

August 14, 2006

Board Secretary
Ontario Energy Board
2300 Yonge Street
Suite 2700
Toronto, ON M4P 1E4

Via email to BoardSec@oeb.gov.on.ca and by courier

Dear Board Secretary:

Re: Expert Report and comments on the OEB Staff Discussion Paper: Cost of Capital and 2nd Generation Incentive Regulation for Ontario's Electricity Distributors: file numbers EB-2006-0088 (Cost of Capital) and EB-2006-0089 (2nd Generation IRM)

The Electricity Distributors Association ("EDA") is the voice of Ontario's electricity distributors. Enclosed is an expert report, inclusive of the EDA's comments on the OEB Staff Discussion Paper, prepared for the EDA by Christensen Associates Energy Consulting in response to the Board's invitation to interested parties to make their submissions on the determination of Cost of Capital and 2nd Generation Incentive Regulation for Ontario's Electricity Distributors.

Please direct any questions or comments to Guru Kalyanraman at 905.265.5334 or at gkalyanraman@eda-on.ca.

Yours truly,



C.C. (Charlie) Macaluso
President and Chief Executive Officer

Encl.

REPORT

**RATE OF RETURN FOR
ONTARIO'S ELECTRICITY DISTRIBUTORS**

for the consideration of:
ONTARIO ENERGY BOARD

developed by:
Robert J. Camfield
Mathew J. Morey
Michael Welsh
CHRISTENSEN ASSOCIATES ENERGY CONSULTING, LLC

submitted on behalf of:
ELECTRICITY DISTRIBUTORS ASSOCIATION

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Executive Summary

This report presents analysis and recommendations of Christensen Associates Energy Consulting regarding the cost of capital of Ontario's electricity distributors. The purpose of the report is to provide guidance to the Ontario Energy Board ("Board"), Board staff, and other interested parties in the deliberation of regulatory policy related to the determination of the cost of capital.

The Board Staff's proposed approach to determining the overall cost of capital for Ontario LDCs is a "one-size-fits-all" method based on two assumptions: there are no significant distinctions that can be made among the LDCs (nearly 100 in number) for purposes of determining and accounting for risk and hence capital costs and the risk profiles of LDCs is similar to that of the gas distributors with which the Board Staff has a strong familiarity.

The Staff Report and the consultant's (Lazar and Prisman's) discussion paper do not provide an evidentiary review and assessment of the financial and economic issues at hand, where such factors impact LDCs regulated lines of business. Furthermore, the Staff Report does not provide the necessary detailed assessment of business risks faced by LDCs within the contemporary timeframe nor does it provide an evidentiary link between the LDCs and gas distributors in Ontario to support the claim that LDCs can be treated in similar fashion with regard to debt structure. The Staff's Report (two reports) and supporting consultant papers do not provide sufficient empirical support for the proposed approach to the estimation of the cost of capital or the proposed reductions in the rate of return for Ontario LDCs.

Our analysis suggests that there is wide variability among electric distributors in Ontario that can be related to the perceived riskiness of LDCs and thus to the cost of equity and debt capital. An assessment of the various risk factors for electric distributors implies that the electric distribution industry as a whole within the current regulatory environment in Ontario is no less risky than it was in 2000 or 2003 when overall rates of return were set for the interim period, and in fact could be considered more risky.

To overcome the problems inherent in a “one-size-fits-all” approach, we propose a more flexible approach to estimating the overall cost of capital by introducing flexibility into determination of the capital structure, and determination of the rate of return on equity (ROE). In particular, setting the ROE would rely on a composite estimate based on several methods in light of the fact that there is no method that is without limitations. We find that a more flexible approach would better serve the Board and Ontario distributors and provide an improved foundation for determining the costs of equity capital and weighted average cost of capital. A major concern is simply that, prospectively, Ontario distributors will have an increasingly difficult time to realize a fair level of return on investment.

Our recommendations for the components of the cost of capital are summarized through Table 1. For purposes of comparison, Table 1 also presents the results of the Staff’s update using the Cannon method and the recommendations based on the Staff’s consultant.

Table 1 Summary and Comparison of Recommendations for Cost of Capital Estimation for Ontario LDCs

	Staff Update Using Cannon Method (Dec 2005)	Lazar & Prisman	Christensen Associates Energy Consulting
Risk Profiles (Rate Base ranges) Equity %	Same	>\$299 million – max 40% <\$300 million – max 50%	min 42% max 52%
Riskless Rate	Avg. Consensus forecasts for 30 year Canadas – 4.45%	Avg of 5,10,15 year forward zero coupon Canadas – 5.01%	Yields on 10-year debt, as observed at or near the time that rates are set
Short-term Debt Mix	Not specified.	Could use ST debt for WACC, up to maximum)	Use S-T debt in WACC. No limits on amount
Rate on Long-term Debt	>\$1.0 Bill. – 5.15% \$250-\$999 Mill.– 5.25% \$100-\$249 Mill. – 5.35% <\$100 Mill. – 5.6%	Riskless rate plus avg spread of A/BBB corp bonds over Canadian rates – about 6.01%	Observed debt rate at the time that debt was issued, providing that it approximates competitive rates at the time of issuance
Preferred Shares	No recommendation	No recommendation	No recommendation
Riskless Rate	As for debt	As for debt	As for debt
Historical Market ERP		S&P 5 year - 7.17% S&P 10-year - 10.06%	Relevant to CAPM and Risk Premium; use current levels if they approximate the long term experience
Determination of ERP for CAPM		TSX proxy co.s '04, '05 Post-tax Beta 0.357	U.S. and CA proxy co's '04/'05 Analysis; Beta 0.75
ERP based on DCF			U.S. proxy co's 9.8%
ERP based on Risk Premium			U.S. proxy co's , small-cap; 12.2%
Transaction Adjustment	Board decision 0.5%	None	Board decision 0.5%
Net ROE	4.45+0.1+3.8=8.36%	Range 5.78% to 7.02%	Range 9.8% to 12.2%
Update Mechanism	Formula based	Annual formula-based over 5 years or expert panel	Panel of experts

1 Introduction

This report presents analysis and recommendations of Christensen Associates Energy Consulting regarding the cost of capital of Ontario’s electricity distributors. The purpose of the report is to provide guidance to the Ontario Energy Board (“Board”), Board staff, and other interested parties in the deliberation of regulatory policy related to cost of capital.

The report does not, however, focus on regulatory governance structure, policy, or methods. Nonetheless, the underlying cost of capital of Ontario’s electricity distributors is impacted directly by the structure of regulatory governance to the degree that such structure affects capital risks. As a consequence, regulatory governance cannot be fully separated from cost of capital and, generally speaking, we suggest that the Board, in the course of its deliberation of policy regarding the two issues, consider them jointly.

The report is organized as follows. Chapter 2 provides a discussion of principles and concepts on cost of capital estimation as they have come to be accepted with regard to financial analysis relevant to the regulated utility industry. Chapter 3 reviews the various methods of estimating the cost of equity capital that have been employed widely by regulators in North America and elsewhere, which includes a critique of the Capital Asset Pricing Model (CAPM) approach to estimating the equity cost of capital. Chapter 4 presents the summary of the financial characteristics of the LDCs. Chapter 5 summarizes the empirical analysis of and estimation of the equity cost of capital applying the methods described in Chapter 3. Chapter 6 summarizes overall recommendations to the Board regarding the several elements of the cost of capital determination for Ontario LDCs. Chapter 7 concludes with a summary of our recommendations. Appendices contain additional details regarding the approaches to estimating the cost of equity capital and data used in the analysis.

2. Review of Cost of Capital Concepts

2.1. Foundations for Cost of Capital Determination

Capital as Utility Resource Inputs

Utilities and more generally companies and other entities use and employ a combination of skilled labour, materials and supplies, energy and fuels, and capital in the process of producing goods and providing services. While the costs of most inputs are expressed in money terms—e.g., dollars per unit of purchase such as hours (labour) or megawatt hours—the cost of capital is expressed as an interest rate, and returns to capital for utilities is typically reflected as dollars of operating income. The required level of operating income, when divided by the amount of capital employed, provides the percentage overall rate of return equal to the overall cost of capital.

Capital inputs used by all entities are obtained through the process of investment involving property rights between savers and entities that employ capital. To facilitate the commitment of capital by savers and their agents to various entities, contracts in the form of letters of credit with banks, bonds and promissory notes to debt holders, and shares of stock to equity investors are put in place. These contracts define the commercial terms and conditions under which savers and their agents, as investors, commit capital. The contracts are capital (financial) assets, and are generally tradable property rights. Financial assets held by investors are claims on the income of the firm after all expenses are paid, as compensation for the commitment of capital, and constitute the financial obligations of the firm. Shares of stock constitute ownership in the firm.

Factors Determining the Cost of Capital

The cost of capital is the compensation required by investors for postponing consumption, expected inflation, and exposure of capital to risks of various dimensions. *Cost of capital* refers to the underlying interest rate used to discount expected benefit flows of capital resources, including in particular cash flow returns to financial assets, and is sometimes referred to as the rate of discount, or simply the discount rate. The cost

of capital is relevant to investors and, in the case of financial assets,¹ the expected benefits are in the form of future cash flows including interest payments, dividend payments, market appreciation, and return of principle. When investors supply funds to entities such as utilities, private firm, or municipalities, not only are they postponing consumption—giving up the value of alternative expenditures in some other way, they are also exposing their funds to the devaluation of ongoing inflation, and various uncertainties and risk attending future cash flows. Investors are willing to incur these penalties only if they are adequately compensated.

While the market price of other inputs including labour, materials, energy can be easily verifiable, the cost of capital—i.e., essentially, the price of capital—is not easily discerned and, all too often, requires estimation through the cautious application of analytical methods.

The cost of capital is determined by the demand for capital, supply of savings, expectations of inflation, and perceptions of risks harbored by participants in capital markets. In short, the cost of capital is a function of demand, supply, expected inflation, and perceived risks. However, the cost of capital is still positive absent inflation and

¹ Financial assets include a multitude of debt vehicles, equity, and derivatives, and are tailored to participants of capital markets including household, small business, corporate, and government segments. Participants across these segments can supply capital—i.e., investors including lenders and holders of common and preferred stock—and also demand capital (borrowers and common stock issuing companies). Commercial banks, credit unions, finance companies, capital exchanges, and investment banks serve as intermediaries that provide the institutional means that facilitates the interaction and linkage of the supply and demand sides of financial markets. These functions essentially include lending, borrowing, and the issuance of equity vehicles. Banks and credit unions borrow (and store) financial assets that in turn are invested in the form of debt and to a lesser extent equity.

Household debt vehicles include, for example, personal loans covering appliances, household services, and credit card mechanisms through finance companies and banks, and real estate and so-called home equity mortgages. Business loads include short-term loans and lines of credit with banks, inventory financing through business wholesalers, and commercial paper of various terms. Corporate debt can be in the form of lines of credit with banks, and mortgage and debenture bonds, while government debt can be in the form of revenue bonds of cities, and short- and long-term debt of various terms.

Equity refers to common and preferred stock, where the investor assumes a share in the ownership of a corporate entity. In some cases, debt instruments can participate in equity returns and have rights of conversion to common stock.

Derivatives refers to options and forward contracts that are specifically designed for speculation and risk hedging, where the market worth of the derivative is determined by investor expectations in the underlying price of an financial asset or commodity.

risks, as savers require, as discussed above, compensation for foregoing (giving up) the right to use the funds saved for consumption of goods and services—essentially, the time value of money.

The demand for and supply of capital are determined by expectations of future levels of economic activity, while expected inflation is driven largely by monetary policy over the relevant timeframe. Perceptions of risk, in turn, cover many dimensions including uncertain government policy and the effects of natural phenomena such as weather. The cost of capital—the discount rate stated in nominal terms—increases with rising demand for capital, with expectations of higher rates of inflation, and with heightened perceptions of risk.

Dimensions of risk also cover individual, idiosyncratic risks associated with specific capital resources, such as that of individual entities or companies. Accordingly, financial markets will reprice downward the bonds of a private company, should the *current* financial condition of the company suddenly decline. Essentially, the decrease in the company's current condition, as reflected perhaps in terms of reduced interest coverage—causes the expectation of the future condition of the company to also decline.

Expectations of the financial condition of the specific company in the future constitute idiosyncratic risks. Because cost of capital rises with increased risks, the price of the bonds decline.²

Capital Attraction and Opportunity Costs

Resources migrate to the highest valued use and worth, given perceived risks, such that the returns to capital are equivalent to opportunity costs. The various forms of capital compete among themselves for savings and with other non-capital resource inputs and

² Bond prices and discount rates, in the form of net interest rates or bond yields move in opposite directions; bond yields increase as bond prices decline, and decrease as bond prices rise.

opportunities.³ Similarly, the vehicles of investment of individual entities, such as the specific bonds of a municipality or the common stock of a company, must compete for savings through a process of capital attraction. That is, if the outlook for earnings of a company rises, participants in capital markets—investors—allocate more capital to the company by bidding up the price of the stock thus increasing the company’s market capitalization. Conversely, perceptions of heightened risks associated with the debt of a company or municipality precipitates a decline in the market value of the outstanding bonds, as capital migrates from the company/municipality to other resource opportunities. Thus, the prices of financial assets of entities including debt and equity securities are highly sensitive to perceptions of risk. Capital markets trade off risks and expected returns, given the overall menu of available choices, as alternative opportunities.

The cost of a specific source of capital⁴ is basically determined by the riskiness of that investment in view of alternative opportunities that together constitute the investors’ current opportunity set. Competitive capital markets, through the process of assessing, buying, and selling, ensure that the expected payoff in the form of market rate of return is approximately equal to that of other investments of risk. In short, debt and equity investment vehicles of comparable risk are priced the same. If not, investors as participants in capital markets will bid up securities with comparatively low risks and bid down others with comparatively high risks. If investor perceptions of capital risks attending a utility increase—or the expectations for returns decline—markets bid down the securities of the utility. This implies that a utility will be unable to attract capital on

³ Capital is the accumulated savings over time, where savings refers to the proportion of the output of an economy that is not consumed as current goods and services. Essentially, savings is the share of output held back and invested in—i.e., put into—capital resources. In the broadest interpretation, capital is output-producing goods (and services). The cumulative level of investment over time, covering many years and centuries, constitutes the capital stock of an economy and a society. It is useful to mention that capital can assume various investment forms aside from financial assets in private and public companies and other entities. The stock of capital includes real estate, household goods, education, public property and infrastructure such as libraries, museums, parks, roads, and transit systems. Individuals, firms, and government entities invest funds in capital resources if the expected flows of benefits realized by the investments in the future are equal to or greater than the value of current consumption given up or foregone.

⁴ At an undefined point in time such that levels of supply and demand for capital and expectations of inflation are equivalent for all investments. Hence, cost of capital associated with specific investment opportunities, at that point in time, are only differentiated by risks, as the other factors that impact cost of capital—i.e., supply-demand, inflation expectations—are common to all investments.

equivalent terms, a result that is manifested in either of two ways: the quantity of capital acquired, in the form of new securities offerings, is reduced for a given level of return (stated in dollars), or a higher prospective rate of return attends the new offerings; it costs more to obtain an equivalent quantity of capital.

Within the context of a utility, as discussed above, investors return is the discount rate that causes the present value of the expected cash flows, as receipts realized by investors, to equal the market value of the financial asset. From the utility side, the cost of funds raised to the utility through the sale of securities is equal to the discounted present value of the cash outflows to be paid by the utility, as expected by investors. But since the (positive) cash flows stream to the investor is identical to the cash outflows of the utility, the two discount rates must be identical.⁵ In other words, the cost of capital to the utility is synonymous with the investor's expected rate of return. Hence, the cost of capital is the discounted expected cash flows necessary for the security to pay its price—i.e., in order to satisfy investors' required rate of return.

In summary, capital markets, when they are sufficiently competitive, ensure that the market value and worth of financial vehicles of the outstanding debt and equity—as held by the investment community, which can include households, financial institutions, government entities, and non-financial companies, is set (i.e., priced) at a level such that the returns to capital approximate the cost of capital. Competitive financial markets imply that differences in the risk of alternative investments cause the prices of the investments (financial vehicles in the form of securities) to carry different price levels, all other factors held constant.

2.2 Utility Revenues, Rate Base, Weighted Cost of Capital

Public utilities, such as Ontario distributors, utilize and employ substantial levels of capital resource inputs to provide delivery services. Total invested capital for purposes of setting regulated prices is often referred to as the rate base, and is valued at either original

⁵ This statement abstracts from the effects of flotation costs. Costs to the issuer exceed the return required by investors to the extent that flotation costs decrease the net amount of funds actually available to the issue.

cost or fair market value. In Canada and the U.S., the regulatory convention is to value the capital of public utilities at original cost. The cost of capital to Ontario distributors—or perhaps more accurately, the cost rate of capital—can be referred to as the required rate of return (%) on the capital resources committed by investors.

In general, the flow of revenues less the costs of non-capital inputs to the firm such as operating expenses provides a level of dollar returns to capital, in the form of operating income. If things are right, investors realize returns equivalent to the overall cost of capital. The overall cost of capital, often referred to as the *weighted average cost of capital* (“WACC”) and expressed in percentage terms, recognizes and is based on the total pool of financing vehicles used by the utility to underwrite the capital that it employs, as reflected as rate base. In summary, the WACC is the composite weighted cost of the financing vehicles including short-term debt, long-term debt such as mortgage bonds, preferred stock, and common stock. These financing vehicles are property rights and constitute the financial contracts between savers and the firm, including government entities and private companies.

As alluded to above, utilities must compete with all other entities in the free open market for the input factors (labour, materials, and energy inputs). The prices of these inputs are set in the competitive marketplace,⁶ and the costs of these inputs that are incorporated into the total costs and required revenues. Likewise, prices are set in competitive markets for capital in the form of equipment, facilities, software, inventories, and working capital. Since utilities including Ontario’s electric distributors must directly or ultimately attract capital through open financial markets, there is, without contradiction or subsidy, a market price to pay for the capital they require—in short, the market cost of capital that implicitly exhausts all opportunities for higher returns, given perceived risks.

⁶ The discussion recognizes that entities including utilities may not face and participate in fully or even workably competitive markets in the process of acquiring various inputs. Along this line, however, it is useful to mention that, worldwide, financial markets are generally considered to be relatively competitive, where the notion of competition implies that actions and behavior by individual market participants including buyers and sellers do not have significant impact on market clearing prices or the availability and sale of goods and services.

Regulation, Demand for Capital, Capital Attraction

The cost of capital concept may also be interpreted from the perspective of internal investments and the demand for resources. Regulated utilities accommodate the ongoing and steadily rising demand for services, which involves expanding employment of resources, capital in particular. Senior managers of firms, as agents for the ownership or controlling interest of the entity such as shareholders or a local municipality, are responsible for ensuring that the expected internal returns to and on incremental capital is equivalent to the cost of capital to the firm—investors’ rate of return requirements. The adequacy of the internal returns on incremental investment by electric distributors to fund capital at full opportunity costs, however, is highly dependent upon the soundness of the regulatory governance structure to ensure the utility has the opportunity to provide sufficient revenues, which in turn can provide adequate returns on new capital.

When the rate of return, as set by regulators, leads to inadequate returns to capital or to the expectation that returns to capital will be insufficient, utility managers are understandably reluctant to make investments in infrastructure. Indeed, when the expansion of capital resources occurs under a regulatory requirement, such as the obligation that accompanies Provider of Last Resort (POLR) status for distribution utilities, the absence of adequate returns implicitly constitutes the confiscation of the capital. Under these regulatory conditions, the utility is forced to provide services that involve new investment, even though adequate returns are not obtainable. The result is a failure of capital attraction by the utility, and the confiscation of capital of investors—an outcome that comes about from the inherent efficiency of competitive capital markets.

Investors, investment rating agencies, investment banks, and commercial bank lenders follow regulatory developments. Anticipating a shortfall of the internal returns to capital vis-à-vis rate of return requirements, capital markets bid down the prices of the outstanding securities of the utility. The reduced market capitalization of the utility constitutes a confiscation of the existing capital of holders of the utilities’ securities. Essentially, the utility has failed to (or simply cannot) attract capital on fair terms—terms that do not cause outstanding investors to incur wealth losses.

In summary, the utility and its managers can often find themselves, as a result of service requirements, forced to invest in real physical assets that are uneconomic from the perspective of the firm and its constituent investors, if the return on incremental investments falls short of the cost of capital. The cost of capital is the minimum rate of return that must be earned on physical assets to justify their acquisition, and thus the regulator must be mindful of the allowed rate of return levels and implement regulatory procedures that provide the utility with an acceptable level of opportunity to realize returns, on the margin, that satisfy the cost of capital—i.e., rates of return equivalent to that realized on investments of comparable risks. In the context of a binding regulatory constraint, such as POLR obligations, it is not necessary but it is sufficient for the required rate of return on incremental investment to adequately satisfy the opportunity cost of funds. The regulator should set the allowed rate of return equal to the cost of capital so that the utility is free to satisfy its capital needs and service customers at fair prices.

The aforementioned principle and accompanying rule can be illustrated by an example. Suppose a utility with a rate base of \$60 million financed 50% through debt and 50% through equity. Assume that the cost rate of the outstanding debt capital is 7.25%, and that rate of return on equity capital is 9.0%, giving a weighted average cost of capital of 8.13 %. Suppose further that the regulator sets the allowed rate of return at 6.81%, rather than 8.13%. To fully service the property right claims of both bondholders and shareholders, revenues over operating costs should amount to \$4.8 million annually (i.e., $0.0813 \times \$60$ million). An allowed rate of return of only 6.81% on a rate base of \$60 million provides returns to capital equal to \$ 4 million. The returns to capital are sufficient to service the outstanding debt, \$2.2 million (i.e., $\$ 60$ million $\times 0.50 \times 7.25$ %). However, bondholders have primary claims to the returns to capital, and shareholders residual claims. Hence, the return available to service equity holders is a mere \$1.8 million, allowing for an equity rate of return of 6.00%.

As a consequence, share prices are significantly bid down, giving rise to sharp decline in market capitalization of the firm, resulting in a significant wealth transfer from shareholders, as investors, to retail consumers. In short, the capital of investors is

confiscated via a failed regulatory governance structure. In addition, the regulatory structure, particularly where the utility has binding service requirements and constraints, causes a breach of fairness criteria and leads to a failure of the utility to satisfy capital attraction standards where capital can be raised at fair and equitable terms..

It is useful to pursue this line further and consider the counterfactual case. Specifically, if the allowed rate of return is greater than the cost of capital, the capital investments are undertaken and investors' opportunity costs are more than achieved. Any excess earnings over and above those required to service debt capital accrue to equity holders, resulting in a rise in share prices. In this case, the wealth transfer occurs from electricity consumers to shareholders.

The upshot is that, in the absence of other considerations such as the impact of the incentive properties of a chosen regulatory governance structure, investments and capital expansion are undertaken by the utility without inappropriate and unfair wealth transfers between consumers and shareholders if, and only if, the allowed rate of return is set equal to the cost of capital. In the case of the above example, the expected earnings realized on incremental investments are just sufficient to service both the incremental and outstanding claims of debt and equity holders on the capital returns of the utility, no more, no less. In conclusion, setting the allowed rate of return equal to the cost of capital is the only policy that ensures that necessary investments are made in order to satisfy utility service requirements while also providing fair and equitable returns to investors.

2.2 Legal Principles for Setting Fair, Non-confiscatory Rates of Return⁷

The heart of utility regulation is the setting of just and reasonable rates by way of fair and reasonable returns to capital. While there are no hard-and-fast rules, no mathematical formula or scientific panaceas that can be mechanically applied, two landmark United States Supreme Court cases define the legal principles underlying the setting of and

⁷ This section is drawn from "Comments on Staff Draft Report..." submitted by Electricity Distributors Association and Christensen Associates Energy Consulting, LLC to the Ontario Energy Board on July 5, 2006 in the current proceeding.

regulation for a public utility's rate of return and provide the foundations for the notion of a fair, non-confiscatory return:

1. *Bluefield Water Works & Improvement Co. v. Public Service Commission of West Virginia* (262 U.S. 679, 1923).
2. *Federal Power Commission v. Hope Natural Gas Company* (320 U.S. 391, 1944).

The *Bluefield* case set the standard against which just and reasonable rates 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.⁸

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 also 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 the 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, however, should be sufficient to assure confidence in the financial integrity of the enterprise, so as to *maintain its credit and attract capital*.⁹

The statements of the U.S. Supreme Court in the *Hope* and *Bluefield* cases established the standards that we have stated above. The economic logic underlying these standards is straightforward. There is an opportunity cost associated with the funds that capital suppliers provide a public utility in the form of expected return foregone by not investing in other enterprises of corresponding risks. Thus, the expected rate of return on a public utility's debt and equity capital should and must be equivalent to that realized by holding the financial instruments (including debt and equity) of other firms having comparable

⁸ Emphasis added.

⁹ Emphasis added.

and corresponding risks. Moreover, a utility is entitled to a return that will allow it to maintain its credit so that it continues to have access to capital markets to raise the funds required for investment. In short, the allowed return should be sufficient to assure confidence in the utility's financial health so that it is able to maintain its credit and continue to attract funds on reasonable terms.

The U.S. Supreme Court reiterated the criteria set forth in *Hope* in the *Federal Power Commission v. Memphis Light, Gas & Water Division* (411 U.S. 458, 1973), and *Permian Rate Cases* (390 U.S., 747, 1968) cases. In the latter case, the Court endorsed the standards of *Bluefield* and the end-result standard of *Hope*, and 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...

In the *Duquesne Light Company et al. v. David M. Barasch et al.* (488 U.S. 299, 1989) decision, the Court not only reasserted the standards of *Hope* and *Bluefield*, but also established a number of important new guidelines in setting rates for regulated utilities. The Court introduced the concept of *regulatory risk*, which is defined as the risk of a particular regulatory approach and plan in a given jurisdiction, as a distinct risk to be recognized by regulators in setting a fair rate of return.

The notion of financial integrity permeates the aforementioned landmark cases. There are many dimensions and factors that determine a utility's financial integrity. The return on equity should certainly be designed, at a minimum, to keep the stock price at or slightly above the book value on average. If replacement costs of capital are taken into account, the return should be high enough to produce a Q-ratio¹⁰ equal to that of comparable risk companies if regulation is to emulate the competitive result. The return should also be high enough to produce interest coverages consistent with that of maintaining adequate debt ratings, as determined by financial rating agencies and commercial lending institutions.

¹⁰ The notion of a Q-ratio is the ratio of the market valuation of the outstanding financial securities of a firm or industry to the replacement costs, at market value, of the bundle of resources employed by the firm.

Similar standards as those contained in *Hope* and *Bluefield* were promulgated by the high courts in other nations, particularly Canada. For example, the concept or standard of just and reasonable rates of return are clearly evident in Canadian regulatory policy. In the setting of rates, it was argued in *Northwestern Utilities v. City of Edmonton* (2 D.L.R. 4, p. 8, 1929) that rate levels should be *just* and *reasonable* to the consumer as well as to the utility and in the latter case, the earnings should yield a *fair* rate of return on money invested. Clearly, if rates are to be just and reasonable to the utility and yield a fair return, the allowable return on common equity should be commensurate with returns on investments in other firms having corresponding risks, and sufficient to assure confidence in the financial integrity of the firm. Otherwise, the utility will be unable to maintain creditworthiness and attract capital on reasonable terms. The concepts of justice, fairness, and reasonableness are intimately related to comparability of returns, financial integrity, and creditworthiness.

As was the case in *Hope* and *Bluefield*, *Northwestern* makes frequent references to returns on investments in other firms. For example, the Court stated:

By a fair return is meant that the company will be allowed as large a return on the capital invested in its enterprise as it would receive if it were investing the same amount in other securities possessing an attractiveness, stability and certainty equal to that of the company's enterprise.

The principle of capital attraction was further enunciated in *British Columbia Electric Railway v. Public Utilities Commission of British Columbia, et al.*, (25 D.L.R. (2d)689, pp.697-698, 1961), where it was stated that “earnings should be sufficient...to enable [the utility] to...attract capital either by the sale of shares or securities.” Clearly, if earnings are to be sufficient for a firm to attract capital on reasonable terms, the firm must offer a return that is comparable to that offered by competing investments. One interpretation of the latter point is that a utility must provide returns achieved on its past investments comparable to those achieved in enterprises of comparable risk.

It is clear from the *Hope-Bluefield* and *Northwestern-British Columbia Railway* pronouncements that among the factors to be considered in determining a fair return are:
1) earnings necessary to assure confidence in the financial integrity of the utility and to

maintain its credit standing, 2) the payment of dividends and interest, and 3) the amount of risk. In summary both capital attraction standards and financial integrity standards must be fulfilled in determining a fair rate of return. Despite a deterioration in credit standing, a utility may be able to attract capital temporarily, but at prohibitive costs and under unfavorable terms. Eventually, the utility will face hard funds rationing or the costs of financing will become prohibitive, and the utility will no longer be able to attract capital at a reasonable price.

2.3 Risk Factors Shaping the Cost of Capital

Business Risk

A major category of overall risk falls under the heading of business risk. Investors' expected return on capital invested in the utility will be based on their perceptions of the utility's business risk. Business risk encompasses all the operating factors that collectively increase the probability that expected future income flows accruing to investors may not be realized, because of the fundamental nature of the firm's business.

Business risk is due to sales volatility and operating leverage. Sales volatility, also referred to as demand risk, refers to the uncertainty in the demand for the firm's products due in part to external factors, where weather plays a significant role as well as the basic cyclical nature of the firm's products which are affected by the strength of the regional economy. Long-term factors include the sensitivity to consumer electricity prices, the degree of competitive entry, the availability of product substitutes, the risk of technological obsolescence, and the conditions of local markets for labour and input materials. Projections of long-term demand is a particular issue of risk, where demand for electricity implies substantial new investment, and where the marginal or incremental cost of investment in new facilities is significantly above average cost. Indeed, the incremental costs of distribution facilities can be much higher than embedded costs.

Sales volatility is also related to internal or controllable factors. The reaction of a firm's management to the business environment, such as the adoption of a particular cost structure, are important dimensions of business risk. If all production costs are variable, then operating income varies proportionately to sales variability. If, as is the case for

utilities, a large portion of costs are fixed, then operating income will be far more volatile than sales. This magnification effect of fixed costs on the variability of operating income is referred to as “operating leverage.”

The business risk of utilities is assessed by examining the strength of long-term demand for utility products and services. Many factors have an impact on business risk, including the size and growth rate of the market, the diversity of customer base and its economic solidity, the availability of substitutes and degree of competition, and the utility’s relative competitive standing in its major markets, including residential, commercial, and industrial retail markets.

The regional economics of a utility’s service territory exert a strong influence on the company’s risk. The proportion of total revenues as between industrial, commercial, and residential customers measures a utility’s dependence on any given class of customers. Within a given class, such as industrial, the concentration of revenues from the top five, ten or twenty business customers is an additional measure of a company’s vulnerability and exposure.

Operating efficiency from the standpoint of cost and quality of service is another factor that may influence a utility’s competitive risk exposure. Other examples of internal risk factors include the degree of diversification in the firm’s asset structure, managerial efficiency, growth strategy, research and development policies, and competitive posture.

The impact of inflation on a specific company’s sales, costs, profits, cash flows, prices, and the firm’s response to such inflationary conditions are also part of the firm’s business risk. The size of a utility’s construction program is also a source of business risk, to the extent that new construction is to meet projected demand. In addition, projected demand is more difficult to forecast than existing demand, and this forecasting risk is compounded by regulatory lag and attrition. Construction factors also impinge on financial risk.

In regard to business risks, Ontario distributors will be incurring substantial costs associated with the mandated Smart Metering initiative. In addition, LDCs are in the

position of Provider of Last Resort (POLR) and are obliged to serve and connect all customers. The cost sharing of the installation of plant for new customers is determined by the Economic Valuation Model as defined in the Distribution System Code. These capital expenditures are outside the control of the LDCs and can be significant. These requirements are in sharp contrast to the gas distributors who do not have the same obligation to serve and have choices regarding whether to install plant (cost sharing is determined by the gas version of the Economic Valuation Model) and, as a result, do not service many areas serviced by LDCs. Finally, Ontario's LDCs face municipal mandates with respect to the types of distribution facilities, CDM capital expenditures and, in contrast to natural gas distributors, to the sometimes burdensome default service obligations (i.e., essentially demand risk that is factored into investor's expectations of a competitive return on investment in a distribution utility. Thus, significant differences exist between the LDCs and gas distributors of Ontario that materially affects the risk profile of the LDCs vis-à-vis the gas distributors.

It is important to note the effects regarding provider of last resort (POLR) type service, known variously as supplier of last resort, default, standard offer, or basic generation, which represents what is equivalent to a call option for customers that can create huge risks for utilities and their investors. The LDCs are under an obligation to serve which means that they must make expenditures to ensure service even in situations where average rates do not recover the actual costs of service, including investment costs. This situation can contribute to the view among investors that the utility is a riskier proposition and would thus require a higher return as fair compensation in order to attract capital.

Commodity Risk

Commodity risks are present in at least two forms. First, there is the potential for substantial lag between the payment for purchases of power supply and the invoicing to electricity consumers and receipt of revenues. Second, the liquidity or lack thereof in the wholesale markets for power and in particular for financial instruments that can be used to hedge wholesale commodity price and fuel input price risk presents a challenge for utilities. To the extent that forward markets are not liquid, the risk associated with fixed

price, physical or financial forward contracts increases. This risk is borne directly by the party, usually the utility, required to provide a fixed price product to the market.

Regulatory Risk

Regulatory risk generally refers to the quality and consistency of regulation applied to a given regulated utility, and specifically to the timeliness, and reasonableness of rate awards, and the gradual (or not so gradual) transition to different modes of regulation.

Regulation for public utilities can certainly be viewed as a major component of business risk because of its impact on revenues and earnings. Decisions of utility regulators and of other governmental regulatory agencies have a direct impact on utility finances.

Regulation can increase business risk if it does not provide adequate returns and/or if it does not provide the utility with the opportunity to earn a fair rate of return. The U.S. Supreme Court's decision in *Duquesne Light Co. et al v. Barasch et al* (1099 S. Ct. 609, 1989) addressed a number of issues relating to regulatory practices and established that regulatory risk is a special class of risk that must be recognized by regulators when setting the allowed rate of return.¹¹

Regulatory jurisdictions are evaluated on the basis of three major factors: earnable return on equity, regulatory quality and regulatory technique. In assessing these three factors, several factors come into play,¹² and regulatory structure can compound the business risk premium if it is unpredictable in reacting to rate hike requests both in terms of the time lag of its response and its magnitude. More generally, if the regulatory response to rising operating costs and higher capital costs because of unanticipated inflation is inadequate or untimely, or if the utility is not given the opportunity to cover higher costs because of political factors or inadequate regulation (e.g., rate base exclusions and disallowances), the business risk premium rises further, along with capital costs. The investment

¹¹ See Kolbe and Tye (1992) for further discussion of this issue.

¹² Factors can include, for example, the length of regulatory lag, the inclusion or exclusion of construction work in progress ("CWIP"), the type of test year employed (whether historical or forward), the normalization of tax timing differences versus flow-through techniques, the proportion of earnings represented by the allowance for funds used during construction ("AFUDC"), environmental issues, and legislative mandates.

community is mindful of regulatory structure, and is increasingly cautious about assessing the credit worthiness of utility capital without consideration of this factor.¹³

By the same token, regulation can also lower business risk. Bonded rate increases, adoption of forward test years, the use of deferral and normalization accounts and automatic adjustment mechanisms, such as fuel adjustment clauses, are examples of attempts to lower regulatory risks, and hence business risks.

Unreasonable rate treatment for any utility may not only raise the cost of capital and, hence, retail customer burdens, but may also have serious public policy implications and repercussions for the entire business or economic region. When adhering to questionable implementations of a given methodology, or when ignoring relevant evidence, a regulatory body runs the risk of ignoring the policy implications of a recommendation. The quality of regulation and the reasonableness of rate of return awards clearly have implications for regulatory climate, economic development, and job creation in a given territory. Fair and reasonable regulation must be consistent with the economic well-being of the area served.

Several issues specific to Ontario regulation of LDCs bear significant relationship to the regulatory risk factor. One of those, as addressed in the EDA's comments on the Staff's proposed overall approach is that associated with the 2nd Generation IRM, which this report will not address in detail. However, we have noted that the development of incentive mechanisms must be done in concert with the process of setting the cost of capital.

In addition to that issue, however, there is the issue of the obligatory Smart Meter program funding over time. The current depreciation rate set to recover the costs of the smart meter installation is 4 percent per annum. There is a strong likelihood that the depreciation rate will not be sufficient to cover replacement costs that will likely be incurred sooner, perhaps within six to ten years, rather than the 25 years anticipated at the

¹³ Immediate evidence is at hand in the form of an article published by the Bank of Montreal where it was stated "We have set out our view herein of a proposal made by Staff of the Ontario Energy Board (OEB) to establish the return on equity for local electricity distribution companies in Ontario within a range of 7.52% and 8.36%. We believe this range is confiscatory and likely violates the fair return standard."

time the depreciation rates were set. What this means is that replacement costs must be funded out of working capital or through short-term debt. In either case, the implications for equity holders is likely to be a reduction in the earned return, which will in turn mean that the utility is viewed as a riskier investment.

The proposed approach to rebasing also adds another dimension of regulatory uncertainty and risk to the LDCs profiles. Ontario's distributors face substantial rising capital and operating costs in the near term.¹⁴ The effective reductions in revenues vis-à-vis costs of service would likely be exacerbated because rebasing and the speed of rate adjustments may cause revenues to lag costs that are driven by expanding capital requirements and rapidly growing plant accounts with corresponding increases in the net rate base of the LDCs. The effect translates into significant reductions of internal cash flows to fund investment, which is vital to electricity consumers, and to provide adequate returns to capital. A concern is the effect of regulatory lag, which can imply the confiscation of capital, on the incentives to invest in needed reinvestment and infrastructure as well as more advanced metering. The regulatory lag associated with the proposed rebasing process could translate into lower returns on equity (and debt) or at the very least into the perceptions by investors that the LDCs are a more risky investment opportunity.

Financial Risk

Financial risk stems for the method used by the firm to finance its investments and is reflected in its capital structure. It refers to the additional variability imparted to income available to common shareholders by the employment of fixed-cost financing, that is, debt and preferred stock capital. Although the use of fixed-cost capital can offer

¹⁴ In particular, Ontario distributors will be incurring substantial costs associated with the mandated Smart Metering initiative. In addition, LDCs are obliged to serve and connect all customers. The cost sharing of the installation of plant for new customers is determined by the Economic Valuation Model as defined in the Distribution System Code. These capital expenditures are outside the control of the LDCs and can be significant. These requirements are in sharp contrast to the gas distributors who do not have the same obligation to serve and have choices regarding whether to install plant (cost sharing is determined by the gas version of the Economic Valuation Model) and, as a result, do not service many areas serviced by LDCs. Finally, Ontario's LDC's face municipal mandates with respect to the types of distribution facilities, CDM capital expenditures and, in contrast to natural gas distributors, to the sometimes burdensome default service obligations. Thus, significant differences exist between the LDCs and gas distributors of Ontario.

financial advantages through the possibility of leverage of earnings (i.e., financial leverage), it creates additional risk due to the fixed contractual obligations associated with such capital. Debt and preferred stock carry fixed charge burdens that must be supported by the company's earnings before any return can be made available to the common shareholder. The greater the percentage of fixed charges to the total income of the company, the greater the financial risk. The use of fixed cost financing introduces additional variability into the pattern of net earnings over and above that already conferred by business risk, and may even introduce the possibility of default and bankruptcy in extreme cases.

Prudent management requires that lower financial risks should be used to offset high business risks. A financial risk premium is required by both bondholders and common shareholders. Common equity holders require compensation for the additional magnification induced in their future earnings, while bondholders require compensation for the greater risk of default. The expression linking equity returns and capital structure is given by:

$$r = [R + (R - K_d) \cdot D/E] \cdot (1 - t) \quad (1)$$

where r is the rate of return on common equity, R is the rate of return on total assets, K_d is the interest rate on debt, D/E is the debt to common equity ratio, and t is the income tax rate. The expression states that the return on the book value of equity is directly proportional to the rate of return on assets, plus a risk premium equal to the excess of the asset rate over the debt rate levered by the debt/equity ratio in book value terms. A given variation in R due to business risk is magnified into a larger variation in the return on equity; the greater the relative proportion of debt, the greater is the magnification effect.

Although financial risk is unique to a specific firm and is distinct from the firm's business risk, business and financial risk are interrelated. The overall risk to the common stock investor is a composite of the business and financial risk. The overall risk of two firms may be similar when a high business risk firm has assumed greater financial risk. In general, unregulated companies have greater business risk than regulated utilities, and

because of these differences in business risk, utilities have adopted a correspondingly higher amount of financial risk in their capital structures.

Liquidity Risk

The ability to buy or sell an investment quickly and without a substantial price concession is referred to as liquidity. Liquidity risk represents the possibility of sustaining a loss from current value when converting an asset into cash. Securities listed on exchanges, such as the New York Stock Exchange, are considered highly liquid, whereas the shares of over-the-counter companies are less marketable.

Liquidity risk is likely to be size-related (or rather correlated with size). Investment risk increases as company size diminishes, all else remaining constant. The size effect phenomenon is well documented in the finance literature. The size effect is most likely the result of a liquidity premium, whereby investors in small stocks (i.e., small cap stocks) demand greater returns as compensation for the lower marketability and liquidity.

2.4 Ontario LDCs Compete for Capital in Efficient Global Capital Markets

Today, the LDC's must compete for capital resources in the face of vastly expanded opportunities for capital as a result of globalization and reduced barriers to capital flows among nations, and markets with increased return opportunities. Capital markets are much more integrated now than in 2000, which was the setting for Cannon's paper on cost of capital for Ontario LDCs. In particular, Canada has removed the Foreign Property Rule, and has experienced substantial growth in income trust vehicles to place capital. One can only conclude that Canadian electric service providers including Ontario's LDCs must participate in significantly more competitive capital markets where investors have a substantially larger set of opportunities to place capital, including other utility regulatory jurisdictions.

As an example of the globalization of the capital markets, net private capital (i.e., debt plus equity) flows to developing countries increased from \$188 billion in 2000 to \$491 billion in 2005.¹⁵ As a World Bank Report states:

Demand for emerging market debt and equities remained strong, spurred by improved fundamentals in many developing countries and investors' search for higher yields in an environment where long-term interest rates remain low in major industrial countries, despite higher short-term interest rates.¹⁶

The emergence of robust global capital markets over the past decade has placed the Ontario LDCs in the position of competing with developing and developed countries as well as the complete gamut of industries seeking capital resources.

In particular, directly as a result of the globalization of capital markets, the utilities in Canada must compete directly with utilities in the U.S. for debt and equity funding. The indirect evidence of this comes from the fact that capital inflows into the United States—most of them private—continue to finance the U.S. current account, and to support the U.S. dollar. These flows carry on unabated because of the country's favorable growth and interest rates, as well as its deep and liquid capital markets. They are unlikely to change direction abruptly since no other country or region enjoys the combination of robust growth and deep financial markets that the U.S. offers.

The global capital markets are today driven by the fact that institutional investors are unlikely to sit on the fence for long and will become less risk-averse; they cannot afford to stay in risk-free but low-yielding cash or low yielding investment positions, and need to remain fully invested by searching for “undervalued” assets. Finally, strategic institutional investors, like pension funds and life insurance companies, are growing in importance in worldwide financial markets. The increasing sophistication of these institutional investors means that they are able to differentiate between country- and

¹⁵ Source, The World Bank, “Global Development Finance: The Development Potential of Surging Capital Flows – Review, Analysis and Outlook, 2006 (“World Bank Report”).

¹⁶ The World Bank Report, p.18.

company-specific versus systemic concerns. This translates into investment behavior that pays close attention to the risk profiles of the utility industry in Canada, including Ontario, when making decisions about strategic placement of funds.

The ties between capital markets in the U.S. and Canada have been strengthened over the past decade as a result of a variety of free trade agreements reached among countries in the Western Hemisphere, such as the Canada-U.S. Free Trade Agreement (1988) and the North American Free Trade Agreement (1994). The impact of these efforts at liberalization of trade is to equalize the costs of capital within the two countries.

Evidence of the integrated nature of the Canadian-U.S. financial markets is the significant side of foreign direct investment (FDI) that is exchanged between the two countries.

According to the Congressional Research Service (CRS):

The U.S.-Canada economic relationship is characterized by substantial investment in each nation by investors of the other. The United States is the largest single investor in Canada with a stock of \$216.6 billion in 2004, a figure that has more than doubled from \$97 billion in 1997. This figure represents 10.5% of U.S. direct investment abroad (DIA), and U.S. investors accounted for 65% of inbound foreign direct investment (FDI) in Canada in 2004. Finance and insurance, manufacturing, and mining/energy are the three largest categories of U.S. FDI in Canada. Canada has a prominent (though not the largest) FDI position in the United States at \$133.8 billion, 8.8% of the total FDI stock in the United States. The United States is the most prominent destination for Canadian DIA, with a stock of 44% of total Canadian DIA in 2004.¹⁷

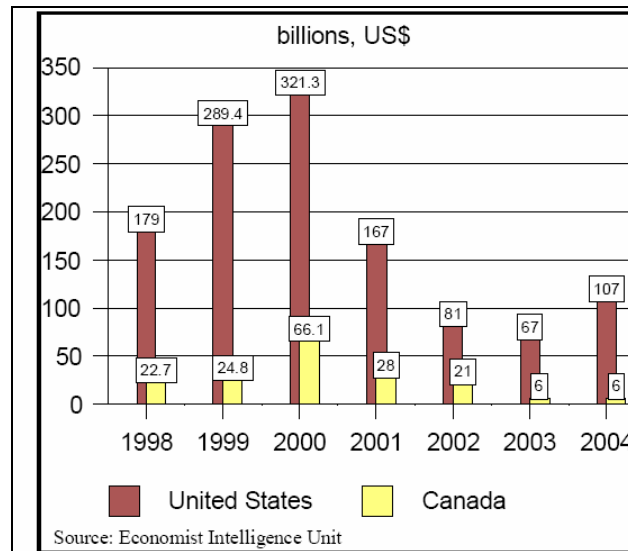
The implications of the growing convergence of the capital markets in Canada and the U.S. is that regulatory policy decisions that lead to significant changes to either the allowed equity return or the overall cost of capital for Ontario's LDCs can place them in a capital squeeze and in effect dilute the value of the existing investments.

Further indirect evidence that Ontario's utilities compete in a global capital market that is increasingly harder for Canadian industry in general is that Canada's FDI recently has been on a downward trend as shown in Figure 1. Again, the CRS states:

¹⁷ Congressional Research Service, "CRS Report for Congress: United States-Canada Trade and Economic Relationship: Prospects and Challenges," Updated March 29, 2006, p. 9.

Canada's share of North American and global FDI has dropped in the last decade. Canada's share of North American FDI has dropped from 17.0% to 13.0%, while the U.S. share has increased to 78.0% from 76.0%. Also, the Canadian share of inward global investment stock fell from 7.7% in 1980 to 3.0% in 2002.¹⁸

Figure 1 Inward FDI Flows from All Countries to Canada and U.S.: 1997-2004¹⁹



The fact that Ontario's LDCs will be competing for capital in highly integrated, international capital markets cannot be minimized when considering setting the equity cost of capital and the overall cost of capital.

3 Review of Cost of Capital Methods

This chapter reviews the methods used to estimate the cost of capital to Ontario distributors and determine the recommended rate of return. These methods are widely applied to issues and problems relating to the determination of the cost of capital, both in North America and abroad. Within the context of determining cost of capital for Ontario distributors, we begin by setting forth three essential points, as follows:

¹⁸ Ibid. p. 10.

¹⁹ CRS, p. 11.

- cost of capital for the entity/firm—and of investors—is a function of the demand for and supply of capital, expectations of inflation, and perceptions of risk, as discussed above.
- cost of capital currently is equal to the opportunity cost of capital in the contemporaneous timeframe, though the experience of long-term history guides the assessment of opportunity costs.
- estimates of the cost of capital for Ontario distributors can be developed from market experience of firms of comparable risks. It is appropriate to then use the market cost of capital, as inferred, to determine the regulated prices for distribution services.

The problem of estimating the cost of debt and the cost of equity, at some point in time, is distinctly different, and determining the opportunity cost rate for equity capital is challenging for two reasons. In the case of debt, both the market price and future expected cash flow returns to capital are observable by inspection. Investors' perceptions of risks are implicit in the primary and secondary market prices of the debt obligations themselves, and need not be known or even estimated. Thus, the net expected yield to maturity, which reflects the opportunity cost of capital to holders of debt, can be determined directly—simply solve iteratively for the underlying discount rate on the expected returns to and of the principle.²⁰ This *is* the market rate of return, *ex ante*. For purposes of determining the overall utility rate of return, however, the cost rate of long-term debt, as a component of the WACC, is often set according to cost rates of the individual debt issues, at the time of issuance of debt within primary financial markets.

In contrast, expectations of investors about the prospective cash flows and market returns on common equity cannot be observed directly, and must be inferred with estimation procedures. In addition, the determination of the cost of common equity involves perceptions of risks harbored by investors, as a matter of the consensus view. Perceptions of risk are also not observable directly. The allowed equity rate of return is typically set according to the current and expected cost of capital, though much of the total equity investment, as with debt, was committed in many years past. In short, the cost of common equity can only be discerned through the proper and careful application of well established methods that serve as the cornerstone of modern finance theory.

²⁰ The observed yields on tradable debt instruments are not the same as the expected yield to maturity. It is yield to maturity, which captures the implied discount rate and thus the cost of debt capital, which is of particular interest.

As mentioned, the methods employed herein are well-established, including two variations of the constant growth Discounted Cash Flow model (DCF), and the Capital Asset Pricing Model (CAPM). These classical approaches are commonly recognized within modern finance theory and are readily utilized by the investment community in the process of evaluating financial assets. We also incorporate a discussion of Arbitrage Pricing Theory (APT), sometimes referred to as Multi-Factor Models. The cost of capital estimates realized by applying these two formal models are augmented by historical returns realized by utility and non-utility companies of comparable risks, and the so-called risk-premium methodology. The application of the procedures to determine the cost of equity capital requires estimation of key parameters, and it is here where the challenges reside.

The efficient market hypothesis plays an essential role in the determination of the cost of capital. Specifically, the working assumption, which is largely though not completely borne out by empirical analysis, is that capital markets are fairly efficient. This means that the supply and demand for risky financial assets, as reflected in bid and ask prices to buy and sell shares, result in financial assets being traded at price levels where *rates of return above the cost of capital cannot be systematically realized*. Above-normal returns—returns above the cost of capital—are realized only randomly. Essentially, the opportunities to systematically realize returns above the underlying cost of capital are exhausted by the competitive market process.

Estimating the cost of capital though not trivial can be fairly straightforward, and both the DCF and CAPM approaches provide a useful framework. The risks to investors in various sectors of the energy services industry cannot ever be known directly; risks—and hence the implied cost of capital—can only be inferred. Specifically, the determination of useful estimates of the cost of common equity capital within either framework requires a discerning application of theory through careful analysis such as that presented herein. In particular, the determination of the cost of equity capital faces two overarching challenges, as follows:

- Both approaches are forward looking and thus the results are highly dependent upon useful estimates of investor expectations about future market performance.

- The underlying assumptions for DCF and CAPM include, among other things, an efficient market and rational behavior of investors such that all opportunities for above- and below-normal returns to capital are exhausted on an expected value basis. In short, capital markets value financial assets at the implied opportunity costs of capital, given investor perceptions of risk.

It is useful to mention that the notion of *risky assets* can apply to any real or financial asset wherein the prospective returns from holding the asset are uncertain. Risky assets include commodity contracts, financial property rights, financial derivatives, and real assets such as transmission facilities. Risk assessment and option theory, moreover, can be applied to the analysis of unbundled services, such as electricity transmission development plans. Within the context of this discussion, however, risky assets refer to financial obligations of firms—common stock—and asset values refer to prices of common stock as observed on major stock exchanges.

3.1 Discounted Cash Flow Methodology

The constant growth Discounted Cash Flow (DCF) model was originally developed by Myron Gordon in 1957, and was advanced actively during the early 1960s. In its classical form, the derived DCF model defines the cost of capital as the sum of the adjusted dividend yield, and expectations of future growth in cash flows to investors including dividends and future appreciation in share prices. The classical (one-stage) DCF model is as follows:

$$k_{e,j} = D_{0,j}(1+E(g_j))/P_{0,j} + E(g_j) \quad (1)$$

with,

$k_{e,j}$ = cost of equity capital, asset j

$D_{0,j}$ = current dividends per common share, asset j

$E(g_j)$ = expected growth in future cash flow returns to investors in asset j

$P_{0,j}$ = current price per common share, asset j .

The one-stage form of the DCF model is an elegant and intuitively tractable model with two terms, a mathematical result derived from the constant growth present value model. A cursory review of historical returns of equities suggests substantial variation in growth in the internal returns to capital and market appreciation is both the typical and dominant

pattern. It is plausible that the *expected path of future returns* harbored by investors may assume a pattern of non-constant growth. This means that, at least under some market conditions, the constant growth form of discounted cash flow may not represent investor expectations of growth with sufficient accuracy. Arguably, other forms of DCF may serve as better approximations of investor expectations.

A plausible means to better model expectations of varying growth might be with stochastic models, where the path of returns and growth is a function of time, with a random component. However, stochastic models introduce considerable complexity. As a first order approximation to stochastic processes, multiple step constant growth models known as multi-stage DCF can serve admirably well. Essentially, multi-stage DCF is a variation of present value theory which postulates that future returns assume a pattern of several growth steps or stages. While any number of stages of constant growth is possible, two- or three- stages are typically applied. In stylized fashion, the Three-Stage DCF model is shown below:

$$P_{0,j} = D_{0,j} * S_1 + D_{5,j} * S_2 + D_{10,j} * S_3 \quad (2)$$

with,

$P_{0,j}$ = current price for common share, asset j

$D_{t,j}$ = current and future dividends per common share for time t , asset j

$E(g_{n,j})$ = expected growth of future cash flows in stages $n=1, 2, 3$, asset j

$k_{e,j}$ = cost of equity capital asset j

$S_{n,j}$ = factor for growth $E(g_{n,j})$ and discounting $k_{e,j}^t$, stages $n=1,2,3$.

Appendix I provides a step-by-step derivation of the classical and multi-stage discounted cash flow models shown above.

3.2 Capital Asset Pricing Model (CAPM)

In this section we discuss the theoretical underpinnings and formulation of the Capital Asset Pricing Model (CAPM) and the problems associated with estimation of a risk premium using that model. The upshot of the discussion is that the CAPM can be used with caution just as any other approach would be used because of the inherent biases that

attend the estimation of the Equity Risk Premium using this rather simplistic, but convenient model.

3.2.1 Theoretical Underpinnings of the CAPM

The Capital Asset Pricing Model (“CAPM”) has a long history of theoretical and empirical investigation. Several authors have contributed to the development of a model describing the pricing of capital assets under conditions of market equilibrium including: Eugene Fama, Michael Jensen, John Lintner, John Long, Robert Merton, Myron Scholes, William Sharpe, Jack Treynor, and Fischer Black. For the past three decades, the mean-variance CAPM of Sharpe-Lintner and Black have served as a cornerstone of financial theory.²¹

The underlying rationale of the CAPM is that an investor diversifies by combining risk securities into a portfolio. The result is such that the risk of the total portfolio is less than that of any of its parts.²²

The adjusted risk-based return is based upon three factors: 1) the covariation of the returns to the asset and that of markets for risky assets, 2) the statistical variance of returns of the market for risky assets, and 3) the *difference* between expected overall returns on risky assets, and risk free returns. The third parameter is referred to as the excess return for risk, and is equal to the difference between the overall returns to risky assets for the market as a whole, and the risk free return rate. The CAPM is shown below:

$$k_{e,j} = r_f + B_{jm}*(r_m - r_f) \quad \text{with,} \quad B_{jm} = \sigma_{jm}/\sigma_m^2 \quad (3)$$

where,

²¹ The derivation of the Capital Asset Pricing Model is provided in Appendix II, along with additional details regarding problems with and limitations of the CAPM in estimating the equity risk premium.

²² There arise problems with this general result of diversification due to limitations of the expected utility maximization criterion that has been the cornerstone of the modern theory of decision making under uncertainty for half a century. The path breaking work of Artzner, Delbaen, Eber, and Heath (Artzner et al) (1998) suggests that the mean-variance foundation of the CAPM model, and hence the traditional estimation of the Equity Risk Premium by the CAPM “market beta,” does not satisfy the principles for coherent risk measures. A reformulation of the CAPM guided by coherent risk measure principles would result in the application of robust estimation methods, such as regression-quantile methods of Koenker and Bassett (1978).

$k_{e,j}$ = cost of capital for risky asset j , stated in percentage terms

r_f = risk free rate of return

B_{jm} = ratio of the covariation between risky asset j and the market as a whole, σ_{jm} , and the variance of market returns, σ_m^2

r_m = rate of return on the overall market for equities.

The CAPM in (3)²³ is derived, discussed and critiqued further in Appendix II.

In the Sharpe-Lintner framework, diversification reduces portfolio risk because security returns do not move perfectly together. Complete elimination of risk is impossible, however, since securities all move together to a certain extent because of the influence of pervasive market-wide forces.

The Sharpe-Lintner asset pricing model uses the characteristics of the consumer wealth allocation decision to derive the equilibrium relationship between risk and expected return for assets and portfolios. In the development of CAPM, simplifying assumptions about the real world are used to define the relationship between risk and return that determines security prices. These assumptions are:

- all investors are risk-averse individuals that maximize the expected utility of their end of period wealth,
- investors are price takers and have homogenous expectations about asset returns that have a joint normal distribution,

²³ The expression in (3) can be generalized from the assumptions described above, and is particularly useful in the next section on APT and multi-factor models, as follows:

$$k_j = f[E(F)] \quad \text{with, } \partial k_j / \partial F > 0 \\ = E(r_j).$$

where,

k_j = cost of capital of financial asset j ;

$E(F)$ = the set of relevant risk factors, as perceived by investors; and,

$E(r_j)$ = market rate of return on asset j , as expected by investors.

Two results logically follow from the above equation. First, the cost of capital for a given asset is a function of risks perceived by investors that influence the return on investment in that asset. Second, efficient markets—that is, the no-arbitrage principle discussed above—value assets at a level such that the expected market returns, $E(r)$, are equivalent to the cost of capital of investors, k .

- there exists a risk-free asset such that an investor can borrow or lend unlimited amounts at the risk-free rate,
- the quantities of the asset are fixed,
- all assets are marketable and perfectly divisible,
- asset markets are frictionless and information is costless and simultaneously available to all investors, and
- there are no market imperfections, such as taxes, regulations, or restrictions on other trading.

The CAPM assumes that the risk of an asset can be separated into systematic and unsystematic risk components. Systematic risk is non-diversifiable, whereas unsystematic risk can be eliminated through diversification (*i.e.*, a portfolio of assets can be constructed that obtains the same expected return while reducing the variance of returns). Systematic risk is based on factors in the economy and financial markets that present surprises that cannot be hedged by investors. The CAPM takes the view that systematic risk is embodied in one factor, the “market”—the entire market of financial assets. This “market” is often represented in terms of a market index, such as the S&P 500 index. Essentially, systematic risk of an individual asset within the context of CAPM is the riskiness of returns to the asset with respect to returns to the market as a whole.

A fundamental notion 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 are lower-risk securities. The CAPM quantifies the additional return required for bearing incremental risk, and provides a formal risk-return relationship anchored to the basic idea that only market risk matters, as measured by the risk premium coefficient called “beta.”

To recap the above discussion, the CAPM model posits that all securities are priced such that:

$$\begin{aligned}
 \text{Expected Return} &= \text{Risk-free Rate} + \text{Risk Premium} \\
 &= \text{Risk-free rate} + \text{Relevant Risk} \times \text{Market Price of Risk} \\
 &= \text{Risk-free Rate} + \text{Beta} \times \text{Market Price of Risk}.
 \end{aligned}$$

Application and testing of the implications of the CAPM relies on the assumption that the *ex post* distribution from which returns are drawn is perceived *ex ante* by investors. It follows from multivariate normality, that (4) directly satisfies the Gauss-Markov regression assumptions. Therefore, when the CAPM relationship is estimated empirically or tested in the literature, as it has been voluminously, it is usually written in following form:

$$k_j - r_f = \alpha + \beta(r_m - r_f) + \varepsilon_j \quad (5)$$

In equation (5), the intercept term α is added, the term $(r_m - r_f)$ is the market price of risk or in other words the excess return of the market over the risk free rate and $(k_j - r_f)$ is excess return on asset j over the risk free rate. The term ε_j is the error term that accounts for the fact that realized return is a random variable and will not be fully explained by the term modeling component: $\alpha + \beta(r_m - r_f)$. In typical, straightforward regression models, of which equation (3) is an example, the error term is assumed to be normally distributed and independently distributed over time and across assets.²⁴ The estimation of the parameters α and β is typically accomplished through an application of the ordinary least squares (OLS) regression method.

If the estimate of α is found not to be significantly different from 0 and if the estimate of β is found to be greater than 0, then the CAPM is assumed to be supported empirically. Conversely, if the asset were uncorrelated with the market, then β should be found to equal 0 and α should be found equal to the risk free rate.

3.2.2 Problems in Estimation of the Cost of Capital Using the CAPM

Formulation

The issues attending the estimation of the cost of capital with CAPM—essentially, the estimation of the risk premium (ERP) in terms of β with equation (5)—arise for reasons having to do with the assumptions underlying the CAPM specification as a whole, and obtaining reliable estimates of β as the sole measure of the relevant risks.

²⁴ In other words, the error terms are said to be *iid* $N(0, \sigma^2)$.

The traditional CAPM, which describes stock returns solely on the basis of an estimate of β , is based on the assumption that all market participants share identical subjective expectations of mean and variance of the return distribution, and the portfolio decision is exclusively based on these moments. However, empirical evidence suggests that the estimated CAPM does not conform to the theory. It has been observed by Engle (1982) and Bollerslev (1986) that return distributions vary over time. In other words, the stock return distribution is time variant in nature and hence, the subjective expectation differs from one period to the next. This can be interpreted as saying that investor expectations of the moments of the *ex ante* distribution of returns behave like random variables rather than as constants, as assumed in the traditional CAPM. The result of this modification of the assumptions in the CAPM has led to the specification of conditional CAPM (CCAPM) formulations that attempt to account for the fact that both the expected value and the variance of returns may be time varying. This approach has been illustrated in the work of Domowitz and Hakkins (1985) and Engle (1987) and Bollerslev (1988), which has been followed subsequently by efforts to improve the precision of the estimate of the risk premium parameter β through the work of Ng (1991) and Bollerslev, Engle, and Woldridge (1988); Harvey (1989); and Bodurtha and Mark (1991).

The CAPM and CCAPM have been subjected to extensive empirical testing over the past 30 years. The early studies of the Sharpe-Lintner-Black (SLB) model were conducted by Black, Jensen, and Scholes (1972); Blume and Friend (1973); Fama and MacBeth (1973); Basu (1977); Reinganum (1981); Banz (1981); Gibbons (1982); Stambaugh (1982); and Shanken (1985). In general, the results from these studies offered very little support for the CAPM or CCAPM approaches. Appendix II contains a detailed discussion of these studies and problems associated with estimation of the CAPM.

The valuable lesson that can be taken from the of the shortcomings associated with the theoretical development of and estimation of the market based risk premium using a single factor CAPM formulation is that it is subject to a great deal of uncertainty. Therefore, the exclusive use of CAPM-based estimates of the ERP to apply to the Ontario LDCs introduces risk into the regulatory rate-setting process that can be avoided or at least reduced by relying on a wider set of approaches. This is of course our strategy, and

we recommend that it be adopted by the Board for the purposes of setting electricity distribution charges.

The OEB Staff acknowledges that CAPM is not without well-known limitations. They contend that these limitations are far less serious than the shortcomings of alternative approaches such as the comparable earnings (CE) and discounted cash flow (DCF) approaches. The failings of the CAPM approach are serious enough to warrant consideration of additional information that might temper the biases inherent in the CAPM framework. Of course, the choice of the proxy group of companies which is a significant consideration in Ontario, given that the majority of LDCs are not publicly traded companies, merely compounds the problems inherent in the CAPM approach, and increases the importance of constructing an estimate of ERP and the rate of return through a more robust approach.

3.3 Risk Premium Approaches

The risk premium method of determining the cost of equity capital recognizes that common equity capital is more risky than debt from an investor's perspective, and that investors require higher returns on stocks than on bonds to compensate for the additional risk. The general approach is relatively straightforward: first, determine the historical spread between the return on debt and the return on equity; second, add this spread to the current observed debt yield to derive an estimate of the current equity return requirements.

Measurement of historical returns is increasingly used as a basis to assess plausible returns in the future. As discussed, efficient markets suggest that *all* financial assets are priced at levels such that the *expected* future returns of individual assets are equivalent to the underlying opportunity cost. Thus, if historical returns guide expectations of future returns, historical returns provide a useful benchmark and, within reasonable bounds, reflect the opportunity cost of capital. In this respect, the Historical Returns methodology can be viewed as a market-based approach of Comparable Earnings, and thus fully satisfies *Bluefield* and *Hope* criteria. The key to successfully applying this approach is to

identify and measure historical returns in a manner that reasonably reflects expectations of investors about the future outlook.

Historically realized returns and future expected returns of financial assets are ordered according to risks. This ordering according to risks is a natural and inevitable result of competitive financial markets: because risk is costly, higher costs must be offset by higher returns. While it is not based upon an explicit model, the analysis of the risk premia among classes of risky assets provides a means to infer the underlying opportunity cost of capital. The underlying concept of the risk premium approach is that *differences* in perceptions of risks among financial assets such as equities and debt are revealed in differences between the historical market returns. The historical differences between equity and debt returns—*i.e.*, the Risk Premium—can thus serve as a surrogate for the compensation for risk in the future. Risk premia, when combined with the expected cost of debt prospectively, provides a useful benchmark to gauge the underlying cost of equity capital.

The application of the Risk Premium approach contains two potential pitfalls, as follows:

- the opportunity cost of common equity capital, stated in nominal terms is a responsive to the demand for and supply of capital, as discussed above;
- the observed risk premia between debt and equity is quite sensitive to expected inflation. As a consequence, the *ex ante* application of the Risk Premium methodology, must adequately account for expected inflation in the future. That is, the underlying rate of inflation and conditions of the historical period over which risk premiums are estimated must match that of the expected conditions of the relevant period over which the common equity recommendation is being applied, and over which electricity distribution charges are being set.

The risk premium approach to estimating the cost of equity capital derives its usefulness from the simple fact that while equity return requirements cannot be readily quantified at any give time, the returns on bonds can be assessed precisely at every instant in time. If the magnitude of the risk premium between stocks and bonds is known, then this information can be used to produce the cost of common equity. This can be accomplished retrospectively using historical risk premiums or prospectively using expected risk premiums.

Three issues need to be addressed in applying the risk premium approach: measurement, stability and risk adjustment. First, the approach has to define how the general levels of the risk premiums are measured, or alternatively expressed, how the relationship between risk and return in capital markets should be measured.²⁵ Second, the application of this approach must address the issue of stability of the level of risk premium over time. The typical assumption is that changes in interest rates do not have a significant effect on the required risk premium. However, there remain questions about whether the risk premium remains constant over time or can be modeled as a function of other factors that determine the level. Third, there arises the issue of adjustment to the risk premium to account for the risk profile of a given utility.

Risk premium approaches can be divided into two groups: historical and expected (i.e., future) risk premium based estimates. The historical approach to estimating the risk premium entails an examination of the historical returns actually earned from investments in stocks and bonds. The risk premium is simply the difference between the historical realized returns on stocks and bonds. A variation on this approach estimates the relationship between earned book returns on equity and bond yields over some reference period, and then applies the relationship to a specific utility's current borrowing costs.²⁶

Several issues arise in applying the historical approach. First, realized risk premium results are sensitive to the choice of time period over which the security return data are compiled. The length of the period and the choice of end points can make a significant difference in the results. Second, a distinction can be made between expected and realized returns, which raises the issue of whether the historical approach that assumes the average realized return is an appropriate proxy for the expected return. The average will be an unbiased estimator if the unanticipated component of the return on stocks is equals the unanticipated component on bonds.

²⁵ This relationship is typically represented by the slope of the capital market line (CML), and leads immediately to question about what point in time or over what time period the relationship should be measured in terms of the CML.

²⁶ A similar approach can use authorized (allowed) returns on equity instead of earned returns on equity.

The alternative to the historical approach is to estimate the risk premium using a model of the differences in the expected returns on investments in common equities and in bonds. As with implementation of the historical approach, several issues must be addressed including (1) the choice of an appropriate debt security; (2) the selection of a representative sample of equity securities and a method for computing returns; (3) and the adjustment of the risk premium to account for comparable risk.

3.4 Arbitrage Pricing Theory (APT) and Multi-Factor Models

Another theory relevant to the issue of estimating the cost of capital for Ontario LDCs is the Arbitrage Pricing Theory (APT), which is based on a similar economic intuition as CAPM, but provides a much more general framework for modeling purposes, and offers a potential improvement over the CAPM approach to estimating the ERP. In practice, the application of APT results in the formulation of multi-factor models for the estimation of the cost of capital for a given investment asset.

APT takes the view that relevant risks can assume several dimensions other than optimally diversified financial market risk alone, which is inherent to mean-variance theory. The generality of APT accords with the intuition that interest rates, inflation, and the level of business activity have important impacts on market return volatility, and thus risk. The framework for multi-factor models accommodates numerous dimensions of risk associated with systematic state variables, with extracted market factors, and with idiosyncratic factors of individual financial assets. Such sources of risk are unspecified within the general framework for APT, however. The intuitive appeal underlying factor models provides practitioners with a variety of relatively new and practical tools to assess the risk-return tradeoff and, in the case of the utility industry, potentially estimate more accurately the cost of capital.

What are the relevant risks that define market return requirements? As mentioned, APT and general factor models do not specify relevant measures of risk or even how many risk metrics exist. However, academic and commercial research suggests that several primary sources of risk consistently impact market returns, and thus return requirements. Among others, relevant risk metrics can be investor confidence, monetary policy, expected

inflation, and financial market performance, along with firm-specific (idiosyncratic) factors.

As a general theory, APT recognizes that the underlying cost of capital is a positive function of risk factors only. In practice, the challenge of estimating factor models is empirical. Namely, what is the plausible set of relevant risk factors that impact the cost of capital and thus ultimately the rate of return requirements?

The conceptual framework underlying factor models is premised on the standard three properties described throughout, namely:

- investors are risk averse. For a given level of expected returns, investors prefer lower risk to higher risk.
- the cost of capital is a positive function of risks, as perceived by investors. The market value and worth of financial assets is ordered according to perceived risks.²⁷
- financial assets are efficiently priced by markets comprised of many buyers and sellers. Efficient markets are a result of information symmetry, such that individual investors have ready access to a common set of information regarding the future prospects and risks of assets. Accordingly, opportunities for above-normal returns, on an expected value basis, are exhausted, and individual investors cannot systematically select assets that realize *ex post* returns above expected returns.

The generalized conceptual model for CAPM (refer to footnote 10) is applicable to the formation of multi-factor models. Since expected market returns are equal to the cost of capital, expected returns are therefore a function of the relevant risk factors, which enables the generalization and expansion of the CAPM framework, as follows:

$$\begin{aligned} E[r_j(t)] &= f(E(F)) \\ &= E(F_1) + E(F_2) + \dots + E(F_M) \quad \text{for all } m=1, 2, \dots, M. \end{aligned} \quad (6)$$

In (6), expected market returns of asset j , $E[r_j]$, are stated as a function of the expected value of risk factors m .

²⁷ This means that if perceived risks—measured as the variance of market return (σ)—are greater for asset A than for asset B, the market price of asset B will be greater than the market price of asset A. Stated differently, investors will price asset A lower than asset B so that its expected future market return is *greater* than that of asset B. This ensures that, by holding asset A, investors are compensated for assuming higher risks.

The above properties are generally common to cost of capital methods such as discounted cash flow, risk premium, market-based comparable earnings approaches, and CAPM. However, with the exception of CAPM, these approaches only implicitly incorporate risk. In contrast, multi-factor models provide a framework for an explicit representation of risk.

Multi-factor models impose no limitations regarding the definition of risk factors, or how factors can be incorporated into the general framework. However, factor models also give no guidance about the relevant, perceived risks harbored by investors.²⁸ The task at hand, then, is empirical: to identify the relevant, perceived risk factors that determine the expected rates of return. This task is carried out through an empirical assessment of the relationships between various quantifiable risk factors and actual (*i.e.*, realized) market returns.

A generalized multi-factor model²⁹ can be specified as a return generating process where expected market returns to financial assets are a linear function of risk factors. The exposure of individual assets to specific risk factors is referred to as *factor loadings*. For each asset, the factor loading attending each risk factor is interpreted as a risk premium of the asset with respect to the risk factor. The value of the risk factor is referred to as the *price of risk*.³⁰

The realized return is defined as the end-of-period *ex post* return, and is represented as a function of the observed values of the relevant factors,³¹ as follows:

$$\begin{aligned} r_j &= a + f(F_m) \\ &= a + \sum_j b_{jm} * (F_m) \quad \text{for all } m=1, 2, \dots, M \end{aligned}$$

²⁸ However, economic theory and general intuition help define the relevant factors *a priori*. For example, Irving Fisher many years ago described how the rate of interest can be stated in real and nominal terms, and how the cost of capital is a function of expected inflation. Fisher's theory provides a basis to infer how the expected rate of inflation influences market rates of return. Similarly, history reveals that profits generally rise with increased economic activity. Thus, we can expect that some measure of real economic activity will be positively related to *ex post* market returns.

²⁹ As referenced in Roll and Ross (1985). Also, an early unpublished study of return generating processes involving multiple factors can be found in Brennan (1971).

³⁰ This is equivalent to the market β estimated in the CAPM.

³¹ Thus, the expectations operator is absent from equation (7).

$$= a + b_{j1} * F_{j1} + b_{j2} * F_{j2} + \dots + b_{jM} * F_{jM} \quad (7)$$

The risk factors, F_m , describe the risks attending asset j and determine the return generating process of j . Some or perhaps all of the relevant risk factors can be idiosyncratic to asset j .³² It is highly likely, however, that some of the relevant risk factors are common to many if not all, financial assets, and that such factors are external to financial markets (*i.e.*, exogenously determined). These common factors are generally referred to as *systematic factors* or state variables. Nonetheless, idiosyncratic factors—factors specific to individual assets or industries—can also have significant impact on the total risk of the underlying assets.

The inclusion of systematic factors along with idiosyncratic factors gives rise to the following model formulation:

$$\begin{aligned} r_j &= a + \sum_s c_{js} * (F_{js}) + \sum_n b_{jn} * (F_{jn}) \\ &\quad \text{for all } s=1, 2, \dots, S \\ &\quad \text{for all } n=1, 2, \dots, N \\ &= a + c_{j1} * F_{js=1} + c_{j2} * F_{js=2} + \dots + c_{jS} * F_{jS} + b_{j1} * F_{jn=1} \\ &\quad + b_{j2} * F_{jn=2} + \dots + b_{jN} * F_{jN} \end{aligned} \quad (8)$$

In (8), risk factors s refers to systematic factors common to all (or most all) financial assets, whereas risk factors n refer to idiosyncratic factors.³³

The right-hand-side variable, a , is the rate of return absent risk (*i.e.*, the riskless rate) and, in the context of the CAPM and other formulations such as APT, is referred to as the risk free return. CA Energy Consulting has worked on the development of empirical APT (multi-factor) models on behalf of a consortium of major electric utilities in the U.S. So far, we have demonstrated an APT model inclusive of five common factors. These explanatory factors appear as statistically significant variables that represent plausible factors affecting investors' expectations for equity risk premia such as business

³² A particularly interesting result is that, if the risk factors of the individual assets of a portfolio are idiosyncratic and uncorrelated, the risks of the assets can be completely diversified. Also, if the factors are completely idiosyncratic, the appropriate notation of the factor loadings is b_m , rather than b_{jm} .

³³ If risk factors n are idiosyncratic to asset j and have no influence on assets $i \neq j$, the appropriate notation of the factor loadings is b_n , rather than b_{jn} .

confidence, time horizon and payout, expected inflation, general business activity, and overall market activity. Our models are able to explain 40% of total variation in monthly returns realized by a sample of large electric utilities. Five factor models—and larger models as well—have been applied previously. The major research challenge, which is of keen interest, is finding the appropriate set of idiosyncratic factors.

The application of a multi-factor model may offer improvements over the estimation of a single “market beta” in the CAPM. As mentioned above, we firmly recommend that the Board and Board staff consider fully the prospects of adopting this modeling approach in conjunction with use of the CAPM and other tried and true methods of estimating the common equity return returns—essentially a cost of capital tool box. The estimation uncertainty is simply too great to rely upon CAPM alone.

3.5 Weighted Average Cost of Capital (WACC) and Overall Rate of Return

Traditionally, the allowed rate of return in regulatory hearings is calculated as the weighted average of the cost of capital (“WACC”) of each individual component of the capital structure weighted by its book value.

The notion of an optimal capital structure is premised on some straightforward behavioral postulates about investors’ tradeoffs of business risk and financial risk. As a utility increases the relative amount of debt capital in its capital structure, total fixed charges increase, and the probability of failing to meet the growing fixed charge burden increases also. The residual earnings available to common shareholders become increasingly variable and riskier as the utility increases its financial leverage, causing shareholders to require a higher return on equity.

The relationship between the average cost of capital and capital structure emerges from debt and equity return requirements. At a zero debt ratio, the cost of capital is coincident with the cost of equity. With each successive substitution of low-cost debt for high-cost equity, the average cost of capital declines as the weight of low-cost debt in the average increases. A low point is reached when the cost advantage of debt is exactly offset by the

increased cost of equity. This is the optimal capital structure point. Beyond this point, the cost disadvantage of equity outweighs the cost advantage of debt, and the WACC rises accordingly.

Utilities should strive for a capital structure that minimizes the composite capital cost while remaining sufficiently flexible. Finding the optimal capital structure is not easy, and the idea of a specific capital structure for all Ontario's LDCs, as a matter of the imputed capital structure, must be approached with caution.

4 Profiles of LDCs

Appendix 3 presents profiles of the Ontario electric distributors. As can be observed, the distributors constitute an enormous range of business context, size in particular. The returns to capital, as shown, are significantly below reasonable estimates of the cost of capital and are risky.

Through our Comparators and Cohorts analysis for the Ontario Energy Board work as well as the immediate engagement, we have participated in several forums discussing the highly varied business environments and issues facing Ontario's LDCs, and have an appreciate for the challenges associated with managing the current issues including changes in market and regulatory structure and requirements.

5 Empirical Analysis of Cost of Equity Capital, Ontario LDCs

This section presents the results of the analysis of the cost of equity capital appropriate for the determination of the rate of return for Ontario LDCs. Recommendations regarding the appropriate rate of return are not, alone, a mechanical model-driven results obtained in isolation, and an understanding of business context to gauge capital risks is essential. Cost of capital simply cannot proceed in an adequate fashion without being fully sensitive to the facts defining the risk profiles of the utilities and the overall investment environment.

The general empirical approach begins by assessing the situation and context of the Ontario distributors. This approach helps gauge the overall business context of the

Ontario distributors including the various business and financial risks that they face in the ongoing course of the providing distribution services. This involved many discussions and conference calls with the Electricity Distributors Associates and its members and draws upon a number of documents that are currently available from various sources (as reported herein).

The analyses reported here utilize four approaches discussed above including discounted cash flow, CAPM, risk premium and comparable earnings. The methods are applied to samples of U.S. and Canadian companies. The U.S. companies are traded on the New York Stock Exchange (NYSE) and the National Association of Security Dealers' market known as NASDAQ, and operated by NASDAQ Stock Market LLC. While estimates of the cost of capital are inherently forward looking, the process of estimation draws upon historical assessments of risks and the future prospects for market returns—essentially, the returns to investors and savers as holders of property rights claims to capital in the form of financial assets.

In the case of the U.S. experience, the cost of capital estimates are based on samples of medium and comparatively small-sized electric utilities, natural gas utilities, and comparable risk non-utility companies. In the case of the Canadian experience, the analysis is based on a sample of utilities listed on the Toronto Stock Exchange, TSX.

The analyses draw upon recent and historical experience to assess capital risks and the future prospects for capital returns. The following tables summarize the analysis conducted using four approaches, first presenting CAPM results for the sample of Ontario utilities, and followed by analyses using the DCF, CAPM, Risk Premium, and Comparable Earnings approaches for the U.S. utilities.

Table 2 Discounted Cash Flow Analysis, U.S. Utilities

Small-Sized Electric Utilities		
Estimated Cost of Equity (%)	Dividend Yield (%)	Expected Growth In Cash Flows (%)
9.2	4.4	5.3
Gas Distribution Utilities		

Estimated Cost of Equity (%)	Dividend Yield (%)	Expected Growth In Cash Flows (%)
9.6	4.4	5.3

Table 3 CAPM Analysis: U.S. Companies

Capital Asset Pricing Model				
Canadian Utilities				
Estimated Cost of equity (%)		Riskless Rate (%)	Beta	Market Risk Premium (%)
10.5		4.2	0.75	8.3
Small-Sized Electric Companies				
Estimated Cost of Equity (%)		Riskless Rate (%)	Beta	Market Risk Premium (%)
10.8		4.7	0.73	8.3
Gas Distribution Utilities				
Estimated Cost of Equity (%)		Riskless Rate (%)	Beta	Market Risk Premium (%)
10.9		4.7	0.65	8.36
Comparable Risk Non-utilities				
Estimated Cost of Equity (%)		Riskless Rate (%)	Beta	Market Risk Premium (%)
9.1		4.7	0.52	8.3

Table 4 Comparable Earnings: U.S. Companies

Historical Market Returns (%)	
Electric Utilities	11.1
Gas Distribution Utilities	11.4
Comparable Risk Non-Utility Companies	11.30

Table 5 Risk Premium Analysis: U.S. Companies

Risk Premium for U.S. Utilities, Non-Utilities	
	Risk Premium (%)
Electric Utilities	12.2
Gas Distribution Utilities	12.0

Comparable Risk Non-Utility Companies	10.6
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(The results above do not incorporate issuance costs)

The estimated cost of equity capital using single-stage DCF analysis is somewhat below the three-stage DCF approach for the sample of small electric utilities, in view of the slowdown in earnings and cash flow growth during 2004 and continuing in 2005. The slowdown is in large part a result of rising input costs, particularly for new investment that is not being recovered in current rates. The dividends are the stated dividend rates during early to mid-2005, and the yields (market prices) are sampled from May-June of 2005. Expected growth relies upon a survey of analysts' assessments and historical experience for both internal cash flow and earnings per share.

The CAPM results utilize estimated Betas for the Canadian sample of utilities is based the period beginning in the year 2000 forward, and are estimated monthly. In the case of the U.S. companies, including utilities and non-utilities, the analyses are based upon Valueline estimates of CAPM Betas, and are also estimated monthly. Both analyses incorporate the Blume adjustment for long-run central tendency of Betas to trend toward unity.³⁴ The U.S. electric and gas utilities draw upon more contemporary Betas, estimated over the 60-month period ending in 2005, as it appears that the underlying market risks of electric and gas utilities have risen in the contemporary period. The CAPM analysis of the non-utility U.S. companies, however, utilize the average Betas estimated over successive 60-month timeframes, although the incremental gains in information is not as great as what it might be suggested by the longer period over which estimates are made. As can be seen in the attached exhibits, the so-called risk free or riskless cost rates used within the CAPM framework are not consistently drawn. In the case of the Canadian CAPM analysis, the risk free rate is the contemporary ten-year yield

³⁴ The so-called Blume methodology derives from the work of Marshall Blume, as first presented in the article "On the Assessment of Risk", *Journal of Finance*, Vol. 26, 1971. The alternative approach to adjust the estimated raw Betas is the so-called Vasicek technique, as proposed by O.A. Vasicek in "A Note on Using Cross-Sectional Information in Bayesian Estimation of Security Betas," *Journal of Finance*, vol. 28, 1973. Generally speaking, the Vasicek approach is considered the preferred methodology though considerable information is required for implementation. Commercial financial services including Bloomberg, Compustat, and Valueline. Ibbotson Associates employs the Vasicek correction method.

on government debt, whereas in the case of the U.S. analysis, it is the average of 10-year yields sampled from historical periods that match fairly well with current investor expectations. Specifically, the historically risk free cost rate used in the U.S. analysis is 4.73%, while long-term U.S. nominal bond rates are currently at 5.05%, suggesting that the U.S. CAPM analyses somewhat understate the cost of equity capital. For reference, the inflation-indexed U.S. long-term government bond yield resides at 2.53%, suggesting 2.5% rate of effective inflation, which we find to be best captured by the chain-weighted GDP price deflator.

The risk premium approach draws upon observed historical risk premia among the realized market returns for debt and equity vehicles. Risk premia can be calculated in many ways. The analyses, here, draw upon the risk premia reported and published by Ibbotson Associates. The analyses suggest that efficient capital markets demand substantially higher market rates of return on equity vis-à-vis debt of various terms. Specifically, equity risk premia are reported with respect to short-, intermediate-, and long-term government debt. We summarize risk premia within the tables that comprise Appendix X.

It is worth noting that progressively higher equity risk premia attend small-sized companies, particularly micro-sized companies like the Canadian distributors. For this reason, our estimated cost of capital results and rate of return recommendations are conservative and, in fact, may understate the underlying cost of capital for Ontario distributors. EDA and Christensen Associates Energy Consulting wish to explore this issue and its implications within the upcoming technical conference associated with the immediate proceeding. The U.S. CAPM analysis results, including equity risk premia for Very Small-sized Companies, are shown in the appropriate pages of the Appendices. Unfortunately, we do not have empirical estimates of the size-differentiated risk premia for Canada to draw upon and, conservatively, have elected to not impute the U.S. size-premia to the Canadian experience. However, we suggest that empirically-based size premia for Canada, particularly given the small-sized utilities in Canada, is a topic worthy of further exploration by the Board and Board staff.

The fourth approach to our overall framework to estimation of cost of equity capital, Comparable Earnings, is in keeping with a market-based analysis. Namely, the only relevant basis for Comparable Earnings, as a matter of interpretation is to determine to Historical Market Returns, as history to a substantial extent is the basis upon which investors form expectations. In fact, such approach is well founded by empirical evidence of capital market experience. For this reason, we draw upon the historical market returns realized by the sample of utilities and non-utility comparable risk Canadian and U.S. companies. These results do not require explanation, though we wish to mention that the historical returns attached in the Appendix hereto incorporate realized dividends by shareholders. Finally, we wish to note that interpretation of Comparable Earnings as either book returns to capital or authorized returns, as is so often the case, is a clear case of circular reasoning where regulators set book returns on a basis of book returns set by others. This results in book returns potentially departing from the underlying cost of capital by substantial margins. We thus suggest that the Board simply reject and ignore, in its determination of the rate of return level(s) for Ontario distributors, all evidence as regards to either book or authorized rates of return.

As shown above, the cost of equity capital for electric and gas utilities as well comparable-risk non-utilities suggests that the underlying cost of equity and rate of return, resides within the range of 9.3 – 12.9%, suggesting a mid-point value of 11.10%. This overall result is without adjustment for issuance costs associated with common equity. The recommendation of Board staff of 0.5 percentage points to cover the issuance costs associated with common shares is reasonable and is accepted for use in our analyses here. Inclusion of issuance costs within the estimated cost of equity capital implies an overall cost of equity capital to Ontario distributors, and our recommendation for rate of return on common equity, for the purpose of determining electric distribution rates resides in the neighborhood of 11.60%.

Appendix III provides all of the details regarding the CAPM inputs for individual companies used in the sample. Similar tables of the analysis results will also be presented in Appendices IV and V.

6 Recommendations Regarding the Rate of Return for Ontario LDCs

We recommend that the Board adopt a flexible policy approach to the determination of the overall weighted average cost of capital for Ontario distributors. A flexible approach has several attractive features and, in particular, accommodates the widely varying needs of the LDCs. The proposed approach contains several key components that we describe below.

6.1 Capital Structure

A flexible approach suggests that the Board codify policy that finds acceptable, for use in determine electric distribution rates, an overall capital structure of individual LDCs in which the capital structure is found to be reasonable and consistent with prudent financial management. We recommend the Board establish five principles to define the policy for capital structure, as elaborated below.

First, the Board should define criteria for defining the reasonable and prudent capital structure as an acceptable range of leverage rates, rather than as a constant, unique ratio.

Second, the range should be identified and expressed in terms of the participation of all elements comprising total debt, including short- and long-term debt, and for equity within total capital.

Third, we recommend that the Board adopt 42% – 52% as the acceptable range for equity participation, with the corresponding range for debt participation set within the range of 58% – 48%.

Fourth, we recommend that, where the extant capital structure resides outside the range defined as reasonable and prudent, the Board at its discretion should consider pursuing one of two policy options:

- utilize a higher authorized rate of return on equity, where the debt participation is unusually high. Conversely, where debt participation within total capital resides at unusually low levels, employ a lower cost of equity for the determination of the authorized rate of return, *or*

- impute a hypothetical capital structure.

Fifth, in cases where the electricity distributor's capital structure does not fall within the acceptable ranges, the distributor should be given the opportunity to demonstrate that the extant capital structure for purposes of setting electric distribution rates is reasonable.

Any recommendation for significant changes to the capital structure for regulated utilities bears serious consideration. While the determination of the optimal capital structure is fraught with challenges, and the topic continues to attract research and remains a topic of debate within corporate finance and academic circles, there is no exact scientific method or formula to derive a specific utility's optimal capital structure. Consequently, caution should be exercised in taking steps to dramatically alter the capital structure used to determine electric distribution rates.

In addition, and as we have discussed, such policy has implications for the estimated cost of equity capital. The degree of corporate leverage has impact on both the cost rates of common equity and debt. Significant changes in the leverage rate cannot be made without consideration of concomitant changes to the equity risk premium. Changes to the leverage rate cannot be considered in isolation from the effects that such changes will have on the cost of equity capital or on what would be the implied cost of equity capital. For example, an increase in the share of debt will be expected to carry with it a corresponding increase in the cost of equity capital.

The OEB staff's recommendation is to apply a capital structure to all Ontario LDCs of 60% debt and 40% equity. This level of leverage implies a significant change in the implicit capital structure for many LDCs, in which case for many would actually result in a significant increase in the share of debt in total capital. The implications of changes in the leverage rate for some LDCs would be to significantly alter the revenue requirements, which in turn could significantly reduce or potentially threaten to reduce the LDC's debt coverage.

The recommended staff level of debt participation in total capital is not wholly unreasonable. However, we suggest that the Board and Board Staff give consideration to somewhat higher equity participation, where equity levels within a range of 42 – 52%, with a corresponding level of debt participation of 58 – 48% are viewed as acceptable.

We should mention that the issuance of debt for small utility companies tends to be somewhat indivisible and lumpy within the context of the existing capital structure. Also, small (capitalized) entities, such as the Ontario LDCs, will tend to use a much higher share of short-term debt because of the high sensitivity of short-term financing needs for funding for unplanned events and to provide a cash bridge between revenue and costs for inputs. In addition, such entities will often have in place established short-term debt facilities with lending institutions, where the facilities have customized features and flexibility to accommodate individual circumstances. Finally, short-term debt is often built up over 2-3 year timeframes (or longer) prior to the issuance of long-term financing vehicles including debt and equity. Because issuance costs can be significant for smaller entities, it is useful to extend short-term debt to fairly high levels prior to the issuance of the long-term vehicles which is then used to “buy down” the extended outstanding short-term amount.

In summary, flexibility of capital structure and financing is an important operating consideration, and is of particular importance in Ontario given the fact that the LDCs are faced with substantial infrastructure investments in the near future, including investments in the Smart Meter program, which as we have mentioned previously, faces the prospect that the allowed depreciation rates will not provide a sufficient fund to cover replacement costs.

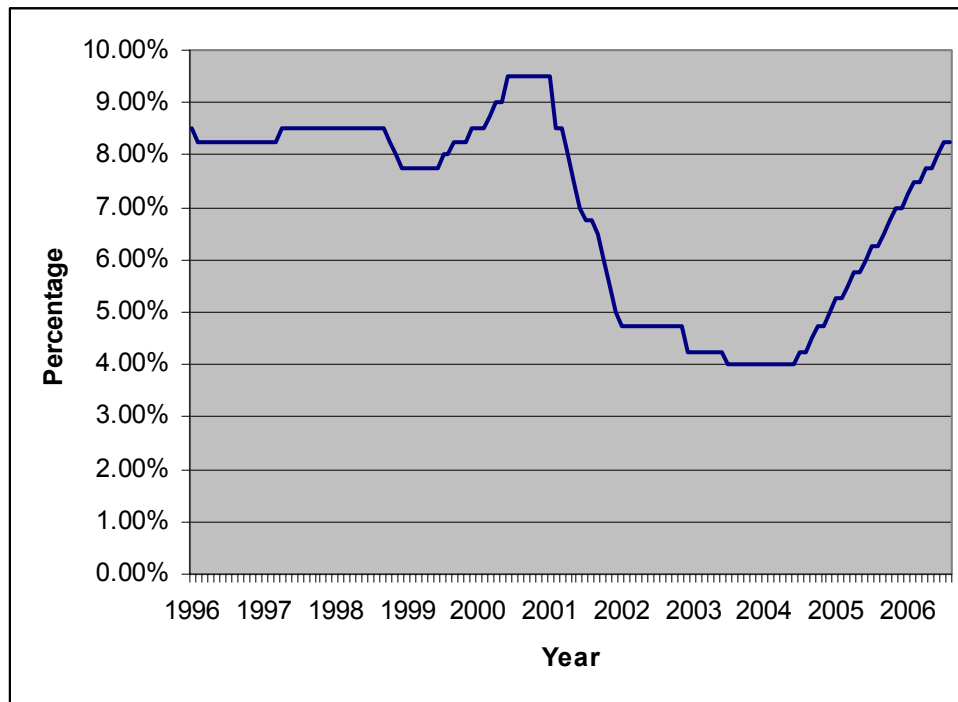
6.2 Long-term Debt Cost Rate

Board and Board staff should utilize the overall cost rate of existing and new long-term debt of individual LDCs, providing that the cost rate closely approximates the market cost of long-term debt *at the time of issue*. Departure from the true cost of long-term debt, in the process of determining electric distribution rates, results in inappropriate windfalls favoring electricity consumers or, potentially shareholders, as we have discussed previously. Accordingly, departures from existing debt can be interpreted as a violation of the principles of cost-based ratemaking.

The importance of using the observed contract rates for long-term debt cost rates, in the context of cost-based ratemaking is evidenced by the pattern of short (and long) term interest rates. Essentially, long-term debt is akin to locking in a forward price, and avoids

potential large swings in interest costs. The effects can be significant.. As Figure 2 illustrates, the Prime Interest Rate [1] has moved from the nearly historic lows achieved during the period from 2001 to 2004 to levels that are more consistent with the longer term, reaching levels of around 8.25% in mid 2006.³⁵[1][2]. The pattern for Canada is similar to that of the U.S., as shown in Figure 2 which plots the Bank Rate over the period 2000 to mid-2006. Again, the historic lows reached in the period 2001 to 2004 are unlikely to return soon. The Bank Rate in Canada has increased and is trending toward the levels seen in the period prior to 2000.³⁶[2][3].³⁷

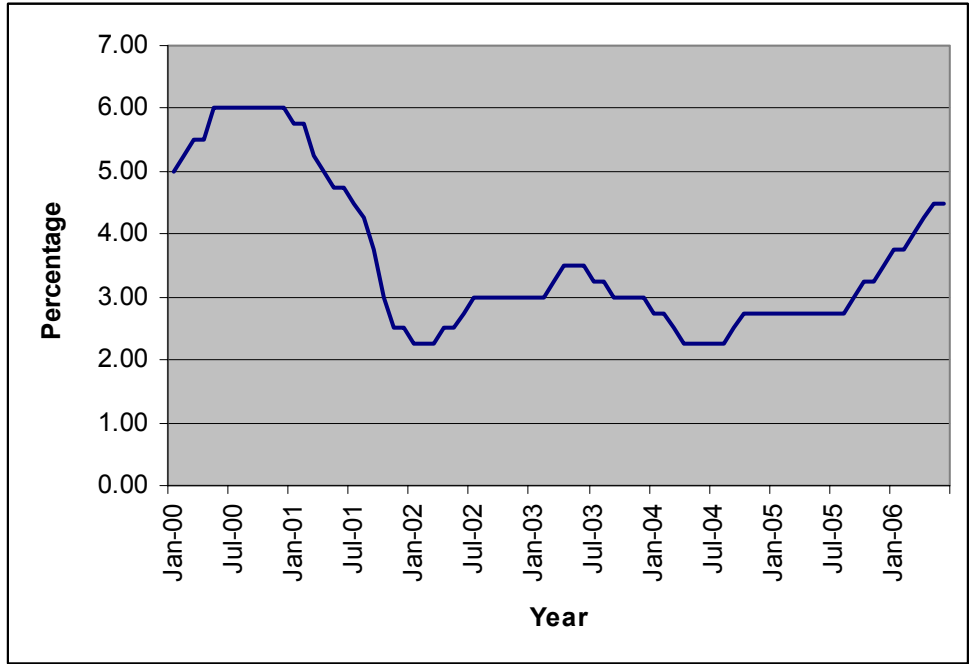
Figure 2 Prime Interest Rate 1996 to 2006³⁸



³⁷ Source: Bank of Canada website August 2, 2006, http://www.bankofcanada.ca/cgi-bin/famecgi_fdps
 Both Figure 1 and Figure 2 are used solely for illustrative purposes. The interest rates represented in each figure cannot be compared directly.

³⁸ Source: Federal Reserve Bank of St. Louis website: <http://research.stlouisfed.org/fred2/data/PRIME.txt>.

Figure 3 Canadian Bank Rates 2000 to Mid-2006



6.3 Short-term Debt Cost Rate

Short-term debt is used to provide for cash needs of utilities and provide a bridge between revenue and cost input flows. Short-term debt also funds the gradual expansion of capital needs and, once short-term balances reach relative high levels, such debt is then converted in longer term vehicles, and short-term balances are paid down. Finally, short term debt provide the means fund resource input needs that result from unexpected events including higher expenditures for power supply that may come about from season variation in weather. Board and Board staff should incorporate short-term debt and the cost of short-term debt within the overall capital structure. Short-term debt, because it serves these multiple needs should be assigned or aligned with working capital. Second, exclusion of short-term debt from the capital structure can give rise to unbalanced capital structures for small utilities like Ontario’s LDCs. This result comes about because short-term financing vehicles allow for interim financing of investment and cash flow needs of utilities. As mentioned above, as the balances of short-term debt rise, it is converted to long-term debt and equity. Hence, the equity and long-term debt participation levels, for

small entities like Ontario LDCs, can demonstrate rather abrupt changes when viewed in isolation from short-term debt. Particularly for small utilities, short-term debt is vital. Essentially, short-term debt serves a long-term function along with other sources of capital, together underwrite the cash needs and permanent capital resources of the LDCs. In addition, the notion that short-term debt is assigned to working capital ignores the reality of the overall pool of capital funding, operated by the treasury function. In short, it is impossible to trace or track the sources and uses of the overall pool of capital funds through a treasury.

6.4 Cost of Equity Capital

As shown above, the estimates cost of equity capital for Canadian utilities, and electric and gas utilities as well as comparable-risk non-utility companies within the U.S. suggest that the underlying cost of equity and rate of return resides in a broad range greater than two percentage points. Further, our assessment indicates that a plausible equity rate of return, particularly when risk premia associated with small size is accounted for, gives a rate of return recommendation of 11.00%. With the addition of issuance costs, the overall recommendation for the cost of equity capital is 11.50%.

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Technical Appendices

APPENDIX I

Present Value of Investment and Derivation of the Constant Growth and Multi-Stage Discounted Cash Flow Model (DCF)

Present Value Theory

As wages are the compensation to labor, interest is the compensation or return to savings and capital. Savings is the share of current income held back to be consumed in later periods. A unit of current consumption has greater value than an equivalent amount of consumption later. Hence, savings must obtain greater consumption later, in order to compensate for its reduced (discounted) value.

The inducement to save is interest; essentially, the accrual of interest on savings offsets the reduction in value of later consumption vis-à-vis current consumption. Without the expectation of interest, savings would be largely exhausted as consumption in the current period. Savings are invested and, over time, give rise to and constitute the accumulation of capital. Savings realize the market rate of interest. Savings and investment—and thus the accumulation of capital—rise as expected interest increases.

Returns to savings, investment, and capital can be viewed as cash flow returns, and can be stated as an annual percentage amount. Cash flows in subsequent periods forego the interest that would have accrued on earlier cash flows. Because of foregone interest, later cash flows are worth less than those of earlier periods by the amount of interest that would have been realized on the earlier flows.

Cash flows over time can be ordered with a discounting procedure commonly known as present value. Present value revalues future cash flows according to the accrual of interest that would have been realized, had they occurred in the present. Specifically, the cash flow within a time step is discounted by a factor equal to the inverse of one plus the market rate of interest, k , compounded by time t — $(1/(1+k))^t$. The present value procedure can be shown more formally as:

$$PV = \frac{CF_1}{(1+k)^1} + \frac{CF_2}{(1+k)^2} + \frac{CF_3}{(1+k)^3} + \dots + \frac{CF_n}{(1+k)^n} \quad (1)$$

or,

$$\sum_{t=1}^n \frac{CF_t}{(1+k)^t} \quad (2)$$

where,

PV = present value

CF_t = cash flow in time t

k = market cost (rate) of interest.

Hence, $1/(1+k)^t$ is the discount factor by which the cash flows at time t are reduced.

Present value analysis equates cash flows at different points in time to the present, and constitutes a fundamental principle of financial and investment analysis. Essentially, present value normalizes the cash flows at the market rate of discount.

Consider a cash flow occurring at time, $t=0$. Since the cash flow occurs in the present and, unlike the subsequent cash flows shown in (3), below, no interest is foregone and thus it is not discounted:

$$NPV = CF_o + \frac{CF_1}{(1+k)^1} + \frac{CF_2}{(1+k)^2} + \frac{CF_3}{(1+k)^3} + \dots + \frac{CF_n}{(1+k)^n}. \quad (3)$$

Presume that a savings agent, a household, invests savings. The purchase of an investment or financial asset such as securities or other liquid assets by the agent constitutes a negative cash flow – an outflow of money. It is the expectation of positive cash flows later that induces the purchase. Positive cash flows prospectively, as expected, tend to balance the negative cash outflow associated with the purchase of the asset. All negative and positive cash flows are contained in net present value, as shown in (4) below:

$$NPV = -CF_o + \sum_{t=1}^n \frac{CF_t}{(1+k)^t} \quad (4)$$

where,

$NPV =$ net present value – *i.e.*, the net of all positive and negative cash flows

If net present value (NPV) is positive, the investment action is “economic” in the sense that the expected positive cash flows, discounted at the market cost of capital, are greater than—or at least equivalent to—the purchase price of the asset, the negative flow.

Competitive capital markets—or the processes of market competition—seek to discover and exhaust all opportunities for positive and negative present values. That is, the *expected* NPV of investment opportunities approximates zero, given the implicit rate of discount harbored by investors. Essentially, the market value of assets is driven to its competitive level prospectively because of arbitrage inherent to competitive markets. Market forces bid prices up in the presence of expected positive returns (NPV), or bid prices down if negative returns are expected. The discounted positive cash flows equate to and balance the purchase cost of the asset, as shown in (5), below:

$$CF_o = \sum_{t=1}^n \frac{CF_t}{(1+k)^t}. \quad (5)$$

In market equilibrium, then:

$$P_o = \frac{CF_1}{(1+k)^1} + \frac{CF_2}{(1+k)^2} + \frac{CF_3}{(1+k)^3} + \dots + \frac{CF_n}{(1+k)^n} \quad (6)$$

$$P_o = \sum_{t=1}^n \frac{CF_t}{(1+k)^t} \quad (7)$$

where,

P_o = market price at time $t=0$.

The market cost of capital implicitly incorporates investor's perceptions of risk and expectations about inflation over the life of future cash flows. It is straightforward to solve for the market cost of capital, k , as we are confronted with one equation and one unknown value. For example, to solve for the internal rate of cost of a debt obligation of a borrowing firm, such as bond, simply determine the internal rate of discount that equates the positive cash flow occurring at time zero, CF_o , and the negative flows, $-\Sigma CF_t$, which represent the annual interest cost and retirement of the principle. The discounted negative cash flows from the perspective of the borrowing firm can be shown as $-\Sigma CF_t / (1+k)^t$. The analysis problem for lenders is precisely the same except that the signs attending the cash flows are reversed. Hence, the rate of discount is both the opportunity cost of capital to investors, given market arbitrage, and the cost of capital to the borrowing firm.

Constant Growth Discounted Cash Flow

For equity capital, investors' expected earnings reflect expectations of future cash flows associated with shares of stock, and thus determine the stock price currently. Assume that investors expect earnings, E_t , and dividends, D_t , to grow at some constant rate, g , over the future, such that:

$$\begin{aligned} E_t &= (1+g)E_{t-1} & (8) \\ E_1 &= (1+g)E_0 \\ E_2 &= (1+g)E_1 = (1+g)^2 E_0 \\ &-- \\ &-- \\ &-- \\ E_n &= (1+g)^n E_0 . \end{aligned}$$

Dividends of course are a function of earnings and therefore represent, along with price appreciation, the discounted cash flows. Dividends can thus be shown similarly to that of earnings, as below:

$$\begin{aligned} D_t &= (1+g)D_{t-1} & (9) \\ \text{i.e., } D_1 &= (1+g)D_0 \\ D_2 &= (1+g)D_1 = (1+g)^2 D_0 \\ &-- \\ &-- \\ &-- \\ D_n &= (1+g)^n D_0 . \end{aligned}$$

Further, assume that dividends, D_t , are a fixed share, m , of earnings, E_t , such that:

$$D_t = mE_t \quad \text{and,} \quad D_t / E_t = m. \quad (10)$$

From equation (8), then:

$$D_t = m(1+g)E_{t-1} \quad (11)$$

$$\text{and,} \quad D_n = m(1+g)^n E_o.$$

Restating equation (7) to represent dividends as a fixed share of earnings which are paid out, provides:

$$\begin{aligned} P_o &= \sum_{t=1}^n \frac{mE_t}{(1+k)^t} \quad (11) \\ &= \frac{mE_1}{(1+k)^1} + \frac{mE_2}{(1+k)^2} + \frac{mE_3}{(1+k)^3} + \dots + \frac{mE_n}{(1+k)^n}. \end{aligned}$$

Observation will disclose that in fact the payout ratio is volatile and tends to offset the volatility in earnings so that dividend growth (realized cash flows) is smoothed.

Equation (12) can be restated to read:

$$\begin{aligned} P_o &= \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \frac{D_3}{(1+k)^3} + \dots + \frac{D_n}{(1+k)^n} \quad (12) \\ &= \sum_{t=1}^n \frac{D_t}{(1+k)^t}. \end{aligned}$$

The relationship between D_{t-1} and D_t is simply $(1+g)$, which is also the relationship between E_{t-1} and E_t defined in (8). And, with an assumed constant payout ratio or share of earnings, the following is obtained:

$$\begin{aligned} P_o &= \frac{D_o(1+g)}{(1+k)} + \frac{D_o(1+g)^2}{(1+k)^2} + \frac{D_o(1+g)^3}{(1+k)^3} + \dots + \frac{D_o(1+g)^n}{(1+k)^n} \quad (13) \\ &= \sum_{t=1}^n \frac{D_o(1+g)^t}{(1+k)^t}. \end{aligned}$$

Now, assume an infinite time horizon:

$$P_o = \frac{D_o(1+g)}{(1+k)} + \frac{D_o(1+g)^2}{(1+k)^2} + \frac{D_o(1+g)^3}{(1+k)^3} + \dots + \frac{D_o(1+g)^\infty}{(1+k)^\infty}. \quad (14)$$

Equation (15) above is simply a geometric series with a growth and discounting parameter, $(1+g)/(1+k)$, that defines the relative value of any two sequential terms.³⁹ Therefore, (15) may be expressed as:

$$P_o = \frac{D_o(1+g)}{(1+k)} \left[\frac{1 - [(1+g)/(1+k)]^\infty}{1 - (1+g)/(1+k)} \right]. \quad (15)$$

And since $[(1+g)/(1+k)]^\infty$ is zero,⁴⁰ and $(1-(1+g)/(1+k))$ is equal to $(k-g)/(1+k)$, the following form can be obtained:

$$P_o = D_o(1+g)/(k-g). \quad (16)$$

Multiplying through by $(k-g)$ and $1/P_o$, and rearranging gives:

$$k = D_o(1+g)/P_o + g. \quad (17)$$

This is the derived form of the constant growth Discounted Cash Flow model.

In addition, the assumption of an infinite time horizon can be relaxed. Assume that the investor has a finite time horizon, n , with a salvage value equal to P_n and a constant price-earnings ratio. Equation (14) is then restated as:

$$P_o = \sum_{t=1}^n \frac{D_o(1+g)^t}{(1+k)^t} + \frac{P_n}{(1+k)^n}. \quad (18)$$

Since $P_o/E_o = P_n/E_n$, $P_n = P_o(1+g)^n$. Thus, (18) can be restated as:

$$P_o = \sum_{t=1}^n \frac{D_o(1+g)^t}{(1+k)^t} + \frac{P_o(1+g)^n}{(1+k)^n}. \quad (19)$$

The first term on the right may be restated as described above, and incorporated into (20), shown below:

$$P_o = \frac{D_o(1+g)}{(k-g)} \left[1 - (1+g)^n / (1+k)^n \right] + P_o(1+g)^n / (1+k)^n. \quad (20)$$

Rearranging and simplifying terms obtains:

³⁹ With $(1+g) = d$, and $(1+k) = r$, a series of the form:

$$\sum_{t=1}^n a(d/r)^t = a \sum_{t=1}^n (d/r)^t.$$

This may be alternately expressed as:

$$a \frac{d}{r} \left[\frac{1 - (d/r)^n}{1 - (d/r)} \right].$$

⁴⁰ If $k > g$

$$P_o - P_o(1+g)^n/(1+k)^n = \frac{D_o(1+g)}{(k-g)} [1 - (1+g)^n/(1+k)^n] \quad (21)$$

or,

$$P_o [1 - (1+g)^n/(1+k)^n] = \frac{D_o(1+g)}{(k-g)} [1 - (1+g)^n/(1+k)^n].$$

Now, dividing both sides by $[1 - (1+g)^n/(1+k)^n]$ gives an equivalent result to (16):

$$P_o = D_o(1+g)/(k-g). \quad (22)$$

Rearranging terms provides:

$$k = D_o(1+g)/P_o + g. \quad (23)$$

Thus, the constant growth form of Discounted Cash Flow is derived for a finite time horizon.

Multi-Stage DCF

The model of constant growth over the future holding period may not be a fully satisfactory representation of investor expectations under some market conditions. The constant growth form can be generalized to a varying growth path or growth with stochastic elements. Such approach increases complexity.

As a practical matter, a useful extension of the constant growth model known as multi-stage DCF can be easily developed. Arguably, multi-stage DCF presents a platform for a more accurate representation of expectations of growth harbored by investors. A derived form of the multi-stage form is developed below:

Multi-stage DCF can be shown as a restatement of Equation 14 with three patterns or rates of growth applicable to specific forward timeframes or stages:

$$P_o = \sum_{t=1}^5 \frac{D_o(1+g_1)^t}{(1+k)^t} + \sum_{t=1}^5 \frac{D_5(1+g_2)^t}{(1+k)^t} (1/(1+k)^5) + \sum_{t=1}^{\infty} \frac{D_{10}(1+g_3)^t}{(1+k)^t} (1/(1+k)^{10}). \quad (24)$$

Each stage can be shown in a simplified form. We begin by separating out the first stage, S_1 – i.e., the first rhs term with growth = g_1 – as follows:

$$S_1 = \sum_{t=1}^5 \frac{D_o(1+g_1)^t}{(1+k)^t}. \quad (25)$$

Pulling out the initial rate of dividends, D_o , from the sum,

$$S_1 = D_o \sum_{t=1}^5 \frac{(1+g_1)^t}{(1+k)^t}.$$

Presenting the ratio of the growth and discount factors as a single term, $F = \frac{(1+g_1)}{(1+k)}$,

and incorporating F into the sum, $S_1 = D_o \sum_t^5 F^t$.

The sum can then be expanded as follows:

$$S_1 = D_o (F^1 + F^2 + \dots + F^5). \quad (26)$$

Defining a new term equal to unity, $\frac{(1-F)}{(1-F)}$, and including the term into the rhs of

Equation 27:

$$S_1 = D_o (F^1 + F^2 + \dots + F^5) \left(\frac{(1-F)}{(1-F)} \right), \text{ and then expanding,}$$

$$S_1 = D_o (F^1 + F^2 + \dots + F^5) - (F^2 + F^3 + \dots + F^6) / (1-F). \quad (27)$$

Canceling terms of Equation 28 provides, $S_1 = D_o (F^1 - F^6) / (1-F)$, and then collecting common terms gives a simplified result, as follows:

$$S_1 = D_o F^1 (1-F^5) / (1-F). \quad (28)$$

Expanding F in Equation 28 provides,

$$S_1 = D_o \left(\frac{(1+g_1)}{(1+k)} \right) \left(1 - \left(\frac{(1+g_1)}{(1+k)} \right)^5 \right) / \left(\frac{(1+k) - (1+g_1)}{(1+k)} \right).$$

Finally, canceling terms to simplify Equation 29 provides the result,

$$S_1 = D_o (1+g_1) \left(1 - \left(\frac{(1+g_1)}{(1+k)} \right)^5 \right) / (k-g_1). \quad (29)$$

The above result for Stage 1 can be stated as follows,

$$S_1 = D_o \left(\frac{(1+g_1)}{(k-g_1)} \right) \left(1 - \left(\frac{(1+g_1)}{(1+k)} \right)^5 \right). \quad (30)$$

Note that this outcome for Stage 1 is identical to Equation 22, above.

Stage 2 of Equation 24 is:

$$S_2 = \sum_{t=1}^5 \frac{D_5 (1+g_2)^t}{(1+k)^t} (1/(1+k)^5).$$

The derived form of Stages 2 and 3 are obtained through application of the same procedures as above, and need not be reviewed. The derived result for Stage 2 is as follows:

$$S_2 = D_5 \left(\frac{(1+g_2)}{(k-g_2)} \right) \left(1 - \left(\frac{(1+g_2)}{(1+k)} \right)^5 \right) \left(1/(1+k)^5 \right). \quad (31)$$

Stage 3 of Equation 25 is:

$$S_3 = \sum_{t=1}^{\infty} \frac{D_{10}(1+g_3)^t}{(1+k)^t} (1/(1+k)^{10}).$$

Similarly, the derived form of Stage 3 is:

$$S_3 = D_{10} \left(\frac{(1+g_3)}{(k-g_3)} \right) \left(1 - \left(\frac{(1+g_3)}{(1+k)} \right)^{\infty} \right) \left(1/(1+k)^{10} \right). \quad (32)$$

Note that in Stage 3, the second term in the second bracket of the rhs vanishes as a result of, by assumption, $k > g$.

APPENDIX II

Derivation of and Discussion of Problems and Limitations of the Capital Asset Pricing Model⁴¹

The Sharpe-Lintner Capital Asset Pricing Model (CAPM)—William Sharpe (1964) and John Lintner (1966)—is an extension of the one-period, mean-variance portfolio model of Markowitz (1959) and Tobin (1958), which in turn is built on the expected utility model of von Neumann and Morgenstern (1953). The Markowitz mean-variance analysis is concerned with how the investor should allocate wealth among the various assets available in the market, given that the investor is a one-period utility maximizer.

The derived CAPM shows how the valuation of a financial asset (price) is based upon two components: risk free returns and an *adjusted risk-based return*. Surrogates for risk free returns can be observed directly in capital markets, and include market returns on short- and intermediate-term debt. As a general rule, the cost rates and market returns on government debt obligations serve as appropriate surrogates.

The CAPM defines the market rate of return of asset j as a combination of the risk free return, R_f , and the product of a risk factor and the excess return above the risk free return, $\beta_{jm}(R_m - R_f)$. Excess return is determined as the difference between the return of the market as a whole, R_m , and the risk free return. The relevant risk factor is the well known market beta, which is defined as,

$$\beta_{jm} = \sigma_{jm} / \sigma_m^2 \tag{1}$$

Start with an investment amount, I , where the share, α , is invested in asset j , and the share $(1 - \alpha)$ is invested in the market portfolio, m . The rate of return on the portfolio is,

$$R_\alpha = \alpha R_j + (1 - \alpha) R_m \tag{2}$$

The measure of variation I the portfolio returns is defined as,

$$\sigma_\alpha = [\alpha^2 \sigma_j^2 + 2\alpha(1 - \alpha)\sigma_{jm} + (1 - \alpha)^2 \sigma_m^2]^{(1/2)}. \tag{3}$$

⁴¹ As derived by and shown in *Investment Science*, by David Luenberger, 1998.

If the portfolio share coefficient, α , is equal to zero, then the return on the portfolio is equal to R_m . This return point within rate of return – risk space is equivalent to the tangency point of market portfolio with the well-known market line.

Taking the relevant derivatives,

$$dR_\alpha/d\alpha = R_j - R_m \quad (4)$$

$$d\sigma_\alpha/d\alpha = [\alpha\sigma_j^2 + (1 - 2\alpha)\sigma_{jm} + (\alpha - 1)\sigma_m^2] / \sigma_\alpha. \quad (5)$$

For $\alpha=0$, the solution to (5) is,

$$d\sigma_\alpha/d\alpha = (\sigma_{jm} - \sigma_m^2) / \sigma_m. \quad (6)$$

Defining a key relationship:

$$dR_\alpha/d\sigma_\alpha = (dR_\alpha/d\alpha) / (d\sigma_\alpha/d\alpha). \quad (7)$$

For $\alpha=0$, the above result obtains,

$$dR_\alpha/d\sigma_\alpha = (R_j - R_m)\sigma_m / (\sigma_{jm} - \sigma_m^2). \quad (8)$$

The result in (8) defines change a rate of change with respect to σ_α , which must be equivalent to the slope of the capital market line. Therefore,

$$(R_j - R_m)\sigma_m / (\sigma_{jm} - \sigma_m^2) = (R_m - R_f) / \sigma_m. \quad (9)$$

Now solving for R_j obtains the capital asset pricing model, stated in its well-known form,

$$R_j = R_f + [(R_m - R_f) / \sigma_m^2] \sigma_{jm} = R_f + \beta_{jm}(R_m - R_f) \quad (10)$$

where β_{jm} is defined as above.

The CAPM can be shown in the context of the general model (refer to footnote 10), where the expected rate of return is a function of risk:

$$R_j = f[E(F)] = R_f + \beta(R_m - R_f). \quad (4)$$

In this formulation, R_j and $f[E(F)]$ are shown to be equivalent. As denoted in (3), R_f is the risk free rate of return, R_M is the market rate of return and $(R_m - R_f)$ is the market price of risk, making β the risk premium attached to holding asset j in the (market) portfolio. The essential issue, then, is whether or not the relevant risk parameter (β) adequately

captures all risks, as perceived by investors. As we discuss below, recent empirical evidence suggest that it may not.

Theoretical and Empirical Issues Associated with Use of CAPM to Estimated the Equity Risk Premium

The results of the early studies of CAPM have suggested that a significant positive relationship existed between realized return and systematic risk, as measured by β , and that the relationship between risk and return appeared to be linear. However, the prediction of Sharpe-Lintner version of the model – that a portfolio or asset uncorrelated with the market should have an expected return equal to the risk free rate of interest, have not done well, and the evidence has suggested that the average return on “zero-beta” portfolios are higher than the risk free rate.

The first tests of CAPM on individual stock in the excess return form have been conducted by Lintner (1965) and Douglas (1968) who found that the estimated intercept is significantly different from the risk free rate r_f and the estimate of β is statistically significant but takes a small value and the residual risk has effect on security returns. Thus, their results appear to contradict the CAPM model. However, the Douglas and Lintner studies appear to suffer from various statistical weaknesses that might explain their anomalous results. The measurement error that might be present in estimated betas in their studies could be explained by the fact that the assumptions of the regression model are not satisfied in practice.⁴²

With regard to the test of CAPM in terms of stock portfolios, one classic test was performed by Fama and MacBeth (1973), who used a combined time series-cross sectional estimation to investigate whether the risk premia of the factors are non-zero. Their results showed that the beta coefficient was statistically insignificant and remained small for many sub-periods. In addition, the estimated intercept term was significantly

⁴² The violations of the standard model assumptions are that the error terms are not normally distributed, not independently distributed and may be correlated with the excess market return (i.e., the explanatory variable in the regression) perhaps due to omitted variables.

greater than the risk free rate, once again implying that the predictions of the CAPM might not hold.

Black, Jensen, and Scholes (1972) (Black *et al*) tested CAPM by using time series regression analysis. The results again showed that the intercept term is significantly different from zero and is time varying. They found that when $\beta > 1$, the intercept is negative and conversely when $\beta < 1$, the intercept is positive. Thus the findings of Black *et al* suggest the predictions of CAPM are not supported empirically. Stambaugh (1982) employed a slightly different methodology to test CAPM and found support for Black's version but not for the Sharpe-Lintner version. Gibbons (1982) has used a similar method as the one used by Stambaugh but instead was led to reject both standard and zero-beta CAPM formulations.

One of the principal arguments against the one-factor CAPM that uses only the market to explain excess returns is that it fails to capture the impact of other economic factors that influence investors' expected return (i.e., risk premium). Thus, another avenue of attack on the Sharpe-Lintner-Black (SLB) CAPM formulations includes studies that have identified variables other than market β to explain a cross-section of expected returns. For example, Basu (1977) showed that the earnings-to-price (E/P) ratio has marginal explanatory power after controlling for β and expected returns appear to be positively related to E/P. Banz (1981) found that a stock's size (i.e., price times share) could help explain expected returns, which means that in the SLB framework, allowing for market β , expected returns on small stocks are too high and expected returns on large stocks are too low. Bhandari (1988) found that leverage is positively related to expected stock returns, and Fama and French (1992) found that higher book-to-market ratios are associated with higher expected returns in their tests that also include market β .

These anomalies of the SLB CAPM formulations are stylized facts that can be explained by a multifactor asset pricing model, of the type considered by Merton (1973) and Ross (1976) and discussed in Section 3.5 below. For example, Ball (1978) argued that E/P is a catch-all proxy for omitted factors in asset pricing tests and one can expect it to have explanatory power when an asset pricing model is expanded to include multiple factors

but all relevant factors are not included in the estimated model. Chan and Chen (1991) argued that the “stock size” effect is due to the fact that small stocks include depressed firms whose performance is sensitive to business conditions.⁴³ Fama and French (1992) have shown that since leverage and book-to-market equity are also largely driven by market value of equity, they may also be used as proxies for risk factors that are related to market judgments about the relative prospects of firms. One can expect when asset pricing models allow for multiple factors and, at least in theory, when all relevant factors are included in the asset pricing tests, the anomalies found in earlier work would be resolved.

The alternate approach in Chen, Roll, and Ross (1986) is to look for economic variables that are correlated with stock returns and then to test whether the loading of these economic factors describe the cross section of expected returns. This approach provides insight into how the factors relate to uncertainties about consumption and portfolio opportunities that are of concern to an investor. They examined a range of business condition variables that might be related to return because they are related to shocks to expected future cash flows or discount rates. The most powerful variables are the growth rate of industrial production and the difference between the return on long-term, low-grade corporate bonds and long-term government bonds. The unexpected inflation rate and the difference between the return on long and short government bonds are found to be less significant.

Merton (1973) has constructed a generalized inter-temporal asset pricing model in which factors other than market uncertainty are priced. In Merton’s formulation, individuals are solving a lifetime consumption decision in a multi-period setting. He has shown that expected return on assets depends not only on the covariance of the asset with the market but also with the covariance of the asset with changes in the investment opportunity set. Therefore, Merton’s formulation can be interpreted as another form of arbitrage pricing theory model. Fama and French (1992) demonstrated that two variables—size and book-to-market-equity—combine to capture the cross-sectional variation in average stock

⁴³ The presence of depressed firms or firms highly sensitive to the business cycle introduces what is known as a martingale effect in expected returns.

return associated with market beta, size, leverage, book-to-market ratio, and earning-to-price ratio.

In addition to the theoretical problems associated with the application of the CAPM to estimating risk premia, there are also statistical issues to be addressed. The problems of estimating and forecasting systematic risk, (i.e., beta) in the CAPM have been studied by several authors such as Lam (1999), Lally (1998), Bowie and Bradfield (1998), Boabang (1996), Draper and Paudyal (1995), Murray (1995), and Bartholdy and Riding (1994). The classical estimator for β is the well-known ordinary least squares (OLS) estimator, but several authors have shown that this estimator suffers from several deficiencies. For example, it has a mean reversion tendency, it is inefficient when return distributions are non-normal, and has significant bias problems when shares are thinly traded.

Several alternatives to OLS have been proposed in the literature. Included among these are Vasicek (1973) and Blume (1973) who both proposed estimators to improve the mean reversion tendency of the OLS estimator of β , Chan and Lakonishok (1992) proposed robust estimators to ensure more efficient estimation of β , and Scholes and Williams (1977) proposed estimators to deal with the bias problem when shares are infrequently traded. A host of empirical studies have been carried out in order to evaluate the performance of the estimators under various conditions including studies by Draper and Paudyal (1995), Murray (1995), Boabang (1996), and Lally (1998). Of the above-mentioned estimators, the Vasicek-estimator and the robust estimators seem to perform well over a wide range of empirical studies.

Appendix III

PROFILES OF ONTARIO ELECTRIC DISTRIBUTORS

	Revenue		Net Assets		Net Income and Interest Paid		Rate of return	
	2002	2004	2002	2004	2002	2004	X	S.D.
Asphodel Norwood Distribution Inc.	\$151	\$173	\$396	\$415	-\$17	\$5	0.74%	1.10%
Atikoken Hydro Inc.	\$474	\$919	\$1,136	\$1,068	-\$83	\$153	3.58%	6.20%
Barrie Hydro Distribution Inc.	\$23,803	\$22,812	\$93,882	\$97,628	\$6,828	\$7,388	5.20%	4.09%
Bluewater Power Distributors	\$1,918	\$2,149	\$40,529	\$42,683	\$2,687	\$2,538	5.03%	4.12%
Brant County Power Inc.	\$3,660	\$4,615	\$9,331	\$10,650	\$533	\$1,038	4.28%	3.64%
Branford Power Inc.	\$9,154	\$12,814	\$41,026	\$41,626	\$4,800	\$2,612	4.00%	5.42%
Burlington Hydro Inc.	\$22,198	\$24,941	\$74,685	\$77,697	\$6,307	\$7,633	7.57%	1.13%
Cambridge and North Dumfries Hydro Inc.	\$14,111	\$18,486	\$74,264	\$72,572	\$4,298	\$4,742	7.05%	1.78%
Canadian Niagara Power Inc.	\$0	\$2,149	\$0	\$2,762	\$2,458	\$4,111	5.40%	3.27%
Centre Wellington Hydro Ltd.	\$2,421	\$2,488	\$7,240	\$7,079	\$835	\$704	6.59%	2.75%
Chapleau Public Utilities Corporation	\$292	\$435	\$958	\$927	\$171	-\$260	11.50%	23.01%
Collus Power Corp	\$3,747	\$3,775	\$9,194	\$8,696	\$113	\$478	1.87%	1.32%
Cooperate Hydro Embrun Inc.	\$295	\$444	\$1,909	\$2,059	\$146	\$93	70.02%	57.80%
ELK Energy Inc.	\$428	\$8,179	\$8,302	\$7,713	\$565	\$1,716	12.58%	7.63%
Energource Hydro Mississauga Inc.	\$86,328	\$94,077	\$383,352	\$387,806	\$32,762	\$23,763	5.31%	3.20%
Enwin Powerlines Ltd.	\$36,744	\$38,110	\$139,311	\$143,653	\$4,411	\$812	1.01%	2.03%
Erie Thames Powerlines Corporation	\$4,347	\$6,095	\$13,264	\$14,878	\$650	\$490	3.17%	4.29%
Espanola Regional Hydro Distribution Corporation	\$979	\$990	\$1,886	\$1,936	-\$248	-\$100	39.01%	78.02%
Festival Hydro Inc	\$6,539	\$8,038	\$27,326	\$28,176	\$2,677	\$2,369	6.31%	2.26%
Fort Frances Power Corporation	-\$112	-\$426	\$3,813	\$3,390	\$95	-\$25	0.69%	0.83%
Grand Valley Energy	\$7	\$10	\$370	\$364	-\$8	-\$23	0.44%	0.52%
Graven Hurst Hydro Electric Inc.	\$2,740	\$2,884	\$6,975	\$6,763	\$575	\$794	17.66%	9.14%
Greater Sudbury Hydro Inc.	\$15,600	\$16,321	\$62,375	\$60,486	\$51	-\$212	0.46%	0.91%
Grimsbury Power Corporation	\$2,592	\$3,017	\$9,835	\$10,353	\$838	\$850	7.65%	2.05%
Guelph Hydro Electric Systems Inc.	\$20,696	\$19,347	\$72,478	\$71,865	\$5,794	\$5,407	7.23%	1.07%
Haldimand County Hydro Inc.	\$6,058	\$9,584	\$29,272	\$29,476	\$3,042	\$1,173	3.96%	4.21%
Halton Hills Hydro Inc.	\$7,352	\$7,926	\$23,774	\$24,114	\$2,230	\$2,161	6.68%	1.74%
Hawkesbury Hydro Inc.	\$867	\$1,232	\$2,235	\$2,019	\$3	\$277	10.89%	13.94%
Hearst Power Distribution	\$51	\$669	\$1,258	\$1,085	\$82	\$91	4.24%	4.81%
Hydro 2000 Inc.	\$218	\$318	\$380	\$350	\$190	\$126	20.54%	14.76%
Innisfil Hydro Distribution Systems Limited	\$5,016	\$5,714	\$17,932	\$16,726	\$1,333	\$1,366	4.25%	1.69%
Kenora Hydro Electric Corporation Ltd.	\$1,735	\$1,639	\$4,869	\$4,690	\$36	\$82	0.00%	0.00%

Kingston Electricity Distribution Limited	\$8,457	\$8,618	\$19,094	\$19,759	\$1,650	\$1,014	2.82%	1.94%	0.69
Kitchener-Wilmot Hydro Inc.	\$28,609	\$29,984	\$121,506	\$128,408	\$8,407	\$9,471	5.42%	1.09%	0.20
Lakefield Distributors Inc.	\$532	\$554	\$1,323	\$1,513	\$39	\$125	4.20%	3.94%	0.94
Lakeland Power Distributors Ltd.	\$3,917	\$4,363	\$12,718	\$12,908	\$1,004	\$1,267	7.62%	3.40%	0.45
London Hydro Inc.	\$42,106	\$42,464	\$159,172	\$163,318	\$4,771	\$12,551	4.30%	2.36%	0.55
Middlesex Power Distribution Corporation	\$2,082	\$2,215	\$8,329	\$7,741	\$73	\$39	0.00%	0.00%	0.00
Midland Power Utility Corporation	\$2,083	\$2,889	\$5,000	\$4,736	\$258	\$870	6.64%	4.06%	0.61
Milton Hydro	\$7,439	\$8,547	\$25,616	\$29,054	\$2,283	\$2,647	6.13%	2.40%	0.39
Niagara Falls Hydro Inc.	\$42,880	\$58,054	\$50,360	\$52,849	\$5,161	\$3,299	6.46%	4.57%	0.71
Niagara-on-the-Lake Hydro Inc.	\$3,550	\$3,257	\$13,262	\$16,634	\$1,039	\$504	3.76%	4.57%	1.21
Norfolk Power Distribution Inc.	\$6,892	\$7,533	\$29,271	\$33,747	\$390	\$1,340	0.47%	0.93%	2.00
North Bay Hydro Distribution Ltd	\$6,068	\$8,958	\$36,194	\$27,869	-\$2,014	\$1,471	4.70%	6.43%	1.37
Northern Ontario Wires Inc.	\$7,614	\$2,155	\$4,307	\$3,740	-\$140	\$18	0.33%	0.67%	2.00
Oakville Hydro Electricity	\$24,411	\$27,271	\$111,390	\$105,377	\$4,489	\$6,863	2.63%	2.65%	1.01
Orangeville Hydro Ltd	\$3,524	\$3,905	\$11,860	\$12,749	\$1,211	\$913	7.12%	1.15%	0.16
Orillia Power Distribution Corporation	\$4,707	\$7,158	\$14,333	\$14,829	\$1,622	\$1,998	9.54%	1.38%	0.14
Oshawa Power and Utilities Corporation	\$1,187	\$16,799	\$34,927	\$40,701	\$4,030	\$4,554	11.83%	0.67%	0.06
Ottawa River Power Corporation / River Energy Solutions Inc.	\$3,019	\$3,690	\$8,847	\$8,897	\$1,198	\$63	7.76%	5.03%	0.65
Parry Sound	\$1,000	\$1,570	\$4,747	\$4,555	\$173	\$291	2.16%	2.09%	0.97
Peterborough Distribution Inc.	\$11,840	\$12,916	\$38,258	\$39,320	\$2,107	\$3,758	5.95%	4.40%	0.74
PowerStream Inc.	\$91,495	\$83,505	\$345,291	\$343,812	\$0	\$19,399	1.16%	2.32%	2.00
PUC Distribution Ltd.	\$10,931	\$10,927	\$30,310	\$29,035	\$3,127	\$4,195	14.24%	12.95%	0.91
Renfrew Hydro Inc.	\$1,150	\$1,384	\$4,152	\$4,028	\$342	\$283	1.76%	2.31%	1.31
Rideau St Lawrence Distribution Inc.	\$1,506	\$1,675	\$3,180	\$3,352	\$219	\$418	6.36%	4.89%	0.77
Sioux Lookout Hydro Inc.	\$800	\$1,339	\$4,887	\$4,903	\$398	\$188	5.12%	2.96%	0.58
St Thomas Energy Inc.	\$5,005	\$6,076	\$16,546	\$17,383	\$542	\$1,458	10.12%	4.35%	0.43
Tay Hydro Electric Distribution Inc.	\$1,219	\$1,289	\$3,177	\$2,891	\$323	\$299	8.44%	2.35%	0.28
Terrace Bay Superior Wires Inc.	\$267	\$409	\$1,387	\$1,239	-\$70	\$29	2.80%	1.91%	0.68
Veridian Connections Inc.	\$18,826	\$34,040	\$104,452	\$98,304	\$2,918	\$7,326	3.00%	2.15%	0.72
Wasaga Distribution Inc.	\$2,383	\$2,903	\$7,916	\$8,210	\$163	\$583	4.44%	4.03%	0.91
Waterloo North Hydro Inc.	\$21,894	\$20,753	\$83,395	\$82,898	\$5,578	\$6,349	8.13%	4.55%	0.56
Weiland Hydro Electric Systems Ltd	\$5,150	\$5,582	\$19,269	\$18,624	-\$228	\$336	1.79%	2.34%	1.30
Wellington Electric Distribution Co Inc.	\$37	\$427	\$1,061	\$1,053	\$81	\$61	1.00%	1.52%	1.52
Wellington North Power Inc.	\$1,049	\$1,168	\$2,418	\$2,544	\$53	\$253	5.59%	5.79%	1.03
West Coast Huron Inc.	\$994	\$1,607	\$3,747	\$3,712	\$322	\$239	3.71%	0.35%	0.09
Westario Power	\$5,265	\$7,311	\$18,139	\$19,855	\$1,588	\$1,212	3.75%	2.74%	0.73
Whitby Hydro Electric Corporation	\$14,416	\$16,125	\$48,457	\$52,370	\$2,356	\$3,036	2.15%	1.60%	0.75
Woodstock Hydro Services Inc.	\$5,556	\$5,460	\$17,232	\$17,374	\$1,100	\$1,002	3.97%	2.87%	0.72

Appendix IV

Canadian Utilities

CAPM ESTIMATES OF THE COST OF EQUITY CAPITAL: CANADIAN UTILITIES

TSX LISTED UTILITIES		AVERAGE YIELDS AND OVERALL RETURNS														
Company Name	Ticker	CAPM Beta,		2000 -	Realized Total Market Returns		1-Year Gov't Debt Interest Rates		10-Year Gov't Debt Interest Rates		30-Year Gov't Debt Interest Rates		1- to 10-Year Spread in Debt Rates		TSX Total Return	Variation in Monthly TSX Returns (S.D.)
		Adjusted	Unadjusted	Current	Average, Monthly	Variation (S.D.)	1- Year	10- Year	10- Year	10- Year	30- Year	1- to 10- Year	1- to 10- Year			
ALTEK POWER	TCA	0.377	0.01		3.87%	30.07%	5.75%	5.84%	5.12%	5.12%	5.12%	0.09%	0.09%	11.59%	6.16%	
TRANSCANADA PIPELINES LTD	TCA	1.896	2.28		0.70%	1.63%	7.05%	10.88%	10.82%	10.82%	10.82%	3.83%	3.83%	-17.62%	5.93%	
NOVA SCOTIA POWER INC	NSI	0.568	0.29		0.54%	3.47%	3.01%	5.37%	5.55%	5.55%	5.55%	2.37%	2.37%	-14.24%	3.93%	
PACIFIC NORTHERN GAS LTD	PNG	0.619	0.37		0.34%	6.71%	2.95%	4.90%	5.28%	5.28%	5.28%	1.95%	1.95%	26.68%	2.63%	
GAZ METRO LTD	GZM	1.268	1.34		0.68%	3.52%	2.48%	4.66%	5.14%	5.14%	5.14%	2.18%	2.18%	8.04%	2.36%	
GREAT LAKES HYDRO	GLH	0.715	0.51		2.11%	6.49%	3.00%	4.08%	4.35%	4.35%	4.35%	1.09%	1.09%	27.09%	3.64%	
BORALEX INC	BLX	0.467	0.14		1.09%	11.10%	3.87%	4.17%	4.06%	4.06%	4.06%	0.30%	0.30%			
TRANSCANADA PIPELINES LTD	TRP	0.990	0.92		1.63%	3.67%	4.01%	5.70%	5.76%	5.76%	5.76%	1.69%	1.69%	6.92%	4.11%	
CANADIAN HYDRO DEVELOPERS	TRP	0.347	-0.04		1.44%	8.60%										
Average		0.81	0.65		1.38%	8.36%										
S. D.		0.51	0.77													

VARIATION IN YIELDS AND RETURNS, OVER YEARS

	1-Year	10-Year	30-Year	1- to 10-Year Spread	TSX Returns Return
S. D.	1.72%	2.37%	2.29%	1.30%	19.34%

CANADIAN COMPANIES.

CAPM ESTIMATES OF COST OF EQUITY CAPITAL

Cost of Equity Capital, Unadjusted	Risk-Free Rate	Market Beta, Adjusted	Expected Market Return	Risk Free Rate
8.93%	3.58%	0.60	12.50%	3.58%
11.79%	4.76%	0.91	12.50%	4.76%
Weighted Average	4.17%	0.75	12.50%	4.17%

Cost Rate, Adjusted for Issuance Costs	Low	High	Weighted Average
9.43%			
12.29%			
10.95%			

Appendix V

U.S. Electric Utilities

CAPM ESTIMATES OF THE COST OF EQUITY CAPITAL: MID-SIZED ELECTRIC UTILITIES, U.S.

Mid-Sized Electric Utilities	Adjusted Beta	Unadjusted Beta	Current		1- to 10-Year		AVERAGE YIELDS AND OVERALL RETURNS		Chain-Weighted Rates of Inflation	
			Year Data 2004	5yr Ave '00-'04	Year Data 2004	5yr Ave '00-'04	1-Year Gov't Debt Interest Rates	10-Year Gov't Debt Interest Rates		1- to 10-Year Spread in Debt Rates
AVA Corp.	0.85	0.68	0.78	0.52	4.40	4.67	0.28	3.22	0.60	2.62
Black Hills	0.90	0.69	0.85	0.54	7.00	7.50	0.50	4.40	0.28	2.62
Hawaiian Elec.	0.65	0.55	0.48	0.33	9.74	10.60	0.85	7.00	0.50	6.82
IDACORP Inc.	0.85	0.64	0.78	0.46	5.36	6.66	1.30	9.74	0.85	4.44
PNM Resources	0.75	0.62	0.78	0.43	3.32	4.73	1.41	5.36	1.30	18.23
Puget Energy Inc.	0.65	0.56	0.48	0.34	5.58	6.28	0.74	3.32	1.41	18.99
UniSource Energy	1.05	0.74	1.07	0.61	5.40	6.23	0.83	4.73	0.74	-3.60
Cleco Corp.	0.65	0.54	0.48	0.31	5.40	6.23	0.83	6.28	0.74	13.00
Empire Dist. Elec.	0.60	0.51	0.40	0.27						3.57
MGE Energy	0.55	0.57	0.33	0.36						
Otter Tail Corp.	0.80	0.65	0.70	0.48						
CH Energy Group	0.75	0.58	0.63	0.37						
Duquesne Light Hldgs	0.80	0.62	0.70	0.43						
UIL Holdings	0.73	0.58	0.62	0.40						
Average S. D.	0.19	0.13	0.21	0.11						
Weighted Average:	0.77	0.61	0.66	0.42						

VARIATION IN YIELDS AND RETURNS			
	1-Year	10-Year	1- to 10-Year Spread
1950s	1.07	0.63	0.51
1960s	1.32	0.91	0.46
1970s	1.75	0.99	1.02
1980s	2.70	2.16	1.02
1990s	1.21	1.00	0.96
2000s	1.75	0.87	1.23
60s, 70s, 90s	1.43	0.97	0.81
Overall	1.96	1.53	0.87

CAPM ESTIMATES OF COST OF EQUITY CAPITAL			
Cost of Equity Capital, Unadjusted	Risk-Free Rate	Market Beta, Adjusted	Expected Market Return
Low	4.24%	0.68	10.91%
High	5.21%	0.77	15.10%
Weighted Average	4.73%	0.73	13.00%

CAPM ESTIMATES OF COST OF EQUITY CAPITAL			
Cost Rate, Adjusted for Issuance Costs	Risk-Free Rate	Market Beta, Adjusted	Expected Market Return
Low	4.24%	0.68	10.91%
High	5.21%	0.77	15.10%
Weighted Average	4.73%	0.73	13.00%

MID-SIZED ELECTRIC UTILITIES

	Gas Utility Company	Ticker	Dividends Declared Per			Average Market Price Per Share,		Dividend Yield	Adjusted Yield	Expected Growth	Single Stage DCF Estimates of Cost of Equity Capital
			Share	May - June '05	June - July '05	May - June					
						Yield	Growth				
1	Avista Corp.	AVA	\$0.55	\$16.89		3.26%	3.77%	10.67%	14.44%		
2	Black Hills	BKH	\$1.28	\$34.72		3.69%	4.11%	6.58%	10.69%		
3	Hawaiian Elec.	HE	\$1.24	\$24.81		5.00%	5.51%	5.26%	10.77%		
4	IDACORP Inc.	IDA	\$1.20	\$26.96		4.45%	4.72%	1.21%	5.93%		
5	PNM Resources	PNM	\$0.77	\$27.98		2.75%	3.06%	6.09%	9.15%		
6	Puget Energy Inc.	PSD	\$1.00	\$21.61		4.63%	5.05%	4.19%	9.24%		
7	UniSource Energy	UNS	\$0.76	\$29.74		2.56%	2.77%	3.38%	6.15%		
8	Cleco Corp.	CNL	\$0.90	\$20.23		4.45%	4.68%	0.54%	5.22%		
9	Empire Dist. Elec.	EDE	\$1.28	\$21.74		5.89%	6.66%	8.04%	14.70%		
10	MGE Energy	MGEE	\$1.37	\$33.84		4.05%	4.53%	6.77%	11.29%		
11	Otter Tail Corp.	OTTR	\$1.12	\$24.39		4.59%	5.08%	5.59%	10.66%		
12	CH Energy Group	CHG	\$2.16	\$42.95		5.03%	5.48%	4.07%	9.55%		
13	Duquesne Light Hldgs	DQE	\$1.00	\$17.82		5.61%	5.99%	1.95%	7.94%		
14	UIL Holdings	UIL	\$2.88	\$51.59		5.58%	5.85%	0.11%	5.96%		

ESTIMATED COST OF EQUITY CAPITAL
SINGLE STAGE DCF, UNADJUSTED

	Dividend Yield		Adjusted Yield		Expected Growth		Estimated Cost Rate
	Yield	S. D.	Yield	S. D.	Yield	Growth	
Average	4.40%		4.80%		4.60%		9.41%
S. D.	1.04%		1.11%		3.01%		2.99%
Range							
Low	3.88%		4.25%		3.10%		7.91%
High	4.91%		5.36%		6.11%		10.90%
Weighted Average	4.34%		4.74%		4.46%		9.20%

Cost Rate, Adjusted for Issuance Costs

Weighted Average		Range	
Average	9.70%	Low	8.41%
		High	11.40%

Company Name	Average Returns Per Annum - Electric Utilities				
	<u>1995 - 2000</u>	<u>1995 - 2001</u>	<u>1995 - 2002</u>	<u>1995 - 2003</u>	<u>1995 - 2004</u>
Avista Corp.	15.57%	8.09%	4.25%	5.36%	8.09%
Black Hills	16.34%	22.82%	16.36%	14.91%	13.90%
Hawaiian Elec.	5.31%	8.15%	10.17%	9.52%	11.36%
IDACORP Inc.	14.72%	13.12%	9.17%	6.56%	8.09%
PNM Resources	11.01%	17.58%	13.25%	12.62%	14.64%
Puget Energy Inc.	8.96%	8.71%	6.93%	7.19%	7.12%
UniSource Energy	0.30%	5.54%	3.95%	4.79%	7.88%
Cleco Corp.	15.86%	16.44%	12.41%	9.44%	10.85%
Empire Dist. Elec.	13.17%	9.16%	8.23%	8.79%	9.01%
MGE Energy	4.47%	8.57%	9.93%	10.72%	10.71%
Otter Tail Corp.	10.54%	14.30%	13.34%	11.34%	10.20%
CH Energy Group	11.65%	14.45%	14.92%	12.53%	12.35%
Duquesne Light Hldgs	15.44%	6.88%	2.50%	1.57%	4.84%
UIL Holdings	15.64%	14.91%	12.99%	9.73%	12.69%
Sample Average	11.33%	12.04%	9.87%	8.92%	10.12%
Weighted Average	10.91%	11.83%	9.59%	8.73%	10.02%

Five Year Returns - Electric Utilities

	1996 - 2000	1997 - 2001	1998 - 2002	1999 - 2003	2000 - 2004
Avista Corp.	15.57%	4.64%	-1.47%	-1.54%	7.97%
Black Hills	16.34%	24.75%	15.69%	11.15%	12.05%
Hawaiian Elec.	5.31%	8.55%	11.23%	8.99%	15.39%
IDACORP Inc.	14.72%	10.91%	6.03%	0.77%	5.71%
PNM Resources	11.01%	14.65%	11.48%	8.89%	17.73%
Puget Energy Inc.	8.96%	7.25%	3.06%	2.73%	5.24%
UniSource Energy	0.30%	6.90%	6.00%	8.23%	20.02%
Cleco Corp.	15.86%	16.49%	12.41%	5.26%	9.02%
Empire Dist. Elec.	13.17%	8.84%	8.32%	5.46%	3.58%
MGE Energy	4.47%	7.73%	12.59%	12.56%	14.95%
Otter Tail Corp.	10.54%	15.63%	16.90%	12.73%	10.20%
CH Energy Group	11.65%	14.17%	13.70%	6.79%	9.55%
Duquesne Light Hldgs	15.44%	3.69%	-3.30%	-9.32%	-5.70%
UIL Holdings	15.64%	14.96%	15.31%	1.19%	8.23%
Sample Average	11.33%	11.34%	9.09%	5.26%	9.58%
Weighted Average	10.91%	10.97%	8.39%	4.98%	9.71%

RISK PREMIUM ANALYSIS

Timeframes	S&P 500 minus Intermediate Term Debt		S&P 500 minus Short Term Debt		GDP Inflation		
	Average Per Annum	Geometric	Average Per Annum	Geometric			
1950s	18.2%	16.6%	19.0%	17.4%	2.6%		
1960s	4.2%	3.2%	4.8%	3.8%	2.6%		
1970s	0.4%	-1.3%	1.2%	-0.7%	6.8%		
1980s	8.2%	7.4%	9.3%	8.4%	4.4%		
1990s	12.7%	11.8%	14.1%	13.2%	2.1%		
2000s	-3.8%	0.0%	-2.5%	0.0%	1.8%		
Average, 50s-90s	8.7%	7.5%	9.7%	8.4%	3.7%		
'50s, '60s, '80s, '90s	10.8%	9.8%	11.8%	10.7%	2.5%		
'70s, '80s	4.3%	3.0%	5.2%	3.9%	5.6%		
2000s	-3.8%	0.0%	-2.5%	0.0%	1.8%		
Timeframes	Mid-Cap Size Premia		Small-Cap Size Premia		Micro-Cap Size Premia		
	Average	S.D.	Average	S.D.	Average	S.D.	
1950s	1.8%	2.1%	2.3%	2.9%	3.6%	4.3%	
1960s	3.0%	3.3%	4.5%	6.5%	8.3%	10.7%	
1970s	3.4%	5.5%	4.6%	9.8%	5.6%	13.8%	
1980s	2.2%	4.2%	3.6%	8.0%	2.4%	11.3%	
1990s	-1.0%	4.2%	-1.6%	5.3%	-1.5%	8.1%	
2000s	2.8%	5.7%	5.7%	7.5%	11.2%	12.3%	
Average, 50s-90s	1.9%	3.8%	2.7%	6.5%	3.7%	11.0%	
'50s, '60s, '80s, '90s	1.5%	3.4%	2.2%	5.7%	3.5%	7.7%	
'70s, '80s	2.8%	4.8%	4.1%	8.9%	4.0%	12.5%	
2000s	2.8%	5.7%	5.7%	7.5%	11.2%	12.3%	
S. D. Across Decades	1.6%		2.6%		4.5%		
Cost Rate Components	Overall Equity Market Return		Small-Sized Equities		Cost of Capital, Small-Sized Equities		
	Market Return	Requirements	Adjustment Component	Lower Bound	Upper Bound	Lower Bound	
1-Year Treasuries	2.0%		Diversifiable Risks	-3.1%	-1.4%	Small Capitalization Equities	9.3%
1-Yr - 10-Yr Spread	1.2%	1.6%	Small Capitalization Equities	0.9%	3.5%	Very Small Capitalization Equities	11.3%
Equity - T. Debt Risk Premia	7.5%		Very Small Capitalization Equities	1.2%	5.7%		17.3%
Expected Overall Market Return	11.5%	13.0%					

Appendix VI

U.S. Natural Gas Utilities

CAPM ESTIMATES OF THE COST OF EQUITY CAPITAL: GAS DISTRIBUTION UTILITIES, U.S.													
Gas Distribution Utilities			Adjusted Beta			Unadjusted Beta,			AVERAGE YIELDS AND OVERALL RETURNS				
Company Name	Ticker	Current Year Data		5yr Ave 00-04	Current Year Data		5yr Ave 00-04	1-Year Gov't Debt Interest Rates		10-Year Gov't Debt Interest Rates	1- to 10-Year Spread in Debt Rates	S&P500 Total Return	Chain-Weighted Rates of Inflation
		2004	2004		2004	2004		2004	2004				
AGL Resources	ATG	0.80	0.68	0.68	0.70	0.48	0.52	2.62	4.40	3.22	0.60	2.60	2.62
Atmos Energy	ATO	0.65	0.60	0.60	0.48	0.48	0.40	4.40	4.67	0.28	0.28	4.40	2.62
Cascade Natural Gas	CGC	0.75	0.63	0.63	0.63	0.45	0.40	7.00	7.50	0.50	0.50	7.92	6.82
Delta Natural Gas	DGAS	0.50	0.48	0.48	0.25	0.22	0.45	9.74	10.60	0.85	0.85	18.23	4.44
EnergySouth Inc	ENSI	0.50	0.49	0.49	0.25	0.24	0.40	3.32	4.73	1.30	1.41	18.99	2.14
Laclede Group	LG	0.70	0.60	0.60	0.55	0.40	0.40	3.32	4.73	1.41	0.74	-3.60	1.83
New Jersey Resources	NJR	0.70	0.62	0.62	0.55	0.43	0.40	5.58	6.28	0.74			
NICOR Inc.	GAS	1.00	0.79	0.79	1.00	0.69	0.43	5.40	6.23	0.83	0.83	13.00	3.57
Northwest Nat. Gas	NWN	0.65	0.60	0.60	0.48	0.40	0.40						
Peoples Energy	PGL	0.75	0.73	0.73	0.63	0.60	0.60						
Piedmont Natural Gas	PNY	0.75	0.65	0.65	0.63	0.48	0.48						
South Jersey Inds.	SJI	0.55	0.49	0.49	0.33	0.24	0.24						
Southwest Gas	SWX	0.80	0.70	0.70	0.70	0.55	0.55						
WGL Holdings Inc.	WGL	0.75	0.65	0.65	0.63	0.48	0.48						
Average		0.70	0.62	0.62	0.56	0.44	0.44						
S. D.		0.13	0.09	0.09	0.19	0.13	0.13						
Weighted Average:		0.75	0.66	0.66	0.63	0.49	0.49	1.07	0.63	0.51	0.51	17.46	
								1.32	0.91	0.46	0.46	20.36	
								1.75	0.99	1.02	1.02	13.07	
								2.70	2.16	1.02	1.02	14.16	
								1.21	1.00	0.96	0.96	22.24	
								1.75	0.87	1.23	1.23		
								1.43	0.97	0.81	0.81		
Overall								1.96	1.53	0.87	0.87		

VARIATION IN YIELDS AND RETURNS

GAS DISTRIBUTION UTILITIES, U.S.

CAPM ESTIMATES OF COST OF EQUITY CAPITAL												
GAS DISTRIBUTION UTILITIES, U.S.			Risk-Free Rate			Market Beta, Adjusted			Expected Market Return			
Cost of Equity Capital, Unadjusted			Risk-Free Rate			Market Beta, Adjusted			Expected Market Return			Risk Free Rate
Low	7.06%		4.24%		0.64		8.6%		4.24%			
High	14.54%		5.21%		0.77		17.4%		5.21%			
Weighted Average	10.94%		4.73%		0.75		13.0%		4.73%			
Cost Rate, Adjusted for Issuance Costs												
Low	7.56%											
High	15.04%											
Weighted Average	11.44%											

SAMPLE OF GAS DISTRIBUTION UTILITIES. U.S.

	Gas Utility Company	Ticker	Dividends Declared Per Share	Average Market Price Per Share,		Dividend Yield	Adjusted Yield	Expected Growth	Single Stage DCF Estimates of Cost of Equity Capital
				May - June '05	Per Share				
1	AGL Resources	ATG	\$1.30	\$34.11		3.81%	4.05%	6.18%	10.23%
2	Atmos Energy	ATO	\$1.25	\$26.55		4.71%	4.80%	2.00%	6.80%
3	Cascade Natural Gas	CGC	\$0.96	\$18.54		5.18%	5.55%	7.21%	12.76%
4	Delta Natural Gas	DGAS	\$1.19	\$24.68		4.82%	5.07%	5.21%	10.29%
5	EnergySouth Inc	ENSI	\$0.83	\$26.45		3.14%	3.32%	5.80%	9.12%
6	Laclede Group	LG	\$1.38	\$28.02		4.93%	5.28%	7.14%	12.42%
7	New Jersey Resources	NJR	\$1.36	\$43.59		3.12%	3.28%	5.03%	8.31%
8	NICOR Inc.	GAS	\$1.86	\$37.40		4.97%	5.15%	3.61%	8.77%
9	Northwest Nat. Gas	NWN	\$1.32	\$35.19		3.75%	3.98%	6.04%	10.02%
10	Peoples Energy	PGL	\$2.18	\$40.14		5.43%	5.79%	6.68%	12.48%
11	Piedmont Natural Gas	PNY	\$0.91	\$23.26		3.91%	4.17%	6.64%	10.81%
12	South Jersey Inds.	SJI	\$0.65	\$27.36		2.38%	2.51%	5.67%	8.18%
13	Southwest Gas	SWX	\$0.82	\$24.25		3.38%	3.56%	5.15%	8.71%
14	WGL Holdings Inc.	WGL	\$1.32	\$30.78		4.29%	4.48%	4.38%	8.85%

**ESTIMATED COST OF EQUITY CAPITAL
SINGLE STAGE DCF, UNADJUSTED**

Average	4.13%	4.36%	5.48%	9.84%
S. D.	0.92%	0.97%	1.43%	1.79%
Range				
Low	3.67%	3.85%	4.77%	8.61%
High	4.59%	4.87%	6.20%	11.07%
Weighted Average	4.15%	4.36%	5.25%	9.62%

**Cost Rate, Adjusted for
Issuance Costs**

Weighted Average	10.12%
Range	
Low	9.11%
High	11.57%

Company Name	Average Returns Per Annum - Natural Gas Distributors				
	1995 - 2000	1995 - 2001	1995 - 2002	1995 - 2003	1995 - 2004
AGL Resources	6.84%	10.89%	10.59%	11.68%	12.44%
Atmos Energy	7.38%	10.09%	8.85%	8.97%	9.58%
Cascade Natural Gas	8.16%	11.17%	10.97%	9.29%	9.79%
Delta Natural Gas	4.27%	7.56%	9.30%	9.54%	10.33%
EnergySouth Inc	12.72%	13.46%	15.42%	15.12%	17.14%
Laclede Group	6.97%	9.28%	8.90%	9.11%	10.45%
New Jersey Resources	17.41%	16.18%	16.05%	15.60%	16.15%
NICOR Inc.	11.53%	12.09%	10.79%	8.59%	8.91%
Northwest Nat. Gas	6.82%	8.29%	9.93%	9.20%	10.04%
Peoples Energy	11.06%	13.35%	11.63%	11.32%	11.62%
Piedmont Natural Gas	13.32%	14.88%	13.91%	13.52%	14.07%
South Jersey Inds.	13.09%	13.66%	13.10%	13.44%	14.92%
Southwest Gas	11.15%	12.13%	11.71%	9.94%	10.30%
WGL Holdings Inc.	12.71%	12.36%	10.62%	9.53%	10.16%
Sample Average	10.26%	11.84%	11.55%	11.06%	11.84%
Weighted Average	10.55%	12.18%	11.47%	11.08%	11.73%

	<u>1996 - 2000</u>	<u>1997 - 2001</u>	<u>1998 - 2002</u>	<u>1999 - 2003</u>	<u>2000 - 2004</u>
AGL Resources	6.84%	9.32%	8.70%	11.92%	14.66%
Atmos Energy	7.38%	6.24%	4.49%	2.00%	5.25%
Cascade Natural Gas	8.16%	10.95%	10.64%	9.09%	9.86%
Delta Natural Gas	4.27%	8.47%	10.02%	11.25%	13.28%
EnergySouth Inc	12.72%	12.62%	12.79%	9.55%	17.65%
Laclede Group	6.97%	7.22%	6.74%	6.40%	10.56%
New Jersey Resources	17.41%	13.43%	13.86%	11.51%	13.47%
NICOR Inc.	11.53%	9.78%	5.58%	0.95%	4.04%
Northwest Nat. Gas	6.82%	6.64%	7.47%	5.84%	10.23%
Peoples Energy	11.06%	10.33%	6.95%	7.24%	8.70%
Piedmont Natural Gas	13.32%	13.49%	12.45%	8.03%	10.36%
South Jersey Inds.	13.09%	12.47%	12.30%	11.20%	15.83%
Southwest Gas	11.15%	10.53%	9.99%	5.18%	2.48%
WGL Holdings Inc.	12.71%	10.55%	7.39%	4.11%	7.07%
Sample Average	10.26%	10.14%	9.20%	7.42%	10.20%
Weighted Average	10.55%	10.09%	8.64%	6.95%	9.55%

RISK PREMIUM ANALYSIS

Timeframes	S&P 500 minus Intermediate Term Debt		S&P 500 minus Short Term Debt		GDP Inflation
	Average Per Annum	Geometric	Average Per Annum	Geometric	
1950s	18.2%	16.6%	19.0%	17.4%	2.6%
1960s	4.2%	3.2%	4.8%	3.8%	2.6%
1970s	0.4%	-1.3%	1.2%	-0.7%	6.8%
1980s	8.2%	7.4%	9.3%	8.4%	4.4%
1990s	12.7%	11.8%	14.1%	13.2%	2.1%
2000s	-3.8%	0.0%	-2.5%	0.0%	1.8%
Average, 50s-90s	8.7%	7.5%	9.7%	8.4%	3.7%
'50s, '60s, '80s, '90s	10.8%	9.8%	11.8%	10.7%	2.5%
'70s, '80s	4.3%	3.0%	5.2%	3.9%	5.6%
2000s	-3.8%	0.0%	-2.5%	0.0%	1.8%

Timeframes	Mid-Cap Size Premia		Small-Cap Size Premia		Micro-Cap Size Premia		1-Year Treasury Yields	1-Year 10-Year Spread
	Average	S.D.	Average	S.D.	Average	S.D.		
1950s	1.8%	2.1%	2.3%	2.9%	3.6%	4.3%	2.6%	0.6%
1960s	3.0%	3.3%	4.5%	6.5%	8.3%	10.7%	4.4%	0.3%
1970s	3.4%	5.5%	4.6%	9.8%	5.6%	13.8%	7.0%	0.5%
1980s	2.2%	4.2%	3.6%	8.0%	2.4%	11.3%	9.7%	0.9%
1990s	-1.0%	4.2%	-1.6%	5.3%	-1.5%	8.1%	5.4%	1.3%
2000s	2.8%	5.7%	5.7%	7.5%	11.2%	12.3%	3.3%	1.4%
Average, 50s-90s	1.9%	3.8%	2.7%	6.5%	3.7%	11.0%	6.6%	0.7%
'50s, '60s, '80s, '90s	1.5%	3.4%	2.2%	5.7%	3.5%	7.7%	4.1%	0.7%
'70s, '80s	2.8%	4.8%	4.1%	8.9%	4.0%	12.5%	8.4%	0.7%
2000s	2.8%	5.7%	5.7%	7.5%	11.2%	12.3%	3.3%	1.4%
S. D. Across Decades	1.6%		2.6%		4.5%		2.6%	0.5%

Overall Equity Market Return	Market Return Requirements		Cost Rate Adjustments, Small-Sized Equities		Cost of Capital, Small-Sized Equities			
	Lower Bound	Upper Bound	Adjustment Component	Lower Bound	Upper Bound	Lower Bound	Upper Bound	
1-Year Treasuries	2.0%	4.6%	Diversifiable Risks	-3.4%	-1.5%	Small Capitalization Equities	8.9%	15.0%
1-Yr - 10-Yr Spread	1.2%	1.6%	Small Capitalization Equities	0.9%	3.5%	Very Small Capitalization Equities	11.2%	17.2%
Equity - T. Debt Risk Premia	7.5%		Very Small Capitalization Equities	1.2%	5.7%			
Expected Overall Market Return	11.5%	13.0%						

Appendix VII

U.S. Non-Utilities

CAPM ESTIMATES OF THE COST OF EQUITY CAPITAL: LOW RISK MEDIUM-SIZED NON-UTILITY COMPANIES, U.S.										
Low Risk Medium-Sized Non-Utility Companies, U.S.			Adjusted Beta		Unadjusted Beta,		AVERAGE YIELDS AND MARKET OVERALL RETURNS			
Company Name	Ticker	Current Year Data 2004	5yr Avg '00-'04	Current Year Data 2004	5yr Avg '00-'04	Gov't Debt Interest Rates	Gov't Debt Interest Rates	Year Spread in Debt Rates	S&P500 Total Return	Chain- Weighted Rates of Inflation
Amer. Pacific	APFC	0.50	0.53	0.25	0.30	2.62	3.22	0.60	2.60	
Andres Wines Ltd. 'A'	ADW/A.TO	0.60	0.56	0.40	0.34	4.40	4.67	0.28	2.62	
Atlantis Plastics	ATPL	0.60	0.56	0.40	0.34	7.00	7.50	0.50	7.92	6.82
Atrion Corp	ATRI	0.70	0.68	0.55	0.52	9.74	10.60	0.85	18.23	4.44
Koss Corp	KOSS	0.35	0.44	0.03	0.16	5.36	6.66	1.30	18.99	2.14
Marsh Supermarkets 'B'	MARSB	0.45	0.49	0.18	0.24	3.32	4.73	1.41	-3.60	1.83
Max & Erma's Restaurants	MAXE	0.50	0.48	0.25	0.22	5.58	6.28	0.74		
NAPCO Security Systems Inc.	NSSC	0.45	0.54	0.18	0.31	5.40	6.23	0.83	13.00	3.57
New Brunswick Scientific Co	NBSC	0.60	0.60	0.40	0.40					
Patriot Transportation Holdin	PATR	0.45	0.00	0.18	-0.49					
Peerless Mfg.	PMFG	0.70	0.66	0.55	0.49					
Rocky Mountain Choc Factory	RMCF	0.65	0.68	0.48	0.52					
S&K Famous Brands	SKFB	0.45	0.48	0.18	0.22					
Span-America Medical Systems	SPAN	0.50	0.54	0.25	0.31					
Tasty Baking	TSTY	0.65	0.52	0.48	0.28					
Village Super Market 'A'	VLGEA	0.55	0.57	0.33	0.36					
Average		0.54	0.52	0.32	0.28					
S. D.		0.10	0.16	0.15	0.23					
Weighted Average:		0.52	0.46	0.29	0.19					

CAPM ESTIMATES OF THE COST OF EQUITY CAPITAL										
LOW RISK MEDIUM-SIZED NON-UTILITY COMPANIES, U.S.										
Unadjusted Cost of Equity	Risk-Free Rate	Market Beta, Adjusted	Expected Market Return	Risk Free Rate						
Low	7.38%	0.49	10.91%	3.96%						
High	11.21%	0.60	15.10%	5.49%						
Weighted Average	9.06%	0.52	13.00%	4.73%						

CAPM ESTIMATES OF THE COST OF EQUITY CAPITAL		
LOW RISK MEDIUM-SIZED NON-UTILITY COMPANIES, U.S.		
Cost Rate, Adjusted for Issuance Costs	Risk-Free Rate	Market Beta, Adjusted
Low	7.88%	0.49
High	11.71%	0.60
Weighted Average	9.56%	0.52

MARKET RETURNS FOR LOW RISK MEDIUM SIZED NON-UTILITY COMPANIES, U.S.

<u>Company Name</u>	<u>AVERAGE MARKET RETURNS</u>				
	<u>1995 - 2000</u>	<u>1995 - 2001</u>	<u>1995 - 2002</u>	<u>1995 - 2003</u>	<u>1995 - 2004</u>
Amer. Pacific	2.3%	-1.3%	6.6%	4.9%	4.6%
Andres Wines Ltd. 'A'	8.8%	12.1%	14.8%	16.2%	17.3%
Atlantis Plastics	10.1%	-0.7%	4.0%	12.4%	23.8%
Atrion Corp	2.7%	16.7%	16.5%	17.7%	20.1%
Koss Corp	12.5%	24.2%	25.1%	23.0%	22.9%
Marsh Supermarkets 'B'	3.7%	6.5%	5.4%	4.3%	5.4%
Max & Erma's Restaurants	1.9%	4.7%	9.8%	10.4%	9.8%
NAPCO Security Systems Inc.	5.9%	8.0%	12.2%	17.4%	18.0%
New Brunswick Scientific Co	9.9%	3.7%	9.7%	6.1%	7.7%
Patriot Transportation Holdin	2.5%	-0.8%	5.4%	5.0%	7.2%
Peerless Mfg.	7.5%	13.2%	26.5%	17.1%	17.8%
Rocky Mountain Choc Factory	-17.9%	5.5%	8.8%	8.8%	19.7%
S&K Famous Brands	2.0%	5.8%	9.1%	11.6%	11.6%
Span-America Medical Systems	0.8%	6.2%	11.6%	13.9%	17.0%
Tasty Baking	8.8%	15.9%	12.1%	6.1%	5.5%
Village Super Market 'A'	13.6%	12.5%	23.1%	19.1%	19.8%
Sample Average	4.7%	8.2%	12.6%	12.1%	14.3%
Weighted Average	5.1%	8.0%	12.7%	12.4%	14.7%

MARKET RETURNS FOR LOW RISK MEDIUM SIZED NON-UTILITY COMPANIES, U.S.

<u>Company Name</u>	FIVE YEAR AVERAGE MARKET RETURNS					<u>Average</u>
	<u>1996 - 2000</u>	<u>1997 - 2001</u>	<u>1998 - 2002</u>	<u>1999 - 2003</u>	<u>2000 - 2004</u>	
Amer. Pacific	2.3%	0.0%	7.7%	1.6%	4.1%	3.1%
Andres Wines Ltd. 'A'	8.8%	9.2%	4.4%	11.3%	20.7%	10.9%
Atlantis Plastics	10.1%	-1.6%	2.1%	15.8%	24.1%	10.1%
Atrion Corp	2.7%	15.0%	18.8%	30.7%	39.0%	21.2%
Koss Corp	12.5%	35.8%	36.1%	29.5%	33.9%	29.6%
Marsh Supermarkets 'B'	3.7%	7.2%	1.0%	1.0%	6.9%	4.0%
Max & Erma's Restaurants	1.9%	8.2%	17.2%	18.8%	18.6%	12.9%
NAPCO Security Systems Inc.	5.9%	7.7%	8.7%	14.5%	24.5%	12.3%
New Brunswick Scientific Co	9.9%	3.1%	9.4%	1.5%	7.6%	6.3%
Patriot Transportation Holdin	2.5%	-1.4%	3.1%	-1.9%	7.9%	2.0%
Peerless Mfg.	7.5%	16.8%	35.0%	22.8%	28.7%	22.2%
Rocky Mountain Choc Factory	-17.9%	16.3%	29.3%	28.3%	50.5%	21.3%
S&K Famous Brands	2.0%	5.6%	2.4%	5.9%	16.0%	6.4%
Span-America Medical Systems	0.8%	3.6%	14.8%	10.7%	25.8%	11.1%
Tasty Baking	8.8%	20.0%	6.5%	-4.6%	1.6%	6.4%
Village Super Market 'A'	13.6%	13.8%	27.3%	20.8%	20.5%	19.2%
Sample Average	4.7%	10.0%	14.0%	12.9%	20.7%	12.4%
Weighted Average	5.1%	9.8%	13.5%	12.1%	20.0%	12.1%

RISK PREMIUM ANALYSIS

Timeframes	S&P 500 minus Intermediate Term Debt		S&P 500 minus Short Term Debt		GDP Inflation
	Average Per Annum	Geometric	Average Per Annum	Geometric	
1950s	18.2%	16.6%	19.0%	17.4%	2.6%
1960s	4.2%	3.2%	4.8%	3.8%	2.6%
1970s	0.4%	-1.3%	1.2%	-0.7%	6.8%
1980s	8.2%	7.4%	9.3%	8.4%	4.4%
1990s	12.7%	11.8%	14.1%	13.2%	2.1%
2000s	-3.8%	0.0%	-2.5%	0.0%	1.8%
Average, 50s-90s	8.7%	7.5%	9.7%	8.4%	3.7%
'50s, '60s, '80s, '90s	10.8%	9.8%	11.8%	10.7%	2.5%
'70s, '80s	4.3%	3.0%	5.2%	3.9%	5.6%
2000s	-3.8%	0.0%	-2.5%	0.0%	1.8%

Timeframes	Mid-Cap Size Premia		Small-Cap Size Premia		Micro-Cap Size Premia		1-Year Treasury Yields	1-Year 10-Year Spread
	Average	S.D.	Average	S.D.	Average	S.D.		
1950s	1.8%	2.1%	2.3%	2.9%	3.6%	4.3%	2.6%	0.6%
1960s	3.0%	3.3%	4.5%	6.5%	8.3%	10.7%	4.4%	0.3%
1970s	3.4%	5.5%	4.6%	9.8%	5.6%	13.8%	7.0%	0.5%
1980s	2.2%	4.2%	3.6%	8.0%	2.4%	11.3%	9.7%	0.9%
1990s	-1.0%	4.2%	-1.6%	5.3%	-1.5%	8.1%	5.4%	1.3%
2000s	2.8%	5.7%	5.7%	7.5%	11.2%	12.3%	3.3%	1.4%
Average, 50s-90s	1.9%	3.8%	2.7%	6.5%	3.7%	11.0%	6.6%	0.7%
'50s, '60s, '80s, '90s	1.5%	3.4%	2.2%	5.7%	3.5%	7.7%	4.1%	0.7%
'70s, '80s	2.8%	4.8%	4.1%	8.9%	4.0%	12.5%	8.4%	0.7%
2000s	2.8%	5.7%	5.7%	7.5%	11.2%	12.3%	3.3%	1.4%
3. D. Across Decades	1.6%		2.6%		4.5%		2.6%	0.5%

Cost Rate Components	Overall Equity Market Return		Market Return Requirements		Cost Rate Adjustments, Small-Sized Equities		Cost of Capital, Small-Sized Equities			
	Lower Bound	Upper Bound	Lower Bound	Upper Bound	Adjustment Component	Lower Bound	Upper Bound	Lower Bound	Upper Bound	
1-Year Treasuries	2.0%	4.6%			Diversifiable Risks	-4.6%	-2.9%	Small Capitalization Equities	7.7%	13.6%
1-Yr - 10-Yr Spread	1.2%	1.6%			Small Capitalization Equities	0.9%	3.5%	Very Small Capitalization Equities	9.8%	15.8%
Equity - T. Debt Risk Premia	7.5%				Very Small Capitalization Equities	1.2%	5.7%			
Expected Overall Market Return	11.5%	13.0%								

Appendix VIII TSX Utilities

Profiles of TSX-Listed Companies - Utilities

Canadian Dollars (Millions) Except Where Noted

Company	Revenue			Operating Income			Assets		
	2005	2004-2005	Annual % Change	2005	2004-2005	Change	2005	2004-2005	Annual % Change
Shear Wind Inc. ¹	0.00	N/A	N/A	(0.04)	N/A	N/A	0.45		N/A
Sierra Geothermal Power Corp	0.00	N/A	N/A	(0.31)	(0.39)	(0.39)	0.58		333.22%
SmartCool Systems Inc.	0.00	N/A	N/A	(0.96)	(0.52)	(0.52)	0.65		30.10%
Sofame Technologies Inc	1.51	8.41%	0.35	1.39	1.39	1.39	1.10		-21.07%
Clearford Industries Inc.	0.02	11.90%	(2.32)	(1.47)	(1.47)	(1.47)	1.30		12.81%
Western Wind Energy Corp	0.00	N/A	N/A	(6.67)	(6.58)	(6.58)	3.79		108.75%
Nevada Geothermal Power Inc. ⁵	0.00	N/A	N/A	0.80	0.63	0.63	4.00		170.62%
Plutonic Power Corporation ³	0.00	N/A	N/A	(0.92)	(0.84)	(0.84)	4.02		128.77%
Altek Power Corp.	1.94	52.89%	(0.90)	0.02	0.02	0.02	5.83		12.35%
Coast Mountain Power Corp.	0.00	N/A	N/A	(0.80)	(0.74)	(0.74)	7.03		122.45%
Hy-Drive Technologies Ltd. ³	0.02	N/A	N/A	(3.24)	5.19	5.19	7.40		108.92%
Athlone Energy Ltd.*	1.03	N/A	(0.58)	(0.52)	(0.52)	(0.52)	11.76		137.16%
Run of River Power Inc.	0.75	135.72%	(1.25)	(1.24)	(1.24)	(1.24)	23.51		143.27%
Western GeoPower Corp.	0.00	N/A	N/A	(3.39)	(3.23)	(3.23)	37.51		87.09%
Polaris Geothermal Inc. ^{2**}	0.77	N/A	N/A	(3.57)	(0.91)	(0.91)	43.39		16.60%
Guest-Tek Interactive Entertainment Ltd. ^{4*}	43.20	72.47%	(2.85)	(2.85)	(3.44)	(3.44)	49.46		117.22%
Macro Enterprises Inc ^{2*}	81.00	71.36%	13.51	13.51	11.22	11.22	56.53		71.11%
Pacific Northern Gas Ltd.	159.95	3.65%	18.64	18.64	(1.84)	(1.84)	215.21		0.96%
Caribbean Utilities Company, Ltd.***	135.68	10.77%	23.35	23.35	0.85	0.85	312.99		6.22%
Boralex Inc.	115.62	5.65%	23.57	23.57	1.27	1.27	429.52		4.93%
Canadian Hydro Developers, Inc.	28.90	16.65%	9.72	9.72	2.89	2.89	583.35		42.71%
Great Lakes Hydro Income Fund	154.46	30.31%	80.33	80.33	53.86	53.86	1,130.76		19.34%
Gaz Metro Limited Partnership	1,808.20	-3.32%	150.89	150.89	9.73	9.73	2,661.09		3.16%
TransAlta Corporation	2,838.50	5.18%	441.20	441.20	73.30	73.30	7,740.70		0.44%
Canadian National Railway Company	7,240.00	6.39%	2,624.00	2,624.00	942.00	942.00	22,188.00		1.12%
TransCanada Corporation ⁴	6,124.00	5.51%	2,050.00	2,050.00	(143.00)	(143.00)	24,113.00		4.83%

Notes:

* For those companies that end the fiscal year in April or earlier, we assign the reported data for a fiscal year to the previous year.

** Financial data provided in US\$ (Millions).

¹ Financial data available for 2005 only.

² Financial data available for 2004-2005. Change statistics calculated over this period.

³ Financial data available for 2003-2005. Change statistics calculated over this period.

⁴ Financial data available for 2002-2005. Change statistics calculated over this period.

⁵ Financial data available for 2001-2004. Change statistics calculated over this period and levels presented are for 2004.

Sources:

Company Financial Statements and Annual Reports obtained from www.SEDAR.com.

Profiles of TSX-Listed Companies - Utilities

Company	Equity Share		Debt Share		Rate of Return		Variation	
	Average		Average		Average			
	2005	2001-2005	2005	2001-2005	2005	2002-2005		
Shear Wind Inc.1	100.0%	100.0%	0.0%	0.0%	N/A	N/A	N/A	0.45
Sierra Geothermal Power Corp	100.0%	100.0%	0.0%	0.0%	N/A	N/A	N/A	0.58
SmartCool Systems Inc.	100.0%	100.0%	0.0%	0.0%	N/A	N/A	N/A	0.65
Sofame Technologies Inc.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.10
Clearford Industries Inc.	100.0%	97.2%	0.0%	2.8%	N/A	N/A	N/A	1.30
Western Wind Energy Corp	94.1%	96.7%	5.9%	3.3%	N/A	N/A	N/A	3.79
Nevada Geothermal Power Inc.5	100.0%	100.0%	0.0%	0.0%	40.2%	91.3%	46%	4.00
Plutonic Power Corporation3	100.0%	100.0%	0.0%	0.0%	-31.3%	0.0%	38%	4.02
Altek Power Corp.	49.4%	52.0%	50.6%	48.0%	N/A	N/A	104%	5.83
Coast Mountain Power Corp.	100.0%	96.7%	0.0%	3.3%	-12.6%	-17.2%	13%	7.03
Hy-Drive Technologies Ltd.3	100.0%	100.0%	0.0%	0.0%	N/A	0.0%	56%	7.40
Athlone Energy Ltd.*	100.0%	100.0%	0.0%	0.0%	-6.3%	N/A	N/A	11.76
Run of River Power Inc.	44.8%	89.0%	55.2%	11.0%	-23.4%	N/A	N/A	23.51
Western GeoPower Corp.	87.7%	81.9%	12.3%	18.1%	-14.8%	N/A	N/A	37.51
Polaris Geothermal Inc.2 **	61.5%	67.4%	38.5%	32.6%	-17.0%	0.0%	N/A	43.39
Guest-Tek Interactive Entertainment Ltd.4 *	100.0%	97.3%	0.0%	2.7%	-6.3%	3.1%	14%	49.46
Macro Enterprises Inc2 *	66.2%	51.1%	33.8%	48.9%	N/A	N/A	N/A	56.53
Pacific Northern Gas Ltd.	45.9%	44.2%	54.1%	55.8%	24.6%	25.4%	1%	215.21
Caribbean Utilities Company, Ltd. **	46.1%	48.6%	53.9%	51.4%	18.0%	15.3%	9%	312.99
Boralex Inc.	44.8%	63.1%	55.2%	36.9%	14.9%	6.1%	7%	429.52
Canadian Hydro Developers, Inc.	59.0%	57.0%	41.0%	43.0%	4.3%	9.0%	3%	583.35
Great Lakes Hydro Income Fund	40.9%	55.6%	59.1%	44.4%	18.0%	16.0%	3%	1,130.76
Gaz Metro Limited Partnership	39.9%	39.8%	60.1%	60.2%	16.6%	18.0%	1%	2,661.09
TransAlta Corporation	49.3%	43.7%	50.7%	56.3%	17.6%	18.0%	6%	7,740.70
Canadian National Railway Company	64.5%	61.8%	35.5%	38.2%	28.3%	23.1%	4%	22,188.00
TransCanada Corporation4	39.6%	36.8%	60.4%	63.2%	29.8%	32.1%	3%	24,113.00
	73.3%	75.2%	26.7%	24.8%	5.9%	16.0%	20.6%	

Notes:

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² Financial data available for 2004-2005. Averages calculated over this period.

³ Financial data available for 2003-2005. Averages calculated over this period.

⁴ Financial data available for 2002-2005. Averages calculated over this period.

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Sources:

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Profiles of TSX-Listed Companies - Non-Utilities

Canadian Dollars (Millions) Except Where Noted

Company	Revenue		Operating Income		Assets	
	2005	Annual % Change 2001-2005	2005	Change 2001-2005	2005	Annual % Change 2001-2005
	Fairchild Investments Ltd.**	0.00	N/A	(0.91)	0.12	0.09
Luca Capital Inc. ¹	0.00	N/A	(0.10)	N/A	0.70	N/A
Audiotech Healthcare Corp.	3.81	7.91%	0.09	0.67	2.59	7.52%
Leis Industries Ltd.	0.00	N/A	(0.25)	(0.04)	2.71	12.57%
Sentex Systems Ltd	3.02	-9.33%	(0.48)	(1.13)	3.58	13.83%
Tribute Resources Inc	0.37	-9.96%	0.05	0.17	3.76	20.20%
Helijet International Inc.	20.06	2.02%	(0.37)	0.26	8.76	-9.90%
Phoenix Capital Inc. ⁵	5.31	38.09%	2.19	2.43	12.34	-2.30%
Granville Pacific Capital Corp.*	6.34	2.88%	0.73	(0.00)	12.57	13.73%
Stone Mountain Holdings Inc.	9.15	-16.05%	(3.36)	(4.71)	15.70	-7.18%
General Fasteners Inc	65.49	5.87%	1.75	0.86	18.19	5.11%
Antigua Enterprises Inc.**	45.90	1.84%	3.43	12.57	27.50	3.19%
Intrinsyc Software International, Inc.	17.54	12.52%	(4.63)	(0.01)	28.09	4.44%
Forest & Marine Investments Ltd.	1.22	-6.37%	1.22	(0.36)	38.00	6.89%
Dominion Citrus Limited	125.85	4.24%	3.45	0.38	41.23	18.23%
Rutter Inc.	70.94	N/A	1.58	1.73	56.80	N/A
Viceroy Homes Limited*	102.98	4.06%	5.55	(1.62)	58.43	0.70%
Cygnal Technologies Corporation	125.77	-2.96%	(22.43)	(27.39)	73.55	-4.59%
20-20 Technologies Inc. ³ **	40.48	15.47%	5.94	1.64	78.96	58.61%
Enghouse Systems Limited	48.43	27.11%	5.89	(2.88)	136.72	18.51%
Foremost Income Fund ²	207.50	29.08%	28.02	7.82	140.53	30.07%
E.D. Smith Income Fund ¹	N/A	N/A	N/A	N/A	N/A	N/A
Cossette Communication Group Inc.	684.28	3.31%	19.95	1.03	226.71	3.20%
Sterling Centrecorp Inc. ⁴	75.64	21.92%	15.12	15.51	282.34	37.75%
Van Houtte Inc.*	377.63	4.53%	33.08	1.93	380.12	0.16%
Transat A.T. Inc.	2,364.48	2.74%	92.96	90.31	949.54	10.80%
WestJet Airlines Ltd.	1,395.02	30.68%	60.84	1.48	2,213.09	54.01%
West Fraser Timber Co. Ltd.	3,576.70	23.01%	191.48	4.25	3,633.68	11.88%
Canadian Pacific Railway Limited	4,391.60	4.39%	1,001.40	160.40	10,891.10	3.04%

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** Financial data provided in US\$ (Millions).

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Profiles of TSX-Listed Companies - Non-Utilities

Company	Equity Share			Debt Share			Rate of Return		
	2005	Average 2001-2005	2005	2005	Average 2001-2005	2005	Average 2002-2005	Variation	
Fairchild Investments Ltd.	100.0%	N/A	0.0%	N/A	11.9%	11.5%	5%		
Luca Capital Inc.1	100.0%	100.0%	0.0%	0.0%	N/A	N/A	N/A		
Audiotech Healthcare Corp.	41.1%	39.5%	58.9%	60.5%	10.4%	3.8%	21%		
Leis Industries Ltd.	75.5%	56.6%	24.5%	43.4%	-11.8%	-8.0%	7%		
Sentex Systems Ltd	68.7%	78.4%	31.3%	21.6%	-19.7%	3.2%	24%		
Tribute Resources Inc	99.1%	88.0%	0.9%	12.0%	2.4%	1.2%	5%		
Helijet International Inc.	100.0%	62.1%	0.0%	37.9%	48.9%	N/A	N/A		
Phoenix Capital Inc.5	100.0%	95.0%	0.0%	5.0%	0.0%	14.6%	24%		
Granville Pacific Capital Corp.*	11.2%	14.1%	88.8%	85.9%	65.7%	64.6%	15%		
Stone Mountain Holdings Inc.	1.2%	38.5%	98.8%	61.5%	N/A	N/A	N/A		
General Fasteners Inc	100.0%	84.6%	0.0%	15.4%	20.3%	21.0%	1%		
Antigua Enterprises Inc.	70.1%	45.6%	29.9%	54.4%	29.5%	N/A	N/A		
Intrinsyc Software International, Inc.	100.0%	97.8%	0.0%	2.2%	-19.8%	N/A	N/A		
Forest & Marine Investments Ltd.	100.0%	100.0%	0.0%	0.0%	3.4%	2.7%	2%		
Dominion Citrus Limited	81.1%	72.0%	18.9%	28.0%	29.6%	45.6%	15%		
Rutter Inc.	23.5%	-5.5%	76.5%	105.5%	18.7%	N/A	N/A		
Viceroy Homes Limited*	100.0%	100.0%	0.0%	0.0%	13.2%	7.3%	10%		
Cygnal Technologies Corporation	53.0%	67.7%	47.0%	32.3%	N/A	N/A	N/A		
20-20 Technologies Inc.3	97.7%	93.7%	2.3%	6.3%	16.5%	30.0%	19%		
Enghouse Systems Limited	100.0%	100.0%	0.0%	0.0%	5.8%	10.6%	4%		
Foremost Income Fund2	77.3%	73.8%	22.7%	26.2%	47.0%	N/A	N/A		
E.D. Smith Income Fund1	76.3%	76.3%	23.7%	23.7%	N/A	N/A	N/A		
Cossette Communication Group Inc.	98.9%	98.5%	1.1%	1.5%	17.2%	21.2%	3%		
Sterling Centrecorp Inc.4	9.9%	31.0%	90.1%	69.0%	N/A	N/A	N/A		
Van Houtte Inc.*	71.3%	67.8%	28.7%	32.2%	14.1%	12.8%	1%		
Transat A. T. Inc.	100.0%	88.6%	0.0%	11.4%	27.6%	19.3%	21%		
WestJet Airlines Ltd.	36.6%	52.6%	63.4%	47.4%	9.7%	15.6%	14%		
West Fraser Timber Co. Ltd.	70.2%	72.3%	29.8%	27.7%	10.5%	11.7%	8%		
Canadian Pacific Railway Limited	59.4%	52.1%	40.6%	47.9%	23.9%	23.1%	3%		
	73.2%	69.3%	26.8%	30.7%	15.6%	16.4%	10.7%		

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Sources:

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