valuation Yearbook.

DEBT AND EQUITY IN YOUR PROXY COMPANIES' AVERAGE CAPITAL STRUCTURE?

A. Yes. My 11.3 percent cost of equity conclusion reflects the financial risk associated with the average market value capital structure of my proxy companies, which has more than 57 percent equity.

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

A. EDG is recommending that the consolidated capital structure of its parent, The Empire District Electric Company, be used for rate making purposes in this proceeding. At December 31, 2008, the consolidated capital structure of The Empire District Electric Company contains 49.32 percent long-term debt, 4.27 percent preferred stock, and 46.41 percent common equity.

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

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

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

A. I recommend an ROE of 11.3 percent for EDG. My recommendation takes into consideration the Company's policy decision to moderate the impact of its rate request on ratepayers. My recommendation is conservative in that it: (1) does not reflect the higher financial risk implicit in EDG's rate making capital structure; and (2) does not reflect the small size premium for small market capitalization companies such as those in my proxy group of natural gas companies.

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

A. Yes, it does.

LIST OF ATTACHMENTS

SCHEDULE JHV-1
SUMMARY OF DISCOUNTED CASH FLOW ANALYSIS
FOR NATURAL GAS COMPANIES

LINE NO.	COMPANY	D_0	P_0	GROWTH	COST OF EQUITY
1	AGL Resources	0.430	30.354	4.25%	10.3%
2	Atmos Energy	0.330	23.847	5.00%	11.0%
3	Energen Corp.	0.125	29.203	3.50%	5.3%
4	Equitable Resources	0.220	32.892	11.67%	14.8%
5	Nicor Inc.	0.465	34.098	2.85%	8.6%
6	NiSource Inc.	0.230	10.462	1.60%	10.9%
7	Northwest Nat. Gas	0.395	43.777	4.75%	8.6%
8	ONEOK Inc.	0.400	27.277	9.07%	15.8%
9	Piedmont Natural Gas	0.260	28.345	7.13%	11.2%
10	South Jersey Inds.	0.284	37.268	7.50%	10.8%
11	Questar Corp.	0.125	31.988	9.00%	10.8%
12	Southwest Gas	0.238	24.100	6.00%	10.1%
13	Market-weighted Average				11.2%

Notes:

d_0 = Most recent quarterly dividend.

d_1,d_2,d_3,d_4 = Next four quarterly dividends, calculated by multiplying the last four quarterly dividends per Value Line by the factor (1 + g).

P_0 = Average of the monthly high and low stock prices during the three months ending February 2009 per Thomson Reuters.

g = I/B/E/S forecast of future earnings growth February 2009 from Thomson Reuters.

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

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

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

Line No.	Date	DCF	Bond Yield	Risk Premium
1	Jun-98	0.1130	0.0703	0.0427
2	Jul-98	0.1162	0.0703	0.0459
3	Aug-98	0.1208	0.0700	0.0508
4	Sep-98	0.1247	0.0693	0.0554
5	Oct-98	0.1233	0.0696	0.0537
6	Nov-98	0.1185	0.0703	0.0482
7	Dec-98	0.1159	0.0691	0.0468
8	Jan-99	0.1168	0.0697	0.0471
9	Feb-99	0.1214	0.0709	0.0505
10	Mar-99	0.1227	0.0726	0.0501
11	Apr-99	0.1230	0.0722	0.0508
12	May-99	0.1193	0.0747	0.0446
13	Jun-99	0.1180	0.0774	0.0406
14	Jul-99	0.1195	0.0771	0.0424
15	Aug-99	0.1193	0.0791	0.0402
16	Sep-99	0.1199	0.0793	0.0406
17	Oct-99	0.1205	0.0806	0.0399
18	Nov-99	0.1212	0.0794	0.0418
19	Dec-99	0.1249	0.0814	0.0435
20	Jan-00	0.1269	0.0835	0.0434
21	Feb-00	0.1310	0.0825	0.0485
22	Mar-00	0.1312	0.0828	0.0484
23	Apr-00	0.1287	0.0829	0.0458
24	May-00	0.1264	0.0870	0.0394
25	Jun-00	0.1268	0.0836	0.0432
26	Jul-00	0.1289	0.0825	0.0464
27	Aug-00	0.1264	0.0813	0.0451
28	Sep-00	0.1233	0.0823	0.0410
29	Oct-00	0.1235	0.0814	0.0421
30	Nov-00	0.1228	0.0811	0.0417
31	Dec-00	0.1217	0.0784	0.0433
32	Jan-01	0.1238	0.0780	0.0458
33	Feb-01	0.1237	0.0774	0.0463
34	Mar-01	0.1251	0.0768	0.0483
35	Apr-01	0.1203	0.0794	0.0409
36	May-01	0.1280	0.0799	0.0481
37	Jun-01	0.1281	0.0785	0.0496
38	Jul-01	0.1313	0.0778	0.0535
39	Aug-01	0.1301	0.0759	0.0542
40	Sep-01	0.1241	0.0775	0.0466

Line No.	Date	DCF	Bond Yield	Risk Premium
41	Oct-01	0.1243	0.0763	0.0480
42	Nov-01	0.1243	0.0757	0.0486
43	Dec-01	0.1229	0.0783	0.0446
44	Jan-02	0.1211	0.0766	0.0445
45	Feb-02	0.1215	0.0754	0.0461
46	Mar-02	0.1165	0.0776	0.0389
47	Apr-02	0.1136	0.0757	0.0379
48	May-02	0.1139	0.0752	0.0387
49	Jun-02	0.1146	0.0741	0.0405
50	Jul-02	0.1214	0.0731	0.0483
51	Aug-02	0.1208	0.0717	0.0491
52	Sep-02	0.1233	0.0708	0.0525
53	Oct-02	0.1224	0.0723	0.0501
54	Nov-02	0.1195	0.0714	0.0481
55	Dec-02	0.1191	0.0707	0.0484
56	Jan-03	0.1194	0.0706	0.0488
57	Feb-03	0.1206	0.0693	0.0513
58	Mar-03	0.1169	0.0679	0.0490
59	Apr-03	0.1137	0.0664	0.0473
60	May-03	0.1103	0.0636	0.0467
61	Jun-03	0.1092	0.0621	0.0471
62	Jul-03	0.1103	0.0657	0.0446
63	Aug-03	0.1114	0.0678	0.0436
64	Sep-03	0.1104	0.0656	0.0448
65	Oct-03	0.1100	0.0643	0.0457
66	Nov-03	0.1066	0.0637	0.0429
67	Dec-03	0.1048	0.0627	0.0421
68	Jan-04	0.1037	0.0615	0.0422
69	Feb-04	0.1017	0.0615	0.0402
70	Mar-04	0.1014	0.0597	0.0417
71	Apr-04	0.1018	0.0635	0.0383
72	May-04	0.1021	0.0662	0.0359
73	Jun-04	0.1013	0.0646	0.0367
74	Jul-04	0.0989	0.0627	0.0362
75	Aug-04	0.0986	0.0614	0.0372
76	Sep-04	0.0956	0.0598	0.0358
77	Oct-04	0.0954	0.0594	0.0360
78	Nov-04	0.0942	0.0597	0.0345
79	Dec-04	0.0950	0.0592	0.0358
80	Jan-05	0.0969	0.0578	0.0391
81	Feb-05	0.0958	0.0561	0.0397
82	Mar-05	0.0958	0.0583	0.0375
83	Apr-05	0.0969	0.0564	0.0405
84	May-05	0.0961	0.0553	0.0408
85	Jun-05	0.0958	0.0540	0.0418
86	Jul-05	0.0948	0.0551	0.0397
87	Aug-05	0.0951	0.0550	0.0401

Line No.	Date	DCF	Bond Yield	Risk Premium
88	Sep-05	0.0963	0.0552	0.0411
89	Oct-05	0.0971	0.0579	0.0392
90	Nov-05	0.1030	0.0588	0.0442
91	Dec-05	0.1026	0.0580	0.0446
92	Jan-06	0.0963	0.0575	0.0388
93	Feb-06	0.1108	0.0582	0.0526
94	Mar-06	0.1111	0.0598	0.0513
95	Apr-06	0.1082	0.0629	0.0453
96	May-06	0.1038	0.0642	0.0396
97	Jun-06	0.1032	0.0640	0.0392
98	Jul-06	0.1071	0.0637	0.0434
99	Aug-06	0.1026	0.0620	0.0406
100	Sep-06	0.1037	0.0600	0.0437
101	Oct-06	0.1014	0.0598	0.0416
102	Nov-06	0.1018	0.0580	0.0438
103	Dec-06	0.1021	0.0581	0.0440
104	Jan-07	0.0998	0.0596	0.0402
105	Feb-07	0.1003	0.0590	0.0413
106	Mar-07	0.1004	0.0585	0.0419
107	Apr-07	0.0994	0.0597	0.0397
108	May-07	0.0955	0.0599	0.0356
109	Jun-07	0.0957	0.0630	0.0327
110	Jul-07	0.0995	0.0625	0.0370
111	Aug-07	0.1008	0.0624	0.0384
112	Sep-07	0.1002	0.0618	0.0384
113	Oct-07	0.1068	0.0611	0.0457
114	Nov-07	0.1071	0.0597	0.0474
115	Dec-07	0.1072	0.0616	0.0456
116	Jan-08	0.1100	0.0602	0.0498
117	Feb-08	0.1127	0.0621	0.0506
118	Mar-08	0.1134	0.0620	0.0514
119	Apr-08	0.1155	0.0629	0.0526
120	May-08	0.1056	0.0627	0.0429
121	Jun-08	0.1049	0.0638	0.0412
122	Jul-08	0.1073	0.0639	0.0434
123	Aug-08	0.1108	0.0638	0.0471
124	Sep-08	0.1114	0.0646	0.0468
125	Oct-08	0.1193	0.0756	0.0437
126	Nov-08	0.1200	0.0762	0.0438
127	Dec-08	0.1139	0.0658	0.0481
128	Jan-09	0.1108	0.0639	0.0470
129	Feb-09	0.1131	0.0631	0.0500
130	Average	0.1121	0.0681	0.0440

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

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

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

SCHEDULE JHV-3
COMPARATIVE RETURNS ON S&P 500 STOCK INDEX
AND MOODY'S A-RATED UTILITY BONDS 1937 - 2009

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

Line No.	Year	S&P 500 Stock Price	Stock Dividend Yield	Stock Return	A-rated Bond Price	Bond Return
42	1968	95.04	0.0313	10.45%	$66.97	-0.81%
43	1967	84.45	0.0351	16.05%	$78.69	-9.81%
44	1966	93.32	0.0302	-6.48%	$86.57	-4.48%
45	1965	86.12	0.0299	11.35%	$91.40	-0.91%
46	1964	76.45	0.0305	15.70%	$92.01	3.68%
47	1963	65.06	0.0331	20.82%	$93.56	2.61%
48	1962	69.07	0.0297	-2.84%	$89.60	8.89%
49	1961	59.72	0.0328	18.94%	$89.74	4.29%
50	1960	58.03	0.0327	6.18%	$84.36	11.13%
51	1959	55.62	0.0324	7.57%	$91.55	-3.49%
52	1958	41.12	0.0448	39.74%	$101.22	-5.60%
53	1957	45.43	0.0431	-5.18%	$100.70	4.49%
54	1956	44.15	0.0424	7.14%	$113.00	-7.35%
55	1955	35.60	0.0438	28.40%	$116.77	0.20%
56	1954	25.46	0.0569	45.52%	$112.79	7.07%
57	1953	26.18	0.0545	2.70%	$114.24	2.24%
58	1952	24.19	0.0582	14.05%	$113.41	4.26%
59	1951	21.21	0.0634	20.39%	$123.44	-4.89%
60	1950	16.88	0.0665	32.30%	$125.08	1.89%
61	1949	15.36	0.0620	16.10%	$119.82	7.72%
62	1948	14.83	0.0571	9.28%	$118.50	4.49%
63	1947	15.21	0.0449	1.99%	$126.02	-2.79%
64	1946	18.02	0.0356	-12.03%	$126.74	2.59%
65	1945	13.49	0.0460	38.18%	$119.82	9.11%
66	1944	11.85	0.0495	18.79%	$119.82	3.34%
67	1943	10.09	0.0554	22.98%	$118.50	4.49%
68	1942	8.93	0.0788	20.87%	$117.63	4.14%
69	1941	10.55	0.0638	-8.98%	$116.34	4.55%
70	1940	12.30	0.0458	-9.65%	$112.39	7.08%
71	1939	12.50	0.0349	1.89%	$105.75	10.05%
72	1938	11.31	0.0784	18.36%	$99.83	9.94%
73	1937	17.59	0.0434	-31.36%	$103.18	0.63%
74	S&P 500 Return 1937--2009		10.8%			
75	A-rated Utility Bond Return		6.3%			
76	Risk Premium		4.5%			

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

SCHEDULE JHV-4
COMPARATIVE RETURNS ON S&P UTILITY STOCK INDEX
AND MOODY'S A-RATED UTILITY BONDS 1937 - 2009

Line No.	Year	S&P Utility Stock Price	Stock Dividend Yield	Stock Return	A-rated Bond Yield	Bond Return
1	2009				$68.43	
2	2008			-25.90%	$72.25	0.24%
3	2007			16.56%	$72.91	4.59%
4	2006			20.76%	$75.25	2.20%
5	2005			16.05%	$74.91	5.80%
6	2004			22.84%	$70.87	11.34%
7	2003			23.48%	$62.26	20.27%
8	2002			-14.73%	$57.44	15.35%
9						
10	2002	243.79	0.0362		$57.44	
11	2001	307.70	0.0287	-17.90%	$56.40	8.93%
12	2000	239.17	0.0413	32.78%	$52.60	14.82%
13	1999	253.52	0.0394	-1.72%	$63.03	-10.20%
14	1998	228.61	0.0457	15.47%	$62.43	7.38%
15	1997	201.14	0.0492	18.58%	$56.62	17.32%
16	1996	202.57	0.0454	3.83%	$60.91	-0.48%
17	1995	153.87	0.0584	37.49%	$50.22	29.26%
18	1994	168.70	0.0496	-3.83%	$60.01	-9.65%
19	1993	159.79	0.0537	10.95%	$53.13	20.48%
20	1992	149.70	0.0572	12.46%	$49.56	15.27%
21	1991	138.38	0.0607	14.25%	$44.84	19.44%
22	1990	146.04	0.0558	0.33%	$45.60	7.11%
23	1989	114.37	0.0699	34.68%	$43.06	15.18%
24	1988	106.13	0.0704	14.80%	$40.10	17.36%
25	1987	120.09	0.0588	-5.74%	$48.92	-9.84%
26	1986	92.06	0.0742	37.87%	$39.98	32.36%
27	1985	75.83	0.0860	30.00%	$32.57	35.05%
28	1984	68.50	0.0925	19.95%	$31.49	16.12%
29	1983	61.89	0.0948	20.16%	$29.41	20.65%
30	1982	51.81	0.1074	30.20%	$24.48	36.48%
31	1981	52.01	0.0978	9.40%	$29.37	-3.01%
32	1980	50.26	0.0953	13.01%	$34.69	-3.81%
33	1979	50.33	0.0893	8.79%	$43.91	-11.89%
34	1978	52.40	0.0791	3.96%	$49.09	-2.40%
35	1977	54.01	0.0714	4.16%	$50.95	4.20%
36	1976	46.99	0.0776	22.70%	$43.91	25.13%
37	1975	38.19	0.0920	32.24%	$41.76	14.75%
38	1974	48.60	0.0713	-14.29%	$52.54	-12.91%
39	1973	60.01	0.0556	-13.45%	$58.51	-3.37%
40	1972	60.19	0.0542	5.12%	$56.47	10.69%
41	1971	63.43	0.0504	-0.07%	$53.93	12.13%
42	1970	55.72	0.0561	19.45%	$50.46	14.81%
43	1969	68.65	0.0445	-14.38%	$62.43	-12.76%
44	1968	68.02	0.0435	5.28%	$66.97	-0.81%
45	1967	70.63	0.0392	0.22%	$78.69	-9.81%

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

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

SCHEDULE JHV-5
USING THE ARITHMETIC MEAN TO ESTIMATE
THE COST OF EQUITY CAPITAL

Consider an investment that in a given year generates a return of 30 percent with probability equal to .5 and a return of -10 percent with a probability equal to .5. For each one dollar invested, the possible outcomes of this investment at the end of year one are:

Ending Wealth	Probability
$1.30	0.50
$0.90	0.50

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

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

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

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

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

The arithmetic mean of this investment is:

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

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

The geometric mean of this investment is:

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

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

SCHEDULE JHV-6
CALCULATION OF CAPITAL ASSET PRICING MODEL COST OF EQUITY
USING SBBI® 6.5 PERCENT MARKET RISK PREMIUM

1	Risk-Free Rate	4.80%	20-Year Treasury Bond Yield Forecast
2	Beta	0.93	Average Beta Proxy Companies
3	Risk Premium	6.50%	Long-horizon SBBI risk premium
4	Beta x Risk Premium	6.05%	
5	Cost of Equity	10.8%	

Forecast Treasury bond yield from Bloomberg News survey of economists, February 12, 2009; SBBI® risk premium from 2009 Ibbotson® Risk Premia Over Time Report, March 3, 2009, published by Morningstar®, Value Line beta for comparable companies from Value Line Investment Analyzer March 2009.

PROXY COMPANY BETAS

LINE NO.	COMPANY	BETA	MARKET CAP $ (MIL)
1	AGL Resources	0.75	2,133
2	Atmos Energy	0.65	2,000
3	Energen Corp.	1.15	1,922
4	Equitable Resources	1.15	4,024
5	Nicor Inc.	0.70	1,418
6	NiSource Inc.	0.75	2,400
7	Northwest Nat. Gas	0.60	1,084
8	ONEOK Inc.	0.90	2,351
9	Piedmont Natural Gas	0.70	1,769
10	South Jersey Inds.	0.75	1,072
11	Questar Corp.	1.25	5,000
12	Southwest Gas	0.75	856
13	Market-Weighted Average	0.93	

Data from Value Line Investment Analyzer March 2009.

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

1	Risk-Free Rate	4.80%	20-Year Treasury Bond Yield Forecast
2	Beta	0.93	Average Beta Proxy Companies
3	DCF S&P 500	13.3%	DCF Cost of Equity S&P 500 (see following)
4	Risk Premium	8.50%	
5	Beta * RP	7.91%	
6	Cost of Equity	12.7%	

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

COMPANY	P_0	D_0	GROWTH	COST OF EQUITY
3M	55.30	2.04	10.30%	14.4%
ABBOTT LABORATORIES	52.00	1.60	11.52%	15.0%
AETNA	27.61	0.04	13.20%	13.4%
ALLERGAN	38.92	0.20	13.66%	14.2%
AMERICAN EXPRESS	18.03	0.72	10.25%	14.7%
AMERISOURCEBERGEN	34.75	0.40	12.17%	13.5%
AON	41.01	0.60	11.00%	12.6%
APPLIED MATS.	9.79	0.24	11.60%	14.4%
ASSURANT	25.46	0.56	9.50%	11.9%
BANK OF NEW YORK MELLON	25.29	0.96	10.75%	15.0%
BAXTER INTL.	54.45	1.04	12.47%	14.6%
BECTON DICKINSON	68.69	1.32	12.67%	14.9%
BEMIS	23.25	0.90	7.74%	12.0%
BEST BUY	27.19	0.56	12.84%	15.2%
BOEING	40.26	1.68	8.20%	12.8%
BURL.NTHN.SANTA FE C	70.22	1.60	9.73%	12.3%
CA	17.42	0.16	10.80%	11.8%
CARDINAL HEALTH	34.71	0.56	11.08%	12.9%
CHESAPEAKE ENERGY	16.03	0.30	10.00%	12.1%
CHEVRON	72.12	2.60	9.13%	13.1%
CINTAS	23.02	0.47	10.83%	13.1%
CLOROX	53.02	1.84	9.67%	13.5%
CME GROUP	187.79	4.60	11.71%	14.5%
COCA COLA	43.72	1.64	8.13%	12.2%
COLGATE-PALM.	63.58	1.76	11.00%	14.1%
COMCAST 'A'	15.13	0.27	11.68%	13.7%
CONOCOPHILLIPS	47.98	1.88	8.07%	12.4%
COOPER INDS.	26.78	1.00	10.80%	15.0%
COSTCO WHOLESALE	48.28	0.64	12.44%	13.9%
CSX	31.61	0.88	8.82%	11.9%
CVS CAREMARK	27.37	0.30	13.75%	15.0%
DENTSPLY INTL.	26.28	0.20	13.80%	14.7%
DOMINION RES.	34.42	1.75	8.16%	13.8%
ELI LILLY	36.13	1.96	6.60%	12.5%
EMERSON ELECTRIC	33.32	1.32	10.33%	14.8%
ENSCO INTL.	27.83	0.10	13.33%	13.7%
ENTERGY	77.20	3.00	9.42%	13.7%
EQT	32.89	0.88	11.67%	14.7%
ESTEE LAUDER COS.'A'	27.45	0.55	10.33%	12.6%
EXELON	53.21	2.10	8.47%	12.8%
FAMILY DOLLAR STORES	26.30	0.54	11.25%	13.6%
FEDERATED INVRS.'B'	19.72	0.96	9.33%	14.8%
FIRSTENERGY	49.53	2.20	9.00%	13.9%
FLUOR	43.26	0.50	12.50%	13.8%
FPL GROUP	48.89	1.89	9.62%	13.9%
FRONTIER COMMUNICATIONS	8.11	1.00	0.72%	13.7%
GAP	12.39	0.34	9.88%	12.9%
GENERAL DYNAMICS	53.44	1.40	9.00%	11.9%

COMPANY	P_0	D_0	GROWTH	COST OF EQUITY
GOLDMAN SACHS GP.	79.16	1.40	12.00%	14.0%
GOODRICH	36.63	1.00	11.67%	14.7%
H&R BLOCK	20.81	0.60	11.80%	15.1%
HARTFORD FINL.SVS.GP.	13.03	0.20	10.75%	12.5%
HASBRO	25.99	0.80	9.00%	12.4%
HEWLETT-PACKARD	34.61	0.32	11.81%	12.8%
HOME DEPOT	22.45	0.90	9.50%	14.0%
HONEYWELL INTL.	31.05	1.21	9.86%	14.2%
ILLINOIS TOOL WORKS	33.18	1.24	8.80%	12.9%
INTERNATIONAL BUS.MCHS.	86.54	2.00	9.83%	12.4%
ITT	43.66	0.85	13.00%	15.2%
J M SMUCKER	42.57	1.28	8.67%	12.0%
JANUS CAPITAL GP.	6.60	0.04	11.20%	11.9%
JOHNSON & JOHNSON	56.73	1.84	8.30%	11.9%
KB HOME	12.65	0.25	10.50%	12.7%
KELLOGG	42.57	1.36	8.83%	12.3%
KRAFT FOODS	26.92	1.16	8.10%	12.8%
L3 COMMUNICATIONS	73.47	1.40	10.33%	12.4%
LOCKHEED MARTIN	77.35	2.28	11.50%	14.8%
LOWE'S COMPANIES	19.64	0.34	11.33%	13.3%
M&T BK.	48.50	2.80	6.30%	12.6%
MARRIOTT INTL.'A'	17.09	0.35	10.88%	13.2%
MARSH & MCLENNAN	21.95	0.80	10.00%	14.1%
MATTEL	14.00	0.75	9.00%	15.0%
MCDONALDS	58.60	2.00	8.87%	12.6%
MCKESSON	40.24	0.48	11.21%	12.5%
MEDTRONIC	31.94	0.75	11.35%	14.0%
METLIFE	28.50	0.74	11.64%	14.6%
MICROSOFT	18.92	0.52	10.22%	13.3%
MOLSON COORS BREWING 'B'	42.45	0.80	10.04%	12.1%
MOTOROLA	4.23	0.20	9.25%	14.5%
NATIONAL SEMICON.	10.67	0.32	9.80%	13.1%
NEWELL RUBBERMAID	9.30	0.42	9.50%	14.5%
NEWMONT MINING	38.60	0.40	13.77%	15.0%
NOBLE	24.56	0.16	13.47%	14.2%
NORFOLK SOUTHERN	41.56	1.36	10.63%	14.3%
NORTHERN TRUST	52.34	1.12	12.20%	14.6%
OCCIDENTAL PTL.	53.94	1.28	9.80%	12.4%
PACCAR	28.24	0.72	11.75%	14.6%
PEOPLES UNITED FINANCIAL	17.12	0.60	10.00%	13.9%
PEPSICO	51.65	1.70	9.45%	13.1%
PERKINELMER	14.06	0.28	12.33%	14.6%
PG&E	37.31	1.68	6.84%	11.7%
POLO RALPH LAUREN 'A'	41.69	0.20	14.00%	14.5%
PRAXAIR	60.27	1.60	10.12%	13.1%
PREC.CASTPARTS	59.18	0.12	13.33%	13.6%
PRINCIPAL FINL.GP.	16.54	0.45	11.47%	14.5%
PROCTER & GAMBLE	56.75	1.60	9.50%	12.6%
PROGRESS ENERGY	38.45	2.48	5.56%	12.5%
PULTE HOMES	10.86	0.16	11.67%	13.3%

COMPANY	P_0	D_0	GROWTH	COST OF EQUITY
QUEST DIAGNOSTICS	48.74	0.40	13.21%	14.1%
QWEST COMMS.INTL.	3.38	0.32	2.40%	12.4%
RAYTHEON 'B'	48.31	1.12	12.40%	15.0%
REGIONS FINL.NEW	6.31	0.40	6.00%	12.9%
RYDER SYSTEM	33.38	0.92	11.53%	14.6%
SEALED AIR	13.99	0.48	8.43%	12.2%
SOUTHWEST AIRLINES	7.71	0.02	13.33%	13.6%
STANLEY WORKS	31.75	1.28	8.67%	13.1%
STARWOOD HTLS.& RSTS. WORLDWIDE	16.41	0.90	7.00%	13.0%
STATE STREET	32.19	0.04	11.83%	12.0%
SUNTRUST BANKS	20.16	0.40	11.25%	13.5%
TARGET	33.24	0.64	12.67%	14.9%
TEXAS INSTS.	15.37	0.44	10.00%	13.2%
TEXTRON	11.26	0.08	11.65%	12.4%
TIFFANY & CO	22.04	0.68	10.83%	14.3%
TIME WARNER	9.36	0.25	11.51%	14.5%
TOTAL SYSTEM SERVICES	13.37	0.28	9.67%	12.0%
TRAVELERS COS.	40.30	1.20	9.00%	12.3%
UNION PACIFIC	45.25	1.08	12.54%	15.3%
UNITED TECHNOLOGIES	48.59	1.54	9.50%	13.0%
UNITEDHEALTH GP.	25.01	0.03	12.83%	13.0%
UNUM GROUP	15.24	0.30	10.00%	12.2%
V F	53.93	2.36	9.90%	14.8%
VERIZON COMMUNICATIONS	31.43	1.84	5.50%	11.8%
WAL MART STORES	52.13	0.95	11.50%	13.5%
WALGREEN	25.69	0.45	11.55%	13.5%
WISCONSIN ENERGY	42.68	1.35	9.13%	12.6%
WW GRAINGER	72.50	1.60	12.43%	14.9%
XCEL ENERGY	18.15	0.95	6.72%	12.4%
XTO EN.	35.70	0.50	11.40%	13.0%
YUM	28.22	0.76	11.84%	14.9%
YUM! BRANDS	28.92	0.76	11.84%	14.8%
Market Weighted Average				13.3%

Notes: In applying the DCF model to the S&P 500, I included in the DCF analysis only those companies in the S&P 500 group which pay a dividend, have a positive growth rate, and have at least three analysts' long-term growth estimates. I also eliminated those 25% of companies with the highest and lowest DCF results, a decision which had no impact on my CAPM estimate of the cost of equity.

D_0 = Current dividend per Thomson Reuters.
P_0 = Average of the monthly high and low stock prices during the three months ending February 2009 per Thomson Reuters.
g = I/B/E/S forecast of future earnings growth February 2009.
k = Cost of equity using the quarterly version of the DCF model shown below:

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

APPENDIX 1
QUALIFICATIONS OF JAMES H. VANDER WEIDE, PH.D.

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

Educational Background and Prior Academic Experience

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

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

Publications

Dr. Vander Weide has written a book entitled *Managing Corporate Liquidity: An Introduction to Working Capital Management* published by John Wiley and Sons, Inc. He has also written a chapter titled, "Financial Management in the Short Run" for *The Handbook of Modern Finance*;" a chapter for *The Handbook of Portfolio Construction:*

Contemporary Applications of Markowitz Techniques, "Principles for Lifetime Portfolio Selection: Lessons from Portfolio Theory," and written research papers on such topics as portfolio management, capital budgeting, investments, the effect of regulation on the performance of public utilities, and cash management. His articles have been published in *American Economic Review, Financial Management, International Journal of Industrial Organization, Journal of Finance, Journal of Financial and Quantitative Analysis, Journal of Bank Research, Journal of Portfolio Management, Journal of Accounting Research, Journal of Cash Management, Management Science, Atlantic Economic Journal, Journal of Economics and Business,* and *Computers and Operations Research*.

Professional Consulting Experience

Dr. Vander Weide has provided financial and economic consulting services to firms in the electric, gas, insurance, telecommunications, and water industries for more than 25 years. He has testified on the cost of capital, competition, risk, incentive regulation, forward-looking economic cost, economic pricing guidelines, depreciation, accounting, valuation, and other financial and economic issues in more than 400 cases before the United States Congress, the Canadian Radio-Television and Telecommunications Commission, the Federal Communications Commission, the National Energy Board (Canada), the Alberta Utilities Commission (Canada), the National Telecommunications and Information Administration, the Federal Energy Regulatory Commission, the public service commissions of 42 states and the District of Columbia, the insurance commissions of five states, the Iowa State Board of Tax Review, the National Association of Securities Dealers, and the North Carolina Property Tax Commission. In addition, he has testified as an expert witness in proceedings before the United States District Court for the District of New Hampshire; United States District Court for the Northern District of California; United States District Court for the District of Nebraska; United States District Court for the Eastern District of North Carolina; Superior Court of North Carolina, the United States Bankruptcy Court for the Southern District of West Virginia; and United States District Court for the Eastern District of Michigan. With respect to implementation of the Telecommunications Act of 1996, Dr. Vander Weide has testified in 30 states on issues relating to the pricing of unbundled network elements and universal service cost studies and has consulted with Bell Canada, Deutsche Telekom, and Telefónica on similar issues. He has also provided expert testimony on issues related to electric and natural gas restructuring. He has worked for Bell Canada/Nortel on a special task force to study the effects of vertical

integration in the Canadian telephone industry and has worked for Bell Canada as an expert witness on the cost of capital. Dr. Vander Weide has provided consulting and expert witness testimony to the following companies:

Telecommunications Companies

ALLTEL and its subsidiaries
AT&T (old)
Bell Canada/Nortel
Centel and its subsidiaries
Cisco Systems
Concord Telephone Company
Deutsche Telekom
Heins Telephone Company
Minnesota Independent Equal Access Corp.
Pacific Telesis and its subsidiaries
Pine Drive Cooperative Telephone Co.
Siemens
Sherburne Telephone Company
The Stentor Companies
Telefónica
Woodbury Telephone Company
U S West (Qwest)
Ameritech (now AT&T new)
Verizon (Bell Atlantic) and subsidiaries
BellSouth and its subsidiaries
Cincinnati Bell (Broadwing)
Citizens Telephone Company
Contel and its subsidiaries
GTE and subsidiaries (now Verizon)
Lucent Technologies
NYNEX and its subsidiaries (Verizon)
Phillips County Cooperative Tel. Co.
Roseville Telephone Company (SureWest)
SBC Communications (now AT&T new)
Southern New England Telephone
Sprint/United and its subsidiaries
Union Telephone Company
United States Telephone Association
Valor Telecommunications (Windstream)

Electric, Gas, and Water Companies

Alcoa Power Generating, Inc.
Alliant Energy
AltaLink, l.p.
Ameren
American Water Works
Atmos Energy
Central Illinois Public Service
Citizens Utilities
Consolidated Natural Gas and its subsidiaries
Dominion Resources
Duke Energy
Empire District Electric Company
EPCOR Distribution & Transmission Inc.
EPCOR Energy Alberta Inc.
FortisAlberta Inc.
Interstate Power Company
Iowa-American Water Company
Iowa-Illinois Gas and Electric
Iowa Southern
Kentucky-American Water Company
Kentucky Power Company
MidAmerican Energy and its subsidiaries
Nevada Power Company
NICOR
North Carolina Natural Gas
Northern Natural Gas Company
NOVA Gas Transmission Ltd.
North Shore Gas
PacifiCorp
PG&E
Peoples Energy and its subsidiaries
The Peoples Gas, Light and Coke Co.
Progress Energy
Public Service Company of North Carolina
PSE&G
Sempra Energy
South Carolina Electric and Gas
Southern Company and subsidiaries
Tennessee-American Water Company
Trans Québec & Maritimes Pipeline Inc.
United Cities Gas Company

Insurance Companies

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

Other Professional Experience

Dr. Vander Weide conducts in-house seminars and training sessions on topics such as creating shareholder value, financial analysis, competitive strategy, cost of capital, real options, financial strategy, managing growth, mergers and acquisitions, valuation, measuring corporate performance, capital budgeting, cash management, and financial planning. Among the firms for whom he has designed and taught tailored programs and training sessions are ABB Asea Brown Boveri, Accenture, Allstate, Ameritech, AT&T, Bell Atlantic/Verizon, BellSouth, Progress Energy/Carolina Power & Light, Contel, Fisons, GlaxoSmithKline, GTE, Lafarge, MidAmerican Energy, New Century Energies, Norfolk Southern, Pacific Bell Telephone, The Rank Group, Siemens, Southern New England Telephone, TRW, and Wolseley Plc. Dr. Vander Weide has also hosted a nationally prominent conference/workshop on estimating the cost of capital. In 1989, at the request of Mr. Fuqua, Dr. Vander Weide designed the Duke Program for Manager Development for managers from the former Soviet Union, the first in the United States designed exclusively for managers from Russia and the former Soviet republics.

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

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APPENDIX 2
DERIVATION OF THE QUARTERLY DCF MODEL

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

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

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

where

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

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

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

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

where the three dots indicate that the sum continues indefinitely.

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

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

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

Geometric Progression

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

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

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

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

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

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

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

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

and

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

or

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

Solving for S_n, we obtain:

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

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

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

Application to DCF Model

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

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

and common factor

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

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

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

as we suggested earlier.

Quarterly DCF Model

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

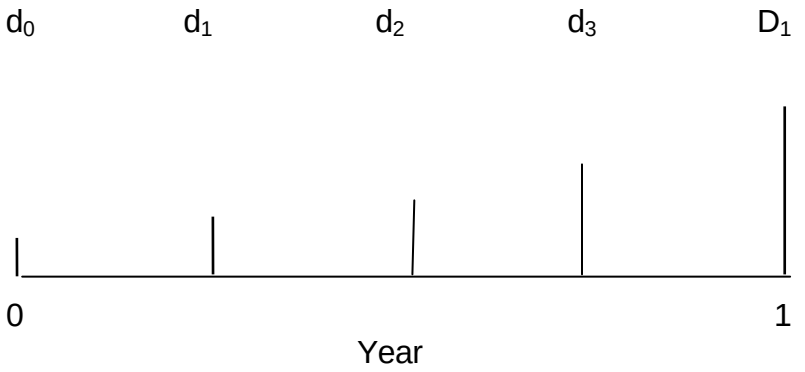
Figure 1

Annual DCF Model

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

Figure 2

Quarterly DCF Model (Constant Growth Version)



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

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

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

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

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

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

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

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

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

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

An Alternative Quarterly DCF Model

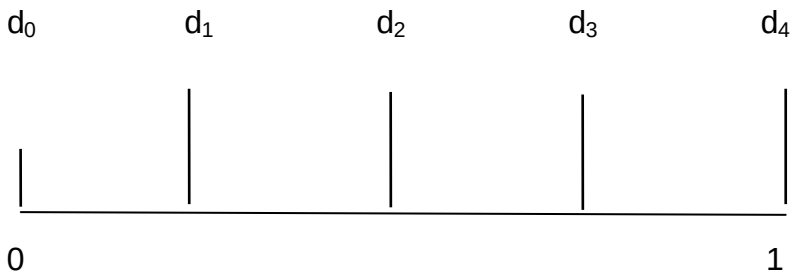
Although the constant growth Quarterly DCF Model [equation (8)] allows for the quarterly timing of dividend payments, it does require the assumption that the firm increases its dividend payments each quarter. Since this assumption is difficult for some analysts to accept, we now discuss a second Quarterly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

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

Figure 3

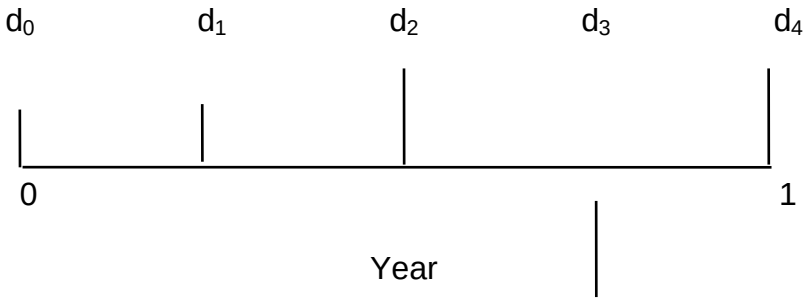
Quarterly DCF Model (Constant Dividend Version)

Case 1



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

Case 2

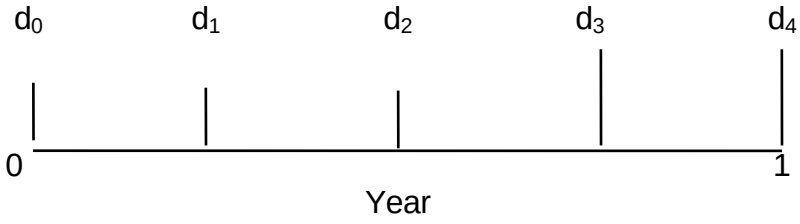


$$d_1 = d_0$$

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

Figure 3 (continued)

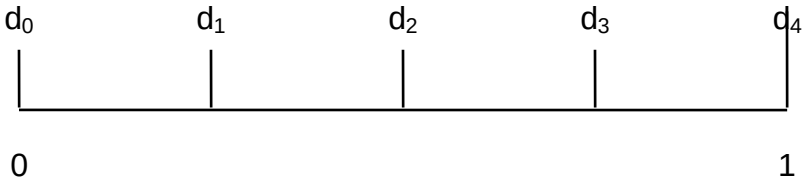
Case 3



$d_1 = d_2 = d_0$

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

Case 4



$d_1 = d_2 = d_3 = d_0$

$d_4 = d_0(1+g)$

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

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

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

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

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

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

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

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

with D_1^* given by (9).

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

APPENDIX 3
EX ANTE RISK PREMIUM APPROACH

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

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

where:

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

To select my ex ante risk premium natural gas proxy group of companies, I used the same criteria that I use when estimating the DCF cost of equity, namely, I selected all the companies in Value Line's groups of natural gas companies that: (1) paid dividends during every quarter of the last two years; (2) did not decrease dividends during any quarter of the past two years; (3) had at least three analysts included in the I/B/E/S mean growth forecast; (4) have an investment grade bond rating and a Value Line Safety Rank of 1, 2, or 3; and (5) have not announced a merger. Schedule 2 displays the results of my ex ante risk premium study, showing the average DCF expected return on an investment in the portfolio of natural gas companies and the yield to maturity on long-term Treasury bonds in each month.

Previous studies have shown that the ex ante risk premium tends to vary inversely with the level of interest rates, that is, the risk premium tends to increase when interest rates decline, and decrease when interest rates go up. To test whether my studies also indicate that the ex ante risk premium varies inversely with the level of interest rates, I performed a regression analysis of the relationship between the ex ante risk premium and the yield to maturity on A-rated utility bonds, using the equation,

$$RP_{PROXY} = a + (b \times I_A) + e$$

where:

RP_{PROXY} = risk premium on proxy company group;

I_A = yield to maturity on A-rated utility bonds;

e = a random residual; and

a, b = coefficients estimated by the regression procedure.

Regression analysis assumes that the statistical residuals from the regression equation are random. My examination of the residuals revealed that there is a significant probability that the residuals are serially correlated (non-zero serial correlation indicates that the residual in one time period tends to be correlated with the residual in the previous time period). Therefore, I made adjustments to my data to correct for the possibility of serial correlation in the residuals.

The common procedure for dealing with serial correlation in the residuals is to estimate the regression coefficients in two steps. First, a multiple regression analysis is used to estimate the serial correlation coefficient, *r*. Second, the estimated serial correlation coefficient is used to transform the original variables into new variables whose serial correlation is approximately zero. The regression coefficients are then re-estimated using the transformed variables as inputs in the regression equation. Based on my knowledge of the statistical relationship between the yield to maturity on A-rated utility bonds and the required risk premium, my estimate of the ex ante risk premium on an investment in my proxy company group as compared to an investment in A-rated utility bonds is given by the equation:

$$RP_{PROXY} = 6.35 - .2836 \times I_A.$$

Using the 2010 forecasted 6.32 percent yield to maturity on A-rated utility bonds as of February 2009, the regression equation produces an ex ante risk premium based on the proxy group equal to 4.56 percent (6.35 – .284 x 6.32 = 4.56).

To estimate the cost of equity using the ex ante risk premium method, one may add the estimated risk premium over the yield on A-rated utility bonds to the forecasted yield to maturity on A-rated utility bonds. As described above, my analyses produce an estimated risk premium over the yield on A-rated utility bonds equal to 4.56 percent. Adding an estimated risk premium of 4.56 percent to the 6.32 percent average yield to maturity on A-rated utility bonds produces a cost of equity estimate of 10.9 percent for the proxy group using the ex ante risk premium method.

APPENDIX 4
EX POST RISK PREMIUM APPROACH

Source of Data

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

Calculation of Stock and Bond Returns

Sample calculation of "Stock Return" column:

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

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

Sample calculation of "Bond Return" column:

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

where Interest = $4.00.

AFFIDAVIT OF JAMES H. VANDER WEIDE

PROVINCE OF ALBERTA)
)
CITY OF CALGARY)

On the 2 day of June, 2009, before me appeared James H. Vander Weide, to me personally known, who, being by me first duly sworn, states that he is Research Professor of Finance and Economics at the Fuqua School of Business of Duke University and also President of Financial Strategy Associates and acknowledges that he has read the above and foregoing document and believes that the statements therein are true and correct to the best of his information, knowledge and belief.

James H. Vander Weide

) IN WITNESS WHEREOF I have hereunto
) subscribed my name and affixed my seal of office at
) the City of Calgary, in the Province of Alberta, this
) 2nd day of June, 2009

Randall W. Block, Q.C.
a Notary Public in and for the Province of Alberta