BEFORE
THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. E-7, SUB 1276

In the Matter of:	)	
	)	**DIRECT TESTIMONY OF**
Application of Duke Energy Carolinas, LLC	)	**ROGER A. MORIN**
For Adjustment of Rates and Charges	)	**FOR DUKE ENERGY**
Applicable to Electric Service in North	)	**CAROLINAS, LLC**
Carolina	)	

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I. INTRODUCTION AND SUMMARY OF RECOMMENDATION

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

A. My name is Dr. Roger A. Morin. My business address is Georgia State University, Robinson College of Business, University Plaza, Atlanta, Georgia, 30303. I am Emeritus Professor of Finance at the Robinson College of Business, Georgia State University and Professor of Finance for Regulated Industry at the Center for the Study of Regulated Industry at Georgia State University. I am also a principal in Utility Research International, an enterprise engaged in regulatory finance and economics consulting to business and government. I am testifying on behalf of Duke Energy Carolinas, LLC ("Duke Energy Carolinas", "DEC", or the "Company").

Q. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND.

A. I hold a Bachelor of Engineering degree and an MBA in Finance from McGill University, Montreal, Canada. I received my Ph.D. in Finance and Econometrics at the Wharton School of Finance, University of Pennsylvania.

Q. PLEASE SUMMARIZE YOUR ACADEMIC AND BUSINESS CAREER.

A. I have taught at the Wharton School of Finance, University of Pennsylvania, Amos Tuck School of Business at Dartmouth College, Drexel University, University of Montreal, McGill University, and Georgia State University. I was a faculty member of Advanced Management Research International, and I am currently a faculty member of S&P Global Intelligence (formerly SNL Knowledge Center or SNL), for whom I have conducted frequent national executive-level education seminars throughout the United States. In the last 40

years, I have conducted numerous national seminars on "Utility Finance," "Utility Cost of Capital," "Alternative Regulatory Frameworks," and "Utility Capital Allocation," which I have developed on behalf of S&P Global Intelligence. I have authored or co-authored several books, monographs, and articles in academic scientific journals on the subject of finance. They have appeared in a variety of journals, including The Journal of Finance, The Journal of Business Administration, International Management Review, and Public Utilities Fortnightly. I published a widely-used treatise on regulatory finance, *Utilities' Cost of Capital*, Public Utilities Reports, Inc., Arlington, Va. 1984. In late 1994, the same publisher released my book, *Regulatory Finance*, a voluminous treatise on the application of finance to regulated utilities. A revised and expanded edition of this book, *The New Regulatory Finance*, was published in 2006, and my latest book *Modern Regulatory Finance* was recently published in January 2022. I have been engaged in extensive consulting activities on behalf of numerous corporations, legal firms, and regulatory bodies in matters of financial management and corporate litigation.

Please see Exhibit RAM-1 for my professional qualifications.

Q. HAVE YOU PREVIOUSLY TESTIFIED ON COST OF CAPITAL BEFORE UTILITY REGULATORY COMMISSIONS?

A. Yes, I have been a cost of capital witness before nearly 50 regulatory bodies in North America, including the North Carolina Utilities Commission ("the Commission") and the Federal Energy Regulatory Commission among several others.

I have testified before the following state, provincial, and other local regulatory commissions:

Alabama	FERC	Missouri	Oklahoma
Alaska	Florida	Montana	Ontario
Alberta	Georgia	Nebraska	Oregon
Arizona	Hawaii	Nevada	Pennsylvania
Arkansas	Illinois	New Brunswick	Quebec
British Columbia	Indiana	New Hampshire	South Carolina
California	Iowa	New Jersey	South Dakota
City of New Orleans	Maine	New Mexico	Tennessee
Colorado	Manitoba	New York	Texas
CRTC	Maryland	Newfoundland	Utah
Delaware	Michigan	North Carolina	Vermont
District of Columbia	Minnesota	North Dakota	Virginia
FCC	Mississippi	Nova Scotia	Washington
		Ohio	West Virginia

The details of my participation in regulatory proceedings are also provided in Exhibit RAM-1.

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

A. The purpose of my testimony in this proceeding is to present an independent appraisal of the fair and reasonable rate of return on common equity ("ROE")[1] on the common equity capital invested in DEC's electric utility operations in

[1] ROE is synonymous with the cost of equity capital and in this testimony I use these terms interchangeably.

the State of North Carolina. Based upon this appraisal, I have formed my professional judgment as to a return on such capital that would:

(1) be fair to ratepayers;

(2) allow DEC to attract the capital needed for infrastructure and reliability investments on reasonable terms;

(3) maintain DEC's financial integrity; and

(4) be comparable to returns offered on comparable risk investments.

Q. PLEASE BRIEFLY IDENTIFY THE EXHIBITS AND APPENDICES ACCOMPANYING YOUR TESTIMONY.

A. I have attached to my testimony Exhibit RAM-1 through Exhibit RAM-9, and Appendices A and B. These Exhibits and appendices relate directly to points in my testimony, and are described in further detail in connection with the discussion of those points in my testimony.

Q. PLEASE SUMMARIZE YOUR FINDINGS CONCERNING DEC'S COST OF COMMON EQUITY.

A. It is my opinion that a fair, reasonable and sufficient ROE for DEC is 10.4%. My recommended return is predicated on the Commission's adoption of DEC's proposed capital structure which consists of 53% common equity capital. A ROE of 10.4 % is required in order for the Company to: (i) attract capital on reasonable terms, (ii) maintain its financial integrity, and (iii) provide DEC a fair opportunity to earn a return commensurate with returns on comparable risk investments.

My ROE recommendation is derived from cost of capital studies that I performed using the financial models available to me and from the application of my professional judgment to the results. I applied various cost of capital methodologies, including Discounted Cash Flow ("DCF"), Capital Asset Pricing Model ("CAPM") and Risk Premium methodologies, to a group of investment-grade dividend-paying vertically-integrated electric utilities which are covered in Value Line's Electric Utility Composite. The results of the cost of capital studies I performed are as follows:

Summary of ROE Estimates

STUDY	**ROE**
DCF Electric Utilities Value Line Growth	9.3%
DCF Electric Utilities Analysts Growth	9.3%
CAPM Electric Utilities	11.0%
Empirical CAPM Electric Utilities	11.2%
Historical Risk Premium Electric Utilities	10.8%
Allowed Risk Premium	10.5%

The average result from the various methodologies is 10.4%. The truncated mean of the results is also 10.4%. Based on those results, my recommended ROE for DEC's electric utility operations in the State of North Carolina is 10.4%.

My recommended ROE reflects the application of my professional judgment to the results in light of the indicated returns from my DCF, CAPM, and Risk Premium analyses.

Q. DR. MORIN, EARLIER THIS YEAR DID YOU FILED RATE OF RETURN TESTIMONY BEFORE THE COMMISSION ON BEHALF OF DUKE ENERGY PROGRESS, LLC ("DEP") WHERE YOU RECOMMENDED A ROE OF 10.2%?

A. Yes, I did.

Q. PLEASE EXPLAIN WHY YOUR RECOMMENDED ROE IN THIS CASE HAS INCREASED SLIGHTLY TO 10.4%.

A. The reason for the slight increase is a significant change in capital market conditions, especially the substantial increase in interest rates. As seen on the arrow on the graph below, the yield on 30-year U.S. Treasury bonds has increased from 3% to the 4% level since the time I prepared my DEP testimony. Utility dividend yields have also increased along with interest rates. Hence, the slight increase in my ROE recommendation from 10.2% to 10.4%.

Q. WOULD IT BE IN THE BEST INTERESTS OF RATEPAYERS FOR THE COMMISSION TO APPROVE A ROE OF 10.4% FOR DEC'S ELECTRIC UTILITY OPERATIONS?

A. Yes. My analysis shows that a 10.4% ROE fairly compensates investors, maintains DEC's credit strength, and will permit the attraction of capital needed for utility infrastructure and reliability capital investments required in the service territory served by DEC.

Q. PLEASE EXPLAIN HOW LOW ALLOWED ROES CAN INCREASE THE FUTURE COST OF CAPITAL AND RATEPAYER COSTS.

A. If a utility is authorized a ROE below the level required by equity investors, the utility or its parent will find it difficult to access equity capital. Investors will not provide equity capital at the current market price if the earnable ROE is

below the level they require given the risks of an equity investment in the utility. The equity market corrects this by generating a stock price in equilibrium that reflects the valuation of the potential earnings stream from an equity investment at the risk-adjusted return that equity investors require. In the case of a utility that has been authorized a return below the level investors believe is appropriate for the risk they bear, the result is a decrease in the utility's market price per share of common stock. This reduces the financial viability of equity financing in two ways. First, because the utility's price per share of common stock decreases, the net proceeds from issuing common stock are reduced. Second, since the utility's market to book ratio decreases with the decrease in the share price of common stock, the potential risk from dilution of equity investments reduces investors' inclination to purchase new issues of common stock. The ultimate effect is the utility will have to rely more on debt financing to meet its capital needs.

However, as a company relies more on debt financing, its capital structure becomes more leveraged. Because debt payments are a fixed financial obligation to the utility, and income available to common equity is subordinate to fixed charges, this decreases the operating income available for dividend and earnings growth. Consequently, equity investors face greater uncertainty about future dividends and earnings from the firm. As a result, the firm's equity becomes a riskier investment. The risk of default on a company's bonds also increases, making the utility's debt a riskier investment. This increases the cost to the utility for both debt and equity financing and increases the possibility a

company will not have access to the capital markets for its outside financing needs. Ultimately, to ensure that DEC has access to capital markets on reasonable terms for its capital needs, a fair and reasonable authorized ROE of 10.4% is required.

DEC must secure outside funds from capital markets to finance required utility plant and equipment investments irrespective of capital market conditions, interest rate conditions and the quality consciousness of market participants. Thus, appropriate rate relief and fair supportive regulation, including approval of my recommended ROE, are essential requirements.

Q. ARE CAPITAL MARKET CONDITIONS IMPORTANT IN DETERMINING THE COST OF CAPITAL FOR A PUBLIC UTILITY?

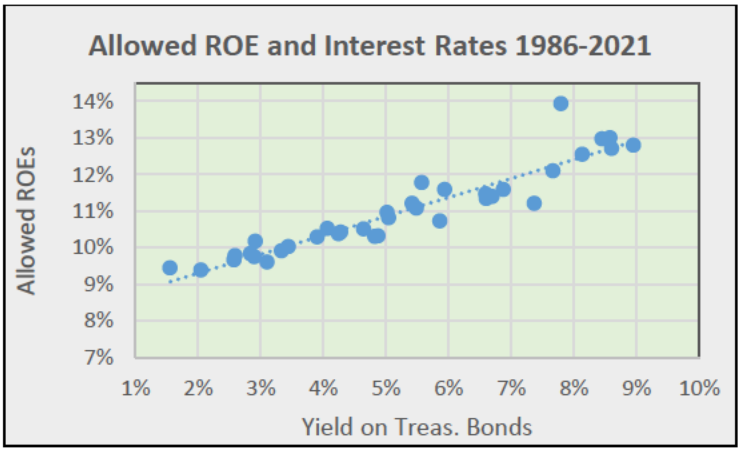
A. Yes, they are. The cost of capital is determined in part by the level and trend of interest rates, by the level of inflation, by investor risk assessments, and by current and prospective economic conditions.

Q. WHAT HAS BEEN THE RECENT TREND IN INTEREST RATES AND ITS IMPACT ON THE COST OF CAPITAL?

A. The steady decline in interest rates over the last decade has ended. As the earlier graph demonstrated, the current 30-year Treasury bond yield has risen from the 2% level to the 4% level, and is expected to rise further in response to record-high inflation, a more robust economic growth, and the Federal Reserve's restrictive monetary policy in its attempt to lower high inflation rates.

Q. HOW DO INTEREST RATES IMPACT A UTILITY COMPANY'S COST OF EQUITY CAPITAL AND ALLOWED RETURN ON EQUITY?

A. The higher the level of interest rates, the higher is the cost of equity capital and the allowed ROE, and conversely as well. This is clearly seen in the graph below which shows the positive relationship between allowed ROEs and the yield on long-term Treasury bonds over the 1986-2021 period.



Allowed returns have typically tracked the level of interest rates as the above graph demonstrates. Hence, it is no surprise that ROE estimates, including my own, have risen in response to both higher interest rates and a higher risk profile for electric utilities. With regards to the latter, as I discuss later in my testimony, a "Perfect Storm" is impacting electric utilities[2]: declining sales per customer, coupled with rising costs, at a time when huge capital investments are required due to aging infrastructure. It is no surprise that investor risk perceptions and return requirements have increased in response to

[2] The "perfect storm" issue is addressed later in the testimony.

not only higher interest rates but also to this paradigm shift in the electric utility industry's risk profile.

Q. PLEASE DESCRIBE HOW THE REMAINDER OF YOUR TESTIMONY IS ORGANIZED.

A. The remainder of my testimony is divided into four broad sections:

(II) Regulatory Framework and Rate of Return;

(III) Cost of Equity Estimates;

(IV) Summary of Results;

(V) Economic Conditions in North Carolina.

Section II discusses the rudiments of rate of return regulation and the basic notions underlying cost of equity capital. Section III contains the application of DCF, Risk Premium, and CAPM tests. Section IV discusses the economic conditions in North Carolina relative to those in the national economy. Section V summarizes the results from the various approaches used in determining a fair return.

II. REGULATORY FRAMEWORK AND RATE OF RETURN

Q. PLEASE EXPLAIN HOW A REGULATED COMPANY'S RATES SHOULD BE SET UNDER TRADITIONAL COST OF SERVICE REGULATION.

A. Under the traditional regulatory process, a regulated company's rates should be set so that the company has a fair opportunity to recover its prudently incurred costs, including taxes and depreciation, plus a fair and reasonable return on its invested capital. The allowed rate of return must necessarily reflect the cost of the funds obtained, that is, investors' return requirements. In determining a

company's required rate of return, the starting point is investors' return requirements in financial markets. A rate of return can then be set at a level sufficient to permit a company the fair opportunity to earn a return commensurate with the cost of those funds.

Funds can be obtained in two general forms, debt capital and equity capital. The cost of debt funds can be easily ascertained from an examination of the contractual interest payments. The cost of common equity funds (i.e., investors' required rate of return on this source of financing) is more difficult to estimate. It is the purpose of the next section of my testimony to estimate a fair and reasonable ROE for DEC's electric utility operations in the State of North Carolina.

Q. WHAT FUNDAMENTAL PRINCIPLES UNDERLIE THE DETERMINATION OF A FAIR AND REASONABLE ROE?

A. The heart of utility regulation is the setting of just and reasonable rates by way of a fair and reasonable return. There are two landmark United States Supreme Court cases that define the legal principles underlying the regulation of a public utility's rate of return and provide the foundations for the notion of a fair return:

1. *Bluefield Water Works & Improvement Co. v. Public Service Commission of West Virginia*, 262 U.S. 679 (1923); and
2. *Federal Power Commission v. Hope Natural Gas Co.*, 320 U.S. 591 (1944).

The *Bluefield* case set the standard against which just and reasonable rates of return are measured:

> A public utility is entitled to such rates as will permit it to earn a return on 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 ...* The *return should be reasonable*, 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 money* necessary for the proper discharge of its public duties.

Bluefield Water Works & Improvement Co., 262 U.S. at 692 (emphasis added).

The *Hope* case expanded on the guidelines to be used to assess the reasonableness of the allowed return. The Court reemphasized its statements in the *Bluefield* case and recognized that revenues must cover "capital costs." The Court stated:

> 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 attract capital*.

Hope Natural Gas Co., 320 U.S. at 603 (emphasis added).

The United States Supreme Court reiterated the criteria set forth in *Hope* in *Federal Power Commission v. Memphis Light, Gas & Water Division*, 411 U.S. 458 (1973); in *Permian Basin Rate Cases*, 390 U.S. 747 (1968); and, most recently, in *Duquesne Light Co. v. Barasch*, 488 U.S. 299 (1989). In the *Permian Basin Rate Cases*, the Supreme Court stressed that a regulatory agency's rate of return order should

> *reasonably be expected to maintain financial integrity, attract necessary capital, and fairly compensate investors for the risks they have assumed.*

Permian Basin Rate Cases, 390 U.S. at 792.

Therefore, the "end result" of this Commission's decision should be to allow DEC the opportunity to earn a ROE that is:

(i) commensurate with returns on investments in other firms having corresponding risks;

(ii) sufficient to assure confidence in DEC's financial integrity; and

(iii) sufficient to maintain DEC's creditworthiness and ability to attract capital on reasonable terms.

Q. DR. MORIN, ARE PROFITS THE SAME AS RETURNS?

A. No, they are not. Profits are dollar figures while returns are percentage figures. Profit in itself is meaningless unless it is compared to the dollars invested to achieve profit. For example, a $100 profit relative to an investment of $1,000 constitutes a 10% return, while the same $100 profit relative to an investment of $10,000 constitutes a return of only 1%.

Q. HOW IS THE FAIR RATE OF RETURN DETERMINED?

A. The aggregate return required by investors is called the "cost of capital." The cost of capital is the opportunity cost, expressed in percentage terms, of the total pool of capital employed by the utility. It is the composite weighted cost of the various classes of capital (e.g., bonds and common stock) used by the utility, with the weights reflecting the proportions of the total capital that each class of capital represents. The fair return in dollars is obtained by multiplying the rate of return set by the regulator by the utility's "rate base." The rate base is

essentially the net book value of the utility's plant and other assets used to provide utility service in a particular jurisdiction.

Although utilities like DEC enjoy varying degrees of monopoly in the sale of public utility services, they (or their parent companies) must compete with everyone else in the free, open market for the input factors of production, whether labor, materials, machines, or capital, including the capital investments required to support the utility infrastructure. The prices of these inputs are set in the competitive marketplace by supply and demand, and it is these input prices that are incorporated in the cost of service computation. This is just as true for capital as for any other factor of production. Since utilities and other investor-owned businesses must go to the open capital market and sell their securities in competition with every other issuer, there is obviously a market price to pay for the capital they require (e.g., the interest on debt capital or the expected ROE relative to the utility's credit quality). In order to attract the necessary capital, utilities must compete with alternative uses of capital and offer a return commensurate with the associated risks.

Q. HOW DOES THE CONCEPT OF A FAIR RETURN RELATE TO THE CONCEPT OF OPPORTUNITY COST?

A. The concept of a fair return is intimately related to the economic concept of "opportunity cost." When investors supply funds to a utility by buying its stocks or bonds, they are not only postponing consumption, giving up the alternative of spending their dollars in some other way, they are also exposing their funds to risk and forgoing returns from investing their money in alternative

comparable risk investments. The compensation they require is the price of capital. If there are differences in the risk of the investments, competition among firms for a limited supply of capital will bring different prices. The capital markets translate these differences in risk into differences in required return, in much the same way that differences in the characteristics of commodities are reflected in different prices.

The important point is that the required return on capital is set by supply and demand and is influenced by the relationship between the risk and return expected for those securities and the risks expected from the overall menu of available securities.

Q. WHAT ECONOMIC AND FINANCIAL CONCEPTS HAVE GUIDED YOUR ASSESSMENT OF DEC'S COST OF COMMON EQUITY?

A. Two fundamental economic principles underlie the appraisal of DEC's cost of equity, one relating to the supply side of capital markets, the other to the demand side.

On the supply side, the first principle asserts that rational investors maximize the performance of their portfolios only if they expect the returns on investments of comparable risk to be the same. If not, rational investors will switch out of those investments yielding lower returns at a given risk level in favor of those investment activities offering higher returns for the same degree of risk. This principle implies that a company will be unable to attract capital funds unless it can offer returns to capital suppliers that are comparable to those achieved on competing investments of similar risk.

On the demand side, the second principle asserts that a company will continue to invest in real physical assets if the expected return on these investments equals, or exceeds, a company's cost of capital. This principle is the essence of the regulatory compact. In other words, a regulatory commission should set rates at a level sufficient to create equality between the expected return on physical asset investments and a company's cost of capital. Failure of the regulator to allow prudent management a fair opportunity to attempt to earn the market required rate of return would be viewed by the capital markets as a breach of the regulatory compact. The financial markets would react to this situation by lowering the utility's common stock price and its credit rating.

Q. HOW DOES DEC OBTAIN ITS CAPITAL AND HOW IS ITS OVERALL COST OF CAPITAL DETERMINED?

A. The funds employed by DEC are obtained in two general forms, debt capital and equity capital. The cost of debt funds can be ascertained easily from an examination of the contractual interest payments. The cost of common equity funds, that is, equity investors' required rate of return, is more difficult to estimate because there are no contractual payments as in the case of debt funds. Rather, the dividend payments received from common stock are not contractual or guaranteed in nature. While both dividend payments and interest payments are risky, dividend payments can increase, decrease or be omitted. Once a cost of common equity estimate has been developed, it can then be combined with the embedded cost of debt in the utility's capital structure, in order to arrive at the overall cost of capital (overall rate of return).

Q. WHAT IS THE MARKET REQUIRED RATE OF RETURN ON EQUITY CAPITAL?

A. The market required rate of return on common equity, or cost of equity, is the risk-adjusted return demanded by the equity investor. Investors establish the price for equity capital through their buying and selling decisions in capital markets. Investors set return requirements according to their perception of the risks inherent in the investment, recognizing the opportunity cost of forgone investments in other companies, and the returns available from other investments of comparable risk.

Q. WHAT MUST BE CONSIDERED IN ESTIMATING A FAIR ROE?

A. The basic premise is that the allowable ROE should be commensurate with returns on investments in other firms having corresponding risks. The allowed return should be sufficient to assure confidence in the financial integrity of the firm, in order to maintain creditworthiness and ability to attract capital on reasonable terms. The "attraction of capital" standard focuses on investors' return requirements that are generally determined using market value methods, such as the DCF, CAPM, or Risk Premium methods. These market value tests define "fair return" as the return investors anticipate when they purchase equity shares of comparable risk in the financial marketplace. This is a market rate of return, defined in terms of anticipated dividends and capital gains as determined by expected changes in stock prices, and reflects the opportunity cost of capital. The economic basis for market value tests is that new capital will be attracted to a company only if the return expected by the suppliers of funds is

commensurate with that available from alternative investments of comparable risk.

III. COST OF EQUITY CAPITAL ESTIMATES

Q. HOW DID YOU ESTIMATE A FAIR ROE FOR DEC?

A. To estimate a fair ROE for DEC, I employed three methodologies:

(i) DCF methodology;

(ii) CAPM methodology; and

(iii) Risk Premium methodology.

All three methodologies are market-based methodologies designed to estimate the return required by investors on the common equity capital committed to DEC.

Q. WHY DID YOU USE MORE THAN ONE APPROACH FOR ESTIMATING THE COST OF EQUITY?

A. No one single method provides the necessary level of precision for determining a fair return, but each method provides useful evidence to facilitate the exercise of an informed judgment. Reliance on any single method or preset formula is inappropriate when dealing with investor expectations because of possible measurement difficulties and vagaries in individual companies' market data. Examples of such vagaries include dividend suspension, insufficient or unrepresentative historical data due to a recent merger, impending corporate transformations such as acquisitions, a new corporate identity due to restructuring activities, and weather anomalies (storms, hurricanes, wildfires, etc.). The added advantage of using several different approaches is that the results of each one can be used to check the others.

As a general proposition, it is extremely dangerous to rely on only one generic methodology to estimate equity costs. The difficulty is compounded when only one variant of that methodology is employed. It is compounded even further when that one methodology is applied to a single company. Hence, several methodologies applied to several comparable risk companies should be employed to estimate the cost of common equity.

There are three broad generic market-based methods available to measure the cost of equity: DCF, CAPM, and Risk Premium. All three of these methods are accepted and used by the financial community and firmly supported in the financial literature. The weight accorded to any one method may vary depending on unusual circumstances in capital market conditions.

Each methodology requires the exercise of professional judgment on the reasonableness of the assumptions underlying the method and on the reasonableness of the proxies used to validate the theory and apply the method. Each method has its own way of examining investor behavior, its own premises, and its own set of simplifications of reality. Investors do not necessarily subscribe to any one method, nor does the stock price reflect the application of any one single method by the price-setting investor. There is no guarantee that a single DCF result is necessarily the ideal predictor of the stock price and of the cost of equity reflected in that price, just as there is no guarantee that a single CAPM or Risk Premium result constitutes the perfect explanation of a stock's price or the cost of equity.

Q. ARE THERE ANY PRACTICAL DIFFICULTIES IN APPLYING COST OF CAPITAL METHODOLOGIES IN ENVIRONMENTS CHARACTERIZED BY VOLATILITY IN CAPITAL MARKETS AND ECONOMIC UNCERTAINTY?

A. Yes, there are. The traditional cost of equity estimation methodologies are difficult to implement when you are dealing with the instability and volatility in the capital markets and the uncertain economy both in the U.S. and abroad. This is not only because stock prices are volatile at this time, but also because utility company historical data have become less meaningful for an industry experiencing substantial change, for example, changing customer expectations, improving energy efficiency technologies, declining per customer usage, the implementation of new grid technologies, the advent of game-changing distributed generation, the transition to stringent carbon-free or renewable energy standards, and the need to secure vast amounts of external capital over the next decade, regardless of capital market conditions. Past earnings and dividend trends may simply not be indicative of the future. For example, historical growth rates of earnings and dividends have been depressed by eroding margins due to a variety of factors, including the sluggish economy, declining per customer usage, restructuring activity in the industry, and falling margins. As a result, this historical data may not be representative of the future long-term earning power of these companies. Moreover, historical growth rates may not be necessarily representative of future trends for several electric utilities involved in mergers, acquisitions, and corporate transformations as

these companies going forward are not the same companies for which historical data are available.

In short, given the volatility in capital markets and economic uncertainties, the utilization of multiple methodologies is critical, while the reliance on a single methodology tends to complicate the estimation process, as does the reliance on a small group of peer companies as I discuss below.

A. DCF Estimates

Q. PLEASE DESCRIBE THE DCF APPROACH TO ESTIMATING THE COST OF EQUITY CAPITAL.

A. According to DCF theory, the value of any security to an investor is the expected discounted value of the future stream of dividends or other benefits. One widely used method to measure these anticipated benefits in the case of a non-static company is to examine the current dividend plus the increases in future dividend payments expected by investors. This valuation process can be represented by the following formula, which is the traditional DCF model:

$$K_e = D_1/P_0 + g$$

where: K_e = investors' expected return on equity

D_1 = expected dividend at the end of the coming year

P_0 = current stock price

g = expected growth rate of dividends, earnings, stock price, and book value

The traditional DCF formula states that under certain assumptions, which are described in the next paragraph, the equity investor's expected return (K_e) can be viewed as the sum of an expected dividend yield (D_1/P_0) plus the expected growth rate of future dividends and stock price (g). The returns anticipated at a

given market price are not directly observable and must be estimated from statistical market information. The idea of the market value approach is to infer K_e from the observed share price, the observed dividend, and an estimate of investors' expected future growth.

The assumptions underlying this valuation formulation are well known, and are discussed in detail in Chapter 9 of my latest 2022 reference text, Modern Regulatory Finance. The standard DCF model requires the following main assumptions:

(i) a constant average growth trend for dividends and earnings;
(ii) a stable dividend payout policy;
(iii) a discount rate in excess of the expected growth rate; and
(iv) a constant price-earnings multiple, which implies that growth in price is synonymous with growth in earnings and dividends.

The standard DCF model also assumes that dividends are paid at the end of each year when in fact dividend payments are normally made on a quarterly basis.

Q. HOW DID YOU ESTIMATE DEC'S COST OF EQUITY WITH THE DCF MODEL?

A. In estimating DEC's cost of equity, I applied the DCF model to a group of investment-grade, dividend-paying, electric utilities that are covered in the Value Line database. The group is described in further detail below.

In order to apply the DCF model, two components are required: the expected dividend yield (D_1/P_0), and the expected long-term growth (g). The expected dividend (D_1) in the annual DCF model can be obtained by

multiplying the current indicated annual dividend rate by the growth factor (1 + g).

Q. HOW DID YOU ESTIMATE THE DIVIDEND YIELD COMPONENT OF THE DCF MODEL?

A. From a conceptual viewpoint, the stock price to employ in calculating the dividend yield is the then-current price of the security at the time of estimating the cost of equity. This is because current stock prices incorporate all publicly available information regarding financial market expectations for that stock which provide the best indication of the true stock prices than any other price in an efficient market. An efficient market implies that prices adjust rapidly to the arrival of new information. Therefore, current prices reflect the fundamental economic value of a security. A considerable body of empirical evidence indicates that capital markets are efficient with respect to a broad set of information. This implies that observed current prices represent the fundamental value of a security, and that a DCF estimate should start with current prices.

In implementing the DCF model, I have used the spot, that is, the current dividend yields reported on the Zacks Investment Research website ("Zacks"). Basing dividend yields on average results from a large group of companies reduces the concern that the vagaries of individual company stock prices will result in an unrepresentative dividend yield.

Q. WHY DID YOU MULTIPLY THE SPOT DIVIDEND YIELD BY (1 + g) RATHER THAN BY (1 + 0.5g)?

A. Some analysts multiply the spot dividend yield by one plus one half the expected growth rate (1 + 0.5g) rather than the conventional one plus the expected growth rate (1 + g). This procedure understates the return expected by the investor.

The fundamental assumption of the basic annual DCF model is that dividends are received annually at the end of each year and that the first dividend is to be received one year from now. Thus, the appropriate dividend to use in a DCF model is the full prospective dividend to be received at the end of the year. Since the appropriate dividend to use in a DCF model is the prospective dividend one year from now rather than the dividend one-half year from now, multiplying the spot dividend yield by (1 + 0.5g) understates the proper dividend yield.

Moreover, multiplying the spot dividend yield by (1 + g) is actually a conservative attempt to capture the reality of quarterly dividend payments typically employed by publicly-traded electric utility holding companies. Use of this method is conservative in the sense that the annual DCF model fully ignores the more frequent compounding of quarterly dividends.

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

A. The principal difficulty in calculating the required return by the DCF approach is in ascertaining the growth rate that investors currently expect. Since no explicit estimate of expected growth is observable, proxies must be employed.

As proxies for expected growth, I examined the consensus growth estimate developed by professional analysts. Projected long-term growth rates actually used by institutional investors to determine the desirability of investing in different securities influence investors' growth anticipations. These forecasts are made by large reputable organizations, and the data are readily available and are representative of the consensus view of investors and are thus consistent with the use of current market prices. Because of the dominance of institutional investors in investment management and security selection, and their influence on individual investment decisions, analysts' growth forecasts influence investor growth expectations and provide a sound basis for estimating the cost of equity with the DCF model.

Growth rate forecasts of several analysts are available from published investment newsletters and from systematic compilations of analysts' forecasts, such as those tabulated by Value Line and Zacks. As proxies for investors' growth expectations in applying the DCF model I used both analysts' long-term growth forecasts reported in Zacks and Value Line's growth forecasts.

Q. WHY DID YOU REJECT THE USE OF HISTORICAL GROWTH RATES IN APPLYING THE DCF MODEL TO UTILITIES?

A. I have rejected historical growth rates as proxies for expected growth in the DCF calculation for two reasons. First, historical growth patterns are already incorporated in analysts' growth forecasts that should be used in the DCF model, and are therefore redundant. Second, published studies in the academic literature demonstrate that growth forecasts made by security analysts are reasonable indicators of investor expectations, and that investors rely on analysts' forecasts. This considerable literature is summarized in Chapter 12 of my most recent 2022 textbook, Modern Regulatory Finance.

Q. DID YOU CONSIDER ANY OTHER METHOD OF ESTIMATING EXPECTED GROWTH TO APPLY THE DCF MODEL?

A. Yes, I did. I considered using the so-called "sustainable growth" method, also referred to as the "retention growth" method. According to this method, future growth is estimated by multiplying the fraction of earnings expected to be retained by a company, 'b', by the expected return on book equity, ROE, as follows:

where: g = expected growth rate in earnings/dividends

b = expected retention ratio

ROE = expected return on book equity

Q. DO YOU HAVE ANY RESERVATIONS IN REGARD TO THE SUSTAINABLE GROWTH METHOD?

A. Yes, I do. First, the sustainable method of predicting growth contains a logic trap: the method requires an estimate of expected return on book equity to be

implemented. But if the expected return on book equity input required by the model differs from the recommended ROE, a fundamental contradiction in logic follows. Second, the empirical finance literature demonstrates that the sustainable growth method of determining growth is not as significantly correlated to measures of value, such as stock prices and price/earnings ratios, as analysts' growth forecasts. I therefore chose not to rely on this method.

Q. DID YOU CONSIDER DIVIDEND GROWTH IN APPLYING THE DCF MODEL?

A. No, not at this time. The reason is that as a practical matter, while there is an abundance of earnings growth forecasts, there are very few forecasts of dividend growth. Moreover, it is reasonable to expect some utilities to lower their dividend payout ratios over the next several years in response to heightened business risk and the need to fund very significant construction programs and infrastructure upgrades over the next decade. Dividend growth has remained largely stagnant in past years as utilities are increasingly conserving financial resources in order to hedge against rising business risks and finance large infrastructure investments. As a result, investors' attention has shifted from dividends to earnings. Therefore, earnings growth provides a more meaningful guide to investors' long-term growth expectations. Indeed, it is growth in earnings that will support future dividends and share prices.

Q. IS THERE ANY EMPIRICAL EVIDENCE DOCUMENTING THE IMPORTANCE OF EARNINGS IN EVALUATING INVESTORS' EXPECTATIONS?

A. Yes, there is an abundance of evidence attesting to the importance of earnings in assessing investors' expectations. First, the sheer volume of earnings forecasts available from the investment community relative to the scarcity of dividend forecasts attests to their importance. To illustrate, Value Line, Yahoo Finance, Zacks, First Call Thompson, Reuters, and IBES provide comprehensive compilations of investors' earnings forecasts. The fact that these investment information providers focus on growth in earnings rather than growth in dividends indicates that the investment community regards earnings growth as a superior indicator of future long-term growth. Second, Value Line's principal investment rating assigned to individual stocks, Timeliness Rank, is based primarily on earnings, which accounts for 65% of the ranking.

Q. HOW DID YOU APPROACH THE COMPOSITION OF COMPARABLE GROUPS IN ORDER TO ESTIMATE DEC'S COST OF EQUITY WITH THE DCF METHOD?

A. Because DEC is not publicly traded, the DCF model cannot be applied directly to DEC and proxies must be used. In the uncertain capital market and industry environment, it is important to select relatively large sample sizes representative of the utility industry as a whole, as opposed to small sample sizes consisting of a handful of companies. This is because the equity market as a whole and utility industry capital market data are volatile. As a result of this

volatility, the composition of small groups of companies is very fluid, with companies exiting the sample due to dividend suspensions or reductions, insufficient or unrepresentative historical data due to recent mergers, impending merger or acquisition, and changing corporate identities due to restructuring activities.

From a statistical standpoint, confidence in the reliability of the DCF model result is considerably enhanced when applying the DCF model to a large group of companies. Any distortions introduced by measurement errors in the two DCF components of equity return for individual companies, namely dividend yield and growth, are mitigated. Utilizing a large portfolio of companies reduces the influence of either overestimating or underestimating the cost of equity for any one individual company. For example, in a large group of companies, positive and negative deviations from the expected growth will tend to cancel out owing to the law of large numbers, provided that the errors are independent.[3] The average growth rate of several companies is less likely to diverge from expected growth than is the estimate of growth for a single firm.

[3] If σ_i^2 represents the average variance of the errors in a group of N companies, and σ_{ij} the average covariance between the errors, then the variance of the error for the group of N companies, σ_N^2 is:

$$\sigma_N^2 = \frac{1}{N}\bar{\sigma}_i^2 + \frac{N-1}{N}\bar{\sigma}_{ij}$$

If the errors are independent, the covariance between them (σ_{ij}) is zero, and the variance of the error for the group is reduced to:

$$\sigma_N^2 = \frac{1}{N}\sigma_i^2$$

As seen in the equation above, as the denominator N gets progressively larger, the variance gets smaller and smaller.

More generally, the assumptions of the DCF model are more likely to be fulfilled for a large group of companies than for any single firm or for a small group of companies.

Moreover, small samples are subject to measurement error, and in violation of the Central Limit Theorem of statistics.[4] From a statistical standpoint, reliance on robust sample sizes mitigates the impact of possible measurement errors and vagaries in individual companies' market data, such as those I listed above.

The point of all this is that the use of a handful of companies in a highly fluid and unstable industry produces fragile and statistically unreliable results. A far safer procedure is to employ large sample sizes representative of the industry as a whole and apply subsequent risk adjustments to the extent that a company's risk profile differs from that of the industry average.

Q. PLEASE DESCRIBE THE PROXY GROUP FOR DEC'S UTILITY BUSINESS?

A. As proxies for DEC, I examined a group of investment-grade dividend-paying electric utilities covered in Value Line's Electric Utility industry group, meaning that these companies all possess utility assets similar to DEC's. I began

[4] The Central Limit Theorem describes the characteristics of the distribution of values we would obtain if we were able to draw an infinite number of random samples of a given size from a given population and we calculated the mean of each sample. The Central Limit Theorem asserts: [1] The mean of the sampling distribution of means is equal to the mean of the population from which the samples were drawn. [2] The variance of the sampling distribution of means is equal to the variance of the population from which the samples were drawn divided by the size of the samples. [3] If the original population is distributed normally, the sampling distribution of means will also be normal. If the original population is not normally distributed, the sampling distribution of means will increasingly approximate a normal distribution as sample size increases.

with all the companies designated as electric utilities that are covered in the Value Line Survey as shown on Exhibit RAM-2. Pacific Gas & Electric was eliminated because of suspended dividends. AvantGrid and PNM Resources were eliminated on account of the ongoing political controversies surrounding that merger. Companies who are primarily distribution-only electric utilities were eliminated so as to focus primarily on vertically-integrated electric utilities like DEC. Private partnerships, private companies, and companies below investment-grade (with a Moody's bond rating below Baa3) were eliminated. Unitil was eliminated on account of its very small size and in order to minimize any stock price anomalies due to thin trading.[5] DEC's parent company Duke Energy was eliminated in order to avoid any circularity in the final results.

The final group of twenty-three companies that comprise the proxy group is shown on Exhibit RAM-2. I stress that this proxy group must be viewed as a portfolio reflecting the risk of the vertically-integrated electric utility industry as a whole. It would be inappropriate to select any particular company or subset of companies from this group and infer the cost of common equity from that company or subset alone without rigorously determining to what degree the subject company is similar in risk to that company or subset.

Q. WHAT DCF RESULTS DID YOU OBTAIN FOR DEC USING VALUE LINE GROWTH PROJECTIONS?

A. Exhibit RAM-3 Page 1 displays the DCF analysis using Value Line growth projections for the twenty-three companies in DEC's proxy group. As shown

[5] This is necessary in order to minimize the well-known thin trading bias in measuring beta. Unitil was excluded for this reason.

on column 3, line 25 of Exhibit RAM-3 Page 1, the average long-term earnings per share growth forecast obtained from Value Line is 5.89% for DEC's proxy group. Combining this growth rate with the average expected dividend yield of 3.78% shown on column 4, line 25 of Exhibit RAM-3 Page 1 produces an estimate of equity costs of 9.67% for DEC's proxy group, as shown on column 5, line 25 of Exhibit RAM-3. Recognition of flotation costs brings the required return estimate to 9.87% for the group, shown in Column 6. The need for a flotation cost allowance is discussed at length later in my testimony.

Page 2 of Exhibit RAM-3 replicates the exact same analysis but without Edison International's ROE estimate of 21%. The resulting average DCF estimate for the group is 9.34%.

Q. WHAT DCF RESULTS DID YOU OBTAIN FOR DEC USING ANALYSTS' CONSENSUS GROWTH FORECASTS?

A. Exhibit RAM-4 displays the DCF analysis using analysts' consensus growth forecasts for the companies in DEC's proxy group. Please note that the growth forecast for Otter Tail was drawn from the Value Line growth forecast since the Zacks growth forecast were not available for that company.

As shown on column 3, line 25 of Exhibit RAM-4, the average long-term earnings per share growth forecast obtained from analysts is 5.35% for DEC's proxy group. Combining this growth rate with the average expected dividend yield of 3.75% shown on column 4, line 25, produces an estimate of equity costs of 9.10% for DEC's proxy group unadjusted for flotation cost, as shown on column 5, line 25, of Exhibit RAM-4. Recognition of flotation costs

brings the required return om equity estimate to 9.30%, shown in Column 6, line 25.

Q. PLEASE SUMMARIZE THE DCF ESTIMATES FOR DEC.

A. Table 1 below summarizes the DCF estimates for DEC:

Table 1. DCF Estimates for DEC

DCF STUDY	ROE
Electric Utilities Value Line Growth	9.34%
Electric Utilities Analysts Growth	9.30%

B. CAPM Estimates

Q. PLEASE DESCRIBE YOUR APPLICATION OF THE CAPM RISK PREMIUM APPROACH.

A. My first two risk premium estimates are based on the CAPM and on an empirical approximation to the CAPM ("ECAPM"). The CAPM is a fundamental paradigm of finance. Simply put, the fundamental idea underlying the CAPM is that risk-averse investors demand higher returns for assuming additional risk, and higher-risk securities are priced to yield higher expected returns than lower-risk securities. The CAPM quantifies the additional return, or risk premium, required for bearing incremental risk. It provides a formal risk-return relationship anchored on the basic idea that only market risk matters, as measured by beta (β). According to the CAPM, securities are priced such that:

EXPECTED RETURN = RISK-FREE RATE + RISK PREMIUM

Denoting the risk-free rate by R_F and the return on the market as a whole by R_M, the CAPM is stated as follows:

$$K = R_F + \beta \times (R_M - R_F)$$

where: K = investors' expected return on equity
R_F = risk-free rate
R_M = return on the market as a whole
β = systematic risk (i.e., change in a security's return relative to that of the market)

This is the seminal CAPM expression, which states that the return required by investors is made up of a risk-free component, R_F, plus a risk premium determined by β x (R_M - R_F). The bracketed expression (R_M - R_F) is known as the market risk premium (MRP) and sometimes known as the equity risk premium (ERP).To derive the CAPM estimate of the cost of equity, three quantities are required: the risk-free rate (R_F), beta (□), and the MRP.

For the risk-free rate (R_F), I used 4.3%, based on consensus yield forecasts. For beta (β), I used 0.89 based on Value Line estimates. For the MRP, that is, (R_M - R_F), I used 7.3% based on historical and prospective market risk premium studies. These inputs to the CAPM are explained below.

CAPM RISK-FREE RATE

Q. HOW DID YOU ARRIVE AT YOUR RISK-FREE RATE ESTIMATE OF 4.3% IN YOUR CAPM AND RISK PREMIUM ANALYSES?

A. To implement the CAPM and Risk Premium methods, an estimate of the risk-free rate is required. I relied on the consensus interest rate forecast reported in the November 2022 edition of Blue Chip Economic Indicators which calls for a rising interest rates in 2023 in response to high inflation rates, a restrictive monetary policy by the Federal Reserve Bank, and high federal deficits. Based on fifty interest rate forecast from a wide variety of prominent sources including

financial institutions, banks, economic consultants, investment bankers, investment research firms, rating agencies among others, the consensus forecast yield on 10-year U.S. Treasury bonds for 2023 is 3.8% and 4.3% on 30-year U.S. Treasury bonds[6].

Q. WHY DID YOU RELY ON LONG-TERM BONDS INSTEAD OF SHORT-TERM BONDS?

A. The appropriate proxy for the risk-free rate in the CAPM is the return on the longest-term Treasury bond possible. This is because common stocks are very long-term instruments more akin to very long-term bonds rather than to short-term Treasury bills or intermediate-term Treasury notes. In a CAPM or Risk Premium analysis, the ideal estimate for the risk-free rate has a term to maturity equal to the security being analyzed. Common stock is a very long-term investment because the cash flows to investors in the form of dividends last indefinitely, therefore the yield on the longest-term possible government bonds, that is the yield on 30-year Treasury bonds, is the best measure of the risk-free rate for use in the CAPM. The expected common stock return is based on very long-term cash flows, regardless of an individual's holding period. Moreover, utility asset investments generally have very long-term useful lives and should correspondingly be matched with very long-term maturity financing instruments.

[6] When only forecasts of 10-year U.S. Treasury notes are available, 50 basis points are added to obtain the 30-year forecast, based on the historical spread between 30-year and 10-year U.S. Treasury bond yields

While long-term Treasury bonds are potentially subject to interest rate risk, this is only true if the bonds are sold prior to maturity. A substantial fraction of bond market participants, usually institutional investors with long-term liabilities (*e.g.*, pension funds and insurance companies), in fact hold bonds until they mature, and therefore are not subject to interest rate risk. Moreover, institutional bondholders neutralize the impact of interest rate changes by matching the maturity of a bond portfolio with the investment planning period. Or they engage in hedging transactions in the financial futures markets. Both academicians and practitioners have extensively documented the merits and mechanics of such immunization strategies.

Another reason for utilizing the longest maturity Treasury bond possible is that the inflation expectations embodied in common equity market-required rates of return will therefore be equal to the inflation rate anticipated to prevail over the very long term. The same expectation should be embodied in the risk-free rate used in applying the CAPM model. It stands to reason that the yields on 30-year Treasury bonds will more closely incorporate within their yields the inflation expectations that influence the prices of common stocks than do short-term Treasury bills or intermediate-term U.S. Treasury notes.

Among U.S. Treasury securities, 30-year Treasury bonds have the longest term to maturity and the yields on such securities should be used as proxies for the risk-free rate in applying the CAPM. Therefore, I have relied on the forecast yields on 30-year Treasury bonds in implementing the CAPM and risk premium methods.

Q. ARE THERE OTHER REASONS WHY YOU REJECT SHORT-TERM INTEREST RATES AS PROXIES FOR THE RISK-FREE RATE IN IMPLEMENTING THE CAPM?

A. Yes. Short-term rates are volatile, fluctuate widely, and are subject to more random disturbances than are long-term rates. Short-term rates are largely administered rates. For example, Treasury bills are used by the Federal Reserve as a policy vehicle to stimulate the economy and to control the money supply. They are also used by governments, companies, and individuals as a temporary safe-house for money.

As a practical matter, it makes no sense to match the return on common stock to the yield on 90-day Treasury bills. This is because short-term rates, such as the yield on 90-day Treasury bills, fluctuate widely, leading to volatile and unreliable equity return estimates. Moreover, yields on 90-day Treasury bills typically do not match the equity investor's planning horizon. Equity investors generally have an investment horizon far in excess of 90 days.

As a conceptual matter, short-term Treasury bill yields reflect the impact of factors different from those influencing the yields on long-term securities such as common stock. For example, the premium for expected inflation embedded into 90-day Treasury bills may be far different than the inflationary premium embedded into long-term securities yields. On grounds of stability and consistency, the yields on long-term Treasury bonds match more closely with common stock returns.

Q. WHY DID YOU IGNORE THE CURRENT LEVEL OF INTEREST RATES IN DEVELOPING YOUR PROXY FOR THE RISK-FREE RATE IN A CAPM ANALYSIS?

A. I relied on projected long-term Treasury interest rates for several reasons. First, investors price securities on the basis of long-term expectations, including interest rates expectations. Cost of capital models, including both the CAPM and DCF models, are prospective (i.e., forward-looking) in nature and must take into account current market expectations for the future because investors price securities on the basis of long-term expectations, including interest rates. As a result, in order to produce a meaningful estimate of investors' required rate of return, the CAPM must be applied using data that reflects the expectations of actual investors in the market. While investors examine history as a guide to the future, it is the expectations of future events that influence security values and the cost of capital.

Second, investors' required returns can and do shift over time with changes in capital market conditions, hence the importance of considering interest rate forecasts. Third, the fact that the numerous organizations cited on the Blue Chip Economic Indicators who provide economic forecasts devote considerable expertise and resources to developing an informed view of the future, and the fact that investors are willing to purchase such expensive services confirm the importance of economic/financial forecasts in the minds of investors. Moreover, the empirical evidence demonstrates that stock prices do indeed reflect prospective financial input data.

Fourth, given that this proceeding is to provide ROE estimates for setting electric rates going forward, forecast interest rates are far more relevant. The use of interest rate forecasts is no different than the use of projections of other financial variables in DCF analyses.

Q. DR. MORIN, WHAT IS YOUR FINAL ESTIMATE OF THE APPROPRIATE RISK-FREE RATE TO BE USED IN A CAPM ANALYSIS?

A. My final estimate of the appropriate risk-free to be used in a CAPM analysis is 4.3%. This is based on the consensus Blue Chip Economic Indicators estimate of 4.3%.

CAPM BETA ESTIMATE

Q. HOW DID YOU SELECT THE BETA FOR YOUR CAPM ANALYSIS?

A. A major thrust of modern financial theory as embodied in the CAPM is that perfectly diversified investors can eliminate the company-specific component of risk, and that only market risk remains. The latter is technically known as "beta" (β), or "systematic risk." The beta coefficient measures the change in a security's return relative to that of the market. The beta coefficient represents the extent and direction of movement in the rate of return on a stock relative to the movement in the rate of return on the market as a whole. It indicates the change in the rate of return on a stock associated with a one percentage point change in the rate of return on the market. It measures the degree to which a particular stock shares the risk of the market as a whole. Modern financial

theory has established that beta incorporates several economic characteristics of a corporation that are reflected in investors' return requirements.

DEC is not publicly traded. Therefore, proxies must be used. In the discussion of DCF estimates of the cost of common equity earlier, I examined a sample of investment-grade dividend-paying electric utilities covered by Value Line. The average beta for DEC's proxy group is 0.89. Please see Exhibit RAM-5, for the beta estimates of the proxy group for DEC. Based on these results, I shall use 0.89 as an estimate for the beta applicable to DEC. I note that the average beta estimate of 0.89 represents a dramatic increase in the average beta of the electric utility industry when compared to historical levels of 0.60 - 0.70. This is not surprising given the rising risks of the electric industry which I discuss further in my testimony.

CAPM MARKET RISK PREMIUM

Q. WHAT MRP DID YOU USE IN YOUR CAPM ANALYSIS?

A. For the MRP, I used 7.4%. This estimate was based on the results of both historical and prospective studies of long-term risk premiums.

Q. CAN YOU DESCRIBE THE HISTORICAL MRP STUDY USED IN YOUR CAPM ANALYSIS?

A. Yes. The historical MRP estimate is based on the results obtained in Kroll's 2022 SBBI Yearbook (formerly published by Duff & Phelps and earlier by Morningstar), which compiles historical returns from 1926 to 2021. his well-known study summarized on Exhibit 6.8 of the handbook shows that a very broad market sample of common stocks outperformed long-term U.S.

Government bonds by 6.3%. The historical MRP over the income component of long-term U.S. Government bonds, rather than over the total bond return, is 7.4%.

The historical MRP should be computed using the income component of bond returns because the intent, even using historical data, is to identify an expected MRP. When Treasury bonds are issued, the income return on the bond is risk free, but the total return, which includes both 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. Moreover, the income component of total bond return (*i.e.*, the coupon rate) is a far better estimate of expected return than the total return (*i.e.*, the coupon rate + capital gain), because both realized capital gains and realized losses are largely unanticipated by bond investors. The long-horizon (1926-2021) MRP is 7.4%.

Q. ON WHAT MATURITY BOND DOES THE KROLL HISTORICAL RISK PREMIUM DATA RELY?

A. Because 30-year bonds were not always traded or even available throughout the entire study period covered in the Kroll study of historical returns, the latter study relied on bond return data based on 20-year Treasury bonds. Given that the normal yield curve is virtually flat above maturities of 20 years for most of the period covered in the Kroll study, the difference in yield is not material.

Q. WHY DID YOU USE LONG TIME PERIODS IN ARRIVING AT YOUR HISTORICAL MRP ESTIMATE?

A. Because realized returns can be substantially different from prospective returns anticipated by investors when measured over short time periods, it is important to employ returns realized over long time periods rather than returns realized over shorter periods when estimating the MRP with historical returns. Therefore, a Risk Premium study should consider the longest possible period for which data are available. Short-run periods during which investors earned a lower risk premium than expected are offset by short-run periods during which investors earned a higher risk premium than expected. Only over long-time periods will investor return expectations and realizations converge.

I have therefore ignored realized risk premiums measured over short time periods. Instead, I relied on results over periods of enough length to smooth out short-term aberrations, and to encompass several business and interest rate cycles. The use of the entire study period in estimating the appropriate MRP minimizes subjective judgment and encompasses many diverse regimes of inflation, interest rate cycles, and economic cycles.

To the extent that the estimated historical equity risk premium follows what is known in statistics as a random walk, one should expect the equity risk premium to remain at its historical mean. Since there is no evidence that the MRP in common stocks has changed over time, that is, no significant serial correlation in the Kroll study prior to that time, it is reasonable to assume that these quantities will remain stable in the future.

Q. SHOULD STUDIES OF HISTORICAL RISK PREMIUMS RELY ON ARITHMETIC AVERAGE RETURNS OR GEOMETRIC AVERAGE RETURNS?

A. Whenever relying on historical risk premiums, only arithmetic average returns over long periods are appropriate for forecasting and estimating the cost of capital. Geometric average returns are not appropriate.[7]

Q. PLEASE EXPLAIN HOW THE ISSUE OF WHAT IS THE PROPER "MEAN" AVERAGE HISTORICAL RETURN ARISES IN THE CONTEXT OF ANALYZING THE COST OF EQUITY?

A. The issue arises in applying methods that derive estimates of a utility's cost of equity from historical relationships between bond yields and earned returns on equity for individual companies or portfolios of several companies. Those methods produce series of numbers representing the annual difference between bond yields and stock returns over long historical periods. The question is how to translate those series into a single number that can be added to a current bond yield to estimate the current cost of equity for a stock or a portfolio. Calculating geometric and arithmetic means are two ways of converting series of numbers to a single, representative figure.

[7] *See* Roger A. Morin, Ph.D., Modern Regulatory Finance, Chapter 5 (2022); Richard A. Brealey, et al., Principles of Corporate Finance (11th ed. 2014); Roger A. Morin, Ph.D., The New Regulatory Finance: Utilities' Cost of Capital, Chapter 4 (2006).

Q. IF THE ARITHMETIC AND THE GEOMETRIC MEANS ARE BOTH "REPRESENTATIVE" OF THE SERIES, WHAT IS THE DIFFERENCE BETWEEN THE TWO MEANS?

A. Each mean represents different information about the series. The geometric mean of a series of numbers is the value which, if compounded over the period examined, would have made the starting value grow to the ending value. The arithmetic mean is simply the average of the numbers in the series. Where there is any annual variation (volatility) in a series of numbers, the arithmetic mean of the series, which reflects volatility, will always exceed the geometric mean, which ignores volatility. Because investors require higher expected returns to invest in a company whose earnings are volatile than one whose earnings are stable, the geometric mean is not useful in estimating the expected rate of return which investors require to make an investment.

Q. CAN YOU PROVIDE A NUMERICAL EXAMPLE TO ILLUSTRATE THIS DIFFERENCE BETWEEN GEOMETRIC AND ARITHMETIC MEANS?

A. Yes. Table 2 below compares the geometric and arithmetic mean returns of a hypothetical Stock A, whose yearly returns over a ten-year period are very volatile, with those of a hypothetical Stock B, whose yearly returns are perfectly stable during that period. Consistent with the point that geometric returns ignore volatility, the geometric mean returns for the two series are identical (11.6% in both cases), whereas the arithmetic mean return of the volatile stock (26.7%) is much higher than the arithmetic mean return of the stable stock (11.6%).

If relying on geometric means, investors would require the same expected return to invest in both of these stocks, even though the volatility of returns in Stock A is very high while Stock B exhibits perfectly stable returns. That is clearly contrary to the most basic financial theory; that is, the higher the risk, the higher the expected return.

Chapter 5, Appendix A of my latest cost of capital textbook Modern Regulatory Finance contains a detailed and rigorous discussion of the impropriety of using geometric averages in estimating the cost of capital. Briefly, the disparity between the arithmetic average return and the geometric average return raises the question as to what purposes should these different return measures be used. The answer is that the geometric average return should be used for measuring historical returns that are compounded over multiple time periods. The arithmetic average return should be used for future-oriented analysis, where the use of expected values is appropriate.

Table 2 Arithmetic vs Geometric Mean Returns

Year	Stock A	Stock B
2012	50.0%	11.6%
2013	-54.7%	11.6%
2014	98.5%	11.6%
2015	42.2%	11.6%
2016	-32.3%	11.6%
2017	-39.2%	11.6%
2018	153.2%	11.6%
2019	-10.0%	11.6%
2020	38.9%	11.6%
2021	20.0%	11.6%
Std. Deviation	**64.9%**	**0.0%**
Arith. Mean	**26.7%**	**11.6%**
Geom. Mean	**11.6%**	**11.6%**

Q. CAN YOU DESCRIBE THE PROSPECTIVE MRP ESTIMATE USED IN YOUR CAPM ANALYSIS?

A. As a second estimate of the MRP, I examined Value Line's dividend yield and growth forecasts for the stocks in the S&P 500 Stock Index, that is, for the broad U.S. economy. Exhibit RAM-6 provides a prospective DCF analysis of the dividend-paying stocks that make up the S&P 500 Index using Value Line's screening software. The dividend yield (D_0/P) on the dividend-paying stocks in the S&P 500 Index is 2.4%, and the average projected long-term growth rate (g) is 9.1%. Adding the expected dividend yield (D_1/P) to the growth component produces an expected market return on aggregate equities of 11.5%. Subtracting the prospective risk-free rate of 4.3% from the latter, the implied

risk premium is 7.2% over long-term U.S. Treasury bonds. This estimate is identical to that obtained from the historical MRP study.

The average of the historical and prospective MRP estimates is 7.3% which is my final estimate of the MRP for purposes of implementing the CAPM.

Q. IS YOUR MRP ESTIMATE OF 7.3% CONSISTENT WITH THE ACADEMIC LITERATURE ON THE SUBJECT?

A. Yes, it is. Based on all the empirical evidence and the vast relevant literature on the subject, it is fair to conclude that a MRP range of 6% - 8% is a reasonable estimate for purposes of estimating the cost of equity with the CAPM in a regulatory setting.

The historical MRP approach is very simple and difficult to improve upon when you consider the variability and instability of the input data in alternative approaches. It is reasonable to conclude that over the long term, the MRP is likely to be similar to what it has been in the past.

In their authoritative corporate finance textbook, Professors Brealey, Myers, and Allen[8] state:

"Many financial economists rely on the evidence of history and therefore work with a risk premium of about 7%. Brealey, Myers, and Allen have no official position on the issue, but we believe that a range of 5% to 8% is reasonable for the risk premium in the United States."

[8] Richard A. Brealey, Stewart C. Myers, and Paul Allen, Principles of Corporate Finance, Irwin McGraw-Hill (11th ed. 2014).

A similar sentiment is echoed by Professors Ross, Westerfield and Jordan (2013) in their well-known textbook, who cite:

"We are comfortable with an estimate based on the historical U.S. equity risk premium of about 7 percent, but estimates of the future U.S. equity risk premium that are somewhat higher or lower could be reasonable if we have good reason to believe the past is not representative of the future. The bottom line is that any estimate of the future equity risk premium will involve assumptions about the future risk environment as well as the amount of risk aversion of future investors". Page 326

My own survey of the considerable literature on the MRP, which appears in Chapter 6 of my latest 2022 textbook, Modern Regulatory Finance, is also consistent with this view.

Q. WHAT IS YOUR ESTIMATE OF DEC'S COST OF EQUITY USING THE CAPM APPROACH?

A. For each company in the group, inserting, a risk-free rate of 4.3%, the company's own beta estimate, and a MRP of 7.3%, into the CAPM equation, the average CAPM cost of common equity estimate for the group is 11.01% inclusive of flotation costs. Please see Exhibit RAM-7 for a detailed description of the CAPM analysis.

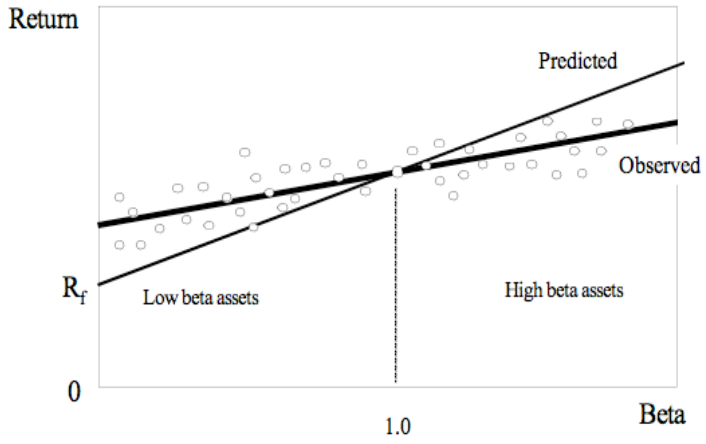
Q. CAN YOU DESCRIBE YOUR APPLICATION OF THE EMPIRICAL VERSION OF THE CAPM?

A. There have been countless empirical tests of the CAPM to determine to what extent security returns and betas are related in the manner predicted by the CAPM. This literature is summarized in Chapter 7 of my latest book, Modern Regulatory Finance. The results of the tests support the idea that beta is related

to security returns, that the risk-return tradeoff is positive, and that the relationship is linear. The contradictory finding is that the risk-return tradeoff is not as steeply sloped as the predicted CAPM. That is, empirical research has long shown that low-beta securities earn returns somewhat higher than the CAPM would predict, and high-beta securities earn less than predicted.

A CAPM-based estimate of cost of capital underestimates the return required from low-beta securities and overstates the return required from high-beta securities, based on the empirical evidence. This is one of the most well-known results in finance. It is displayed graphically below.

CAPM: Predicted vs Observed Returns



A number of variations on the original CAPM theory have been proposed to explain this finding. The ECAPM makes use of these empirical findings. The ECAPM estimates the cost of capital with the equation:

$$K = R_F + \alpha + \beta \times ((R_M - R_F) - \alpha)$$

where the symbol alpha, α, represents the "constant" of the risk-return line, MRP is the market risk premium (R_M - R_F), and the other symbols are defined as previously noted.

Inserting the risk-free rate, an alpha in the range of 1% - 2%, and reasonable values of beta and the MRP in the above equation produces results that are indistinguishable from the following more tractable ECAPM expression:

$$K = R_F + 0.25 \times (R_M - R_F) + 0.75\beta \times (R_M - R_F)$$

An alpha range of one to two percent is somewhat lower than that estimated empirically. The use of a lower value for alpha leads to a lower estimate of the cost of capital for low-beta stocks such as regulated utilities. This is because the use of a long-term risk-free rate rather than a short-term risk-free rate already incorporates some of the desired effects of using the ECAPM. In other words, the long-term risk-free rate version of the CAPM has a higher intercept and a flatter slope than the short-term risk-free version which has been tested. This is also because the use of adjusted betas rather than the use of raw betas incorporates some of the desired effect of using the ECAPM.[9] Thus, it is reasonable to apply a conservative alpha adjustment. Please see Appendix A for a discussion of the CAPM and the ECAPM.

[9] The regression tendency of betas to converge to 1.0 over time is very well known and widely discussed in the financial literature. As a result, several commercial beta producers adjust their forecasted betas toward 1.00 in an effort to improve their forecasts. Value Line and Bloomberg betas are adjusted for their long-term tendency to regress toward 1.0 by giving approximately 66% weight to the measured raw beta and 33% weight to the prior value of 1.0 for each stock: $\beta_{adjusted} = 0.33 + 0.66\ \beta_{raw}$

In short, the following equation provides a viable approximation to the observed relationship between risk and return, and provides the following cost of equity capital estimate:

$$K = R_F + 0.25 (R_M - R_F) +. 0.75 \times \beta \times (R_M - R_F)$$

For each company in the group, inserting the risk-free rate of 4.3%, a MRP of 7.3% for $(R_M - R_F)$ and that company's beta estimate in the above equation, the average cost of common equity for the group is return on common equity is 11.22% inclusive of flotation costs. Please see Exhibit RAM-7 for a detailed description of the ECAPM analysis.

Q. IS THE USE OF THE ECAPM CONSISTENT WITH THE USE OF ADJUSTED BETAS?

A. Yes, it is. Some have argued that the use of the ECAPM is inconsistent with the use of adjusted betas, such as those supplied by Value Line and Bloomberg. The reasoning to support the inconsistency argument is that the reason for using the ECAPM is to allow for the tendency of betas to regress toward the mean value of 1.00 over time, and, since Value Line betas are already adjusted for such trend, an ECAPM analysis results in double-counting. But this reasoning is erroneous.

Fundamentally, the ECAPM is not an adjustment, increase, or decrease in beta. The observed return on high beta securities is actually lower than that produced by the CAPM estimate, and conversely. The ECAPM is a formal recognition that the observed risk-return tradeoff is flatter than predicted by the CAPM based on myriad empirical evidence. The ECAPM (which adjusts the slope of the Capital Market Line) and the use of adjusted betas (which addresses

the tendency of betas to regress to the value of 1.0) comprise two separate features of asset pricing. Even if a company's beta is estimated accurately, the CAPM still understates the return for low-beta stocks and overstates the return for high beta stocks. And even if the ECAPM is used, the return for low-beta securities is understated if the betas are understated. Referring back to the previous graph, the ECAPM is a return (vertical axis) adjustment and not a beta (horizontal axis) adjustment. Both adjustments are necessary. Moreover, the use of adjusted betas has the added benefit to compensate for interest rate sensitivity of utility stocks not captured by unadjusted betas.

Q. PLEASE SUMMARIZE YOUR CAPM ESTIMATES.

A. Table 3 below summarizes the common equity estimates obtained from the CAPM studies.

Table 3 CAPM Results

CAPM Method	ROE
Traditional CAPM	11.1%
Empirical CAPM	11.3%

C. Historical Risk Premium Estimates

Q. PLEASE DESCRIBE YOUR HISTORICAL RISK PREMIUM ANALYSIS OF THE UTILITY INDUSTRY USING TREASURY BOND YIELDS.

A. A historical risk premium for the utility industry was estimated with an annual time series analysis applied to the utility industry as a whole over the 1930-2021 period, using Standard and Poor's Utility Index (S&P Index) as an

industry proxy. The risk premium was estimated by computing the actual realized ROE capital for the S&P Utility Index for each year, using the actual stock prices and dividends of the index, and then subtracting the long-term Treasury bond return for that year. Please see Exhibit RAM-8, for an analysis of the historical risk premium for the utility industry using an annual time series analysis applied to the utility industry as a whole over the 1930-2021 period.

As shown on Exhibit RAM-8, the average risk premium over the period was 5.5% over long-term Treasury bond yields and 6.3% over the income component of bond yields. As discussed previously, the latter is the appropriate risk premium to use. Given the risk-free rate of 4.3%, and using the historical estimate of 6.3% for bond returns, the implied cost of equity is 4.3% + 6.3% = 10.6%. This estimate becomes 10.8% with flotation costs, discussed later in my testimony.

Q. ARE YOU CONCERNED ABOUT THE REALISM OF THE ASSUMPTIONS THAT UNDERLIE THE HISTORICAL RISK PREMIUM METHOD?

A. No, I am not, for they are no more restrictive than the assumptions that underlie the DCF model or the CAPM. While the method looks backward in time and assumes that the risk premium is constant over time, these assumptions are not necessarily restrictive. By employing returns realized over long time periods rather than returns realized over more recent time periods, investor return expectations and realizations converge. Realized returns can be substantially different from prospective returns anticipated by investors, especially when

measured over short time periods. By ensuring that the Risk Premium study encompasses the longest possible period for which data are available, short-run periods during which investors earned a lower risk premium than they expected are offset by short-run periods during which investors earned a higher risk premium than they expected. Only over long time periods will investor return expectations and realizations converge, or else, investors would be reluctant to invest money.

D. Allowed Risk Premium Estimates

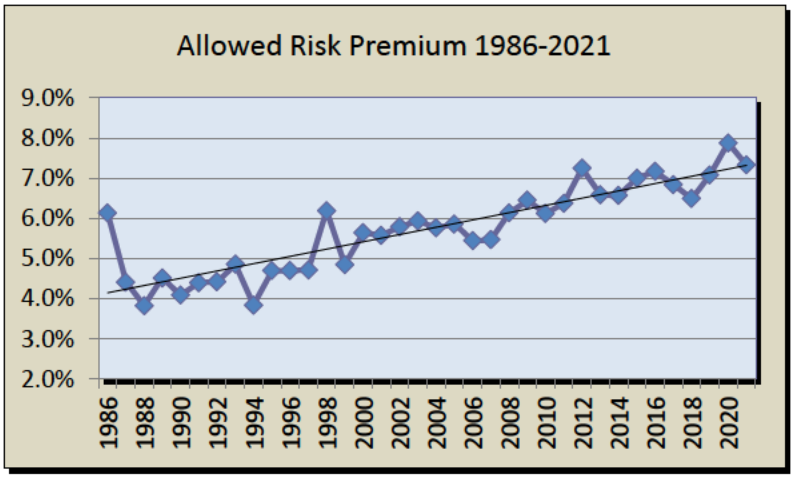
Q. PLEASE DESCRIBE YOUR ANALYSIS OF ALLOWED RISK PREMIUMS IN THE ELECTRIC UTILITY INDUSTRY.

A. To estimate the electric and gas utility industry's cost of common equity, I also examined the historical risk premiums implied in the ROEs allowed by regulatory commissions utilities over the 1986-2021 period for which data were available, relative to the contemporaneous level of the long-term Treasury bond yield. Please see Exhibit RAM-9, for an analysis of historical risk premiums implied in the ROEs allowed by regulatory commissions utilities over the 1986-2021 period.

This variation of the risk premium approach is reasonable because allowed risk premiums are presumably based on the results of market-based methodologies (DCF, CAPM, Risk Premium, etc.) presented to regulators in rate hearings and on the actions of objective unbiased investors in a competitive marketplace. Historical allowed ROE data are readily available over long periods on a quarterly basis from Regulatory Research Associates (now S&P

Global Intelligence) and easily verifiable from prior issues of that same publication and past commission decision archives.

The average ROE spread over long-term Treasury yields was 5.73% over the entire 1986-2021 period for which data were available. The graph below shows the year-by-year allowed risk premium. The escalating trend of the risk premium in response to lower interest rates and rising competition is noteworthy.



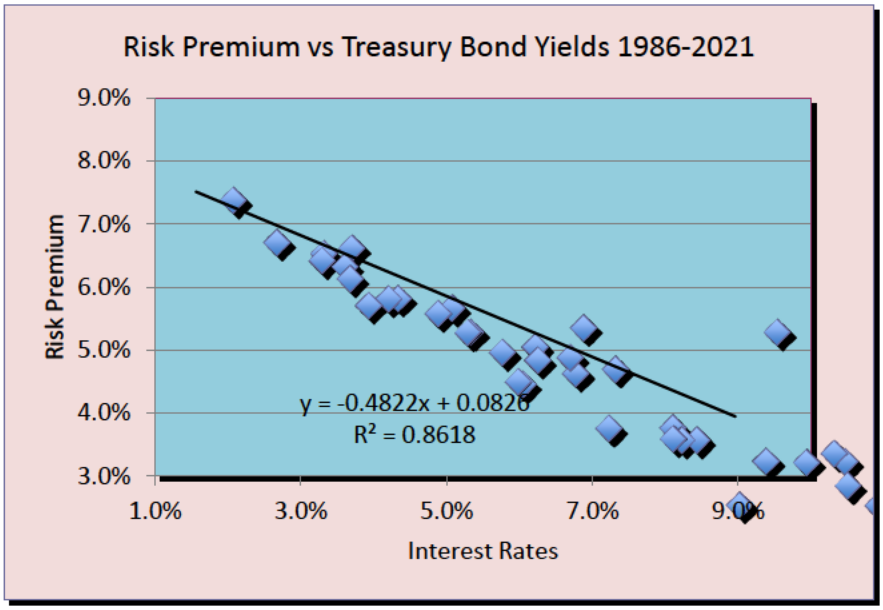
A careful review of these ROE decisions relative to interest rate trends reveals a narrowing of the risk premium in times of rising interest rates, and a widening of the premium as interest rates fall. The following statistical relationship between the risk premium (RP) and interest rates (YIELD) emerges over the 1986-2021 period:

$$RP = 8.2600 - 0.4822\ YIELD$$

$R^2 = 0.86$

The relationship is highly statistically significant[10] as indicated by the very high R^2. The graph below shows a clear inverse relationship between the allowed risk premium and interest rates as revealed in past ROE decisions.

Inserting the long-term Treasury bond yield of 4.3% in the above equation suggests a risk premium estimate of 6.2%, implying a cost of equity of 10.5%. There is no need to adjust this figure for flotation cost given that the ROE data are based on allowed returns on book equity (and should already include an implicit or explicit flotation cost adjustment) rather than on market-based returns.



[10] The coefficient of determination R^2, sometimes called the "goodness of fit measure," is a measure of the degree of explanatory power of a statistical relationship. It is simply the ratio of the explained portion to the total sum of squares. The higher R^2 the higher is the degree of the overall fit of the estimated regression equation to the sample data.

Q. DO INVESTORS TAKE INTO ACCOUNT ALLOWED RETURNS IN FORMULATING THEIR RETURN EXPECTATIONS?

A. Yes, among many other factors, investors do indeed take into account returns granted by various regulators in formulating their risk and return expectations, as evidenced by the availability of commercial publications disseminating such data, including Value Line and S&P Global Intelligence (formerly SNL and Regulatory Research Associates). Allowed returns, while certainly not a precise indication of a particular company's cost of equity capital, are nevertheless important determinants of investor growth perceptions and investor expected returns.

Q. PLEASE SUMMARIZE YOUR RISK PREMIUM ESTIMATES.

A. Table 5 below summarizes the ROE estimates obtained from the two Risk Premium studies.

Table 4 Risk Premium Estimates for DEC

Risk Premium Method	ROE
Historical Risk Premium	10.8%
Allowed Risk Premium	10.5%

E. Need for Flotation Cost Adjustment

Q. PLEASE DESCRIBE THE NEED FOR A FLOTATION COST ALLOWANCE.

A. All the market-based estimates reported above include an adjustment for flotation costs. The simple fact of the matter is that issuing common equity capital is not free. Flotation costs associated with stock issues are similar to the flotation costs associated with bonds and preferred stocks. Flotation costs are

not expensed at the time of issue, and therefore must be recovered via a rate of return adjustment. This is done routinely for bond and preferred stock issues by most regulatory commissions, including FERC. Clearly, the common equity capital accumulated by the Company is not cost-free. The flotation cost allowance to the cost of common equity capital is discussed and applied in most corporate finance textbooks; it is unreasonable to ignore the need for such an adjustment.

Flotation costs are very similar to the closing costs on a home mortgage. In the case of issues of new equity, flotation costs represent the discounts that must be provided to place the new securities. Flotation costs have a direct and an indirect component. The direct component is the compensation to the security underwriter for his marketing/consulting services, for the risks involved in distributing the issue, and for any operating expenses associated with the issue (e.g., printing, legal, prospectus). The indirect component represents the downward pressure on the stock price as a result of the increased supply of stock from the new issue. The latter component is frequently referred to as "market pressure."

Investors must be compensated for flotation costs on an ongoing basis to the extent that such costs have not been expensed in the past, and therefore the adjustment must continue for the entire time that these initial funds are retained in the firm. Appendix B to my testimony discusses flotation costs in detail, and shows: (1) why it is necessary to apply an allowance of 5% to the dividend yield component of equity cost by dividing that yield by 0.95 (100%

- 5%) to obtain the fair return on equity capital; (2) why the flotation adjustment is permanently required to avoid confiscation even if no further stock issues are contemplated; and (3) that flotation costs are only recovered if the rate of return is applied to total equity, including retained earnings, in all future years.

By analogy, in the case of a bond issue, flotation costs are not expensed but are amortized over the life of the bond, and the annual amortization charge is embedded in the cost of service. The flotation adjustment is also analogous to the process of depreciation, which allows for the recovery of funds invested in utility plant. The recovery of bond flotation expense continues year after year, irrespective of whether a company issues new debt capital in the future, until recovery is complete, in the same way that the recovery of past investments in plant and equipment through depreciation allowances continues in the future even if no new construction is contemplated. In the case of common stock that has no finite life, flotation costs are not amortized. Thus, the recovery of flotation costs requires an upward adjustment to the allowed ROE.

A simple example will illustrate the concept. A stock is sold for $100, and investors require a 10% return, that is, $10 of earnings. But if flotation costs are 5%, the Company nets $95 from the issue, and its common equity account is credited by $95. In order to generate the same $10 of earnings to the shareholders, from a reduced equity base, it is clear that a return in excess of 10% must be allowed on this reduced equity base, here 10.53%.

According to the empirical finance literature discussed in Appendix B, total flotation costs amount to 4% for the direct component and 1% for the

market pressure component, for a total of 5% of gross proceeds. This in turn amounts to approximately 20 basis points, depending on the magnitude of the dividend yield component. To illustrate, dividing the average expected dividend yield of around 4.0% for utility stocks by 0.95 yields 4.2%, which is 20 basis points higher.

Sometimes, the argument is made that flotation costs are real and should be recognized in calculating the fair ROE, but only at the time when the expenses are incurred. In other words, as the argument goes, the flotation cost allowance should not continue indefinitely, but should be made in the year in which the sale of securities occurs, with no need for continuing compensation in future years. This argument is valid only if the Company has already been compensated for these costs. If not, the argument is without merit. My own recommendation is that investors be compensated for flotation costs on an on-going basis rather than through expensing, and that the flotation cost adjustment continue for the entire time that these initial funds are retained in the firm.

In theory, flotation costs could be expensed and recovered through rates as they are incurred. This procedure, although simple in implementation, is not considered appropriate, however, because the equity capital raised in a given stock issue remains on the utility's common equity account and continues to provide benefits to ratepayers indefinitely. In the absence of valid reasons to do so, burdening the current generation of ratepayers with the full costs of raising capital is not preferable when the benefits of that capital extend indefinitely. The common practice of capitalizing rather than expensing eliminates the

intergenerational transfers that would prevail if today's ratepayers were asked to bear the full burden of flotation costs of bond/stock issues in order to finance capital projects designed to serve future as well as current generations. Moreover, expensing flotation costs requires an estimate of the market pressure effect for each individual issue, which is likely to prove unreliable. A more reliable approach is to estimate market pressure for a large sample of stock offerings rather than for one individual issue.

There are several sources of equity capital available to a firm including: common equity issues, conversions of convertible preferred stock, dividend reinvestment plans, employees' savings plans, warrants, and stock dividend programs. Each carries its own set of administrative costs and flotation cost components, including discounts, commissions, corporate expenses, offering spread, and market pressure. The flotation cost allowance is a composite factor that reflects the historical mix of sources of equity. The allowance factor is a build-up of historical flotation cost adjustments associated with and traceable to each component of equity at its source. It is impractical and prohibitively costly to start from the inception of a company and determine the source of all present equity. A practical solution is to identify general categories and assign one factor to each category. My recommended flotation cost allowance is a weighted average cost factor designed to capture the average cost of various equity vintages and types of equity capital raised by the Company.

Q. DR. MORIN, CAN YOU PLEASE ELABORATE ON THE MARKET PRESSURE COMPONENT OF FLOTATION COST?

A. The indirect component, or market pressure component, of flotation costs represents the downward pressure on the stock price as a result of the increased supply of stock from the new issue, reflecting the basic economic fact that when the supply of securities is increased following a stock or bond issue, the price falls. The market pressure effect is real, tangible, measurable, and negative. According to the empirical finance literature cited in Appendix B, the market pressure component of the flotation cost adjustment is approximately 1% of the gross proceeds of an issuance. The announcement of the sale of large blocks of stock produces a decline in a company's stock price, as one would expect given the increased supply of common stock.

Q. IS A FLOTATION COST ADJUSTMENT REQUIRED FOR AN OPERATING SUBSIDIARY LIKE DEC THAT DOES NOT TRADE PUBLICLY?

A. Yes, it is. It is sometimes alleged that a flotation cost allowance is inappropriate if the utility is a subsidiary whose equity capital is obtained from its owners, in this case, Duke Energy Corporation. This objection is unfounded since the parent-subsidiary relationship does not eliminate the costs of a new issue, but merely transfers them to the parent. It would be unfair and discriminatory to subject parent shareholders to dilution while individual shareholders are absolved from such dilution. Fair treatment must consider that, if the utility-

subsidiary had gone to the capital markets directly, flotation costs would have been incurred.

IV. SUMMARY OF RESULTS AND RECOMMENDATION

Q. PLEASE SUMMARIZE YOUR RESULTS AND RECOMMENDATION.

A. To arrive at my final recommendation, I performed

(i) a DCF analysis on a group of investment-grade dividend-paying electric utilities using Value Line's growth forecasts;

(ii) a DCF analysis on a group of investment-grade dividend-paying electric utilities using analysts' growth forecasts;

(iii) a traditional CAPM using current market data;

(iv) an empirical approximation of the CAPM using current market data;

(v) historical risk premium data from electric utility industry aggregate data, using the yield on long-term US Treasury bonds; and

(vi) allowed risk premium data from electric utility industry aggregate data, using the yield on long-term US Treasury bonds.

Table 5 below summarizes the ROE estimates for DEC.

Table 5 Summary of ROE Estimates

STUDY	ROE
DCF Electric Utilities Value Line Growth	9.3%
DCF Electric Utilities Analysts Growth	9.3%
CAPM Electric Utilities	11.0%
Empirical CAPM Electric Utilities	11.2%
Historical Risk Premium Electric Utilities	10.8%
Allowed Risk Premium	10.5%

The average ROE estimate and the truncated mean[11] are both 10.4%.

I stress that no one individual method provides an exclusive foolproof formula for determining a fair return, but each method provides useful evidence so as to facilitate the exercise of an informed judgment. Reliance on any single method or preset formula is hazardous when dealing with investor expectations. Moreover, the advantage of using several different approaches is that the results of each one can be used to check the others.

Q. DR. MORIN, WHAT IS YOUR FINAL CONCLUSION REGARDING DEC'S RETURN ON COMMON EQUITY CAPITAL?

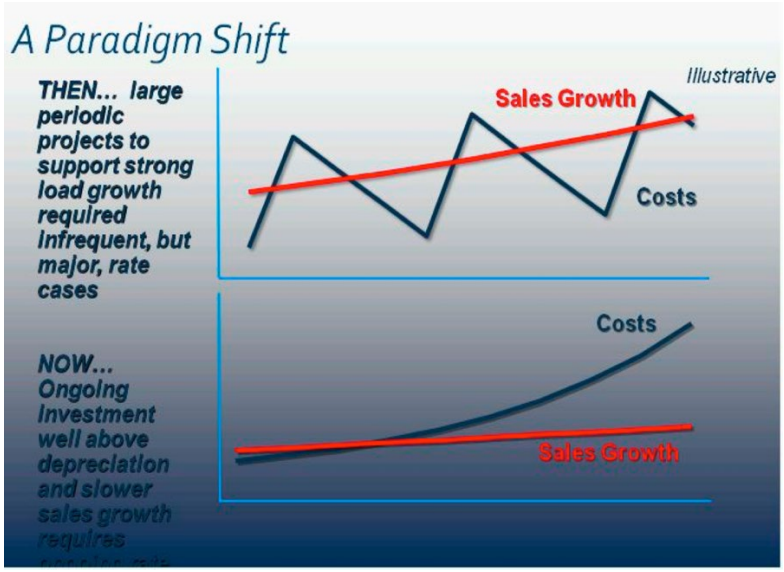
A. Based on the results of all my analyses, the application of my professional judgment, and the risk circumstances of DEC, it is my opinion that a just and reasonable ROE for DEC's electric utility operations in the State of North Carolina is 10.4%. My recommended return on common equity for DEC is predicated on the adoption of a pro forma capital structure consisting of

[11] The truncated mean is obtained by removing the high and low results and computing the average of the remaining observations.

approximately 53% common equity capital. Company Witness Newlin explains the basis for the Company's requested cost of capital, including my ROE recommendation.

Q. DR. MORIN, PLEASE DESCRIBE THE CURRENT RISK ENVIRONMENT IN WHICH ELECTRIC UTILITY COMPANIES, INCLUDING DEC, OPERATE.

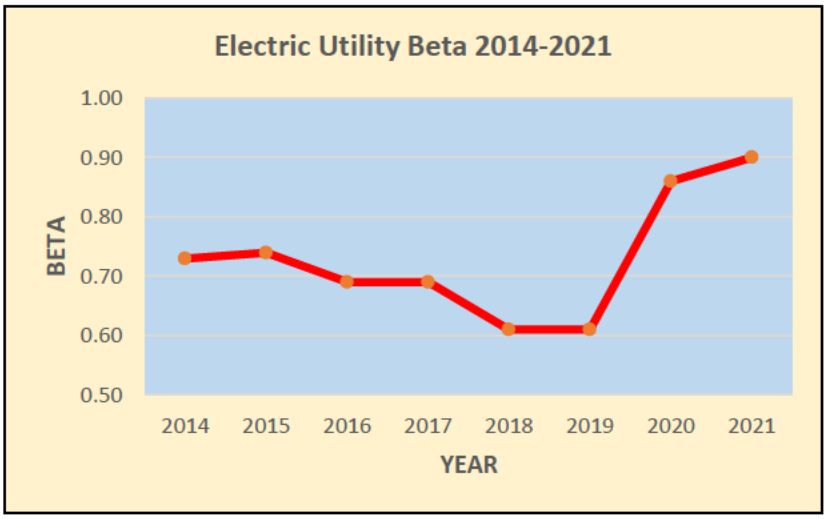
A. The graph below[12] illustrates schematically the paradigm shift in the electric utility industry's risk profile. The upper half displays the traditional business model and the lower half displays the new business environment. In a nutshell, the industry is experiencing declining demand growth, rising operating costs, rising capital costs, while at the same time the industry is beset by lower allowed returns. It is not surprising that investor risk perceptions have escalated in such a "perfect storm" environment.



[12] Dr. R. A. Morin S&P Global Intelligence Seminar "*Essentials of Regulatory Finance*", 2019.

Q. HAVE THE RISK PERCEPTIONS OF THE ELECTRIC UTILITY INDUSTRY INCREASED IN RECENT YEARS?

A. Yes, they have intensified dramatically, and that is the reason why cost of equity estimates for the industry are escalating. The graph below illustrates my point. The second graph shows a dramatic increase in the average beta risk measure for electric utility stocks over the 2014-2022 period, rising from the 0.65 level to the unprecedented level of close to 1.0. A beta figure approaching 1.0 is an indication that electric utility stocks are becoming as risky as the average stock.



Q. TO WHAT DO YOU ATTRIBUTE THIS QUANTUM INCREASE IN THE RISK COMPLEXION OF THE ELECTRIC UTILITY INDUSTRY?

A. Four major challenges today are facing electric utilities like DEC and have resulted in a "Perfect Storm," and hence higher risks.

First, U.S. economic growth has outpaced energy consumption growth over the past decade. Due to improvements in energy science and productivity, growth in energy consumption has slowed. Society as a whole is doing more

with less energy. Clearly, the century-old model of an industry founded on the thesis of uninterrupted rising energy demand is becoming somewhat archaic.

Second, and this is certainly the case for DEC, at the same time that energy consumption growth is receding, record amounts of new capital are required for replacing aging infrastructure, improving reliability, and delivering renewable generation. The utility industry's cost of replacing generation assets, transformers, and power lines is estimated to be in excess of $4.8 trillion over the next decades.[13]

The shift in generation mix to renewable sources of energy, possibly hydrogen as a fuel source, and away from fossil fuels is accelerating. As a result, utility companies look to upgrade and modernize the country's aging energy infrastructure and accommodate the expansion of electric vehicles, energy efficiency, battery storage and smart grid technologies that facilitate the transition toward decarbonization.

There is also an urgent need for capital investments in new transmission infrastructure in order to interconnect the new renewable energy resources to the grid and to strengthen the grid in light of unprecedented and unpredictable extreme weather events which have challenged the grid's reliability and resiliency.

Third, utility companies are facing higher business risks. Electric utilities are witnessing the emergence of 'prosumers,' that is, customers

[13] Clean Capital, D. Daly, Director of Investments & Capital Markets, "Four challenges that will shape electric utilities this decade," Feb. 6, 2019.

(residential, commercial, industrial) who are both consumers and producers. This paradigm shift from a consumer-centric model to a prosumer-centric model adds to the industry's business risk because prosumers who generate their own energy and feed it back to the grid not only create bypass risks but also operational complexity at the grid level because of added difficulties for utility companies to forecast supply and demand. To illustrate, companies such as Google, Amazon, Apple and Walmart will increase utility companies' business risks and forecasting risks by setting up their own solar and wind farms.

Adding to bypass risks, distributed energy resources are experiencing exponential growth which is expected to double by 2023[14]. The declining costs of distributed solar, energy storage, smart thermostats, electric vehicles, and small-scale combined heat and power will continue to propel this growth. To quote the trade journal Transmission & Distribution World: "*The century-old, one-way electricity delivery model that has been serving the utility industry traditionally, is proving to be inadequate to support the rising demand and diverse energy options being explored by today's consumers."*

Fourth, operating costs (labor, materials, commodities, etc.) are trending upward due to rising inflation and supply chain bottlenecks.

[14] Clean Capital, op. cit.

Q. WHAT DO YOU CONCLUDE FROM THIS PARADIGM SHIFT IN THE INDUSTRY'S RISK PROFILE.

A. Given the new paradigm shift in the industry, it is transparent that state regulatory support, including adequate returns on equity, will be instrumental to ensure ongoing capital attraction in the utility sector at reasonable costs.

V. ECONOMIC CONDITIONS IN NORTH CAROLINA

Q. DID YOU CONSIDER THE ECONOMIC CONDITIONS IN NORTH CAROLINA IN ARRIVING AT YOUR ROE RECOMMENDATION?

A. Yes, I did. Right from the start, I do want to point out that I fully support the notion that the Commission must balance the interests of investors and customers in setting the cost of equity, and that the Commission's task is to set rates as low as possible consistent with the dictates of the United States and North Carolina Constitutions[15]. In that regard, the return should be the minimum amount needed to meet the *Hope* and *Bluefield* Comparable Risk, Capital Attraction, and Financial Integrity standards.

I am also aware that the North Carolina Supreme Court has indicated that "in retail electric service rate cases, the Commission must make findings of fact regarding the impact of changing economic conditions on customers when determining the proper ROE for a public utility."[16] The Court has made clear, however, that the Commission need not "'quantify' the influence of this

[15] *Order Granting General Rate Increase*, N.C.U.C. Docket No. E-7, Sub 1026, (Sept. 24, 2013), at 25.

[16] *State of North Carolina ex rel. Utilities Commission v. Cooper*, 366 N.C. 484, 495, 739 S.E.2d 541 (2013) (*Cooper I*). This holding was made upon appeal of the Commission's Order in Duke Energy Carolinas' 2012 rate case, Docket No. E-7, Sub 989. The Court reiterated this holding upon appeal of Dominion Energy North Carolina's 2012 rate case, Docket No. E-22, Sub 479. *See State of North Carolina ex rel. Utilities Commission v. Cooper*, 367 N.C. 430, 761 S.E.2d 640 (2014) (*Cooper II*).

factor upon the final ROE determination."[17] Rather, as the Commission observed in its decision on remand of *Cooper II*, testimony "indicating that economic conditions in North Carolina are highly correlated with national conditions" suffices to support its required findings of fact, in that such testimony tends to show that those "conditions are reflected in … econometric analyses and resulting rate of return on equity recommendations."[18]

In light of the aforementioned decisions, I have examined a number of key macroeconomic factors such as GDP growth, employment data, and household income levels in North Carolina and in DEC's service territory relative to the aggregate U.S. economy. Based on my review of this data, I concluded that my recommended ROE of 10.4% is fair and reasonable to DEC, its shareholders, and its customers in light of the effect of those macroeconomic economic conditions.

Q. CAN YOU DESCRIBE BE THE MACROECONOMIC CONDITIONS THAT YOU REVIEWED.

A. Yes, I reviewed the following economic factors in both the national and North Carolina economies:

1. Rate of unemployment
2. Labor force participation rate
3. Real Gross Domestic Product (GDP) growth[19]
4. GDP per capita

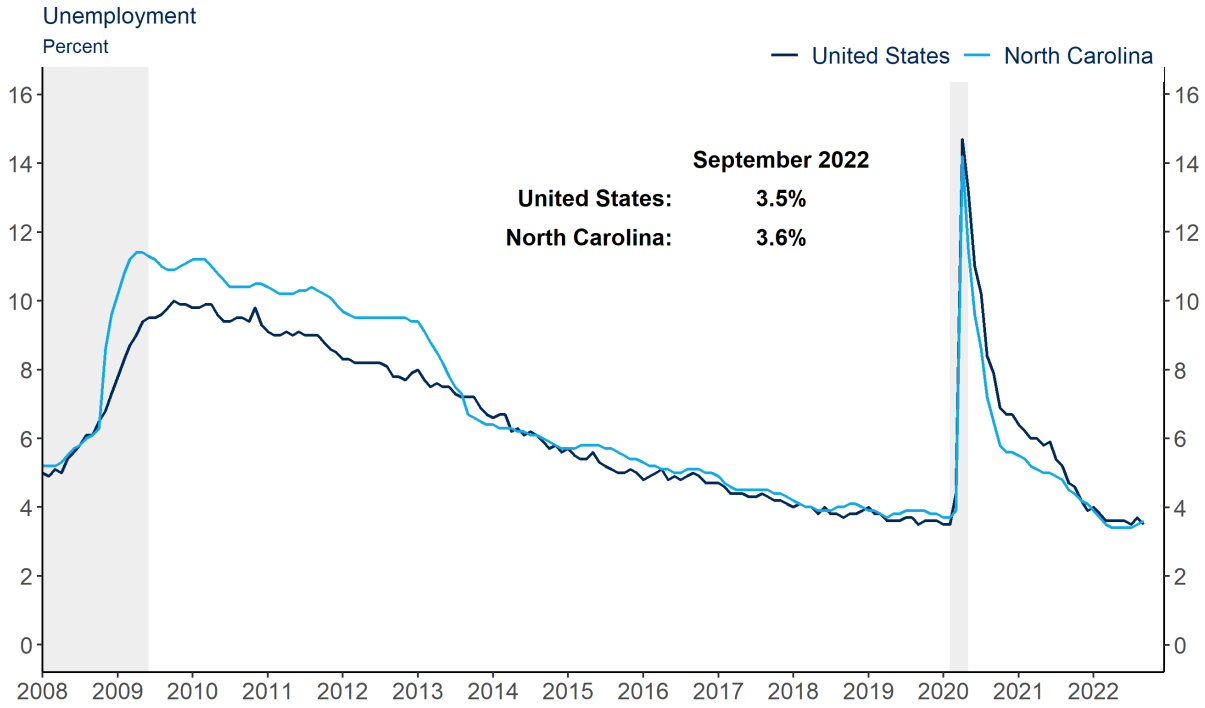
[17] *State of North Carolina ex rel. Utilities Commission v. Cooper*, 367 N.C. 444, 450, 761 S.E.2d 640 (2014) (*Cooper III*).
[18] *Order on Remand*, N.C.U.C. Docket No. E-22, Sub 479 (July 23, 2015), at 39.
[19] GDP is a comprehensive measure of the economies of each state. GDP estimates the value of the goods and services produced in a state and in the overall U.S. economy.

5. Personal income growth levels
6. Payroll employment
7. Retail electricity costs

Q. PLEASE DESCRIBE YOUR FINDINGS ON THE RATE OF UNEMPLOYMENT.

A. As shown on Chart 1 below, the rate of unemployment has fallen steadily and substantially in both North Carolina and the U.S. in the last two years. The two are highly correlated[20] since the early 2020s. As of September 2022, North Carolina's unemployment rate remains low at 3.6% despite growing concerns about a possible recession and some layoffs being reported across the state. The U.S. jobless rate is virtually identical at 3.5% as seen on Chart 1.

Chart 1: Unemployment Rate[21]



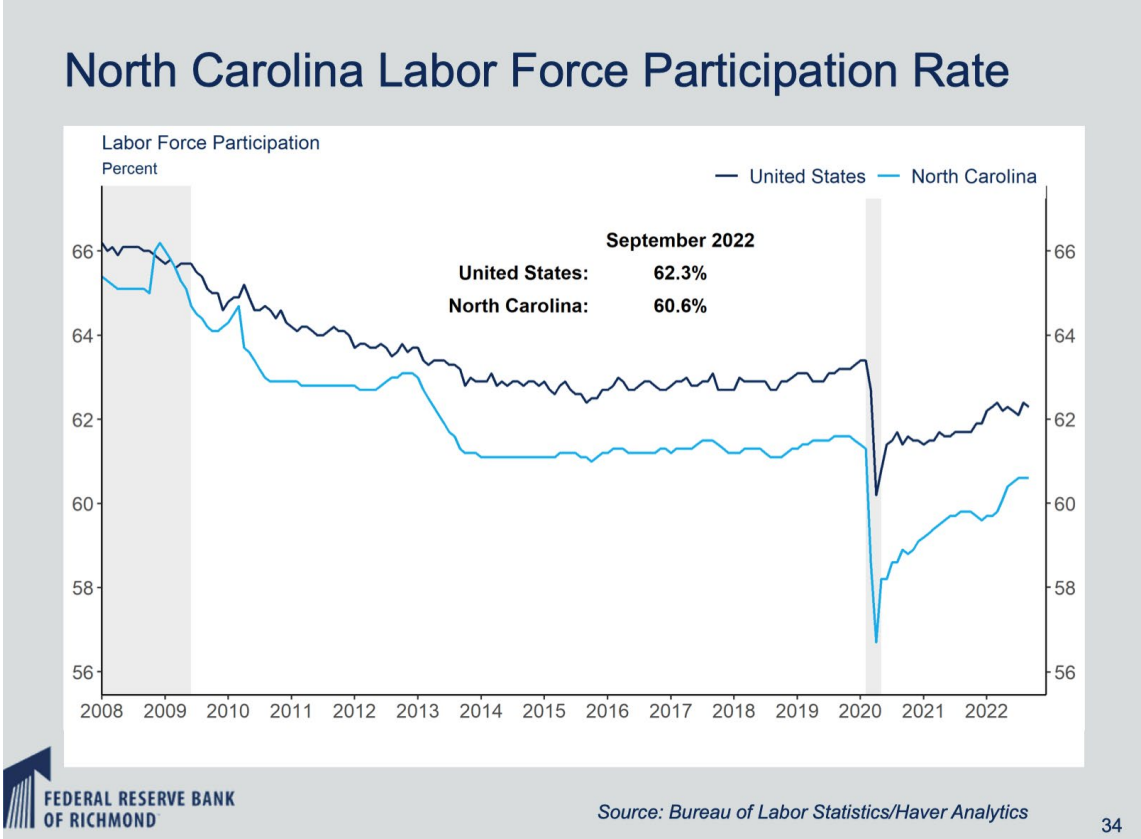
[20] The statistical correlation coefficient is 97%

[21] Source: Federal Bank of Richmond, "Fifth District Economic Indicators," Nov. 2022.

Q. PLEASE DESCRIBE YOUR FINDINGS ON THE LABOR PARTICIPATION RATE.[22]

A. As seen clearly on Chart 2, North Carolina's labor participation rate[23] is 61% which is nearly identical and highly correlated over time with that of the national economy's 62%.

Chart 2



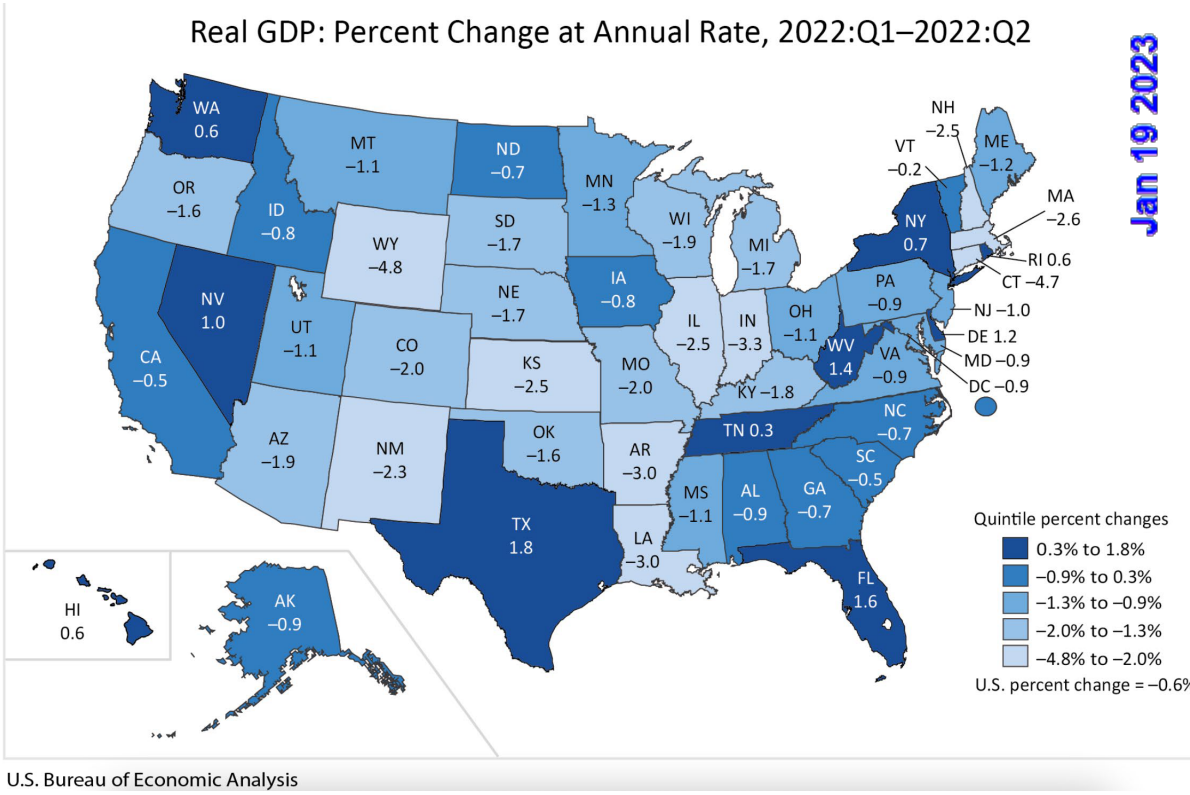
Q. PLEASE DESCRIBE YOUR FINDINGS ON THE REAL GDP GROWTH IN BOTH THE U.S. AND NORTH CAROLINA.

A. As displayed on Chart 3, real GDP for the nation decreased at an annual rate of -0.6% versus virtually the same amount in North Carolina at -0.7% over the

[22] The labor participation rate is the number of employed and unemployed people as a percent of the population aged 15 and older.
[23] See Federal Bank of Richmond, op. cit..

first half of 2022. North Carolina's economic growth has been highly correlated with U.S. economic growth throughout the entire 2005-2021 time period as displayed on Chart 4.

Chart 3

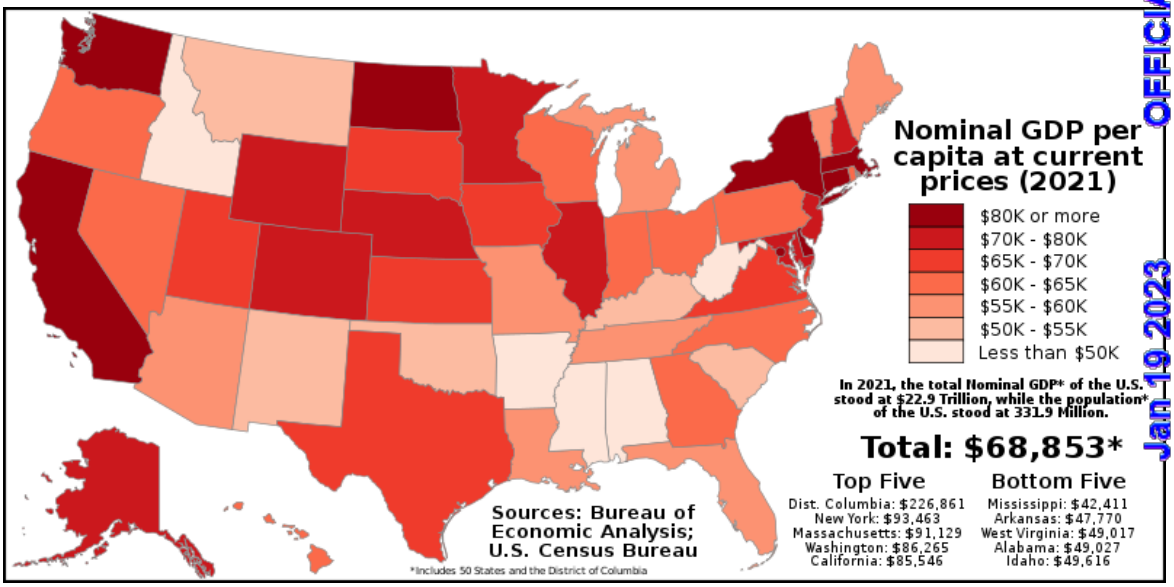


U.S. Bureau of Economic Analysis

Q. PLEASE DESCRIBE YOUR FINDINGS ON PER CAPITA GDP.

A. As shown on the map on Chart 4, North Carolina's average nominal GDP per capita ranges from $65K to $70K with a midpoint of $67,250, which is nearly identical to that of the U.S. as a whole at $68,853.

Chart 4

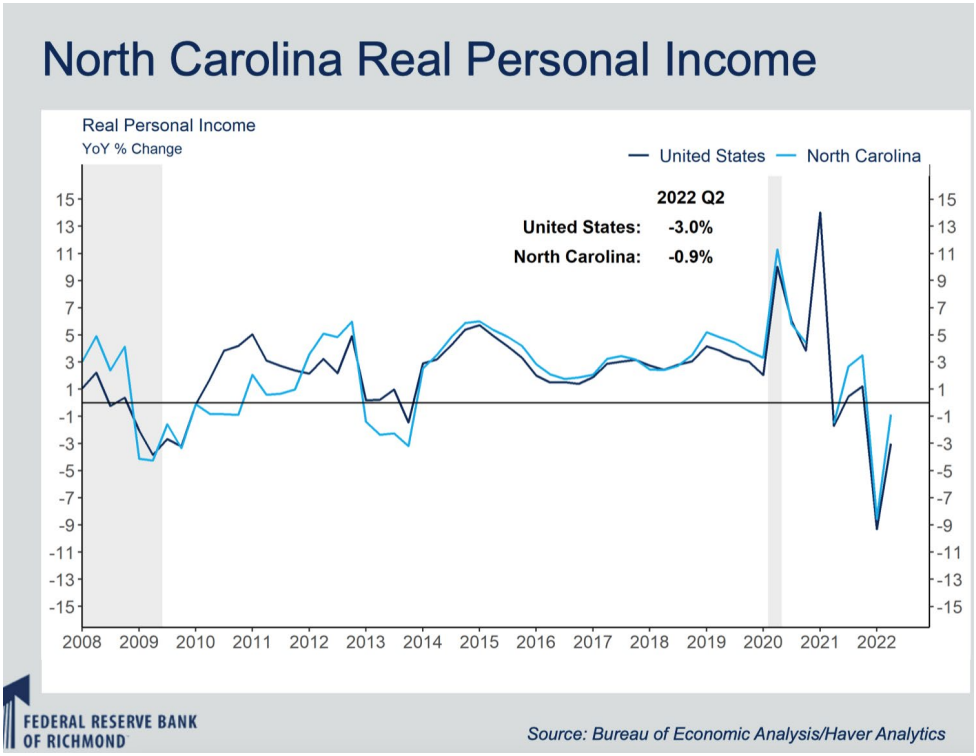


Q. PLEASE DESCRIBE YOUR FINDINGS ON PERSONAL INCOME LEVELS AND PAYROLL EMPLOYMENT.

A. Chart 5 displays the pattern of North Carolina and U.S. real personal income level changes over the 2008-2022 period.[24] The two were highly correlated over most of the period, except for the 2022 Q2 when the North Carolina change in income of -0.9% fared much better than the U.S. change of -3.0%.

[24] Federal Reserve Bank of Richmond, op. cit.

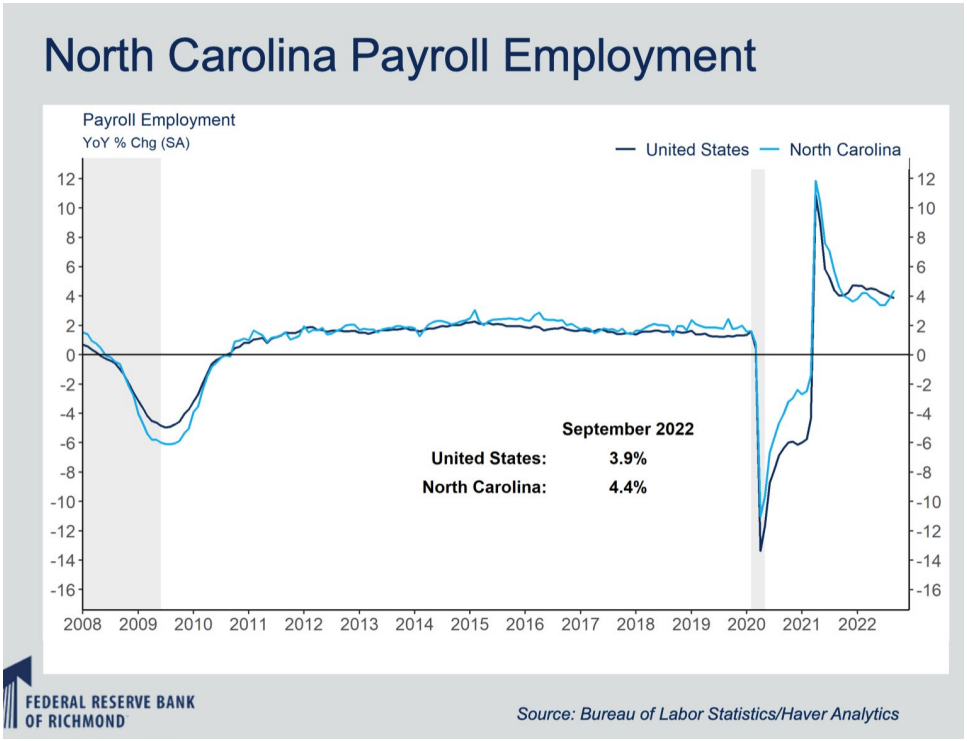
Chart 5



North Carolina payroll employment shows a similar highly correlated lockstep pattern as shown on Chart 7. As of September 2022, North Carolina fared slightly better than the U.S. with a year-to-year change of 4.4% versus 3.9% for the U.S.[25]

[25] Federal Reserve Bank of Richmond, op. cit.

Chart 6

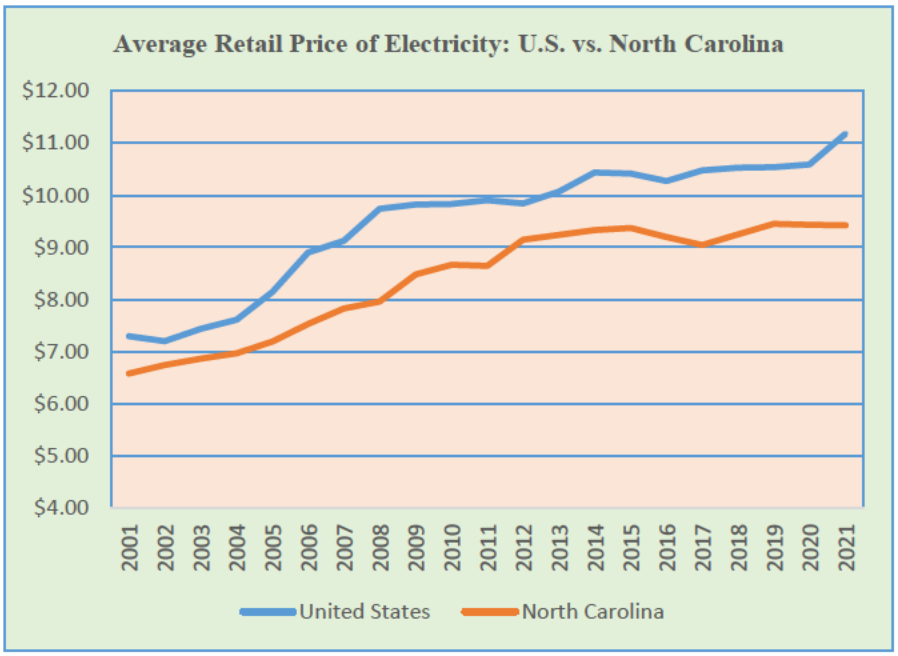


Q. PLEASE DESCRIBE YOUR FINDINGS ON THE RETAIL PRICE OF ELECTRICITY.

A. Chart 7 displays the average retail price of electricity for the United States in annual cents per kilowatt/hr and for North Carolina.[26] Residential rates in North Carolina have been systematically below the national average over the entire 2001-2021 period, and the state ranks first or second with the lowest rate in the nation throughout the entire period. Residential electricity rates have been approximately 11.0% below the national average over the last two decades, and remain highly correlated with the national average with a 97% correlation coefficient.

[26] Source: U.S. Energy Information Administration

Chart 7



Q. PLEASE SUMMARIZE YOUR ANALYSES AND CONCLUSIONS.

A. In its Order on Remand in Docket No. E-22, Sub 479, the Commission observed that economic conditions in North Carolina were highly correlated with national conditions, such that they were reflected in the analyses used to determine the Cost of Equity.[27] Those relationships remain. Economic conditions in North Carolina continue to improve from the COVID-19 pandemic, and they continue to be strongly correlated to conditions in the U.S., generally and have actually improved in recent months relative to the U.S. In particular, unemployment at the state level continues to fall and remains highly correlated with national rates of unemployment. GDP growth also remains well correlated with U.S. GDP growth. Median household income in North Carolina has grown at a rate consistent with the rest of the U.S., and remains strongly correlated with

[27] *See Order on Remand*, N.C.U.C. Docket No. E-22, Sub 479 (July 23, 2015), at 39.

national levels. On balance, the correlations between state-wide measures of economic conditions noted by the Commission in Docket No. E-22, Sub 479 remain strongly in place and, as such, they continue to be reflected in the models and data used to estimate the cost of equity capital.

Q. HOW WOULD YOU SUMMARIZE THE ECONOMIC INDICATORS THAT YOU HAVE ANALYZED AND DISCUSSED IN YOUR TESTIMONY?

A. Based on the indicators discussed above, it is my opinion that North Carolina, and the counties contained within DEC's service area, remain highly correlated with the national economy.

Q. IN YOUR OPINION, IS AN ROE OF 10.4% FAIR AND REASONABLE TO DEC, ITS SHAREHOLDERS, AND ITS CUSTOMERS?

A. Yes. Based on the myriad economic well-being factors I have examined, I believe that an ROE of 10.4% is fair and reasonable to DEC, its shareholders, and its customers in light of the effect of those prevailing economic conditions.

Q. WERE EXHIBITS RAM-1 TO RAM-9 AND APPENDICES A AND B PREPARED BY YOU AND UNDER YOUR DIRECTION?

A. Yes. They were.

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

A. Yes. It does.

APPENDIX A
CAPM, EMPIRICAL CAPM

The Capital Asset Pricing Model (CAPM) is a fundamental paradigm of finance. Simply put, the fundamental idea underlying the CAPM is that risk-averse investors demand higher returns for assuming additional risk, and higher-risk securities are priced to yield higher expected returns than lower-risk securities. The CAPM quantifies the additional return, or risk premium, required for bearing incremental risk. It provides a formal risk-return relationship anchored on the basic idea that only market risk matters, as measured by beta. According to the CAPM, securities are priced such that their:

EXPECTED RETURN = RISK-FREE RATE + RISK PREMIUM

Denoting the risk-free rate by R_F and the return on the market as a whole by R_M, the CAPM is:

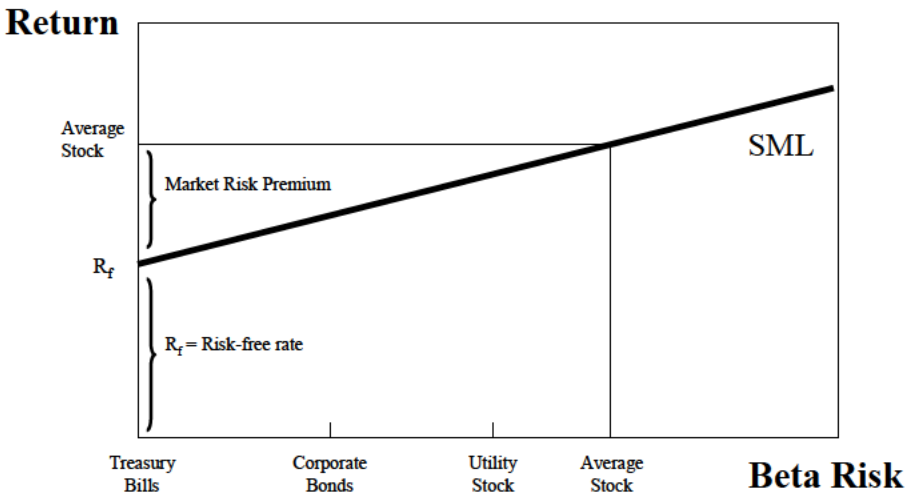
$$K = R_F + \beta(R_M - R_F) \quad (1)$$

Equation 1 is the CAPM expression which asserts that an investor expects to earn a return, K, that could be gained on a risk-free investment, R_F, plus a risk premium for assuming risk, proportional to the security's market risk, also known as beta, β, and the market risk premium, $(R_M - R_F)$, where R_M is the market return . The market risk premium $(R_M - R_F)$ can be abbreviated MRP so that the CAPM becomes:

$$K = R_F + \beta \times MRP \quad (2)$$

The CAPM risk-return relationship is depicted in the figure below and is typically labeled as the Security Market Line (SML) by the investment community.

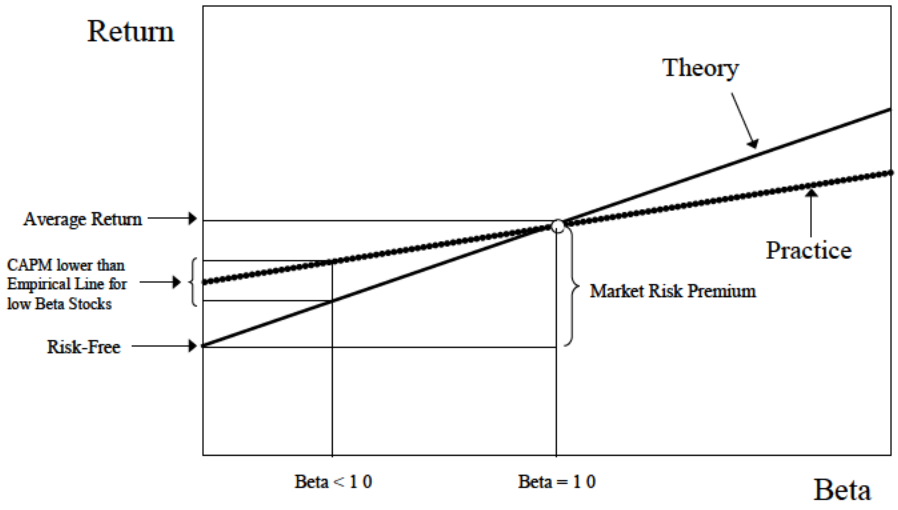
CAPM and Risk - Return in Capital Markets



A myriad empirical tests of the CAPM have shown that the risk-return tradeoff is not as steeply sloped as that predicted by the CAPM, however. That is, low-beta securities earn returns somewhat higher than the CAPM would predict, and high-beta securities earn less than predicted. In other words, the CAPM tends to overstate the actual sensitivity of the cost of capital to beta: low-beta stocks tend to have higher returns and high-beta stocks tend to have lower risk returns than predicted by the CAPM. The difference between the CAPM and the type of relationship observed in the empirical studies is depicted in the figure below. This is one of the most widely known empirical findings of the finance literature. This extensive literature is summarized in Chapter 13 of Dr. Morin's book [The New Regulatory Finance, Public Utilities Report Inc., Arlington, VA, 2006].

Risk vs Return

Theory vs. Practice



A number of refinements and expanded versions of the original CAPM theory have been proposed to explain the empirical findings. These revised CAPMs typically produce a risk-return relationship that is flatter than the standard CAPM prediction. The following equation makes use of these empirical findings by flattening the slope of the risk-return relationship and increasing the intercept:

$$K = R_F + \alpha + \beta (MRP - \alpha) \quad (3)$$

where α is the "alpha" of the risk-return line, a constant determined empirically, and the other symbols are defined as before. Alternatively, Equation 3 can be written as follows:

$$K = R_F + a\,MRP + (1-a)\,\beta\,MRP \quad (4)$$

where a is a fraction to be determined empirically. Comparing Equations 3 and 4, it is easy to see that alpha equals 'a' times MRP, that is, $\alpha = a \times MRP$

Theoretical Underpinnings

The obvious question becomes what would produce a risk return relationship which is flatter than the CAPM prediction, or in other words, how do you explain the presence of "alpha" in the above equation. The exclusion of variables aside from beta would produce this result. Three such variables are noteworthy: dividend yield, skewness, and hedging potential.

The dividend yield effects stem from the differential taxation on corporate dividends and capital gains. The standard CAPM does not consider the regularity of dividends received by investors. Utilities generally maintain high dividend payout ratios relative to the market, and by ignoring dividend yield, the CAPM provides biased cost of capital estimates. To the extent that dividend income is taxed at a higher rate than capital gains, investors will require higher pre-tax returns in order to equalize the after-tax returns provided by high-yielding stocks (e.g. utility stocks) with those of low-yielding stocks. In other words, high-yielding stocks must offer investors higher pre-tax returns. Even if dividends and capital gains are undifferentiated for tax purposes, there is still a tax bias in favor of earnings retention (lower dividend payout), as capital gains taxes are paid only when gains are realized.

Empirical studies by Litzenberger and Ramaswamy (1979) and Litzenberger et al. (1980) find that security returns are positively related to dividend yield as well as to beta. These results are consistent with after-tax extensions of the CAPM developed by Breenan (1973) and Litzenberger and Ramaswamy (1979) and suggest that the relationship between return, beta, and dividend yield should be estimated and employed to calculate the cost of equity capital.

In order to rectify the CAPM's basic shortcomings, Litzenberger, Ramaswamy, and Sosin (1980) not only summarize the criticisms of the CAPM insofar as they affect public utilities, but they also describe the econometric intricacies involved and the methods of circumventing the statistical problems[1]. Essentially, the average monthly returns over a lengthy time period on a large cross-section of securities grouped into portfolios, are related to their corresponding betas by statistical regression techniques;

[1] Litzenberger, R.H., Ramaswamy, K., and Sosin, H. "On the CAPM Approach to the Estimation of a Public Utility's Cost of Equity Capital." *Journal of Finance,* May 1980, 369-383.

that is, Equation (3) is estimated from market data. The utility's beta value is substituted into the equation to produce the cost of equity figure. Their results demonstrate how the standard CAPM underestimates the cost of equity of public utilities because of utilities' high dividend yield and return skewness.

As far as skewness is concerned, investors are more concerned with losing money than with total variability of return. If risk is defined as the probability of loss, it appears more logical to measure risk as the probability of achieving a return which is below the expected return. The traditional CAPM provides downward-biased estimates of cost of capital to the extent that these skewness effects are significant. As shown by Kraus and Litzenberger (1976), expected return depends on both on a stock's systematic risk (beta) and the systematic skewness. Empirical studies by Kraus and Litzenberger (1976), Friend, Westerfield, and Granito (1978), and Morin (1981) found that, in addition to beta, skewness of returns has a significant negative relationship with security returns. This result is consistent with the skewness version of the CAPM developed by Rubinstein (1973) and Kraus and Litzenberger (1976).

This is particularly relevant for public utilities whose future profitability is constrained by the regulatory process on the upside and relatively unconstrained on the downside in the face of socio-political realities of public utility regulation. The process of regulation, by restricting the upward potential for returns and responding sluggishly on the downward side, may impart some asymmetry to the distribution of returns, and is more likely to result in utilities earning less, rather than more, than their cost of capital. The traditional CAPM provides downward-biased estimates of cost of capital to the extent that these skewness effects are significant.

As far as hedging potential is concerned, investors are exposed to another kind of risk, namely, the risk of unfavorable shifts in the investment opportunity set. Merton (1973) shows that investors will hold portfolios consisting of three funds: the risk-free asset, the market portfolio, and a portfolio whose returns are perfectly negatively correlated with the riskless asset so as to hedge against unforeseen changes in the future risk-free rate. The higher the degree of protection offered by an asset against unforeseen changes in interest rates, the lower the required return, and conversely. Merton argues that low beta assets, like utility stocks, offer little protection against changes in interest rates, and require higher returns than suggested by the standard CAPM.

Another explanation for the CAPM's inability to fully explain the process determining security returns involves the use of an inadequate or incomplete market index. Empirical studies to validate the CAPM invariably rely on some stock market index as a proxy for the true market portfolio. The exclusion of several asset categories from the definition of market index mis-specifies the CAPM and biases the results found using only stock market data. Kolbe and Read (1983) illustrate the biases in beta estimates which result from applying the CAPM to public utilities. Unfortunately, no comprehensive and easily accessible data exist for several classes of assets, such as mortgages and business investments, so that the exact relation between return and stock betas predicted by the CAPM does not exist. This suggests that the empirical relationship between returns and stock betas is best estimated empirically (ECAPM) rather than by relying on theoretical and elegant CAPM models expanded to include missing assets effects. In any event, stock betas may be highly correlated with the true beta measured with the true market index.

Yet another explanation for the CAPM's inability to fully explain the observed risk-return tradeoff involves the possibility of constraints on investor borrowing that run counter to the assumptions of the CAPM. In response to this inadequacy, several versions of the CAPM have been developed by researchers. One of these versions is the so-called zero-beta, or two-factor, CAPM which provides for a risk-free return in a market where borrowing and lending rates are divergent. If borrowing rates and lending rates differ, or there is no risk-free borrowing or lending, or there is risk-free lending but no risk-free borrowing, then the CAPM has the following form:

$$K = R_Z + \beta(R_m - R_F)$$

The model, christened the zero-beta model, is analogous to the standard CAPM, but with the return on a minimum risk portfolio which is unrelated to market returns, R_Z, replacing the risk-free rate, R_F. The model has been empirically tested by Black, Jensen, and Scholes (1972), who found a flatter than predicted CAPM, consistent with the model and other researchers' findings.

The zero-beta CAPM cannot be literally employed in cost of capital projections, since the zero-beta portfolio is a statistical construct difficult to replicate.

Empirical Evidence

A summary of the empirical evidence on the magnitude of alpha is provided in the table below.

Empirical Evidence on the Alpha Factor		
Author	**Range of alpha**	**Period relied**
Black (1993)	-3.6% to 3.6%	1931-1991
Black, Jensen and Scholes (1972)	-9.61% to 12.24%	1931-1965
Fama and McBeth (1972)	4.08% to 9.36%	1935-1968
Fama and French (1992)	10.08% to 13.56%	1941-1990
Litzenberger and Ramaswamy (1979)	5.32% to 8.17%	
Litzenberger, Ramaswamy and Sosin (1980)	1.63% to 5.04%	1926-1978
Pettengill, Sundaram and Mathur (1995)	4.6%	
Morin (1994)	2.0%	1926-1984
Harris, Marston, Mishra, and O'Brien (2003)	2.0%	1983-1998

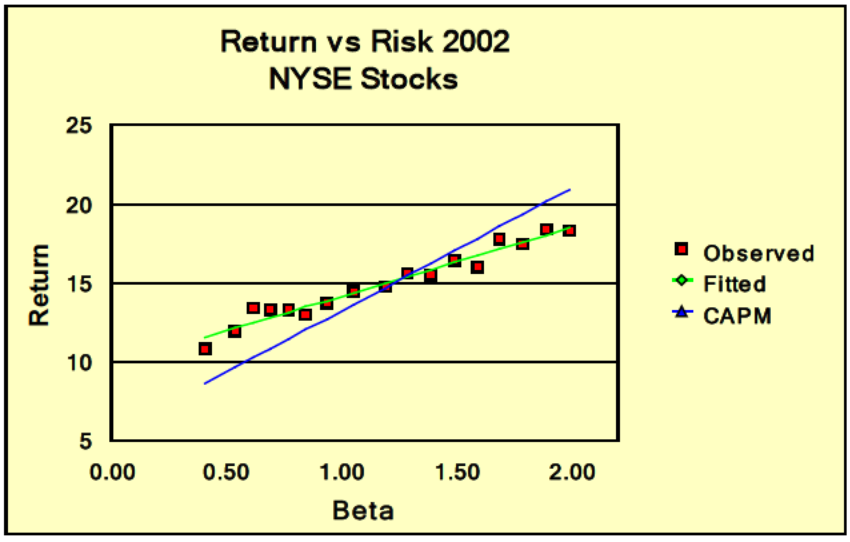
Given the observed magnitude of alpha, the empirical evidence indicates that the risk-return relationship is flatter than that predicted by the CAPM. Typical of the empirical evidence is the findings cited in Morin (1989) over the period 1926-1984 indicating that the observed expected return on a security is related to its risk by the following equation:

$$K = .0829 + .0520\,\beta$$

Given that the risk-free rate over the estimation period was approximately 6 percent, this relationship implies that the intercept of the risk-return relationship is higher than the 6 percent risk-free rate, contrary to the CAPM's prediction. Given that the average return on an average risk stock exceeded the risk-free rate by about 8.0 percent in that period, that is, the market risk premium (R_M - R_F) = 8 percent, the intercept of the observed relationship between return and beta exceeds the risk-free rate by about 2 percent, suggesting an alpha factor of 2 percent.

Most of the empirical studies cited in the above table utilize raw betas rather than Value Line adjusted betas because the latter were not available over most of the time periods covered in these studies. A study of the relationship between return and adjusted beta is reported on Table 6-7 in Ibbotson Associates Valuation Yearbook 2001. If we exclude the portfolio of very small cap stocks from the relationship due to significant size effects, the relationship between the arithmetic mean return and beta for the remaining portfolios is flatter than predicted and the intercept slightly higher than predicted by the CAPM, as shown on the graph below. It is noteworthy that the Ibbotson study relies on adjusted betas as stated on page 95 of the aforementioned study.

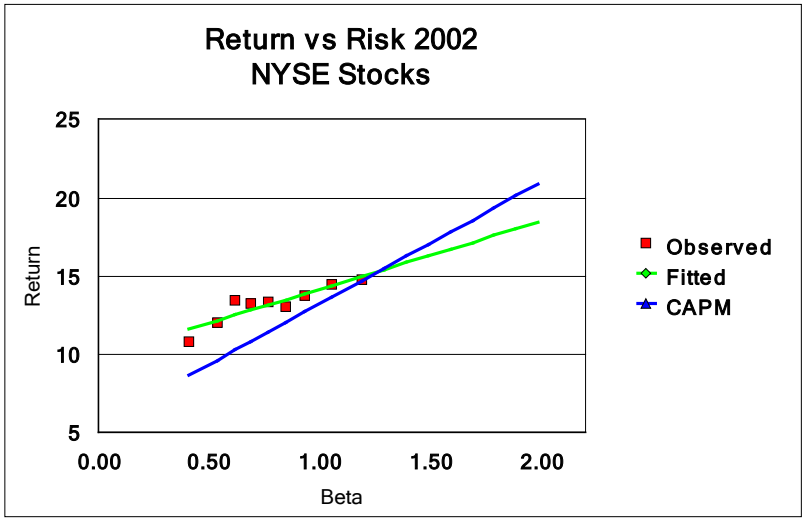
CAPM vs ECAPM



Another study by Morin in May 2002 provides empirical support for the ECAPM. All the stocks covered in the Value Line Investment Survey for Windows for which betas and returns data were available were retained for analysis. There were nearly 2000 such stocks. The expected return was measured as the total shareholder return ("TSR") reported by Value Line over the past ten years. The Value Line adjusted beta was also retrieved from the same data base. The nearly 2000 companies for which all data were available were ranked in ascending order of beta, from lowest to highest. In order to palliate measurement error, the nearly 2000 securities were grouped into ten portfolios of approximately 180 securities for each portfolio. The average returns and betas for each portfolio were as follows:

Portfolio #	Beta	Return
portfolio 1	0.41	10.87
portfolio 2	0.54	12.02
portfolio 3	0.62	13.50
portfolio 4	0.69	13.30
portfolio 5	0.77	13.39
portfolio 6	0.85	13.07
portfolio 7	0.94	13.75
portfolio 8	1.06	14.53
portfolio 9	1.19	14.78
portfolio 10	1.48	20.78

It is clear from the graph below that the observed relationship between DCF returns and Value Line adjusted betas is flatter than that predicted by the plain vanilla CAPM. The observed intercept is higher than the prevailing risk-free rate of 5.7 percent while the slope is less than equal to the market risk premium of 7.7 percent predicted by the plain vanilla CAPM for that period.



In an article published in Financial Management, Harris, Marston, Mishra, and O'Brien ("HMMO") estimate ex ante expected returns for S&P 500 companies over the period 1983-1998[2]. HMMO measure the expected rate of return (cost of equity) of each dividend-paying stock in the S&P 500 for each month from January 1983 to August 1998 by using the constant growth DCF model. They then investigate the relation between the risk premium (expected return over the 20-year U.S. Treasury Bond yield) estimates for each month to equity betas as of that same month (5-year raw betas).

The table below, drawn from HMMO Table 4, displays the average estimate prospective risk premium (Column 2) by industry and the corresponding beta estimate for that industry, both in raw form (Column 3) and adjusted form (Column 4). The latter were calculated with the traditional Value Line – Merrill Lynch – Bloomberg adjustment methodology by giving 1/3 weight of to a beta estimate of 1.00 and 2/3 weight to the raw beta estimate.

The observed statistical relationship between expected return and **adjusted beta** is shown in the graph below along with the CAPM prediction:

[2] Harris, R. S., Marston, F. C., Mishra, D. R., and O'Brien, T. J., "*Ex Ante* Cost of Equity Estimates of S&P 500 Firms: The Choice Between Global and Domestic CAPM," Financial Management, Autumn 2003, pp. 51-66.

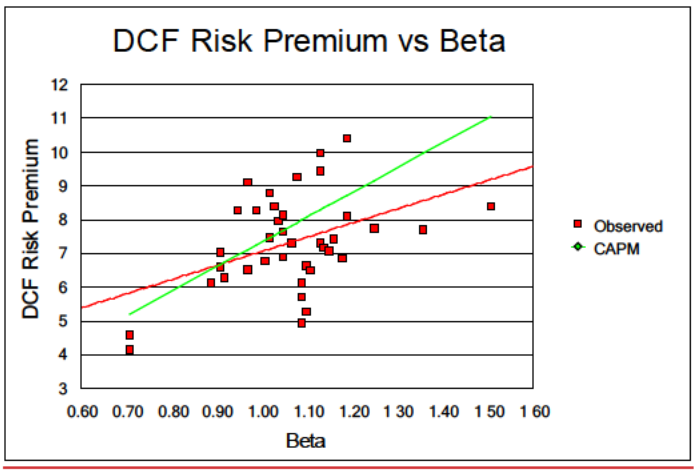


Table A-1 Risk Premium and Beta Estimates by Industry

	Industry (1)	DCF Risk Premium (2)	Raw Industry Beta (3)	Adjusted Industry Beta (4)
1	Aero	6.63	1.15	1.10
2	Autos	5.29	1.15	1.10
3	Banks	7.16	1.21	1.14
4	Beer	6.60	0.87	0.91
5	BldMat	6.84	1.27	1.18
6	Books	7.64	1.07	1.05
7	Boxes	8.39	1.04	1.03
8	BusSv	8.15	1.07	1.05
9	Chems	6.49	1.16	1.11
10	Chips	8.11	1.28	1.19
11	Clths	7.74	1.37	1.25
12	Cnstr	7.70	1.54	1.36
13	Comps	9.42	1.19	1.13
14	Drugs	8.29	0.99	0.99
15	ElcEq	6.89	1.08	1.05
16	Energy	6.29	0.88	0.92
17	Fin	8.38	1.76	1.51

18	Food	7.02	0.86	0.91
19	Fun	9.98	1.19	1.13
20	Gold	4.59	0.57	0.71
21	Hlth	10.40	1.29	1.19
22	Hsld	6.77	1.02	1.01
23	Insur	7.46	1.03	1.02
24	LabEq	7.31	1.10	1.07
25	Mach	7.32	1.20	1.13
26	Meals	7.98	1.06	1.04
27	MedEq	8.80	1.03	1.02
28	Pap	6.14	1.13	1.09
29	PerSv	9.12	0.95	0.97
30	Retail	9.27	1.12	1.08
31	Rubber	7.06	1.22	1.15
32	Ships	1.95	0.95	0.97
33	Stee	4.96	1.13	1.09
34	Telc	6.12	0.83	0.89
35	Toys	7.42	1.24	1.16
36	Trans	5.70	1.14	1.09
37	Txtls	6.52	0.95	0.97
38	Util	4.15	0.57	0.71
39	Whlsl	8.29	0.92	0.95
	MEAN	**7.19**		

If the plain vanilla version of the CAPM is correct, then the intercept of the graph should be zero, recalling that the vertical axis represents returns in excess of the risk-free rate. Instead, the observed intercept is approximately 2 percent, that is approximately equal to 25 percent of the expected market risk premium of 7.2 percent shown at the bottom of Column 2 over the 1983-1998 period, as predicted by the ECAPM. The same is true for the slope of the graph. If the plain vanilla version of the CAPM is correct, then the slope of the relationship should equal the market risk premium of 7.2 percent. Instead, the observed slope of close to 5 percent is approximately equal to 75 percent of the expected market risk premium of 7.2 percent, as predicted by the ECAPM.

In short, the HMMO empirical findings are quite consistent with the predictions of the ECAPM.

Practical Implementation of the ECAPM

The empirical evidence reviewed above suggests that the expected return on a security is related to its risk by the following relationship:

$$K = R_F + \alpha + \beta (MRP - \alpha) \quad (5)$$

or, alternatively by the following equivalent relationship:

$$K = R_F + a\,MRP + (1-a)\,\beta\,MRP \quad (6)$$

The empirical findings support values of α from approximately 2 percent to 7 percent. If one is using the short-term U.S. Treasury Bills yield as a proxy for the risk-free rate, and given that utility stocks have lower than average betas, an alpha in the lower range of the empirical findings, 2 percent - 3 percent is reasonable, albeit conservative.

Using the long-term U.S. Treasury yield as a proxy for the risk-free rate, a lower alpha adjustment is indicated. This is because the use of the long-term U.S. Treasury yield as a proxy for the risk-free rate partially incorporates the desired effect of using the ECAPM[3]. An alpha in the range of 1 percent - 2 percent is therefore reasonable.

To illustrate, consider a utility with a beta of 0.80. The risk-free rate is 5 percent, the MRP is 7 percent, and the alpha factor is 2 percent. The cost of capital is determined as follows:

$$K = R_F + \alpha + \beta (MRP - \alpha)$$
$$K = 5\% + 2\% + 0.80(7\% - 2\%)$$
$$= 11\%$$

A practical alternative is to rely on the second variation of the ECAPM:

$$K = R_F + a\,MRP + (1-a)\,\beta\,MRP$$

With an alpha of 2 percent, a MRP in the 6 percent - 8 percent range, the 'a" coefficient is 0.25, and the ECAPM becomes[4]:

[3] The Security Market Line (SML) using the long-term risk-free rate has a higher intercept and a flatter slope than the SML using the short-term risk-free rate

[4] Recall that alpha equals 'a' times MRP, that is, alpha = a MRP, and therefore a = alpha/MRP. If alpha is

$$K = R_F + 0.25\ MRP + 0.75\ \beta\ MRP$$

Returning to the numerical example, the utility's cost of capital is:

$$K = 5\% + 0.25 \times 7\% + 0.75 \times 0.80 \times 7\%$$
$$= 11\%$$

For reasonable values of beta and the MRP, both renditions of the ECAPM produce results that are virtually identical[5].

2 percent, then a = 0.25

[5] In the Morin (1994) study, the value of "a" was actually derived by systematically varying the constant "a" in equation 6 from 0 to 1 in steps of 0.05 and choosing that value of 'a' that minimized the mean square error between the observed relationship between return and beta:

$$K = 0.0829 + .0520\ \beta$$

The value of a that best explained the observed relationship was 0.25.

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APPENDIX B

FLOTATION COST ALLOWANCE

To obtain the final cost of equity financing from the investors' expected rate of return, it is necessary to make allowance for underpricing, which is the sum of market pressure, costs of flotation, and underwriting fees associated with new issues. Allowance for market pressure should be made because large blocks of new stock may cause significant pressure on market prices even in stable markets. Allowance must also be made for company costs of flotation (including such items as printing, legal and accounting expenses) and for underwriting fees.

1. MAGNITUDE OF FLOTATION COSTS

According to empirical studies, underwriting costs and expenses average at least 4% of gross proceeds for utility stock offerings in the U.S. (See Logue & Jarrow: "Negotiations vs. Competitive Bidding in the Sale of Securities by Public Utilities", Financial Management, Fall 1978.) A study of 641 common stock issues by 95 electric utilities identified a flotation cost allowance of 5.0%. (See Borum & Malley: "Total Flotation Cost for Electric Company Equity Issues", Public Utilities Fortnightly, Feb. 20, 1986.)

Empirical studies suggest an allowance of 1% for market pressure in U.S. studies. Logue and Jarrow found that the absolute magnitude of the relative price decline due to market pressure was less than 1.5%. Bowyer and Yawitz examined 278 public utility stock issues and found an average market pressure of 0.72%. (See Bowyer & Yawitz, "The Effect of New Equity Issues on Utility Stock Prices", Public Utilities Fortnightly, May 22, 1980.)

Eckbo & Masulis ("Rights vs. Underwritten Stock Offerings: An Empirical Analysis", University of British Columbia, Working Paper No. 1208, Sept., 1987) found an average flotation cost of 4.175% for utility common stock offerings. Moreover, flotation costs increased progressively for smaller size issues. They also found that the relative price decline due to market pressure in the days surrounding the

announcement amounted to slightly more than 1.5%. In a classic and monumental study published in the prestigious Journal of Financial Economics by a prominent scholar, a market pressure effect of 3.14% for industrial stock issues and 0.75% for utility common stock issues was found (see Smith, C.W., "Investment Banking and the Capital Acquisition Process," Journal of Financial Economics 15, 1986). Other studies of market pressure are reported in Logue ("On the Pricing of Unseasoned Equity Offerings, Journal of Financial and Quantitative Analysis, Jan. 1973), Pettway ("The Effects of New Equity Sales Upon Utility Share Prices," Public Utilities Fortnightly, May 10 1984), and Reilly and Hatfield ("Investor Experience with New Stock Issues," Financial Analysts' Journal, Sept.- Oct. 1969). In the Pettway study, the market pressure effect for a sample of 368 public utility equity sales was in the range of 2% to 3%. Adding the direct and indirect effects of utility common stock issues, the indicated total flotation cost allowance is above 5.0%, corroborating the results of earlier studies.

As shown in the table below, a comprehensive empirical study by Lee, Lochhead, Ritter, and Zhao, "The Costs of Raising Capital," Journal of Financial Research, Vol. XIX, NO. 1, Spring 1996, shows average direct flotation costs for equity offerings of 3.5% - 5% for stock issues between $60 and $500 million. Allowing for market pressure costs raises the flotation cost allowance to well above 5%.

In a 2014 study filed before the State of Texas Comptroller of Public Accounts Property Tax Division by Bwembya Chikolwa and Rick Parker, "Capitalization Rate Study Gas And Liquid Pipeline Industry," Appendix C, the average direct flotation cost on more than 100 common stock issuances in the gas and liquid pipeline industry was 3.22% without the market pressure effect.

In a recent comprehensive study, Tegarden Associates (2020) estimate the flotation costs for both debt and common equity issues for several hundred utilities, and find results consistent with the finding of earlier studies, namely that the direct flotation associated with utility common stock issues is 3% without the market pressure effect[1].

[1] Tegarden & Associates, "Appraisal of the Operating Properties of PacifiCorp," Utah State Tax Commission, Appeal No. 20-1050, Jan. 2020.

FLOTATION COSTS: RAISING EXTERNAL CAPITAL

(Percent of Total Capital Raised)

Amount Raised in $ Millions	Average Flotation Cost: Common Stock	Average Flotation Cost: New Debt
$ 2 - 9. 99	13.28%	4.39%
10 - 19. 99	8.72	2.76
20 - 39. 99	6.93	2.42
40 - 59. 99	5.87	1.32
60 - 79. 99	5.18	2.34
80 - 99. 99	4.73	2.16
100 - 199. 99	4.22	2.31
200 - 499. 99	3.47	2.19
500 and Up	3.15	1.64

Note: Flotation costs for IPOs are about 17 percent of the value of common stock issued if the amount raised is less than $10 million and about 6 percent if more than $500 million is raised. Flotation costs are somewhat lower for utilities than others.

Source: Lee, Inmoo, Scott Lochhead, Jay Ritter, and Quanshui Zhao, "The Costs of Raising Capital," *The Journal of Financial Research,* Spring 1996.

Therefore, based on empirical studies, total flotation costs including market pressure amount to approximately 5% of gross proceeds. It is therefore reasonable to assume a 5% total flotation cost allowance in cost of capital analyses.

2. APPLICATION OF THE FLOTATION COST ADJUSTMENT

The section below shows: 1) why it is necessary to apply an allowance of 5% to the dividend yield component of equity cost by dividing that yield by 0.95 (100% - 5%) to obtain the fair return on equity capital, and 2) why the flotation adjustment is permanently required to avoid confiscation even if no

further stock issues are contemplated. Flotation costs are only recovered if the rate of return is applied to total equity, including retained earnings, in all future years.

Flotation costs are just as real as costs incurred to build utility plant. Fair regulatory treatment absolutely must permit the recovery of these costs. An analogy with bond issues is useful to understand the treatment of flotation costs in the case of common stocks.

In the case of a bond issue, flotation costs are not expensed but are rather amortized over the life of the bond, and the annual amortization charge is embedded in the cost of service. This is analogous to the process of depreciation, which allows the recovery of funds invested in utility plant. The recovery of bond flotation expense continues year after year, irrespective of whether the company issues new debt capital in the future, until recovery is complete. In the case of common stock that has no finite life, flotation costs are not amortized. Therefore, the recovery of flotation cost requires an upward adjustment to the allowed return on equity. Roger A. Morin, Regulatory Finance, Public Utilities Reports Inc., Arlington, Va., 1994, provides numerical illustrations that show that even if a utility does not contemplate any additional common stock issues, a flotation cost adjustment is still permanently required. Examples there also demonstrate that the allowance applies to retained earnings as well as to the original capital.

From the standard DCF model, the investor's required return on equity capital is expressed as:

$$K = D_1/P_o + g$$

If P_o is regarded as the proceeds per share actually received by the company from which dividends and earnings will be generated, that is, P_o equals B_o, the book value per share, then the company's required return is:

$$r = D_1/B_o + g$$

Denoting the percentage flotation costs 'f', proceeds per share B_o are related to market price P_o as follows:

$$P - fP = B_o$$

$$P(1 - f) = B_o$$

Substituting the latter equation into the above expression for return on equity, we obtain:

$$r = D_1/P(1-f) + g$$

that is, the utility's required return adjusted for underpricing. For flotation costs of 5%, dividing the expected dividend yield by 0.95 will produce the adjusted cost of equity capital. For a dividend yield of 6% for example, the magnitude of the adjustment is 32 basis points: .06/.95 = .0632.

In deriving DCF estimates of fair return on equity, it is therefore necessary to apply a conservative after-tax allowance of 5% to the dividend yield component of equity cost.

Even if no further stock issues are contemplated, the flotation adjustment is still permanently required to keep shareholders whole. Flotation costs are only recovered if the rate of return is applied to total equity, including retained earnings, in all future years, even if no future financing is contemplated. This is demonstrated by the numerical example contained in pages 7-9 of this Appendix. Moreover, even if the stock price, hence the DCF estimate of equity return, fully reflected the lack of permanent allowance, the company always nets less than the market price. Only the net proceeds from an equity issue are used to add to the rate base on which the investor earns. A permanent allowance for flotation costs must be authorized in order to insure that in each year the investor earns the required return on the total amount of capital actually supplied.

The example shown on pages 7-9 shows the flotation cost adjustment process using illustrative, yet realistic, market data. The assumptions used in the computation are shown on page 7. The stock is selling in the market for $25, investors expect the firm to pay a dividend of $2.25 that will grow at a rate of 5% thereafter. The traditional DCF cost of equity is thus k = D/P + g = 2.25/25 + .05 = 14%. The firm sells one share stock, incurring a flotation cost of 5%. The traditional DCF cost of equity adjusted for flotation cost is thus ROE = D/P(1-f) + g = .09/.95 + .05 = 14.47%.

The initial book value (rate base) is the net proceeds from the stock issue, which are $23.75, that is, the market price less the 5% flotation costs. The example demonstrates that only if the company is allowed to earn 14.47% on rate base will investors earn their cost of equity of 14%. On page 8, Column 1 shows the initial common stock account, Column 2 the cumulative retained earnings balance, starting at zero, and steadily increasing from the retention of earnings. Total equity in Column 3 is the sum of common stock capital and retained earnings. The stock price in Column 4 is obtained from the seminal DCF formula: $D_1/(k - g)$. Earnings per share in Column 6 are simply the allowed return of 14.47% times

the total common equity base. Dividends start at $2.25 and grow at 5% thereafter, which they must do if investors are to earn a 14% return. The dividend payout ratio remains constant, as per the assumption of the DCF model. All quantities, stock price, book value, earnings, and dividends grow at a 5% rate, as shown at the bottom of the relevant columns. Only if the company is allowed to earn 14.47% on equity do investors earn 14%. For example, if the company is allowed only 14%, the stock price drops from $26.25 to $26.13 in the second year, inflicting a loss on shareholders. This is shown on page 9. The growth rate drops from 5% to 4.53%. Thus, investors only earn 9% + 4.53% = 13.53% on their investment. It is noteworthy that the adjustment is always required each and every year, whether or not new stock issues are sold in the future, and that the allowed return on equity must be earned on total equity, including retained earnings, for investors to earn the cost of equity.

ASSUMPTIONS:

ISSUE PRICE =	$25.00
FLOTATION COST =	5.00%
DIVIDEND YIELD =	9.00%
GROWTH =	5.00%
EQUITY RETURN = (D/P + g)	**14.00%**
ALLOWED RETURN ON EQUITY = (D/P(1-f) + g)	**14.47%**

Yr	COMMON STOCK (1)	RETAINED EARNINGS (2)	TOTAL EQUITY (3)	STOCK PRICE (4)	MARKET / BOOK RATIO (5)	EPS (6)	DPS (7)	PAYOUT (8)
1	$23.75	$0.000	$23.750	$25.000	1.0526	$3.438	$2.250	65.45%
2	$23.75	$1.188	$24.938	$26.250	1.0526	$3.609	$2.363	65.45%
3	$23.75	$2.434	$26.184	$27.563	1.0526	$3.790	$2.481	65.45%
4	$23.75	$3.744	$27.494	$28.941	1.0526	$3.979	$2.605	65.45%
5	$23.75	$5.118	$28.868	$30.388	1.0526	$4.178	$2.735	65.45%
6	$23.75	$6.562	$30.312	$31.907	1.0526	$4.387	$2.872	65.45%
7	$23.75	$8.077	$31.827	$33.502	1.0526	$4.607	$3.015	65.45%
8	$23.75	$9.669	$33.419	$35.178	1.0526	$4.837	$3.166	65.45%
9	$23.75	$11.340	$35.090	$36.936	1.0526	$5.079	$3.324	65.45%
10	$23.75	$13.094	$36.844	$38.783	1.0526	$5.333	$3.490	65.45%
			5.00%	**5.00%**		**5.00%**	**5.00%**	

Yr	COMMON STOCK (1)	RETAINED EARNINGS (2)	TOTAL EQUITY (3)	STOCK PRICE (4)	MARKET/ BOOK RATIO (5)	EPS (6)	DPS (7)	PAYOUT (8)
1	$23.75	$0.000	$23.750	$25.000	1.0526	$3.325	$2.250	67.67%
2	$23.75	$1.075	$24.825	$26.132	1.0526	$3.476	$2.352	67.67%
3	$23.75	$2.199	$25.949	$27.314	1.0526	$3.633	$2.458	67.67%
4	$23.75	$3.373	$27.123	$28.551	1.0526	$3.797	$2.570	67.67%
5	$23.75	$4.601	$28.351	$29.843	1.0526	$3.969	$2.686	67.67%
6	$23.75	$5.884	$29.634	$31.194	1.0526	$4.149	$2.807	67.67%
7	$23.75	$7.225	$30.975	$32.606	1.0526	$4.337	$2.935	67.67%
8	$23.75	$8.627	$32.377	$34.082	1.0526	$4.533	$3.067	67.67%
9	$23.75	$10.093	$33.843	$35.624	1.0526	$4.738	$3.206	67.67%
10	$23.75	$11.625	$35.375	$37.237	1.0526	$4.952	$3.351	67.67%
			4.53%	**4.53%**		**4.53%**	**4.53%**	

RESUME OF ROGER A. MORIN

(SUMMER 2022)

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EMPLOYER 1980-2022: Georgia State University
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RANK: Emeritus Professor of Finance

HONORS: Distinguished Professor of Finance for Regulated Industry,
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Robinson College of Business, Georgia State University.

EDUCATIONAL HISTORY

- Bachelor of Electrical Engineering, McGill University, Montreal, Canada, 1967.

- Master of Business Administration, McGill University, Montreal, Canada, 1969.

- PhD in Finance & Econometrics, Wharton School of Finance, University of Pennsylvania, 1976.

EMPLOYMENT HISTORY

- Lecturer, Wharton School of Finance, Univ. of Pennsylvania, 1972-3

- Assistant Professor, University of Montreal School of Business, 1973-1976.

- Associate Professor, University of Montreal School of Business, 1976-1979.

- Professor of Finance, Georgia State University, 1979-2012

- Emeritus Professor of Finance, Georgia State University 2012-present

- Distinguished Professor of Finance for Regulated Industry and Director, Center for the Study of Regulated Industry, Robinson College of Business, Georgia State University, 1985-2011

- Visiting Professor of Finance, Amos Tuck School of Business, Dartmouth College, Hanover, N.H., 1986

OTHER BUSINESS ASSOCIATIONS

- Communications Engineer, Bell Canada, 1962-1967.

- Member Board of Directors, Financial Research Institute of Canada, 1974-1980.

- Co-founder and Director Canadian Finance Research Foundation, 1977.

- Vice-President of Research, Garmaise-Thomson & Associates, Investment Management Consultants, 1980-1981.

- Member Board of Directors, Executive Visions Inc., 1985-2021

- Board of External Advisors, College of Business, Georgia State University, Member 1987-1991.

- Member Board of Directors, Hotel Equities Inc., 2009-2022

PROFESSIONAL CLIENTS

AGL Resources
AT & T Communications
Alagasco - Energen
Alaska Anchorage Municipal Light & Power
Alberta Power Ltd.
Allete
Alliant Energy
AmerenUE
American Water
Ameritech
Arkansas Western Gas
ATC Transmission
Baltimore Gas & Electric – Constellation Energy
Bangor Hydro-Electric
B.C. Telephone

B C GAS
Bell Canada
Bellcore
Bell South Corp.
Bruncor (New Brunswick Telephone)
Burlington-Northern
C & S Bank
California Pacific
Cajun Electric
Canadian Radio-Television & Telecomm. Commission
Canadian Utilities
Canadian Western Natural Gas
Cascade Natural Gas
Centel
Centra Gas
Central Illinois Light & Power Co
Central Telephone
Central & South West Corp.
CH Energy
Chattanooga Gas Company
Cincinnatti Gas & Electric
Cinergy Corp.
Citizens Utilities
City Gas of Florida
Cleco Power
CN-CP Telecommunications
Commonwealth Telephone Co.
Columbia Gas System
Consolidated Edison
Consolidated Natural Gas
Constellation Energy
Delmarva Power & Light Co
Deerpath Group
Detroit Edison Company
Dayton Power & Light Co.
DPL Energy
Duke Energy Indiana
Duke Energy Kentucky
Duke Energy Ohio
Duke Energy Progress South Carolina
Duke Energy Progress North Carolina
DTE Energy
Edison International
Edmonton Power Company
Elizabethtown Gas Co.
Emera

Energen
Engraph Corporation
Entergy Corp.
Entergy Arkansas Inc.
Entergy Gulf States, Inc.
Entergy Louisiana, Inc.
Entergy Mississippi Power
Entergy New Orleans, Inc.
Federal Energy Regulatory Commission
First Energy
Florida Water Association
Fortis
Garmaise-Thomson & Assoc., Investment Consultants
Gaz Metropolitain
General Public Utilities
Georgia Broadcasting Corp.
Georgia-Pacific
Georgia Power Company
GTE California - Verizon
GTE Northwest Inc. - Verizon
GTE Service Corp. - Verizon
GTE Southwest Incorporated - Verizon
Gulf Power Company
Havasu Water Inc.
Hawaiian Electric Company
Hawaiian Elec & Light Co
Heater Utilities – Aqua - America
Hope Gas Inc.
Hydro-Quebec
ICG Utilities
Interstate Power & Light
Illinois Commerce Commission
Interstate Power & Light
Island Telephone
ITC Holdings
Jersey Central Power & Light
Kansas Power & Light
KeySpan Energy
Maine Public Service
Manitoba Hydro
Maritime Telephone
Maui Electric Co.
Metropolitan Edison Co.
Minister of Natural Resources Province of Quebec
Minnesota Power & Light
Mississippi Power Company

Missouri Gas Energy
Mountain Bell
National Grid PLC
Nevada Power Company
New Brunswick Power
Newfoundland Power Inc. - Fortis Inc.
New Market Hydro
New Mexico Gas Co.
New Tel Enterprises Ltd.
New York Telephone Co.
NextEra Energy
Niagara Mohawk Power Corp
Norfolk-Southern
Northeast Utilities
Northern Telephone Ltd.
Northwestern Bell
Northwestern Utilities Ltd.
Nova Scotia Power
Nova Scotia Utility and Review Board
NUI Corp.
NV Energy
NYNEX
Oklahoma Gas & Electric
Ontario Telephone Service Commission
Orange & Rockland
PNM Resources
PPL Corp
PacifiCorp
Pacific Northwest Bell
People's Gas System Inc.
People's Natural Gas
Pennsylvania Electric Co.
Pepco Holdings
Potomac Electric Power Co.
PSI Energy
Public Service Electric & Gas
Public Service of New Hampshire
Public Service of New Mexico
Puget Sound Energy
Quebec Telephone
Regie de l'Energie du Quebec
Rockland Electric
Rochester Telephone
SNL Center for Financial Execution
San Diego Gas & Electric
SaskPower

Sempra
Sierra Pacific Power Company
Southern California Gas Company
Source Gas
Southern Bell
Southern California Gas
Southern States Utilities
Southern Union Gas
South Central Bell
Sun City Water Company
TECO Energy
The Southern Company
Touche Ross and Company
TransEnergie
Trans-Quebec & Maritimes Pipeline
TXU Corp
US WEST Communications
Union Heat Light & Power
Utah Power & Light
Vermont Gas Systems Inc.
Wisconsin Power & Light

MANAGEMENT DEVELOPMENT AND PROFESSIONAL EXECUTIVE EDUCATION

- Canadian Institute of Marketing, Corporate Finance, 1971-73

- Hydro-Quebec, "Capital Budgeting Under Uncertainty," 1974-75

- Institute of Certified Public Accountants, Mergers & Acquisitions, 1975-78

- Investment Dealers Association of Canada, 1977-78

- Financial Research Foundation, bi-annual seminar, 1975-79

- Advanced Management Research (AMR), faculty member, 1977-80

- Financial Analysts Federation, Educational chapter: "Financial Futures Contracts" seminar

- The Management Exchange Inc., faculty member 1981-2008:

National Seminars: *Risk and Return on Capital Projects*
Cost of Capital for Regulated Utilities
Capital Allocation for Utilities
Alternative Regulatory Frameworks
Utility Directors' Workshop
Shareholder Value Creation for Utilities
Fundamentals of Utility Finance

Contemporary Issues in Utility Finance

- SNL Center for Financial Education faculty member 2008-2018
- S&P Global Intelligence, faculty member 2015 -2022
  National Seminars: *Essentials of Utility Finance*

EXPERT TESTIMONY & UTILITY CONSULTING AREAS OF EXPERTISE

Corporate Finance
Rate of Return
Capital Structure
Generic Cost of Capital
Costing Methodology
Depreciation
Flow-Through vs Normalization
Revenue Requirements Methodology
Utility Capital Expenditures Analysis
Risk Analysis
Capital Allocation
Divisional Cost of Capital, Unbundling
Incentive Regulation & Alternative Regulatory Plans
Shareholder Value Creation
Value-Based Management

REGULATORY BODIES

Alabama Public Service Commission
Alaska Regulatory Commission
Alberta Public Service Board
Arizona Corporation Commission
Arkansas Public Service Commission
British Columbia Board of Public Utilities
California Public Service Commission
Canadian Radio-Television & Telecommunications Comm.
City of New Orleans Council
Colorado Public Utilities Commission
Colorado Department of Revenue
Delaware Public Service Commission
District of Columbia Public Service Commission
Federal Communications Commission
Federal Energy Regulatory Commission
Florida Public Service Commission
Georgia Public Service Commission
Georgia Senate Committee on Regulated Industries
Hawaii Public Utilities Commission
Illinois Commerce Commission

Indiana Utility Regulatory Commission
Iowa Utilities Board
Kentucky Public Service Commission
Louisiana Public Service Commission
Maine Public Utilities Commission
Manitoba Board of Public Utilities
Maryland Public Service Commission
Michigan Public Service Commission
Minnesota Public Utilities Commission
Mississippi Public Service Commission
Missouri Public Service Commission
Montana Public Service Commission
National Energy Board of Canada
Nebraska Public Service Commission
Nevada Public Utilities Commission
New Brunswick Board of Public Commissioners
New Hampshire Public Utilities Commission
New Jersey Board of Public Utilities
New Mexico Public Regulation Commission
New Orleans City Council
New York Public Service Commission
Newfoundland Board of Commissioners of Public Utilities
North Carolina Utilities Commission
Nova Scotia Board of Public Utilities
Ohio Public Utilities Commission
Oklahoma Corporation Commission
Ontario Telephone Service Commission
Ontario Energy Board
Oregon Public Utility Service Commission
Pennsylvania Public Utility Commission
Quebec Regie de l'Energie
Quebec Telephone Service Commission
South Carolina Public Service Commission
South Dakota Public Utilities Commission
Tennessee Regulatory Authority
Texas Public Utility Commission
Utah Public Service Commission
Utah State Tax Commission
Vermont Department of Public Services
Virginia State Corporation Commission
Washington Utilities & Transportation Commission
West Virginia Public Service Commission

SERVICE AS EXPERT WITNESS

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Southern Bell, So. Carolina PSC, Docket #82-294C
Southern Bell, North Carolina PSC, Docket #P-55-816
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Northern Telephone, Ontario PSC
GTE-Quebec Telephone, Quebec PSC, Docket 84-052B
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CN-CP Telecommunications, CRTC
Quebec Northern Telephone, Quebec PSC
Edmonton Power Company, Alberta Public Service Board
Kansas Power & Light, F.E.R.C., Docket # ER 83-418
NYNEX, FCC generic cost of capital Docket #84-800
Bell South, FCC generic cost of capital Docket #84-800
American Water Works - Tennessee, Docket #7226
Burlington-Northern - Oklahoma State Board of Taxes
Georgia Power, Georgia PSC, Docket # 3549-U
GTE Service Corp., FCC Docket #84-200
Mississippi Power Co., Miss. PSC, Docket U-4761
Citizens Utilities, Ariz. Corp. Comm., Docket U2334-86020
Quebec Telephone, Quebec PSC, 1986, 1987, 1992
Newfoundland L & P, Nfld. Brd. Publ Comm. 1987, 1991
Northwestern Bell, Minnesota PSC, Docket P-421/CI-86-354
GTE Service Corp., FCC Docket #87-463
Anchorage Municipal Power & Light, Alaska PUC, 1988
New Brunswick Telephone, N.B. PUC, 1988
Trans-Quebec Maritime, Nat'l Energy Brd. of Cda, '88-92
Gulf Power Co., Florida PSC, Docket #88-1167-EI
Mountain States Bell, Montana PSC, #88-1.2
Mountain States Bell, Arizona CC, #E-1051-88-146
Georgia Power, Georgia PSC, Docket # 3840-U, l989
Rochester Telephone, New York PSC, Docket # 89-C-022
Noverco - Gaz Metro, Quebec Natural Gas PSC, #R-3164-89
GTE Northwest, Washington UTC, #U-89-3031
Orange & Rockland, New York PSC, Case 89-E-175
Central Illinois Light Company, ICC, Case 90-0127
Peoples Natural Gas, Pennsylvania PSC, Case
Gulf Power, Florida PSC, Case # 891345-EI
ICG Utilities, Manitoba BPU, Case 1989

New Tel Enterprises, CRTC, Docket #90-15
Peoples Gas Systems, Florida PSC
Jersey Central Pwr & Light, N.J. PUB, Case ER 89110912J
Alabama Gas Co., Alabama PSC, Case 890001
Trans-Quebec Maritime Pipeline, Cdn. Nat'l Energy Board
Mountain Bell, Utah PSC,
Mountain Bell, Colorado PUB
South Central Bell, Louisiana PS
Hope Gas, West Virginia PSC
Vermont Gas Systems, Vermont PSC
Alberta Power Ltd., Alberta PUB
Ohio Utilities Company, Ohio PSC
Georgia Power Company, Georgia PSC
Sun City Water Company
Havasu Water Inc.
Centra Gas (Manitoba) Co.
Central Telephone Co. Nevada
AGT Ltd., CRTC 1992
BC GAS, BCPUB 1992
California Water Association, California PUC 1992
Maritime Telephone 1993
BCE Enterprises, Bell Canada, 1993
Citizens Utilities Arizona gas division 1993
PSI Resources 1993-5
CILCORP gas division 1994
GTE Northwest Oregon 1993
Stentor Group 1994-5
Bell Canada 1994-1995
PSI Energy 1993, 1994, 1995, 1999
Cincinnati Gas & Electric 1994, 1996, 1999, 2004
Southern States Utilities, 1995
CILCO 1995, 1999, 2001
Commonwealth Telephone 1996
Edison International 1996, 1998
Citizens Utilities 1997
Stentor Companies 1997
Hydro-Quebec 1998
Entergy Gulf States Louisiana 1998, 1999, 2001, 2002, 2003
Detroit Edison, 1999, 2003
Entergy Gulf States, Texas, 2000, 2004
Hydro Quebec TransEnergie, 2001, 2004
Sierra Pacific Company, 2000, 2001, 2002, 2007, 2010
Nevada Power Company, 2001
Mid American Energy, 2001, 2002
Entergy Louisiana Inc. 2001, 2002, 2004
Mississippi Power Company, 2001, 2002, 2007

Oklahoma Gas & Electric Company, 2002 -2003
Public Service Electric & Gas, 2001, 2002
NUI Corp (Elizabethtown Gas Company), 2002
Jersey Central Power & Light, 2002
San Diego Gas & Electric, 2002, 2012, 2014
New Brunswick Power, 2002
Entergy New Orleans, 2002, 2008
Hydro-Quebec Distribution 2002
PSI Energy 2003
Fortis – Newfoundland Power & Light 2002
Emera – Nova Scotia Power 2004
Hydro-Quebec TransEnergie 2004
Hawaiian Electric 2004
Missouri Gas Energy 2004
AGL Resources 2004
Arkansas Western Gas 2004
Public Service of New Hampshire 2005
Hawaiian Electric Company 2005, 2008, 2009
Delmarva Power & Light Company 2005, 2009
Union Heat Power & Light 2005
Puget Sound Energy 2006, 2007, 2009
Cascade Natural Gas 2006
Entergy Arkansas 2006-7
Bangor Hydro 2006-7
Delmarva 2006, 2007, 2009
Potomac Electric Power Co. 2006, 2007, 2009
Duke Energy Ohio, 2007, 2008, 2009
Duke Energy Kentucky 2009
Consolidated Edison 2007 Docket 07-E-0523
Duke Energy Ohio Docket 07-589-GA-AIR
Hawaiian Electric Company Docket 05-0315
Sierra Pacific Power Docket ER07-1371-000
Public Service New Mexico Docket 06-00210-UT
Detroit Edison Docket U-15244
Potomac Electric Power Docket FC-1053
Delmarva, Delaware, Docket 09-414
Atlantic City Electric, New Jersey, Docket ER-09080664
Maui Electric Co, Hawaii, Docket 2009-0163, 2011
Niagara Mohawk, New York, Docket 10E-0050
Sierra Pacific Power Docket No. 10-06001
Gaz Metro, Regie de l'Energie (Quebec), Docket 2012 R-3752-2011
California Pacific Electric Co., LLC, California PUC, Docket A-12-02-014
Duke Energy Ohio, Ohio Case No. 11-XXXX-EL-SSO
San Diego Gas & Electric, FERC, 2012, 2014, 2018
San Diego Gas & Electric, California PUC, 2012, Docket A-12-04
Southern California Gas, California PUC, 2012, Docket A-12-04

Puget Sound Electric 2016
Puget Sound Electric 2017
Duke Energy of Ohio 2015, 2018
Duke Energy of Kentucky 2017. 2018
Duke Energy of Ohio 2017
Dayton Power & Light 2016-2018
Missouri American Water
California Power Electric Company
Interstate Power & Light Iowa 2017, 2018
Wisconsin Power & Light 2016
OG&E Electric 2018
Duke Energy Kentucky 2019
IPL Iowa 2019
Puget Sound Electric 2019
SDG&E California 2019
SDG&E FERC 2019
Southern California Gas 2019
Entergy Louisiana Inc. 2020-2021
Cleco Power 2021
PacifiCorp 2021

PROFESSIONAL AND LEARNED SOCIETIES

- Engineering Institute of Canada, 1967-1972
- Canada Council Award, recipient 1971 and 1972
- Canadian Association Administrative Sciences, 1973-80
- American Association of Decision Sciences, 1974-1978
- American Finance Association, 1975-2002
- Financial Management Association, 1978-2002

ACTIVITIES IN PROFESSIONAL ASSOCIATIONS AND MEETINGS

- Chairman of meeting on "New Developments in Utility Cost of Capital", Southern Finance Association, Atlanta, Nov. 1982

- Chairman of meeting on "Public Utility Rate of Return", Southeastern Public Utility Conference, Atlanta, Oct. 1982

- Chairman of meeting on "Current Issues in Regulatory Finance", Financial Management Association, Atlanta, Oct. 1983

- Chairman of meeting on "Utility Cost of Capital", Financial Management Association, Toronto, Canada, Oct. 1984.

- Committee on New Product Development, FMA, 1985

- Discussant, "Tobin's Q Ratio", paper presented at Financial Management Association, New York, N.Y., Oct. 1986

- Guest speaker, "Utility Capital Structure: New Developments", National Society of Rate of Return Analysts 18th Financial Forum, Wash., D.C. Oct. 1986

- Opening address, "Capital Expenditures Analysis: Methodology vs Mythology," Bellcore Economic Analysis Conference, Naples Fl, 1988.

- Guest speaker, "Mythodology in Regulatory Finance", Society of Utility Rate of Return Analysts (SURFA), Annual Conference, Wash., D.C. February 2007.

PAPERS PRESENTED:

"An Empirical Study of Multi-Period Asset Pricing," annual meeting of Financial Management Assoc., Las Vegas Nevada, 1987.

"Utility Capital Expenditures Analysis: Net Present Value vs Revenue Requirements", annual meeting of Financial Management Assoc., Denver, Colorado, October 1985.

"Intervention Analysis and the Dynamics of Market Efficiency", annual meeting of Financial Management Assoc., San Francisco, Oct. 1982

"Intertemporal Market-Line Theory: An Empirical Study," annual meeting of Eastern Finance Assoc., Newport, R.I. 1981

"Option Writing for Financial Institutions: A Cost-Benefit Analysis", 1979 annual meeting Financial Research Foundation

"Free-lunch on the Toronto Stock Exchange", annual meeting of Financial Research Foundation of Canada, l978.

"Simulation System Computer Software SIMFIN", HP International Business Computer Users Group, London, 1975.

"Inflation Accounting: Implications for Financial Analysis." Institute of Certified Public Accountants Symposium, 1979.

OFFICES IN PROFESSIONAL ASSOCIATIONS

- President, International Hewlett-Packard Business Computers Users Group, 1977

- Chairman Program Committee, International HP Business Computers Users Group, London, England, 1975

- Program Coordinator, Canadian Assoc. of Administrative Sciences, 1976

- Member, New Product Development Committee, Financial Mgt Ass, 1985-1986

- Reviewer: Journal of Financial Research, Financial Management
Financial Review, Journal of Finance

PUBLICATIONS

"Risk Aversion Revisited", Journal of Finance, Sept. 1983

"Hedging Regulatory Lag with Financial Futures," Journal of Finance, May 1983. (with G. Gay, R. Kolb)

"The Effect of CWIP on Cost of Capital," Public Utilities Fortnightly, July 1986.

"The Effect of CWIP on Revenue Requirements" Public Utilities Fortnightly, August 1986.

"Intervention Analysis and the Dynamics of Market Efficiency," Time-Series Applications, New York: North Holland, 1983. (with K. El-Sheshai)

"Market-Line Theory and the Canadian Equity Market," Journal of Business Administration, Jan. l982, M. Brennan, editor

"Efficiency of Canadian Equity Markets," International Management Review, Feb. 1978.

"Intertemporal Market-Line Theory: An Empirical Test," Financial Review, Proceedings of the Eastern Finance Association, 1981.

BOOKS

Utilities' Cost of Capital, Public Utilities Reports Inc., Arlington, Va., 1984.

Regulatory Finance, Public Utilities Reports Inc., Arlington, Va., 2004

Driving Shareholder Value, McGraw-Hill, January 2001.

The New Regulatory Finance, Public Utilities Reports Inc., Arlington, Va., 2006.

Modern Regulatory Finance, PUR Books, Reston, Va., 2022.

MONOGRAPHS

Determining Cost of Capital for Regulated Industries, Public Utilities Reports, Inc., and The Management Exchange Inc., 1982 - 1993. (with V.L. Andrews)

Alternative Regulatory Frameworks, Public Utilities Reports, Inc., and The Management Exchange Inc., 1993. (with V.L. Andrews)

Risk and Return in Capital Projects, The Management Exchange Inc., 1980. (with B. Deschamps)

Utility Capital Expenditure Analysis, The Management Exchange Inc., 1983.

Regulation of Cable Television: An Econometric Planning Model, Quebec Department of Communications, 1978.

"An Economic & Financial Profile of the Canadian Cablevision Industry," Canadian Radio-Television & Telecommunication Commission (CRTC), 1978.

Computer Users' Manual: Finance and Investment Programs, University of Montreal Press, 1974, revised 1978.

Fiber Optics Communications: Economic Characteristics, Quebec Department of Communications, 1978.

"Canadian Equity Market Inefficiencies", Capital Market Research Memorandum, Garmaise & Thomson Investment Consultants, 1979.

MISCELLANEOUS CONSULTING REPORTS

"Operational Risk Analysis: California Water Utilities," Calif. Water Association, 1993.

"Cost of Capital Methodologies for Independent Telephone Systems", Ontario Telephone Service Commission, March 1989.

"The Effect of CWIP on Cost of Capital and Revenue Requirements", Georgia Power Company, 1985.

"Costing Methodology and the Effect of Alternate Depreciation and Costing Methods on Revenue Requirements and Utility Finances", Gaz Metropolitan Inc., 1985.

"Simulated Capital Structure of CN-CP Telecommunications: A Critique", CRTC, 1977.

"Telecommunications Cost Inquiry: Critique," CRTC, 1977.

"Social Rate of Discount in the Public Sector", CRTC Policy Statement, 1974.

"Technical Problems in Capital Projects Analysis", CRTC Policy Statement, 1974.

RESEARCH GRANTS

"Econometric Planning Model of the Cablevision Industry," International Institute of Quantitative Economics, CRTC.

"Application of the Averch-Johnson Model to Telecommunications Utilities," Canadian Radio-Television Commission. (CRTC)

"Economics of the Fiber Optics Industry", Quebec Dept. of Communications.

"Intervention Analysis and the Dynamics of Market Efficiency", Georgia State Univ. College of Business, 1981.

"Firm Size and Beta Stability", Georgia State University College of Business, 1982.

"Risk Aversion and the Demand for Risky Assets", Georgia State University College of Business, 1981.

IPL Exhibit Morin Direct, Schedule C

Proxy Group for Duke Energy

	Company	Ticker
1	Alliant Energy	LNT
2	Amer. Elec. Power	AEP
3	Ameren Corp.	AEE
4	Avista Corp.	AVA
5	Black Hills	BKH
6	CenterPoint Energy	CNP
7	CMS Energy Corp.	CMS
8	Dominion Energy	D
9	DTE Energy	DTE
10	Edison Int'l	EIX
11	Entergy Corp.	ETR
12	Evergy Inc.	EVRG
13	Eversource Energy	ES
14	FirstEnergy Corp.	FE
15	IDACORP Inc.	IDA
16	NorthWestern Corp.	NWE
17	OGE Energy	OGE
18	Otter Tail Corp.	OTTR
19	Portland General	POR
20	Sempra Energy	SRE
21	Southern Co.	SO

Vertically-Integrated Elec Utilities
DCF Analysis Value Line Growth Rates

Line No.	(1) Company Name	(2) Current Dividend Yield	(3) Projected EPS Growth	(4) % Expected Divid Yield	(5) Cost of Equity
1	Alliant Energy	3.09	6.00	3.28	9.28
2	Amer. Elec. Power	3.64	6.50	3.88	10.38
3	Ameren Corp.	2.74	6.50	2.92	9.42
4	Avista Corp.	4.52	3.00	4.66	7.66
5	Black Hills	3.66	6.00	3.88	9.88
6	CenterPoint Energy	2.43	6.50	2.59	9.09
7	CMS Energy Corp.	3.07	6.50	3.27	9.77
8	Dominion Energy	4.51	5.50	4.76	10.26
9	DTE Energy	3.09	4.50	3.23	7.73
10	Edison Int'l	4.54	16.00	5.27	21.27
11	Entergy Corp.	3.82	4.00	3.97	7.97
12	Evergy Inc.	4.18	7.50	4.49	11.99
13	Eversource Energy	3.20	6.50	3.41	9.91
14	FirstEnergy Corp.	4.05	3.00	4.17	7.17
15	IDACORP Inc.	2.99	4.00	3.11	7.11
16	NorthWestern Corp.	4.54	2.50	4.65	7.15
17	OGE Energy	4.22	6.50	4.49	10.99
18	Otter Tail Corp.	2.95	4.50	3.08	7.58
19	Portland General	3.84	4.50	4.01	8.51
20	Sempra Energy	2.90	7.00	3.10	10.10
21	Southern Co.	4.15	6.50	4.42	10.92
22	WEC Energy Group	3.04	6.00	3.22	9.22
23	Xcel Energy Inc.	2.85	6.00	3.02	9.02
25	**AVERAGE**	**3.57**	**5.89**	**3.78**	**9.67**

Notes:

28 Column 2: Zacks Investment Reports 11/19 /2022
29 Column 3: Value Line Investment Reports 11/2022
30 Column 4 = Column 2 times (1 + Column 3/100)
31 Column 5 = Column 4 + Column 3

Vertically-Integrated Elec Utilities
DCF Analysis Value Line Growth Rates

Line No.	(1) Company Name	(2) Current Dividend Yield	(3) Projected EPS Growth	(4) % Expected Divid Yield	(5) Cost of Equity	(6) Return on Equity
1	Alliant Energy	3.09	6.00	3.28	9.28	9.45
2	Amer. Elec. Power	3.64	6.50	3.88	10.38	10.58
3	Ameren Corp.	2.74	6.50	2.92	9.42	9.57
4	Avista Corp.	4.52	3.00	4.66	7.66	7.90
5	Black Hills	3.66	6.00	3.88	9.88	10.08
6	CenterPoint Energy	2.43	6.50	2.59	9.09	9.22
7	CMS Energy Corp.	3.07	6.50	3.27	9.77	9.94
8	Dominion Energy	4.51	5.50	4.76	10.26	10.51
9	DTE Energy	3.09	4.50	3.23	7.73	7.90
10	Edison Int'l	4.54	16.00	5.27	21.27	
11	Entergy Corp.	3.82	4.00	3.97	7.97	8.18
12	Evergy Inc.	4.18	7.50	4.49	11.99	12.23
13	Eversource Energy	3.20	6.50	3.41	9.91	10.09
14	FirstEnergy Corp.	4.05	3.00	4.17	7.17	7.39
15	IDACORP Inc.	2.99	4.00	3.11	7.11	7.27
16	NorthWestern Corp.	4.54	2.50	4.65	7.15	7.40
17	OGE Energy	4.22	6.50	4.49	10.99	11.23
18	Otter Tail Corp.	2.95	4.50	3.08	7.58	7.75
19	Portland General	3.84	4.50	4.01	8.51	8.72
20	Sempra Energy	2.90	7.00	3.10	10.10	10.27
21	Southern Co.	4.15	6.50	4.42	10.92	11.15
22	WEC Energy Group	3.04	6.00	3.22	9.22	9.39
23	Xcel Energy Inc.	2.85	6.00	3.02	9.02	9.18
25	**AVERAGE**	**3.57**	**5.89**	**3.78**	**9.67**	**9.34**

Notes:

28 Column 2: Zacks Investment Reports 11/19 /2022
29 Column 3: Value Line Investment Reports 11/2022
30 Column 4 = Column 2 times (1 + Column 3/100)
31 Column 5 = Column 4 + Column 3
32 Column 6 = Column 4/0.95 + Column 3

IPL Exhibit Morin Direct, Schedule E

Vertically Integrated Elec Utilities
DCF Analysis Analysts' Growth Forecasts

Line No.	(1) Company Name	(2) Current Dividend Yield	(3) Analysts' Growth Forecast	(4) % Expected Divid Yield	(5) Cost of Equity
1	Alliant Energy	3.09	5.92	3.27	9.19
2	Amer. Elec. Power	3.64	6.20	3.87	10.07
3	Ameren Corp.	2.74	7.20	2.94	10.14
4	Avista Corp.	4.52	5.18	4.75	9.93
5	Black Hills	3.66	5.37	3.86	9.23
6	CenterPoint Energy	2.43	3.53	2.52	6.05
7	CMS Energy Corp.	3.07	8.04	3.32	11.36
8	Dominion Energy	4.51	5.72	4.77	10.49
9	DTE Energy	3.09	6.00	3.28	9.28
10	Edison Int'l	4.54	2.57	4.66	7.23
11	Entergy Corp.	3.82	6.76	4.08	10.84
12	Evergy Inc.	4.18	5.24	4.40	9.64
13	Eversource Energy	3.20	6.21	3.40	9.61
14	FirstEnergy Corp.	4.05	6.70	4.32	11.02
15	IDACORP Inc.	2.99	3.38	3.09	6.47
16	NorthWestern Corp.	4.54	1.74	4.62	6.36
17	OGE Energy	4.22	5.00	4.43	9.43
18	Otter Tail Corp.	2.95	4.50	3.08	7.58
19	Portland General	3.84	5.35	4.05	9.40
20	Sempra Energy	2.90	5.71	3.07	8.78
21	Southern Co.	4.15	4.00	4.32	8.32
22	WEC Energy Group	3.04	6.16	3.23	9.39
23	Xcel Energy Inc.	2.85	6.47	3.03	9.50
25	**AVERAGE**	**3.57**	**5.35**	**3.75**	**9.10**

27 Notes:
28 Column 2, 3: Zacks Investment Research 11/17/22
29 Column 4 = Column 2 times (1 + Column 3/100)
30 Column 5 = Column 4 + Column 3

IPL Exhibit Morin Direct, Schedule F

Vertically-Integrated Elec Utilities Beta Estimates

Line No.	Company Name	(1) Beta
1	Alliant Energy	0.85
2	Amer. Elec. Power	0.75
3	Ameren Corp.	0.85
4	Avista Corp.	0.90
5	Black Hills	0.95
6	CenterPoint Energy	1.15
7	CMS Energy Corp.	0.80
8	Dominion Energy	0.85
9	DTE Energy	0.95
10	Edison Int'l	0.95
11	Entergy Corp.	0.95
12	Evergy Inc.	0.90
13	Eversource Energy	0.90
14	FirstEnergy Corp.	0.85
15	IDACORP Inc.	0.80
16	NorthWestern Corp.	0.90
17	OGE Energy	1.05
18	Otter Tail Corp.	0.85
19	Portland General	0.85
20	Sempra Energy	0.95
21	Southern Co.	0.95
22	WEC Energy Group	0.80
23	Xcel Energy Inc.	0.80
25	**AVERAGE**	**0.89**

27 Source: Value Line Investment Reports 11/22

PROSPECTIVE MRP S&P 500

	Company Name	Ticker	% Curr Div Yield	Proj EPS Gth
1	3M Company	MMM	4.5	6.5
2	Abbott Labs.	ABT	1.7	8.0
3	AbbVie Inc.	ABBV	3.8	4.5
4	Accenture Plc	ACN	1.5	12.5
5	Activision Blizzard	ATVI	0.7	12.5
6	Advance Auto Parts	AAP	3.1	16.0
7	AES Corp.	AES	3.2	
8	Aflac Inc.	AFL	3.1	9.0
9	Agilent Technologies	A	0.7	11.5
10	Air Products & Chem.	APD	2.8	11.0
11	Albemarle Corp.	ALB	0.7	15.0
12	Alexandria Real Estate	ARE	3.2	10.0
13	Allegion plc	ALLE	1.6	10.5
14	Alliant Energy	LNT	3.1	6.0
15	Allstate Corp.	ALL	2.8	2.5
16	Altria Group	MO	8.5	5.5
17	Amcor plc	AMCR	3.8	14.0
18	Amer. Elec. Power	AEP	3.5	6.5
19	Amer. Express	AXP	1.4	10.0
20	Amer. Tower 'A'	AMT	2.4	9.0
21	Amer. Water Works	AWK	1.8	3.0
22	Ameren Corp.	AEE	2.8	6.5
23	Ameriprise Fin'l	AMP	2.1	12.5
24	AmerisourceBergen	ABC	1.3	8.5
25	AMETEK Inc.	AME	0.8	10.0
26	Amgen	AMGN	3.3	5.5
27	Amphenol Corp.	APH	1.2	12.5
28	Analog Devices	ADI	1.9	14.0
29	Aon plc	AON	0.8	7.5
30	Apple Inc.	AAPL	0.6	14.0
31	Applied Materials	AMAT	1.0	14.5
32	Archer Daniels Midl'd	ADM	2.1	13.0
33	Assurant Inc.	AIZ	1.8	14.0
34	AT&T Inc.	T	5.4	0.5
35	Atmos Energy	ATO	2.6	7.5
36	Automatic Data Proc.	ADP	2.1	9.0
37	AvalonBay Communities	AVB	3.4	6.5
38	Avery Dennison	AVY	1.8	12.0
39	Baker Hughes	BKR	2.8	
40	Bank of America	BAC	2.6	9.5

41	Bank of New York Mellc	BK	3.4	6.5
42	Baxter Int'l Inc.	BAX	1.8	10.0
43	Becton Dickinson	BDX	1.5	5.5
44	Berkley (W.R.)	WRB	0.6	15.5
45	Best Buy Co.	BBY	4.5	7.0
46	Bio-Techne Corp.	TECH	0.4	17.5
47	BlackRock Inc.	BLK	3.2	10.0
48	BorgWarner	BWA	1.9	9.5
49	Boston Properties	BXP	4.4	-1.0
50	Broadridge Fin'l	BR	1.7	9.0
51	Brown & Brown	BRO	0.7	8.0
52	Brown-Forman 'B'	BF/B	1.1	14.0
53	C.H. Robinson	CHRW	2.2	8.0
54	Camden Property Trust	CPT	2.9	2.5
55	Campbell Soup	CPB	3.1	5.0
56	Capital One Fin'l	COF	2.1	-1.0
57	Cardinal Health	CAH	3.6	5.0
58	Carrier Global	CARR	1.6	
59	Caterpillar Inc.	CAT	2.7	10.0
60	Cboe Global Markets	CBOE	1.6	10.0
61	CDW Corp.	CDW	1.2	8.5
62	Celanese Corp.	CE	2.4	7.5
63	CenterPoint Energy	CNP	2.5	6.5
64	Chubb Ltd.	CB	1.8	11.0
65	Church & Dwight	CHD	1.1	6.0
66	Cigna Corp.	CI	1.7	9.5
67	Cincinnati Financial	CINF	2.5	7.0
68	Cintas Corp.	CTAS	1.0	13.5
69	Cisco Systems	CSCO	3.4	8.0
70	Citigroup Inc.	C	4.0	5.5
71	Citizens Fin'l Group	CFG	4.5	9.0
72	Clorox Co.	CLX	3.1	4.5
73	CME Group	CME	2.0	8.5
74	CMS Energy Corp.	CMS	3.0	6.5
75	Coca-Cola	KO	2.9	7.5
76	Cognizant Technology	CTSH	1.6	7.5
77	Colgate-Palmolive	CL	2.5	6.5
78	Comcast Corp.	CMCSA	2.6	9.5
79	Comerica Inc.	CMA	3.4	6.0
80	Conagra Brands	CAG	3.8	4.0
81	ConocoPhillips	COP	2.0	20.0
82	Consol. Edison	ED	3.5	4.5
83	Constellation Brands	STZ	1.3	5.0
84	Constellation Energy	CEG	1.0	

85	Corning Inc.	GLW	3.1	17.5
86	Corteva Inc.	CTVA	1.1	16.5
87	Costco Wholesale	COST	0.7	10.5
88	Crown Castle Int'l	CCI	3.5	12.0
89	CSX Corp.	CSX	1.3	10.5
90	Cummins Inc.	CMI	3.1	8.5
91	CVS Health	CVS	2.3	6.0
92	Danaher Corp.	DHR	0.4	16.5
93	Darden Restaurants	DRI	4.0	19.5
94	Deere & Co.	DE	1.4	15.0
95	Dentsply Sirona	XRAY	1.4	10.0
96	Diamondback Energy	FANG	2.5	
97	Digital Realty Trust	DLR	4.1	-3.5
98	Discover Fin'l Svcs.	DFS	2.2	8.5
99	Dollar General	DG	0.9	10.0
100	Dominion Energy	D	3.6	14.0
101	Domino's Pizza	DPZ	1.1	16.0
102	Dover Corp.	DOV	1.6	8.0
103	Dow Inc.	DOW	5.5	15.0
104	DTE Energy	DTE	3.0	4.5
105	Duke Energy	DUK	3.9	6.0
106	Duke Realty Corp.	DRE	2.0	-2.5
107	DuPont de Nemours	DD	2.4	10.0
108	Eastman Chemical	EMN	3.3	9.5
109	Eaton Corp. plc	ETN	2.4	12.0
110	eBay Inc.	EBAY	1.9	15.5
111	Ecolab Inc.	ECL	1.3	10.5
112	Edison Int'l	EIX	4.6	15.5
113	Electronic Arts	EA	0.6	11.5
114	Elevance Health	ELV	1.1	12.5
115	Emerson Electric	EMR	2.5	10.0
116	Entergy Corp.	ETR	3.9	4.0
117	Equifax Inc.	EFX	0.8	10.0
118	Equinix Inc.	EQIX	2.0	15.0
119	Equity Residential	EQR	3.5	-6.0
120	Essex Property Trust	ESS	3.4	-4.0
121	Everest Re Group Ltd.	RE	2.5	9.5
122	Evergy Inc.	EVRG	3.8	7.5
123	Eversource Energy	ES	3.1	6.0
124	Exelon Corp.	EXC	3.2	3.5
125	Expeditors Int'l	EXPD	1.3	6.5
126	Extra Space Storage	EXR	3.5	4.0
127	FactSet Research	FDS	0.9	10.0
128	Fastenal Co.	FAST	2.6	8.5

129	Federal Rlty. Inv. Trust	FRT	4.2	
130	FedEx Corp.	FDX	2.0	10.5
131	Fifth Third Bancorp	FITB	3.7	11.0
132	First Republic Bank	FRC	0.7	11.0
133	FirstEnergy Corp.	FE	4.2	7.5
134	FMC Corp.	FMC	2.1	11.0
135	Fortive Corp.	FTV	0.5	11.5
136	Fortune Brands Home	FBHS	1.7	10.5
137	Fox Corp. 'A'	FOXA	1.4	11.0
138	Franklin Resources	BEN	4.6	4.0
139	Gallagher (Arthur J.)	AJG	1.2	16.0
140	Garmin Ltd.	GRMN	2.7	8.0
141	Gen'l Dynamics	GD	2.3	8.5
142	Gen'l Mills	GIS	2.9	3.5
143	Genuine Parts	GPC	2.5	9.0
144	Gilead Sciences	GILD	4.7	13.5
145	Global Payments	GPN	0.8	17.0
146	Globe Life Inc.	GL	0.8	8.5
147	Goldman Sachs	GS	3.1	5.0
148	Grainger (W.W.)	GWW	1.5	8.5
149	Hartford Fin'l Svcs.	HIG	2.4	8.5
150	Hasbro Inc.	HAS	3.4	9.0
151	HCA Healthcare	HCA	1.3	11.0
152	Healthpeak Properties	PEAK	4.6	17.0
153	Henry (Jack) & Assoc.	JKHY	1.0	9.0
154	Hershey Co.	HSY	1.7	7.0
155	Hess Corp.	HES	1.4	
156	Hewlett Packard Ent.	HPE	3.5	7.5
157	Home Depot	HD	2.6	9.0
158	Honeywell Int'l	HON	2.2	11.0
159	Hormel Foods	HRL	2.2	8.0
160	Horton D.R.	DHI	1.3	13.0
161	Howmet Aerospace	HWM	0.2	17.0
162	HP Inc.	HPQ	3.0	12.5
163	Humana Inc.	HUM	0.7	10.5
164	Hunt (J.B.)	JBHT	0.9	11.5
165	Huntington Bancshs.	HBAN	4.9	12.5
166	Huntington Ingalls	HII	2.3	10.0
167	IDEX Corp.	IEX	1.3	10.5
168	Illinois Tool Works	ITW	2.6	11.0
169	Ingersoll Rand Inc.	IR	0.2	
170	Int'l Business Mach.	IBM	5.1	3.0
171	Int'l Flavors & Frag.	IFF	2.6	7.5
172	Int'l Paper	IP	4.3	12.5

173	Intel Corp.	INTC	3.6	2.5
174	Intercontinental Exch.	ICE	1.5	6.5
175	Interpublic Group	IPG	4.0	10.0
176	Intuit Inc.	INTU	0.6	17.5
177	Invesco Ltd.	IVZ	4.5	11.5
178	Iron Mountain	IRM	5.4	11.0
179	Jacobs Engineering	J	0.7	12.0
180	Johnson & Johnson	JNJ	2.6	8.0
181	Johnson Ctrls. Int'l plc	JCI	2.8	12.5
182	JPMorgan Chase	JPM	3.8	7.0
183	Juniper Networks	JNPR	2.9	9.0
184	Kellogg	K	3.4	3.5
185	Keurig Dr Pepper	KDP	2.2	12.0
186	KeyCorp	KEY	4.3	9.0
187	Kimberly-Clark	KMB	3.5	5.5
188	Kimco Realty	KIM	3.9	8.5
189	Kinder Morgan Inc.	KMI	6.4	19.0
190	Kraft Heinz Co.	KHC	4.2	3.0
191	Kroger Co.	KR	2.2	6.5
192	L3Harris Technologies	LHX	2.0	18.5
193	Laboratory Corp.	LH	1.2	1.5
194	Lam Research	LRCX	1.3	17.0
195	Lamb Weston Holdings	LW	1.3	5.0
196	Lauder (Estee)	EL	1.0	14.0
197	Leidos Hldgs.	LDOS	1.4	9.0
198	Lennar Corp.	LEN	2.0	9.0
199	Lilly (Eli)	LLY	1.2	11.5
200	Lincoln Nat'l Corp.	LNC	3.7	11.5
201	Linde plc	LIN	1.7	12.0
202	LKQ Corp.	LKQ	1.9	11.0
203	Lockheed Martin	LMT	2.9	7.0
204	Loews Corp.	L	0.4	16.0
205	Lowe's Cos.	LOW	2.2	12.5
206	Lumen Technologies	LUMN	9.1	1.5
207	LyondellBasell Inds.	LYB	5.3	3.5
208	M&T Bank Corp.	MTB	3.0	8.0
209	Marathon Petroleum	MPC	2.6	
210	MarketAxess Holdings	MKTX	1.0	10.5
211	Marsh & McLennan	MMC	1.5	11.5
212	Martin Marietta	MLM	0.8	5.5
213	Masco Corp.	MAS	2.1	8.5
214	MasterCard Inc.	MA	0.6	13.5
215	McCormick & Co.	MKC	1.8	6.0
216	McDonald's Corp.	MCD	2.2	10.5

217	McKesson Corp.	MCK	0.6	11.5
218	Medtronic plc	MDT	3.0	8.0
219	Merck & Co.	MRK	3.1	8.0
220	MetLife Inc.	MET	3.3	5.0
221	Microchip Technology	MCHP	1.7	10.0
222	Microsoft Corp.	MSFT	1.0	16.5
223	Mid-America Apt.	MAA	2.9	
224	Mondelez Int'l	MDLZ	2.3	8.0
225	Moody's Corp.	MCO	1.0	8.0
226	Morgan Stanley	MS	3.8	9.0
227	Motorola Solutions	MSI	1.5	8.0
228	MSCI Inc.	MSCI	1.0	14.5
229	Nasdaq Inc.	NDAQ	1.4	6.0
230	NetApp Inc.	NTAP	3.0	8.0
231	Newell Brands	NWL	4.6	
232	Newmont Corp.	NEM	4.2	9.5
233	News Corp. 'A'	NWSA	1.2	
234	NextEra Energy	NEE	2.2	12.5
235	NiSource Inc.	NI	3.3	9.5
236	Nordson Corp.	NDSN	1.0	12.0
237	Norfolk Southern	NSC	2.1	10.5
238	Northern Trust Corp.	NTRS	2.9	8.0
239	Northrop Grumman	NOC	1.5	6.5
240	NortonLifeLock Inc.	NLOK	2.0	9.5
241	NRG Energy	NRG	3.9	-10.5
242	Nucor Corp.	NUE	1.7	-0.5
243	NXP Semi. NV	NXPI	1.9	12.0
244	Occidental Petroleum	OXY	0.9	
245	Old Dominion Freight	ODFL	0.4	10.5
246	Omnicom Group	OMC	4.1	6.5
247	ONEOK Inc.	OKE	6.4	11.5
248	Oracle Corp.	ORCL	1.8	9.0
249	Otis Worldwide	OTIS	1.6	
250	PACCAR Inc.	PCAR	3.4	9.5
251	Packaging Corp.	PKG	3.6	11.0
252	Paramount Global	PARA	3.7	7.5
253	Parker-Hannifin	PH	2.0	13.5
254	Paychex Inc.	PAYX	2.6	9.5
255	Pentair plc	PNR	1.7	12.5
256	PepsiCo Inc.	PEP	2.6	6.0
257	PerkinElmer Inc.	PKI	0.2	5.0
258	Pfizer Inc.	PFE	3.1	6.5
259	Philip Morris Int'l	PM	5.6	5.0
260	Pinnacle West Capital	PNW	5.0	0.5

261	PNC Financial Serv.	PNC	3.7	12.0
262	Pool Corp.	POOL	1.0	14.0
263	PPG Inds.	PPG	2.0	4.0
264	PPL Corp.	PPL	3.5	-0.5
265	Price (T. Rowe) Group	TROW	4.1	8.0
266	Principal Fin'l Group	PFG	4.0	6.5
267	Procter & Gamble	PG	2.6	6.5
268	Progressive Corp.	PGR	0.4	6.5
269	Prologis	PLD	2.6	6.0
270	Prudential Fin'l	PRU	5.0	5.0
271	Public Serv. Enterprise	PEG	3.7	4.0
272	Public Storage	PSA	2.6	8.0
273	PulteGroup Inc.	PHM	1.4	11.0
274	PVH Corp.	PVH	0.2	13.5
275	Qualcomm Inc.	QCOM	2.0	19.0
276	Quanta Services	PWR	0.2	16.0
277	Quest Diagnostics	DGX	2.0	3.5
278	Ralph Lauren	RL	3.1	12.5
279	Raymond James Fin'l	RJF	1.4	14.5
280	Raytheon Technologies	RTX	2.3	7.0
281	Realty Income Corp.	O	4.3	6.0
282	Regency Centers Corp.	REG	4.0	12.5
283	Regions Financial	RF	3.7	10.0
284	Republic Services	RSG	1.4	12.5
285	ResMed Inc.	RMD	0.7	13.5
286	Robert Half Int'l	RHI	2.1	10.5
287	Rockwell Automation	ROK	2.1	9.5
288	Rollins Inc.	ROL	1.1	9.5
289	Roper Tech.	ROP	0.6	3.5
290	Ross Stores	ROST	1.6	13.5
291	S&P Global	SPGI	0.9	12.5
292	Schwab (Charles)	SCHW	1.3	9.0
293	Seagate Technology plc	STX	3.4	15.0
294	Sealed Air	SEE	1.4	10.0
295	Sempra Energy	SRE	3.1	7.5
296	Sherwin-Williams	SHW	1.0	11.5
297	Simon Property Group	SPG	6.8	3.0
298	Skyworks Solutions	SWKS	2.1	14.5
299	Smith (A.O.)	AOS	1.9	11.5
300	Smucker (J.M.)	SJM	3.2	4.0
301	Snap-on Inc.	SNA	3.0	-16.0
302	Southern Co.	SO	3.8	6.5
303	Stanley Black & Decker	SWK	2.9	8.5
304	Starbucks Corp.	SBUX	2.5	16.5

305	State Street Corp.	STT	3.6	9.5
306	STERIS plc	STE	0.8	11.5
307	Stryker Corp.	SYK	1.4	8.5
308	Synchrony Financial	SYF	2.6	6.0
309	Sysco Corp.	SYY	2.2	16.5
310	Tapestry Inc.	TPR	3.0	15.0
311	Target Corp.	TGT	2.8	12.0
312	TE Connectivity	TEL	1.8	10.5
313	Teleflex Inc.	TFX	0.5	10.0
314	Teradyne Inc.	TER	0.4	9.0
315	Texas Instruments	TXN	2.8	9.0
316	Textron Inc.	TXT	0.1	10.5
317	Thermo Fisher Sci.	TMO	0.2	10.0
318	TJX Companies	TJX	1.9	17.0
319	Tractor Supply	TSCO	1.9	12.5
320	Trane Technologies plc	TT	2.0	
321	Travelers Cos.	TRV	2.4	6.5
322	Truist Fin'l	TFC	4.1	6.5
323	Tyson Foods 'A'	TSN	2.2	4.5
324	U.S. Bancorp	USB	4.3	6.0
325	UDR Inc.	UDR	3.4	10.5
326	Union Pacific	UNP	2.4	9.5
327	United Parcel Serv.	UPS	3.3	11.0
328	UnitedHealth Group	UNH	1.3	12.0
329	Universal Health `B'	UHS	0.7	9.0
330	V.F. Corp.	VFC	4.2	11.0
331	Valero Energy	VLO	3.6	12.5
332	Ventas Inc.	VTR	3.8	10.5
333	Verisk Analytics	VRSK	0.7	13.5
334	Verizon Communic.	VZ	5.3	3.0
335	VICI Properties	VICI	4.4	8.5
336	Visa Inc.	V	0.8	13.5
337	Vornado R'lty Trust	VNO	7.1	-20.5
338	Vulcan Materials	VMC	1.0	8.5
339	Wabtec Corp.	WAB	0.7	9.5
340	Walgreens Boots	WBA	4.9	5.0
341	Walmart Inc.	WMT	1.7	7.5
342	Waste Management	WM	1.7	8.0
343	WEC Energy Group	WEC	3.1	6.0
344	Wells Fargo	WFC	2.5	11.5
345	Welltower Inc.	WELL	3.1	3.5
346	West Pharmac. Svcs.	WST	0.2	17.0
347	WestRock Co.	WRK	2.4	20.0
348	Weyerhaeuser Co.	WY	2.0	8.0

349	Whirlpool Corp.	WHR	4.2	7.0
350	Williams Cos.	WMB	5.2	8.5
351	Willis Towers Wat. plc	WTW	1.6	8.0
352	Xcel Energy Inc.	XEL	3.0	6.0
353	Xylem Inc.	XYL	1.5	9.0
354	Yum! Brands	YUM	1.9	10.5
355	Zimmer Biomet Hldgs.	ZBH	0.9	5.5
356	Zions Bancorp.	ZION	3.0	8.0
357	Zoetis Inc.	ZTS	0.7	11.0
	AVERAGE		**2.4**	**9.1**

Source: Value Line Investment Survey 11/2022

ELECTRIC UTILITIES CAPM AND ECAPM RESULTS

Line No.	Company Name	Risk-Free Rate (1)	Beta (2)	MRP (3)	CAPM Cost of Equity (4)	Flotation Cost (5)	CAPM ROE (6)	ECAPM Cost of Equity (7)	Flotation Cost **(8)** **0**	ECAPM ROE (9)
1	Alliant Energy	4.30%	0.85	7.30%	10.51%	0.20%	10.71%	10.78%	0.20%	10.98%
2	Amer. Elec. Power	4.30%	0.75	7.30%	9.78%	0.20%	9.98%	10.23%	0.20%	10.43%
3	Ameren Corp.	4.30%	0.85	7.30%	10.51%	0.20%	10.71%	10.78%	0.20%	10.98%
4	Avista Corp.	4.30%	0.90	7.30%	10.87%	0.20%	11.07%	11.05%	0.20%	11.25%
5	Black Hills	4.30%	0.95	7.30%	11.24%	0.20%	11.44%	11.33%	0.20%	11.53%
6	CenterPoint Energy	4.30%	1.15	7.30%	12.70%	0.20%	12.90%	12.42%	0.20%	12.62%
7	CMS Energy Corp.	4.30%	0.80	7.30%	10.14%	0.20%	10.34%	10.51%	0.20%	10.71%
8	Dominion Energy	4.30%	0.85	7.30%	10.51%	0.20%	10.71%	10.78%	0.20%	10.98%
9	DTE Energy	4.30%	0.95	7.30%	11.24%	0.20%	11.44%	11.33%	0.20%	11.53%
10	Edison Int'l	4.30%	0.95	7.30%	11.24%	0.20%	11.44%	11.33%	0.20%	11.53%
11	Entergy Corp.	4.30%	0.95	7.30%	11.24%	0.20%	11.44%	11.33%	0.20%	11.53%
12	Evergy Inc.	4.30%	0.90	7.30%	10.87%	0.20%	11.07%	11.05%	0.20%	11.25%
13	Eversource Energy	4.30%	0.90	7.30%	10.87%	0.20%	11.07%	11.05%	0.20%	11.25%
14	FirstEnergy Corp.	4.30%	0.85	7.30%	10.51%	0.20%	10.71%	10.78%	0.20%	10.98%
15	IDACORP Inc.	4.30%	0.80	7.30%	10.14%	0.20%	10.34%	10.51%	0.20%	10.71%
16	NorthWestern Corp.	4.30%	0.90	7.30%	10.87%	0.20%	11.07%	11.05%	0.20%	11.25%
17	OGE Energy	4.30%	1.05	7.30%	11.97%	0.20%	12.17%	11.87%	0.20%	12.07%
18	Otter Tail Corp.	4.30%	0.85	7.30%	10.51%	0.20%	10.71%	10.78%	0.20%	10.98%
19	Portland General	4.30%	0.85	7.30%	10.51%	0.20%	10.71%	10.78%	0.20%	10.98%
20	Sempra Energy	4.30%	0.95	7.30%	11.24%	0.20%	11.44%	11.33%	0.20%	11.53%
21	Southern Co.	4.30%	0.95	7.30%	11.24%	0.20%	11.44%	11.33%	0.20%	11.53%
22	WEC Energy Group	4.30%	0.80	7.30%	10.14%	0.20%	10.34%	10.51%	0.20%	10.71%
23	Xcel Energy Inc.	4.30%	0.80	7.30%	10.14%	0.20%	10.34%	10.51%	0.20%	10.71%
26	**AVERAGE**						**11.02%**			**11.22%**

Notes: Column (1): Risk-free rate
Column (2): see Exhibit RAM-5
Column (3): Market Risk Premium
Column (4): Column (1) + Column (2) x Column (3)
Column (5): Flotation cost allowance
Column (6): Column (4) + Column (5)
Column (7): Column (1) + 0.25 x Column (3) + 0.75 x Column (2) x Column (3) + Column (8)

IPL Exhibit Morin Direct, Schedule H

2021 Utility Industry Historical Risk Premium

Line No	Year	(1) Long-Term Government Bond Yield	(2) Long-Term Government Income Component Bond Yield	(3) 20 year Maturity Bond Value	(4) Gain/Loss	(5) Interest	(6) Bond Total Return	(7) S&P Utility Index Return	(8) Utility Equity Risk Premium Over Bond Returns	(9) Utility Equity Risk Premium Over Bond Return Income Component
1	1931	4 07%	3 33%	1,000 00						
2	1932	3 15%	3 69%	1,135 75	135 75	40 70	17 64%	-0 54%	-18 18%	-4 23%
3	1933	3 36%	3 12%	969 60	-30 40	31 50	0 11%	-21 87%	-21 98%	-24 99%
4	1934	2 93%	3 18%	1,064 73	64 73	33 60	9 83%	-20 41%	-30 24%	-23 59%
5	1935	2 76%	2 81%	1,025 99	25 99	29 30	5 53%	76 63%	71 10%	73 82%
6	1936	2 56%	2 77%	1,031 15	31 15	27 60	5 88%	20 69%	14 81%	17 92%
7	1937	2 73%	2 66%	973 93	-26 07	25 60	-0 05%	-37 04%	-36 99%	-39 70%
8	1938	2 52%	2 64%	1,032 83	32 83	27 30	6 01%	22 45%	16 44%	19 81%
9	1939	2 26%	2 40%	1,041 65	41 65	25 20	6 68%	11 26%	4 58%	8 86%
10	1940	1 94%	2 23%	1,052 84	52 84	22 60	7 54%	-17 15%	-24 69%	-19 38%
11	1941	2 04%	1 94%	983 64	-16 36	19 40	0 30%	-31 57%	-31 87%	-33 51%
12	1942	2 46%	2 46%	933 97	-66 03	20 40	-4 56%	15 39%	19 95%	12 93%
13	1943	2 48%	2 44%	996 86	-3 14	24 60	2 15%	46 07%	43 92%	43 63%
14	1944	2 46%	2 46%	1,003 14	3 14	24 80	2 79%	18 03%	15 24%	15 57%
15	1945	1 99%	2 34%	1,077 23	77 23	24 60	10 18%	53 33%	43 15%	50 99%
16	1946	2 12%	2 04%	978 90	-21 10	19 90	-0 12%	1 26%	1 38%	-0 78%
17	1947	2 43%	2 13%	951 13	-48 87	21 20	-2 77%	-13 16%	-10 39%	-15 29%
18	1948	2 37%	2 40%	1,009 51	9 51	24 30	3 38%	4 01%	0 63%	1 61%
19	1949	2 09%	2 25%	1,045 58	45 58	23 70	6 93%	31 39%	24 46%	29 14%
20	1950	2 24%	2 12%	975 93	-24 07	20 90	-0 32%	3 25%	3 57%	1 13%
21	1951	2 69%	2 38%	930 75	-69 25	22 40	-4 69%	18 63%	23 32%	16 25%
22	1952	2 79%	2 66%	984 75	-15 25	26 90	1 17%	19 25%	18 08%	16 59%
23	1953	2 74%	2 84%	1,007 66	7 66	27 90	3 56%	7 85%	4 29%	5 01%
24	1954	2 72%	2 79%	1,003 07	3 07	27 40	3 05%	24 72%	21 67%	21 93%
25	1955	2 95%	2 75%	965 44	-34 56	27 20	-0 74%	11 26%	12 00%	8 51%
26	1956	3 45%	2 99%	928 19	-71 81	29 50	-4 23%	5 06%	9 29%	2 07%
27	1957	3 23%	3 44%	1,032 23	32 23	34 50	6 67%	6 36%	-0 31%	2 92%
28	1958	3 82%	3 27%	918 01	-81 99	32 30	-4 97%	40 70%	45 67%	37 43%
29	1959	4 47%	4 01%	914 65	-85 35	38 20	-4 71%	7 49%	12 20%	3 48%
30	1960	3 80%	4 26%	1,093 27	93 27	44 70	13 80%	20 26%	6 46%	16 00%
31	1961	4 15%	3 83%	952 75	-47 25	38 00	-0 92%	29 33%	30 25%	25 50%
32	1962	3 95%	4 00%	1,027 48	27 48	41 50	6 90%	-2 44%	-9 34%	-6 44%
33	1963	4 17%	3 89%	970 35	-29 65	39 50	0 99%	12 36%	11 37%	8 47%
34	1964	4 23%	4 15%	991 96	-8 04	41 70	3 37%	15 91%	12 54%	11 76%
35	1965	4 50%	4 19%	964 64	-35 36	42 30	0 69%	4 67%	3 98%	0 48%
36	1966	4 55%	4 49%	993 48	-6 52	45 00	3 85%	-4 48%	-8 33%	-8 97%

IPL Exhibit Morin Direct, Schedule H

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		Long-Term	Long-Term	20 year				S&P	Utility Equity	Utility Equity
37	1967	5 56%	4 59%	879 01	-120 99	45 50	-7 55%	-0 63%	6 92%	-5 22%
38	1968	5 98%	5 50%	951 38	-48 62	55 60	0 70%	10 32%	9 62%	4 82%
39	1969	6 87%	5 96%	904 00	-96 00	59 80	-3 62%	-15 42%	-11 80%	-21 38%
40	1970	6 48%	6 74%	1,043 38	43 38	68 70	11 21%	16 56%	5 35%	9 82%
41	1971	5 97%	6 32%	1,059 09	59 09	64 80	12 39%	2 41%	-9 98%	-3 91%
42	1972	5 99%	5 87%	997 69	-2 31	59 70	5 74%	8 15%	2 41%	2 28%
43	1973	7 26%	6 51%	867 09	-132 91	59 90	-7 30%	-18 07%	-10 77%	-24 58%
44	1974	7 60%	7 27%	965 33	-34 67	72 60	3 79%	-21 55%	-25 34%	-28 82%
45	1975	8 05%	7 99%	955 63	-44 37	76 00	3 16%	44 49%	41 33%	36 50%
46	1976	7 21%	7 89%	1,088 25	88 25	80 50	16 87%	31 81%	14 94%	23 92%
47	1977	8 03%	7 14%	919 03	-80 97	72 10	-0 89%	8 64%	9 53%	1 50%
48	1978	8 98%	7 90%	912 47	-87 53	80 30	-0 72%	-3 71%	-2 99%	-11 61%
49	1979	10 12%	8 86%	902 99	-97 01	89 80	-0 72%	13 58%	14 30%	4 72%
50	1980	11 99%	9 97%	859 23	-140 77	101 20	-3 96%	15 08%	19 04%	5 11%
51	1981	13 34%	11 55%	906 45	-93 55	119 90	2 63%	11 74%	9 11%	0 19%
52	1982	10 95%	13 50%	1,192 38	192 38	133 40	32 58%	26 52%	-6 06%	13 02%
53	1983	11 97%	10 38%	923 12	-76 88	109 50	3 26%	20 01%	16 75%	9 63%
54	1984	11 70%	11 74%	1,020 70	20 70	119 70	14 04%	26 04%	12 00%	14 30%
55	1985	9 56%	11 25%	1,189 27	189 27	117 00	30 63%	33 05%	2 42%	21 80%
56	1986	7 89%	8 98%	1,166 63	166 63	95 60	26 22%	28 53%	2 31%	19 55%
57	1987	9 20%	7 92%	881 17	-118 83	78 90	-3 99%	-2 92%	1 07%	-10 84%
58	1988	9 19%	8 97%	1,000 91	0 91	92 00	9 29%	18 27%	8 98%	9 30%
59	1989	8 16%	8 81%	1,100 73	100 73	91 90	19 26%	47 80%	28 54%	38 99%
60	1990	8 44%	8 19%	973 17	-26 83	81 60	5 48%	-2 57%	-8 05%	-10 76%
61	1991	7 30%	8 22%	1,118 94	118 94	84 40	20 33%	14 61%	-5 72%	6 39%
62	1992	7 26%	7 26%	1,004 19	4 19	73 00	7 72%	8 10%	0 38%	0 84%
63	1993	6 54%	7 17%	1,079 70	79 70	72 60	15 23%	14 41%	-0 82%	7 24%
64	1994	7 99%	6 59%	856 40	-143 60	65 40	-7 82%	-7 94%	-0 12%	-14 53%
65	1995	6 03%	7 60%	1,225 98	225 98	79 90	30 59%	42 15%	11 56%	34 55%
66	1996	6 73%	6 18%	923 67	-76 33	60 30	-1 60%	3 14%	4 74%	-3 04%
67	1997	6 02%	6 64%	1,081 92	81 92	67 30	14 92%	24 69%	9 77%	18 05%
68	1998	5 42%	5 83%	1,072 71	72 71	60 20	13 29%	14 82%	1 53%	8 99%
69	1999	6 82%	5 57%	848 41	-151 59	54 20	-9 74%	-8 85%	0 89%	-14 42%
70	2000	5 58%	6 50%	1,148 30	148 30	68 20	21 65%	59 70%	38 05%	53 20%
71	2001	5 75%	5 53%	979 95	-20 05	55 80	3 57%	-30 41%	-33 98%	-35 94%
72	2002	4 84%	5 59%	1,115 77	115 77	57 50	17 33%	-30 04%	-47 37%	-35 63%
73	2003	5 11%	4 80%	966 42	-33 58	48 40	1 48%	26 11%	24 63%	21 31%
74	2004	4 84%	5 02%	1,034 35	34 35	51 10	8 54%	24 22%	15 68%	19 20%
75	2005	4 61%	4 69%	1,029 84	29 84	48 40	7 82%	16 79%	8 97%	12 10%
76	2006	4 91%	4 68%	962 06	-37 94	46 10	0 82%	20 95%	20 13%	16 27%
77	2007	4 50%	4 86%	1,053 70	53 70	49 10	10 28%	19 36%	9 08%	14 50%
78	2008	3 03%	4 45%	1,219 28	219 28	45 00	26 43%	-28 99%	-55 42%	-33 44%
79	2009	4 58%	3 47%	798 39	-201 61	30 30	-17 13%	11 94%	29 07%	8 47%

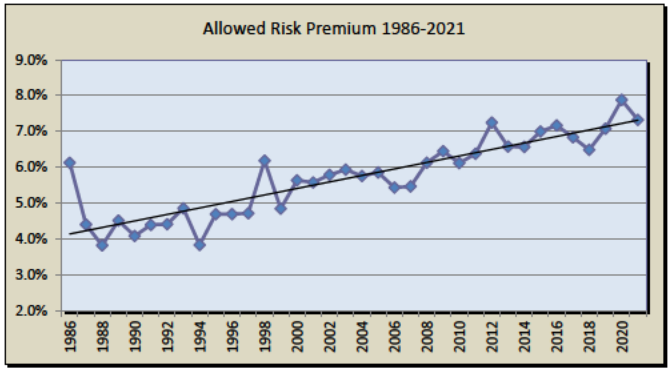
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		Long-Term	Long-Term	20 year				S&P	Utility Equity	Utility Equity
80	2010	4 14%	4 25%	1,059 45	59 45	45 80	10 52%	5 49%	-5 03%	1 24%
81	2011	2 55%	3 82%	1,247 89	247 89	41 40	28 93%	19 88%	-9 05%	16 06%
82	2012	2 46%	2 46%	1,014 15	14 15	25 50	3 96%	1 29%	-2 67%	-1 17%
83	2013	3 78%	2 88%	815 92	-184 08	24 60	-15 95%	13 26%	29 21%	10 38%
84	2014	2 46%	3 41%	1,207 53	207 53	37 80	24 53%	28 61%	4 08%	25 20%
85	2015	2 68%	2 47%	966 11	-33 89	24 60	-0 93%	1 38%	2 31%	-1 09%
86	2016	2 72%	2 30%	993 86	-6 14	26 80	2 07%	16 27%	14 20%	13 97%
87	2017	2 54%	2 67%	1,028 09	28 09	27 20	5 53%	12 11%	6 58%	9 44%
88	2018	2 84%	2 82%	954 46	-45 54	25 40	-2 01%	4 11%	6 12%	1 29%
89	2019	2 25%	2 55%	1,094 60	94 60	28 40	12 30%	31 48%	19 18%	28 93%
90	2020	1 37%	1 53%	1,153 49	153 49	22 50	17 60%	0 05%	-17 55%	-1 48%
91	2021	1 88%	1 73%	915 31	-84 69	13 70	-7 10%	4 20%	11 30%	2 47%
93	**Mean**								**5.5%**	**6.3%**

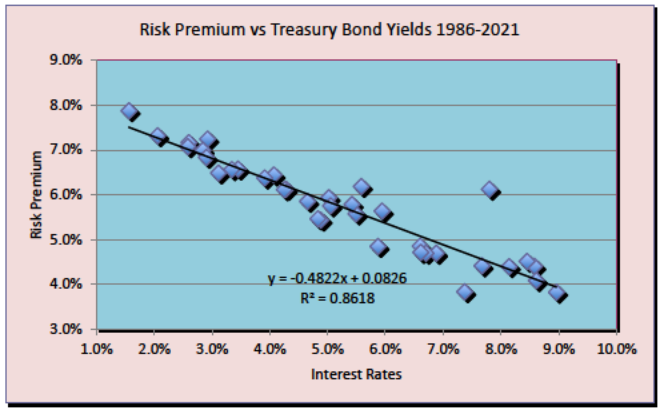
95 Source: Bloomberg Web site: Standard & Poors Utility Stock Index % Annual Change, Jan to Dec
96 Long-Term Government Bond yield data from Duff & Phelps 2022 Valuation Yearbook Appendices A7 and A9

ALLOWED RISK PREMIUM ANALYSIS

Line	Date	Treasury Bond Yield[1]	Authorized Electric Returns[2]	Indicated Risk Premium
		(1)	(2)	(3)
1	1986	7 80%	13 93%	6 1%
2	1987	8 58%	12 99%	4 4%
3	1988	8 96%	12 79%	3 8%
4	1989	8 45%	12 97%	4 5%
5	1990	8 61%	12 70%	4 1%
6	1991	8 14%	12 54%	4 4%
7	1992	7 67%	12 09%	4 4%
8	1993	6 60%	11 46%	4 9%
9	1994	7 37%	11 21%	3 8%
10	1995	6 88%	11 58%	4 7%
11	1996	6 70%	11 40%	4 7%
12	1997	6 61%	11 33%	4 7%
13	1998	5 58%	11 77%	6 2%
14	1999	5 87%	10 72%	4 9%
15	2000	5 94%	11 58%	5 6%
16	2001	5 49%	11 07%	5 6%
17	2002	5 42%	11 21%	5 8%
18	2003	5 02%	10 96%	5 9%
19	2004	5 05%	10 81%	5 8%
20	2005	4 65%	10 51%	5 9%
21	2006	4 88%	10 32%	5 4%
22	2007	4 83%	10 30%	5 5%
23	2008	4 28%	10 41%	6 1%
24	2009	4 07%	10 52%	6 5%
25	2010	4 25%	10 37%	6 1%
26	2011	3 91%	10 29%	6 4%
27	2012	2 92%	10 17%	7 3%
28	2013	3 45%	10 03%	6 6%
29	2014	3 34%	9 91%	6 6%
30	2015	2 84%	9 84%	7 0%
31	2016	2 60%	9 77%	7 2%
32	2017	2 90%	9 74%	6 8%
33	2018	3 11%	9 60%	6 5%
34	2019	2 58%	9 66%	7 1%
35	2020	1 56%	9 44%	7 9%
36	2021	2 06%	9 38%	7 3%
	Average	**5.25%**	**10.98%**	**5.73%**

Sources:
1 Fed Reserve Board of Governors H 15 Release, 30-Yr Treasury rate
2 S&P Global Intelligence (Regulatory Research Associates)
Major Rate Case Decisions 1986-2021





IF YIELD =	4 3%
THEN RP =	6 2%
Ke =	10 5%