KLIPPENSTEINS

KLIPPENSTEINS
BARRISTERS & SOLICITORS
160 JOHN STREET, SUITE 300,
TORONTO, ONTARIO M5V 2E5
TEL: (416) 598-0288
FAX: (416) 598-9520

September 14, 2010

BY COURIER (8 COPIES) AND EMAIL

Ms. Kirsten Walli
Board Secretary
Ontario Energy Board
P.O. Box 2319
2300 Yonge Street, Suite 2700
Toronto, Ontario M4P 1E4
Fax: (416) 440-7656
Email: boardsec@oeb.gov.on.ca

Dear Ms. Walli:

Re: Pollution Probe – Responses to Interrogatories
EB-2010-0008 – Ontario Power Generation – 2011-12 Payment Amounts

Pursuant to *Procedural Order No. 4*, please find enclosed responses on behalf of Pollution Probe to interrogatories from Board Staff, Energy Probe, and OPG.

Yours truly,

B. Alexander

Basil Alexander

BA/ba

Encl.

cc: Applicant and Intervenors per Applicant and List of Intervenors attached to *Procedural Order No. 3*

Board Staff Interrogatory No. 1 to Pollution Probe

Question:

Issue 3.1: What is the appropriate capital structure and rate of return on equity?

Reference: Pollution Probe's Intervenor Evidence (Exhibit M, Tab 10), page 8, Section 1.3.4

In section 1.3.4, with respect to capital structure recommendations for OPG's prescribed hydroelectric generation, Drs. Kryzanowski and Roberts state:

> We assess the business risk faced by OPG Hydro as low to moderate – higher than that of a distribution utility and somewhat above the business risk of an integrated electric utility. This suggests that a fair common equity ratio for OPG Hydro should be at 40%, which is just below the middle of the range of common equity ratios that we find for our comparisons. We set the recommended equity ratio at this level to account for our benchmark of allowed equity ratios being generous.

In the *Report of the Board on Cost of Capital and 2nd Generation Incentive Regulation for Ontario's Electricity Distributors*[1], the Board adopted a deemed capital structure of 56% long-term debt, 4% short-term debt and 40% equity for rate-setting purposes, with electricity distributors migrating to that deemed capital structure from their then current deemed capital structure, which depended on the size of their rate base. The *Report of the Board on Cost of Capital for Ontario's Regulated Utilities*[2] affirms the deemed 40% equity thickness of electricity distribution rate-setting. If Drs. Kryzanowski and Roberts conclude that the business risk for OPG's prescribed hydroelectric generation is "higher than that of a distribution utility", then should not the equity thickness be higher than 40%, assuming that the ROE formula is the same for both electricity distributors and for OPG's prescribed assets? Please explain your response.

Response:

Drs. Kryzanowski and Roberts provide a more detailed discussion of the 40% benchmark set by the Board for distribution utilities and allowed returns in general on pages 62 – 63 of their pre-filed evidence (Exhibit M, Tab 10). They regard both the Board's 40% benchmark and the average equity ratio awarded by regulators for the companies in their sample as "generous" relative to what would obtained in a market setting. This is because the regulatory process is by

[1] Report of the Board on Cost of Capital and 2nd Generation Incentive Regulation for Ontario's Electricity Distributors, December 20, 2006, http://www.oeb.gov.on.ca/documents/cases/EB-2006-0088/report_of_the_board_201206.pdf
[2] EB-2009-0084 Report of the Board on the Cost of Capital for Ontario's Regulated Utilities, December 11, 2009, http://www.oeb.gov.on.ca/OEB/_Documents/EB-2009-0084/CostofCapital_Report_20091211.pdf

its nature an adversarial process between parties instead of a process determined by market forces. Utilities thus have an incentive to ask for higher equity ratios than they would generally obtain elsewhere. These requests are inputs into the adversarial regulatory process, and the resulting awards thus tend to be “generous” relative to what would be obtained in a market process. Drs. Kryzanowski and Roberts thus regard the 40% equity thickness as “generous” (relative to the market) for distribution utilities, but this equity thickness is appropriate for OPG Hydro with its higher business risk.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

Board Staff Interrogatory No. 2 to Pollution Probe

Question:

Issue 3.3: Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

Reference: Pollution Probe's Intervenor Evidence (Exhibit M, Tab 10), page 15, Section 3.3.1

Drs. Kryzanowski and Roberts state that: "The major advantage of using divisional costs of capital when divisional risks differ is to ensure that the scarce resource of capital is allocated efficiently (referred to as "allocational efficiency")."

(a) Does cost of service rate-setting, including review of capital projects, by a regulatory tribunal like the Ontario Energy Board act, as a proxy[,] to guard against allocational inefficiencies?

(b) Please identify instances or projects where Drs. Kryzanowski and Roberts believe there has been allocational inefficiency:
   (i) By OPG; or
   (ii) By other utilities examined in Pollution Probe's evidence.

Response:

(a) Cost of service rate-setting, including review of capital projects, by a regulatory tribunal like the Ontario Energy Board does act as a proxy to guard against allocational inefficiencies. However, the efficacy of such regulation depends upon the nature and scope of the review. For example, if the business cases for proposed investments do not account for material differences in investment riskiness (such as in the discount rate) then capital may not be allocated efficiently (as noted in their pre-filed evidence).

(b) (i) The Darlington Refurbishment is an example where the decision to proceed could depend upon whether the lower average cost of capital for OPG or its higher risk-adjusted average cost of capital for Nuclear is used in the assessment. When OPG uses the same discount rate that it uses for all its investment decisions (i.e. 7% instead of a project-specific risk-*adjusted* discount rate), OPG estimates that the project will cost 6¢ to 8¢ per kWh (Exhibit D2-2-1, p. 5; Exhibit L-10-3). OPG does do a sensitivity analysis around this estimate by using 7% plus or minus 1%, and it finds that the results of the Updated Economic Assessment are most sensitive to five input factors, where the fifth factor is the discount rate (Exhibit D2-2-1, Attachment 4, page 33 of 35). However, OPG should have used a risk-adjusted rate specific for the project instead of the standard 7%, which is not adjusted for risk differences. Since Drs. Kryzanowski and Roberts do not have access to the Monte Carlo Simulation and all of the input data used by OPG, they cannot determine how the expected and range of costs in cents per kWh would change if the middle of the discount rate range is instead a higher risk-*adjusted* discount rate (i.e. not the 7% used for all projects). They similarly cannot determine the resulting changes if the range used in the sensitivity analysis is plus or minus 1% or more from the appropriate risk-adjusted discount rate.

(ii) Drs. Kryzanowski and Roberts have not done a post-audit of projects approved by regulatory bodies, such as the Ontario Energy Board, because they do not have access to the complete set of data and they believe it is beyond their mandate for the purposes of this proceeding.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

Board Staff Interrogatory No. 3 to Pollution Probe

Question:

Issue 3.3: Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

Reference: Pollution Probe's Intervenor Evidence (Exhibit M, Tab 10), page 21, Section 3.3.2.2.2

(a) Please provide a copy of the article referenced in Footnote 14: Dr. Lawrence Kryzanowski and Ms. Ying Lu, "In government we trust: Rise and Fall of Canadian business income trust conversions", *Managerial Finance* 35:9 (September 2009), pages 784-802.

(b) How many of the income trusts examined in the article were for electricity generation or natural gas or electricity utility operations?

Response:

(a) Please see Attachment 1 for a copy of the requested article.

(b) The sample contained one such income trust. The decrease in its beta post-announcement was not statistically significant.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

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In government we trust: rise and fall of Canadian business income trust conversions

Lawrence Kryzanowski
Finance Department, John Molson School of Business, Concordia University, Montreal, Canada, and
Ying Lu
Wealth Management Department, Bank of East Asia, Shanghai, China

Abstract

Purpose – The purpose of this paper is to assess the market impact of announcements that publicly traded limited liability firms would convert to business income trusts, and to test the robustness of the tax motive as the primary determinant of any conversion announcement effects by estimating the market impact of the announcement by the Canadian Federal Government that the corporate income of Canadian income trusts would be taxed at the trust level.

Design/methodology/approach – Event-study methodology (including various tests of robustness) is used to examine the market impacts of the initial conversion announcement and the announcement that the corporate income of Canadian income trusts would be taxed at the trust level. Cross-sectional regressions are used to identify the determinants of the market effect associated with income trust conversion announcements.

Findings – The paper finds that the market- and risk-adjusted abnormal returns (ARs) are positive and very significant on the announcement dates and not significant on the conversion effective dates. The price discovery process is not as smooth for the Canadian government's announcement after the market close on Halloween day 2006, that it would tax income trusts at the trust level. While the ARs are negative and very significant on the first and second trading days after the announcement, much of the second day ARs are reversed in the subsequent two days. Furthermore, negative and significant ARs precede the government announcement. The market impact of trust conversion announcements is primarily related to the tax savings associated with such conversions and more weakly related to potential agency problems associated with free cash flows.

Research limitations/implications – The research indicates the importance of any taxation changes associated with changes in organization form on firm value. It also identifies the potential for informational leakage associated with government decisions.

Originality/value – The paper highlights the importance of taxes and tax changes and organization form changes on firm valuation.

Keywords Income, Trusts, Corporate governance, Corporate taxation, Canada

Paper type Research paper

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1. Introduction

Canadian income trusts, which are perceived by many investors as being an alternative asset class, date back to the mid-1980s for oil and gas investment. As the yields on fixed-income investments declined, income trusts became a popular investment vehicle with retail investors in Canada and abroad (the latter due to the low Canadian withholding tax of 15 percent on trust distributions to non-residents). Over the last two decades, the aggregate market capitalization of income trusts has increased dramatically from $1.93 billion Cdn in 1994 to $158.7 billion Cdn in 2005, and especially from a value of $28.2 billion Cdn in year 2001[1]. Income trusts are generally categorized as business, resource, utility and real estate investment trusts (REITs), although there is some cross-listing among the former three categories. On 26 January, 2005, Standard and Poor's (S&P) announced its decision to add income trusts to the existing S&P/TSX Composite Index, the leading indicator of Canadian equity market performance. On 17 March, 2006, income trusts were fully integrated into the S&P/Toronto Stock Exchange (TSX) Composite Index. After the market close on 31 October, 2006 (Halloween), the Canadian Federal Government announced that the income of Canadian income trusts would become taxable at the trust level.

The rapid growth in Canadian income trusts is primarily the result of conversions from traditional limited liability to trust legal structures. A business income trust example of the latter is GMP Capital Corporation, Canada's second-largest independent brokerage firm, whose 18 August, 2005 announcement after the market close dealt with plans to convert into an income trust in November of the same year. On August 19, 2005, the price of a GMP share increased by $3.60 (12.6 percent) to a record high of $32.25 on the TSX (National Post, 2005).

Income trusts are the subject of many internet and financial press articles, roundtables, conferences, and regulatory publications[2]. The financial sections of the business newspapers have moved from reports of firms announcing their intentions to convert into income trusts to income-trust buy-outs. Despite the rapid growth in the relative importance of income trusts and the considerable interest in income trusts among practitioners and corporate acquirers, only a few academic papers (e.g. Kryzanowski *et al.*, 2006; Aguerrevere *et al.*, 2005; Halpern, 2004; Halpern and Norli, 2006; King, 2003) are found in academic or mixed academic/practitioner journals. Aguerrevere *et al.* (2005) report a positive and persistent market reaction, in most of the cases, for a sample of 29 conversions to various types of income trusts (i.e. utility trusts, business income trusts, resource royalty trusts, and REITs) over the period between January 1996 and 2004.

Thus, this paper has three main objectives. The first objective is to assess the market impact of announcements by our sample of publicly traded limited liability firms that they would convert to business income trusts. The second objective is to identify the determinants of any announcement effects given that many hypotheses or conjectures are advanced but not tested empirically to explain why limited liability firms convert into business income trusts. The third objective is to test the robustness of the tax motive as the primary determinant of any conversion announcement effects. This is done by estimating the market impact for the same set of income trusts of the announcement by the Canadian Federal Government that the corporate income of Canadian income trusts would be taxed at the trust level. For all these tests, we examine a sample of 29 publicly traded, primarily small, non-penny firms that converted to business income trusts over the 1998-2005 period.

This paper makes three contributions to the literature. The first contribution, albeit more minor given the findings reported by Halpern (2004), is to document that the market impact for the announcements that publicly traded firms plan to convert to business income trusts is robust, positive, very significant and quick in terms of price discovery. The mean and median abnormal returns (ARs) for the announcement dates (ADs) for our sample of conversions to business income trusts are a significant 15.52 and 13.95 percent, respectively. In contrast and as expected, the market impact for the effective conversion date is not significantly different from zero (mean and median ARs of 0.12 and −0.62 percent, respectively).

The second contribution is the finding that the ARs are positively and strongly related to the tax-saving motivation for conversions to business income trusts. The estimated coefficient of the variable, "tax-rate", is positive and highly significant in all the regressions. The ARs are also positively but weakly related to better control of the potential agency problems associated with free cash flows (FCF) for business income trust conversions since the estimated coefficient of the variable "FCF per share divided by price per share" is positive and weakly significant (at the 0.10 level) in the more parsimonious regressions. Thus, although many untested hypotheses or conjectures are advanced to explain why limited liability firms convert into business income trusts, the evidence only strongly supports the tax-saving motive and weakly supports the reduction of the agency problems associated with FCFs for such conversions.

The third contribution is the finding that the tax motive as the primary determinant of the price effects associated with income trust conversions is robust. Specifically, we find a sharp market correction for the same sample of income trust converts following the Canadian government announcement after the market close on 31 October, 2006 (the Halloween debacle) that the corporate income of trusts would be taxed at the trust level. Significant mean and median ARs of −10.64 and −11.08 percent, respectively, occur on the announcement day (i.e. 1 November, 2006 given that the announcement was after the close of the market). This was followed by significant mean and median ARs of −4.51 and −4.37 percent, respectively, on the following day, and 2.70 and 3.12 percent on the second day post-announcement. Thus, a tentative price discovery process follows this announcement as investors attempted to gauge if the government would be forced to alter or even abandon their initial announcement to tax trusts. In addition, there is weak evidence that there was a market reaction during the three trading days preceding the announcement date. Cumulative average (unweighted and size-weighted) abnormal returns or CAARs of −1.38 and −2.01 percent, respectively, over the three days prior to the tax announcement date are significant.

The remainder of this paper is organized as follows. In the next section, the alleged merits for the income trust organizational structure are discussed. In the third section, the sample and data collection are described. In the fourth section, the market reactions to the announcements of conversions to organizational income trust structures and their actual conversions are examined. In the fifth section, the determinants of the market effect associated with income trust conversion announcements are assessed. In the sixth section, the market reactions to the government announcement to tax trusts are examined to assess the robustness of the tax motive as the primary determinant of income trust conversions (as was found in section five). In the seventh section, further tests of the robustness of the AR results for the trust conversion announcements and for the government announcement to tax trusts are conducted. In the eighth and final section, some concluding comments are offered.

2. Merits of the income trust organizational structure

Income trusts have at least three dominant advantages[3]. The first is tax efficiency because the Canadian income trust legal structure is subject to flow-through taxation rules where income distributions from the trust are taxed at the unitholder level. For units held by non-taxable entities, such as trusteed pension plans or Registered Retirement Savings Plan and Registered Retirement Income Fund accounts, the present value of future deferred tax payments are reduced. However, since the income portion of the cash distributions is now taxed as income and not dividends for an income trust, the favorable dividend tax credit no longer applies. Mintz (CTV.ca News Staff, 2006) raises an earlier estimate of the annual loss in taxes collected (so-called tax leakage) from $500 to $700 million in 2004 (Aggarwal and Mintz, 2004) to about $1.1 billion to the federal and provincial governments once two large telecoms (i.e. Telus Corp. and BCE Inc.) convert[4]. Various parties argue that these estimates are exaggerated often without providing their own estimates. For example, Fortin (2006) argues that "[t]hese studies however rest on incorrect assumptions or fail to take all relevant factors into consideration".

The second advantage of the trust structure is its monthly (or quarterly) distributions of cash flows to unitholders, which supposedly deals with the agency problems associated with FCF. Companies using the income trust structure usually are mature, with stable cash flows, a low level of income elasticity, and a low need for new investment (Aggarwal and Mintz, 2004). A high payout ratio controls the tendency of these types of mature and profitable revenue-generating firms from investing FCF into marginal projects that are either value neutral or value destroying.

The third advantage of the trust structure is that income trusts, especially business trusts, provide a potential diversification benefit by enlarging the investment opportunity set available for equity investment without incurring unreasonable marginal trade costs or risks. To illustrate, Halpern (2004) reports that business trusts have the lowest correlation (0.41) with the TSX index, and lowest standard deviation (13.9%) among the various equity asset classes that he examines. Kryzanowski *et al.* (2006) report that the inclusion of trusts in the S&P/TSX Composite Index should materially expand the investment opportunity set available for investment (particularly for equity indexers), albeit at the addition of some incremental performance drag, and that trusts as equities exhibit more bond-like than equity market risk sensitivities.

3. Description of the sample and data

The sample of 29 conversions of publicly traded limited-liability firms to publicly traded business income trust organizational structures over the 1998-2005 period, which are not penny stocks, are identified using the Canadian Financial Market Research Center (CFMRC) database, *Bloomberg*, and business trust filings available from *SEDAR*[5]. The conversion announcement and effective conversion dates (i.e. AD and effective dates (ED)) for the income trusts are obtained from the web homepage of each converted trust or from its regulatory filings available from *SEDAR*, and are cross-checked using *Bloomberg* and *Lexis-Nexis*. The announcement and EDs of these trust conversions are concentrated in three years (2002, 2004, and 2005). The corresponding numbers for each of these three years are 9, 5, and 12 trusts for conversion ADs, and 8, 5, and 12 trusts for conversion EDs. Three business sectors account for almost 83 percent of the 29 converted trusts (i.e. 38 percent in industries, 24 percent in utilities, and 21 percent in consumer staples).

Daily stock prices, closing bid and ask prices and returns and all capital distributions are extracted from *CFMRC* for TSX-listed firms/trusts to the end of 2005, and from *DataStream* and *Bloomberg* thereafter and for those firms/trusts that were listed on the TSX Venture Exchange. Returns for days without trade are calculated using the closing bid-ask midspreads and reflecting cash distributions (if any)[6]. Accounting data for the sample of trust conversions are retrieved from *StockGuide* as well as annual reports and proxy statements filed with *SEDAR*.

4. Market reaction to trust conversions

4.1 Hypothesis

The first null hypothesis ($H_0{}^1$) that is tested herein is: No market- and risk-adjusted ARs are associated with the announcement or EDs of limited-liability firm conversions into publicly-traded income trusts. Our expectation is that the ARs associated with conversion announcements will be positive and significant due to the benefits supposedly associated with such conversions that were discussed in the previous section[7]. Unlike our expectation for the announcement day, our expectation is that the ARs associated with conversion EDs will not be significantly different from zero in an efficient capital market such as the TSX.

4.2 Methodology

The market- and risk-adjusted ARs associated with trust conversion/or ADs and/or EDs are estimated using a market model that allows for a change in beta on and after the conversion AD or ED. Specifically:

$$R_{it} = \alpha_i + \beta_{1i}R_{mt} + \beta_{2i}D_1R_{mt} + \sum_{j=-5}^{+5}\gamma_{ij}D_{2j} + \sum_{j=-1}^{+1}\lambda_{ij}D_{3j} + \varepsilon_{it} \tag{1}$$

where R_{it} is the return on a (share) unit of (the predecessor to) trust i on day t; R_{mt} is the return for the S&P/TSX composite index on day t; α_i is the intercept for (the predecessor to) trust i; β_{1i} is the estimated beta for the predecessor to trust i prior to the conversion AD or ED; β_{2i} is the change in the estimated beta for the predecessor to trust i or on trust i on and after the conversion AD or ED; D_1 is a dummy variable which is equal to one for the conversion AD or ED and the respective period thereafter, and is equal to 0 otherwise; D_{2j} are the event dummies for the conversion AD or ED which equal one for day j in the event window [−5, 5] and zero otherwise; γ_{ij} is the AR for day j in the AD (or ED) event window for a share or unit of trust i; D_{3j} are the event dummies for the conversion ED (or AD) which equal one for day j in the event window [−1, 1] and zero otherwise if the ED (or AD) occurs in the period [−90, +90] used to estimate (1) for the AD (ED); λ_{ij} is the AR for day j in the ED (or AD) event window for a share or unit of trust i if the ED (or AD) occurs in the period [−90, +90] used to estimate (1) for the AD (ED); and ε_{it} is the estimated error term for a (share) unit of (the predecessor to) trust i on day t, which is assumed to be normally distributed with mean zero and constant variance[8]. Since (1) is estimated using the 181 days centered on either the AD or ED, the 90 days post-AD may include the ED and the 90 days pre-ED may include the AD given that the mean (median) number of trading days between the AD and ED is 59 (51) days. Thus, the term in (1) that includes D_{3j} is used to remove any possible contamination from such overlaps.

The statistical significance of the mean and median abnormal returns for single- and multi-day periods are tested using both parametric *t*- and non-parametric Wilcoxon signed rank tests, respectively. Significance at the 0.10, 0.05, and 0.01 levels are referred to as being weakly significant, significant, and very significant hereafter.

4.3 Empirical results for conversion announcement and effective dates for a one-factor model

The mean and median single- and multi-day average abnormal returns (ARs and AARs) around the conversion announcement dates based on the market model (1) are summarized in Table I, and the CAARs over the ten days centered on the conversion announcement dates or ADs are depicted in Figure 1. The daily mean and median ARs for AD [0] of 15.52 and 13.95 percent, respectively, are very significant statistically. Interestingly, the mean and median ARs for days other than AD in the event window are not significant. Also, since the mean and median AAR over the pre- and post-AD panes of the event window (i.e. [−5, −2] and [2, 5]) are not statistically significant, no evidence exists that the market overreacts to trust conversion announcements or that price discovery is slow after such announcements or that the market reacted prior to the announcement[9].

	Announcement dates				Effective dates			
Event day or period	Daily mean AR or AAR	*t*-value	Daily median AR or ARR	Wilcoxon test statistic *p*-value	Daily mean AR or AAR	*t*-value	Daily median AR or AAR	Wilcoxon test statistic *p*-value
−5	−0.0092	−1.28	−0.0027	0.1958	0.0049	0.90	−0.0008	0.8085
−4	0.0108	1.28	0.0034	0.3339	−0.0003	−0.05	0.0004	0.8911
−3	0.0009	0.13	−0.0003	0.7922	−0.0061	−1.11	0.0000	0.6501
−2	0.0053	1.07	−0.0010	0.5757	−0.0026	−0.59	−0.0041	0.3559
−1	−0.0035	−0.62	0.0000	0.3127	0.0039	0.68	−0.0002	0.6964
0	0.1552	7.44***	0.1395	<0.0001	0.0012	0.14	−0.0062	0.2036
1	0.0104	1.27	0.0057	0.2036	−0.0017	−0.19	0.0020	0.3232
2	0.0013	0.2	−0.0078	0.9078	0.0021	0.34	−0.0012	0.8579
3	0.0142	1.36	−0.0036	0.8579	−0.0045	−0.74	−0.0055	0.1474
4	−0.0063	−1.15	−0.0043	0.2635	−0.0022	−0.37	−0.0039	0.2280
5	−0.0026	−0.50	0.0006	0.6349	−0.004	−1.12	−0.0031	0.1413
[−5, 5]	0.0160	5.06***	0.0129	<0.0001	−0.0008	−0.55	−0.0004	0.7121
[−5, −2]	0.0020	1.03	0.0011	0.3232	−0.001	−0.44	−0.0021	0.9078
[−1, 1]	0.0540	7.06***	0.0482	<0.0001	0.0011	0.23	−0.0011	0.8249
[0, 1]	0.0828	7.06***	0.0931	<0.0001	−0.0003	−0.04	−0.0040	0.2924
[2, 5]	0.0017	0.50	−0.0024	0.8249	−0.0021	−0.94	−0.0025	0.2280

Notes: This table reports the mean and median daily abnormal returns (ARs) and multi-day daily average abnormal returns for the total sample of 29 trust conversions over the 1998-2005 period for the event window [−5, +5] based on a single-factor model (1); cumulative average abnormal return for the multi-day periods can be obtained by multiplying the reported daily AARs by the number of days in the multi-day periods; two types of event dates are examined: conversion announcement and effective dates (as represented by announcement date and effective date, respectively); the mean and median values are tested using *t*- and Wilcoxon sign tests, respectively; * indicates statistical significance at the 0.01 level

Table I.
Abnormal returns for various single- and multi-day periods within the event window around trust conversion announcement and effective dates based on a single-factor model

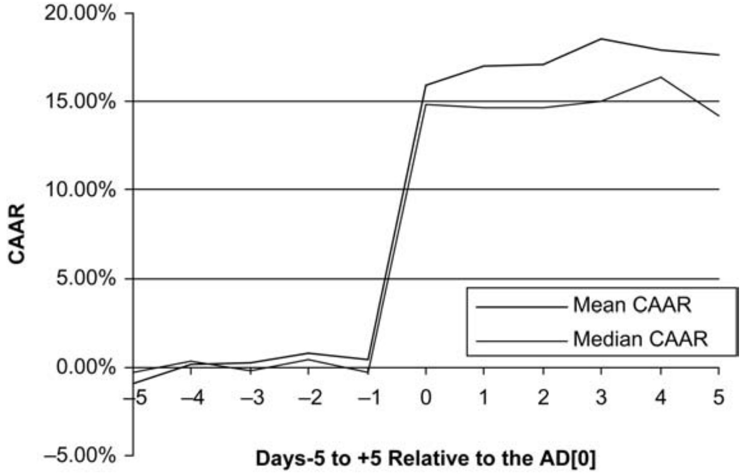


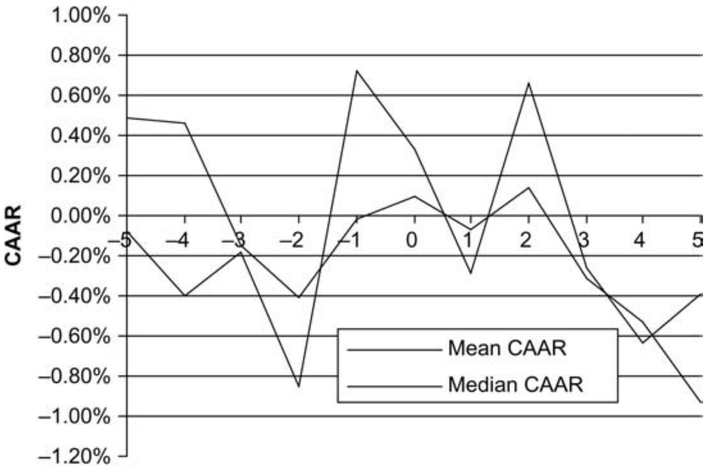
Figure 1.
Cumulative average abnormal return (CAAR) around conversion announcement dates based on single-factor market model

Notes: This figure plots the (CAARs) for the 29 conversions to trusts for the 11 days centered on the conversion announcement dates or AD[0] (i.e. over the event window [–5, +5]); the ARs are based on the single-factor market model (1)

The untabulated mean and median estimated betas (β_{1i}) of 0.09 and 0.14, respectively, for the pre-conversion announcement periods are not significantly different from zero. The untabulated changes (increases) in the mean and median estimated betas (β_{2i}) of 0.19 and 0.22, respectively, on the ADs are also not significant at conventional levels, although the untabulated post-announcement mean and median betas of 0.29 and 0.20 are highly significant.

The ARs based on the market model (1) around the conversion EDs are reported in Table I, and the CAARs for the twenty days centered on the conversion EDs are depicted in Figure 2. The mean and median daily AR of 0.12 percent and -0.62 percent for the ED are not significantly different from zero. This is also the case for the single and multi-day ARs and AARs around the ED. Thus, the second hypothesis can not be rejected as expected. The untabulated mean and median estimated betas (β_{1i}) are an insignificant 0.21 and a very significant 0.23, respectively, for the pre-conversion period. The untabulated changes in the mean and median estimated betas (β_{2i}) of 0.09 and -0.06, respectively, on the effective conversion dates are not significant at conventional levels.

Since the above analysis does not account for the relative size of each trust, the relative performance of the total sample is re-examined by weighting each converted trust by the relative total assets of each trust conversion i, which is given by $w_{TA,i,-1} = TA_{i,-1}/\sum_{i=1}^{N} TA_{i,-1}$, where $TA_{i,-1}$ measures the total assets for firm i for the year prior to its trust conversion announcement (effective) date, and N is the sample size. The Z-values for the cross-sections of the size-weighted ARs are computed based on the Eckbo and Norli (2005) methodology. The p-values for the mean of the cross-section of size-weighted ARs are computed using $U \equiv \omega' AR/(\sigma\sqrt{(\omega'\omega)})$, where ω is a vector of cross-sectional total-asset weights and AR is the corresponding vector of cross-sectional AR. Assuming that AR is distributed normally $N(\mu, \sigma^2)$ and that σ^2



Notes: This figure plots the CAARs for the 29 conversions to trusts for the 11 days centered on the conversion effective dates or ED[0] (i.e. over the event window [−5, +5]; the ARs are based on the single-factor market model (1)

Figure 2. Cumulative average abnormal return around effective conversion dates based on single-factor market model

can be consistently estimated using $\sum_{i=1}^{N} \omega_i (AR_i - \mu_{AR})^2$, where $\mu_{AR} = \sum_{i=1}^{N} \omega_i AR$, then U is distributed $N(0,1)$.

The untabulated results for the size-weighted mean single-day ARs in the AD event windows are very similar to the unweighted results discussed above. Although the weighted mean of 13.97 percent is lower than its unweighted counterpart of 15.52 perecnt, the weighted and unweighted means increase to 17.68 percent (t-value of 6.48) and 16 percent (t-value of 7.62) when the non-significant AR for the AD (i.e. day [0]) for Precision Drilling, which has a 23.5 percent weight, is removed from the calculations. Thus, there appears to be no inference changing size effect in the ARs for the AD. Similarly, based on untabulated results, the inferences are unchanged for the ED when size-weighted mean ARs are examined in the ED event window.

5. Determinants of the market effect associated with business trust conversion announcements

5.1 Methodology

Since any abnormal (or unexpected) market performance around trust conversion announcements may be related to factors that are identified in the literature as likely (but essentially untested) determinants of such performance, various cross-sectional multivariate regressions are run in this section of the paper. The most general form of the model used is given by:

$$\begin{aligned} AAR_i = {} & \alpha + \alpha D_1 + \beta_1\, TaxRate_i + \beta_2\, Tax\,PS_i/Price_i \\ & + \beta_3 FCFPS_i/Price_i + \beta_4\, Log\,FirmSize_i \\ & + \beta_5 P/B_i + \beta_6 E/P_i + \beta_7 D/EQ_i + \beta_8 \Delta M\&DOwn_i \\ & + \beta_9 M\&DOwn_i + \beta_{10}\, Div\,Yld + \varsigma_i \end{aligned} \quad (2)$$

In model (2), AAR_i is the average daily AR for the two-day event window [0, +1] for trust conversion announcement i since the ARs are also significant for some trust conversion announcements on day [+1][10].

$TaxRate_i$ is the mean rate of income tax paid or reimbursed during the three-year period immediately preceding the trust conversion announcement for predecessor firm i, which is based on taxes paid divided by earnings before tax (EBT) for each fiscal year-end for predecessor firm i[11]. Since the reduction of tax expenses is supposedly one of the major rationales for trust conversion (Aguerrevere *et al.*, 2005; Halpern, 2004), the expected sign for this variable is positive.

TaxPS/P is the mean ratio of income taxes paid per share divided by the price per share during the three-year period immediately preceding the trust conversion announcement for predecessor firm i. Since *TaxPS* is a cash outflow and the reduction in relative taxes paid is a primary reason for trust conversions (Aguerrevere *et al.*, 2005; Aggarwal and Mintz, 2004), the expected sign for the possible reduction in tax payments when scaled by price is positive.

FCFPS/P is the mean ratio of FCFs per share divided by the price per share during the three-year period immediately preceding the trust conversion announcement for predecessor firm i, which is based on the ratio of FCFs (i.e. net operating cash flows minus capital expenditures) per share to price per share for each fiscal year-end for predecessor firm i. Since the reduction of any agency problems associated with FCFs is supposedly one of the major rationales for trust conversions (Aguerrevere *et al.*, 2005; Halpern, 2004) and greater FCFs result in higher cash distributions and potentially greater tax savings under an income trust organizational structure, the expected sign for this variable is positive.

$LogFirmSize_i$ is the log of the size of trust conversion i based on the market value of equity of predecessor firm i at the end of the fiscal year before trust conversion announcement i. Some authors argue that smaller firms are likely to benefit more from conversion to a trust structure (Aguerrevere *et al.*, 2005; Halpern, 2004). However, the risk associated with potential cash distributions is likely to be higher for smaller firms. Thus, the expected sign for this variable is indeterminate.

B/P_i is the book-to-price ratio for trust conversion i, as measured by the book value of equity divided by the market value of equity at the end of the fiscal year before trust conversion announcement i. The book-to-price ratio is a commonly used proxy for investment or growth opportunities (as is the subsequently discussed earnings-to-price ratio). Since firms with higher growth opportunities are likely to benefit less from conversion to a trust structure due to the high payouts associated with business trusts (Aguerrevere *et al.*, 2005), the expected sign for this variable is positive.

E/P_i is the earnings yield for trust conversion i, as measured by earnings per share (EPS) at the end of the fiscal year before trust conversion announcement i divided by the stock price at that point in time. Since firms with higher earnings yields are likely to benefit more from conversion to a trust structure as a result of the favorable tax status of a trust (Halpern, 2004), the expected sign for this variable is positive. The E/P ratio is used instead of the P/E ratio to avoid the tendency of the P/E ratio to go towards infinity with very small EPS values and to be un-interpretable for negative EPS values.

D/EQ_i is the leverage ratio for trust conversion i, as measured by total liabilities divided by total equity at the end of the fiscal year before trust conversion announcement i. Some authors argue that firms with higher leverage ratios are likely to benefit less from conversion to a trust structure because they probably have less debt capacity that can be used to achieve tax-free status (Aguerrevere *et al.*, 2005; Halpern and Norli, 2003) or to fund future growth opportunities. However, since the value of tax shields associated with corporate debt are lower post-conversion provided the converted firms pay out their earnings, such firms can reduce their financial risk without an offsetting reduction in the value of the tax shield. Thus, the expected sign for this variable is indeterminate.

$\Delta M\&DOwn_i$ is the expected change in the share ownership of managers and directors (M&Ds) upon the conversion of predecessor firm *i* into trust *i*. This variable is measured as the change of M&D common share ownership to total common shares outstanding from the pre-conversion limited liability company to the conversion into a business trust. Since conversion reduces potential agency problems associated with high M&D ownership due to the high payouts associated with income trusts, positive (negative) changes in this variable may signal greater (lower) confidence of the M&Ds that the cash distributions of the converted entity are sustainable. Thus, the expected sign of this variable is positive[12].

$M\&DOwn_i$ is the share ownership of M&Ds of the predecessor firm that is being converted into trust *i*. This variable is measured as the percentage of M&D common share ownership to total common shares outstanding for the pre-conversion limited liabilities companies. Given the potential agency problems associated with high M&D ownership in a limited liability firm and its lessening in an income trust due to its high payout of cash flows, the expected sign of this variable is positive.

DivYld is the dividend yield of the predecessor firm that is being converted into trust *i*. Since investors expect trust conversions to result in greater cash distributions, the expected sign of this variable is negative.

Descriptive statistics for the dependent and explanatory variables are reported in Table II. The average tax rate for the trusts per-conversion is 33.22 percent and varies from −16.53 to 146.88 percent. The average FCFs per share divided by price per share for a pre-conversion trust is 4.91 percent and ranges from −65.74 to 47.71 percent. The average trust pre-conversion has an equity market value of $72.39 million, and the equity market values range from $5.05 million to $4.59 billion. The average trust

Variable	Mean	Median	Standard deviation	Minimum	Maximum
AAR[0,1]	0.0828	0.0931	0.0632	−0.0109	0.2742
TaxRate	0.3322	0.3381	0.2814	−0.1653	1.4688
TaxPS/P	−0.0475	−0.0430	0.0484	−0.1328	0.0608
FCFPS/P	0.0491	0.0637	0.1940	−0.6574	0.4771
LogFirmSize	1.8597	1.7532	0.7143	0.7037	3.6619
B/P	0.9226	0.7874	0.5400	0.2611	2.3028
E/P	0.0549	0.0750	0.2273	−0.9882	0.3848
D/EQ	0.6450	0.3100	0.6974	0.0100	2.4900
$\Delta M\&DOwn$	0.0154	0.0056	0.0837	−0.1301	0.2070
$M\&DOwn$	0.1935	0.1261	0.1896	0.0000	0.6308
DivYld	0.0251	0.0000	0.0533	0.0000	0.2498

Notes: This table reports summary descriptive statistics for the dependent and explanatory variables used in the cross-sectional regressions for the determinants of the market reaction to trust conversion announcements for the 29 firms converted into business income trusts during the 1998-2005 period; the explanatory variables are as defined in section 5 of the text of the paper

Table II. Descriptive statistics for the variables included as potential determinants of the market reaction to trust conversion announcements pre-conversion has a book-to-price ratio that is less than one (0.9226), and earnings and dividend yields of 5.49 and 2.51 percent, respectively. However, the dividend yields vary from a low of 0 percent to a high of 24.98 percent. The average trust pre-conversion is not heavily leveraged since the mean debt-to-equity ratio is below one-to-one at 0.645. However, the debt-to-equity ratios also vary from a low of 0.01-2.49. The average trust per-conversion has a management and director (M&D) ownership ratio of 19.35 percent that varies from 0.00 to 63.08 percent. On average, the M&D ownership ratio increases by an additional 1.54 percent post-conversion.

5.2 Empirical results

The results for multivariate cross-sectional regressions based on model (2) for the daily AAR for the two-day event window of [0, +1] against four combinations of the explanatory variables are presented in Table III. Cross-sectional regression (1) includes the full set of independent variables. Cross-sectional regression (2) excludes three independent variables based on the deletion of correlated variable pairings of 0.45 or higher. Thus, *M&DOwn* is deleted due to its correlation of -0.55 with *TaxPS/P*, *E/P* is deleted due to its correlation of -0.46 with *FCFPS/P* and -0.51 with *D/EQ*, and *LogFirmSize* is deleted due to its correlation of -0.47 with B/P_i. Cross-sectional regression (3) excludes an additional variable, $\Delta M\&DOwn$, due to its correlation of 0.42 and 0.40 with *FCFPS/P* and *D/EQ*, respectively. Cross-sectional regression (4) represents the most parsimonious model with only three independent variables; namely, *TaxRate*, *FCFPS/P* and B/P_i.

Not surprisingly, the significance of the estimated relationship as measured by the *F*-value and the adjusted R^2 value increase as insignificant variables are deleted from the regression runs. Thus, cross-sectional regressions (2), (3), and (4) are significant at the 0.10, 0.05, and 0.01 levels, respectively. Similarly, the adjusted R^2 values increase monotonically from 0.21 to 0.33 from regressions (1)-(4), respectively. In all the

Variable/ statistic	Expected sign	Regression run (1)	(2)	(3)	(4)
Intercept		−0.0276 (−0.45)	0.0205 (0.67)	0.0175 (0.61)	0.0061 (0.24)
TaxRate	+	0.1318 (2.58)**	0.1394 (3.33)***	0.1415 (3.50)***	0.1392 (3.86)***
TaxPS/P	+	0.3143 (1.13)	0.1300 (0.58)	0.1260 (0.58)	
FCFPS/P	+	0.1031 (1.40)	0.0973 (1.54)	0.1052 (1.87)*	0.0932 (1.80)*
LogFirmSize	?	0.0129 (0.67)			
B/P	+	0.0408 (1.62)	0.0293 (1.40)	0.0301 (1.48)	0.0280 (1.49)
E/P	+	0.0073 (0.09)			
D/EQ	?	0.0019 (0.08)	−0.0075 (−0.43)	−0.0057 (−0.35)	
$\Delta M\&DOwn$	+	0.0152 (0.09)	0.0477 (0.30)		
M&DOwn	+	0.1026 (1.34)			
DivYld	−	−0.2699 (−1.15)	−0.2206 (−1.05)	−0.1995 (−1.03)	
Adjusted R^2		0.21	0.25	0.28	0.33
F-value		1.74	2.31*	2.80**	5.51***

Table III. Regression results for the determinants of announcement period abnormal returns

Notes: This table reports the regression estimates and statistics for various combinations of the independent variables in model (3) for the 29 conversions to business income trusts during the 1998-2005 period; the explanatory variables are defined in section 5 of the text; the *t*-statistics are reported in parentheses; *, **, and *** indicate statistical significance at the 0.10, 0.05, and 0.01 levels, respectively regressions, the intercepts are not significant at conventional levels. As expected, *TaxRate* is positively related with the dependent variable AAR [0, 1] in all the regressions. The estimated coefficient for *TaxRate* is fairly consistent across the regressions at about 0.13-0.14. This implies that trusts with higher income tax rates tend to have higher ARs after a trust conversion announcement. This supports the conjecture that tax expense reduction is one of the major rationales for trust conversions. All the other independent variables have their hypothesized sign but only the estimated coefficient for *FCFPS/P* is weakly significant (and positive) for regressions (3) and (4). The weak significance of the FCF variable provides support for two hypothesized motivations for conversions into income trusts. It provides weak support for the hypothesis that such conversions are motivated by a desire to reduce any agency problems associated with FCFs, and it also provides additional support (along with the very significant tax rate variable) for the hypothesis that such conversions are motivated by a desire to reduce tax expenses.

Thus, the general finding in this section of the paper is that, although many hypotheses or conjectures are advanced to explain why limited liability firms convert into business income trusts, the evidence only strongly supports the tax-saving motive and weakly supports the reduction of the agency problems associated with FCFs for such conversions. While it is possible that the proxies used to capture the other motives are misspecified, the reasonably high explanatory power associated with the tax-saving proxies suggests that these potentially excluded motives are at best of secondary importance.

6. Market reaction to the government announcement that trusts will be taxed

In this section, we provide a robustness test of the tax-saving motive for income trust conversions by examining the price impact on the same sample of trusts of the Canadian government's announcement that the tax advantage of income trusts would be modified.

6.1 Hypothesis

The second null hypothesis (H_0^2) that is tested in this paper is: No market- and risk-adjusted ARs are associated with the Canadian government's announcement after the close of the market on October 31, 2006 that it would tax the corporate income of business income trusts[13]. Our expectation is that the announcement has a significantly negative impact on the unit prices of the trusts, and thus, resulted in a negative AR. The Federal Conservative Government prior to assuming power had promised that they would not tax income trusts and the general market consensus was that they would honor that promise. For example, the party's election platform under the section, Stand up for Families, stated that its plan was to "[s]top the Liberal attack on retirement savings and preserve income trusts by not imposing any new taxes on them" (Conservative Party of Canada, p. 33). Furthermore, when asked about whether he would "rule out changes to income trusts, Finance Minister Jim Flaherty would only say he is monitoring the market, and that the government is proceeding with legislation to enact a 2006 budget measure to reduce the relative tax advantage of trusts" (CTV.ca News Staff, 2006). Our first expectation is that the market did not react prior to the Halloween day announcement based on the media reports following the announcement that reported that the announcement was a "surprise" (CBC National News, November 1, 2006; Canada Wire, 2006; Ferguson, 2006). Our second expectation is that the market would take a few trading days to incorporate the information into market prices given the vocal but minority opposition to the imposition of the tax on trusts, and their previous lobbying successes. For example, Democracy Watch filed an open complaint letter with the federal Ethics Commissioner:

> concerning the promises made not to tax income trusts by the Conservative Party and then-Opposition Leader Stephen Harper during the last election, and the Conservative government's recent proposal to tax income trusts (Democracy Watch, 2006, p. 1).

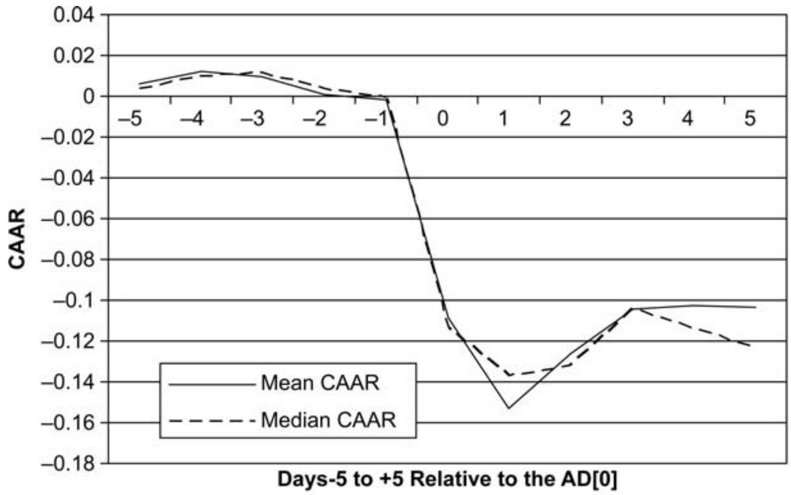
6.2 Methodology and empirical results

The market- and risk-adjusted ARs associated with the Canadian federal government's trust-taxing announcement are estimated using the same market model (1) used in section 4.2, except that the estimation period is now [−90, +60] days to conform to the data available when this test was added to the paper. The mean and median single- and multi-day daily ARs and AARs around the government tax announcement date (November 1 herein) based on the market model (1) are summarized in Table IV, and the CAARs over the ten days centered on the government tax announcement date or AD are depicted in Figure 3. The daily mean and median AR for AD [0] of −10.64 and

	Unweighted				Weighted	
Event day or period	Daily mean AR or AAR	*t*-value	Daily median AR or AAR	Wilcoxon test statistic *p*-value	Daily mean AR or AAR	*Z*-value
−5	0.0058	1.40	0.0035	0.1603	0.0055	0.97
−4	0.0061	1.18	0.0050	0.0815*	0.0071	1.36
−3	−0.0026	−0.73	−0.0002	0.8085	−0.0038	−0.72
−2	−0.0082	−1.58	−0.0075	0.0025***	−0.0126	−2.60***
−1	−0.0030	−0.65	−0.0031	0.6050	−0.0036	−0.81
0	−0.1064	−9.51***	−0.1108	<0.0001***	−0.1126	−10.24***
1	−0.0451	−6.45***	−0.0437	<0.0001***	−0.0432	−6.10***
2	0.0270	5.50***	0.0312	<0.0001***	0.0267	4.19***
3	0.0223	3.47**	0.0183	0.0005***	0.0196	2.44**
4	0.0012	0.24	−0.0006	0.7439	−0.0008	−0.11
5	−0.0008	−0.12	−0.0061	0.4524	−0.0089	−1.11
[−5, 5]	−0.0094	−6.52***	−0.0112	<0.0001***	−0.0115	−5.64***
[−5, −2]	0.0003	0.13	0.0009	0.1739	−0.0010	−0.32
[−3, −1]	−0.0046	−2.46**	−0.0021	0.0365**	−0.0067	−2.41**
[−1, 1]	−0.0515	−12.75***	−0.0470	<0.0001***	−0.0532	−10.39***
[0, 1]	−0.0758	−12.49***	−0.0759	<0.0001***	−0.0779	−10.48***
[2, 5]	0.0124	5.47***	0.0146	<0.0001***	0.0246	3.42***

Notes: This table reports the unweighted mean and median daily abnormal returns (ARs) and multi-day daily average abnormal returns (AARs) for the total sample of 29 business income trusts around the government's announcement that the income of such trusts would be taxed; this table also reports the TA-weighted mean daily ARs and multi-day daily AARs; the announcement occurred after the close of the market on October 31, 2006; the ARs and daily AARs are based on the single-factor market model (1), and are reported for various day(s) within the event window [−5, +5] centered on the announcement date of November 1, 2006; CAARs for the multi-day periods can be obtained by multiplying the reported daily AARs by the number of days in the multi-day periods; the mean and median values are tested using *t*- and Wilcoxon sign tests, respectively; the *Z*-values for the cross-sections of the size-weighted ARs or daily AARs are computed based on the Eckbo and Norli (2005)methodology, which is described in the text of the paper; *, **, and *** indicate statistical significance at the 0.10, 0.05, and 0.01 levels, respectively

Table IV.
Abnormal returns for various single- and multi-day periods within the event window around the government's announcement to tax trusts based on the single-factor market model



Notes: This figure plots the CAARs for the 29 converted trusts for the 11 days centered on the Canadian federal government's announcement (represented by AD[0]) that the corporate income of trusts would be taxed; the 11 days centered on AD[0] are for the event window [-5, +5]. The ARs are based on the single-factor market model (1)

Figure 3.
Cumulative average abnormal return around tax change announcement date based on single-factor market model

−11.08 percent, respectively, are very significant statistically. Given the uncertainty associated with the announcement, it is not surprising that both the mean and median ARs for each of the following three days are very significant. Interestingly, the very significant negative mean and median ARs on AD [+1] are primarily reversed by very significant positive mean and median ARs on ADs [+2] and [+3]. This suggest that either investors overreacted on AD [+1] and corrected on ADs [+2] and [+3] or that the behavior of the mean and median ARs on these three days after the announcement day were caused by portfolio rebalancing as the perceived value of the trusts changed differently for different investors. While the mean and median daily AARs are positive and not significant for the [−5, −1] pane of the event window, the negative mean and median ARs for days [−3] through [−1], although not significant individually except for the very significant median AR on AD [−2], suggest that investors may have either anticipated an unfavorable information release or that there was some information leakage prior to the announcement[14]. To examine this possibility further, the mean and median daily AAR over the [−3, −1] period are examined. The mean and median daily AAR of −0.46 and −0.21 percent (or CAARs of −1.38 and −0.63 percent) for the three-day [−3, −1] window are significant (respectively, t-value of −2.46 and p-value of 0.020; Wilcoxon value of −95.5 and p-value of 0.037). Thus, there may have been some unexplained price activity pre-announcement that should be examined more closely.

The untabulated mean and median estimated betas (β_{1i}) of 0.48 and 0.44, respectively, for the pre-tax-change announcement period are highly significant (t- and Wilcoxon values of 4.57 and 167.5, respectively; both of which are significant at less than the 0.001 level). The untabulated mean and median changes in the estimated betas (β_{2i}) of 0.19 and 0.09, respectively, on this AD are not significant at conventional levels (t- and p-values for the mean of 1.66 and 0.108, respectively, and t- and Wilcoxon-values for the median of 60.5 and 0.20, respectively).

Since the above analysis does not account for the relative size of each trust, the relative performance of the total sample is re-examined by weighting each converted trust by the relative total assets of each trust conversion *i* when computing the AR and AAR. The *Z*-tests of their significance are then computed based on the Eckbo and Norli (2005) methodology. The mean single- and multi-day average daily ARs and AARs around the government tax announcement based on market model (1) are summarized in Table IV. The daily TA-weighted mean of −11.26 for AD [0] is very significant statistically (*t*-value of −10.24), and a more negative value than its unweighted counterpart of −10.64 percent. Similarly, the daily TA-weighted mean AR of −1.26 percent for AD [−2] is very significant and greater in magnitude than its unweighted counterpart of −0.82 percent, and the daily TA-weighted mean AAR of −0.67 percent (or CAAR of −2.01 percent) for three-day AD [−3, −1] is significant and greater in magnitude than its unweighted counterpart of −0.46 percent (or CAAR of −1.38 percent). Using two tests we find an insignificant size effect in the AARs for the three-day AD [−3, −1]. The first test consists of a regression of the AARs with trust size (TA), and the second test consists of a test of the mean AARs for the smallest vs its counterpart for the largest 14 trusts.

7. Test of robustness for the conversion and tax change announcements based on a two-factor model

Since Kryzanowski *et al.* (2006) find that income trusts as equities exhibit more bond- than stock-like risk sensitivities, the ARs associated with announcements of both the conversions to trusts and the tax change are re-estimated using a two-factor model that allows for changes in the factor betas on and after the conversion ADs. Specifically:

$$R_{it} = \alpha_i + \beta_{1i}R_{mt} + \beta_{2i}D_1R_{mt} + \beta_{3i}R_{bt} + \beta_{4i}D_1R_{bt} + \sum_{j=-5}^{5}\gamma_{ij}D_{2j} + \sum_{j=-1}^{+1}\lambda_{ij}D_{3j} + \varepsilon_{it} \quad (3)$$

where R_{bt} is the total return on the Scotia McLeod long Canada government bond index on day *t*; β_{1i} and β_{3i} are the estimated equity and bond market betas, respectively, for a share of the predecessor firm to trust *i* for the period prior to the conversion AD or for a unit of trust *i* for the period prior to the tax change AD; β_{2i} and β_{4i} are the changes in the estimated equity and bond market betas, respectively, for a share or unit of trust *i* or its predecessor firm on and after the conversion or tax change AD; and all other terms are as defined earlier.

Based on the new mean and median AR and AAR results reported in Table V derived from the two-factor model (3), the results reported earlier based on the one-factor model (1) are robust. For example, the mean daily AR of 15.47 percent from the two-factor model (3) for the conversion AD [0] is almost identical to it counterpart of 15.52 percent from the one-factor model (1). As for the Canadian government announcement to tax trust income, the mean daily AR of −10.62 percent from the two-factor model (3) for the tax AD [0] is almost identical to its counterpart of −10.64 percent from the one-factor model (1). The very significant negative mean and median ARs on AD [+1] are primarily reversed by very significant positive mean and median ARs on ADs [+2] and [+3], as was reported earlier using the one-factor model (1). Furthermore, the negative mean ARs for ADs [−3] through [−1] and median ARs for ADs [−2] and [−1], are not significant except for the very significant median AR on AD [−2]. As discussed earlier, both the mean and median daily AAR of −0.35 percent

	Type of announcement							
	Conversion to trust				Government to tax trust income			
Event day	Daily mean AR or AAR	t-value	Daily median AR or AAR	Wilcoxon test statistic p-value	Daily mean AR or AAR	t-value	Daily median AR or AAR	Wilcoxon test statistic p-value
−5	−0.0105	−1.46	−0.0068	0.1134	0.0067	1.64	0.0037	0.1134
−4	0.0102	1.19	0.0032	0.3448	0.0081	1.44	0.0051	0.0569*
−3	0.0015	0.22	0.0013	0.6964	−0.0013	−0.38	0.0003	0.7922
−2	0.0040	0.79	−0.0005	0.5757	−0.0080	−1.54	−0.0076	0.0023**
−1	−0.0040	−0.79	0.0005	0.4025	−0.0013	−0.28	−0.0018	0.7280
0	0.1547	7.35**	0.1409	<0.0001**	−0.1062	−9.52**	−0.1106	<0.0001**
1	0.0105	1.28	0.0110	0.1958	−0.0476	−6.90**	−0.0409	<0.0001**
2	0.0014	0.22	−0.0062	0.9916	0.0213	4.05**	0.0237	0.0004**
3	0.0150	1.44	−0.0017	0.8414	0.0238	3.64**	0.0166	0.0001**
4	−0.0056	−1.02	−0.0051	0.3673	0.0053	1.07	0.0056	0.5613
5	−0.0022	−0.43	0.0017	0.7121	0.0003	0.04	−0.0056	0.5903
[−5, 5]	0.0159	5.00**	0.0131	<0.0001**	−0.0090	−6.29**	−0.0094	<0.0001**
[−5, −2]	0.0013	0.61	0.0013	0.5191	0.0014	0.56	0.0017	0.0987*
[−3, −1]	0.0005	0.17	0.0010	0.7121	−0.0035	−1.98*	−0.0022	<0.0001**
[−1, 1]	0.0537	7.01**	0.0479	<0.0001**	−0.0517	−12.68**	−0.0474	<0.0001**
[0, 1]	0.0826	7.01**	0.0932	<0.0001**	−0.0769	−12.70**	−0.0756	<0.0001**
[2, 5]	0.0021	0.66	−0.0028	0.8579	0.0127	5.55**	0.0152	0.1134

Notes: This table reports the mean and median daily abnormal returns (ARs) and multi-day daily average abnormal returns (AARs) for the 29 public limited liability firms that converted to business income trusts over the 1998-2005 period for the event window [−5, +5] based on the two-factor model (3); cumulative average abnormal return for the multi-day periods can be obtained by multiplying the reported daily AARs by the number of days in the multi-day periods; two types of event dates are examined: conversion announcement dates and the Canadian federal government's announcement that trust income would be taxed; the two factors are the market factor as proxied by the total return on the S&P/TSX composite index, and the interest rate factor as proxied by the total return on the Scotia McLeod long Canada bond index; the mean and median values are tested using t- and Wilcoxon sign tests, respectively; * and ** indicate statistical significance at the 0.10 and 0.01 levels, respectively

Table V. Abnormal returns for various single- and multi-day periods within the event window around trust conversion announcement dates and the government announcement to tax trust income based on a two-factor model

(or CAAR of −1.05 percent) and −0.22 percent (or CAAR of −0.66 percent), respectively, for the three-day AD [−3, −1] are significant (respectively, t-value of −1.98 and p-value of 0.058; Wilcoxon value of −83.5 and p-value of 0.070).

The untabulated betas or beta changes on the conversion ADs are not significantly different from zero. In contrast, the untabulated mean and median market betas (β_{1i}) of 0.49 and 0.44, respectively, for the tax announcement to tax income trusts are very significant, and the mean and median interest-rate betas (β_{3i}) of −0.26 and −0.14, respectively, are weakly significant[15]. The untabulated changes in the mean and median betas for the market (β_{2i}) of 0.10 and 0.04 and for interest rates (β_{4i}) of −0.34 and −0.46, respectively, for the trust taxing announcement are not significant at conventional levels.

8. Conclusion

This paper documents a statistically significant market- and risk-adjusted AR (mean AR of 15.52 percent) for the announcements of conversions to business income trusts in

Canadian capital markets using an approach that reflects any changes in the betas on the ADs. The market reaction around the effective conversion dates is not significantly different from zero, indicating that the Canadian capital market is efficient. Both inferences are qualitatively similar when the tests use total-asset-weighted ARs and ARs from a two-factor model.

Only two explanations commonly used in the financial press and academic literature for the ARs associated with conversion announcements were supported empirically. Proxies for potential income tax savings associated with trust conversions are very significant and with their expected signs. This finding is consistent with the conjectures in Aguerrevere *et al.* (2005) and Halpern (2004). Similarly, a proxy for the agency problems associated with FCFs is marginally significant and with its expected sign.

After the close of the market on October 31, 2006, the Canadian federal government announced plans to begin taxing income trusts. After this announcement, some business trusts are contemplating conversions back to their original limited liability organizational structures or have become acquisition targets. Due to the tax-saving motive for most of the conversions to trusts that was supported empirically herein, it is not surprising that there were significant negative announcement-day effects for business income trust on the first trading day after the announcement (i.e. day [0] herein], and that the price discovery process extended beyond the day of this material government announcement. The very significant negative mean AR of -10.648 percent on AD [0] indicates that the market deemed the taxation of trust corporate income as a value-decreasing policy. The very significant negative mean AR on the following day is primarily reversed by very significant positive mean ARs on the next two trading days. The negative mean daily ARs for the three days prior to the announcement are significant collectively but not individually. Their collective significance suggests that investors may have either anticipated an unfavorable information release or that some information leakage occurred prior to the announcement. These inferences are qualitatively similar when the tests are conducted using total-asset-weighted ARs and abnormal returns from a two-factor model.

Notes

1. The data sources are Halpern (2004) for 1994-6, and CIBC World Markets thereafter based on its composite income trust index, which is available at: http://research.cibcwm.com/res/Equ/ArEquIRITI.html
2. King (2003) provides a broad overview of the background, structure, growth and valuation of income trusts in the Canadian financial market. Some examples of regulatory publications include draft National Policy 41-201, "Income trusts and other indirect offerings (NP 41-201)", which the Canadian Securities Administrators (CSA) published for comment in fall 2003; the Ontario government's Trust beneficiaries' Liability Act, 2003; and the Alberta government's discussion paper, "Income trusts: governance and legal status" (July 2004).
3. Other advantages allegedly associated with income trusts are a reduction of financial distress costs, the improvement of the efficiency of markets, and the facilitation of venture capital exits by making IPOs more attractive (Halpern, 2004). Halpern and Norli (2006) provide a very extensive discussion of the organizational structure of income trusts.
4. These two firms did not convert after the trust taxing announcement by the federal government. Tax leakage also occurs due to the low withholding tax of 15 percent for nonresidents.

5. All trusts in the sample are listed as business trusts in Investcom.com at the point of sample selection in early 2006.
6. CFMRC does not calculate a daily return if a stock did not trade on that day or the previous day. Thus, if a cash distribution occurs in these cases, it is not accounted for in the return series for the trust reported in CFMRC.
7. Halpern, 2004, p. 29) finds a significant CAR of 12.78 percent for a two-day event date that includes the day following the announcement for a sample of 23 business trusts.
8. According to Karafiath (1988), this dummy variable approach is equivalent and more convenient to use than the traditional two-step approach of Fama *et al.* (1969).
9. These results are robust when we use the two-step approach and estimate the parameters of the single-factor market model using a different estimation period that runs from 200 through 20 days before the AD. Specifically, only the AAR for the AD of 15.30 percent is significant (p-value of <0.0001) for each of the 11 days centered on the AD and none of the AAR for each of the 11 days centered on the ED are significant (e.g. AAR for the ED of 0.06 has a p-value of 0.9517).
10. We also test a version of (2) that includes a dummy variable on the constant that is equal to one for the conversion announcement years 2003, 2004, and 2005 and zero otherwise. This tests if the constant part of the AAR has changed more recently. Based on untabulated results, the estimated coefficient for this dummy is insignificant at conventional levels.
11. For accounting-based independent variables, a shorter period of one or two years is used if the full three years of data are not available.
12. This is consistent with the finding by Damodaran *et al.* (2005) that firms that switch to a more restrictive organizational structure in the real estate industry (such as from a limited company to a trust) have increases in stock value and managerial ownership.
13. The application of the new tax was to begin with the 2007 taxation year for all income trusts that began trading after 31 October, 2006, and was to begin after a four-year phase-in period for previously existing trusts.
14. Another explanation suggested to us is that the federal government's announcement was timed so that it coincided with the market close on the day of the fiscal year end of most Canadian banks so that the banks could unload their inventories of securities prior to their fiscal year ends. However, we offer no evidence dealing with the validity of this hypothetical explanation.
15. Due to their longer durations, the attractiveness of trust investments relative to fixed-income securities is inversely related to movements in interest rates. The primary driving force is the higher durations associated with equities as opposed to most fixed-income investments due to the infinite life assumption for equities.

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Corresponding author
Lawrence Kryzanowski can be contacted at: lawrence.kryzanowski@concordia.ca

Board Staff Interrogatory No. 4 to Pollution Probe

Question:

Issue 3.3: Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

Reference: Pollution Probe's Intervenor Evidence (Exhibit M, Tab 10), pages 84-86, Schedule 5.1

(a) With five factors listed under operational risk, compared to two each for market and regulatory risk, does operational risk have the greatest weight in determining the overall risk? Do Drs. Kryzanowski and Roberts believe that operational risk, as opposed to market risk or regulatory risk, is the most important factor considered by the financial community in assessing a firm's overall risk and hence creditworthiness?

(b) Both transmission and distribution utilities are assessed a rating of "1" (Low) for "Technology", "Capacity" and "Asset retirement/construction", while OPG hydroelectric is rated as "2" for "Technology", "3" for "Capacity" and 2 for "Asset retirement/construction".

(i) Do Drs. Kryzanowski and Roberts consider that deployment of technologies such as smart meters (for distribution) and smart grid, and interconnection of new renewable generation or distributed generation are emerging considerations affecting the technologies and costs for distribution and transmission utilities in Ontario?

(ii) Do these same factors affect OPG's regulated hydroelectric and nuclear generation?

(iii) In light of technological and investment considerations affecting transmitters and distributors in Ontario, please provide further explanation for assessing transmitters' and distributors' operational risk for "Technology", "Capacity" and "Asset retirement/construction" as "1" (Low), in contrast to ratings of "2" or "3" for OPG.

(iv) If the risk for transmitters and distributors for "Technology", "Capacity" and "Asset retirement/construction" were rated higher than "1" on account of operating risks emerging due to, for example, the Green Energy and Green Economy Act, how would the business risks and proposed equity thicknesses for OPG's hydroelectric and nuclear divisions change relative to that of transmission and distribution utilities?

Response:

(a) Drs. Kryzanowski and Roberts conducted an assessment of the individual components of each of the three key areas of business risk: market, operational and regulatory risks. Their pre-filed evidence documents that their views of these risk components are consistent with those of bond rating agencies. They note that in the comparisons in Schedule 5.1, it is the scores associated with the elements of operational risk that serve to differentiate the business risks of the different sectors and divisions of OPG. They further note that the London Economics Report authored by A.J. Goulding and filed in EB-2007-0905 also focuses on operational risk as a major area for OPG:[1]

> LEI views the risk factors for the prescribed assets as falling into four broad categories: risks related to corporate structure, risks associated with cost recovery, operational risks, and political risks. *For the prescribed assets, we believe that the greatest risks borne by equity are in the operational and political realms.* [emphasis added]

(b) (i-iii) Drs. Kryzanowski and Roberts acknowledge that, if all other things were to remain the same, the factors indicated would theoretically tend to increase the business risks of electricity transmission and distribution. The discussion in Section 5.4 of their pre-filed evidence provides an overview of the business risks of the various sectors of the electric utility industry that is consistent with past decisions of the Board and the AUC. Conducting a detailed analysis of each sector goes beyond the scope of their evidence. That said, they are not aware of any recent major changes in the relative business risks of the sectors. This understanding is consistent with the view of the Board when it reaffirmed in 2009[2] the capital structures it set in 2006.[3]

(iv) Such a hypothetical rerating of business risk components for transmission and distribution would narrow the gap between the business risk rankings for these sectors and the two divisions of OPG.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

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[1] A. J. Goulding, *Development of an Overall Framework to Determine an Appropriate Capital Structure and Return on Equity for Ontario Power Generation's Prescribed Facilities* prepared for Ontario Energy Board staff by London Economics International LLC, April 21st, 2008

[2] EB-2009-0084, *Report of the Board on the Cost of Capital for Ontario's Regulated Utilities*, page 50.

[3] *Report of the Board on Cost of Capital and 2nd Generation Incentive Regulation for Ontario's Electricity Distributors*, December 20, 2006.

Energy Probe Interrogatory No. 1 to Pollution Probe

Question:

Issue 3.3: Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

Reference: Pollution Probe's Evidence (Exhibit M, Tab 10), page 33

Viewing regulated hydro and nuclear as separate divisions, please indicate whether, in the context of CAPM, nuclear-specific regulatory changes would be considered a systematic or non-systematic risk?

Response:

Nuclear specific regulatory changes could impact either systematic or unsystematic risk. For example, the introduction of a new deferral account or guarantee could reduce business risk and with it unsystematic risk. Alternatively, a mandated change in the allowed capital structure would impact leverage and with it systematic risk.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

Energy Probe Interrogatory No. 2 to Pollution Probe

Question:

Issue 3.3: Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

Reference: Pollution Probe's Evidence (Exhibit M, Tab 10), page 33

Does the greater operating leverage in nuclear mean that, *ceteris paribus*, it is more exposed to systematic risk factors than hydro?

Response:

Operating leverage has an impact on systematic risk so that, with other things the same, an increase in operating leverage would be associated with a higher systematic risk.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

Energy Probe Interrogatory No. 3 to Pollution Probe

Question:

Issue 3.3: Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

Reference: Pollution Probe's Evidence (Exhibit M, Tab 10), page 33

If unplanned outages occur in nuclear by reason of equipment failure, would that risk be diversifiable in the context of CAPM?

Response:

The risk of unplanned outages may be considered diversifiable in the context of CAPM as such a risk pertains only to one entity.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

<u>Energy Probe Interrogatory No. 4 to Pollution Probe</u>

Question:

<u>Issue 3.3:</u> Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

<u>Reference:</u> Pollution Probe's Evidence (Exhibit M, Tab 10), page 33

Does the fact that regulated hydro, but not nuclear, is dispatchable in relation to unexpected changes in demand for electricity mean that, [*ceteris*] *paribus*, hydro is more exposed to systematic risk factors than nuclear?

Response:

Drs. Kryzanowski and Roberts believe that dispatch risk is low for OPG Hydro as documented on page 42 of their pre-filed evidence. However, speaking hypothetically with other things being the same, whether dispatch risk related to unexpected changes in demand affects systematic or unsystematic risk depends on the source of the change in demand. For example, if demand changes in a local area due to unexpected severe local weather, such a change would be diversifiable and unsystematic risk. On the other hand, if demand changes were due to an economic downturn, then any associated dispatch risk would be undiversifiable and systematic.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

Energy Probe Interrogatory No. 5 to Pollution Probe

Question:

Issue 3.3: Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

Reference: Pollution Probe's Evidence (Exhibit M, Tab 10), pages 33 and 65

If, as suggested on p. 65, nuclear is riskier than hydro due to operational and regulatory risk, what are the implications for the respective costs of equity in the CAPM framework?

Response:

If nuclear and hydro had the same capital structure, then the cost of equity would be expected to be higher for nuclear. However, in the Board's framework of having no differential in the cost of equity, which is the one Drs. Kryzanowski and Roberts have adopted in their evidence, these risk differences are instead reflected in the equity thickness for these two "divisions".

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

<u>Energy Probe Interrogatory No. 6 to Pollution Probe</u>

Question:

<u>Issue 3.3:</u> Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

<u>Reference:</u> Pollution Probe's Evidence (Exhibit M, Tab 10), page 33

Is there any evidence in the literature that supports a particular beta for nuclear and, if not, would it be more reasonable to conclude that the beta is greater or less than one?

Response:

Drs. Kryzanowski and Roberts have not done a comprehensive literature search for evidence on the betas for nuclear. However, Venkataraman & Cortright (2010, pages 3-4, notes to Table 1) in an S&P report use a base case equity return of 15% for the evaluation of a new nuclear plant and a lower return of 10% for a new gas combined-cycle plant due to the risk differences and the expected future price of gas.[1] This report was summarized by Nuclear Power International magazine as follows:[2]

> A nuclear plant costing $6,500/kW to build is likely non-competitive without a federal loan guarantee at prevailing forward gas prices, S&P said.
>
> Under the best-case scenario, which includes government subsidies and carbon costs of $20/ton, the cost of reactors can be as low as $3.90/MMBtu, the report said, compared with natural gas prices in the $5/MMBtu range.
>
> For regulated utilities, reactor construction may be easier to obtain, since they can make the case to regulators that nuclear costs are more stable than gas-fired units and argue that emissions regulations that would favor nuclear may be forthcoming, S&P said.
>
> However, the report said it expects unregulated companies that generally do not receive loan guarantees to defer or abandon the projects because they are too expensive or

[1] Swami Venkataraman and Richard Cortright, Jr., 2010. The economics of U.S. nuclear power: Natural gas prices and loan guarantees are key to viability, *Standard & Poor's Global Credit Portal Ratings Direct* (August 16, 2010).
[2] Nuclear Power Magazine, "Nuclear energy developments dependent on federal support", (August 17, 2010). Available online at: http://www.powergenworldwide.com/index/display/articledisplay/1925889998/articles/powergenworldwide/nuclear/reactors/2010/08/Nuclear-dependent-on-loan-guarantees.html.

uneconomic to build.

However, the section of this quote regarding regulated utilities would not apply to hydro generation. The implication of the report for the risk (i.e. beta) of nuclear builds relative to the market is thus that the risk is materially higher for nuclear than the risk for hydro.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

<u>Energy Probe Interrogatory No. 7 to Pollution Probe</u>

Question:

<u>Issue 3.3:</u> Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

<u>Reference:</u> Pollution Probe's Evidence (Exhibit M, Tab 10), page 33

Having regard to the fact that shares of companies in cyclically-sensitive economic sectors such as construction have betas that exceed one, would it be more reasonable to conclude that the hydro beta should be close to 1.0 or substantially different from 1.0?

Response:

It is rare to find an estimated beta for a Canadian regulated utility that is close to one. On page 13 of their pre-filed evidence, Drs. Kryzanowski and Roberts state: "Further, in past evidence in recent hearings we have consistently demonstrated that the level of systematic risk measured by beta (total risk) for an average Canadian utility is approximately half that of the market (an average firm in the market)."

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

<u>Energy Probe Interrogatory No. 8 to Pollution Probe</u>

Question:

<u>Issue 3.3:</u> Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

<u>Reference:</u> Pollution Probe's Evidence (Exhibit M, Tab 10), pages 33 and 65

Re: p. 65, would an estimate of MERP of 550 basis points (including transaction costs) be reasonable? If so, would the reconciliation of the Board's UERP of 550 basis points with CAPM require that the appropriate weighted-average of nuclear and hydro betas be 1.0?

Response:

If MERP = UERP = 550 basis points and everything else were kept the same, this would suggest that the relative risks of both are not significantly different. However, there is no empirical evidence to indicate that the weighted-average of nuclear and hydro betas would be one in a Canadian context.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

<u>Energy Probe Interrogatory No. 9 to Pollution Probe</u>

Question:

<u>Issue 3.3:</u> Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

<u>Reference:</u> Pollution Probe's Evidence (Exhibit M, Tab 10), page 13

You indicate that the market equity risk premium for Canada for the 110-year period ending 2009 is 3.7%. Please provide the source for this estimate.

Response:

Please see the source listed at the bottom of the table in Schedule 2.2 on page 77 of the pre-filed evidence by Drs. Kryzanowski and Roberts.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

Energy Probe Interrogatory No. 10 to Pollution Probe

Question:

Issue 3.3: Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

Reference: Pollution Probe's Evidence (Exhibit M, Tab 10), page 61

Please confirm the statement on p. 61 that the research by Sanyal and Bulan indicates that the increase in business risk that resulted from deregulation in the U.S. was accompanied by a decrease in the equity ratio. Did they not conclude the opposite, that increased risk under deregulation led to reduced leverage?

Response:

There is a typographical correction to the statement referenced from page 61 of the pre-filed evidence of Drs. Kryzanowski and Roberts. In the first paragraph on Section 5.6.1 on that page, line 10, the words "equity ratio" should be deleted and replaced with "leverage ratio". The sentence should have read as follows:

> Academic research by Drs. Sanyal and Bulan documents the increase in business risk with U.S. deregulation which was accompanied by a decrease from 38% to 32% in the average book value *leverage* ratio for U.S. electrical utilities (i.e. with deregulation, these companies do not have their leverage ratios set by regulators so these declines reflect adjustments to shifts in business risk). [change emphasized]

With this correction, it is clear that the article concluded that increased risk under deregulation led to reduced leverage.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

Energy Probe Interrogatory No. 11 to Pollution Probe

Question:

Issue 3.3: Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

Reference: Pollution Probe's Evidence (Exhibit M, Tab 10), page 61

Please discuss briefly the implications of the Sanyal/Bulan research for the current application. Should OPG's unregulated businesses have the same capital structure as the regulated businesses? Since the regulator will establish a "deemed" capital structure for the regulated businesses but not require actual separation of the regulated and non-regulated businesses for operational and financing purposes, what problems may arise from a financial point of view?

Response:

There is no reason to believe that the unregulated businesses have the same business risk as the regulated business. Generally, Drs. Kryzanowski and Roberts expect that the unregulated businesses would be riskier as stated on page 61 of their pre-filed evidence. On page 62 of their pre-filed evidence, they also discuss how a subsidy to the shareholders of a utility's holding company (whose holdings include unregulated businesses) may arise if the company succeeds in convincing its regulator to set the deemed equity ratio of the regulated entity above a fair level.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

<u>Energy Probe Interrogatory No. 12 to Pollution Probe</u>

Question:

<u>Issue 3.3:</u> Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

<u>Reference:</u> Pollution Probe's Evidence (Exhibit M, Tab 10), pages 64 and 91

At p. 64, it is stated that a 40% equity ratio is in the middle of the "generous range" of capital structures. Is Schedule 5.6 at p. 91 the source of the supporting information?

Response:

Yes, Schedule 5.6 on page 91 provides the data supporting the statement referenced. The Schedule shows the "generous range" of equity ratios allowed by regulators, and the mean is 40.09%.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

Energy Probe Interrogatory No. 13 to Pollution Probe

Question:

Issue 3.3: Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

Reference: Pollution Probe's Evidence (Exhibit M, Tab 10), pages 62-63

It is suggested that 40% equity ratio benefits investors at the expense of consumers. From a finance perspective, what other problems may arise if a regulated utility has too much equity?

Response:

The discussion on page 62 of the pre-filed evidence notes that a further result of a regulated utility having too much equity is that the utility's parent holding company would be subsidized by being able to increase its borrowing power beyond what it would otherwise have. In addition to adding value for the shareholders as a result, such enhanced borrowing power could encourage the parent to overexpand its investment in riskier unregulated activities.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

<u>Energy Probe Interrogatory No. 14 to Pollution Probe</u>

Question:

<u>Issue 3.3:</u> Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

<u>Reference:</u> Pollution Probe's Evidence (Exhibit M, Tab 10), pages 62-63

Are there sound reasons from a finance perspective for having more debt in the capital structure of a regulated utility other than the ones discussed? What would be the problem with having excessive amounts of debt?

Response:

Drs. Kryzanowski and Roberts discuss the factors underlying capital structure choices in Section 5.2 of their pre-filed evidence, which starts on page 34. They quote from a leading finance textbook which identifies three important factors affecting target debt ratios: taxes, type of assets / financial distress costs and uncertainty of operating income (i.e. probability of financial distress). They explain why financial distress costs and the probability of financial distress are generally both low for electric utilities. As a result, they conclude at page 39 that "we would expect regulated electric utilities to be among the most highly leveraged industries". Viewed in this context, if a regulated utility had excessive amounts of debt, both financial distress costs and the probability of financial distress would be elevated.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

Energy Probe Interrogatory No. 15 to Pollution Probe

Question:

Issue 3.3: Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

Reference: Pollution Probe's Evidence (Exhibit M, Tab 10), pages 62-63

Are the 40% and 50% equity ratios suggested for regulated hydro and nuclear respectively to be based on the book values of debt and equity as provided in OPG's various exhibits?

Response:

Yes, the equity ratios recommended are to be applied to book values for each division of OPG. Section 5.6.5 of the pre-filed evidence of Drs. Kryzanowski and Roberts, which starts on page 66, illustrates how the respective rate bases and revenue requirements are calculated. Please also refer to the response to *OPG Interrogatory No. 19 to Pollution Probe* (Exhibit M, Tab 10.15, Schedule 19) for a revised set of calculations based on book values.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

<u>Energy Probe Interrogatory No. 16 to Pollution Probe</u>

Question:

<u>Issue 3.3:</u> Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

<u>Reference:</u> Pollution Probe's Evidence (Exhibit M, Tab 10), pages 62-63

Please comment, from a financial point of view, on the appropriate treatment of OPG's "Long-term debt provision" since it does not refer to actual debt. Does it matter how the provision is allocated to regulated hydro and nuclear if separate deemed capital structures are adopted? Does the provision have equity-like characteristics that increase the creditworthiness of OPG's senior debt?

Response:

Drs. Kryzanowski and Roberts make no reference to "long-term debt provision" on these pages of their evidence. Since this term can refer to many different things, Drs. Kryzanowski and Roberts have insufficient information to fully and adequately respond to this interrogatory.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

<u>Energy Probe Interrogatory No. 17 to Pollution Probe</u>

Question:

<u>Issue 3.3:</u> Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

<u>Issue 4.2:</u> Are the capital budgets and/or financial commitments for 2011 and 2012 for the regulated hydroelectric business appropriate and supported by business cases?

<u>Issue 4.5:</u> Are the capital budgets and/or financial commitments for 2011 and 2012 for the nuclear business appropriate and supported by business cases?

<u>Reference:</u> Pollution Probe's Evidence (Exhibit M, Tab 10), pages 10 & 18

Please clarify your criticism of the 7% discount rate that OPG applies to both regulated hydro and nuclear. Specifically, please expand briefly on your observations that:

(a) "It is not obvious from its application how OPG deals with the contemporaneous interrelationships between the input variables and the tendency of simulation to underweight tail observations."

(b) "While specifying the S-curve for factor inputs reflects the uncertainty associated with those factor inputs, it does not account for the project risks."

Response:

(a) & (b) Please see the response to *OPG Interrogatory No. 26 to Pollution Probe* (Exhibit M, Tab 10.15, Schedule 26). Drs. Kryzanowski and Roberts note that they confined their analysis to whether or not a risk-adjusted discount rate was used for one of the business cases and to the use of a Monte Carlo simulation to account for differences in risk in terms of the discount rate.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

Energy Probe Interrogatory No. 18 to Pollution Probe

Question:

Issue 3.3: Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

Issue 4.5: Are the capital budgets and/or financial commitments for 2011 and 2012 for the nuclear business appropriate and supported by business cases?

Reference: Pollution Probe's Evidence (Exhibit M, Tab 10), page 10

Is it your view that OPG's project evaluation procedures are seriously biased in favour of adopting of high-risk nuclear projects because it does not use separate costs of capital for nuclear and regulated hydro?

Response:

It is Dr. Kryzanowski's and Dr. Roberts's view that the discount rate inputted into the Monte Carlo simulation assessment of the Darlington refurbishment should be risk-adjusted since it should reflect the actual risk implicit in the project being evaluated. Thus, as higher risks are not being accounted for in its assessments, OPG's project evaluation procedures would be biased in favour of adopting projects that actually have higher risks than the average risk of OPG's in-place investments.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

<u>OPG Interrogatory No. 1 to Pollution Probe</u>

<u>Issue 3.3:</u> Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

<u>Reference:</u> Pollution Probe's Evidence (Exhibit M, Tab 10), page 27, Fuqua Industries Approach

Preamble:

At page 27, Drs. Kryzanowski and Roberts state that "Fuqua Industries is a U.S. company with 20-plus divisions that has also developed a multi-stage approach for the estimation of divisional costs of capital that uses multidimensional screens." The article that Drs. Kryzanowski and Roberts cite referencing the Fuqua Industries method for estimating the divisional cost of capital is dated 1982. OPG would like to understand if this is a methodology that is still being used by Fuqua[.]

Question:

(a) To Drs. Kryzanowski and Roberts's knowledge, does Fuqua Industries still use the methodology described in their report?

(b) What is the current status of Fuqua Industries?

Response:

(a) & (b) Drs. Kryzanowski and Roberts do not know if this firm is still using this approach. However, as stated in their pre-filed evidence (pages 40-41), multidimensional screening approaches are used by financial institutions, rating agencies, and others to evaluate risk. Drs. Kryzanowski and Roberts have not followed the historical development of Fuqua Industries because it is not material to their evidence. The model reported used by Fuqua Industries is merely illustrative of one such implementation of a multidimensional screening approach.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

OPG Interrogatory No. 2 to Pollution Probe

Issue 3.3: Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

Reference: Pollution Probe's Evidence (Exhibit M, Tab 10), page 26, footnote 24. Drs. Kryzanowski and Roberts reference an article entitled "A note on estimating the divisional cost of capital for diversified companies: An Empirical evaluation of heuristic-based approaches, *The European Journal of Finance* 10 (February 2004), pages 68-80.

Preamble:

OPG would like to understand the implications of the article as they relate to the estimation of technology-specific capital structures.

Question:

(a) Could Drs. Kryzanowski and Roberts please briefly describe, in layman's terms, what the objective of the analysis conducted in the article was, the analysis undertaken, and the conclusions reached by the authors?

Response:

(a) The objective of the study was to analyze the potential of heuristic-based methods for approximating a divisional cost of capital. The paper tests the explanatory power of the risk measures to proxy the CAPM beta using the Boston Consulting Group (BCG) and the Fuqua Industries methods. The methods have some explanatory power, but the results are not generally applicable. The BCG method was superior for very homogeneous companies (i.e. single-division clones), while the Fuqua method produces contradictory and rather unsatisfactory results.

The implication of the study is that if one is interested in estimating total risk (i.e. beta) of a non-traded division, then properly implemented heuristic-based methods can produce reasonable estimates of the total risk. However, since Drs. Kryzanowski and Roberts are interested in measuring *business* risk (and not *total* risk) in their evidence, the applicability of the findings of this study are only suggestive. Furthermore, the empirical results reported in the paper are based on 87 survey responses from a sample of 222 companies. Of the 56 firms that provided responses to cost of capital questions, only 11% of the interviewees determined cost of capital according to WACC and CAPM, and only nine firms could actually state their company betas.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

<u>OPG Interrogatory No. 3 to Pollution Probe</u>

<u>Issue 3.3:</u> Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

<u>Reference:</u> Pollution Probe's Evidence (Exhibit M, Tab 10), page 20, ATWACC Approach

Preamble:

At page 20, Drs. Kryzanowski and Roberts state that "This ATWACC approach invokes the unrealistic assumption that ATWACC (or the overall cost of capital) is the same for each utility used in the estimation (even if their bond ratings vary from BBB- to A)." OPG would like to better understand how Drs. Kryzanowski and Roberts reach this conclusion.

Question:

(a) Could Drs. Kryzanowski and Roberts please explain in more detail why the assumption that the ATWACC is constant across a range of capital structures for a sample of companies would mean that the ATWACC is the same for each of the individual companies in the sample?

Response:

(a) On page 19 of their pre-filed evidence, Drs. Kryzanowski and Roberts state:

> If one calculates the divisional equity beta or the cost of equity using an analytical approach, one must somewhat use that information to determine the divisional capital structures. Ms. McShane describes her conversion process as follows: "To the extent required by the analysis, the conversion of differences in the cost of equity among proxy samples into capital structure equivalents will be based on the premise that the overall cost of capital is constant across the relevant range of capital structures".

However, her proxy samples have bond ratings ranging from BBB- to A. As noted in the pre-filed evidence of Drs. Kryzanowski and Roberts at page 21:

The U.S. samples used by Ms. McShane suffer from many of the problems involved in selecting matching or proxy samples. For example, her sample of 44 U.S. electric utilities used in the instrumental variables analysis have mean and median S&P debt ratings of BBB+ and BBB, respectively. The failure to address carefully how the sample risk differs from that of Canadian utilities is particularly problematic as Ms. McShane previously pointed out these very differences. In EB-2007-0905, Ms. McShane provided various reasons why a rating lower than A would not be appropriate for OPG, including "[o]f particular concern would be that a BBB rated utility would, at times, be completely shut out of the long-term (30-year) debt market". [footnotes omitted]

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

OPG Interrogatory No. 4 to Pollution Probe

Issue 3.3: Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

Reference: Pollution Probe's Evidence (Exhibit M, Tab 10), page 26, BCG's implementation of the heuristic-based approach

Preamble:

At page 26, Drs. Kryzanowski and Roberts describe the Boston Consulting Group methodology. OPG would like to better understand how the Boston Consulting Group methodology would be applied.

Question:

(a) Could Drs. Kryzanowski and Roberts please explain what is meant by a linear extrapolation? For illustrative purposes, could Drs. Kryzanowski and Roberts please show what the implied divisional costs of capital are based on linear extrapolation if the firm-level cost of capital is 7% and the aggregate scores of two divisions are respectively 12 and 24 respectively (compared to the firm level score of 18)?

Response:

(a) As stated in their pre-filed evidence on this page, "the divisional cost of capital equals the firm-level cost of capital multiplied by the divisional normalized aggregate score" using a linear extrapolation of these factors, but their pre-filed evidence also states that other weighting schemes could be used. However, Drs. Kryzanowski and Roberts do not apply the BCG heuristic-based approach in their evidence. The evidence of Drs. Kryzanowski and Roberts instead deals with the determination of the equity thickness for OPG's two "divisions". Thus, an illustration is not provided as it is not relevant.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

OPG Interrogatory No. 5 to Pollution Probe

Issue 3.3: Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

Reference: Pollution Probe's Evidence (Exhibit M, Tab 10), Schedule 5.7, Business Risk Scores

Preamble:

In Schedule 5.7[,] Drs. Kryzanowski and Roberts show the OPG Hydro, OPG Nuclear and OPG Regulated Business Risk Scores at 1.8, 2.6 and 2.1 respectively. In their Schedule 3.7, the corresponding Business Risk Scores were 1.8, 2.3 and 2.1. In EB-2007-0905, OPG would like to better understand the difference in the results between the two proceedings.

Question:

(a) Could Drs. Kryzanowski and Roberts please explain why the Business Risk Score of OPG Regulated would still be 2.1 if the Business Risk Score of OPG Nuclear has increased from 2.3 to 2.6?

Response:

(a) There is a typographical correction to Schedule 5.7. The business risk score of OPG Regulated should have been 2.3 based on the weights given in footnote 69 of that schedule. However, Drs. Kryzanowski's and Roberts's overall conclusion that OPG Regulated has moderate business risk remains unchanged. This conclusion is robust for a significant range of numerical values, including 2.3.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

OPG Interrogatory No. 6 to Pollution Probe

Issue 3.3: Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

Reference: Pollution Probe's Evidence (Exhibit M, Tab 10), page 55, Nuclear Liabilities

Preamble:

At page 55, Drs. Kryzanowski and Roberts state, with reference to the Board's denial of the fixed payment and the setting of a lower accretion rate for nuclear liabilities, "As explained above, these denials are immaterial to the comparison of business risk since the Decision in EB-2007-0905." OPG would like to understand Drs. Kryzanowski and Roberts's position on the lower accretion rate for nuclear liabilities.

Question:

(a) Please explain where this item was discussed by Drs. Kryzanowski and Roberts.

(b) If not already discussed, please provide Drs. Kryzanowski and Roberts's understanding of the impact of the Board's decision on OPG's risk and why they conclude the denial is immaterial.

Response:

(a) The discussion of the fixed charge is on page 51 of the pre-filed evidence of Drs. Kryzanowski and Roberts.

(b) Drs. Kryzanowski and Roberts do not state that the denial of the fixed charge was immaterial to business risk. On the contrary, on page 51 of their pre-filed evidence, they note that the denial increased OPG's business risk, and they accordingly make an adjustment to the rating of the deferral account category. The statement on page 55 instead refers to what has changed *since* the EB-2007-0905 Decision. Since the denial occurred in that Decision, it is immaterial to the comparison of business risk today with business risk at the time the Decision was made.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

OPG Interrogatory No. 7 to Pollution Probe

Issue 3.3: Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

Reference: Pollution Probe's Evidence (Exhibit M, Tab 10), page 55, Nuclear Liabilities

Preamble:

In EB-2007-0905, the Board adopted a different treatment of nuclear liabilities than OPG requested. Drs. Kryzanowski and Roberts's evidence does not appear to refer to this element of the Board's decision. OPG wishes to understand Drs. Kryzanowski and Roberts's views on this issue.

Question:

(a) Please explain whether in making their capital structure recommendations in EB-2007-0905 Drs. Kryzanowski and Roberts assumed that the nuclear liabilities would be given rate base treatment as OPG had proposed. If not, please explain what their assumption was and provide any references to that assumption from their testimony, responses to information requests or cross-examination in EB-2007-0905

(b) If Drs. Kryzanowski and Roberts assumed that that the nuclear liabilities would be given rate base treatment in EB-2007-0905, please explain how they have taken the Board's decision to alter the proposed treatment in arriving at their recommended capital structure for OPG Nuclear in this proceeding.

Response:

(a) & (b) Drs. Kryzanowski and Roberts found no record of discussion of the treatment of nuclear liabilities in a search of their evidence filed in EB-2007-0905. Drs. Kryzanowski and Roberts thus made no assumptions either way regarding the treatment of nuclear liabilities as they did not regard such treatment as an important factor in determining regulatory risk for the purpose of their evidence. Further, in preparing their pre-filed evidence for this proceeding, they again did not regard the treatment of nuclear liabilities as an important factor in determining regulatory risk for the purposes of their pre-filed evidence. This conclusion is consistent with the approach taken by both S&P and DBRS as a search of their rating reports found no discussion of this point.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

OPG Interrogatory No. 8 to Pollution Probe

Issue 3.3: Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

Reference: Pollution Probe's Evidence (Exhibit M, Tab 10), Schedule 5.1

Preamble:

In Schedule 5.1, Drs. Kryzanowski and Roberts provide business risk scores for each of the nine dimensions of risk for an integrated electric utility. OPG wishes to understand how the risk scores of an integrated electric utility were derived.

Question:

(a) Did Drs. Kryzanowski and Roberts assume that the business risk scores for the generation component of an integrated electric utility were equal to the scores that they had assigned to OPG Hydro? If no, please explain what the assumptions were. If yes, please explain why the business risk score for hydroelectric assets was used as the proxy for generation assets generally rather than a score that represents a diversified portfolio of generation assets.

Response:

(a) Drs. Kryzanowski and Roberts explain the calculation of the score for a hypothetical integrated utility on page 57 of their pre-filed evidence. The calculation is designed to provide a benchmark for a hypothetical integrated utility. For this reason, Drs. Kryzanowski and Roberts did not refine the score for generation and simply used the score for OPG Hydro for the generation component of the hypothetical integrated utility. A diversified portfolio of generation assets was not used as conducting further detailed business risk analyses for other individual integrated utilities goes beyond the scope of and what is needed for their evidence.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

OPG Interrogatory No. 9 to Pollution Probe

Issue 3.3: Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

Reference: Pollution Probe's Evidence (Exhibit M, Tab 10), page 60, ROEs for Canadian Utilities

Preamble:

At page 60, Drs. Kryzanowski and Roberts state, "A focus on the most recent year reveals that the actual ROEs earned by the parent holding company in 2009 exceeded ROE targets for 7 of the 11 regulated entities in Schedule 5.5 (i.e. all of the four ATCO regulated entities as well as Nova Scotia Power, Enbridge Gas and TransCanada Pipelines)." OPG wishes to understand Drs. Kryzanowski and Roberts's understanding of the ROEs.

Question:

(a) Please explain what Drs. Kryzanowski and Roberts mean by "ROE targets".

(b) What proportion of the operating income of Enbridge Inc. is accounted for by Enbridge Gas Distribution?

(c) What proportion of the operating income of Emera is accounted for by Nova Scotia Power?

(d) What proportion of the operating income of ATCO is accounted for by the regulated operations of ATCO Electric Transmission and Distribution, ATCO Gas and ATCO Pipelines?

(e) What proportion of the operating income of TransCanada Corporation is accounted for by TransCanada Pipelines and any other transmission operations governed by the allowed ROE of 8.57%?

(f) Please explain why it is "instructive to compare actual earned ROEs against the allowed ROEs set by regulators" in light of the responses to parts a to e of the interrogatory?

Response:

(a) By "ROE targets" Drs. Kryzanowski and Roberts mean the allowed returns.

(b) Enbridge Gas Distribution represented 17 % of income according to *DBRS Rating Report*, November 27, 2009.

(c) 90% of Emera's earnings are from regulated operations according to DBRS *Rating Report*, November 29, 2009.

(d) ATCO's regulated operations produced 40% to 45% of net income according to *DBRS Rating Report*, December 21, 2009.

(e) Regulated pipeline business accounted for 65% to 70% of EBITDA according to *DBRS Rating Report*, November 20, 2009.

(f) As noted at page 60 of their pre-filed evidence, Drs. Kryzanowski and Roberts qualify their comparison in recognition of the role of unregulated operations:

> Although the comparison is somewhat imprecise due to the inclusion of unregulated businesses in the traded companies, it is instructive to compare actual earned ROEs against the allowed ROEs set by regulators.

The comparison provides an indication of profitability of utility operations in general and in particular for companies with ratings in the BBB range.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

<u>OPG Interrogatory No. 10 to Pollution Probe</u>

<u>Issue 3.3:</u> Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

<u>Reference:</u> Pollution Probe's Evidence (Exhibit M, Tab 10), page 63, Sample Benchmarks

Preamble:

At page 63, Drs. Kryzanowski and Roberts state, "The third estimate is the range from our recommendation to the equity thickness allowed by the AUC in 2009 for ATCO Pipelines, a high-risk utility, of 42 to 45%." OPG wishes to understand the implications of this finding for OPG's regulated assets.

Question:

(a) Please confirm that Drs. Kryzanowski and Roberts appeared in that proceeding and did a business risk analysis for ATCO Pipelines.

(b) What would the ATCO Pipelines business risk score have been using the nine risk dimensions, independent of the merger with NGTL cited at page 63 of Drs. Kryzanowski and Roberts's testimony?

Response:

(a) Confirmed.

(b) In the 2009 Generic Hearing, Drs. Kryzanowski and Roberts rated the business risk of a status quo ATCO Pipelines (i.e. independent of the merger with NGTL) as Medium.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

<u>OPG Interrogatory No. 11 to Pollution Probe</u>

<u>Issue 3.3:</u> Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

<u>Reference:</u> Pollution Probe's Evidence (Exhibit M, Tab 10), page 64, Sample Benchmarks

Preamble:

At page 64, Drs. Kryzanowski and Roberts state, "We reinforce this view with our fourth benchmark of 42 to 53% equity recommended and generously allowed by the AUC for a high-risk Alberta utility." OPG wishes to understand the context of the 53% equity ratio cited.

Question:

(a) Please explain to what the 53% equity ratio cited in this sentence refers.

Response:

(a) There is a typographical correction on page 64 in the sentence referenced. The 53% equity ratio should have been 45%. The correct range is given before on page 63 in the first full paragraph.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

OPG Interrogatory No. 12 to Pollution Probe

Issue 3.3: Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

Reference: Pollution Probe's Evidence (Exhibit M, Tab 10), Schedule 5.7, Relating the benchmarks

Preamble:

At page 65, Drs. Kryzanowski and Roberts state that "Schedule 5.7 shows that this business risk rating for OPG Nuclear exceeds the rating for OPG Hydro (1.8). It also signals that OPG Nuclear bears higher business risk than generic integrated companies (rated 1.5) or generic distribution utilities rated (1.4). The higher business risk of OPG Nuclear should translate into a significant increase in its common equity ratio on the order of 5-10% over that for OPG Hydro producing a recommended equity ratio for OPG Nuclear of 45 to 50%. In the interests of conservatism and to ensure fairness to the shareholder, we stand by our 2008 recommendation of the higher number of 50% for the equity ratio." OPG needs a better understanding of these statements.

Question:

(a) Please explain how the risk ratings for OPG Hydro and OPG Nuclear translate into a 5 to 10 percentage point difference in equity ratios.

(b) If the difference between scores of 1.8 and 2.6 translates to a 5 to 10 percentage point difference in equity ratio, what difference in equity ratio does the difference between risk scores of 1 (transmission) and 1.4 (distribution) translate into? What percentage point difference in equity ratios does a difference in risk scores of 1.4 (distribution) and 1.5 (integrated electric) translate into?

(c) What percentage point difference in equity ratios does a difference in risk scores of 1.5 (integrated electric) and 1.8 (hydroelectric) translate into?

Response:

(a) – (c) The determination of risk scores is a heuristic process as discussed on pages 40-41 of the pre-filed evidence of Drs. Kryzanowski and Roberts. As discussed in detail in Section 5.2 starting on page 34 of their pre-filed evidence, recommended capital structures are a matter of judgment and do not follow a formula. For these reasons, the cited passage uses non-quantitative language such as “a significant increase” and “on the order of 5 – 10%”. Parts (b) and (c) of the question imply the use of a formula to simply determine what changes would occur in the debt-equity ratio, which contradicts and is not compatible with the heuristic framework used by Drs. Kryzanowski and Roberts in their pre-filed evidence.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

OPG Interrogatory No. 13 to Pollution Probe

Issue 3.3: Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

Reference: Pollution Probe's Evidence (Exhibit M, Tab 10), Section 5.3 commencing on page 39

Preamble:

OPG would like to understand Drs. Kryzanowski and Roberts' framework for business risk analysis.

Question:

(a) Have Drs. Kryzanowski and Roberts made any changes in their framework for business risk analysis since EB-2007-0905?

(b) If yes, please explain. Please explain why Drs. Kryzanowski and Roberts have given equal weight to each of the nine dimensions of business risk.

(c) Have Drs. Kryzanowski and Roberts done any sensitivity analyses using other weighting schemes for each of the nine dimensions of business risk? If so, please provide, and explain how the different weightings tested would impact the conclusions that the scores for OPG Hydro and Nuclear are 1.8 and 2.6 respectively.

(d) Please explain how Drs. Kryzanowski and Roberts took into account the OEB's decisions to adopt deemed common equity ratios of 40% for Hydro One's Transmission operations and 40% for the Ontario electricity distributors in arriving at their recommended common equity ratio for OPG Hydro given their conclusion that OPG Hydro is of higher business risk than both transmission and distribution.

Responses:

(a) The framework for business risk analysis is the same as that used by Drs. Kryzanowski and Roberts in their evidence filed in EB-2007-0905.

(b) Given the response to (a), the first part of this question is not applicable. With respect to the second part of this question, please refer to part (a) of the response to *Board Staff Interrogatory No. 4 to Pollution Probe* (Exhibit M, Tab 10.1, Schedule 4).

(c) Drs. Kryzanowski and Roberts have conducted no sensitivity analysis using other weighting schemes. Please also refer to the response to *OPG Interrogatory No. 12 to Pollution Probe* (Exhibit M, Tab 10.15, Schedule 12).

(d) Please refer to the response to *Board Staff Interrogatory No. 1 to Pollution Probe* (Exhibit M, Tab 10.1, Schedule 1).

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

OPG Interrogatory No. 14 to Pollution Probe

Issue 3.3: Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

Reference: Pollution Probe's Evidence (Exhibit M, Tab 10), page 59

Preamble:

Drs. Kryzanowski and Roberts state that "from the vantage point of DBRS, Canadian Utilities, Enbridge, Newfoundland Power and TransCanada Corporation are the only companies which enjoy an A credit rating." and "As stated earlier, the typical company is rated A(low) by DBRS . . . ."

Question:

(a) Please provide the DBRS debt ratings of the following:

AltaLink

CU Inc.

Enbridge Pipelines

Gaz Métro

Nova Gas Transmission

Terasen Gas

Union Gas

(b) If the sample of companies which Drs. Kryzanowski and Roberts is using relates only to those which are publicly traded and their subsidiaries, please explain why CU Inc., Enbridge Pipelines, Nova Gas Transmission and Terasen Gas were excluded from the sample.

(c) As Gaz Métro is a publicly traded energy utility, please explain why it was not included in the sample of publicly traded companies.

Response:

(a) The DBRS ratings for unsecured debentures are as follows:

AltaLink LP	A
CU Inc.	A (high)
Enbridge Pipelines	A (high)
Gaz Métro	Unsecured debentures discontinued;
	1st mortgage bonds – A
Nova Gas Transmission	A
Terasen Gas	Unsecured debentures discontinued;
	Medium Term Notes – BBB (high)
Union Gas	A

(b) CU Inc. was excluded to avoid double counting with ATCO and Canadian Utilities. Enbridge Pipelines was similarly excluded as its parent company is included. Nova Gas Transmission was excluded as it does not trade publicly, and it is a wholly-owned subsidiary of TransCanada (which was included). Terasen was excluded due to its interrupted history as a public company (i.e. Terasen was owned by Kinder Morgan between 2005 and 2007).

(c) Gaz Métro was not included as it is a limited partnership.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

<u>OPG Interrogatory No. 15 to Pollution Probe</u>

<u>Issue 3.3:</u> Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

<u>Reference:</u> Pollution Probe's Evidence (Exhibit M, Tab 10), page 59

Preamble:

"We conclude that the experiences of the companies in Schedules 5.2 - 5.4 suggest that a bond rating of BBB or higher is sufficient to maintain good access to capital markets."

Question:

(a) Please define "good access".

(b) Please discuss the proportion of the debt outstanding for each of these companies that has actually been raised by the companies in the sample at the holding company level versus the operating company level.

(c) Please discuss how access to debt capital by utilities in Canada might be impacted if the universe of utilities were attempting to access the debt market with BBB ratings.

(d) Please quantify how much higher the cost of debt to a BBB credit (versus the cost of debt for an A credit) would have to be for Drs. Kryzanowski and Roberts to conclude that an A rating results in a lower cost of capital to ratepayers.

(e) How would the cost of long-term debt for TransAlta or Pacific Northern Gas under current market conditions compare to the cost of long-term debt for Enbridge Gas Distribution or CU Inc.?

Response:

(a) Drs. Kryzanowski and Roberts define "good access" in the sentence prior to the one quoted in the preamble for this interrogatory: "Yet, despite their lower ratings, with the exception of Pacific Northern Gas, a small company which experienced financial distress, these companies have had no difficulties in accessing capital markets to raise long-term financing."

(b) The companies in Schedules 5.2 – 5.4 are all holding companies. Some of these companies also raise debt at the operating company level (e.g. Nova Scotia Power). Others, such as ATCO and CU Inc., finance at the holding company level. Drs. Kryzanowski and Roberts do not have detailed data on the breakdown of such financing for each company.

(c) Drs. Kryzanowski and Roberts would expect that, in the hypothetical case posed, Canadian utilities would increasingly turn to financing in the U.S. where only a minority of utilities enjoy an A rating.

On page 2 of its report, *Credit ratings, Q4 2009 Financial update*, the Edison Electric Institute ("EEI") provides S&P utility credit ratings distributions for the 69 U.S. shareholder-owned electric utilities that it tracks. As of December 31, 2009, the distribution is: A or higher (7.5%); A- (12%); BBB+ (23%); BBB (29%); BBB- (21%); and below BBB- (7.5). These data show that 80.5% of the firms in the EEI sample of U.S. shareholder-owned electric utilities have a BBB+ or lower rating from S&P.[1]

Academic research further documents that the U.S. bond market is open to Canadian issuers with ratings *below* the BBB range. Drs. Mittoo and Zhang study U.S. bond issues by low-quality Canadian issues with credit ratings below investment grade (below BBB-).[2] They show that these firms finance extensively in the U.S. as the bond markets in the two countries have become increasingly integrated since the 1990s. This integration advanced after the introduction of the Multijurisdictional Disclosure System ("MJDS"), which allowed Canadian issuers to access U.S. markets with Canadian disclosure documents. Drs. Mittoo and Zhang state that "Canadian firms are heavy users of the U.S. bond market and since 1993, about 48% of the Canadian debt has been issued in the U.S.". For the posed hypothetical of accessing debt capital using higher BBB ratings, Drs. Kryzanowski and Roberts would thus expect that this would not be an issue to access financing in the U.S.

(d) & (e) Drs. Kryzanowski and Roberts acknowledge that the cost of debt is higher for BBB as compared to A rated firms. However, given the issues in this proceeding, they have not conducted detailed analyses of the differential costs of debt and costs of capital. After all, they are not recommending that the decision in this proceeding precipitate (or would precipitate) a downgrade in OPG's credit rating.

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[1] Available online at http://www.eei.org/whatwedo/DataAnalysis/IndusFinanAnalysis/finreview/Documents/CM-CreditRatings.pdf.
[2] Usha R. Mittoo and Zhou Zhang, "Bond Market Access, Credit Quality, and Capital Structure: Canadian Evidence, *Financial Review* 45, August 2010, pages 579-602.

Their evidence instead deals with how to practically recommend separate equity ratios for OPG's two "divisions", while maintaining a credit rating in the A range.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

OPG Interrogatory No. 16 to Pollution Probe

Issue 3.3: Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

Reference: Pollution Probe's Evidence (Exhibit M, Tab 10), page 60 and Schedule 5.5

Preamble:

"The average 2009 allowed return for this sample was 8.95% while the average actual ROE for the consolidated company was 11.64%. The difference of 269 basis points represents the out-performance of allowed returns." OPG wishes to explore the implications of the "out-performance".

Question:

(a) Would Drs. Kryzanowski and Roberts discuss whether, in their view, the level of consolidated ROEs have any impact, positive or negative, on the companies' debt ratings?

Response:

(a) Consolidated ROE is a measure of the profitability of the holding company. With all other things remaining the same, Drs. Kryzanowski and Roberts would expect that being more profitable with a higher, and thus more stable, ROE would have a positive effect on a company's bond rating.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

OPG Interrogatory No. 17 to Pollution Probe

Issue 3.3: Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

Reference: Pollution Probe's Evidence (Exhibit M, Tab 10), pages 63-64, Benchmark Equity Ratios

Preamble:

(i) Page 63 "We summarize our discussion of utility industry benchmark equity ratios as falling into a range of 40% to 45%."

(ii) Pages 63-64 "Our analysis of the business risk faced by OPG Hydro assesses this risk as low to moderate – higher than that of a distribution utility and somewhat above the business risk of an integrated electric utility. This suggests that a fair common equity ratio for OPG Hydro should be at 40%, at the middle of our generous range."

(iii) Page 64 "...our fourth benchmark of 42 to 53% equity recommended and generously allowed by the AUC for a high-risk Alberta utility. Given OPG Hydro's level of business risk, we believe that its target equity ratio should fall toward the low end of this range."

Question:

(a) Please reconcile statements (i) and (ii) above.

(b) Please reconcile statements (i) and (iii) above.

Response:

(a) Statement (i) refers to the three benchmarks discussed in the rest of the paragraph. The full paragraph from page 63 of the pre-filed evidence of Drs. Kryzanowski and Roberts is as follows:

> We summarize our discussion of utility industry benchmark equity ratios as falling into a range of 40% to 45%. We form three estimates of the appropriate

equity ratio for a utility. The first is 40.46% (Schedule 5.3) and represents the average of actual equity ratios for eight traded utility companies. The second estimate is the average equity ratio allowed 13 regulated entities within these companies by their regulatory boards of 40.09% (Schedule 5.6) combined with the Board's award of 40% for Ontario electric distributors. The third estimate is the range from our recommendation to the equity thickness allowed by the AUC in 2009 for ATCO Pipelines, a high-risk utility, of 42 to 45%. These benchmark equity ratios all fall in a range of 40% to 45%.

Statement (ii) on pages 63-64 refers to a "generous range" of equity ratios allowed by regulators. The range is shown in Schedule 5.6 on page 91 of the pre-filed evidence of Drs. Kryzanowski and Roberts. The mean of the "generous range" constitutes the second benchmark discussed on page 63 (i.e. 40.09%). Schedule 5.6 shows a "generous range" of allowed equity ratios from a low of 36% to a high of 45%. The equity ratio of 40% recommended for OPG Hydro is "at the middle of our generous range".

(b) The range referred to in Statement (iii) is the same range as in Statement (i) (i.e 40% to 45%). The recommended equity ratio of 40% is thus "*toward* the low end of this range" [emphasis added].

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

OPG Interrogatory No. 18 to Pollution Probe

Issue 3.3: Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

Reference: Pollution Probe's Evidence (Exhibit M, Tab 10), page 20

Preamble:

"The Board appears to have agreed with the result of our judgmental approach in Decision EB-2007-0905 (pages 149-150)."

Question:

(a) Please confirm the following statement by the Board from pages 160-161 of [the] Decision [in] EB-2007-0905.

> "However, the Board also finds that the evidence in this proceeding is not sufficiently robust to set separate parameters at this time. Drs. Kryzanowski and Roberts developed separate estimates, but concluded with a combined recommendation. Ms. McShane developed separate estimates, but cautioned that she was not as confident with the analytical results because they had been derived from working backwards."

(b) Please explain what analysis and evidence Drs. Kryzanowski and Roberts have performed and provided which is more robust than was presented in EB-2007-0905.

Response:

(a) Confirmed.

(b) The current pre-filed evidence of Drs. Kryzanowski and Roberts expands and updates what they presented in EB-2007-0905. Unlike in 2008, the issues focused on here are mainly related to separate estimates for each division. Their pre-filed evidence also contains a critique of the report submitted by Ms. McShane in the current proceeding regarding these issues.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

OPG Interrogatory No. 19 to Pollution Probe

Issue 3.3: Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

Reference: Pollution Probe's Evidence (Exhibit M, Tab 10), page 66, footnote 60

Preamble:

Drs. Kryzanowski and Roberts calculate the weights based on MWs as follows: "OPG states its total regulated capacities as 6,606 MW nuclear and 3,302 MW hydroelectric for a total of 9,908 MW… The weights are 66.67% nuclear and 33.33% hydro. "

Question:

(a) Please confirm that the 2011 and 2012 rate bases funded by capital structure (debt and equity) for OPG Hydro are approximately $3,800 million and for OPG Nuclear are approximately $2,600 million, so that, based on rate base funded by capital structure, the weights are approximately 60% hydroelectric and 40% nuclear. If this cannot be confirmed, please explain why not.

(b) Please confirm that the Board approved an overall equity thickness for OPG of 47% in EB-2007-0905. If this cannot be confirmed, please explain why not.

(c) Please confirm that the application of a 40% equity ratio to the actual regulated hydroelectric rate base as forecast by OPG and a 50% equity ratio to the portion of nuclear rate base funded by debt and equity as forecast by OPG will result in an overall equity ratio for OPG's prescribed assets financed by capital structure lower than the 47% approved in EB-2007-0905.

(d) Please provide the revised equity ratios for each of the regulated hydroelectric and nuclear operations that would result in an equity ratio for OPG's total hydroelectric and nuclear rate base financed by capital structure of 47% assuming the rate base amounts for each are as forecast by OPG rather than using Drs. Kryzanowski's and Roberts' allocation of total rate base to nuclear and hydroelectric on the basis of capacity. Please explain the rationale for the revisions.

Response:

(a) Drs. Kryzanowski's and Roberts's calculations result in proportions that are close to 60% at 60.2% (i.e. 3803.40 divided by 6321.40) for 2011 and 58.7% (i.e. 3787.40 divided by 6448.10) in 2012 for Hydro. This continues the downward trend in the rate base weight of Hydro since 2008 as shown in the following table:

Rate Base Item	Actual 2009	Budget 2010	Plan 2011	Plan 2012	
Hydro ($M)	3,834.00	3,815.70	3,803.40	3,787.40	[a]
Nuclear ($M)	2,261.50	2,355.50	2,518.00	2,660.70	[b]
Total ($M)	6,095.50	6,171.20	6,321.40	6,448.10	[c]
Hydro (%)	62.90%	61.83%	60.17%	58.74%	
Nuclear (%)	37.10%	38.17%	39.83%	41.26%	
Total (%)	100.00%	100.00%	100.00%	100.00%	

[a]: Filed: 2010-05-26, EB-2010-0008, Exhibit B1, Tab 1, Schedule 1, Table 1: Prescribed Facility Rate Base – Regulated Hydroelectric ($M).
[b]: Total minus Hydro to back out "Adjustment for Lesser of UNL or ARC".
[c]: Filed: 2010-05-26. EB-2010-0008, Exhibit C1, Tab 1, Schedule 1, Tables 1- 6.

(b) Confirmed.

(c) The implicit weights of the equity ratios for Hydro and Nuclear given our recommendations of 40% and 50% that accommodate a fixed (upwardly conservative or "generous") equity ratio of 47% for OPG as a whole are obtained by solving for the weight of Hydro represented by W in (W * 40%) + [(1-W) * 50%] = 47%. Doing such gives similar weights to the weights we used (i.e. Hydro weight of 33% and a Nuclear weight of 67%).

Simple mathematics tells us that using a different weighting scheme will result in a weighted average that is different from 47%. For example, putting more weight on the 40% and less weight on the 50% will lower the weighted average.

Using the rate-base percentages from (a) instead in the calculation thus results in a weighted average of approximately 44% for 2011 and 2012.

(e) Drs. Kryzanowski and Roberts can use "reverse-engineering" logic to obtain the divisional equity ratios that results in the fixed (i.e. "generous") equity ratio of 47% for

OPG as a whole if the rate-base percentages for OPG's "divisions" are used instead to determine the weighted average of the overall equity ratio.

This is done in two-steps. First, one must find the shortfall from the overall weighted equity ratio when one uses the rate-base weights and Drs. Kryzanowski's and Roberts's recommended equity ratios of 40% and 50% for Hydro and Nuclear. From part (c), this is 3%. This 3% shortfall is then allocated to both Hydro and Nuclear so that their resulting equity ratios are 43% and 53% to arrive at the fixed equity ratio of 47% for both test years.

Using weights of 60% and 40% as asked in this interrogatory, the weighted-average equity ratios for OPG as a whole are now: (43% times 60%) plus (53% times 40%), which equals 47%.

The updated credit metrics (i.e. Schedules 5.8A-OPG-IR19 to 5.8D-OPG-IR19) using the rate-base weights instead are attached to these responses as Attachments 1-4. Drs. Kryzanowski and Roberts qualify their assessment of these updated credit metrics by noting that rating agencies consider other factors in addition to coverage ratios in setting ratings and that bond ratings have shortcomings as a timely measure of risk. Nonetheless, they conclude from their analysis of Interest and FFO coverage and Cash Flow to Debt Ratios that, to the extent that such ratios constitute relevant input into bond ratings, the ratios implied by their recommendations are consistent with a bond rating in the A range.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

Schedule 5.8A-OPG-IR19 (Note: Additions/changes are underlined)

This schedule uses OPG's projections of EBITDA, Taxes, Capitalization and Costs of Equity and Debt to calculate its Interest Coverage Ratio, its FFO Coverage Ratio and its Cash Flow to Debt Ratio for OPG's Hydro Assets for 2012. 'Interest Coverage Ratio' is calculated by dividing 'Allowed $ return on rate base' or 'EBIT' by 'Cost of Capital $' for 'Total Debt' (i.e. interest expense). 'FFO Coverage Ratio' is 'EBITDA (i.e. Funds From Operations or FFO or EBIT as given by 'Allowed $ return on rate base' plus Depreciation & Amortization) divided by 'Cost of Capital $' for 'Total Debt' (i.e. interest expense). 'FFO-AT Coverage Ratio' is 'EBITDA – Taxes') divided by 'Cost of Capital $' for 'Total Debt' (i.e. interest expense). 'Cash Flow to Debt Ratio' is calculated by dividing 'Earnings After Tax' + 'Depreciation & Amortization' by 'Total Debt', where 'Earnings After Tax' equal EBIT minus Taxes. This table uses Hydro's proportion of the rate-base of 58.74% and Hydro's adjusted equity ratio of 43% that ensures that OPG's overall equity ratio remains at 47%.

Capital Structure	Principal	Component (%)	Cost (%)	Cost of Capital ($)
Total debt (% of total)	2,158.94	57.00%	5.58%	120.47
Common equity (% of total)	1,628.67	43.00%	9.85%	160.42
Adjustment for taxes on equity return[a]				27.40
Rate base financed[b]	3,787.61	100.00%		
Allowed $ return on rate base (EBIT)				308.29
Depreciation & Amortization[c]				63.80
EBITDA				372.09
Interest Coverage Ratio (times)	2.56			
FFO Coverage Ratio (times)	3.09	FFO-AT Coverage Ratio (times)		2.86
Cash Flow to Debt Ratio (%)	10.39			

Notes:

[a] Corporate income tax from EB-2010-0008, Exhibit F4, Tab 2, Schedule 1, Table 1, Filed: 2010-05-26.

[b] Total rate base financed by capital structure of 6448.1 million from EB-2010-0008, Exhibit C1, Tab 1, Schedule 1, Table 1, Filed: 2010-05-26, multiplied by 58.74%.

[c] Depreciation & Amortization of 63.4 million plus 0.4 million from EB-2010-0008, Exhibit B2, Tab 4, Schedule 1, Table 2. Filed: 2010-05-26.

Schedule 5.8B-OPG-IR19 (Note: Additions/changes are underlined)

This schedule uses OPG' s projections of EBITDA, Taxes, Capitalization and Costs of Equity and Debt to calculate its Interest Coverage Ratio, its FFO Coverage Ratio and its Cash Flow to Debt Ratio for OPG's Hydro Assets for 2011. 'Interest Coverage Ratio' is calculated by dividing 'Allowed $ return on rate base' or 'EBIT' by 'Cost of Capital $' for 'Total Debt' (i.e. interest expense). 'FFO Coverage Ratio' is 'EBITDA (i.e. Funds From Operations or FFO or EBIT as given by 'Allowed $ return on rate base' plus Depreciation & Amortization) divided by 'Cost of Capital $' for 'Total Debt' (i.e. interest expense). 'FFO-AT Coverage Ratio' is 'EBITDA – Taxes') divided by 'Cost of Capital $' for 'Total Debt' (i.e. interest expense). 'Cash Flow to Debt Ratio' is calculated by dividing 'Earnings After Tax' + 'Depreciation & Amortization' by 'Total Debt', where 'Earnings After Tax' equal EBIT minus Taxes. This table uses Hydro's proportion of the rate-base of 60.17% and Hydro's adjusted equity ratio of 43% that ensures that OPG's overall equity ratio remains at 47%.

Capital Structure	Principal	Component (%)	Cost (%)	Cost of Capital ($)
Total debt (% of total)	2,168.04	57.00%	5.58%	120.98
Common equity (% of total)	1,635.54	43.00%	9.85%	161.10
Adjustment for taxes on equity return[a]				30.6
Rate base financed[b]	3,803.59	100.00%		
Allowed $ return on rate base (EBIT)				312.68
Depreciation & Amortization[d]				63.20
EBITDA				375.88

Interest Coverage Ratio (times)	2.58		
FFO Coverage Ratio (times)	3.11	FFO-AT Coverage Ratio (times)	2.85
Cash Flow to Debt Ratio (%)	10.35		

Notes:

[a] Corporate income tax from EB-2010-0008, Exhibit F4, Tab 2, Schedule 1, Table 1, Filed: 2010-05-26.

[b] Total rate base financed by capital structure of 6321.4 million from EB-2010-0008, Exhibit C1, Tab 1, Schedule 1, Table 2, Filed: 2010-05-26, multiplied by 60.17%.

[c] Depreciation & Amortization of 62.9 million plus 0.3 million from EB-2010-0008, Exhibit B2, Tab 4, Schedule 1, Table 2. Filed: 2010-05-26.

Schedule 5.8C-OPG-IR19 (Note: Additions/changes are underlined)

This schedule uses OPG' s projections of EBITDA, Taxes, Capitalization and Costs of Equity and Debt to calculate its Interest Coverage Ratio, its FFO Coverage Ratio and its Cash Flow to Debt Ratio for OPG's Nuclear Assets for 2012. 'Interest Coverage Ratio' is calculated by dividing 'Allowed $ return on rate base' or 'EBIT' by 'Cost of Capital $' for 'Total Debt' (i.e. interest expense). 'FFO Coverage Ratio' is 'EBITDA (i.e. Funds From Operations or FFO or EBIT as given by 'Allowed $ return on rate base' plus Depreciation & Amortization) divided by 'Cost of Capital $' for 'Total Debt' (i.e. interest expense). 'FFO-AT Coverage Ratio' is 'EBITDA – Taxes') divided by 'Cost of Capital $' for 'Total Debt' (i.e. interest expense). 'Cash Flow to Debt Ratio' is calculated by dividing 'Earnings After Tax' + 'Depreciation & Amortization' by 'Total Debt', where 'Earnings After Tax' equal EBIT minus Taxes. This table uses Nuclear's proportion of the rate-base of 41.26% and Nuclear's adjusted equity ratio of 53% that ensures that OPG's overall equity ratio remains at 47%.

Capital Structure	**Principal**	**Component (%)**	**Cost (%)**	**Cost of Capital ($)**
Total debt (% of total)	1,250.43	47.00%	5.58%	69.77
Common equity (% of total)	1,410.06	53.00%	9.85%	138.89
Adjustment for taxes on equity return[a]				75.90
Rate Base financed[b]	2,660.49	100.00%		
Allowed $ return on rate base (EBIT)				284.56
Depreciation & Amortization[d]				255.60
EBITDA				540.16

Interest Coverage Ratio (times)	4.08		
FFO Coverage Ratio (times)	7.74	FFO-AT Coverage Ratio (times)	6.65
Cash Flow to Debt Ratio (%)	31.55		

Notes:

[a] Corporate income tax from EB-2010-0008, Exhibit F4, Tab 2, Schedule 1, Table 3, Filed: 2010-05-26.

[b] Total rate base financed by capital structure of 6448.1 million from EB-2010-0008, Exhibit C1, Tab 1, Schedule 1, Table 1, Filed: 2010-05-26, multiplied by 41.26%.

[c] Depreciation & Amortization of 239.5 million plus 16.1 million from EB-2010-0008, Exhibit B3, Tab 4, Schedule 1, Table 1. Filed: 2010-05-26.

Schedule 5.8D-OPG-IR19 (Note: Additions/changes are underlined)

This schedule uses OPG' s projections of EBITDA, Taxes, Capitalization and Costs of Equity and Debt to calculate its Interest Coverage Ratio, its FFO Coverage Ratio and its Cash Flow to Debt Ratio for OPG's Nuclear Assets for 2011. 'Interest Coverage Ratio' is calculated by dividing 'Allowed $ return on rate base' or 'EBIT' by 'Cost of Capital $' for 'Total Debt' (i.e. interest expense). 'FFO Coverage Ratio' is 'EBITDA (i.e. Funds From Operations or FFO or EBIT as given by 'Allowed $ return on rate base' plus Depreciation & Amortization) divided by 'Cost of Capital $' for 'Total Debt' (i.e. interest expense). 'FFO-AT Coverage Ratio' is 'EBITDA – Taxes') divided by 'Cost of Capital $' for 'Total Debt' (i.e. interest expense). 'Cash Flow to Debt Ratio' is calculated by dividing 'Earnings After Tax' + 'Depreciation & Amortization' by 'Total Debt', where 'Earnings After Tax' equal EBIT minus Taxes. This table uses Nuclear's proportion of the rate-base of 39.83% and Nuclear's adjusted equity ratio of 53% that ensures that OPG's overall equity ratio remains at 47%.

Capital Structure	Principal	Component (%)	Cost (%)	Cost of Capital ($)
Total debt	1,183.37	47.00%	5.58%	66.03
Common equity	1,334.44	53.00%	9.85%	131.44
Adjustment for taxes on equity return[a]				53.9
Rate base financed[b]	2,517.81	100.00%		
Allowed $ return on rate base (EBIT)				251.37
Depreciation & Amortization[d]				234.50
EBITDA				485.87

Interest Coverage Ratio (times)	3.81		
FFO Coverage Ratio (times)	7.36	FFO-AT Coverage Ratio (times)	6.54
Cash Flow to Debt Ratio (%)	30.92%		

Notes:
[a] Corporate income tax from EB-2010-0008, Exhibit F4, Tab 2, Schedule 1, Table 3, Filed: 2010-05-26.
[b] Total rate base financed by capital structure of 6321.4 million from EB-2010-0008, Exhibit C1, Tab 1, Schedule 1, Table 2, Filed: 2010-05-26, multiplied by 39.83%.
[c] Depreciation & Amortization of 218.9 million plus 15.6 million from EB-2010-0008, Exhibit B3, Tab 4, Schedule 1, Table 1. Filed: 2010-05-26.

<u>OPG Interrogatory No. 20 to Pollution Probe</u>

<u>Issue 3.3:</u> Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

<u>Reference:</u> Pollution Probe's Evidence (Exhibit M, Tab 10), Schedule 5.7

Preamble:

Drs. K[ryzanowski] and R[oberts] categorize different utilities along with their regulated equity ratios by type, transmission, distribution and integrated. OPG would like to better understand what factors determine whether a utility is categorized as distribution or integrated.

Question:

(a) Drs. K[ryzanowski] and R[oberts] categorize Newfoundland Power and Maritime Electric as integrated utilities. What are the criteria for categorizing utilities as integrated rather than distribution electricity utilities?

Response:

(a) Drs. Kryzanowski and Roberts categorize a company as an integrated utility when it includes significant elements of generation, transmission and distribution. For example, Maritime Electric states on its website that it "owns and operates a fully integrated system providing for the generation, transmission and distribution of electricity to customers throughout Prince Edward Island".[1] Further, Newfoundland Power's website states that the company "operates an integrated generation, transmission and distribution system throughout the island portion of Newfoundland and Labrador".[2]

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

[1] Available online at http://www.maritimeelectric.com/about_us/ab_corporate_profile.asp.
[2] Available online at http://www.newfoundlandpower.com/AboutUs/Profile.aspx.

OPG Interrogatory No. 21 to Pollution Probe

Issue 3.3: Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

Reference: Pollution Probe's Evidence (Exhibit M, Tab 10), Schedule 5.8A

Preamble:

On Schedule 5.8[A,] Drs. Kryzanowski and Roberts calculate coverage ratios for OPG's regulated hydroelectric operations for 2012, using their calculation of rate base of $2,162.1M, OPG's forecast cost of debt, the allowed ROE of 9.85%, OPG's forecast depreciation and amortization and OPG's forecast income tax for the hydroelectric operations. OPG would like to understand the implications of Drs. Kryzanowski and Roberts' assumptions on the calculation.

Question:

(a) Would Drs. Kryzanowski [and Roberts] please confirm that the forecast income tax used in the calculation of the interest coverage ratio reflects the forecast 2012 rate base of $3,787.4M and the overall equity ratio of 47% approved for OPG in EB-2007-0905? If they cannot confirm, please explain why not.

(b) Would Drs. Kryzanowski and Roberts please confirm that the income tax allowance they used to calculate the implied pre-tax interest coverage ratio of 2.56 and the FFO coverage ratio of 3.44 are inconsistent with the rate base and capital structure ratios used in the calculation? If they cannot confirm, please explain why not.

(c) Would Drs. Kryzanowski and Roberts please confirm that the depreciation and amortization expense that they used to calculate the implied FFO and cash flow to debt coverage ratios are inconsistent with their calculation of the regulated hydroelectric rate base, i.e., that the depreciation expense reflects a forecast rate base of $3,787.4M, not $2,162.1M as calculated by Drs. Kryzanowski and Roberts? If they cannot so confirm, please explain why not.

Response:

(a) – (c) Confirmed. Please also see part (d) of the response to *OPG Interrogatory No. 19 to Pollution Probe* (Exhibit M, Tab 10.15, Schedule 19).

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

<u>OPG Interrogatory No. 22 to Pollution Probe</u>

<u>Issue 3.3:</u> Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

<u>Reference:</u> Pollution Probe's Evidence (Exhibit M, Tab 10), Schedule 5.8C

Preamble:

On Schedule 5.8[C,] Drs. Kryzanowski and Roberts calculate coverage ratios for OPG's nuclear operations for 2012, using their calculation of the rate base financed by capital structure of $4,350.54M. OPG would like to clarify Drs. Kryzanowski and Roberts' understanding of OPG's nuclear rate base.

Question:

(a) Would Drs. Kryzanowski and Roberts please confirm that the actual forecast 2012 nuclear rate base financed by capital structure is $2,660.7M equal to $4,150.8M as per Ex. B1-T1-S1 Table 2 less the adjustment for the lesser of UNL or ARC of $1,490.1 as per Ex. C1-T1-S1 Table 1? If they cannot confirm, please explain why not.

(b) Please provide any and all precedents for estimating the rate base for OPG's nuclear and hydroelectric prescribed assets using the procedure used by Drs. Kryzanowski and Roberts, i.e., by allocating the total rate base between nuclear and hydroelectric operations on the basis of capacity.

Response:

(a) & (b) Confirmed. Please also see part (d) of the response to *OPG Interrogatory No. 19 to Pollution Probe* (Exhibit M, Tab 10.15, Schedule 19).

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

OPG Interrogatory No. 23 to Pollution Probe

Issue 3.3: Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

Reference: Pollution Probe's Evidence (Exhibit M, Tab 10), page 68

Preamble:

Drs. Kryzanowski and Roberts cite the December 2009 Alberta Utilities Commission Generic Cost of Capital decision regarding levels of interest coverage ratios sufficient to maintain A ratings, including the AUC's conclusion that there is "some indication that the lower end of the EBIT coverage range necessary to maintain a credit rating in the A range is approximately 1.8." OPG would like to understand better the relevance of the AUC's findings to OPG.

Question:

(a) Would Drs. Kryzanowski and Roberts agree that the levels of interest coverage ratios that would be sufficient to maintain A credit ratings would generally be higher for higher risk utilities? If not, please explain why not.

(b) Could Drs. Kryzanowski and Roberts please confirm that the AUC's conclusion was drawn from the observation of achieved interest coverage ratios of mainly electricity transmission and distribution utilities with rated debt? If not, please explain.

(c) Could Drs. Kryzanowski and Roberts confirm that the AUC's observation that there is some indication that the lower end of the EBIT coverage range necessary to maintain a credit rating in the A range is approximately 1.8 refers to interest coverage ratios that were achieved by electricity transmission utilities?

(d) Would Drs. Kryzanowski and Roberts confirm that in their view electricity transmission utilities are at the low end of their business risk scale, accorded a business risk score of 1.0 in a range of 1.0 to 5.0?

Response:

(a) Drs. Kryzanowski and Roberts agree that higher risk companies would generally be expected to maintain higher coverage ratios for a given rating. However, in this context, they note that their response to *OPG Interrogatory No. 19 to Pollution Probe* (Exhibit M, Tab 10.15, Schedule 19) shows that the calculated coverage ratios for OPG's Hydro assets are 2.56 times for 2012 and 2.58 times for 2011, which are well in excess of the AUC's target of 1.8 times and consistent with higher risk. Similarly, the same interrogatory response calculates interest coverage ratios for OPG's Nuclear assets as 4.08 and 3.81 times for 2012 and 2011 respectively, which are also well in excess of the AUC target of 1.8 times and consistent with higher risk.

(b) – (d) All confirmed.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

OPG Interrogatory No. 24 to Pollution Probe

Issue 3.3: Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

Reference: Pollution Probe's Evidence (Exhibit M, Tab 10), pages 69 and 70

Preamble:

Drs. Kryzanowski and Roberts compare their estimates of the FFO interest coverage for OPG Hydro and OPG Nuclear to the ratios cited in the December 2009 Alberta Utilities Commission Generic Cost of Capital decision regarding levels of FFO interest coverage ratios sufficient to maintain A ratings. OPG would like to understand better whether Drs. Kryzanowski and Roberts' calculations for OPG are comparable to those of the AUC.

Question:

(a) Could Drs. Kryzanowski and Roberts confirm that the FFO (Free Cash Flow) coverage ratios that they calculated for OPG are EBITDA coverage ratios, that is, the ratios are calculated pre-tax? If not, please explain why not.

(b) Could Drs. Kryzanowski and Roberts please confirm that the AUC's estimates of FFO coverage ratios were made after-tax, as indicated at page 69 of Dr. Kryzanowski and Roberts' testimony?

(c) Could Drs. Kryzanowski and Roberts please confirm that their calculations of FFO coverage for OPG are systematically higher than those estimated by the AUC due to their inclusion of income tax expense in the coverage calculation?

(d) At pages 69 and 70 of their testimony Drs. Kryzanowski and Roberts state that "we see that, compared to the AUC's benchmark of 3 times FFO coverage for credit ratings in the lower A range, the OPG Hydro values are 3.4 and 3.5 times in 2012 and 2011, respectively, and the OPG Nuclear values are 5.5 times and 5.2 times in 2012 and 2011, respectively." Could Drs. Kryzanowski and Roberts please revise their calculations for OPG Hydro and OPG Nuclear to be consistent with the AUC's 3 times after-tax FFO coverage benchmark.

Response:

(a) – (c) Confirmed.

(d) The revised calculations are in the revised schedules attached as Attachments 1-4 to the response to *OPG Interrogatory No. 19 to Pollution Probe* (Exhibit M, Tab 10.15, Schedule 19, Attachments 1-4). The results of the calculations are labeled as "FFO-AT coverage ratio (times)" in each schedule. The values calculated for OPG Hydro for 2012 and 2011, respectively, are 2.86 and 2.85 times. While marginally below the AUC benchmark of 3 times, these ratios are not inconsistent with a bond rating in the A range. For OPG Nuclear the FFO-AT coverage ratios for 2012 and 2011, respectively, are 6.65 and 6.54 times. Both of these ratios far exceed the AUC benchmark of 3 times and are also not inconsistent with a bond rating in the A range. However, Drs. Kryzanowski and Roberts note the calculations employ a number of assumptions, and one unrealistic simplifying assumption is that the respective standalone costs of debt for OPG's Hydro assets and OPG's Nuclear assets are the same as when both sets of assets are combined.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

<u>OPG Interrogatory No. 25 to Pollution Probe</u>

<u>Issue 3.3:</u> Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

<u>Reference:</u> Pollution Probe's Evidence (Exhibit M, Tab 10), Schedule 5.7, Drs. Kryzanowski's and Roberts' Recommended Capital Structures

Preamble:

Drs. Kryzanowski and Roberts provide some of their recommended capital structures in prior proceedings in which they have appeared. OPG would like to understand better how Drs. Kryzanowski and Roberts' recommendations have compared to the equity ratios adopted by regulators.

Question:

(a) Could Drs. Kryzanowski and Roberts please provide a table showing:
 (1) the recommended capital structure in each case in which Drs. Kryzanowski and Roberts have appeared since 2002;
 (2) the date of the testimony;
 (3) the client on whose behalf the testimony was prepared;
 (4) the regulatory jurisdiction;
 (5) the date of the decision;
 (6) the awarded capital structure.

Response:

(a) Drawn largely from the response to *OPG Interrogatory No. 28 to Pollution Probe* in EB-2007-0905, a chronological list of the cases in which Drs. Kryzanowski and Roberts appeared follows, which includes the requested information.

<u>Nova Scotia Power</u>

On behalf of the Province of Nova Scotia, they provided evidence and testified before the Nova Scotia Utility and Review Board in the matter of Nova Scotia

Power Inc. in 2002. Their recommended equity ratio was 35%. The Board awarded an equity ratio of 37.5% in 2002.

Hydro Quebec

They filed evidence and testified before the Régie de l'Enérgie du Quebec for the Fédération canadienne de l'entreprise indépendante ("FCEI") / Union des municipalities du Québec ("UMQ") & Option consommateurs ("OC") in the 2003 application of Hydro Quebec Distribution. Their recommended equity ratio was 34%. The Régie decision in 2003 awarded an equity ratio of 35%.

Alberta Generic Hearing 2003-4

On behalf of Consumers Group (i.e. Aboriginal communities, Alberta Association of Municipal Districts & Counties, Alberta Federation of REAs Ltd., Alberta Irrigation Projects Association, Alberta Urban Municipalities Association, Canadian Forest Products, Consumer Coalition of Alberta, Federation of Alberta Gas Co-ops Ltd. & Gas Alberta Inc., and Public Institutional Consumers of Alberta), they prepared testimony and testified in Generic Hearing No. 1271597 before the Alberta Energy and Utilities Board in 2003-2004. The following lists the common equity recommendations of Drs. Kryzanowski and Roberts by company along with the Board's decisions in 2004.

	2004 Board Approved Common Equity Ratios (%)	**Ratio Recommended by Drs. Kryzanowski and Roberts**
ATCO TFO	33.0	30.0
AltaLink	35.0	30.0
EPCOR TFO	35.0	30.0
NGTL	35.0	32.0
ATCO Electric DISCO	37.0	35.0
FortisAlberta (Aquila)	37.0	35.0
ATCO Gas	38.0	37.0
ENMAX DISCO	39.0	35.0
EPCOR DISCO	39.0	35.0
AltaGas	41.0	37.0
ATCO Pipelines	43.0	40.0

Northwest Territories Power Corporation

Drs. Kryzanowski and Roberts submitted evidence and testified before the Public Utilities Board of the Northwest Territories in the General Rate Application of Northwest Territories Power Corporation in 2007. The client was Hydro Communities (i.e. City of Yellowknife, the Town of Hay River and the Town of Fort Smith). Their recommended equity ratio was 42%. The Board awarded NTPC in 2007 deemed common equity ratios of 45.53% for 2006/7 and 48.59% for 2007/8.

Ontario Power Generation

More recently in 2008, Drs. Kryzanowski and Roberts submitted evidence and testified before the Ontario Energy Board in EB-2007-0905 on behalf of Pollution Probe regarding Ontario Power Generation's application. Their recommended equity ratio was 47%. The company requested an equity ratio of 57.5%. The Board awarded an equity thickness of 47% in 2008.

Alberta Generic Hearing 2009

Most recently, Drs. Kryzanowski and Roberts submitted evidence and testified before the Alberta Utilities Commission in the 2009 Generic Cost of Capital hearing on behalf of the Utilities Consumer Advocate ("UCA"). The UCA is a Government of Alberta entity whose mandate is "to ensure small consumers have the information, representation and protection they need to better equip them to make informed choices in Alberta's restructured electricity and natural gas markets" and to represent "the interests of small consumers in regulatory hearings". A table summarizing the requested information follows.

Date of Testimony: 2009 Generic Hearing. Client: Utilities Consumer Advocate. Jurisdiction: Alberta Utilities Commission. Date of Decision: 2009.			
K&R Recommended Equity Ratio %	Requested Equity Ratio	Utility	Awarded Capital Structure %
33	38	ATCO Electric TFO	36
33	38	AltaLink	36
30	40	ENMAX TFO	37
35	40	EPCOR TFO	37
42/34	43	ATCO Pipelines	45
35	40	ATCO Electric DISCO	39
35	44	ENMAX DISCO	41

35	44	EPCOR DISCO	41
34	40	ATCO Gas	39
35	44	FortisAlberta	41
40/37	46	AltaGas	43

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

<u>OPG Interrogatory No. 26 to Pollution Probe</u>

<u>Issue 3.3:</u> Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

<u>Reference:</u> Pollution Probe's Evidence (Exhibit M, Tab 10), Section 3.3.1.

Preamble:

On page 18, Drs. Kryzanowski and Roberts discuss their concerns with OPG's approach to reflecting project specific risks in cash flows. OPG wishes to understand whether Drs. Kryzanowski's and Roberts' concerns are already addressed in OPG's approach.

Question:

(a) Drs. Kryzanowski and Roberts state that there is a tendency of Monte Carlo simulations to underweight tail observations. Please provide the rationale for this conclusion.

(b) Do Drs. Kryzanowski and Roberts agree that if contemporaneous interrelationships (more commonly called correlation) are appropriately modeled that the above issue would be taken care of? If not, why not?

(c) Drs. Kryzanowski and Roberts argue that a Monte Carlo simulation should be done using the risk free rate to determine the appropriate discount rate. Please explain how this discount rate is then used.

(d) If the risk profile/uncertainty in an input variable changes, would that result in a different discount rate for the project?

(e) Would this not result in a different discount rate for each project? If not, why not?

Response:

(a) Dr. Kryzanowski has approximately 40 years of experience with the use of resampling techniques in research and investment/product analysis, including Monte Carlo simulations. He began with the development of a computer program for applying Monte Carlo simulation analysis to capital investment projects. An illustration of the practical use of this work is that he provided a major natural resource firm with an independent evaluation of a proposed significant plant expansion. He then implemented Monte Carlo simulation analysis and other forms of resampling techniques in other firms and financial institutions for project evaluation, measurement of portfolio performance, and measurement of the risk of financial assets or portfolios of assets. He has also used various other resampling techniques, such as the "jackknife" and "bootstrapping" (traditional, block, etc.), in various settings.

Based on this experience and conversations with others about their experiences with the use of resampling techniques (including Monte Carlo simulations), he has come to the conclusion that not adequately accounting for possible observations in the tails of the various distributions is a major concern with the use of such resampling techniques, particularly for project assessment. In addition, this concern has been commonly identified as a contributor to various problems encountered with various financial products and institutions.

(b) Drs. Kryzanowski and Roberts agree that accounting for cross-correlations is definitely an improvement over ignoring the problem. However, the effectiveness of such accounting depends upon whether or not such cross-correlations are conditional and how the conditioning is implemented. For example, the investment profession has learned that diversification is actually less effective when needed most because cross-correlations become larger (i.e. the correlation coefficient becomes closer to one) when major economic shocks occur (particularly bad scenarios). Any implementation of accounting for cross-correlations is also hampered because factors may exhibit time-series correlations because they are persistent or path dependent.

(c) In a typical project evaluation using a Monte Carlo simulation, one of the first outputs is generally a NPV distribution when the discount rate is the risk-*free* discount rate to account for the time-value of money. Then, based on an assessment of this distribution, one can make an assessment of the nature of the risk inherent in the project. This is then used to obtain a risk-*adjusted* discount rate, which is then used to derive a risk-adjusted NPV distribution for the project.

(d) If everything else were held the same, material changes in the uncertainty (as embodied in the cumulative probability distribution or "S-curve") of an input variable would affect the perceived risk of the project. Thus, all else being held the same, this would have an effect on the discount rate that should be used in the evaluation.

(e) Different discount rates for each project is what should happen. However, that is not what is happening here. As noted at page 18 of the pre-filed evidence of Drs. Kryzanowski and Roberts:

> In its response to Pollution Probe's Interrogatory 016, OPG states that it uses the **same discount rate of 7%** in its financial analysis for all investments with respect to Prescribed Assets, and that risks are taken into account in the cash flows. [emphasis added and footnotes omitted]

Drs. Kryzanowski and Roberts subsequent note on the same page of their pre-filed evidence that:

> To evaluate the sensitivity of the Darlington LUEC, for example, OPG conducts a sensitivity (and not a more robust scenario) analysis using the "low and high ends of these ranges for each of the key input Factors". To evaluate the sensitivity of the Darlington LUEC, for example, OPG has a range for the discount rate of 7% plus or minus 1%. [footnotes omitted]

The mid-point of the range for the discount rate should be the appropriate risk-*adjusted* discount rate for the project and not the same 7% rate that is used for all of OPG's projects. The low and high end of the range should then be around this risk-adjusted discount rate to account for future uncertainty in the risk-adjusted discount rate.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

OPG Interrogatory No. 27 to Pollution Probe

Issue 3.3: Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

Reference: Pollution Probe's Evidence (Exhibit M, Tab 10), Schedule 5.7, Relating the benchmarks

Preamble:

At page 65, Drs. Kryzanowski and Roberts state that "Schedule 5.7 shows that this business risk rating for OPG Nuclear exceeds the rating for OPG Hydro (1.8). It also signals that OPG Nuclear bears higher business risk than generic integrated companies (rated 1.5) or generic distribution utilities rated (1.4).

Question:

(a) Please confirm that the following table reflects the risk assessment of Drs. Kryzanowski and Roberts in EB-2007 -0905, and that the sole difference in their assessment in this case is that the OPG nuclear rating for deferral accounts should be 3.0 instead of 1.0 to reflect the fact the OEB determined that no fixed cost recovery should be allowed for OPG's regulated operations, and that the overall result is that OPG's Nuclear operations are rated as a 2.6 in the opinion of Drs. Kryzanowski and Roberts.

Risk Type	Transco	Disco	Integrated	OPG Hydro	OPG Nuclear
Market					
Competition	1	2	1.3	1	1
Credit	1	2	1.3	1	1
Operational					
Leverage	1	3	2.6	3	4
Technology	1	1	1.5	2	4
Capacity	1	1	2	3	3
Asset Retire/construct	1	1	1.5	2	3
Deferral Accounts	1	1	1	1	1
Regulatory					
Primary Regulatory	1	1	1	1	1
Environmental/Safety	1	1	1.5	2	3

OVERALL	1	1.4	1.5	1.8	2.3
Linear AVERAGE	1	1.44	1.52	1.77	2.33

(b) Drs. Kryzanowski and Roberts state that capital structures for regulated utilities are all established on a heuristic basis without reliance on a formula. Has the above scoring model been used to establish a utility capital structure or cost of capital for any regulated party? If so, please provide copies of the testimonies in which this scoring model was used.

(c) Drs. Kryzanowski and Roberts assert that OPG's nuclear operations rate a 2.6 on their scale of 1 to 5. They also state on page 40 that their scale of 1 to 5 represents risks for utilities. They also state that transmission utilities rate as 1.0 across all dimensions of their risk assessment as they are the least risky. Is there any Canadian utility that faces higher business risk than OPG's regulated nuclear component of its regulated operations? If so, please provide the utilities and the associated risk analysis using the 1 to 5 rating scale.

(d) Drs. Kryzanowski's and Roberts' scoring of each risk reflected in Schedule 5.1 of Page 86 reflect moderate risk as 3.0, moderate-high risk as 4.0, and presumably high risk as 5.0. Please provide the nuclear capital structure that would result if the linear average for all nine risk criteria resulted in an overall assessment that OPG's nuclear operations were moderately risky (e.g. 3.0), moderately-highly risky (4.0) and highly risky (5.0).

(e) In EB-2007-0905, OEB staff's witness defined "Risk Exposure" as a function of probability and cost (EB-2007-0905 page 13 of Ex. M Tab 1 Evidence of London Economics International, "Development of an Overall Framework to Determine an Appropriate Capital Structure and Return on Equity for Ontario Power Generation's Prescribed Facilities," by A.J. Goulding). Do Drs. Kryzanowski and Roberts agree with that definition?

(f) If Drs. Kryzanowski and Roberts do not agree with this definition, should factors whose score is identical among the comparators, e.g., primary regulation, be excluded from a comparative financial analysis? If no, please explain why not.

(g) If Drs. Kryzanowski and Roberts agree that the assessment of relative risk should be derived from the main drivers of absolute risk, should factors that are inconsequential (in terms of the probability and cost as defined by Goulding) be eliminated from the analysis in the table provided in part (a)?

(h) Please provide an adjusted risk assessment table similar to that summarized in Part a) that eliminates the factor "primary regulation" and the market factors of "competition/demand" and "credit".

Response:

(a) Confirmed.

(b) The framework was used in past evidence submitted by Drs. Kryzanowski and Roberts in EB-2007-0905 to support their recommendation of a 47% overall equity ratio for OPG. As noted on page 20 of their current pre-filed evidence, the Board adopted that recommendation. The framework was also used in their evidence in the Generic Cost of Capital Hearing leading to AUC Decision 2009-216. As requested, copies of Drs. Kryzanowski's and Roberts's pre-filed evidence for these two proceedings are attached as Attachments 1 and 2.

(c) Drs. Kryzanowski and Roberts have not conducted a detailed assessment of the business risk of all individual utilities in Canada. Consequently, they do not have the data to answer this question. However, they do note that there is no *a priori* reason to expect to find companies that will lie at every point on the rating scale if such an assessment were done.

(d) Please refer to the response to *OPG Interrogatory No. 12 to Pollution Probe* (Exhibit M, Tab 10.15, Schedule 12).

(e) On page 13 of the referenced report by Mr. Goulding, Drs. Kryzanowski and Roberts find the following passage that addresses probability and cost:

> Glyn A. Holten, in a 2004 paper, defines risk as being the "exposure to a proposition to which one is uncertain" (footnote deleted). Here, "exposure" means the degree to which a given outcome has a material consequence. For example, there may be a non-zero chance that the stock market will decline, but if we own no stocks our exposure is none and so our risk is zero. Mathematically, risk may be quantified as follows:
>
> $$R = P * C$$
>
> which states simply that a given risk (R) is equal to the probability that an event will occur (P) times the cost (C) incurred as a result.

Drs. Kryzanowski and Roberts agree that this is a standard general definition of risk. On pages 36-37 of their pre-filed evidence, they quote from a leading finance textbook that applies this general definition to the risk of financial distress associated with excessive leverage. In that context, uncertainty of operating income is associated with an increased probability of financial distress while the types of assets is related to the cost of that distress.

(f) Not applicable as Drs. Kryzanowski and Roberts do not disagree with the definition.

(g) & (h) Drs. Kryzanowski and Roberts agree that the assessment of relative risk should arise from an examination of the main risk drivers. However, it does not follow that factors that are not associated with substantial risk or are common to different entities being compared should be eliminated from the comparison. For this reason, Drs. Kryzanowski and Roberts believe that an abbreviated table as requested would serve little useful purpose.

The report by Mr. Goulding mentioned above is consistent with the position of Drs. Kryzanowski and Roberts. On page 48, that report states that:

> The above section reviewed the various identified risk factors and discussed how each could be used to determine risk relative to other asset classes. Two approaches are possible to convert this list into a framework. One would be to rank the OPG prescribed assets in each risk category relative to the other identified asset classes, and then to average the ranks; using the average rank for the OPG prescribed assets, OPG's place on the risk continuum can be determined.

Witness Panel Responsible: Dr. Lawrence Kryzanowski and Dr. Gordon Roberts

Before the Ontario Energy Board

In the matter of:

EB-2007-0905 - OPG - 2008-09 Payments

Exhibit M
Tab 12

Evidence on Behalf of Pollution Probe

On Capital Structure, Return on Common Equity, Automatic Adjustment Formula

Text, Appendices and Schedules

Prepared Testimony of

Dr. Lawrence Kryzanowski and Dr. Gordon S. Roberts

Concordia University Research Chair in Finance, John Molson School of Business, Concordia University, Montreal; and CIBC Professor of Financial Services, Schulich School of Business, York University, Toronto.

April 2008

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1. INTRODUCTION AND SUMMARY

1.1 QUALIFICATIONS

This evidence is the work of Dr. Lawrence Kryzanowski of Concordia University and Dr. Gordon S. Roberts of York University. Dr. Kryzanowski is currently a Full Professor of Finance and Concordia University Research Chair in Finance (previously Ned Goodman Chair in Investment Finance) at Concordia University. He earned his Ph.D. in Finance at the University of British Columbia. Dr. Gordon S. Roberts is currently CIBC Professor of Financial Services at York University's Schulich School of Business. He earned his Ph.D. in Economics at Boston College.

Dr. Kryzanowski has experience in preparing evidence as an expert witness in utility rate of return applications, stock market insider trading court proceedings, and confidential final offer arbitration hearings for the setting of fair rates for the movement of various products by rail. Together with Dr. Roberts in 1997, he prepared a report for the Calgary law firm, MacLeod Dixon, on rate of return considerations in the pipeline application by Maritimes and Northeast. For a group of organizations collectively and most recently referred to as the Consumers Group (formerly UNCA Intervenor Group and FIRM Customers), Drs. Kryzanowski and Roberts provided evidence on the fair return on equity and the recommended capital structure for ATCO Electric Limited in its 2001/2002 Distribution Tariff Application and for Aquila Networks Canada (Alberta) Ltd. ("ANCA") in its 2001/2002 Distribution Tariff Application and its 2002 Distribution Tariff Application (DTA) No. 1250392 before the Alberta Energy and Utilities Board. On behalf of the Province of Nova Scotia, they provided evidence and testified before the Nova Scotia Utility and Review Board in the matter of Nova Scotia Power Inc. in 2002. They filed evidence and testified before the Régie de l'Enérgie du Quebec for the Fédération canadienne de l'entreprise indépendante ("FCEI") / Union des municipalities du Québec ("UMQ") & Option consommateurs

("OC") in the 2003 application of Hydro Quebec Distribution. Together with Dr. Roberts, and on behalf of Consumers Group, he prepared testimony and testified in Generic Hearing No. 1271597 before the Alberta Energy and Utilities Board in 2003-2004. Most recently, Drs. Kryzanowski and Roberts submitted evidence and testified before the Public Utilities Board of the Northwest Territories in the General Rate Application of Northwest Territories Power Corporation in 2007.

Dr. Roberts is also experienced in preparing evidence for utility rate of return hearings. From 1995-1997 he submitted prefiled testimony as a Board witness in rate hearings for Consumers Gas. In 1996, he served as an expert advisor to the Ontario Energy Board in its Diversification Workshop. As noted above, together with Dr. Kryzanowski, he has also prepared evidence on rate of return and capital structure considerations and appeared before regulatory boards in Nova Scotia, Quebec and Alberta.

More broadly, Drs. Kryzanowski and Roberts often provide technical expertise and advice on financial policy. Among our consulting clients in recent years are the Superintendent of Financial Institutions, the federal Department of Finance, Canada Investment and Savings, Canada Mortgage and Housing Corporation, and Canada Deposit Insurance Corporation. Our brief *curricula vitae* are attached as Appendix 1.A

1.2 PURPOSE OF EVIDENCE AND GENERAL APPROACH

Pollution Probe has retained us to provide evidence on the fair return on equity, recommended capital structure, and automatic adjustment formula for Ontario Power Generation (OPG) in the present hearing.

In preparing our evidence we considered and used various techniques for determining an appropriate capital structure and for measuring the fair return on equity for a regulated utility. Although OPG has a single shareholder, the Province of Ontario, we follow the stand-alone principle under which capital structure and the fair return on equity are determined as if each company were “standing alone” as a shareholder-owned entity.

For determining an appropriate capital structure for OPG, we begin with a brief overview of financial theory focused on the practical implications for capital structure. We then review the business risks faced by OPG’s hydro assets and nuclear assets separately and compare them with those of other sectors of the utilities industry as well as with selected individual regulated companies. We next conduct an analysis of the bond ratings, capital structures, interest coverage ratios, returns on equity and equity ratios (both actual and those allowed by regulators) for a comparable sample of utilities. To arrive at a recommendation for OPG, we use our business benchmarks for OPG hydro and OPG nuclear to determine appropriate capital structures for each division. Combining these leads to our recommendation for OPG’s total regulated assets.

For the determination of the recommended rate of return on equity (ROE), we consider and eliminate various approaches as being unreliable (such as the Comparable Earnings Estimation Method), and formulate our recommended rate of return based on four methods for estimating the market equity risk premium (MERP) and two methods for estimating the risk of an average-risk utility relative to the market. Our MERP estimate is primarily determined by our estimate from the Equity Risk Premium Estimation Method. We assess the directional conservatism of this MERP estimate when it is benchmarked against estimates based on a survey of the estimates published primarily in the peer-reviewed scientific literature, the estimates that we derive using the Discounted Cash Flow (DCF) Estimation Method at the market level, and the return expectations for stocks and bonds of various samples of buy- and sell-side (top-down) investment professionals.

We also address the appropriateness of using an automatic adjustment formula for future rate setting for OPG.

1.3 SUMMARY OF EVIDENCE

1.3.1 Economic and Financial Market Conditions

In Section 2 we examine current economic and financial market conditions in the U.S. and Canada and forecast those economic variables that we use as inputs in the fair rate of return and capital structure tests.

The current global credit crisis has caused increased volatility in equity markets and wider spreads in debt markets and these conditions are likely to continue in the short term. However, there is no reason to believe that the current U.S. crisis will have a material effect on the long-run cost of equity for Canadian utilities beyond 2008.

Turning from trends to our economic forecast, a key factor in predicting Canadian economic fortunes over the next two years is what will happen in the U.S. where the economy is currently in a slowdown and likely a recession. The slower pace of economic growth south of the border is being driven by a crisis in the housing market along with high energy prices and their impact on consumer spending in the U.S. The U.S. economic downturn combined with the strong Canadian dollar, is leading to weaker Canadian exports. Despite the slowdown, Canada’s real GDP (Gross Domestic Product) growth is still expected to be positive in 2008 and back to the long-term target of 2% in 2009.

We also discuss the prospects for the economy of Ontario and conclude that growth at a lower rate than the overall rate for Canada is likely due to the strong manufacturing emphasis in the Province.

Turning to interest rates, for rate-making purposes we require a forecast of the rate on 30-year Canada's (i.e., Canadian government bonds with a 30-year term to maturity). We examine forecasts contained in *Consensus Forecasts* (published by Consensus Economics) for 10-year Canada's and adjust upward by an estimated spread. We forecast the rate on 30-year Canada's at 3.85% for 2008 and 4.25% for 2009.

1.3.2 Capital Structure

Section 3 contains our views on the appropriate capital structure for OPG. We begin with a brief overview of the practical implications of capital structure theory. Turning to business risk, we provide our assessment for OPG's regulated hydro generating assets as well as for its nuclear assets. We next examine relevant financial data for a sample of eight traded Canadian utilities. We analyze their bond ratings, capital structures (both actual and allowed), interest coverage ratios and returns on equity. The analysis produces a range of capital structures for distribution and integrated utilities of 39-43%.

Based on these examinations and tests, we arrive at a recommendation for the appropriate equity ratio for each segment of OPG. We assess the business risk faced by OPG Hydro as low to moderate – higher than that of a distribution utility and somewhat above the business risk of an integrated electric utility. This suggests that a fair common equity ratio for OPG Hydro should be at 40%, just below the middle of the range of common equity that we find for our comparisons. In contrast, our analysis rates the business risk of OPG's regulated nuclear assets as moderate and greater than that of OPG Hydro. The higher business risk of OPG Nuclear should translate into a significant increase in its common equity ratio on the order of 5 to 10% over that for OPG Hydro producing a recommended equity ratio for OPG Nuclear of 45 to 50%. In the interests of conservatism and to ensure fairness to the shareholder, we recommend the higher number of 50% for the equity ratio. In order to achieve an overall recommended capital structure for OPG's rate base we calculate a weighted average of our individual capital structures using the asset breakdown in the Electricity Restructuring Act of Ontario of 2004: 66.47% nuclear and 33.53% hydro. When we apply these weights to our two separate capital structure recommendations, we obtain an overall rounded recommended equity ratio of 47% for OPG's rate base. Thus, our recommended common equity ratio for OPG's total regulated assets is 47%.

1.3.3 Rate of Return on Common Equity

In Section 4, we estimate the fair rate of return for OPG. We assess the expected market risk premium for the average Canadian stock at 5.00% using the Equity Risk Premium Estimation Method, and directional checks and reaffirmation using a survey of the estimates reported in primarily the peer-reviewed scientific literature, the Discounted Cash Flow (DCF) Estimation Method employing historical and future estimates of dividend growth rates for the market proxy, and with comparisons of the long-term return expectations of buy- and sell-side (primarily top-down) investment professionals for equities and bonds. Next, we determine that an average-risk utility is 50% as risky as the S&P/TSX Composite using two estimation methods. We add an adjustment of 10 basis points for flotation costs. Given our point forecast of a long-term Government of Canada bond rate of 3.85% for the first test year and 4.25% for the second, we are recommending a return on equity of 7.10% for 2008 and 7.25% for 2009. Our return on equity recommendation for 2008 allows an average-risk utility a risk premium (with inclusion of adjustments for flotation costs as well as for financial flexibility and integrity) of 325 basis points over our forecast for long Canada yields. For 2009, the risk premium is 300 basis points when we remove the financial integrity adjustment reflecting unsettled market conditions in 2008. We apply this recommended rate of return to OPG leaving it to the capital structure to adjust for higher business risk.

1.3.4 Generic Formula-based Adjustment Mechanism

In Section 5, we review the use of generic adjustment formulas by utilities regulators in Canada. After reviewing the advantages and disadvantages of the use of such formulas, we conclude with our recommendation that the Board implement such a mechanism for OPG.

1.3.5 Critique of Evidence Submitted by Ms. McShane

Section 6 of our evidence contains our critique of key aspects of the evidence dealing with the recommended ROEs and capital structure, and economic/financial market assessments of Ms. McShane, expert witness for OPG.

We focus on three key areas in our critique: the forecast for the 30-year Canada rate, recommended capital structure, and return on equity. Turning to the first area, we find that Ms. McShane arrives at forecasts higher than our own because she uses dated inputs from *Consensus Forecasts*, which is published by Consensus Economics.

On the topic of capital structure, we examine the methodologies employed in determining common equity ratios (ranges) by Ms. McShane and show that they are flawed. As a result, her recommendations are overly generous when viewed in the context of the business risks of the hydro and nuclear businesses of OPG. In particular, we show that Ms. McShane's unsupported view that OPG would require a stand-alone bond rating of at least A- inflates her recommended common equity ratio.

For return on equity, the third area, we document in detail a number of adjustments that Ms. McShane either makes or fails to make to standard methodologies. We demonstrate that her stance on these adjustments or non-adjustments consistently leads her toward a higher recommended return on equity when compared with our recommendation.

We complete our discussion of the cost of equity with a detailed comparison of recommendations for the returns on equity by Ms. McShane, ourselves, and the results of selected adjustment formulas currently in use by Canadian regulators. We regard the regulatory formulas as generous because they do not reflect the trend toward a lower equity market risk premium or MERP discussed in Section 4 of our evidence and incorporated into our recommendations. With this in mind, we conclude that, should the Board wish to move deliberately in the direction of implementing a lower MERP, it would be appropriate to set the fair rate of return for an average-risk utility somewhere between our recommendations based on a risk premium over 30-year Canada's of 300 to 325 basis points and the average of regulatory formulas bearing an average-risk premium of 431 basis points. The analysis also demonstrates once more the upward biases in the recommended ROE of Ms. McShane.

1.4 SUMMARY TABLE FOR OUR RECOMMENDATIONS FOR RETURN ON EQUITY FOR OPG

The following table provides a summary of our recommendations for return on equity for OPG.

Panel A: Determination of Market Equity Risk Premium (MERP) for S&P/TSX Composite Index

MERP Estimation Method	Estimate	Weight
Equity Risk Premium Method	5.00%	Primary
Survey of Estimates Reported in the Literature	Risk Premium of 5.00% for S&P/TSX Composite is Conservatively High	Directional for bench-marking purposes
Discounted Cash Flow Estimation Method	Risk Premium of 5.00% for S&P/TSX Composite is Conservatively High	Directional for bench-marking purposes
Survey Expectations of Investment Professionals*	Risk Premium of 5.00% for S&P/TSX Composite is Conservatively High	Directional for bench-marking purposes

Panel B: Determination of Risk of an Average-risk Canadian Utility Relative to the Market (S&P/TSX Composite Index)

Relative Risk Estimation Method	Estimate	Weight
Beta	0.50	Primary
Standard Deviation of Utilities relative to Large Sample of Industries	Relative Risk of 0.50 for Average-risk Utility is Conservatively High	Directional for bench-marking purposes

Panel C: Determination of Recommended Return on Equity (ROE) for an Average-risk Utility and OPG when risk differences are accounted for by Adjusting the Equity Ratio for OPG

Test Year	Recommended Market Equity Risk Premium	Recommended Relative Risk Adjustment to the MERP	Recommended Equity Risk Premium for OPG	Recommended Risk-free rate	Flotation, Financial Flexibility & Additional Financial Integrity Allowance	Recommended ROE for OPG
2008	5.00%	0.50	5.00% x 0.50 = 2.50%	3.85%	0.10% + 0.40% + 0.25% = 0.75%	7.10%
2009	5.00%	0.50	5.00% x 0.50 = 2.50%	4.25%	0.10% + 0.40% + 0.00% = 0.50%	7.25%

*Includes surveys conducted by W.M. Mercer Limited and Watson Wyatt.

2. ECONOMIC AND FINANCIAL MARKET CONDITIONS

2.1 OVERVIEW OF THIS SECTION

We begin by noting a downward shift in expected market returns relative to ideal capital market conditions in the 1990s.

Next, we present our views on the current global credit crisis and its impact on capital markets. Starting in mid-2007 in the U.S., the crisis is ongoing with turbulence in the U.S. housing market and the collapse of Bear Stearns. Both the Fed (U.S. Federal Reserve Board) and the President have introduced policies to address the crisis. In Canada, the credit crisis manifested itself in the freezing of the market for asset-backed commercial paper. As a result of the credit crisis, equity market volatility remains high and credit spreads wide in both the U.S. and Canada. By next year, however, it is likely that capital market conditions will normalize.

The next topic in Section 2 is the economic outlook for Canada and Ontario. An economic slowdown in the U.S., coupled with the high Canadian dollar and moderating commodity prices are expected to slow the Canadian economy in 2008. Growth in real GDP is predicted to remain positive but just over 1%. In 2008, conditional on a U.S. economic recovery, the Canadian economy should expand at a rate close to the Bank of Canada's target rate of 2%. For Ontario, the negative factors impacting the Canadian economy will have a negative effect magnified by the province's heavy manufacturing emphasis. As a result, growth is expected to be slower than for Canada and unemployment higher than in the western provinces.

We conclude Section 2 with our forecasts of the long Canada rate to be used in our rate of return analysis. Drawing on *Consensus Forecasts* from Consensus Economics, March 10, 2008, we obtain forecasts for 10-year Canada's. Adding the average spread on 30-year over 10-year Canada's observed over the first quarter of 2008 adjusted downward, we obtain forecasts of the 30-year Canada rate: 3.85% for 2008 and 4.25% for 2009. Using a similar approach we forecast rates on 30-year U.S. Treasury Bonds as 3.95% for 2008 and 4.35% for 2009.

2.2 Capital Market Trend

We begin by noting the trend toward lower expected market returns, as suggested by slowing economic growth rates relative to much of the 1990s. After the recession of the early 1990s, the rest of the decade was an ideal period in capital markets due to a long economic expansion and falling interest rates. As evidence of the economic expansion, note that between January 1990 and December 1999 real GDP in Canada grew by 37.33%.[1] Average real GDP growth in Canada was 2% annually between 1990 and 1998, and was 5.1% in 1999 and 4.4% in 2000. Annual average real GDP growth in the U.S. was 2.9% between 1990 and 1998, and averaged 4.1% in 1999 and 2000. As evidence of falling interest rates, 91-day Canadian T-Bills (i.e., a debt obligation backed by the Canadian government with a maturity of 91 days) decreased from 12.13% in January 1990 to 4.82% in December 1999, while U.S. T-Bills decreased from 7.75% to 5.37%. In brief, most of the 1990s was an ideal period for capital markets characterized by strong and sustained growth for much of the period and falling interest rates.

2.3 Global Credit Crisis

Prior to the global credit crisis, global capital markets enjoyed a period of stability through the first part of 2007. Higher energy and commodity prices fueled by economic growth in China and India led to booms in energy and mining. Combined with the decline of the U.S. dollar, the result was a substantial strengthening of the Canadian dollar and strong equity and debt markets. The

[1] See CANSIM II SERIES V498943, V122484 and V121817.

TSX experienced double-digit returns in 2004, 2005 and 2006. Liquidity was ample and interest rates followed a downward trend.

2.3.1 U.S. Sub-prime Crisis

When the credit market correction came in mid-2007, bringing a sharp increase in the price of risk, the weakest borrowers were forced into default precipitating the U.S. subprime crisis. With the financial system under strain, cracks also occurred in some securitization structures widened by such structures' reliance on bond rating agencies, as opposed to traditional lenders, in assessing credit risk. Unlike bank lenders, rating agencies do not have relationships with borrowers. Further, because bond rating agencies do not pay for their mistakes as severely as do lending officers, this "outsourcing of risk assessment" reinforced the general trend toward underestimating credit risk and contributed to the collapse of some securitization structures most notably collateralized debt obligations (CDOs) supported by subprime mortgages. With this collapse, investors turned away from all securitization products. The crisis also brought on a flight to quality with a widening of spreads on bank debt and corporate bonds.

The credit crisis continues in 2008 fueled by ongoing housing market turmoil in the U.S., which has resulted in global credit concerns and upheaval. This has been further aggravated by the economic recession in the U.S., and the strong possibility that it will cause significant economic slowdowns (if not recessions) in other economies.

Another defining event that has shaken the confidence of investors in the U.S. and globally is the collapse and rescue of Bear Stearns. The collapse started with a run on the investment bank's derivatives counterparty business as market participants lost confidence in the bank's ability to meet potential demands. To prevent an unravelling of risks, JP Morgan Chase bought Bear Stearns for $236 million ($2 per share; subsequently increased to $10 per share) although the shares were valued in the market pre-purchase at $3.5 billion ($30 per share). The Fed facilitated the purchase by providing up to $30 billion financing for the less liquid assets (e.g., mortgage securities) of Bear Stearns and assumed the risk of any decline in the value of those assets. This curtailed a run on Bear Stearns, which was the second-largest underwriter of U.S. mortgage-backed securities.

More recently, U.S. markets have encountered a manifestation of bad economic news. This includes poor U.S. employment numbers, a decline in nonfarm payrolls and a record number of residential mortgage foreclosures with no sign that the upward trend in foreclosures will abate. Consumer confidence has been adversely affected by home price deflation, which is now the highest since WWII and the Great Depression. Investor confidence has been further aggravated by a series of failed margin calls, which drove up credit spreads and resulted in the demise of at least 12 hedge funds.

Reacting to the near-collapse of Bear Stearns discussed earlier and having learned lessons from governmental activities in the U.S. during the Great Depression,[2] the U.S. Fed has flooded the markets with liquidity and cheaper funds. This included bypassing its own emergency-lending policy by allowing 20 primary dealers (such as Lehman Brothers Holdings Inc. and Morgan Stanley) access to the lending window at the same rate as commercial banks using a broad range of investment-grade collateral.[3]

The U.S. government also provided fiscal stimulus of about one percent of U.S. GDP by passing the Economic Stimulus Act of 2008. The bill provides

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[2] Some of these lessons were used successfully by Canadian regulators during the Great Depression. See Drs. Kryzanowski and Roberts: Capital forbearance: Depression-era experience of life insurance companies. *Canadian Journal of Administrative Sciences* 15:1 (March 1998), pages 1-16; and Canadian banking solvency, 1922-1940. *Journal of Money, Credit and Banking* 25:3 (August 1993, Part 1), pages 361-376.
[3] Sherry Cooper, Red alert, *The Bottom Line*, BMO Capital Markets, March 17, 2008, page 1.

temporary tax incentives for businesses to make investments and individual tax relief in the form of tax rebates. In addition, numerous measures were undertaken to alleviate problems in the housing sector. These include increasing FHA insurance and allowing Fannie Mae and Freddie Mac (i.e., two U.S. Government-sponsored mortgage funding companies) to purchase larger mortgages by relaxing their capital requirements.

How these policies will impact markets in 2008 remains an open question. On the equity side, the positive changes in the level of the S&P and Nasdaq indices, for example, during 2007 were aided by record buybacks of their own stocks by U.S. nonfinancial corporations. For example, in the fourth quarter of 2007, U.S. nonfinancial corporations bought back a record $1.2 trillion (annualized) of stocks in value. While these corporations appear to still hold sizeable cash positions and the ratios of liquid assets to both short-term liabilities and GDP are historically high, what impact heightened uncertainty will have on their buy-back programs is unknown. Also, there is considerable uncertainty whether there will be write-downs in the values of these “cash” holdings. Turning to debt markets, despite Fed actions credit spreads remain high raising the cost of financing as investors enact a flight to quality.

2.3.2 Canada and the Credit Crisis

Investor confidence in Canadian debt markets has been shaken somewhat during the past year by the ongoing crisis in the asset-backed commercial paper (ABCP) market that required the complete freezing of $33 billion of the most troubled paper via the so-called Montreal accord, and required Canadian court granted bankruptcy protection for 20 ABCP trusts on March 17, 2008. This action was necessary because a standstill agreement that froze the funds was expiring. Investors in the ABCP include some of Canada's biggest pension funds, the National Bank of Canada, numerous large and small corporate entities and individual investors. With the malaise in the ABCP market reinforcing concerns about counterparty risk in the U.S. and globally, credit spreads remain high in Canada. Debt investors are becoming more risk averse enacting a flight to quality in the form of government bonds and high-grade corporates (i.e., bonds issued by corporations that carry a high bond rating) according to Ted Carmichael, chief economist at J.P. Morgan Securities Canada Ltd.[4]

The loss of investor confidence in corporate credits was also reflected in the imbalance of bond rating downgrades in 2007. In 2007, DBRS (Dominion Bond Rating Service) downgraded 55 bond issuers while upgrading only 36, a ratio of downgrades to upgrades of 1.53. In contrast, in 2004-2006, downgrades were generally somewhat fewer than upgrades.[5]

Turning to the equity side, until the week leading up to Easter, professional market watchers had argued that the Canadian economy had become decoupled to a large extent from economic shocks in the U.S. These market watchers pointed to strong commodity prices (including record oil and gas prices) and noted that any economic fallout would be confined primarily to the financial sector and manufacturing. These professional market watchers also predicted that the impact of any economic contagion from the U.S. would thus be primarily confined to central Canada (Ontario and Quebec).

The sudden decline in commodity prices in which the CRB index fell almost 10% over four sessions followed the “bailout” of Bear Stearns by the U.S. Fed and a less than expected cut of 75 basis points in the discount rate by the U.S. Fed. As one would expect for a commodity-dependent economy like that in Canada, this eliminated much of the relative better performance of the S&P/TSX Composite index and resulted in a slippage of the Canadian dollar so that it traded below par relative to the U.S. dollar.

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[4] Allan Robinson, Risk-averse investors flock to government bonds, Report on Business, Globe and Mail, March 24, 2008.
[5] DBRS, Industry study: The 2007 year in review and 2008 outlook for DBRS corporate ratings, DBRS, January 2008.

As in the U.S., uncertainty remains at a high level in Canadian equity markets. The expected volatility of the market over the next month as measured by the Montreal Exchange's MVX has been higher on average but quite volatile itself since July of 2007.[6] In contrast, the Ink insider trading sentiment is neutral. This ratio is calculated by dividing the number of TSX-listed companies with insider buy-only transactions by the number with sell-only transactions (available at: www.inkresearch.ca).

2.3.3 Implications

It should not be surprising that when a major economic power (the U.S.) goes into recession that it creates temporary economic and market uncertainty, and that this has a short-run adverse effect on stock market prices and realized returns along with credit spreads. As long as the crisis is of the magnitude of such crises in the past (i.e., short-run with the exception of the Great Depression), it will not have a long-lasting effect on either the economy or equity markets. Thus, there is no reason to believe that the current U.S. crisis will have a material effect on the long-run cost of equity for Canadian utilities beyond 2008. Furthermore, one must careful consider the logical inconsistent between the argument that the cost of equity has increased because realized returns are lower (when equity prices are lower due to increased uncertainty) and the argument at other times that the cost of equity has increased because realized returns have increased (when times are good and uncertainty has decreased).

Similarly, the current credit crisis in the U.S. should not restrict utilities' abilities to raise debt funding. Given the investment grade rating and plain vanilla character of Canadian utility debt, these issuers should be in a position to benefit from the present flight to quality and away from exotic derivatives.

[6] The MVX is derived from option prices on the S&P/TSX 60 ETF (exchange traded fund).

2.3 Economic Forecasts

2.3.1 Forecasts for the Canadian Economy

A key factor in predicting Canada's economic future over the course of the coming years is what will come of slowing economic activity in the United States, which some reports have recognized as a recession. The slowdown which has gripped the U.S. economy through a combination of significant contractions in housing activity, deterioration in credit markets, inflationary pressures, and a sharp retreat in consumer spending has spilled over into the Canadian economy.[7] The depreciation in the greenback's value relative to the loonie, continuous slowdown in domestic manufacturing, and a fall in net exports have weakened Canada's real GDP growth predictions for 2008.

Looking forward, the Canadian economy should narrowly avoid a recession. Robust consumer spending thanks to firm labour markets and low retail prices as a result of the loonie's strength have had positive impacts on the economy as a whole. Furthermore, corporate earnings will be supported by the recent boom in commodity prices, which while expected to level off, are likely to remain at historic highs. Although residential construction activity is likely to cool in late 2008 and through 2009, the housing market is much healthier than in the U.S. However, downward pressure on the greenback and the continuing strength of the Canadian dollar are expected to continue into the foreseeable future hurting export driven industries such as manufacturing and forestry.

The current year should see the continuation of strong prices for commodities driven by a weak U.S. dollar and rising inflationary expectations. Prices are expected to cool going into 2009. Reports from BMO and TD confirm that the

[7] Our forecast is drawn from TD Economics, *TD Quarterly Economic Forecast*, March 19, 2008, Hwww.td.com/economicsH; BMO Capital Markets Economics, *Canadian Economic Outlook*, April 4, 2008, Hwww.bmonesbittburns.com/economicH; and Scotiabank Group, *Global Economic Research, Forecast Update*, March 28, 2008, Hwww.scotiabank.comH.

majority of the gains in 2007 and 2008 are concentrated in agriculture and energy. The predicted fall in the commodities indices between 2008 and 2009 should occur as a result of depreciating agriculture and metals prices brought on by the U.S. recession and a reduction of the global economic growth rate. Forestry products are forecasted to consistently increase in price up to 2009.

Reports by Scotia Capital and BMO Economics predict that the Bank of Canada overnight rate will bottom out at 2.75% in either Q1 or Q2 of 2008 and rebound to 3.00% by Q2 of 2009. The current overnight rate is 3.5%. Rate cuts are predicted as a way for the Bank of Canada to counteract decreased exports and a negative deviation from the target growth rate of 2%. From now until Q4 2009, forecasters expect a 1 to 1.5% spread between the Bank of Canada rate and the Federal Funds rate. With respect to exchange rates, the Canadian dollar is expected to remain close to parity through 2009. It is important to recognize, however, that exchange rate predictions have traditionally been subject to considerable forecasting error.

While the U.S. economy is expected to contract for the first half of 2008, activities are predicted to rebound by the latter half of 2008, resulting in an overall real GDP growth of 1.1% for the year. This resilience is attributed to the combined efforts of the Federal Reserves' aggressive monetary action and the President's economic stimulus package (discussed above) taking hold. The benefits of these initiatives are expected to spillover through 2009, with the real GDP forecasted to grow at around 2%.

In light of a forecasted rebound in the U.S. economy, which will help support Canadian exports, in conjunction with strong domestic demand conditions and historically high commodity prices, the Canadian economy should avoid recession in 2008 and return to modest growth in 2009. In the near future, Canada's real GDP is predicted to grow at approximately 1.35% and 2.13% for 2008 and 2009, respectively.

2.3.2 Forecasts for Ontario

The rising Canadian dollar, high oil prices and slowdowns in the U.S., which accounts for 84% of Ontario's exports, have had negative impacts on Ontario's economy. However, these losses have been mitigated in part by greater commodity exports (gold, nickel, and uranium) to the United Kingdom, and higher manufacturing sales to Japan.[8]

Given Ontario's heavy dependence on manufacturing (particularly the auto sector) and exports, the provincial real GDP will grow more slowly than for Canada as a whole at predicted rates of 1% and 1.4% in 2008 and 2009, respectively, according to Scotiabank Economics. Outside of the Western Provinces, Ontario's unemployment rate is expected to remain the lowest in the country, and is forecasted to be 6.5% for 2008 and 6.7% for 2009. This is half-a-percentage point higher than the national average for both years. The increase in unemployment is expected to be centered around manufacturing, while the services sectors continue to be robust, having added 146,000 jobs in 2007.

Amidst a tightening credit market, Ontario's commercial office properties construction continues to grow. On the housing front, prices increased by 17% year-over-year in December 2007, although housing sales and price growths are expected to cool. In 2008, housing starts are expected to cool to 63,000 units from 68,400 in 2007.

In summary, Ontario's economy has been negatively affected by the fall of the U.S. dollar and slowdowns in the U.S. As a result, the near future does not look

[8] Our forecast is drawn from BMO Capital Markets Economics, *Provincial Monitor*, Winter 2008, Hwww.bmonesbittburns.com/economicH; and Scotiabank Group, *Global Economic Research, Provincial Forecast Update*, March 31, 2008, Hwww.scotiabank.comH; CIBC World Markets, *Provincial Forecasts*, October 2006, 2007, Hhttp://research.cibcwm.com/res/Eco/EcoResearch.htmlH; and RBC Economics, *Provincial Economics*, February 208, Hhttp://www.rbc.com/economics/market/hi_provincialeco.htmlH.

particularly optimistic for the province. Nonetheless, the economy will continue to experience positive real growth, and should rebound to a targeted growth rate of 2% within the medium future upon the recovery of the U.S.

2.4 Interest Rate Forecasts for 2008 and 2009

2.4.1 Forecasts for the 30-year Canada Bond Rate

For rate-making purposes we need to forecast the rate on 30-year Canada's for each test year. In developing our forecast, we draw on forecasts from *Consensus Forecasts* (published by Consensus Economics), March 2008, which provides consensus mean forecasts for the end of June 2008 and the end of March 2009. Because these forecasts are for 10-year Canada's we follow the common practice of adding an average spread to obtain a forecast for 30-year Canada's.

Beginning with the 10-year forecasts, Consensus Economics reported in *Consensus Forecasts* on March 10, 2008 that the mean forecast for 10-year Canada's for the end of June 2008 was 3.6%. For the end of June 2009, the mean consensus forecast was 4.1%.

To transform our 10-year forecasts into a prediction for the rate on 30-year Canada's we start with the average spread between these two instruments as observed over the first three months of 2008. Using data from the Bank of Canada we calculate this average spread as 39 basis points in Schedule 2.1. Recognizing that this estimate may be biased upward if markets settle and the yield curve flattens later in 2008 and 2009, we estimate the spread as 25 basis points for 2008 and 15 basis points for 2009.[9] Adding our spread estimate of 25 basis points to 3.6% gives us 3.85% as our 30-year Canada's forecast for test

[9] We will continue to monitor this trend and, if necessary, will file an updated forecast prior to the hearing.

year 2008. Similarly, adding 15 basis points to 4.1% gives 4.25% as the forecast rate for 30-year Canada's for 2009.

2.4.2 Forecasts for the 30-year U.S. Treasury Bond Yield

Our forecast for the 30-year U.S. Treasury bond yield follows the same methodology that we employ for the long-term Canada rate. We obtain consensus mean forecasts for the 10-year U.S. Treasury bond rate from the same issue of *Consensus Forecasts* (published by Consensus Economics) that is used for the Canada forecasts above: 3.7% for the end of June 2008 and 4.1% for the end of March 2009.

Following our practice for Canadian rates discussed earlier, we convert these forecasts for 10-year Treasuries to forecasts for the yield on 30-year Treasuries by adding an estimated average spread. For the U.S. we measure the spread by averaging observed values over the most recent four quarters (Q1 through Q4 2007). For U.S. Treasuries this was 25 basis points based on data from TD Economics. We also examine data for the first quarter of 2008 which show a somewhat higher value. We then add 25 basis points to 3.7% to obtain 3.95% as our forecast for the U.S. 30-year Treasury yield for the end of June 2008. For the end of March 2009, adding 25 basis points to 4.1% gives 4.35% as our forecast for the yield on 30-year U.S. Treasury Bonds.

3. CAPITAL STRUCTURE

3.1 OVERVIEW OF THIS SECTION

We begin with a brief overview of the practical implications of financial theory for our analysis of the appropriate capital structure for OPG. Our main conclusion is that, although no generally accepted formula exists for setting capital structure, the level of equity should increase with the degree of business risk.

To implement this conclusion, we next review the business risks faced by OPG hydro assets (OPG Hydro) and nuclear assets (OPG Nuclear) separately. Our review of market, operational and regulatory risks leads to the conclusion that OPG's regulated hydro business carries low to moderate risk (1.8 on a scale of 5 where 1 is the lowest risk and 5 the highest). In contrast, OPG's regulated nuclear generation has a higher level of business risk which we assess as approaching moderate (2.3 on our 5-point scale).

In order to gain perspective on these measures of business risk, it is useful to compare them against the risks of generic electricity transmission and distribution businesses as well as those of integrated electric utilities. This will allow us to benchmark our recommendations for OPG against capital structures allowed by this Board and by other Canadian regulators for other companies in these categories. Our approach also facilitates comparisons with our own analysis in prior testimony. We assess the average risk for transmission as low (1 on our 5-point scale). We also study the business risk associated with generic distribution and rate it as low to moderate (1.4 on our scale). Based on these inputs, we assess the business risk of an integrated company by taking an asset-weighted average of the risks of OPG hydro, generic transmission and generic distribution. Our analysis sets the business risk of an integrated electricity company at 1.5 on our scale or low to moderate.

We then turn to examining relevant financial data for a sample of eight Canadian gas and electric utilities and pipelines that have publicly traded common shares. We require the included companies to be publicly traded to ensure consistency between our samples here and in later sections where we present our evidence on the fair rate of return. We analyze bond ratings, capital structures, interest coverage ratios and returns on equity for our sample companies.

Drawing on the basic principle that the level of equity in the deemed capital structure of a utility should reflect its business risk and combining our risk assessments, we conclude that being considerably riskier than a generic transmission and somewhat riskier than an integrated company or a generic distribution company, OPG hydro should carry a higher level of equity than any of these three comparators. We assign 40% as the appropriate equity ratio for OPG's hydro assets. Following similar logic, we set 50% as the fair level of equity for OPG's nuclear assets. To achieve a recommendation for OPG's combined regulated assets we take a weighted average of our two recommendations based on regulated MW (megawatts): 6,606 for nuclear (66.47%) and 3,332 MW for hydro (33.53%) to attain an overall recommended capital structure of 47% equity.

3.2 IMPLICATIONS OF FINANCIAL THEORY

Finance theory has several important implications for setting the appropriate level of the equity ratio for a regulated electric utility. First, theory teaches us to be suspicious of attempts to determine an appropriate equity ratio using a formula. Unlike other areas in finance, research on capital structure can offer only qualitative policy advice. To quote a leading, current corporate finance textbook:

"No exact formula is available for evaluating the optimal debt-equity ratio."[10]

While we expect an introductory textbook to contain an element of simplification in order to present material to beginning students, this statement has yet to be superseded by advanced research. We review selected research on capital structure in Appendix 3.A.

This important implication of finance theory has been accepted by Canadian regulators including the Alberta Utilities Commission (formerly the Alberta Energy and Utilities Board). In Decision 2004-052, page 35, it wrote:

> "In the Board's view, setting an appropriate equity ratio is a subjective exercise that involves the assessment of several factors and the observation of past experience. The assessment of the level of business risk of the utilities is also a subjective concept. Consequently, the Board considers that there is no single accepted mathematical way to make a determination of equity ratio based on a given level of business risk."

Although it does not offer a formula, finance theory does highlight key considerations in determining capital structure. In the same textbook we find the following:

> "How should companies establish target debt-equity ratios? While there is no mathematical formula for establishing a target ratio, we present three important factors affecting this ratio:[11]

- Taxes. As pointed out earlier, firms can only deduct interest for tax purposes to the extent of their profits before interest. Thus, highly

[10] S.A. Ross, R.W. Westerfield, J. F. Jaffe and G.S. Roberts, *Corporate Finance*, Fifth Canadian Edition, Toronto, McGraw-Hill Ryerson, 2008, p. 500.
[11] S.A. Ross, R.W. Westerfield, J. F. Jaffe and G.S. Roberts, *Corporate Finance*, Fifth Canadian Edition, Toronto, McGraw-Hill Ryerson, 2008, p. 502.

profitable firms are more likely to have larger target ratios than less profitable firms.

- Types of assets. Financial distress is costly, with or without formal bankruptcy proceedings. The costs of financial distress depend on the types of assets that the firm has. For example, if a firm has a large investment in land, buildings, and other tangible assets, it will have smaller costs of financial distress than a firm with a large investment in research and development. Research and development typically has less resale value than land; thus, most of its value disappears in financial distress. Therefore, firms, with large investments in tangible assets are likely to have higher target debt-equity ratios than firms with large investments in research and development.
- Uncertainty of operating income. Firms with uncertain operating income have a high probability of experiencing financial distress, even without debt. Thus, these firms must finance mostly with equity. For example, pharmaceutical firms have uncertain operating income because no one can predict whether today's research will generate new drugs. Consequently, these firms issue little debt. By contrast, the operating income of utilities generally has little uncertainty. Relative to other industries, utilities use a great deal of debt [emphasis added]."

Taken together, these three factors are central to establishing the appropriate amount of debt for a utility. If we set aside the second and third factors for a moment, the first factor tells us that a company should use a large proportion of debt financing to reduce its cost of capital. Simply stated, factors 2 and 3 determine the level of business risk which restrains the company's use of debt in order to reduce the cost of financial distress and the probability that it will occur due to low operating income. Turning from speaking in general about any company to focusing on a regulated electric utility, we believe that factors 2 and 3 are largely mitigated by the special features of this industry.

For an electric utility, the costs of financial distress (factor 2) are reduced because its assets make excellent collateral. Further, the regulation process virtually ensures that the company will recover its debt payments and other costs. Further, regulation allows the company to go back to its regulator to apply for relief in the unlikely event that it does not earn its fair rate of return in a given year, and especially if its ability to service its debt were in jeopardy. Additionally, in the extreme event that an electric utility became insolvent, it is highly likely that the regulator (and other governmental bodies) would work with the company to find new investors or a merger partner so that service (and thus, asset usage) would not be interrupted. This is what occurred with the bankruptcy of Pacific Gas and Electric Company in California.[12] As a result, the cost of financial distress is far lower than for a nonregulated firm.

The third factor is the probability of financial distress. As stated in the quotation, this probability is low for utilities because operating income has low variability, which is further diminished if the utilities make extensive use of deferral accounts. In conclusion, we come back to the beginning of our answer to this question. If we set aside factors 2 and 3 (the costs of financial distress and the probability of financial distress), the theory suggests that a company should use a high proportion of debt. Our comments on factors 2 and 3 explain why it makes sense to expect them to carry less importance in practice for this industry. With the focus then on the first factor, taxes, we would expect regulated electric utilities to be among the most highly leveraged industries.

We now turn from electric utilities as an industry to examine the business risk of OPG both on its own and relative to that of other sectors of the industry.

[12] K. Gaudette, Bankrupt Pacific Gas and Electric hopes to avoid state laws, Associated Press, *The Nando Times*, January 25, 2002, www.nando.net/business/story/228567p-2199342c.html.

3.3 BUSINESS RISK OF ONTARIO POWER GENERATION

3.3.1 Framework for Analysis

Our assessment of business risk focuses on uncertainty of operating income introduced earlier in our overview of important factors in the determination of capital structure. Factors that increase costs to a utility such as higher fuel prices do not necessarily translate directly into increased business risk. Management can prevent these factors from increasing the uncertainty of operating income in several ways. First, it can forecast their impacts and build them into proposed pricing. In a fair regulatory environment, such costs will be allowed and passed on to customers. Second, management can engage in risk mitigation to control the impact of such factors on operating income. Third, risk can be mitigated by use of deferral accounts. Business risk is only increased to the extent that these three approaches to control risk only work incompletely.

Our analysis of business risk begins with an examination of the risks of hydroelectric and nuclear generation for OPG. Because the two types of generation carry different risks we assess each separately. We introduce each of the three major categories of business risk for utilities: market, operational and regulatory, and discuss each in detail first for the regulated hydro and then for the nuclear operations of OPG. Our discussion presents a detailed breakdown of the components of business risk within each category and a numerical ranking of each on a scale of low (1), moderate (3) or high (5). We create a summary table, Schedule 3.6, displaying the rankings of each of 9 individual risks covering our three categories. Our conclusion is that the regulated hydro generation activities of OPG carry a low to moderate level of business risk (1.8 on our 5 point scale with a score of 1 representing low risk and 5 the highest risk for a utility). The regulated nuclear operations are rated as approaching moderate risk (2.3 on our 5-point scale).

To provide perspective on our business risk rankings, we next use our framework to measure the business risks of other sectors of the utilities industry and explain why we agree with the commonly held view that transmission (wires) carries the lowest business risk followed by distribution and then by generation with the highest business risk. We assess the business risk of transmission utilities as low (score of 1 out of 5) and distribution utilities as somewhat higher at low to moderate (1.4). These assessments form the basis for our capital structure recommendations for OPG Hydro and OPG Nuclear below. The analysis of business risks in the transmission and distribution sectors provides the basis for comparisons with deemed capital structures in those sectors.

3.3.2 Business Risk of OPG's Hydroelectric Generating Assets

3.3.2.1 Market Risk

Market risk is the risk that a hydro generator will not be able to meet its target sales due to weak markets, to competition or to other related factors. OPG is the market leader in Ontario accounting for 71% of the electricity sold in 2007.[13] DBRS expects that the company will retain this position for the near future out to 2014. The Ontario economy is facing slowing growth in the short-run particularly in the manufacturing sector as discussed in Section 2 but residential growth remains steady. The province has experienced long-term growth of around 1% annually in electricity consumption over the period 1998-2007. In the most recent years, growth has displayed a flattening tendency with rates of -3.8% and 0.7% for 2006 and 2007, respectively.[14] Because OPG is a base-load, low marginal cost generator it is not expected to experience a significant level of demand or dispatch risk. Competitive cost structure and transmission limitations protect

[13] Our discussion draws on Ontario Power Generation, Corporate Credit Rating, Standard & Poor's, December 9, 2005 and DBRS Rating Reports, August 3, 2006 and November 30, 2007.
[14] 18 Month Outlook: An Assessment of the Reliability of the Ontario Electricity System From April 2008 to September 2009, Independent Electricity System Operator (IESO), March 12, 2008, Hwww.ieso.caH

OPG from competitive supply threats from Quebec and Manitoba. We assign a rating of low (1 out of 5) for competition / demand risk as shown in Schedule 3.1.

Our view of competition/demand risk agrees with that of Ms. McShane who states: "Nevertheless, dispatch risk for the regulated assets is currently relatively low" (Exhibit C2, Tab 1, Schedule 1, page 59).

A related component of market risk is the credit risk that may arise if a utility's customers default on their payments. This element of market risk is also low (1 out of 5) for OPG because it does not sell directly to ultimate power users.

With competition/demand risk and customer credit risk both rated low, we conclude that market risk is low (1 out of 5) for OPG's hydro generation business.

3.3.2.2 Operational Risk

Operational risk represents the risk that OPG will not meet production and profitability targets. We identify four elements of operational risk and discuss them in turn. We also discuss how deferral accounts serve to mitigate the various elements of operational risk. The first component of operational risk is operating leverage which arises when operations such as hydro generation are characterized by a high level of fixed costs which make operating cash flow more sensitive to changes in production. We assess operating leverage as moderate (3 out of 5) in Schedule 3.1. Related to operating leverage, advanced technology also impacts fixed costs as well as making production more sensitive to technical breakdowns. We assign a risk rating of low to moderate (2 out of 5) to technology risk.

Capacity risk relates to forced outages due to unanticipated breakdowns or prolonged maintenance. Hydroelectric generation is typically subject to a low rate of forced outages. Capability factors measure reliability as the ratio of available energy generation to reference energy generation defined as production under full power. Available energy generation may fall below reference levels due to “limitations within control of plant management, i.e., plant equipment and personnel performance, and work control” according to the International Atomic Energy Agency.[15] In a regulatory perspective, such a shortfall does not constitute a risk for which a utility should be compensated. OPG continues its traditional record of high capability factors for its hydro units.

Further, hydro generating units are not subject to the risk of increasing fuel costs as are fossil fuel and nuclear units. Nor do they fall prey to significantly increased risks of environmental compliance. However, availability of water does create a production risk as lower water levels could reduce output and create unrecovered costs. Historically, water availability has not been a problem for OPG due to its diversification of regulated hydro assets on two river systems, the St. Lawrence and Niagara Rivers.[16]

Further, OPG currently has a deferral account (Water Conditions Deferral Account) which allows the company to collect cost recovery in years with lower water levels and to replenish the account when water levels are above average. The company has applied to the Board to continue this account. Assuming that the Board grants this continuation, the risk to OPG from water variability is low.

Considering all the elements of capacity risk produces a rating of moderate (3 out of 5). The presence of a water deferral account mitigates capacity risk and leads to a rating of low risk (1 out of 5) under deferral accounts.

A further aspect of operational risk arises from costs that can arise from the obligatory retirement of assets and construction of new generation. For its hydro generation, environmental issues related to asset retirement are not a major

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[15] Hwww.iaea.orgH
[16] Corporate Credit Rating, Standard & Poor’s, December 9, 2005

concern as they are for coal burning and nuclear units. Hydro generators do face risks with regard to capital expenditures. However, the recovery of fixed capital costs such as depreciation is included in the allowed rate. DBRS believes that these risks will be mitigated by financial structuring:

> "It is expected that OPG will not undertake any major capital projects without having its financing and cost-recovery mechanism in place, thus minimizing the financial risks. It is also expected that OPG will turn to the OEFC for project-style financing in the capital markets to fund these projects. Although OPG may be able to reduce its risks through design-build contracts, some residual risk will remain on significant capital expenditures".[17]

In brief, our assessment of risks associated with asset retirement and construction leads us to conclude that this risk is low to moderate for OPG Hydro.

3.3.2.3 Regulatory Risk

Regulatory risk can arise when costs are disallowed, allowed returns do not fit market expectations or rate design (including allowed capital structures) varies from what is fair and reasonable in view of business risks. Alternatively, regulation can mitigate risks through the introduction of deferral accounts and by allowing generous allowed returns and capital structures as discussed in other parts of this evidence.

We believe that regulation by the Board plays the second, positive role for OPG and assess the regulatory risk as low for a number of reasons. First, as discussed earlier, deferral and variance accounts allowed by the Board in the past and likely to be continued reduce operational risk. Second, as also explained above, we expect that the Board will approve structures that will mitigate the risk of future construction. Third, it is our understanding that the

[17] Ontario Power Generation Inc., DBRS Rating Report, November 30, 2007, page 4.

Board regulates in a fair manner. It follows that it is logically contradictory for the Board to recognize possible future political interference as a risk for which the company should be compensated.

Ms. McShane's evidence offers two, apparently conflicting, views of the regulatory risk faced by OPG. On page 63, she states: "On balance, I view the regulatory risk for OPG as higher than that of the typical regulated utility in Canada and in Ontario". Page 60 contains a contrasting view implying that regulatory risk is low:

> "For purposes of the business risk assessment, I proceed on the assumption that OPG will be treated no differently from any other utility subject to the Board's jurisdiction: OPG will be provided a reasonable opportunity to recover its prudently incurred costs and earn a return that reasonably reflects the risks to which it is exposed."

Pollution Probe Information Request #49 asked Ms. McShane to reconcile these two statements. Her reply was:[18]

> "The first statement [page 60] simply means that the Board would seek to apply the same standards and principles to OPG as to other utilities under its jurisdiction. The second statement needs to be read in conjunction with the paragraph that follows:
>
> 'As the Board suggested in its November 20, 2006 report, the application of cost of service regulation to generation is a relatively unique phenomenon, with no track record upon which to gauge the outcome. The uncertainty of the "end state" is amplified by the fact that OPG will be regulated in a market

[18] Ms. McShane's Response to Pollution Probe Interrogatory #49, EB-2007-0905, Exhibit L, Tab 12, Schedule 49, page 1 of 1.

environment which is a hybrid of regulation and competition, which creates additional pressure on regulated rates in a period of potentially significant cost increases (e.g., decommissioning costs, other post-retirement benefit expenses).' "

Our reading of Ms. McShane's response is that the Board may seek to regulate fairly but, due to the novelty of its task, be unable to achieve that goal. This argument lacks any logical basis. Therefore, for reasons explained above, we agree with her second assessment of regulatory risk associated with OPG's primary regulator as low (1 out of 5).

Regulatory risk may also arise due to unanticipated shifts in environmental or safety regulations or in their enforcement. Because hydro generation does not involve the burning of fossil fuels or the potential dangers of nuclear generation, we rate this element of risk as low to moderate (2 out of 5).

3.3.2.4 Summary on Business Risk for OPG's Hydroelectric Assets

Our review assesses nine dimensions falling within the three main areas of business risk, market, operational and regulatory and the ratings presented above are summarized in Schedule 3.1 in the column marked OPG Hydro. As the Schedule shows, the average-risk rating is 1.8 producing a low to moderate level of business risk for OPG's hydro assets.

3.3.3 Business Risk of OPG's Nuclear Generating Assets

3.3.3.1 Market Risk

Market risk is the same for nuclear as for hydro generation. Therefore, we assess both competition and customer credit risks as low for the reasons explained earlier.

3.3.3.2 Operational Risk

Nuclear technology is more advanced and characterized by a greater degree of fixed costs (operating leverage) and higher technology risk. We rate both as moderate to high (4 out 5). Mitigating risk deriving from operating leverage is the proposed fixed charge covering 25% of the projected nuclear revenue requirement. Nuclear generation is also subject to more intense environmental and safety regulations that create the potential for lengthy unplanned outages. In the case of OPG the greater risk of nuclear generation is magnified by issues related to unplanned maintenance and inspection outages.

As explained above, to the extent that such production shortfalls are due to factors under the control of management, they do not constitute a risk for which a company should be compensated. By comparing unit capability factors supplied by OPG against the industry benchmark of 91% provided by DBRS, we may assess management performance. OPG provided such data on unit capability factors in its response to Pollution Probe Interrogatory #5 (bolding added).[19] Specifically:

> "The table below provides unit capability factor percentages for each of OPG's nuclear units for the period 2005 - 2007. The data are provided as `Unit Capability Factor' consistent with the manner in which OPG has represented unit output in its evidence (please see definition provided at Ex. E2-T1-S1, page 23). `Annual capacity utilization rates' is not a term OPG uses to track generation output.
>
> OPG declines to provide historical information prior to 2005 for the reasons given in L-12-6."

[19] OPG's Response to Pollution Probe Interrogatory #5, EB-2007-0905, Exhibit L, Tab 12, Schedule 5, page 1 of 1.

ONTARIO POWER GENERATION NUCLEAR
Unit Capability Factor (%)

Unit	2005	2006	2007
Darlington			
Unit 1	**96.1**	83.5	**97.0**
Unit 2	79.2	**98.6**	83.0
Unit 3	**98.7**	72.7	**94.2**
Unit 4	85.8	**97.1**	81.0
Pickering A			
Unit 1	**92.7**	77.3	38.9
Unit 4	66.5	66.3	43.7
Pickering B			
Unit 5	53.3	89.7	57.7
Unit 6	64.3	86.5	71.8
Unit 7	**97.9**	59.2	82.0
Unit 8	**94.5**	64.9	87.3

We have added emphasis by marking in bold each plant year in which the capacity factor equals or exceeds the industry benchmark of 91.0%. This occurred in 9 of 30 plant years, i.e. for 30% of the plant years. For 21 of 30 plant years (70% of the cases) the unit capability factor failed to achieve the benchmark level. These data strongly suggest that production shortfalls attributable to management issues (and not constituting a risk to be recognized in regulation) were a major concern for OPG Nuclear in the period 2005-7.[20]

Unpredicted fuel cost increases represent an added potential capacity risk to nuclear generation. Although the price of uranium has increased dramatically in the past from $15.55U.S. per pound in January 2004 to $73U.S. in February 2008, this increase is not expected to continue as new supply comes into the market.[21] Further, this price increase was moderated somewhat by the rise in the Canadian dollar. Analysts surveyed by Reuters in December 2007 predicted that

[20] Data for capability factors for these plants going back to inception are available on the website of the International Atomic Energy Agency. They show a similar pattern of low capacity factors.
[21] www.cameco.com

the average mid-range spot price for uranium will go to $106.90U.S. in 2008 and moderate to $91.90U.S. in 2009.[22] Further, it is only the unexpected component of any price increase that is a source of risk and OPG has two lines of defense against fuel cost risk. First, the company engages in fuel price hedging for both fossil and nuclear fuels. According to Standard & Poor's, OPG hedged 100% of estimated fuel needs for 2005 and 93% for 2006.[23] Second, uranium fuel price risk will be covered by the variance account requested in this proceeding. According to Ms. McShane, "OPG is requesting a variance account to record variances between forecast and actual uranium costs. The proposed variance account would cover the preponderance of OPG's fuel price risk".[24]

As we noted earlier, costs of decommissioning assets and disposing of used fuel are higher for nuclear than for hydro generation. For OPG these risks are mitigated by funding of a Used Fuels Fund and a Decommissioning Fund under the Ontario Nuclear Funds Agreement (ONFA) between OPG and the Province. Under the ONFA the Province and OPG share the risks associated with the assumed rates of return on these funds. According to DBRS, the decommissioning fund was overfunded as of September 30, 2007.

A final aspect of operational risk derives from the need to build new generation assets. Because the largest proportion of OPG's planned future growth is in nuclear, this risk is higher than for hydro generation. As indicated in our discussion of hydro risks, however, this risk is mitigated through project structuring.

Summarizing our discussion of operational risk in OPG's nuclear assets, the company faces moderate to high levels of both operating leverage and technology risks both rated 4 out of 5. Its moderate (3 out of 5) exposure to

[22] Anna Stablum, Strong demand to boost spot uranium price in 2008, Reuters, January 22, 2008, Hwww.reuters.comH.
[23] Corporate Credit Rating, Standard & Poor's, December 9, 2005.
[24] McShane's Evidence, EB-2007-0905, Exhibit C2, Tab 1, Schedule 1, page 73.

capacity risk arises from aspects of nuclear generation outside of management control. The stand-alone principle of regulation implies that costs associated with capacity risk arising from substandard reliability or other causes under management control should not be considered in rate making. Further, OPG faces moderate risk associated with decommissioning and construction. Finally, deferral accounts related to fuel costs and funds supporting used fuel and decommissioning costs mitigate the associated risks leading to a low rating (1) for deferral accounts. In addition, this rating reflects the proposed 25% fixed capacity charge which also serves to moderate operating risk.

3.3.3.3 Regulatory Risk

Regulatory risk associated with the primary regulator is subject to the same factors for nuclear as for hydro assets. The difference is that the stakes are higher due to the higher operational risk of nuclear generation. On this point we agree with Standard & Poor's which states:

> "OPG is likely to be the first and only generator to fall under OEB's (Ontario Energy Board's) regulatory oversight. It remains to be seen whether the capital structure and returns allowed by the regulator post 2008 will reflect the much operating risks associated with electricity generation (including hydrology risk and nuclear technology risk) as compared with the low risk profile of distribution and transmission companies" (Corporate Credit Rating, Standard & Poor's, December 9, 2005, page 6).

Nuclear assets are subject to additional regulatory risks relating to environmental and safety regulation under the supervision of the Canadian Nuclear Safety Commission (CNSC). The CNSC regulates Canada's seven nuclear power plants including those of OPG along with other nuclear reactors.[25] Due to the high level of regulation, it is possible that an enhancement to

[25] Hwww.nuclearsafety.gc.caH.

regulations or an unexpectedly strict interpretation by CNSC could cause unforeseen costs or unplanned outages at one of OPG's plants. Such a closure occurred at the Chalk River nuclear research facility operated by Atomic Energy of Canada Ltd. in November 2007. At issue was the classification of a redundant safety system as either an optional safety enhancement or a necessary condition of licensing.[26] Further, future legislation could impose more onerous safety regulations on OPG.

While we recognize that shifts in environmental and safety regulation do pose a risk to OPG in its nuclear operations, we assess this risk as moderate for several reasons. First, the risk is only a possibility and to date has been overshadowed by management issues as the main cause of capacity shortfalls. Second, should the risk from shifts in environmental and safety regulation materialize, it can be mitigated by a deferral account as documented by Ms. McShane:

> "To the extent that nuclear production is adversely impacted by changes in legislation or regulations related to CNSC compliance or compliance with any other applicable laws, OPG is at risk, with the proviso that it retains the right to request a deferral account to recover related costs if they result in a material financial impact" (Exhibit C2, Tab 1, Schedule 1, page 72).

In brief, our review of OPG's regulatory risk in its nuclear generation rates regulatory risk with respect to the Board as low based on our earlier discussion of regulatory risk. Additional regulatory risk arises from possible shifts in environmental and safety regulations regarding nuclear operations but this is mitigated by the minor role currently played by this risk and the company's right to request a deferral account should the risk become material in the future. Overall, we assign a rating of moderate to this second aspect of regulatory risk arising from OPG's nuclear operations.

[26] Peter Calamai, "Medical isotope power struggle", Hwww.thestar.comH , February 25, 2008.

3.3.3.4 Summary of Business Risk of Nuclear Generation

Our review examines the three main areas of business risk (market, operational and regulatory) using nine dimensions. We summarize the ratings presented above in Schedule 3.1 in the column marked OPG Nuclear. As the Schedule shows, the average-risk rating is 2.3 approaching a moderate level of business risk for OPG's nuclear assets.

3.4 RELATIVE RISKS OF ELECTRICITY SECTORS

With our business risk analysis of OPG's hydro and nuclear generation complete, we now turn to an examination of the relative business risks of electricity transmission and distribution. Because there are a number of regulated companies in these sectors in Canada, such a comparison provides a useful perspective.

Market competition risk is low for transmission because of its status as a natural monopoly. While electricity distribution also has the characteristics of a monopoly it carries higher market competition risk due to the possibility of customers switching to natural gas or increasing reliance on co-generation. Further, because distribution companies sell to wholesale and retail customers, they face credit risk to a larger degree than do transmission companies whose sole customer is a distribution firm. More importantly, distribution companies are subject to operating leverage risk as they levy variable charges to cover fixed costs. Our view of the relative risks of electricity distribution vs. transmission is consistent with the opinion of the Alberta Utilities Commission (formerly the Alberta Energy and Utilities Board) in EUB Decision 2004-052 (July 2, 2004), page 48:

> "The Board notes the consensus that electric distribution companies are subject to more business risk than electric transmission companies, principally due to their recovery of a significant amount of fixed costs in variable charges and their greater exposure to credit risks."

Electricity generation carries higher business risk than distribution along a number of dimensions. As explained above, because it is not a natural monopoly, generation faces potential competition from independent electricity producers locally as well as from generating facilities in neighboring provinces or states. Generation also carries a higher degree of operating leverage as a result of a higher level of fixed assets and more complex technology. On the production side capacity risk arises from unplanned outages, fuel costs and water availability. Further electricity generators are subject to risks from unplanned costs of asset retirement and construction of new generating facilities. Both DBRS and Ms. McShane agree that, as an industry sector, electricity generation is the most risky.[27]

3.5 BOND RATINGS AND CAPITAL STRUCTURES FOR CANADIAN UTILITIES

In this section we examine the bond ratings and capital structures, both actual and allowed for a sample of Canadian utilities. Our purpose is to develop benchmarks of capital structures for different segments of the industry. With these benchmarks in hand, we can then draw on our analysis of business risk above to recommend an appropriate equity ratio for OPG Hydro, OPG Nuclear and for OPG's total regulated rate base.

Beginning with bond ratings, Schedule 3.2 displays Dominion Bond Rating Service (DBRS) and Standard & Poor's (S&P) bond ratings in March 2008 for our

[27] Ontario Power Generation Inc., DBRS Rating Report, November 30, 2007, page 4 and Ms. McShane's Evidence, EB-2007-0905, Exhibit C2, Tab 1, Schedule 1, pages 77-78.

eight Canadian utilities and their regulated subsidiaries spanning different parts of the industry: gas, electric and pipelines. These companies represent a current sample of utilities with publicly traded shares. In forming this sample we seek to measure ratings and financial ratios for the traded entity associated with the regulated utility. In focusing on traded companies, our goal is to maintain sample consistency throughout our evidence. We recognize, however, that many of the traded companies include nonregulated businesses in addition to the regulated utility. We control for any bias by commenting on the differences as well as comparing our conclusions to those drawn strictly for regulated entities.

The bond ratings are from the websites of DBRS and S&P. Starting with the DBRS ratings, Schedule 3.2 shows that these range from A for Canadian Utilities, Enbridge, Newfoundland Power and TransCanada Corporation down to BBB (low) for Pacific Northern Gas. The Schedule shows that the typical Canadian energy utility is rated A (low) by DBRS. We next turn to the S&P ratings and make a similar comparison. The S&P ratings for the utilities in our sample range from A for Atco and Canadian Utilities down to BBB for Emera, Nova Scotia Power, Maritime Electric and TransAlta. S&P does not rate Pacific Northern Gas or the Fortis subsidiaries. The Schedule shows that the typical Canadian energy utility is rated A- by S&P.

The next step is to examine the actual, long-term capital structures of the companies in our sample for 2005 through 2007, the latest years for which data are available in the *Financial Post Advisor* and company annual reports. These ratios show common equity, long-term debt and preferred shares as percentages of long-term capital excluding short-term debt. Focusing on the 2007 common equity ratios, Schedule 3.3 reveals that there is considerable variation across companies from a high of 57.41% for TransAlta to a low of 31.75% for Atco. The average percentage of common equity was 41.92% in 2007 up slightly from 41.08% in 2005.

In addition, Schedule 3.3 shows the percentages of long-term debt and preferred shares (separated from common equity) in the capital structures of these companies. Again, there was considerable variation in the proportionate use of financing across companies. On average, the companies employed 54.41% long-term debt and 3.66% preferred shares in 2007.

The presentation of ratios for the same group of companies continues in Schedule 3.4. The first three columns show the coverage ratio, EBIT/Interest expense.[28] The average coverage ratio was 2.68X in 2007. The next three columns display cash flow to debt which averaged 21.43X in 2007.[29]

The schedules show that, from the vantage point of DBRS, Canadian Utilities, Enbridge, Newfoundland Power and TransCanada Corporation are the only companies which enjoy an A credit rating. The other companies are all rated A (low) or lower. For S&P, only two companies in our sample (Atco and Canadian Utilities) are rated A. As stated earlier, the typical company is rated on the borderline between A(low) and BBB (high) by DBRS and given a marginally higher A- rating by S&P for its smaller set of ratings. Of the eight traded companies and five subsidiaries in our sample, six received a rating of BBB from at least one of the agencies. Yet, despite their lower ratings, these companies have experienced no difficulties in accessing capital markets to raise long-term financing. This conclusion was not contradicted by Ms. McShane in her responses to Pollution Probe Interrogatory #54.[30] We conclude that the experiences of the companies in Schedules 3.2 - 3.4 suggest that a bond rating of BBB or higher is sufficient to maintain good access to capital markets.

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[28] EBIT are earnings before interest and taxes.
[29] Cash flow from operations divided by the sum of long- and short-term debt. The result is expressed as a percentage.
[30] Ms. McShane's Response to Pollution Probe Interrogatory #54, EB-2007-0905, Exhibit L, Tab 12, Schedule 54, page 1 of 1.

Schedule 3.4 also contains data on ROEs for the companies in our sample which support our argument that a bond rating of BBB or above is sufficient for a regulated utility. The ROE figures for 2005 through 2007 show that all of the companies earned positive ROEs in all three years. Further, a 2001 study on the Canadian electric utility industry by DBRS concludes that actual earned ROEs typically exceed ROE targets set by regulators.[31]

In Schedule 3.4 we update this comparison for 2007 and broaden it beyond DBRS' focus on electric utilities to encompass our sample. The update shows that utilities continue to enjoy typical earned ROEs in excess of the target ROEs allowed by regulators. Turning to the details, we conduct our update for 7 of our eight sample companies for which we have data on allowed returns. For two companies, Atco and Fortis, we have allowed returns by divisions giving us a sample of 11 comparisons. The average 2007 allowed return for this sample was 8.75% while the average actual ROE for the consolidated company was 12.03%. The difference, 328 basis points represents the outperfomance of allowed returns. Further, only 1 of our 11 regulated companies failed to achieve an actual ROE higher than its allowed rate. This strongly suggests that having a bond rating of BBB did not impede these companies from profitably conducting their businesses.

3.6 COMMON EQUITY RATIO BENCHMARKS

Our discussion shows that the typical Canadian utility in our sample has a bond rating of A (low) from DBRS and A- from S&P. Further, a number of companies have BBB ratings. While OPG falls into this range with a bond rating of A (low) from DBRS and BBB+ from S&P, its bond rating is enhanced by the support it receives from the Province of Ontario. Further, ownership by the

[31] G. Lavalee, M. Kolodzie and W. Schroeder, The Canadian Electric Utility Industry, Dominion Bond Rating Service, November 2001, p. 49.

Province of Ontario impacts the goals of the company according to The Government Backgrounder (23 February, 2005) which stated:[32]

> “The Ontario government has established prices for electricity produced by Ontario Power Generation (OPG) effective April 1, 2005. These prices are designed to:
>
> a) Better reflect the true cost of producing electricity
>
> b) Ensure a reliable, sustainable and diverse supply of power in Ontario
>
> c) Protect Ontario’s medium and large businesses by ensuring rates are stable and competitive
>
> d) Provide an incentive for OPG to contain costs and to maximize efficiencies
>
> e) Allow OPG to better service its debt while earning a rate of return that balances the needs of customers and ensures a fair return”

Under the stand-alone principle of regulation, we must set aside the impact of provincial ownership of OPG and assess a fair capital structure from the standpoint of an investor-owned utility of comparable risk. This standard is provided by our sample in Schedule 3.2. Our analysis establishes that the sample represents a group of companies which, with appropriate adjustments discussed below, can proxy for the risk that would be faced by OPG if it were investor owned. Mindful of the goals set by the province but emphasizing the stand-alone principle, we use this sample to establish an appropriate capital structure for OPG.

3.6.1 Sample Benchmarks

First, we turn to Schedule 3.3 where we observe that the average actual equity ratio for utilities in our sample was 41.92% for 2007, the most recent year for which we have data. This represents one useful benchmark for the equity

[32] Board Interrogatory #10.

ratio for a Canadian utility. Other benchmarks are helpful for two reasons. First, like any sample average, our average equity ratio depends on the sample drawn and can vary somewhat for this reason. Second, as we indicated earlier, the average is based on equity ratios for traded companies which include nonregulated activities which are likely to be more risky than regulated utilities.

As a check on our calculations we examine the equity ratios allowed by various Canadian regulatory bodies for the companies in our sample for which we obtained data from past decisions. The sample includes Atco Electric Transmission and Distribution, Atco Gas and Pipelines, Enbridge Gas Distribution, Emera (Nova Scotia Power), Fortis Alberta, Fortis British Columbia, Maritime Electric, Newfoundland Power, Pacific Northern Gas, TransAlta, and TransCanada Pipelines. In Schedule 3.6, we report the average allowed equity ratio for these 13 companies as 39.40%. The analysis in Schedule 3.5 reinforces our conclusion that the average "generous" equity ratio for our sample of electric and gas utilities is around 39%.

We call this average equity ratio "generous" because it represents the result of a regulatory process in which decisions by regulatory bodies take as input the views of opposing parties each representing its own interest. We already showed how the regulatory process may be regarded as generous as it almost always results in the regulated companies earning an ROE in excess of the allowed return. Focusing the discussion of generosity on the common equity ratio leads to a similar conclusion. Regulated utilities have little incentive to optimize the use of debt in their capital structures. Having a capital structure with insufficient debt increases the weighted cost of capital because equity is the most expensive form of financing. In the case of regulated utilities, this "extra" cost associated with insufficient debt may be recovered through the process of regulation. If the company can persuade its regulator to approve this unwarranted extra equity, there is no cost to the company from a higher cost of capital. If this occurs, then the regulated company has unused debt capacity which can be a benefit to the parent holding company. The assets of the regulated utility can then serve as collateral to increase the borrowing power of the unregulated part of the holding company adding value for the shareholders. If this occurs, the shareholders gain unfairly at the expense of the customers of the regulated utility who have to pay higher rates to “compensate” the regulated utility for the cost of carrying unwarranted extra equity.

Returning to the discussion of benchmarks, we can develop another benchmark common equity ratio by focusing on one company from Schedule 3.5: ATCO Pipelines. We select ATCO Pipelines because it represents an example of a utility with greater business risk than a relevant set of comparison companies drawn from different segments of the utility industry in Alberta – the eleven utilities included in the AEUB’s Generic Decision 2004-052. In that hearing, we recommended a common equity ratio for ATCO Pipelines of 40%, Ms. McShane recommended 50% and the Board awarded 43%. These numbers are drawn from Table 8 on page 35 of the Decision. We also identified AltaGas Distribution as a company with business risk well above the average and recommended an equity ratio of 40%. The Board awarded 41%. Based on these numbers and recalling our earlier discussion of “generosity” in past decisions, we regard 40 to 43% as an appropriate range for a higher risk utility.

We summarize our discussion of utility industry benchmark equity ratios as falling into a range of 39% to 43%. We form three estimates of the appropriate equity ratio for a utility. The first is 41.92% (Schedule 3.2) and represents the average of actual equity ratios for eight traded utility companies. The second estimate is the average equity ratio allowed 13 regulated entities within these companies by their regulatory boards of 39.40% (Schedule 3.5). The third estimate is the range allowed by the AEUB for two high-risk utilities of 40 to 43%. These benchmark equity ratios all fall in a range of 39% to 43%.

3.6.2 Relating the Benchmarks to OPG Hydro

In order to use benchmarks to set a recommended capital structure for OPG's two types of assets, it is necessary to draw on our earlier business risk analysis. Our analysis of the business risk faced by OPG Hydro assesses this risk as low to moderate – higher than that of a distribution utility and somewhat above the business risk of an integrated electric utility. This suggests that a fair common equity ratio for OPG Hydro should be at 40%, just below the middle of our range.

To explore the reasonableness of this conclusion, we reconsider our four benchmarks in turn. Our first benchmark, the average of actual equity ratios for 8 traded utilities is 41.92%. These companies are transmission, distribution or integrated utilities. However, because this measure also includes capital for unregulated activities which tend to be riskier than regulated businesses, we believe that it exceeds the appropriate level of equity for an average-risk utility. We confirm this view when we look next at our second benchmark of 39.40% which we regard as a generous measure of an appropriate capital structure. Given our view that OPG Hydro's level of business risk is above those of transmission, distribution and integrated utilities in our sample, our second benchmark indicates that a level of equity of no less than 39% is required.

We reinforce this view with our third benchmark of 40 to 43% equity allowed by the AEUB for high-risk Alberta utilities. Given, OPG Hydro's level of business risk, we believe that its target equity ratio should fall into this range.

Schedule 3.7 summarizes this discussion and restates our recommendation to set the common equity ratio for OPG Hydro at 40%.

3.6.3 Relating the Benchmarks to OPG Nuclear

We take a similar approach in reaching a recommendation for the equity ratio for OPG Nuclear. As we discuss above and summarize in Schedule 3.7, OPG's nuclear assets carry higher levels of operational risk compared to its hydro assets. Further, regulatory risk associated with environmental and safety issues are also elevated compared to that of OPG Hydro. Our analysis rates the business risk of OPG's regulated nuclear assets as moderate (2.3 on our 5 point scale).

Schedule 3.7 shows that this business risk rating for OPG Nuclear exceeds the rating for OPG Hydro (1.8). It also signals that OPG Nuclear bears higher business risk than generic integrated companies (rated 1.5) or generic distribution utilities rated (1.4). The higher business risk of OPG Nuclear should translate into a significant increase in its common equity ratio on the order of 5-10% over that for OPG Hydro producing a recommended equity ratio for OPG Nuclear of 45 to 50%. In the interests of conservatism and to ensure fairness to the shareholder, we recommend the higher number of 50% for the equity ratio.

3.6.4 Recommended Capital Structure for OPG's Overall Rate Base

In order to achieve an overall recommended capital structure for OPG's rate base we calculate a weighted average of our individual capital structures using the asset breakdown in the Electricity Restructuring Act of Ontario of 2004 which set OPG's prices for electricity for 6,606 MW from regulated nuclear generation and 3,332 MW for hydro generation. These two sources total 9,938 MW of which 66.47% is nuclear and 33.53% hydro. Applying these weights to our two separate capital structure recommendations results in an overall rounded recommended equity ratio of 47% for OPG's rate base.[33] We summarize our analysis in Schedule 3.7.

3.6.5 Capital Structure Impact of Fixed Charge for Nuclear Assets

As stated earlier, the analysis on which we predicate our recommended capital structure assumes that the Board grants OPG's request for a 25% fixed charge for nuclear assets. Should the Board deny this request the impact would be to reduce risk mitigation. In our framework, this falls under the deferral account category in the OPG Nuclear column Schedule 3.1. Under the scenario in which the Board disallowed OPG's request for a 25% fixed charge, business risk would be increased raising the rating for this category from Low (1) to Moderate (3). As a result the overall business risk ranking for OPG Nuclear would increase to 2.6. Although this ranking is still within the moderate range, we would move our capital structure for OPG Nuclear from 50 to at most 53% to reflect the increase in risk. Using our weighted average approach, the result would be to increase the recommended common equity ratio for OPG's regulated assets to 49%.[34]

3.6.6 Projected Coverage Ratios

Our recommendation for OPG's overall capital structure flows from our analysis of the business risks of its two types of assets as well as from our review of appropriate industry benchmarks. Those benchmarks include bond ratings and we concluded above that a rating of BBB would be sufficient to allow a stand-

[33] In her Response to Pollution Probe Interrogatory #2, Ms. McShane uses different weights: 45% nuclear and 55% hydro based on her analysis of the 2009 forecast rate base. Repeating our calculations with her weights produces a lower overall rounded equity ratio of 45%. We use the higher weight of nuclear assets from the 2004 Act so that our weighted estimate will capture any possible future increase in the percentage of nuclear assets.
[34] Reworking the overall cost of capital for the rate base for 2008 using the increased common equity ratio, shows that the cost of capital would increase by 3 basis points from 6.39% (from Schedule 3.8) to 6.42%. For 2009, the overall cost of capital for the rate base would increase by 2 basis points from 6.55% (from Schedule 3.8) to 6.57%.

alone utility to conduct its business properly and to access capital markets. To show that our recommendation of 47% equity for the rate base is not incompatible with a BBB rating, we calculate the implied coverage ratios for 2008 and 2009 in Schedule 3.8.

To illustrate, we explain our calculations for 2008 in detail. We start with the rate base of $7,400.8 M from Table 3 from EB-2007-0905, Exhibit C1, Tab 2, Schedule 1, Updated 2008-03-14. We also use OPG's estimate of the cost of total debt for 2008 at 5.76%. We fill in our estimate of the fair return on equity from Section 4 of this evidence as 7.10% for 2008. Next we enter our recommended capital structure of 47% common equity and 53% debt. Finally, we use these numbers to calculate the allowed cost of capital for debt and equity. Summing these two amounts, we compute the total allowed cost of capital for the rate base as $472.9M.

To obtain a projected coverage ratio for the rate base, we divide the total allowed cost of capital (allowed earnings on rate base) of $472.9M by the total cost of debt of $225.9M to obtain a projected coverage ratio for rate base of 2.1X. For 2009, we perform a similar set of calculations replacing the inputs we used from Table 3 for 2008 with a similar set of inputs from Table 2 for 2009. We use the same capital structure for 2009 and set the cost of common equity at 7.25% as recommended in Section 4 of this evidence. As Schedule 3.8 shows, the projected coverage ratio for 2009 is 2.1X, the same as for 2008.

In brief, the analysis in Schedule 3.8 shows that our recommended capital structure implies an interest coverage ratio of 2.1X for OPG's rate base. We compare this projected coverage ratio against the actual coverage ratios for traded utilities in our sample. Schedule 3.1 reveals that 4 traded companies in our sample are rated BBB by at least one rating agency: Emera Inc., Fortis Inc., Pacific Northern Gas and TransAlta. In Schedule 3.3 shows that the 2007 coverage ratios for these four companies were 2.91 (Emera), 1.70 (Fortis Inc.), 2.10 (Pacific Northern Gas) and 3.17 (TransAlta).

Comparing these ratios to our projection for OPG's rate base, we conclude that the projected coverage ratio for OPG of 2.1X falls into the middle of the range of observed coverage ratios for these 4 BBB rated companies. As far as it goes, this comparison suggests that there is no reason to believe that OPG as a stand-alone company with our recommended 47% common equity in its capital structure could not achieve a BBB bond rating. We qualify this conclusion by noting that rating agencies consider other factors in addition to coverage ratios in setting ratings. A further qualification arises from our discussion in Section 2 of the shortcomings of bond ratings as a timely measure of risk.

4. RATE OF RETURN ON COMMON EQUITY FOR 2008 AND 2009 TEST YEARS

4.1 OVERVIEW OF THIS SECTION

In this section, we begin with a discussion of the general regulatory principles that are appropriate in conducting our fair rate of return analysis. As discussed in Section 1 of our evidence, our general approach is to determine the appropriate return on equity for a utility of average investment risk (henceforth referred to as the “average-risk utility”), and then to determine a capital structure for the applicant utility (OPG) that accounts for any difference in its business risk from this hypothetical benchmark average-risk utility.

After discussing general regulatory principles, we discuss the two main methodologies for estimating a forward-looking market equity risk premium or MERP. They are *ex post* measurement methodologies that generate a “historical or *ex post* MERP” that leads to the generation of an “*ex ante* MERP”, and the *ex ante* methodology that generates an “*ex ante* MERP.” Based on the merits of the various estimation methods used under each of these methodologies, we recommend that four of these estimation methods have sufficient validity to be used in our determination of the MERP and/or market return in a forward-looking sense. We then present our implementation of each of these four estimation methods to arrive at an appropriate return on equity (henceforth ROE) for OPG for the 2008 and 2009 test years.

4.1.1 Methods to Estimate the Market Equity Risk Premium (MERP)

The first estimation method is the Equity Risk Premium Estimation Method that generates an *ex ante* MERP estimate from an examination of the historical (*ex post)* MERP and expected future economic and market conditions. To this end, we estimate the required MERP for Canadian equities based on historical estimates for Canada and the U.S., and survey recent evidence that suggests that previously estimates using realized returns as a proxy for expected returns have produced an upwardly biased estimate of the required MERP. We argue using finance theory that most of the fundamental changes in the Canadian market imply that the MERP has decreased and will remain below that achieved over historical periods that exceed 50 years. We explain why some have argued that the MERP can be low, nil or negative given that the difference between the higher risk (standard deviation of returns) of equities compared to the lower risk of bonds and cash over short holding periods of one year decreases over longer holding periods of ten to twenty years. The conclusion that we draw from this estimation method is that a forward-looking MERP for Canada is no more than 5% after allowing for the estimation error contained in the estimates generated by this estimation method.

The second estimation method also generates an *ex ante* MERP estimate that is based on “historical or *ex post* MERP” estimates using a literature survey method. Based on the forward-looking MERP estimates that follow from this survey of the literature, we again conclude that our MERP estimate from the first estimation method is reasonable, if not conservatively high.

The third estimation method generates an *ex ante* MERP using the Discounted Cash Flow (DCF) Estimation Method. This approach is commonly implemented at the market level using a Dividend Discount Model (DDM) where future estimates of dividend growth rates as proxied by expected growth rates of nominal GDP are used to obtain an alternate estimate of the MERP. For this purpose, we rely on the forecasts from the same survey of investment professionals that is commonly used by Canadian regulators as a basis for their forward-looking yield forecasts for 30-year Canada’s; namely, *Consensus Forecasts* published by Consensus Economics. We use our estimates from the DDM to determine what adjustment (if any) is required to our forward-looking MERP estimate from our first estimation method. Based on the estimates from this method, we conclude that our MERP estimate from the first method is reasonable, if not conservatively high.

The fourth estimation method also generates an *ex ante* MERP estimate using survey methods. The surveys are of large and representative samples of investment professionals about their expectations of future returns on the Canadian and U.S. equity and fixed-income markets. These surveys are conducted by reputable consultants (Mercer and Watson Wyatt) of large and representative samples of investment professionals, much like those used by Consensus Economics in its publication *Consensus Forecasts*. Since these samples include representation from both the sell and buy sides of the market and are not expectations for specific companies, we are confident that they do not contain the optimism bias that has been documented in the literature for the earnings expectations of (bottom-up) financial analysts for individual firms. Based on the forward-looking MERP estimates from these surveys, we again conclude that our MERP estimate from the first estimation method is reasonable, if not conservatively high.

4.1.2 Adjusting for Risk Differences between an Average-risk Utility and the Market Proxy used for the MERP Estimate

It is commonly accepted that an average-risk utility is less risky than the market proxy used to obtain the MERP estimate. The debate centers on how much less and what is (are) appropriate method(s) for the determination of how much less risky an average-risk utility is. The premium (or additional return) that equity investors require to bear the investment risk of this average-risk utility is commonly referred to as the own equity risk premium or own ERP for an average-risk utility.

We use two methods for estimating the risk of an average-risk utility relative to the risk of the market proxy used to obtain the MERP estimate. In the first estimation method, we invoke the implicit assumption behind most of the commonly formulated asset pricing models, such as the Capital Asset Pricing Model (CAPM) or Arbitrage Pricing Model (APM), which is that investors are only compensated for non-diversifiable risk. In these models, the risk of a specific firm relative to the risk of a systematic factor, such as the market factor as proxied by a market index in the case of the CAPM, is given by the estimated regression coefficient (commonly referred to as its "beta") on the market factor when the returns on the specific utility are regressed against the returns on the market factor over some estimation period (generally 60 months).

Using the first method, we estimate the relative investment riskiness of our average-risk utility as being its beta of 0.5, and show that the betas of utilities (and their return correlations with the market proxy) have increased somewhat during the past three years after decreasing over the 1990-98 period. We then demonstrate that the two primary rationales that have been given for using the adjusted- or inflated-beta method when calculating the ROE are not valid.

In the second risk estimation method, we invoke the highly unlikely assumption that investors are compensated for total risk including the part that they can diversify away by holding portfolios that contain two or more financial assets. We find that the relative total riskiness of utilities is less than 50% of the mean total riskiness of various benchmarks consisting of 39 to 47 industries. Thus, even if investors require additional compensation for bearing risk that they can diversify away, we find no contradictory evidence to the relative-risk estimate of 0.50 for an average-risk utility.

4.1.3 Determination of the "Bare-bones" Cost of Equity for an Average-risk Utility

The "bare-bones" ROE is equal to the estimate of the premium (or additional return) that investors (owners) require to bear the risk equivalent to an equity investment in an applicant utility of average risk plus an estimate of the risk-free rate. When we multiply our estimate of the MERP of 5.00% by our estimate of the relative investment riskiness of our average-risk utility of 0.50, we obtain our estimate of the own ERP for our average-risk utility of 2.50%.

For the estimate of the risk-free rate for each test year, we use the estimates for the yields on 30-year Canada's of 3.85% and 4.25% for 2008 and for 2009, respectively, which were determined earlier in Section 2. These estimates conform to the common practice of estimating a risk-free rate at Canadian regulatory proceedings and Canadian automatic ROE adjustment mechanisms. Specifically, our estimates are based on consensus forecasts from *Consensus Forecasts* (published by Consensus Economics) along with an estimate of the appropriate term premium for 30-year versus 10-year Canada's.

Adding our estimate of the own ERP for an average-risk utility to each of our risk-free forward-looking forecasts yields "bare-bones" costs of equity estimates of 6.35% and 6.75% for 2008 and 2009, respectively.

4.1.4 Determination of the "All-in" Cost of Equity for an Average-risk Utility

Based on the "stand-alone" principle, we add 10 basis points to the "bare bones" cost to compensate the applicant utility (OPG) for potential equity flotation or issuance costs even if it will never incur such costs. Given that it is common regulatory practice in Canada, we add a financial flexibility premium of 40 basis points to further ensure the financial flexibility of OPG for both test years, and a further 25 basis points for the 2008 test year to protect the financial integrity of OPG against any adverse impacts from the possibility of additional turmoil in the capital markets and the economy. This is based on our expectation that capital market conditions will normalize in 2009, as was explained in Section 2.

Putting all the parts together, we end this section of our evidence with our ROE recommendation for an average-risk utility of 7.10% and 7.25% for the 2008 and 2009 test years. Our ROE recommendation allows an average-risk utility to earn a risk premium (including the flotation cost and financial flexibility and integrity adjustments) of 325 and 300 basis points over our forecast for long Canada yields of 3.85% and 4.25% for the 2008 and 2009 test years.

4.2 DISCUSSION OF GENERAL PRINCIPLES

According to the fair or reasonable return standard, the allowed return on capital should:

- be comparable to the risk-adjusted return available from the re-allocation of the investment to other enterprises in a competitive (non-monopolistic) environment (the "comparable investment" standard);[35]
- enable the regulated enterprise to maintain its financial integrity by being able to meet its financial obligations (the "financial integrity" standard); and
- allow the regulated enterprise to attract incremental capital on reasonable terms and conditions (the "capital attraction" or "financial flexibility" standard).

The shareholders' (owners') interests must be balanced with the interests of the customers who are entitled to safe and reliable service at reasonable rates.

In preparing our testimony, we identified and evaluated the scientific merit of various techniques that are commonly used for measuring the fair rate of return on equity both before the Board and in other jurisdictions. For this purpose, we used the four Daubert criteria for evaluating the admissibility (scientific merit) of expert testimony that has been adopted by federal and many state courts in the U.S. They are: (1) whether the methods upon which the testimony is based are centered upon a testable hypothesis; (2) the known or potential rate of error associated with the method; (3) whether the method has been subject to peer

[35] In financial economics, the first standard for judging the performance of primary or secondary markets is referred to as "allocational efficiency". It is tested by examining whether investments of similar risk offer their investors or owners similar expected returns, and whether investments of higher (lower) risk offer their investors or owners higher (or lower) expected returns. One of the earliest applications of this concept is: Irwin Friend, The SEC, and the economic performance of securities markets, *Conference on Economic Policy and the Regulation of Corporate Securities,* George Washington University, March 1968.

review and publication; and (4) whether the method is generally accepted in the relevant scientific community, particularly in terms of the non-judicial uses to which the scientific techniques are put.[36]

We have based our conclusions regarding the fair rate of return on common equity or ROE primarily on the Equity Risk Premium Estimation Method. Although we consider the DCF Estimation Method to be generally inferior to the Equity Risk Premium Estimation Method, we use the DCF Estimation Method at the market level to provide additional estimates of MERP using both historical and forward-looking estimates of share price or dividend growth. We use these estimates as further inputs for judging the reasonableness of our estimates of the implied MERP using the Equity Risk Premium Estimation Method. Section 6 includes a detailed discussion of why the DCF Estimation Method as commonly employed in the regulatory setting at the firm and industry levels is deemed to be inferior to the ERP Estimation Method, and why the DCF Estimation Method is best applied at the market and not individual firm or industry levels. Similarly, we use survey reviews of peer-reviewed and published articles that estimate MERPs or equity costs, and surveys of investment professionals as further inputs for judging the reasonableness of our estimates of the implied MERP using the Equity Risk Premium Estimation Method.

We do not employ the Comparable Earnings Estimation Method because we believe that it is of dubious scientific merit (using, for example, the Daubert criteria) and thus unsuitable for use in determining a fair ROE for a utility.[37] Section 6 of our evidence includes a detailed discussion of this point.

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[36] For a more extensive discussion of this U.S. Supreme court decision, see, for example: Stephen Mahle, The Impact of *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, on Expert Testimony: With Applications to Securities Litigation, April 1999. Available at: http://www.daubertexpert.com/basics_daubert-v-merrell-dow.html.

[37] In testimony before the Public Utilities Board of the Northwest Territories, Ms. McShane has acknowledged that "… a number of regulatory boards in the United States give no weight to the comparable earnings test" (The Public Utilities Board of the Northwest Territories, Board Decision 1-91, page 42. As detailed further in section 6 of our evidence, this is also the case in Canada.

4.3 THE DETERMINATION OF THE REQUIRED RETURN (COST OF EQUITY CAPITAL) FOR AN AVERAGE-RISK UTILITY

We use various methods to estimate the components of the required return (or alternately the cost of equity capital) for utility companies based on the other publicly traded investment opportunities that are available to their owners. The resulting estimate is the risk-adjusted "opportunity cost" for investing in the shares of an average-risk utility. In an allocationally efficient market, this risk-adjusted equity return (or cost) should be comparable using marked-to-market returns across firms.

Our methodology for estimating the required ROE for an average-risk utility uses an explicit or implicit combination of the following inputs as sequenced:

1. a forward-looking risk premium for the S&P/TSX Composite (our domestically diversified market proxy) (input #1);
2. a forward-looking forecast of the investment riskiness of an average-risk utility relative to the market portfolio as proxied by the S&P/TSX Composite or relative to other Canadian industries (input #2);
3. the yield forecasted for 2008 and 2009 for 30-year Canada's (input #3); and
4. an adjustment to cover fees involved with potential equity offerings or issues by an average-risk utility and to ensure its financial flexibility and integrity (input #4).

These four input estimates are subsequently estimated and combined as follows:

[(Input #1) *x* (Input #2)] + (Input #3) + (Input #4) = recommended rate of return on equity or ROE for an average-risk utility.

We now need to detail how we obtained the final estimates of each of the four inputs, and to present the recommended rates of return on equity for an average-risk utility that result from a combination of the final estimates of the four inputs.

4.3.1 Obtaining the Market Equity Risk Premium (MERP) Estimate (Input #1)

As discussed in the overview to this section of our evidence, we use four methods to estimate the market equity risk premium (MERP). We put primary reliance on the first method, and use the estimates from the other three estimation methods to determine if the estimate from the first method should be adjusted.

The MERP reflects equity investors' assessment of the expected (or required) return differential from investing in a portfolio that reflects available investment opportunities as compared to investing in the "risk-free" benchmark security. It indicates the total incremental return that equity investors require for bearing the risk of equities relative to investing in a risk-free benchmark security. In Canada, the S&P/TSX Composite Index is usually chosen as being representative of the equity opportunities that are publicly available for investment. This portfolio is well diversified in a relative sense only when viewed from a domestic-only investment perspective. The equity risk premium occurs because risk-averse investors require a positive reward for bearing each unit of risk, and equities exhibit varying degrees of risk. The reward required for bearing each unit of risk increases as investors become less risk tolerant, and decreases as investors become more risk tolerant. The MERP is the total compensation that investors require to bear the total risk of the chosen market proxy.

4.3.1.1 MERP Estimate: Based on Historical MERPs (First Estimation Method)

As noted earlier, the first estimation method generates an *ex ante* MERP estimate that is based on an examination of “historical or *ex post* MERPs”. Because the forward-looking or *ex ante* risk premium is difficult to observe and depends on future estimates that are subject to considerable error and bias depending upon the source, cost of equity studies typically place a heavy weight on measurement of historical or *ex post* risk premiums.

4.3.1.1.1 Measurement errors caused by divergence between realized and expected returns

There are several potential sources of measurement error when the MERP estimates generated from the first estimation method are used as forward-looking estimates.

The first source relates to the occurrence of negative risk premiums. The expected MERP measures the expected return differential of a well-diversified but risky portfolio of equities over risk-free government securities. Since investors are risk averse, they would not invest in equities unless they expected the MERP to be non-negative. However, since realizations can differ from rational expectations, the historical or realized MERP can be negative for any given period of time. To illustrate, the total return (i.e., dividend yield plus investment value change) for the S&P/TSX Composite for 1990 was minus 14.80%. This results in a negative MERP for 1990 when the risk premium is calculated using the return on 30-year Canada’s of 3.34%. This negative MERP was not a good proxy of the MERP expectation of equity investors at the beginning of 1990. As of January 2, 1990, those investors holding equities must have expected that equities would outperform 30-year Canada’s over the year. Similarly, investors holding equities must not have expected the negative total returns achieved by the S&P/TSX Composite in 1992, 1994, 1998, 2001 and 2002.

To address this potential difficulty with historical data, return on equity studies generally employ periods of at least ten years so that the realized MERP is positive. Also, the difference between the average realized and the average expected MERP should diminish, as the measurement period gets longer if the underlying return distribution is normal and remains unchanged over this longer measurement period. This is commonly referred to as returns being IID normal, or independently and identically and normally distributed, in that they have the same normal distribution at each point in time and returns are independent (not related) over time. This assumption suffers from various important drawbacks. First, even if single-period returns are assumed to be normal, then multiperiod returns cannot also be normal since they are products (**not** sums) of the single-period returns. Second, several studies using longer-horizon or multi-year returns conclude that there is substantial mean-reversion in stock market prices at longer horizons. For example, Campbell and Viceira (2005, p. 39) find that:[38]

> "At very long horizons, holding long-term nominal bonds is even riskier than holding stocks. At horizons of up to 30 years, stocks are still riskier than bills and bonds but the relative magnitude of these risks changes with the investment horizon."

This means that due to fundamental shifts in economies and/or markets (technically, referred to as regime shifts), the use of too distant time periods may result in the inclusion of time periods that are no longer representative of currently possible market returns and/or market risk premiums in a forward-looking sense. Fundamental changes have occurred over time in the level of market integration across international markets, the level of market frictions (particularly, trade costs), and so forth. For example, much of the impact of the globalization of economies and financial markets, and of financial innovations has occurred over the past 30 to 40 years.

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[38] John Y. Campbell and Luis M. Viceira, 2005. The term structure of the risk-return trade-off, *Financial Analysts Journal* 61:1 (January-February), pages 34-44.

A second source of measurement error arises when returns are not IID (i.e., independently and identically distributed) since both the market risk and its equity risk premium then are time-varying. *Ceteris paribus* (everything else held equal), the MERP will change over time, and can change drastically with changes in the risk-free rate, risk tolerance of the representative investor, and the set of available investment opportunities. For example, the set of available investment opportunities has expanded significantly since the 1960's due to the astonishing variety of new risk management securities introduced in the 1980's and 1990's.[39]

A third source of measurement error arises because periods with a declining required MERP are likely to coincide with temporarily increased realized MERPs. Peter A. Diamond, Institute Professor at M.I.T., states this as follows for the U.S. market:[40]

> "It is important to recognize that a period with a declining required equity premium is likely to have a temporary increase in the realized equity premium. This divergence occurs because a greater willingness to hold stocks, relative to bonds, tends to increase the price of stocks. Such a price rise may yield a higher return than the required return. For example, the high realized equity premium since World War II may be in part a result of the decline in the required equity premium. Therefore, it would be a mistake during the transition period to extrapolate what may be a temporarily high realized return."

A fourth source of measurement error arises because the reliability and comparability of the chosen proxy of the market or the risk-free rate varies considerably over time. To illustrate, most experts use the Canadian stock and

[39] For example, see Merton Miller, Financial innovation: Achievements and prospects, pages 385-392, In: Donald H. Chew, Jr. (Ed.), *The new corporate finance* (New York: McGraw-Hill Irwin, third edition, 2001).
[40] Peter A. Diamond, What stock market returns to expect for the future?, *An Issue in Brief*, Centre for Retirement Research at Boston College, No. 2, September 1999, page 2.

Long Canada return series available from the Canadian Institute of Actuaries (CIA) for the period from 1924 onwards. Thus, while the S&P/TSX Composite Total Return Index is used from December 1956, other proxies that are more likely to be contaminated by survivorship and selection biases are used from 1924 to 1957. Similarly, S&P's U.S. dividend yields reported in Ibbotson and Sinquefield (1977) are used for Canada for the period January 1926-December 1933, after adjusting for the 0.17% difference between the S&P and TSX dividend yield index over the period January 1956-December 1965. While the long-term bond series is for bonds with a term-to-maturity of over ten years, the actual average maturity is less than 30 years, and varies over time. Given a positive realized term premium, this results in realized risk premiums that are somewhat too high.

4.3.1.1.2 Based on nominal or real returns

It is preferable to use real returns to estimate the MERP when using historical data, although many experts use nominal returns.[41] The use of real returns is more appropriate for low inflation regimes, such as the present one, because MERP estimates that include high inflation periods include an additional risk premium that grows with the rate of inflation to compensate investors for a loss in the purchasing power of the risk premium.

4.3.1.1.3 The appropriate average of historical annual data

When it is preferable to use the arithmetic or the geometric average historical MERP is discussed more fully in Appendix 4.A. We begin with the observation that the use of the geometric average or some weighted-average of the arithmetic and geometric averages is becoming conventional wisdom. However,

[41] Dr. Booth (1999) identifies the existence of a risk-free rate bias, inflation rate bias and term premium bias in estimating MERPs. He suggests that the MERP forecast should be based on the real equity return combined with the current inflation expectation to minimize such biases. Laurence Booth, 1999, Estimating the equity risk premium and equity costs: New ways of looking at old data, *Journal of Applied Corporate Finance* 12: 1, pages 100-112.

we formulate our recommended MERP by placing no weight on the geometric average.

The arithmetic average is preferred for forward-looking decisions when historical returns are normal IID or independently and identically distributed over the estimation period. As is discussed later, the normal IID assumption is not appropriate for asset returns for investors that have longer term horizons (so-called buy-and-hold investors).

The geometric mean or some weighted-average of the geometric and arithmetic mean are preferred when the length of the investment horizon exceeds the return measurement interval, and the weight given to the geometric mean in any such weighted average increases as the investment horizon becomes longer. Similarly, the geometric mean or some weighted-average of the geometric and arithmetic mean is preferred when returns are not normal IID due to, for example, long-run mean reversion in the returns for some asset classes, as has been found for stocks, and long-run mean aversion in the returns for other asset classes, as has been found for bonds. Dr. Siegel notes that his work on the risk premium using data for the period 1802-2001 provides support for mean reversion for a 30-year horizon (i.e., the horizon used for 30-year Canada's in rate of return regulation).[42]

Dr. Buckley summarizes the debate on this issue as follows:[43]

> "Particularly important in estimating the equity risk premium is whether excess returns are measured using a geometric or an arithmetic mean return. To a significant extent, this question revolves around mean reversion in stock returns. Evidence of mean reversion is substantial, although it cannot be

[42] Jeremy J. Siegel, Historical results: Discussion, *Equity Risk Premium Forum*, November 8, 2001, page 46.
[43] A. Buckley, *The European Journal of Finance* 5: 3 (September 1999), pages 165-180.

proved unequivocally. Given the weight of evidence of mean reversion, there may be a strong case for the use of a geometric mean with an equity premium of between 3% and 5% - or even less."

Dr. John Campbell at a 2001 *Equity Risk Forum* has aptly stated the argument for a weighted average of the two types of means as follows:[44]

"Which is the right concept, arithmetic or geometric? Well, if you believe that the world is identically and independently distributed and that returns are drawn from the same distribution every period, the theoretically correct answer is that you should use the arithmetic average. Even if you're interested in a long-term forecast, take the arithmetic average and compound it over the appropriate horizon. However, if you think the world isn't i.i.d., the arithmetic average may not be the right answer.

I think that the world has some mean reversion. It isn't as extreme as in the highway example, but whenever any mean reversion is observed, using the arithmetic average makes you too optimistic. Thus, a measure somewhere between the geometric and the arithmetic averages would be the appropriate measure."

Drs. Mehra and Prescott, who are the authors who first identified the equity premium puzzle, note that they reported arithmetic averages, since the best available evidence at that point in time indicated that (multi-year) stock returns were uncorrelated over time.[45] They now acknowledge that the arithmetic average can lead to misleading estimates when returns are serially correlated, and that the geometric average may be the more appropriate statistic to use. Drs.

[44] John Campbell, Historical results: Discussion, *Equity Risk Premium Forum*, November 8, 2001, page 45.
[45] Rajnish Mehra and Edward C. Prescott, The Equity Premium in Retrospect, forthcoming: G.M. Constantinides, M. Harris and R. Stulz, *Handbook of the Economics of Finance* (Amsterdam: North Holland). Draft of their paper, February 2003.

Mehra and Prescott (p. 57) note that stock returns have been found to be mean reverting.

Furthermore, corporate practice among the leading U.S. corporate entities is to use the geometric mean if a long-term risk-free rate is used (such as long Treasuries) and to use the arithmetic mean if a short-term risk-free rate is used (such as T-Bills). Specifically, the teaching note to the case study, Grand Metropolitan PLC, states:[46]

> "In practice, two combinations of risk-free rates and equity-risk premiums are seen: (1) long-term risk-free rates plus geometric means or (2) short-term risk-free rates plus arithmetic means. Nothing in the theory of the CAPM dictates the use of these parameters; they are artifacts of practice. A recent survey of leading American corporations and financial institutions suggests greater use of the geometric-mean/long-term risk-free rate approach."

While tests for autocorrelation in annual returns are of interest to momentum traders and short-term speculators, they are not relevant to the longer-term investors that invest in utilities. To test how the relative risk of equities and bonds change as the investment horizons of investors get longer, we apply a formal test for mean reversion/aversion, the variance ratio test, to these two asset classes in Canada.

We calculate the variance ratios for holding periods of 5, 10 and 15 years relative to a benchmark holding period of 1 year for stocks, long bonds and risk premiums for Canada. The Canada data are annual from the Canadian Institute of Actuaries (CIA) for the period 1924-2007. The results are reported in Schedule 4.1 and depicted in Schedule 4.2.

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46 The referenced study is: R. F. Bruner, K.M. Eades, R.S. Harris and R. Higgins, 1998, Best practices in estimating the cost of capital: Survey and synthesis, *Financial Practice and Education* (Spring/Summer).

From Schedule 4.2, it is apparent that:

- Equity returns exhibit mean reversion and bond returns exhibit mean aversion in Canada as the investment horizon increases from 1 to 5 to 10 to 15 years; and
- The extent of mean reversion in equity returns and mean aversion in bond returns is more pronounced for the most recent 50 years than for the full time horizon ending with 2007 for Canada.

From these results, we conclude that the use of the arithmetic mean MERP results in an overstatement of the prospective MERP, and that the use of the geometric mean MERP results in an understatement of the prospective MERP. This is likely to be the reason why different groups of professionals use one or the other type of mean in their forward-looking analyses. Many financial economists, especially those associated with buy-side investment entities, have historically used the arithmetic mean MERP. As noted earlier, well-run corporations typically use the arithmetic mean MERP with the T-Bill rate as the risk-free proxy, and the geometric mean MERP with a long Treasury as the risk-free proxy. Although a blended average that consists of 75% of the arithmetic mean and 25% of the geometric mean MERP is preferable, we do not rely on such a blended average or on the geometric mean MERP when subsequently formulating our MERP recommendation. The reason is to further ensure that our MERP recommendation is conservatively high.

4.3.1.1.4 Measured over what time period

For purely statistical reasons, the error in the MERP estimate will decrease (that is, the estimate will become more precise) with longer evaluation periods if returns are IID. However, the statistical niceties of using the longest time period must be balanced against other criteria. First, it is desirable that the chosen time period have data that are reasonably reliable and are for a somewhat comparable proxy of available market investment opportunities over its duration. Second, it is desirable that the chosen time period be a reasonable match for the regimes that can be expected to be possible in the future.

No time period completely satisfies these criteria. To illustrate using the comparable proxy criterion, the time period since 1956 had reliable data for a comparable market proxy (the S&P/TSX Composite Index) until the two-phase inclusion of income trusts in the S&P/TSX Composite Index in 2005 and 2006. The available Canadian equity market data prior to 1956 are usually obtained by splicing together series for equity portfolios with inconsistent formation characteristics. Because of the existence of interest rate controls and the absence of a Canadian money market to price fixed income securities, the data on fixed income securities are also of poor quality prior to 1956. Furthermore, while the period of time since 1956 incorporates much of the impact of globalization, financial market innovation and trade cost competition on the expected returns for equities and bonds, it does not include regimes that occurred prior to 1956 that are not very likely but are still possible in the future.

4.3.1.1.5 Initial examination of Canadian MERP based on historical data using first estimation method

We begin with an examination of the 57-year time period of 1951-2007 because, although it does not satisfy the longevity criterion, it is based on a time period that is likely to represent the types of regimes and regime shifts most probable to occur in the future and it is not contaminated by the first few years of rapid economic and equity market exuberance resulting from the satisfaction of pent-up consumer demand and very low administered interest rates after World War II. We then examine three shorter periods, 1957-2007, 1965-2007 and 1977-2007, and three longer time periods, 1936-2007, 1924-2007 and 1900-2007. The examination of the longer periods is required to capture some of the regimes that are not captured in the 1951-2007 time period but have a small chance of occurring in the future. Based on the results reported in Schedule 4.3, the arithmetic annual nominal MERP for the 57-year period of 1951-2006 is 4.52% based on nominal returns, and 4.34%, respectively, based on real returns. The arithmetic average annual MERP based on nominal returns is lower at 3.14%,2.41% and 2.66% for the three shorter time periods, 1957-2007, 1965-2007 and 1977-2007, respectively, and is higher at 5.17%, 5.19% and 5.76% for the three progressively longer time periods, 1936-2007, 1924-2007 and 1900-2007, respectively. The corresponding arithmetic average annual MERP are lower using real returns. To illustrate, the arithmetic average annual MERP for the longest time period drops from 5.76% to 5.02% when we move from nominal to real returns. The major observation that we draw from this analysis is that the MERP has been declining in Canada over time, and that using the historical MERP over the longest available time period as a going-forward MERP estimate is not appropriate.

4.3.1.1.6 Non-Canadian MERP based on historical data using first estimation method

There is some limited value in examining the U.S. or international experience. First, foreign-exchange and risk-adjusted returns become approximately equal across various world markets as markets become more integrated. This is referred to as the “law of one price”. Second, examining other markets provides an imprecise test of how reasonable the Canadian estimates of the MERP are. However, one must be careful not to introduce an *ex post* selection bias when selecting which other market(s) to examine. Choosing the market that has grown to be the largest market or has had an above-average *ex post* performance introduces an *ex post* selection bias. This happens to some extent when the U.S. equity market is chosen for this purpose. We address this issue further in a subsequent part of our evidence.

MERP estimates for the U.S. are commonly based on data from Ibbotson & Associates for the period 1926-2006. Dimson *et al.* use the data series developed by Drs. Wilson and Jones in the data series that they assembled for the 1900-2002 period.[47] The Dimson *et al.* data series are available from Ibbotson Associates, and is referred to as the DMS-Ibbotson data set.

The estimates using the two Ibbotson data sets are summarized in Schedule 4.4. The arithmetic mean MERP for the longest time periods for each data set are 6.47% (nominal returns) and 6.10% (real returns) for the longer DMS-Ibbotson data set time period of 1900-2007 and 6.42% (nominal returns) and 6.18% (real returns) for the shorter Ibbotson data set time period of 1926-2006. While the arithmetic mean MERP is 6.28% (nominal) and 6.12% (real) for the 1951-2007 period, they are less than 5.0% for the three time periods equal to 51 years or less. As noted by Dr. Schwert, any MERP estimates that incorporate stock returns during the Great Depression period are suspect since stock market volatility was abnormally high during this period.[48]

To obtain a forward-looking U.S. MERP from these estimates that can be used in arriving at a recommended forward-looking Canadian MERP, one needs to adjust for the higher risk of the U.S. market, the upward bias caused by unsustainable upward equity revaluations primarily over the more recent time periods,[49] the 1% reduction estimated by Dr. Jones from the reduction of trade costs over the last 100-plus-years, and about a 20 basis point increase due to bond investors obtaining less than they expected. Doing such would reduce the

[47] J.W. Wilson and C. P. Jones, 2002. An analysis of the S&P 500 index and Cowles extensions: Price indexes and stock returns, 1870-1999, *Journal of Business* 75: 3 (July), pages 505-533.
[48] G.W. Schwert, 1990. Indexes of United States stock prices from 1802 to 1987, *Journal of Business*, 63: 3 (July), pages 399–426. The market volatility results are reported in G.W. Schwert, 1989. Why does stock market volatility change over time?" *Journal of Finance*, 44: 5 (December), pages 1115–54.
[49] To illustrate, the removal of equity revaluations over the 103-year period (1900-2002) studied by Drs. Dimson et al reduces the arithmetic mean MERPs for the U.S. and Canadian markets from 6.4% and 5.5%, respectively, to 5.5% and 4.9%, respectively.

forward-looking U.S. MERP to around 5%. In addition, Drs. He and Kryzanowski find that the U.S. market does not make a statistically significant contribution to explaining the portion of the return of Canadian utilities that is not explained by the Canadian market.[50]

Furthermore, we find that the arithmetic mean MERP for the world index of Drs. Dimson *et al.* over the 103-year period 1900-2002 is 4.9% when the revaluation of equities is not removed and is 4.1% when the revaluation of equities is removed using the revaluation estimates of Drs. Dimson *et al*. When an adjustment is made for the lower total risk level of the world index as compared to the Canadian index, the arithmetic mean MERP for the world index becomes 5.0%. However, over most of this 103-year period, the achievement of the rewards associated with international diversification would have been quite high. Thus, the 1% reduction in the MERP for the U.S. due to trade cost reductions would be even higher for the world index.

Thus, the major observation that we draw from the historical international evidence is that the MERP has also been declining internationally over time, and that using the historical MERP over the longest available time period as a going-forward MERP estimate is not appropriate.

4.3.1.2 MERP Estimate Based on Survey of the Literature (Second Estimation Method)

4.3.1.2.1 Survey of Canadian Studies

We examine the MERP estimates reported in two more recent studies. Dr. Booth reports a 3.29% MERP for Canada, and a 5.61% MERP for the U.S. over

[50] Z. He and L. Kryzanowski, Cost of equity for Canadian and U.S. sectors, *North American Journal of Economics and Finance* 18:2 (August 2007), pages 215-229.

the period of 1957–2000.[51] Drs. He and Kryzanowski report annualized estimates of the MERP of 4.32% and 5.88% for Canada and the U.S., respectively, over the longer period of 1956-2005.[52] Two reasons contribute to the higher estimates reported by Drs. He and Kryzanowski. First, they use a longer sample period in which the Canadian and U.S. markets realized lower average returns than those in Dr. Booth's sample. Second, Dr. Booth determines the MERP with respect to long-term bond yields of 8.04% for Canada and 7.32% for the U.S. In contrast, Drs. He and Kryzanowski determine the MERP with respect to the yields of 6.24% for Canada and 5.16% for the U.S. for short-term treasury bills.

4.3.1.2.2 Survey of non-Canadian Studies

A review of the literature on non-Canadian MERP estimates is presented in Appendix 4.B. Two studies estimate realized and expected MERP for 15 countries over more than a century. They find that the expected MERP, when measured **against short-term** government bonds over the 101-year period, is 4.0% and 3.5% for the U.S. and a sample of 15 developed countries including the U.S., respectively. All of the studies reviewed in Appendix 4.B conclude that the U.S. MERP has narrowed substantially, and is expected to be lower in the future. Most of the U.S. forward-looking equity risk premium estimates vary from zero or slightly negative to about 4%. Interestingly, at an equity risk premium forum in November 2001, Dr. Ibbotson made a long-term 4 percent (400 bps) MERP forecast (i.e., geometric return in excess of the long-term government bond yield), under the assumption that the market was fairly valued.[53]

Dr. Jeremy Siegel has conducted extensive studies of the MERP for the U.S. over the past 200 years. Based on his results for the three major sub-periods,

[51] L. Booth, 2001, Equity risk premiums in the U.S. and Canada, *Canadian Investment Review 14*(3), pages 34-43.
[52] Z. He and L. Kryzanowski, Cost of equity for Canadian and U.S. sectors, *North American Journal of Economics and Finance* 18:2 (August 2007), pages 215-229.
[53] Roger Ibbotson, Summary comments, *Equity Risk Premium Forum*, November 8, 2001, page 108.

which are summarized in Schedule 4.5, the so-called Ibbotson time period, 1926-2001, has generated the highest arithmetic mean MERP of 6.2%. Dr. Siegel notes that this high MERP is due to real stocks maintaining their long-term historical average real return of almost 7%, while real bond and bill returns were below their long-term historical average real returns. In fact, for the 55 years up to 1982, the real return on bills averaged nearly zero. Dr. Siegel goes on to conclude that *the reason why the MERP is too high for this period is that historical real stock returns are biased upward to some extent and government bond returns are biased downwards over this period*.[54]

Mr. Richard Arnott and Mr. Peter Bernstein reach a similar conclusion that the realized MERP exceeded the expected MERP over this time period.[55] Specifically, equity investors earned 70 basis points annually more than what they expected and bond investors earned 20 basis points annually less than what they expected. According to Mr. Arnott and Mr. Bernstein, one cause of this risk premium windfall was the unanticipated inflation of the late 1960s and 1970s that adversely affected realized bond returns. Another cause was the rise in **price-to-dividend** multiples from 18 to 70 times over the 1926-2001 period, with almost all of this increase occurring in the last 17 years of this period, that favorably affected stock returns. Mr. Arnott and Mr. Bernstein estimate that this rise in the price-to-dividend multiple added about 180 basis points or 1.8% to annual stock returns.[56]

When we examine the arithmetic mean MERP reported in Schedule 4.5 for the major sub-periods that begin prior to World War II and run through 2001, we

[54] Jeremy J. Siegel, Historical results I, *Equity Risk Premium Forum*, November 8, 2001, pages 31-32.
[55] Robert D. Arnott and Peter L. Bernstein. What risk premium is “normal”?, *Financial Analysts Journal* 58:2 (March/April 2002), pages 64-85.
[56] This is higher than the 1% estimate of Drs. Dimson et al. (2003). Elroy Dimson, Paul Marsh and Mike Staunton, Global evidence on the equity risk premium, *Journal of Applied Corporate Finance* 15:4 (Summer 2003), pages 27-38.

find that the two sub-periods that predate the Ibbotson time period have a MERP of less than 5%. Furthermore, if we adjust the realized MERP for the 1926-2001 sub-period downwards by 90 basis points to reflect the normal expectations of investors, as per Mr. Arnott and Mr. Bernstein, the arithmetic MERP of 6.2% is now 5.3%.

The conclusion that we draw from this literature survey is that a forward-looking MERP for Canada is not more than 5% after allowing for the estimation error contained in the estimates reported in these studies.

4.3.1.3 MERP Estimate Based on the DCF Estimation Method (Third Estimation Method)

As is discussed in more detail in Section 6 of our evidence, Discounted Cash Flow (DCF) Estimation Methods have a number of disadvantages that make them much less reliable for estimating the required rate of return or risk premium on equity, particularly for individual companies. This is likely the reason why Graham and Harvey (2001, 2002) based on a survey of a large sample of U.S. corporations find that “few firms used a dividend discount model to back out the cost of equity”.[57] Nevertheless, because the DCF approach represents an alternative method of estimating the MERP, it is useful as a check on the reasonableness of our other MERP estimation methods. With this in mind, we conduct DCF Tests using the constant growth version of the Dividend Discount Model or DDM for the Canadian Market as proxied by the S&P/TSX Composite Index and for the U.S. market as proxied by the S&P500 Index. We use forecasts of future growth as proxied by GDP (Gross Domestic Product). The output of these DCF tests consists of various estimates of the MERP.

[57] John Graham and Campbell Harvey, How do CFOs make capital budgeting and capital structure decisions?, *Journal of Applied Corporate Finance* 15:1 (Spring 2002), page 12. This article was a practitioner version of the following paper that won the Jensen prize for the best *JFE* paper in corporate finance in 2001: John Graham and Campbell Harvey, The theory and practice of corporate finance: Evidence from the field, *Journal of Financial Economics* 60 (2001).

The required rate of return in the constant growth DDM or Gordon model is given by:

where D_1 is the expected dividend in the next period, or D_0 (1 + g);

P_0 is the current price or level of the stock or index;

is the dividend yield; and

g is the growth rate in dividends, which is assumed to be constant until the end of time.

In this version of the model, the growth rates in dividends, earnings, book value and share price are all assumed to be equal.

In the two-stage DDM, dividends are assumed to grow at a fixed rate g_1 or variable rate g_t for an initial period (herein deemed to be up to the first five years), and then to grow at a different fixed rate g_2 thereafter. In this version of the DDM, the implied required rate of return is found by solving for k in:

;

Or:

Where

or .

The implied MERP is then obtained by subtracting the current or going forward yield on long-term government bonds from the estimate of k derived from the above models.

The commonly held position is that the long-term growth in dividends (earnings) cannot exceed long-term growth in GDP. In the summary comments at an equity risk premium forum, Dr. Leibowitz summarized his viewpoint as follows:[58]

> "I'm very impressed by the level of consensus on the view that earnings can grow only at a somewhat slower rate than GDP per capita and that no one seems to feel it can grow much more – except Roger Ibbotson…"

There are at least five reasons why the long-term growth in the economy is considered to be an upper bound for the long-term growth in the dividends (earnings) of the market. First, since a disproportionate share of the growth in the economy comes from unlisted firms (i.e., private entrepeneurs), these investment opportunities are typically not available to the general public and are not captured by the indexes used to calculate MERPs.[59] Second, a good portion of the growth in the business sector of the economy cannot be financed by retained earnings and, thus, requires the continual issuance of new shares (referred to as seasoned issues). Third, many firms dilute their share base by issuing stock options, which are generally not offset by share repurchases. Fourth, Siegel (p. 15) argues "the returns to technological innovation have gone to workers in the form of higher real wages, while the return per unit of capital has remained

[58] Marin Leibowitz, Summary comments, *Equity Risk Premium Forum*, November 8, 2001, page 109.

[59] Jagannathan et al. use the S&P, CRSP and Board of Governors (BOG) portfolios to examine the MERP. The BOG portfolio, which includes stocks that are not publicly traded and all stocks held by U.S. residents, has about two times the value of the CRSP stocks. While they obtain nearly identical MERP estimates using the S&P and CRSP portfolios over the entire sample period and various sub-periods, their estimates using the BOG data are higher on average by roughly two percent. Ravi Jagannathan, Ellen R. McGrattan and Anna Scherbina, 2000, The declining U.S. equity premium, *Quarterly Review of Federal Reserve Bank of Minneapolis*, Fall, pages 3-19.

essentially unchanged."[60] Fifth, the growth in the economy is usually measured as growth in GDP or in GDP on a per-capita basis.

In Schedule 4.6, we assume that cash distributions other than dividends (e.g., share repurchases) are offset by stock option issuance. We do this because many observers have shown that completed repurchases are much less than announced repurchases and that stock buybacks are offset by share issuances.[61] We also make no adjustment for the inflation in the dividend yield of the S&P/TSX Composite caused by inclusion of income trusts in that index. In Schedule 4.6, we use consensus estimates of real GDP and inflation obtained from surveys conducted by Consensus Economics (as published in *Consensus Forecasts*) and Watson Wyatt. All of the MERP using the consensus forecasts for both the U.S. and Canadian equity markets are below 5%, except when we use the most optimistic forecasts (e.g., the forecast at the 90th percentile).

We now illustrate how the equity costs in Schedule 4.6 are calculated by detailing how the equity cost of 5.76% for Scenario or Case 1a in panel A is determined. Using the formula, which was described earlier, that states that the cost of equity (*k*) is equal to the dividend yield ( ) plus dividend growth (*g*) as proxied by nominal growth in GDP (i.e., real GDP + inflation), we obtain that *k* is equal to 2.66% + (1.50% + 1.60%) or 5.76%.

The conclusion that we draw from these DCF estimations is that a forward-looking MERP for Canada is not more than 5% after allowing for the estimation error contained in the estimates generated by this estimation method.

[60] J. Siegel, 1999, The shrinking equity premium, *Journal of Portfolio Management* 26:1 (Fall), pages 10–17; and W. Reichenstein, 2002, What do past stock market returns tell us about the future?, *Journal of Financial Planning* forthcoming.

[61] For examples, see J.C. Bogle, 1995, The 1990s at the halfway mark, *Journal of Portfolio Management* 18:1 (Summer), pages 21–31; and K. Cole, J. Helwege and D. Laster, 1996, Stock market valuation indicators: Is this time different?, *Financial Analysts Journal* 52:3 (May/June), pages 56–64.

4.3.1.4 MERP Estimate Based on the Survey of the Forecasts of Investment Professionals (Fourth Estimation Method)

There are some foreign regulatory jurisdictions that place weight on the surveys of investment professionals for their estimates of MERP. According to a report prepared by NERA,[62] U.K. regulatory estimates of the MERP have generally relied heavily on survey evidence of investor expectations with some consideration usually given to evidence on historic average returns. However, U.K. regulators have generally judged that the historic MERP provides an overstatement of the current risk premium.

The forecasts based on two surveys are summarized in Schedule 4.7. We first considered the forecasts by 54 Canadian and global investment managers on the economy and capital markets contained in *2008 Fearless Forecast* authored by Mercer.[63] Based on consensus expectations (mean or median), the expected MERP based on the S&P/TSX Composite and the DEX long-term total return index (DEX Long Bond TR) is 3.5% for the 5-year period ending December 2012. To examine the MERP derived using the most optimistic scenario drawn from this survey (i.e., has only a 5% chance of occurring), we subtract the 95th percentile estimate of the S&P/TSX Composite return (i.e., the return that has a 95% chance of being lower) from its bond index counterpart. Doing such, we subtract the 6.4% value in the last column of Panel A of Schedule 4.7 for the DEX Long Bond TR from the 11.4% value in the same column for the S&P/TSX Composite to obtain a MERP estimate of 5.0% for the 5-year period ending December 2012.

We then consider the survey of the "country's leading business economists and portfolio managers in 42 organizations, such as chartered banks, investment management firms and other corporations" conducted in mid-November 2007 by

[62] NERA, UK water cost of capital, *A Final Report for Water UK*, Prepared by NERA, London, July 2003, page 76.
[63] Mercer, *2008 Fearless Forecast, 17th edition.*

Watson Wyatt.[64] Based on consensus expectations (median), the expected MERP based on the S&P/TSX Composite and 30-year Canada Bonds is 3.2% mid-term (2009-2012) and 2.8% long-term (2013-2022). To examine the MERP derived using the most optimistic scenario drawn from this survey (i.e., has only a 10% chance of occurring), we subtract the 90th percentile estimate of the S&P/TSX Composite return (i.e., the return that has a 90% chance of being lower) from its 30-year Canada Bond counterpart. Doing such for the mid-term (2009-2012), we subtract the 6.0% value in the last column of Panel B of Schedule 4.7 for 30-year Canada Bonds from the 12.0% value in the same column for the S&P/TSX Composite to obtain a MERP estimate of 6.0%. Doing such for the long-term (2013-2022), we subtract the 6.6% value in the last column of Panel C of Schedule 4.7 for 30-year Canada Bonds from the 10.0% value in the same column for the S&P/TSX Composite to obtain a MERP estimate of 3.4%.

The conclusion that we draw from these survey forecasts is that a forward-looking MERP for Canada is not more than 5% after allowing for estimation error contained in the estimates generated by this estimation method.

4.3.1.5 Other Considerations

In this section, we consider the evolution of a number of factors that affect *ex post* estimates of the MERP. On balance, changes in these factors imply that very long-term estimates of the MERP using historical data will be over-estimates of the forward-looking MERP.

4.3.1.5.1 Survivorship and selection biases

Ex post estimates of the MERP often suffer from survivorship and selection biases. Some examples follow. First, as proposed by Drs. Brown, Goetzmann

[64] Watson Wyatt, Economic Expectations 2008, 27th Annual Canadian Survey.

and Ross (1995),[65] financial economists concentrate on the performance of surviving markets and so-called "winner" markets like the U.S. stock market. Financial economists ignore other markets that have done poorly or even disappeared. Examples given by Drs. Brown *et al.* include the Argentine market that is considered a comparatively less important emerging market because of its long history of poor performance, and the Russian market where investors at one point had all their wealth expropriated during the last 100 years. Second, when a new index is introduced, the index sponsor generally provides historic data on that index. For example, when the S&P/TSX Composite index was introduced in January 1977, historic ("back-fill") data was provided dating back to January 1956. The historic data was for firms in existence as of the date of the index introduction.

4.3.1.5.2 Changes in financial markets

Financial market changes that have had an impact on the MERP include the increased integration of financial markets, the rapid growth of financial innovation, mutual funds, index products, derivative products and exchange-traded funds over the past 30 to 40 years. Since this allows small investors to acquire and manage diversified portfolios at lower cost, the required risk premium is lowered since greater diversification means that these investors attain the same expected returns by bearing less risk. Also, since the reduction in cost has been higher for equity versus fixed income investment vehicles, the MERP relative to historical levels has declined.[66]

4.3.1.5.3 Changes in market frictions

Historical MERP studies are based on gross and not net returns, although investors make decisions between investments of different risk based on net and

[65] S. Brown, W. Goetzmann and S. Ross, Survival, *Journal of Finance* 50 (1995), pages 853-873. The following examples are drawn from Brown et al. (1995).
[66] Similar points are made about mutual funds by Diamond (1999), page 2.

not gross returns. There are at least two frictions that cause a divergence between gross and net returns from investment.

The first major market friction is taxes. As tax rates increase, investors require higher gross returns from investment to get the same net (after-tax) return, and *vice versa* when tax rates decrease. Similarly, if the tax rate reduction differs by type of asset, then their gross returns will change by different amounts to maintain their same net returns. To illustrate, if the effective tax rate on the return of a non-dividend-paying growth stock declines by more than that on the return of a long-term government bond, then the drop in the gross return of the stock to maintain its after-tax return will exceed the drop in the gross return of the bond. In turn, this will decrease the required MERP, all else held equal. Examples include the introduction of a capital gains tax in Canada in 1972 (increases the MERP), and more recent successive reductions in the capital gains inclusion rate (decreases the MERP).

The second major market friction is trade costs, which include liquidity costs (as measured, for example, by the effective bid-ask spread), brokerage commissions, and so forth. In general, the gap between gross and net returns increases as trade costs increase, and decreases as trade costs decrease. As noted by Dr. Jones, trade costs drive a wedge between gross equity returns and net equity returns. His analysis shows that the average cost to buy or sell stocks has dropped from over 1% of value as late as 1975 (i.e., before the deregulation of brokerage fees) to under 0.18% today. He concludes that, while trade costs account for a small part of the observed equity premium, the gross equity premium is perhaps 1% lower today than it was earlier in the 1900's.[67]

4.3.1.6 The Final Canadian MERP Estimate (Final Input #1)

[67] Charles M. Jones, 2001, A century of stock market liquidity and trading costs, working paper presented at an asset pricing workshop, Summer Institute, National Bureau of Economic Research, July 19-20.

Based on a subjective consideration of the estimates from the above four estimation methods and balancing the other considerations just discussed above with providing an allowance for estimation error, we are forecasting a MERP of 5.00% for an average-risk utility for 2008 and 2009.

4.3.2 Obtaining the Relative Risk Estimate for an Average-risk Utility (Input #2)

4.3.2.1 Conceptual Underpinning

If the market only rewards investors for bearing non-diversifiable risk (the most commonly accepted view), the relative non-diversifiable risk or beta of the average-risk utility relative to the market proxy needs to be estimated because investments in the securities of individual firms (such as stocks in specific utilities) are not by themselves well-diversified portfolios. Under this assumption, the MERP is adjusted upwards or downwards to reflect the relative **non-**diversifiable risk of the average-risk utility relative to the more diversified market portfolio. The lower non-diversifiable risk of our average-risk utility relative to that for the diversified market portfolio necessitates a downward adjustment in the risk premium added to the forecasted long-term risk-free rate to calculate the cost of equity for our average-risk utility.

If most investors do not hold well-diversified portfolios and thus require an additional premium for bearing diversifiable risk, then the total risk or some portion thereof of the average-risk utility needs to be compared to the total risk of average-risk firms in other industries. Under this view of the world, the relative ratio of the total risk of the average-risk utility to that of the mean of average-risk firms across industries can be used as an index to adjust the MERP upwards or downwards to get the appropriate own ERP for an average-risk utility. However, this needs to be done with care because most investment textbooks contain graphs depicting the reduction of total risk with an increase in portfolio size (i.e., the number of securities or firms in the portfolio).

Under the commonly accepted risk pricing viewpoint, the overall (investment) riskiness of an average-risk utility is typically determined by measuring its contribution to the risk of the market proxy. In a risk premium framework, this contribution is typically measured by the market beta of an average-risk utility.

Since market betas vary over time, investment professionals prefer to use only the most recent data in order to capture the firm's current risk even for firms with long trading histories. However, to ensure reasonable statistical precision, beta estimations typically are based on approximately 5 years of monthly observations. The betas used herein are based on 60 months of data, and are only calculated if almost all months have returns based on actual market transactions.

4.3.2.2 Beta Measure of Relative Risk of an Average-risk Utility

It is not possible to estimate a reliable beta for the average-risk utility directly. This hypothetical utility does not trade publicly. However, it is possible to make an approximation. We use the same sample of the publicly traded utilities that we used in our capital structure discussion in Section 3. We presented the rationale for the sample selection there. Here we add Westcoast Energy as this company traded throughout 2001, and as exchange units of Duke in 2002. As shown in Schedule 4.8, the average beta for a group of ten utilities is 0.315 for 1992-2007, a sizeable decrease from 0.583 for 1990-1994. [68] The means of the mean cross-sectional betas for the first four, middle five and the last (most recent) five rolling five-year periods are 0.541, 0.267 and 0.182, respectively.

[68] Betas of 0 and 1 correspond to no market risk and a market risk equal to a well diversified portfolio such as the S&P/TSX Composite index, respectively. Thus, a beta of 0.50 for an average-risk utility indicates that this utility has 50% of the investment risk of the S&P/TSX Composite.

We also examined whether an average utility was becoming a more desirable investment because of an increase in its potential to diversify investor portfolios. In modern portfolio theory, an asset becomes more desirable for portfolio diversification purposes if its correlations with all the other assets decrease towards zero or even become negative, everything else held constant. This important contribution led to the awarding of a Nobel Prize in Economics to Dr. Harry Markowitz.

Thus, we calculated moving average correlations for our sample of utilities with the S&P/TSX Composite index. These results are summarized in Schedule 4.9. We find that the average correlation between a utility in our sample and the S&P/TSX Composite has declined substantially from the most distant four-year period to the more recent five-year period (0.469 versus 0.104), and is quite low at 0.264 when averaged over the 14 rolling five-year periods. This suggests that an average utility is now more desirable as an investment because of its enhanced potential for portfolio risk reduction. A greater potential for risk reduction leads to a reduction in an asset's own equity risk premium. This reduction in the correlations between the returns of the utilities and the market also contributes to the reduction in the betas of the sample of utilities.[69] The adoption of adjustment mechanisms to automatically adjust ROE on a generic basis by various Canadian regulatory bodies has most likely contributed to this reduction in risk.

4.3.2.3 Total Risk Measure of Relative Risk of an Average-risk Utility

There is some conflicting evidence in the literature on whether or not the own risk of a firm is rewarded in the market. As pointed out earlier, if enough

[69] The beta coefficient is given by , where σ_i and σ_m are the standard deviation of returns for utility *i* and the market *m*, respectively; and is the correlation between the returns for utility *i* and the market *m*, respectively. Thus, if the relative risks of the utility and market remain constant, the beta decreases towards zero as the correlation between their returns moves from 1 to 0.

investors do not hold well-diversified portfolios and thus require an additional premium for bearing all or a part of diversifiable risk, then further confidence in the beta measure is obtained by comparing the total risk of the average-risk utility to the total risk of average-risk firms in other industries. Under this view, the relative ratio of the total risk of the average-risk utility to that of the mean of the average-risk firms in various industries can be used as an index to adjust the relative risk index as proxied by beta upwards or downwards to get the appropriate ERP for an average-risk utility.

There are three reasons why it is not appropriate to use a relative risk index that compares the variance of an average-risk utility to the variance of the market proxy. First, a relative risk index should have the property that when one finds the weighted average of the firms or industries that comprise the market index the result is the risk of the market proxy. This does not happen if you use a relative risk index that is obtained by dividing the variance of an industry index by the variance of the market proxy. Second, if investors receive a return premium for bearing nondiversifiable risk, then the capitalization-weighted average return premium will be already reflected in the return of the market proxy. This happens because the return on the market proxy is merely a weighted average of the returns on the firms or industries that compose that market proxy. Thus, the market proxy already incorporates the nondiversifiable risk premium for a firm (or industry) of “average” nondiversifiable risk. Third, how the nondiversifiable risk of an average-risk firm in a particular industry compares to such firms in other industries is best studied using our approach.

We use the indirect decomposition method of Campbell *et al.* to estimate the industry-level monthly variances for 47 industry groups. The specific procedure is detailed in Appendix 4.C. The results for the complete period of 1975-2003 and the most recent 10-year period of 1994-2003 are summarized in Schedule 4.10. We examine various benchmarks that include: (i) the elimination of the three industries with the highest variances, (ii) the elimination of industries with less than 10 firms, and (iii) the elimination of industries with less than 10 firms and the industry with the highest variance after eliminating industries with less than 10 firms. In all cases, we find that the average variance of the utilities is less than 40% of the mean variance of the industry benchmark. Thus, even if we assume that investors need to be compensated for bearing nondiversifiable risk, the relative risk of utilities compared to all industries is less than 50%.

4.3.2.4 The Relative Risk of an Average-risk Canadian Utility (Input #2)

We conclude that a relative risk index of 0.50 is appropriate whether or not investors receive a return premium for bearing nondiversifiable risk when appropriate benchmarks are chosen. We believe that this estimate is conservatively high, and provides sufficient coverage for any estimation errors.

4.3.2.5 The Non-use of the Adjusted or Inflated-Beta Method

There are two primary arguments that have been given for using the adjusted beta method when calculating the required rate of return on equity.[70] Both rationales are flawed. The first rationale is based on the empirical finding by Dr. Blume (1975) that the betas of individual U.S. equities, for a large sample that is representative of the overall market, tend to regress over the long-run towards the mean beta for the sample.[71] In the case of a large representative sample drawn from all the firms in the market, the mean beta will be the market beta of one.

Dr. Blume regresses the beta estimates obtained over the period 1955-1961 against the beta estimates obtained over the period 1948-1954 for common shares traded on the NYSE. Dr. Blume finds that the betas of firms with values less than one subsequently, on average, tend to increase towards the sample

[70] Ms. McShane uses one of these arguments to justify the use of adjusted betas in her evidence (EB-2007-0905, Exhibit C2, Tab 1, Schedule 1, page 35 of 261).
[71] M.E. Blume, Betas and their regression tendencies, *Journal of Finance* 30 (June 1975), pages 785-796.

beta of one, and firms with betas of more than one tend to subsequently decrease, on average, towards the market beta of one. The relationship estimated by Dr. Blume suggests that the quality of beta forecasts can be improved, and that a higher quality predictor of an individual firm's beta may be a weighted average of the sample beta and the firm's current beta where the weights are approximately one-third and two-thirds, respectively.[72]

There are at least six substantive reasons for not adjusting betas for utilities based on this rationale. First, Dr. Harrington (1983)[73] shows that the betas that are supplied by commercial vendors that use this adjustment have little predictive accuracy. Her conclusion is based on a comparison of the actual beta forecasts supplied by a number of commercial investment vendors (such as Value Line) with their corresponding benchmark estimates for four forecast horizons.

Second, there appears to be no evidence that the relationship estimated by Dr. Blume for the U.S. market that is over 40 years old applies to other markets, such as the Canadian market, or to more recent time periods. In other words, there appears to be no empirical evidence that the betas of Canadian stocks revert to the sample mean.

Third, if the population average is consistently lower than the market beta, as is the case for the samples of utilities studied herein, the use of the market beta of one will result in an over-prediction of the mean beta in the next period for the sample. This is easily shown by taking a portfolio that is invested 40% in risk-free assets and 60% in the market, and thus, has a constant beta of 0.60 by

[72] Also, see O.A. Vasicek, A note on using cross-sectional information vs. Bayesian estimation of security betas, *Journal of Finance* 28 (September 1973), pages 1233-1239.
[73] D.R. Harrington, Whose beta is best?, *Financial Analysts Journal* (July-August 1983), pages 67-73.

construction. Its adjusted beta would consistently be 0.73 (i.e., two-thirds of 0.6 + one-third of 1), although its actual or true beta is substantially lower at 0.6.

Fourth, the previous point has already been documented in a peer-reviewed scientific journal. Drs. Kryzanowski and Jalilvand (1986)[74] test the relative accuracy of six beta predictors for a sample of fifty U.S. utilities from 1969-1979. They find that the best predictors differ only in that they use different weighted combinations of the average beta of their sample of utilities, and that, not unexpectedly, the worst predictor is to use a beta of one or the so-called "long-term tendency of betas towards 1.00".

Fifth, adjusting the beta towards one assumes that the "true" beta for the utility is one. In other words, this adjustment method is based on the implicit assumption that the "true" beta for the utility is the same as that of the market index.

Sixth, based on an examination of dynamic betas estimated using the Kalman filter approach, Drs. He and Kryzanowski find that the trend beta (i.e., the stable part of the beta) has been 0.5 or less since the late 1990s, that dynamic betas significantly increase the explanatory power of the market model (particularly for the utilities sector), and that time-variation (temporary deviations) in the betas is the most important source of variation in the market model for the Canadian utilities sector.[75] They also find that the U.S. market does not make a statistically significant contribution to explaining the portion of the return of Canadian utilities that is not explained by the Canadian market.

The second rationale for using a variant of the adjusted-beta method for utilities is that raw utility betas need to be adjusted upward due to their sensitivity

[74] L. Kryzanowski and A. Jalilvand, Statistical tests of the accuracy of alternative forecasts: Some results for U.S. utility betas, *The Financial Review* (1986), pages 319-335.
[75] Zhongzhi He and Lawrence Kryzanowski, Dynamic betas for Canadian sector portfolios, *International Review of Financial Analysis*, in press.

to interest rate changes, and that the appropriate adjustment is one that is intermediate between the raw and adjusted betas. We provide a detailed criticism of this rationale in Appendix 4.D. This detailed criticism will now be summarized.

As is the case for the S&P/TSX Composite index, the returns of utilities are sensitive to changes in both market and bond returns. This suggests that utility returns may be better modeled using these two potential return determinants or factors. However, one should not confuse the sensitivity of utility returns to the returns of each of these factors with the premium required by investors to bear market and interest rate risk when investing in utility equities.

When there is only one determinant of utility returns (namely, the market), the Market Risk Premium Estimation Method is implemented by first estimating the utility's beta by running a regression of the returns on the utility against the returns on the market proxy (S&P/TSX Composite index). The utility's required equity risk premium is obtained by multiplying the equity risk premium estimate for the market by the utility's beta estimate. The cost of equity for the utility is obtained by adding the equity risk premium estimate for the utility to the estimate of the risk-free rate (as proxied by the yield on 30-year Canada's).

When there are two possible determinants of utility returns (in this case, equity market risk and interest rate risk), the Equity Risk Premium Method now is implemented by first estimating the utility's two betas by running a regression of the returns on the utility against the returns on the equity market proxy (S&P/TSX Composite index) and on the bond market proxy (long Canada's; i.e., Government of Canada bonds with a long term to maturity). The first component of the utility's required equity risk premium is obtained by multiplying the equity risk premium estimate for the market by the utility's market beta estimate, and the second component of the utility's required equity risk premium is obtained by multiplying the bond risk premium estimate by the utility's bond beta estimate.

The utility's required equity risk premium is the sum of these two components. The cost of equity for the utility then is obtained by adding the equity risk premium estimate appropriate for the level of relative risk for the utility to the estimate of the risk-free rate (as proxied by the yield on long Canada's).

While one would expect the estimates of the return on the S&P/TSX Composite index, of the return on long Canada's, and of the return on the S&P/TSX Composite index over the yield on long Canada's to be positive and significant, such is not the case for the return on long Canada's over the yield on long Canada's. Over the long run, we would expect the average return on long Canada's to be equal to the yield on long Canada's (the proxy for the risk-free rate in rate of return settings). This is because our expectation is that rates would fluctuate randomly so that returns would be above yields to maturity in some periods and below them in others. Thus, while it is true that utility returns are sensitive to interest rates, it is not true that interest rate risk will have a positive risk premium in an asset pricing implementation over the long run.

To examine the nature of bond market risk premiums, we calculate them over various time periods that correspond to some of those used previously to calculate the MERP. These results are reported in Schedule 4.D2 in Appendix 4D. As expected, over long periods, such as 1965-2002, the mean bond market risk premium is only 30 basis points, and it becomes negative over the three progressively longer time periods of 1957-2002, 1951-2002 and 1936-2002. While it is positive and quite material over the 1980-2002 period at 1.745%, this is offset by the relatively low MERP of 2.797%. Furthermore, according to our expectations, all of the mean bond risk premiums are not significantly different from zero at conventional levels. In contrast, the mean equity risk premiums are significantly different from zero for the two longest time periods of 1936-2002 (at 5% level) and 1951-2002 (at 12% level).

Looking forward we expect MERPs to be low, and we do not expect the bond market risk premium to be material (on the positive side) since interest rates are now at or near historic lows.

4.3.3 Long Canada Yield Estimate (input #3)

As discussed in Section 2, we have forecasted the midpoint of the range of the long-term Government of Canada bond rates to be 3.85% and 4.25% for the 2008 and 2009 test years.

4.3.4 The "Bare-bones" Cost of Equity Capital Recommendation

Based on a MERP estimate of 5.00% and at a relative risk factor of 50% of the S&P/TSX Composite index, the ERP required for our average-risk utility (i.e., our final estimate of input #1 multiplied by our final estimate of input #2) is calculated to be 2.50%. Given our point forecast of a long-term Government of Canada bond rate of 3.85% and 4.25% for the 2008 and 2009 test years (our final estimates of input #3), our "bare-bones" cost of equity capital point estimates are 6.35% and 6.75% for the 2008 and 2009 test years.

4.3.5 Adjustment to the "Bare-bones" Cost of Equity Capital Recommendation for an Average-risk Utility

Past practice in various regulatory jurisdictions considers the need to adjust from a market-value based rate of return to an accounting-based rate of return in order to preserve the financial integrity and financing flexibility of a utility such as our average-risk utility. The idea is that our average-risk utility should be allowed to maintain its market-to-book value ratio sufficiently above unity (the value of one) in order to attract investment and to recoup flotation costs associated with issuing new equity financing instruments.[76] The notion that each company should maintain a market value above book value is somewhat contradictory as it

[76] For example, see G.R. Schink and R.S. Bower, Application of the Fama-French model to utility stocks, in *Financial Markets, Institutions and Instruments; Estimating the Cost of Capital: Methods and Practice* 3:3 (1994), pages 74-95.

suggests that each company should plan to earn a return on new investments above the allowed rate of return. However, we can accept the notion that an additional premium should be included to preserve financial integrity and financing flexibility, and that an additional temporary premium may be warranted during times of heightened volatility in the capital markets and economy. Thus, we add a financial flexibility premium of 40 basis points to further ensure the financial flexibility of OPG for both test years, and a further 25 basis points for the 2008 test year to protect the financial integrity of OPG against any adverse impacts from the possibility of additional turmoil in the capital markets and the economy. This is based on our expectation that capital market conditions will normalize in 2009, as was explained in Section 2.

We also consider flotation costs as a justification for making an adjustment to the “bares bones” cost. While OPG neither has nor is expected to undertake public equity offerings due to its ownership by the Province, we make an adjustment to the “bare bones” cost to compensate the OPG for potential equity flotation costs which it could occur as a stand-alone entity.

We arrive at our flotation cost adjustment as follows. When firms issue or sell new equity to the market, they incur underwriting fees paid for marketing the issue, and other underwriting and issue expenses for legal and accounting services, printing of issuing documents, and applicable registration fees. Research on flotation or issuance costs for new equity issues for utilities in Canada over the five year period ending with 2001 finds that the median fee is 4% of gross proceeds for equity offerings (see Schedule 4.11). When the equity offering fees are amortized over a 50-year period, the annual adjustment needed to compensate the average-risk utility for potential equity flotation costs is about 8 basis points annually, which we round up to 10 basis points to cover other issue costs.

4.3.6 The Final Recommended Cost of Equity Capital for an Average-risk Utility

Putting all the parts together, we end this section of our evidence with our ROE recommendation for an average-risk utility of 7.10% and 7.25% for the 2008 and 2009 test years. Our ROE recommendation allows an average-risk utility to earn a risk premium (including the flotation cost and financial flexibility and integrity adjustments) of 325 and 300 basis points over our forecast for long Canada yields of 3.85% and 4.25% for the 2008 and 2009 test years.

5. TREND TOWARD USE OF GENERIC FORMULA-BASED ADJUSTMENT MECHANISMS FOR THE ANNUAL RESETTING OF THE ALLOWED ROE

5.1 PURPOSE OF GENERIC FORMULA-BASED ADJUSTMENT MECHANISMS

The primary purpose of generic formula-based adjustment (GFBA) mechanisms for the resetting of return on equity (ROE) is to avoid reviews consisting of formal proceedings of the allowed return on equity on a utility-by-utility basis at a frequency that could be as short as yearly.

5.2 USE OF GENERIC FORMULA-BASED ADJUSTMENT (GFBA) MECHANISMS BY CANADIAN REGULATORS

Six different regulatory jurisdictions in Canada use generic formula-based adjustment mechanisms for the annual resetting of return on equity (ROE) for all or some of the applicant utilities under their jurisdiction. Generic formula-based approaches for the determination of ROE have been in place in Canada since 1994 when the BCUC (British Columbia Utilities Commission) and the NEB (National Energy Board) both adopted them.[77] They also are currently in use in Alberta, Manitoba, Newfoundland and Labrador and Ontario.[78] Nova Scotia currently follows the traditional practice of conducting hearings. In Quebec, the Régie de l'Enérgie adopted a formula for Gaz Metropolitain but not for Hydro Quebec.[79]

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[77] British Columbia Utilities Commission, Return on Common Equity Decision, June 10, 1994, Order G-35-94; National Energy Board, Multi-Pipeline Cost of Capital, RH-2-94; National Energy Board's Reasons for Decision, TransCanada Pipelines Limited RH-4-2001, June 2002.
[78] Alberta Energy and Utilities Board, Generic Cost of Capital, Decision 2004-052, July 2, 2004; Manitoba Public Utilities Board Order 49095, p. 50; Newfoundland & Labrador, Orders No. P.U. 16 and 36 (1998-99) and No. P. U. 18 (1999-2000); Ontario Energy Board Draft Guidelines on a Formula-Based Return on Common Equity for Regulated Utilities, March 1997.
[79] Quebec Régie de l'Énergie, D-99-11, R-3397-98, February 10, 1999.

Three of these boards have reviewed and retained their annual ROE adjustment formulas during the past three years. The BCUC reviewed its formula in a March 2006 decision for Terasen Gas in which it lowered its adjustment factor to a 75 basis point adjustment to the allowed return for each one percent change in the long Canada bond yield. The OEB reviewed its formula in December 2006 when it decided to apply its formula for determining the allowed ROE to electricity distributors. In Decision D-2007-116, which was rendered on October 15, 2007, the Quebec Régie on page 10 of an English version of section 4.1 of its decision "renewed the automatic ROE adjustment formula to be in application as of the year 2009, according to the terms and conditions established in Decision D-99-11". However, the Quebec Régie did reset both the risk-free starting rate and marginally increased the own risk premium by 14 basis points due to increased competition from electricity (i.e., for residential space demand from Hydro Quebec).

5.3 TWO APPROACHES FOR ESTABLISHING THE ALLOWED RATE OF RETURN AND ITS ASSOCIATED DEEMED CAPITAL STRUCTURE USED BY CANADIAN REGULATORS

Canadian regulators generally use one of two approaches to determine the allowed return on equity (ROE) and its associated deemed capital structure (equity ratio). The first approach, which is used by the EUB (now called the AUC), NEB and OEB, begins with a determination of the allowed ROE for a benchmark utility of *average* risk that is applicable without any further return adjustment to all applicant utilities. This is followed by a determination of the capital structure (equity ratio) for each applicant utility based primarily on its relative business risk determined by the relative weight and import of various business risk determinants but also on its stand-alone investment grade debt rating (usually chosen from the range of BBB+ to A). This approach approximately equates the total risks of all subject utilities to both themselves and to the benchmark ROE if it is implemented correctly. Under this approach, regulators can change the deemed capital structure in utility-specific proceedings to reflect changes in business risks, and annually change the allowed ROE for all utilities using a GFBA mechanism.

The second approach, which is used by the British Columbia Utilities Commission (BCUC), begins with a determination of the allowed ROE for a benchmark utility of *low* risk that becomes the starting or base ROE for the determination of the allowed ROE for specific applicant utilities. This is followed by a determination of a ROE adjustment and deemed capital structure (equity ratio) for each applicant utility based primarily on its relative business risk but also on its stand-alone investment grade debt rating (usually chosen from the range of BBB+ to A). This approach is somewhat more difficult to implement since equating the total risks of all applicant utilities to both themselves and to the (low risk) benchmark used to estimate the unadjusted or starting ROE requires the simultaneous determination of both a reasonable equity ratio as well as a ROE adjustment to the starting ROE. The ROE adjustment under this approach is usually a ROE premium or kicker since the applicant's total risk with the chosen deemed capital structure is deemed to be higher than that for the low-risk utility benchmark. Under this approach, regulators can change both the deemed capital structure and ROE in utility-specific proceedings to reflect changes in business and total risks. However, unlike the first approach, the second approach does not eliminate the time and cost involved in preparing testimony on what is an appropriate ROE at each utility-specific regulatory proceeding.

5.4 GENERIC FORMULA-BASED ADJUSTMENT (GFBA) MECHANISMS USED IN CANADA

All of the GBFA mechanisms currently in use in Canada are based on an initial or seed or starting year ROE. This involves the determination of two components that when added together provide the initial ROE. The first component is the risk-free rate as proxied by the rate on the benchmark long-term (30-year) Government of Canada bond. The second component is the equity risk premium for an average-risk utility in five jurisdictions and a low-risk utility in BC.

The adjustment mechanism then specifies how the ROEs for subsequent years change from the base ROE. The only new input into the adjustment mechanism is a new forward-looking forecast of the risk-free rate. Given this new input, a formula adjustment factor is then used to adjust the ROE on a yearly basis. A 75% adjustment factor is primarily used in the Canadian jurisdictions that rely on this ROE resetting mechanism.[80] If the adjustment factor is set at 0.75, then the annual change in the allowed ROE is 75% of the change in the forecast long-term Government of Canada bond yield.

The actual implementation of a GFBA mechanism can be demonstrated by describing the NEB approach. To obtain the starting ROE, the NEB procedure takes the average 3-month out and 12-month out forecasts of 10-year Government of Canada bond yields as reported in the November issue of *Consensus Forecasts* (Consensus Economics, Inc., London, England.) To this, the NEB adds the average daily spread between 10-year and 30-year Government of Canada bonds as reported in the *National Post* for October to obtain its starting 30-year Canada rate. This procedure provides the starting risk-free rate component of the starting allowed ROE. To get the final starting allowed ROE, an equity risk premium of 300 basis points is added to the determined 30-year Canada rate to get the final starting allowed ROE for the sample of pipeline companies.

[80] In 2006, the BCUC moved from a 100% adjustment for a forecast long Canada yield below 6.0% and a 75% adjustment factor for a forecast long Canada yield above 6%. Terasen Gas Inc./Terasen Gas (Vancouver Island) Inc. – Application to Determine the Appropriate Return on Equity “ROE”) and Capital Structure and to Review and Revise the Automatic Adjustment Mechanism (Order Number G-14-06), page 16.

In order to incorporate the belief of the NEB (as is the case for all other regulatory jurisdictions using a GFBA mechanism) that equity risk premiums decrease when rates on 30-year Canada's are rising and increase when rates are falling, the NEB adopted an adjustment mechanism that allows for the ROE to be adjusted upwards or downwards by 75% of the subsequent annual increases in the consensus estimates of the rate on long Canada's (when calculated using the above procedure).

The formulas currently in use work well in reducing ROE volatility with changing risk-free rates and are simple to implement. However, these formulas are grounded on limited old peer-reviewed scientific evidence on what are the determinants of changes in equity risk premiums. In fact, the peer-reviewed scientific literature identifies other variables as being better predictors of changes in risk premia, such as the dividend yield on a market index like the S&P500 or S&P/TSX Composite or the default spread as measured by the yield spread between long corporates and long governments (i.e., sovereign government bonds with a long term to maturity). While these other predictors are superior technically, they are more contentious and technically difficult to implement.

5.5 PROS AND CONS OF GENERIC FORMULA-BASED ADJUSTMENT (GFBA) MECHANISMS

There are three main advantages to the use of a properly formulated and fairly seeded GFBA mechanism. First, such mechanisms reduce the regulatory burden that occurs when ROEs are determined on a utility-by-utility basis for typical rate-setting proceedings. Second, a GFBA mechanism reduces the cost of ROE determination. Since the determination of the unobservable ROE can be subject to wide differences of expert opinion, considerable applicant and intervenor time and cost are incurred in expert testimony preparation, information requests, cross-examination and preparation of final argument. The process also expends considerable Board resources. Third, a GFBA mechanism increases the predictability and reduces the arbitrariness of allowed returns. All else held constant, this should lower the risk profile of an applicant utility as compared to its risk profile under the old traditional approach to rate setting.

However, if an improperly formulated and/or unfairly seeded GFBA mechanism is used, then the allowed ROE may unfairly advantage either the utility or its customers. If it results in too high of an ROE, this enriches the shareholders of the utility at the expense of its customers. Similarly, if it results in too low of an ROE, it favours the customers over the shareholders of the utility, and may even jeopardize the financial integrity, flexibility and cost at which the utility can raise funds.

5.6 POTENTIAL NEED TO RESEED A GENERIC FORMULA-BASED ADJUSTMENT (GFBA) MECHANISM

Any disadvantages of a GFBA mechanism can be alleviated if provisions are available for either utilities or customers to seek a review of the GFBA mechanism in order to reseed it at a different initial ROE and/or to realign its adjustment factor. For example, if a utility is near a downgrade to speculative grade for its regulated activities, then the utility should have the right to seek a review of the GFBA. Furthermore, concerns about financial flexibility and increased business risk can be addressed by requesting a change in the deemed capital structure at utility-specific proceedings. However, since the process for intervenor intervention is generally reactive and not proactive, there appears to be little opportunity for ongoing oversight by potential intervenors of whether the current ROE is too high until a utility applies to the regulator to reset the allowed ROE.

5.7 RECOMMENDATION FOR A GENERIC FORMULA-BASED ADJUSTMENT (GFBA) MECHANISM FOR OPG

We recommend that the OEB implement a GFBA mechanism for OPG given the three main advantages to the use of a properly formulated and fairly seeded GFBA mechanism discussed above.

6. CRITIQUE OF EVIDENCE SUBMITTED BY MS. MCSHANE

6.1 OVERVIEW

In this section of our evidence, we critique the evidence of Ms. McShane dealing with the 2008 and 2009 recommended ROE and capital structures for OPG. The primary purpose of this critique is three-fold. First, it is to present the similarities and the differences between the recommendations made by Ms. McShane and us for the forecast of the 30-year Canada yield and the rate of return on equity for an average-risk utility, and the equity ratios and ROE for OPG for each of the two test years. Second, it is to show which adjustments made or not made to various standard methodologies by Ms. McShane result in her ROE and equity ratio recommendations being different than ours. We show that these adjustments or non-adjustments consistently inflate the recommended values for the ROE and the equity ratios of Ms. McShane compared to our recommendations. Third, it is to compare the recommendations for the return on equity for OPG against that which would be obtained by using the adjustment formulas presently in use by a number of Canadian regulators.

We begin by comparing the test year forecasts of the 30-year Canada yield advanced by Ms. McShane for OPG and ourselves. We show that her forecasts are higher because they are based on dated inputs. If these lower rates persist, we expect the forecasted long Canada rates to be lower when Ms. McShane files her update prior to the hearing.

We then proceed to the first major area of disagreement, namely, the equity ratio for OPG for the two test years. We examine the methodologies employed in determining common equity ratios (ranges) by Ms. McShane and show that they are flawed. As a result, her recommendations are overly generous when viewed in the context of the business risks of the hydro and nuclear businesses of OPG. In particular, we show that Ms. McShane's unsupported view that OPG would require a stand-alone bond rating of at least A- inflates her recommended common equity ratio. We also demonstrate that the quantification exercise in her evidence lacks a theoretical foundation and is without merit. Finally, we note the lack of any derivation of the recommended equity ratio from individual ratios for OPG's hydro and nuclear businesses. Without such a foundation, Ms. McShane's recommendation lacks credibility.

We then proceed to the third major area of disagreement, namely, the rate of return on equity or ROE for the two test years. We show that the implementation of various standard methodologies for estimating the ROE by Ms. McShane for OPG consistently lead to inflated ROE estimates. After we demonstrate the impact of introducing or not dealing with known biases in the evidence of Ms. McShane, we conclude that with the correction for all of these biases, the fair rate of return estimates made by Ms. McShane are quite close to our own recommended rates.

This is followed by tests of whether Ms. McShane's control sample of 20 Canadian industrials and whether a sample of Canadian utilities satisfied the comparable return standard based on realized returns. Based on *ex post* tests of risk-adjusted returns, we find that both samples have exceeded the minimum requirements for the comparable return standard in that they have earned abnormal or "free lunches". For this purpose, we use test methodologies that satisfy all four Daubert criteria for evaluating the admissibility (scientific merit) of expert testimony that has been adopted by federal and many state courts in the U.S.

We end this sub-section with a comparison of the recommendations for the ROE for the two test years by Ms. McShane for OPG and ourselves against the estimates that would be obtained if they were calculated using the various adjustment formulas presently in use by some Canadian regulators. Our recommendation reflects the current trend towards a lower MERP.

The comparison indicates that our own recommendations represent a reasonable choice should the Board wish to embrace our argument and adjust to the new market regime. However, if the Board wishes to move more cautiously, it could choose to set the allowed equity return for an average-risk utility in the range between our recommendation and the average of the regulatory formulas. Either way, our examination of the regulatory formulas and other evidence suggests that the Board should attach little weight to the ROE recommendations of Ms. McShane for OPG.

6.2 RATE FORECASTS FOR 30-YEAR CANADA'S

Ms. McShane uses a methodology similar to ours although there are some differences in the details of implementation.[81] She first obtains a forecast for 10-year Canada's from *Consensus Forecasts* (published by Consensus Economics) and then adds an estimate of the average spread of 30-year Canada's over 10-year Canada's. Her forecasts, 4.7% for the 2007 test year and 5.0% for the 2008 test year, are higher than ours. Ms. McShane indicates that she will update her interest rate forecasts before the hearing.

There are two areas in which Ms. McShane's implementation techniques differ from our own – the forecast used for 10-year Canada's and the spread calculation. Beginning with the 10-year forecast, we draw ours from the March 10, 2008 issue of *Consensus Forecasts* (published by Consensus Economics) while Ms. McShane's forecasts are from the August 13, 2007 issue. Because interest rate forecasts have been reduced, her numbers are higher. As a result, we expect that her updated forecasts will be lower.

The second step involves adding a spread to the forecasts of 10-year Canada's to obtain forecasts for 30-year Canada's for 2008 and 2009. We first

[81] Ms. McShane's Evidence, EB-2007-0905, Exhibit C2, Tab 1, Schedule 1, page 24 of 261.

measure this spread as the actual average over the most recent quarter (first quarter 2008) for which data are available. Recognizing that this estimate may be biased upward if markets settle and the yield curve flattens later in 2008 and 2009, we estimate the spread as 25 basis points for 2008 and 15 basis points for 2009. In contrast, Ms. McShane appears to be using the spread over the most recent month (August 2007) for her estimate of zero referring to "a relatively flat yield curve". This tends to reduce her estimate slightly. The difference between Ms.McShane's informal spread estimate and our use of historical numbers has only a minor impact on the forecast. Nonetheless, it is important to note that our approach is more consistent with regulatory practice.

6.3 CAPITAL STRUCTURE

6.3.1 Overview of Critique of Capital Structure Evidence

The framework employed by Ms. McShane for determining a recommended capital structure is similar to ours with regard to the topics covered. First, she assesses the business risks of OPG's hydro and nuclear operations. Second, her analysis addresses an appropriate target bond rating and its implications for capital structure. Third, Ms. McShane's discussion then turns to financial risk and ratio measures. Fourth, her evidence examines the capital structures of other utilities in Canada as well as of generation utilities in the U.S. Fifth, Ms. McShane develops a framework for "quantification of the common equity range … based on the application of two capital structure theories".[82] Sixth, she draws on all five types of analyses to recommend a common equity ratio of 57.5%.

Our evidence on capital structure covers all the same areas with one exception. We omit the fifth area of analysis because it is conceptually flawed. In this section we provide a critique of the second, fourth and sixth steps in Ms. McShane's evidence detailing the errors in analysis. In addition, we address her

[82] Ms. McShane's Evidence, EB-2007-0905, Exhibit C2, Tab 1, Schedule 1, page 95 of 261.

fifth step and show why the approach used therein is without merit. We do not address the first step (business risk) and the third (financial risk) as these are critiqued in Section 2 or our evidence.

6.3.2 Target Bond Rating for OPG

Ms. McShane is mistaken when she argues that a rating of A- or higher is necessary for a Canadian utility. In Section 3 of this evidence, we show that BBB ratings are sufficient for the profitable functioning of a number of utilities in Canada. Further support for this view comes from Ms. McShane's reply to Pollution Probe Interrogatory #54 which asks:[83]

> " Ms. McShane expresses the "concern … that a BBB rated utility would, at times, be completely shut out of the long-term (30-year) debt market". In footnote 86 she gives an example of Fortis as a Baa3 rated utility that experienced difficulties. In Schedule 26, Ms. McShane includes 6 additional companies that are rated below A by at least one bond rating agency: EPCOR, Newfoundland Power, Nova Scotia Power, Pacific Northern Gas, Union Gas and Westcoast Energy.
>
> Please provide all evidence/materials of which Ms. McShane is aware of regarding difficulties accessing financing experienced by any of these six additional companies with a rating of BBB."

The response was:

> "Ms. McShane is not aware of any specific financing issues that the referenced companies, other than Pacific Northern Gas, have faced…"

[83] Ms. McShane's Response to Pollution Probe Interrogatory #54, EB-2007-0905, Exhibit L, Tab 12, Schedule 54, page 1 of 2.

Further, it is interesting to note that Ms. McShane creates a sample of U.S. generation utilities for analysis which she describes as follows:[84]

> "The selected sample includes 21 utilities with an average S&P debt rating of BBB (Moody's rating of Baa2), and an average proportion of generation to total assets of 48%. Sixteen of the 21 utilities have nuclear generation."

She goes on to use this sample to derive her estimate of "high generation beta" and to attempt to quantify the appropriate common equity ratio. We explain the fallacy in this methodology below. Here we note that this sample is used without any reference to possible difficulties that might arise due to the average BBB rating. We conclude that such "difficulties" are not material.

Finally, the emphasis on preserving a target bond rating of A- or higher is misplaced in light of the mistakes made by bond rating agencies in the current global credit crisis as discussed in Section 3 above. Ms. McShane confirms these errors in her response to the following Pollution Probe Interrogatory #55:[85]

> "In light of her emphasis on the views of rating agencies, please have Ms. McShane explain if there exists any evidence to suggest that the views of these agencies could be subject to error."

Her response was as follows:

> "Yes, there have been circumstances in which the rating agencies have misestimated the risk of firms or securities; e.g., with respect to the recent sub-mortgage crisis, the rating agencies underestimated the risk of many mortgage-backed securities."

[84] Ms. McShane's Evidence, EB-2007-0905, Exhibit C2, Tab 1, Schedule 1, page 92 of 261.
[85] Ms. McShane's Response to Pollution Probe Interrogatory #55, EB-2007-0905, Exhibit L, Tab 12, Schedule 55, page 1 of 1.

6.3.3 Capital Structures of Other Utilities

Ms. McShane conducts two sets of comparisons in her analysis of peer companies. First, she identifies TransAlta Utilities and TransAlta Corporation as Canadian peer generation companies. We question the appropriateness of the comparison to OPG for two reasons. First, as Ms. McShane notes, TransAlta Utilities and TransAlta Corporation are not regulated. Second, they use different fuels in generation. Setting aside the issue of appropriateness of the comparison, we note Ms. McShane's comment on the ratings of these companies and the implications for an appropriate capital structure:[86]

> "Moreover, since the ratings of TransAlta Utilities are split (A(low) by DBRS and BBB+ by S&P) and the ratings of TransAlta Corporation are both in the BBB category, they provide some insight into what would be warranted for a BBB rating, but not for an A rating. For a BBB rating, the TransAlta capital structures are indicative of a common equity ratio (based solely on a debt/equity split) of approximately 50% for a generating company."

Ms. McShane notes that 50% common equity is sufficient for what she regards as a peer company to obtain a BBB rating. Based on our analysis above and in Section 3 showing that a BBB rating is high enough for a utility to function normally, her statement suggests that the common equity ratio of 57.5% that she recommends is unnecessarily high.

6.3.4 Quantification of the Common Equity Ratio

Drawing on her "residual beta model" and two stylized theories of capital structure, Ms. McShane derives a range of common equity ratios.[87] The analysis is misleading for two reasons. First, the two theories vastly oversimplify the state

[86] Ms. McShane's Evidence, EB-2007-0905, Exhibit C2, Tab 1, Schedule 1, page 89 of 261.
[87] Ms. McShane's Evidence, EB-2007-0905, Exhibit C2, Tab 1, Schedule 1, pages 91-96 of 261.

of current research on capital structure as summarized in Appendix 3.A. Second, based on this oversimplification of capital structure theory, Ms. McShane attempts a financial "mission impossible": quantification of the common equity ratio. We discuss each of these reasons in turn.

Appendix 3.A reviews current research on capital structure theory beginning with the trade-off theory, the formal academic terminology for the approach to determining capital structure taken in this evidence. The name describes the central idea of this theory: firms determine a target optimal capital structure by balancing the tax-reduction benefits of debt against the expected costs of financial distress and loss of financial flexibility. The appendix reviews the standing of this theory in the academic literature and its following among financial executives.

The main conclusions of our review are three-fold: first, among academic researchers, the trade-off theory enjoys reasonable support but faces serious challenges from a number of competing theories. Second, while it has moderate support among financial executives, a recent survey in the U.S. shows that executives look outside the implications of this theory when setting capital structures for their firms. Third, and most important, while the trade-off theory can offer useful qualitative guidance, it is a mistake to treat capital structure as if it were amenable to precise analysis by a formula.

These conclusions show that Ms. McShane's quantification of capital structure lacks a valid theoretical foundation as well as any practical justification. In addition, as we show in Section 3, it contradicts the views of Canadian regulators who have accepted that capital structure analysis must be qualitative.

6.3.5 Recommended Capital Structure for OPG

Ms. McShane recommends a common equity ratio in the range of 55 to 60% (midpoint 57.5%) for “OPG’s regulated operations”.[88] Although she distinguishes between the business risks of OPG’s hydro and nuclear generation, her analysis fails to demonstrate how her recommended capital structure is derived from combining appropriate capital structures for each of OPG’s regulated businesses. In contrast to the analysis in Section 3 of this evidence, there is no breakdown of capital structures by business segment comparing each against appropriate benchmarks.[89] The lack of such a breakdown, combined with the theoretical and implementation shortcomings detailed above, seriously undermine the credibility of Ms. McShane’s capital structure recommendation.

6.4 FAIR RATE OF RETURN ESTIMATES: OVERRIDING COMMENT

We obtain ERP estimates above 30-year Canada's that are substantially lower than those entered into evidence by Ms. McShane for OPG. Ms. McShane arrives at overly generous estimates of both the betas for an average-risk utility, and of the magnitude or size of the ERP required to adequately compensate equity investors for bearing this level of risk. Basically, we find that Ms. McShane:

- adjusts her beta estimates when she should not;
- does not adjust her market equity risk premium (MERP) estimates for its time-series decline due to the significant reduction in trade costs (e.g., commissions and bid-ask spreads), the benefits of easier and less costly diversification both across investment classes and internationally, and the near consensus view that not only is the realized MERP an overestimate of the MERP that investors expected historically, but also that the forward-

[88] Ms. McShane’s Evidence, EB-2007-0905, Exhibit C2, Tab 1, Schedule 1, page 97 of 261.
[89] Ms. McShane provides some supplementary analysis on this point in her response to Pollution Probe Interrogatory #2, EB-2007-0905, Exhibit L, Tab 12, Schedule 2, pages 1 to 3.

looking MERP is expected to be significantly lower than that realized in the past;

- chooses an inappropriate time period to focus on to calculate *ex post* MERP;[90] namely the post-World War II period whose early years are not representative due to rapid economic and equity market exuberance due to the satisfaction of pent-up demand for consumer goods and infrastructure (e.g., roads, schools and hospitals), the existence of interest rate controls, the absence of a Canadian money market to price fixed income securities, and the rapid growth in exports due to Canada's participation in the U.S.-led reconstruction of a war-ravaged Europe; and
- Recommends a ROE for OPG of 10.5% for the two test years that not only represents a 550 basis points premium over her forecast for 30-year Canada's of 5% but exceeds the average mid-term forecasts of investment professionals of 8% for the expected mid-term total return on the market (as proxied by the S&P/TSX Composite Index) that is reported in the survey results authored by Mercer and by Watson Wyatt.

Ms. McShane uses three methods for estimating the rate of return in her evidence for OPG. They are the Equity Risk Premium Method, Discounted Cash Flow Method and Comparable Earnings Method.[91] As we subsequently discuss, her implementation of the first two approaches has several serious shortcomings, and her use of the Comparable Earnings Method is without scientific justification and cannot be implemented without introducing serious biases.

[90] Ms. McShane's Evidence, EB-2007-0905, Exhibit C2, Tab 1, Schedule 1, page 28 of 261.
[91] Ms. McShane's Evidence, EB-2007-0905, Exhibit C2, Tab 1, Schedule 1, page 2 of 261.

6.5 FAIR RATE OF RETURN ESTIMATES FROM MS. MCSHANE'S IMPLEMENTATION OF THE EQUITY RISK PREMIUM METHOD

6.5.1 MERP Estimation Problems

6.5.1.1 Choice of Return Series for Determining the MERP

Ms. McShane uses the historic average MERP for Canada, the U.S. and the U.K. over the period 1947-2006. This results in an inappropriate estimate of the MERP going forward. First, the chosen time period results in an inflated estimate of the going-forward likelihood of achieving the high realized returns on equities and low realized returns on bonds that followed World War II. This period began with rapid economic growth due to pent up demand from the war period and administered low interest rates. The MERP that Ms. McShane estimates for Canada for the 1947-2006 period is materially impacted by the first four years of this period. To illustrate, the annual average over the first four years (1947-1950) are 7.69% for the Consumer Price Index, 1.38% for long Canada bonds, 0.46% for 91-day Canadian Treasury Bills and 20.88% for the equity market index. The result is an annual average MERP over this four-year period of 19.50%!

Second, minimal or no weight is placed on the declining trend of MERPs for the three markets over this time period. Third, no adjustments are made for differences in risks across the market proxies used to calculate the MERP in the different countries. Fourth, no adjustments are made for the effect of equity re-valuations over this period of time. Mr. Arnott and Mr. Bernstein (2002) find that a good part of the realized MERP over this period was caused by rising valuation multiples. Specifically, Mr. Arnott and Mr. Bernstein (2002) report that the U.S. price-to-**dividend** multiple increased from 18 to 70 times from 1926 to 2001, with most of the increase in the last 17 years of this period.[92] The most recent (2008) price-to-dividend multiple that reflects the drop in the U.S. market is still over 42

[92] Robert D. Arnott and Peter L. Bernstein, 2002, What risk premium is "normal"?, *Financial Analysts Journal* 58:2 (March/April), pages 64-85.

times. Thus, an adjustment needs to be made unless one believes that price-to-dividend multiples will exhibit a similar two-fold-plus increase over the next 59 years.

While Ms. McShane is correct that the various smoothed annual market returns in the 3 pages of her Schedule 4 have not changed much over time, such is not the case for Long Government Bond Returns and, more importantly, the MERP. Using her 25-year rolling average market returns from page 1 of her Schedule 14, the Canada and U.S. risk premia are 9.8% and 11.7% for 1947-1971, 4.2% and 3.8% for 1962-1986 and -1.0% and 2.8% for 1982-2006, respectively. Using her increasing average market returns from page 2 of her Schedule 4, the Canada and U.S. risk premia are 9.9% and 11.7% for 1947-1971, 7.9% and 8.4% for 1947-1986, and 5.4% and 7.0% for 1947-2006, respectively. Using her increasing market returns from page 3 of her Schedule 4, the Canada and the U.S. risk premia are 5.4% and 7.0% for 1947-2006, 2.5% and 3.8% for 1962-2006, and -1.0% and 2.8% for 1982-2006, respectively. In other words, all of the series she presents indicate a steady decrease in the MERPs in both Canada and the U.S. It also vividly illustrates why the choice of 1947 as the starting point for determining the MERP results in a maximum MERP.

In a subsequent section, we compare each of the three tables in Ms. McShane's Schedule 11 for the Canadian and U.S. market indexes with each corresponding table in Ms. McShane's Schedule 4 for the utility sub-indexes. We show that the returns and risk premia for the S&P/TSX Composite Index are overshadowed by the returns and risk premia for the S&P/TSX Utilities Index for Canada, and the returns and risk premia for either the S&P/Moody's Electric or Gas Distributors Indexes approach the returns and risk premia for the U.S market as proxied by the S&P500 Index.

6.5.1.2 Validity of Using Risk Premia from Other Country Markets

There are at least three major problems with placing some weight on non-Canadian MERP in order to estimate the required Canadian MERP for calculating the required own ERP for an average-risk utility or for OPG. First, this approach ignores the benefits from international diversification. While the expected return of adding markets is linear, the risk is not linear in the risks of the individual markets unless all of the markets are perfectly correlated. In turn, the required MERP for bearing (reduced) domestic risk is reduced in an international context. Second, this approach makes no adjustment for the differences in the non-diversifiable or even in the total risks of the various market proxies used in this process. The reduction in total risk from international diversification is substantially higher for the Canadian market proxy than for the U.S. market proxy given the much smaller size of the Canadian market (i.e., about 2% to 3% of the world market). Third, based on recent empirical evidence published in a peer-reviewed scientific journal by Drs. He and Kryzanowski, the contribution of the U.S. market to the explanation of the returns for the Canadian utilities sector is not statistically significant. Thus, no weight should be placed on U.S. equity returns or risk premiums when estimating the going-forward MERP for Canadian utilities.[93]

6.5.1.3 Validity of Placing Sole Reliance on Arithmetic Mean Returns and MERPs

Although Ms. McShane reports both types of averages, she does not appear to use the geometric mean in any of her estimations of the MERP. Thus, given mixed evidence on which type of average is best in a forward-looking sense, she adopts the polar position that results in the highest going-forward MERP. We also use the arithmetic mean MERP in obtaining our going-forward MERP estimate. However, we also present a weighted-average of the arithmetic and

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[93] Z. He and L. Kryzanowski, Cost of equity for Canadian and U.S. sectors, *North American Journal of Economics and Finance* 18:2 (August 2007), pages 215-229.

geometric means as a further benchmark to further demonstrate that our estimate is conservatively high. We do this because there are advocates for three possible approaches; namely, the use of the arithmetic mean only, the use of the geometric mean only, and the use of a weighted average of both types of means. As we noted in Section 4, fairness dictates that some non-zero weight should be placed on both averages when there is no consensus on which polar position is best.

We now discuss the two polar positions. The references that are often cited in terms of the use of the arithmetic mean include the Brealey and Myers' basic finance textbook, *Principles of Corporate Finance*, and the Ibbotson Associates publications. As Dr. Ritter notes in the first paragraph of his article published in a peer-reviewed scientific journal:[94]

> "When I started teaching at the University of Pennsylvania's Wharton School over twenty years ago, I used the very first edition of the Brealey and Myers textbook. The book had some mistakes in it, as almost all books do. For example, the first two editions had an incorrect formula for the valuation of warrants."

Dr. Ritter then goes on to focus on some of the conceptual mistakes that need to be corrected in what some academics teach in introductory finance courses, including the use of arithmetic rather than geometric mean returns. He concludes that the correct average return will be closer to the geometric (compounded) average than the arithmetic (simple) average if there is mean reversion in stock returns and/or mean aversion in bond returns.[95] Furthermore, since the difference between the arithmetic and geometric averages usually is higher for stocks than bonds, this inflates estimates of risk premia based on historical data.

[94] Jay R. Ritter, 2002, The biggest mistakes we teach, *The Journal of Financial Research* 25:2 (Summer), page 159.
[95] Jay R. Ritter, 2002, The biggest mistakes we teach, *The Journal of Financial Research* 25:2 (Summer), page 160.

In Section 4 and Appendix 4.A of our evidence, we provide numerous reasons why the historical MERP should not be measured using only the arithmetic mean return. We provide a multitude of evidence that concludes that a weighted average of the arithmetic and geometric means should be used. Our evidence includes the more advanced textbook by Drs. Campbell and Viceira, *Strategic asset allocation: Portfolio choice in long-term investors* (2002), articles published in major finance peer-reviewed journals, such as the *Journal of Finance*, *Journal of Financial Research*, and the *Journal of the American Statistical Association*, by Drs. Fama, French, Ritter, Blume, Indro, and Lee, amongst others; and support or non-objection by the participants at the *AIMR Risk Forum* by Drs. Campbell, Siegel, and Ibbotson, amongst others. Nevertheless, **we opt for a very conservative position where we estimate the historical MERP using the arithmetic annual mean MERP and use a weighted-average that favors the arithmetic annual mean MERP over the geometric annual mean MERP as a benchmark for our estimate to provide one measure of how conservatively high our estimate is**.

6.5.1.4 Ms. McShane Provides Evidence in Support of the Use of the Geometric Mean MERP

In section 4.3.1.1.1 of our evidence, we note that recommendations for using the arithmetic mean MERP estimate from historical data as a going-forward estimate depend upon the validity of returns being normal IID or independently and identically distributed over the estimation period, and that the validity of this assumption depends upon the ratio of the standard deviations of equity market returns and long Governments not exhibiting mean reversion or aversion as the return measurement interval gets longer.

Ms. McShane has provided evidence that supports our evidence that Canadian stock returns exhibit mean reversion and long Canada's exhibit mean aversion. Schedule 6.1 is drawn from her evidence for 25-year holding periods and supplemented by our calculations for one-year holding periods because she does not provide the standard deviations or return ranges for the one-year returns that she reports for the 1947-2006 time period. Based on Schedule 6.1, we find that while stocks are more risky than long government bonds in both the Canadian and U.S. markets for a one-year holding period as shown by ratios greater than one in the fourth column of Schedule 6.1, stocks are less risky than long government bonds in both markets for the 25-year holding periods used by Ms. McShane as shown by ratios less than one in the last (right-most) column of Schedule 6.1. Thus, while Ms. McShane argues that the use of the arithmetic mean is justified based on the one-year forward unpredictability of returns on page 143 of her evidence, she uses the 25-year rolling window data that exhibits mean reversion for equity returns and mean aversion for bond returns to argue that the “historic equity market returns have not exhibited a secular upward or downward trend” and the “total bond returns have experienced an upward trend” on page 147 of her evidence.[96]

6.5.2 Beta Estimation Problems

Ms. McShane argues that unaltered utility betas are not very reliable because they became “decoupled” from the overall equity market.[97] The word decoupling (or its counterpart recoupling) merely describes the strength of the correlation between the returns of utilities and the market when their individual risks remain unchanged and/or the changes in their relative risks when the strength of their correlation remains unchanged. For example in the former case when the returns on utilities become less correlated with the returns on the market (i.e., the correlations move towards zero), Ms. McShane describes this as being a decoupling. However, a lowering of the correlation between the returns of utilities and the market would be expected if regulators are focusing on rate stability

[96] Ms. McShane’s Evidence, EB-2007-0905, Exhibit C2, Tab 1, Schedule 1, page 147 of 261.
[97] Ms. McShane’s Evidence, EB-2007-0905, Exhibit C2, Tab 1, Schedule 1, pages 33 and 34 of 261.

while all else is held constant. In the extreme case where the returns on utilities did not vary, the correlations and, hence, the betas of the utilities would be equal to zero.

6.5.2.1 The Use of Adjusted (Inflated) Betas in Estimating Own ERP

Ms. McShane uses the Value Line (and not the Merrill Lynch) method to adjust (inflate) her unadjusted betas upwards.[98] Value Line's beta adjustment procedure is quite simple in that it is a weighted average of the firm's unadjusted beta and the market beta of 1, where the weight placed on each is two-thirds and one-third, respectively. Since (Canadian) regulated utilities almost always have unadjusted betas less than one, a Value Line type of adjustment almost always results in an adjusted beta that is higher than its corresponding unadjusted beta, or what is more properly referred to as an "inflated" beta.

6.5.2.1.1 The merits of adjusting (inflating) betas

Adjusted betas were discussed in Section 4 of our evidence, where they were shown to be inappropriate for Canadian utilities. One justification proposed for the use of this adjustment method is the argument that utility betas tend to revert to a hypothesized true value of one (i.e., the market beta) over time.[99] In other words, it is formulated around the belief that an average-risk regulated Canadian utility, which is considered to be of low risk in an overall market context, has the same relative risk as the market index as proxied by the S&P/TSX Composite Index, which is considered to be of average risk in an overall market context.

In section 4.3.2.5 of our evidence, we provide six substantive reasons why this is not the case for a sample of utilities, including evidence that using an

[98] Ms. McShane's Evidence, EB-2007-0905, Exhibit C2, Tab 1, Schedule 1, starting on pages 35 of 261.
[99] Ms. McShane's Response to Pollution Probe Interrogatory #19, EB-2007-0905, Exhibit L, Tab 12, Schedule 19, page 1 of 1. She also acknowledges that she is not aware of any empirical evidence that supports mean reversion for Canadian betas in the same response.

adjusted beta to forecast future betas results in a substantial over-estimate of actual realized betas. Value Line type betas are based on a dated empirical study that found that the average U.S. equity beta for all the stocks in the U.S. market regresses towards the market's or sample's beta of 1. This has to be true by construction since the market beta itself is by definition equal to one and is by definition equal to the weighted average of the betas of all the stocks in that market. In contrast, utility-specific studies find that a forecast of a U.S. equity utility beta is improved by either reflecting the tendency of utility-specific betas to regress to the sample average for utilities or incorporating estimation error into the derivation of the beta estimate.[100] Mean reversion implies that the mean will be reached at some point in time, and fairly quickly given an assumed reversion rate of one-third. In fact in section 4, we showed that the rolling five-year average beta had become negative and was now positive but not above 0.5 (never mind one) for our sample of utilities since the later 1990s. This is hardly the behavior that would occur if the average sample beta had a tendency to regress towards the market beta of one.

Since Ms. McShane basically uses the sample average utility beta as her estimate of the beta for an average-risk utility, no adjustment is needed to offset the tendency of the beta of a specific utility to regress to that same sample average utility beta. Ms. McShane should not have adjusted (inflated) the unadjusted sample betas. Furthermore, as we have shown in Section 4 of our evidence, Ms. McShane's beta mid-point estimate of 0.675 (range of 0.65-0.70)[101] is higher than the highest five-year mean beta of 0.583 for our sample of utilities (i.e., for the 1990-1994 or 1991-1995 period), and is substantially higher than the five-year mean beta of 0.421 for our sample of utilities for the 2003-2007 period. This period coincides with the time during which Ms. McShane notes that there was a recoupling of utilities with the general market between utility stocks

[100] We refer to a recent study by Drs. He and Kryzanowski using the Kalman filter approach for Canadian sectors. Z. He and L. Kryzanowski, Dynamic betas for Canadian sector portfolios, *International Review of Financial Analysis*, in press.
[101] Ms. McShane's Evidence, EB-2007-0905, Exhibit C2, Tab 1, Schedule 1, page 36 of 261.

and the S&P/TSX Composite.[102] Thus, while the beta values proposed by Ms. McShane are beyond the upper end of the range of possible beta values based on historical values, we have chosen to use a beta value of 0.5 as our point estimate that is above the longer-term mean of that range, and above the shorter-term mean of that range.

We do not agree with the argument by Ms. McShane that the provision of adjusted betas by various service vendors justifies the use of adjusted betas. We note that many vendors provide products that are devoid of both theoretical and empirical justification. The studies by Drs. Kryzanowski and Jalilvand, Gombola and Kahl, and others cited in Section 4 of our evidence, provide support for the tendency of the betas of utilities to regress toward their grand utility mean and not toward the grand or market average of 1.0. However, since Ms. McShane already effectively uses the grand utility mean for her benchmark utility, properly accounting for the tendency to regress to itself would not change the unadjusted or unaltered beta estimate for the benchmark utility.

Dr. Damodaran, the author of many textbooks, states that "it can be argued that the beta looking forward will be different from the historical beta" even if the latter is well estimated if the firm has changed in terms of business and financial risk. He states that "[o]ne simplistic way of adjusting historical betas is to assume that betas will move towards one in the long term and adjust beta estimates towards one", and then provides what he considers to be more accurate ways of estimating forward looking betas than using historically estimated betas.[103] Once again, it is important to emphasize that this is only for the case where the business and financial risks of the firm have materially changed. It also is important to emphasize that, by extension, Dr. Damodaran would suggest a reduction in the historically estimated beta if the firm has undergone a material

[102] Ms. McShane's Evidence, EB-2007-0905, Exhibit C2, Tab 1, Schedule 1, page 33 of 261.
[103] A. Damodaran, Discussion issues and derivations, under his section 4. Available at: Hhttp://pages.stern.nyu.edu/~adamodar/New_Home_Page/AppldCF/derivn/ch4deriv.html#ch4.3H , and accessed on December 11, 2002.

lowering of its business and financial risks and all else remains constant. Thus, using a Value Line adjusted beta in this case would move the historically estimated beta in the wrong direction.

As further support for our position that unadjusted betas should remain unaltered, we note that tests and applications of asset pricing models (like the CAPM) that are published in the peer-reviewed scientific literature do not use Value Line type of adjusted betas. This literature includes numerous studies by Fama and French, amongst others, about whether or not the traditional CAPM is empirically supported.[104] Furthermore, we are not aware of any use of adjusted (inflated) betas in applications of event study methods in academic research or in practice.[105]

6.5.2.1.2 Impact of using adjusted (inflated) betas on the ERP estimates of utilities

After multiplying her inflated beta estimate of 0.65-0.70 with her inflated MERP estimate of 6.5%, Ms. McShane concluded that the "indicated benchmark utility equity risk premium is approximately 4.25-4.50%".[106] Using the corresponding upper end of the range of the corresponding unadjusted or unaltered beta estimate for the benchmark utility of 0.48 yields a revised estimate of the own ERP of the benchmark of 3.1%, or a reduction of over 26% from her estimate of 4.25% using her estimation method. This is assuming, for the moment, that Ms. McShane's estimate of the MERP is not similarly inflated. Of course, we showed previously that Ms. McShane' MERP estimate is also too high.

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[104] Eugene F. Fama and Kenneth R. French, 1996, The CAPM is wanted, dead or alive, *Journal of Finance* 51:5 (December), pages 1947-1958; Eugene F. Fama and Kenneth R. French, 1995, Size and book-to-market factors in earnings and returns, *Journal of Finance* 50:1, pages 131-155; Eugene F. Fama and Kenneth R. French, 1996, Multifactor explanation of asset pricing anomalies, *Journal of Finance* 51:1 (March), pages 55-84; and James L. Davis, Eugene F. Fama and Kenneth R. French, 2000, Characteristics, covariances, and average returns: 1929 To 1997, *Journal of Finance* 55:1 (February), pages 389-406.
[105] Event-study methods are used extensively in class action litigation by expert witnesses for both the plaintiff and the defendant to estimate price inflation due to misrepresentation or fraud.
[106] Ms. McShane's Evidence, EB-2007-0905, Exhibit C2, Tab 1, Schedule 1, page 37 of 261.

6.5.2.2 The Validity of the CAPM

6.5.2.2.1 The empirical evidence provided by Ms. McShane against the CAPM

The empirical tests of the CAPM conducted by Ms. McShane are unreliable in that they do not examine the cross-sectional nature of the conditional return-risk relationship postulated by the CAPM, and do not conform to any of the accepted methodologies for testing the CAPM.[107] Ms. McShane could not provide any references to the peer-reviewed literature that provide support for the methodology that she used to test the relationship between beta and return in the Canadian equity market. Specifically, her response to Pollution Probe Interrogatory #34 was:[108]

> "Ms. McShane's analysis was not constructed based on a peer-reviewed methodology. It is a simple correlation between betas and returns which demonstrates that over a long period of time, the betas of lower and higher risk sectors of the economy and the returns they have achieved have not conformed to the relationship predicted by the CAPM, leading to the conclusion that depending on a raw beta to predict the expected return is problematic at best."

Based on a survey of a large sample of U.S. corporations, Graham and Harvey (2001, 2002) find that the:[109]

> "Capital Asset Pricing Model (CAPM) was by far the most popular method of estimating the cost of equity capital: 73.5% of respondents always or almost

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[107] Ms. McShane's Evidence, EB-2007-0905, Exhibit C2, Tab 1, Schedule 1, starting on the bottom of page 154 of 261.
[108] Ms. McShane's Evidence, EB-2007-0905, Exhibit C2, Tab 1, Schedule 34, page 1 of 1.
[109] John Graham and Campbell Harvey, How do CFOs make capital budgeting and capital structure decisions?, *Journal of Applied Corporate Finance* 15:1 (Spring 2002), page 12. This article was a practitioner version of the following paper that won the Jensen prize for the best *JFE* paper in corporate finance in 2001: John Graham and Campbell Harvey, The theory and practice of corporate finance: Evidence from the field, *Journal of Financial Economics* 60 (2001).

always used it. The second and third most popular methods were average stock returns and a multi-factor CAPM, respectively. Few firms used a dividend discount model to back out the cost of equity."

6.5.2.2.2 The empirical evidence based on tests of the CAPM

Earlier studies that found biases in the CAPM typically used U.S. 90-day Treasury bills as a proxy for the risk-free rate. These studies found that the estimated intercept of the Security Market Line or SML was above this choice of risk-free rate, and that the estimated slope of the SML was smaller than the difference between the mean return on the market proxy and the mean return on T-Bills (i.e., the MERP measured relative to the T-Bill rate). More recent studies find strong support for the zero-beta version of the CAPM where the estimated intercept is the return on the zero-beta portfolio and for conditional forms of the CAPM. The expectation of the CAPM is that the return on the zero-beta portfolio should exceed the return on T-Bills.[110] The use of the higher long Canada rate as the proxy for the risk-free rate instead of the 30- or 90-day Treasury Bill rate is consistent with these empirical findings.

The use of the higher long Canada rate when constructing the SML increases the intercept of the SML and also flattens the slope of the SML. This implies that an over or double adjustment for the same empirical phenomenon if one makes a further adjustment to the beta to account for a flatter-than-expected SML. Thus, this represents another unsupported rationale that some experts use to adjust their beta estimates upwards for a sample of utilities or to attack the validity of the CAPM. In Appendix 6.A, we discuss the type of adjustment that should be made if, for the sake of argument, one accepted that there should be an adjustment for the early empirical evidence of a flatter-than-expected SML.

[110] Robert F. Stambaugh, 1982, On the exclusion of assets from tests of the two-parameter model: A sensitivity analysis, *Journal of Financial Economics*, November, pages 237-268.

Although a number of older studies do not support the unconditional (or single period) version of the traditional CAPM, the empirical evidence for multifactor or conditional CAPM is much stronger.

The U.S. literature includes the study by Drs. Pettengill, Sundaram and Mathur (1995) that explains the not significant beta-return relation that is observed when the unconditional beta is used. [111] When they use a constant beta model that is conditioned on up and down markets, they find significant risk premiums for both types of betas. Drs. Pettengill, Sundaram and Mathur (2002) find significant risk premiums for both types of betas for constant risk and dual beta models that are conditioned on the market return.[112] For up markets, they find an insignificant premium for the Fama and French book-to-market equity factor for both models and a marginally significant premium for the Fama and French size factor for only the constant risk beta model. For down markets, they find significant premiums for both Fama and French factors for both models.

Very recent studies by Drs. Ang, Hodrick, Xing and Zhang (2006 forthcoming) strongly demonstrate that for 23 developed markets (including the U.S.) over a sample period that spans January 1980 to December 2003 that only the market factor is consistently priced.[113] Furthermore, the small-minus-big capitalization factor and the high-minus-low book-to-market factor are often insignificant and often have the wrong sign predicted by Drs. Fama and French (1993).[114]

Drs. He and Kryzanowski (2006) find that the significant beta-return relation that is observed when the unconditional beta is used for Canada is well

[111] G.N. Pettengill, S. Sundaram and I. Mathur, The conditional relation between beta and returns. *Journal of Financial and Quantitative Analysis*, 30 (1995), pages 101–115.
[112] G. Pettengill, S. Sundaram and I. Mathu, Payment for risk: Constant beta vs. dual-beta models, *The Financial Review* 37:2 (May 2002), pages 123-136.
[113] A. Ang, R.J. Hodrick, Y. Xing and X. Zhang, The cross-section of volatility and expected returns. *Journal of Finance*, 61:1 (2006a), pages 259–299; and A. Ang, R.J. Hodrick, Y. Xing and X. Zhang, High idiosyncratic volatility and low returns: International and further U.S. evidence., forthcoming *Journal of Financial Economics*.
[114] E. F. Fama and K.R. French, Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics* 33 (1993), pages 3-56.

explained by the inverse beta-return relation that is expected when the realized market returns are below the zero-beta rate.[115] In particular, while the estimated risk premiums are significant with their expected signs for up- and down-market betas, the estimated risk premium during down-markets dominates the risk premium during up-markets in both magnitude and significance. They also identify significant size and liquidity premiums, although the latter is small in magnitude.

6.5.2.2.3 Implications for determining allowed ROE

It is incorrect to equate the Equity Risk Premium Estimation Method with the CAPM. Although the use of equity risk premiums in finance pre-dates the CAPM, the use of beta as a measure of priced risk can be derived from the CAPM.

However, the intuitions behind the conditional CAPM or one factor asset pricing model are used by many experts in determining the equity rate of return since they provide an updated estimate of the utility-specific measure of risk, MERP and prospective long Canada yield in their successive testimonies. Furthermore, their historical estimates of risks and equity risk premiums are estimated for various time periods in order to assess the time-series movement in these important inputs for determining their recommended ROE. In contrast, Ms. McShane argues that no expert has used a conditional approach in implementing the Equity Risk Premium Estimation Method. Specifically, quoting Ms. Mc Shane's response to Pollution Probe Interrogatory #30:[116]

> "The simple CAPM model used to estimate the cost of equity is a static model. Conditional models of the CAPM essentially hypothesize that betas and risk premiums are time varying. The empirical work that has been done using conditional models suggests that a conditional model may explain more

[115] Z. He and L. Kryzanowski, The cross section of expected returns and amortized spreads, *Review of Pacific Basin Financial Markets and Policies (RPBFMP)* 9: 4 (December 2006), pages 597-638.
[116] Ms. McShane's Evidence, EB-2007-0905, Exhibit C2, Tab 1, Schedule 30, page 1 of 1.

of the cross-section of market returns. However, Ms. McShane is not aware of any practical applications of a conditional CAPM, and has never seen such a model proposed for, or used to, estimate the cost of equity for a regulated company."

6.5.2.2.4 Decisions by regulatory commissions

There are regulatory commissions, boards or régies that have reached a similar conclusion regarding the selective use of the empirical evidence for the CAPM to adjust the beta of the utility upwards. These regulatory entities have addressed the validity of using a model to implement an upward beta adjustment that is commonly referred to as the Empirical CAPM or ECAPM. Specifically, the Public Utilities Commission of the State of California in "D.99-06-057 rejected the ECAPM financial model because it artificially raises the ROE requirement".[117] Similarly, in its decision for Hydro Quebec Distribution, the Régie de l'Enérgie found insufficient support for the use of the ECAPM. It also reaffirmed its earlier decision against the use of adjusted betas, and indicated that it did not support estimates obtained using the comparable earnings method or the DCF for individual firms.[118]

6.5.2.3 No Downward Beta Adjustment with the Use of U.S. MERP

We stated earlier that Ms. McShane not only adjusted betas when she should not have but also did not adjust betas when she should have. Ms. McShane uses the MERP estimates obtained from the Ibbotson Historical return data for the U.S., along with other estimates, to obtain an estimate of the MERP. She then applied her beta estimate of 0.65-0.70 to her MERP estimate to obtain an own

[117] As noted on pages 24 and 33 in the Proposed decision of A.L.J. Galvin (mailed 10/8/2002), Interim opinion on rates of return on equity for test year 2003 before the Public Utilities Commission of the State of California, Application of Pacific Gas and Electric Company for authority to establish its authorized rates of return on common equity for electric utility operations and gas distribution for test year 2003. (U39M), application 02-05-022, filed May 8, 2002. Available at: Hhttp://www.cpuc.ca.gov/published/comment_decision/19761.htmH.
[118] Régie de L'énergie du Québec, D é c i s i o n, Demande relative à la détermination du coût du service du Distributeur et à la modification des tarifs d'électricité, phase I, D-2003-93, R-3492-2002, 21 mai 2003, pages 71-73.

ERP estimate for an average-risk Canadian utility. Thus, she effectively used the same beta estimate for both her Canadian MERP estimates and her U.S. MERP estimates. Thus, Ms. McShane's use of an implicit scheme for weighting MERP from the U.S. and Canadian markets ignores the fact that the beta of a utility is different for each market proxy, and differs in a domestic-only context from that in an international context. As noted by Dr. René Stulz, a former editor of the *Journal of Finance*, "globalization reduces the beta of all companies whose profits and values are more strongly correlated with their local economies than with the global economy".[119] One would expect this to be the case for the portion of OPG whose ROE is regulated by the Board.

6.6 FAIR RATE OF RETURN ESTIMATES FROM MS. MCSHANE'S IMPLEMENTATION OF THE DCF ESTIMATION METHOD

6.6.1 Optimism Bias in Forecasts of Analysts

Ms. McShane uses the forecasts of analysts in her DCF analyses for individual utilities.[120] Numerous studies show that analysts' forecasts are optimistic. One could argue that the DCF cost of equity will be an unbiased estimate of investors' expected returns if investors believe the forecasts, and price the securities accordingly. However, this would attribute considerably irrationality to investors in that they believe forecasts that they know have an optimistic bias. Such irrationality would invalidate a basic assumption of using the DCF method to estimate the cost of equity; namely, that prices are fair. Fair prices are needed to obtain estimates of fair rates of return for utilities using the DCF method.

[119] René M. Stulz, Globalization, corporate finance, and the cost of capital, *Journal of Applied Corporate Finance* 12:3 (Fall 199), page 12.
[120] E.g., Ms. McShane's Evidence, EB-2007-0905, Exhibit C2, Tab 1, Schedule 1, page 40 of 261.

In support of the relevance of the forecasts, one could refer to a number of dated studies that find that the forecasts of analysts are better than the use of time-series methods to forecast future growth rates. However, this is no longer the case. To illustrate, the most recent study referenced by Ms. McShane was published about 19 years ago.[121] First, the information disclosure playing field has been leveled in both the U.S. and Canada as companies are now restricted from disclosing information first to financial analysts and then to the general public. Second, as has been discussed at length in the press, analysts are generally overly optimistic in their forecasts to facilitate the underwriting side of their business, and, more importantly, to maintain access to the firms that they cover. Third, forecasting accuracy has not been a criterion in retaining analysts, at least in more recent years where the emphasis has been on the revenue they generate for their employers. Fourth, as is discussed next, the optimism bias in analyst forecasts has been significant.

It is well documented in the published literature that the bottom-up market forecasts of financial analysts and top-down market forecasts of market strategists contain an optimism bias, and that the bottom-up forecasts tend to be much more optimistic than their top-down counterparts. We discuss three representative studies next. Chopra (1998)[122] finds that the average consensus earnings per share growth forecasts made by analysts for the S&P500 index over the 1985-1997 time period is almost twice the actual growth rate. Chung and Kryzanowski (2000)[123] find a significant optimism bias in bottom-up and top-down forecasts of earnings per share by analysts for the S&P500 index for the current fiscal year (FY1) and subsequent fiscal year (FY2).[124] They find that the optimism

[121] Ms. McShane's Evidence, EB-2007-0905, Exhibit C2, Tab 1, Schedule 1, page 164 of 261.
[122] V. K. Chopra, Why so much error in analysts earning forecasts? *Financial Analysts Journal*, 54:6 (1998), pages 35-42.
[123] R. Chung and L. Kryzanowski, Market timing using strategists' and analysts' forecasts of S&P500 earnings, *Financial Services Review*, 8:3 (2000).
[124] Similarly, Chung and Kryzanowski (1999) find that the quarterly EPS forecasts for the S&P400 and S&P500 are, on average, optimistically biased for the top-down forecasts of market strategists that are reported to I/B/E/S. R. Chung and L. Kryzanowski, Accuracy of consensus expectations for top-down earnings per share forecasts for two S&P indexes, *Applied Financial Economics* 9 (1999), pages 233-238.

bias is significantly higher in the bottom-up forecasts compared to the top-down forecasts on average. They examine the 218 months of such annual forecasts over the period from January 1982 through February 2000. The bottom-up forecasts of financial analysts exhibit a statistically significant mean optimism bias of 17.5% and 30.5% for the next and subsequent fiscal years (FY1 and FY2), respectively.

In a paper published in the *Journal of Finance* in 2003, Drs. Chan, Karceski and Lakonishok conclude that:[125]

> “There is no persistence in long-term earnings growth beyond chance, and there is low predictability even with a variety of predictor variables. Specifically, IBES growth variables are overly optimistic and add little predictive power.”

They also observe that (p. 672):

> “Notably, analysts’ estimates are quite optimistic over the period 1982 to 1998, the median of the distribution of IBES growth forecasts is about 14.5 percent, a far cry from the median realized five-year growth rate of about 9 percent for income before extraordinary items.”

They find that the level of over-optimism in the IBES forecasts varies somewhat but is substantial across all their five quintiles of firms. Based on the results presented in their table IX (p. 673), the over-optimism bias is still high at about 4.0% for quintile 1, which consists of the firms in their lowest growth grouping of firms. The actual and forecasted growth rates for income before extraordinary items are 2.0% and 6.0% for their quintile 1 group, where utilities are 25% of the membership in this quintile. This is a 200% overestimate when measured against the actual annual rate of growth of 2.0% for this quintile of firms.

Analysts have been criticized for the aggressive “hyping” of stocks. The research director of the world’s largest securities firm told its analysts to be more

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[125] Louis K.C. Chan, Jason Karceski and Josef Lakonishok, 2003, The level and persistence of growth rates, *Journal of Finance* 58:2 (April), page 643.

critical.[126] Charles Hill, director of research at Thomson Financial/First Call noted that only 1.8% of all current stock recommendations are "sells", even in a bear market. He went on to complain that the compensation packages of many analysts are tied too closely to the performance of the lucrative investment banking operations of the major brokers. The aversion of analysts to make sell recommendations is not confined to one sector or time period, and is ongoing. A recent article published on Bloomberg.com notes that even with a 10% decline in the S&P500, "analysts' recommendations to "buy" or "hold" U.S. shares climbed to 94.5 percent, the highest rate in more than five years".[127]

6.6.2 Need to Adjust for Optimism Bias in Forecasts of Analysts

Even if the recommendations of analysts influence market prices as Ms. McShane argues, this does not mean that investors do not make decisions after removing some or a great part of the bias inherent in such forecasts. In fact, a number of studies published in peer-reviewed scientific journals report evidence that investors make adjustments for predictable bias (e.g., Freeman and Tse, 1992; Dugar and Nathan, 1995, Han, Manry and Shaw, 2001).[128] Furthermore, the following question comes to mind: Why use earnings growth forecasts of investment analysts who use a "bottom-up" approach to generate extremely noisy and upwardly biased estimates of future return expectations when you can directly obtain the future return expectations of investment professionals from both the buy and sell sides of the market using "top-down" and not "bottom-up"

[126] Dave Ebner, Merrill Lynch tells analysts to be more critical, *Globe and Mail*, March 7, 2002, page B18.
[127] M. Tsang and E. Martin, Schwab Asks Who Needs Analysts After Biggest Flub (Update4), Bloomberg.com, April 7, 2008. Available at: http://www.bloomberg.com/apps/news?pid=20670001&refer=home&sid=aafbjqdWG7pQ.
[128] R. N. Freeman and S.Y. Tse, A nonlinear model of security price responses to unexpected earnings, *Journal of Accounting Research* 30:2 (1992), pages 185-209; A. Dugar and S. Nathan, The effect of investment banking relationships on financial analysts' earnings forecasts and investment recommendations, *Contemporary Accounting Research* 12:1 (1995), pages 131-165; and B. H. Han, D. Manry, and W. Shaw, Improving the precision of analysts' earnings forecasts by adjusting for predictable bias, *Review of Quantitative Finance and Accounting* 17:1 (2001), pages 81-98.

approaches, as we have done in our evidence for the market proxy (our fourth estimation method)?

In response to Pollution Probe Interrogatory #21, Ms. McShane quotes from a decision by the BCUC that concludes that the forecasts by Value Line have no bias since Value Line is an independent research firm that neither buys nor sell securities, and that I/B/E/S forecasts have no bias because their forecasts are similar to those of Value Line.[129] This conclusion suffers from two errors in logic. First, analyst bias depends primarily upon the need for the analyst to maintain access to the management of the firms being covered, and this depends upon being firm-friendly and not upon whether or not the analyst's employer buys or sells securities. Second, the conclusion does not follow from the empirical evidence on analyst bias that has been published in peer-reviewed journals.

Thus, we do not advocate the use of "bottom-up forecasts" for individual firms in the determination of ROE recommendations because such forecasts tend to be optimistic, sometimes excessively optimistic, and the amount of the bias varies in an unknown fashion over time.

6.6.3 Does Ms. McShane Adjust for Optimism Bias in Forecasts of Analysts

Since Ms. McShane does not adjust for optimism in the forecasts of analysts,[130] we conclude that the estimates obtained using the DCF-based risk premium test conducted by Ms. McShane result in ERP estimates for individual firms that are too unreliable to be used as a proxy for the fair required return on equity capital. If the optimism bias is removed, such ERP estimates provide some very noisy indicative (or secondary) information about the fair required return on equity capital.

[129] Ms. McShane's Response to Pollution Probe Interrogatory #21, EB-2007-0905, Exhibit L, Tab 12, Schedule 21, page 1 of 1.
[130] Ms. McShane's Response to Pollution Probe Interrogatory #21, EB-2007-0905, Exhibit L, Tab 12, Schedule 21, page 1 of 1.

6.6.4 Problems with the Use of DCF Estimates of Fair Return from a Sample of Utilities

Ms. McShane generates DCF estimates of a fair return on equity for various samples of utilities.[131] Discounted cash flow (DCF) tests have a number of disadvantages that make them unreliable when applied to specific firms in the same industry. First, the DCF test depends critically on estimating the expected growth rate. Error in capturing the growth rate impacts directly on DCF estimates. Because estimates of the growth rate depend on past growth and/or analyst opinion, it is difficult to achieve any measure of precision. Furthermore, if firms are drawn from the same or similar industries, the growth rate errors will tend to be correlated, and the benefits in terms of forecast precision from an increasing sample size will be greatly reduced. Highly correlated forecast errors across individual firms in the same or similar industries arise due to the fact that analysts specializing in the same industry will make such forecasts.

Second, circularity also causes a problem in applying the DCF approach to individual firms in regulated industries. Analysts base their analysis of the future growth in earnings and dividends on the rate of return allowed by regulatory bodies, which translates into the market price for the shares. If we, in turn, rely solely on the market price and dividend growth rate for our required return on equity, then we are being influenced by the market, which, in turn, is being influenced by the regulator's decision. Thus, by employing the DCF method, we would, in effect, be anticipating what the market is expecting the regulators to do thus introducing circularity.

Third, the DCF model assumes that returns are set competitively, and that no excess returns or "free lunches" are possible. If investors are on average overcompensated for the investment risk they bear for investing in regulated

[131] Ms. McShane's Evidence, EB-2007-0905, Exhibit C2, Tab 1, Schedule 1, Appendices D and E, starting on page 159 of 261.

utility stocks, then the DCF model will generate implied returns that are too high. Ms. McShane provides evidence of such excess returns to Canadian utility investors. Specifically, she reports an annual arithmetic mean return of 12.6% for Canadian utilities over the 1956-2006 period.[132] This 12.6% mean annual return is materially higher (140 basis points annually) than the arithmetic mean annual return of 11.2 percent for the Canadian market over the same time period based on data from the CIA.

6.7 FAIR RATE OF RETURN ESTIMATES FROM MS. MCSHANE'S IMPLEMENTATION OF THE COMPARABLE EARNINGS METHOD[133]

6.7.1 Deficiencies in the Comparable Earnings Methodology that Make it Unsuitable for ROE Determination

6.7.1.1 Introduction

The Comparable Earnings Estimation Method arises from the notion that capital should not be committed to a venture unless it can earn a return commensurate with that available prospectively in alternative ventures of comparable risk. While capital needs to be allocated efficiently so that the risk-adjusted returns are equivalent across firms and uses, the Comparable Earnings Test does not measure if this is the case. The Comparable Earnings Test measures rates of return but does not compare them with the opportunity cost of capital as is commonly done with measures such as Economic Value Added or the measures used to measure the allocational efficiency of secondary markets. Thus, we conclude that this Method should not be used as a tool to estimate a fair rate of return on equity for a utility.

[132] Ms. McShane's Evidence, EB-2007-0905, Exhibit C2, Tab 1, Schedule 1, Schedule 10, page 227 of 261.
[133] Ms. McShane's Evidence, EB-2007-0905, Exhibit C2, Tab 1, Schedule 1, Appendix F, starting on page 168 of 261.

Drs. Brigham, Shome and Vinson state that the comparable earnings method "has now been thoroughly discredited (see Robichek [15]), and has been replaced by three market-oriented (as opposed to accounting-oriented) approaches …".[134] Furthermore, there is widespread agreement among utility and intervenor witnesses and Boards that the Comparable Earnings Test is not appropriate for determining a fair rate of return.[135] For example, in 1999, the Alberta Energy and Utilities Board stated:[136]

> "In the Board's view, the comparable earnings test is sensitive to accounting practices of the sample firms, the sample selection, the selected business cycle and discontinuities caused by mergers, divestiture or restructuring. Given the historical corporate restructuring and economic uncertainty, which may adversely affect the test results, the Board gives little weight to the comparable earnings test in this proceeding for the purposes of determining an appropriate rate of return."

The Alberta Energy Utilities Board has re-iterated its position on the merits of the Comparable Earnings Method in a subsequent decision on the application by AltaLink and TransAlta as follows:[137]

> "Accordingly, for all of the above reasons, the Board continues to consider that the comparable earnings method is not appropriate and, hence, gives no weight to the comparable earnings method in this proceeding for the purposes of determining the appropriate equity rate of return."

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[134] E. F. Brigham, D. K. Shome and Steve R. Vinson, 1985, The risk premium approach to measuring a utility's cost of equity, *Financial Management* (Spring), pages 33-45.
[135] The direct testimony of Dr. M.J. Vilbert for TransAlta Utilities Corporation, May 2000, is an example of a utility witness, and the direct testimony of Drs. L.D. Booth and M.K. Berkowitz for TRANSCO, August 2000, is an example of intervenor witnesses.
[136] Alberta Energy Utilities Board Decision U099099, November 25, 1999, page 326.
[137] Alberta Energy and Utilities Board, August 2003, Decision 2003-061: AltaLink Management Ltd. and TransAlta Utilities Corporation Transmission Tariff for May 1, 2002 – April 30, 2004, TransAlta Utilities Corporation Transmission Tariff for January 1, 2002 – April 30, 2002, page 115.

Despite this widespread agreement against its use, Ms. McShane places a significant weight on the results of applying the Comparable Earnings Method when determining her recommended fair rate of return on common equity for OPG.

6.7.1.2 The Widespread Agreement Against the Use of the Comparable Earnings Estimation Method is Based on a Number of Problems with its Use

The basic problem with the use of the Comparable Earnings Estimation Method is that there is neither a theoretical underpinning nor any empirical support for the comparable earnings approach to estimating a regulated fair rate of return for a utility. As an *ad hoc* approach to estimating a regulated fair rate of return, there are no agreed-upon rules for deciding upon how the Comparable Earnings Estimation Method should be implemented.

Furthermore, the Comparable Earnings Estimation Method does not satisfy any of the four Daubert criteria for evaluating the admissibility (scientific merit) of expert testimony that has been adopted by federal and many state courts in the U.S. They are: (1) whether the methods upon which the testimony is based are centered upon a testable hypothesis; (2) the known or potential rate of error associated with the method; (3) whether the method has been subject to peer review and publication; and (4) whether the method is generally accepted in the relevant scientific community, particularly in terms of the non-judicial uses to which the scientific techniques are put.[138] This is confirmed by Ms. McShane in her response to Pollution Probe Interrogatory #40 as follows:[139]

[138] For a more extensive discussion of this U.S. Supreme court decision, see, for example: Stephen Mahle, The Impact of *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, on Expert Testimony: With Applications to Securities Litigation, April 1999. Available at: http://www.daubertexpert.com/basics_daubert-v-merrell-dow.html.
[139] Ms. McShane's Response to Pollution Probe Interrogatory #40, EB-2007-0905, Exhibit L, Tab 12, Schedule 40, page 1 of 1.

> "(a) - (g) The comparable earnings test is specifically applicable to utilities that are regulated on an original cost book value basis, for the specific purpose of adherence to the fairness standard. The limited purpose of the test is in stark contrast to the CAPM or DCF tests, which are more generally applicable across industries, used to estimate the required or expected rate of return on market values. Thus, it would be unlikely that the comparable earnings test has been subject to the types of peer review suggested in the question. Nevertheless, the importance of adherence to the fairness standard in setting the ROE (return on equity) and capital structure for regulated utilities regulated on the basis of original cost warrants giving weight to the comparable earnings test to properly take account of the unique construct."

We will now review some of the problems encountered in implementing a Comparable Earnings Estimation Method.

First, there is no agreement on how long and what time period should be used in the test. Some analysts use a full business cycle while others use a fixed time period of five or ten years. The results tend to be sensitive to the choice of the time period. To illustrate, although Ms. McShane states that "the appropriate period for measuring industrial returns should encompass an entire business cycle",[140] her sample period of 1994-2006 does not cover a complete business cycle. Specifically, in her response to Pollution Probe Interrogatory #26 she states that:[141]

> "The period 1994 - 2006 is not based on an official definition of a business cycle, which traditionally is measured from trough to trough. The most recent trough in the official business cycle in Canada ended in 1992, with 1993

[140] Ms. McShane's Evidence, EB-2007-0905, Exhibit C2, Tab 1, Schedule 1, Appendix F, page 169 of 261.
[141] Ms. McShane's Response to Pollution Probe Interrogatory #26, EB-2007-0905, Exhibit L, Tab 12, Schedule 26, page 1 of 1.

continuing to reflect the hang-over of the effects of both the deep recession and the ongoing restructuring of the economy in part arising out of the provisions of NAFTA and thus relatively anemic growth (2.3 percent). The period 1994 - 2006 does not include a year of technical recession, since unlike the U.S., Canada did not experience a recession in 2001. The period does, however, include three years of slowdown, as demonstrated in the annual growth rates provided below, and a balance of years of expansion (above trend growth), economic downturns and growth at approximately trend (average) levels."

Second, samples drawn from the same population vary considerably for the same expert even when they are drawn in close time proximity. To illustrate this bias, four of the 20 firms (i.e., 20%) used by Ms. McShane in her 11/07 sample for OPG were not in her 11/06 sample for the Northwest Territories Power Corporation although none were delisted over the period. This 20% change in the sample over a one-year period highlights the *ex post* selection bias associated with the Comparable Earnings Estimation Method.[142]

Third, there is no agreement on how structural changes in the economy or a number of economic sectors should be dealt with. Furthermore, structural changes may invalidate the usefulness of past rate of return series for predicting future expected rates of return.

Fourth, the predictive usefulness of historical time series of accounting rates of return on equity appears to remain untested. Unlike equity returns that are forward looking in that they incorporate expectations, (accounting) rates of return on equity are backward looking.

[142] Ms. McShane's Response to Pollution Probe Interrogatory #39, EB-2007-0905, Exhibit L, Tab 12, Schedule 39, page 2 of 2.

Fifth, as an accounting-based measure, comparable earnings will only coincide with the investor's opportunity cost (desired rate of return) by accident. There is no conceptual reason to expect that comparable earnings represent a rational expectation of an investor's desired rate of return from investing in the firm.

Sixth, as an accounting-based measure, comparable earnings are subject to variations in the quality of earnings caused by accounting reinstatements, business combinations and divestitures, accounting choice of what is extraordinary, accounting choices of what is expensed and what is capitalized, and managerial choices about accounting practice. The time-varying use of "aggressive accounting" by firms makes earnings numbers not very reliable for determining ERP.

Seventh, Comparable Earnings Tests suffer from survivorship and selection biases since they tend to be retrospective. This tends to inflate the average rates of return found for the comparable sample. For example, none of the firms in the Canadian sample used by Ms. McShane failed to reach the end of the time period that she examined. In reality, even low-risk firms have a material probability of failure over a 13-year period if they are not subject to regulation.

Eighth, the Comparable Earnings Test is very dependent upon the criteria or screens used to select the sample members. Most analysts use accounting-based risk proxies to screen possible candidate firms. These screens are an attempt to identify a sample that is similar in risk to the low risk utilities. These accounting-based risk proxies measure total risk and not the systematic risk which is important to diversified investors. Thus, some firms with a high systematic risk survive the screening process. Some of the screens, such as ones that screen out firms with a high coefficient of variation for book returns, bias performance upwards. The coefficient of variation of book (or accounting) returns measures the uncertainty of returns divided by the mean return. Its inverse is a Sharpe-like measure of performance that provides the mean return per unit of standard deviation. High Sharpe-like ratios indicate better performance. For example, the CAPM (Capital Asset Pricing Model) assumes that the MERP per unit of standard deviation of return (essentially the Sharpe ratio) is positive and constant.[143] Thus, screening out firms with high coefficients of variation tends to screen out firms with low performance based on the Sharpe-like measure. Stated differently, the coefficient of variation of book returns screen retains firms that are most desired from an investor's viewpoint given their high return-to-variability ratios. Such firms include those with the market power to earn sustainable economic rents. In the sample of Canadian industrials used by Ms. McShane, she fails to screen out dual-class shares. The result is that almost one-half of her sample consists of dual-class shares where the subordinated shareholders' claims to earnings may have been enhanced to compensate for their subordinated voting power.

Ninth, the screens used by some experts produce comparable samples with an average price-to-book ratio and an average price-to-earnings ratio that exceeds that of a typical utility. We know from basic valuation theory that the price-to-earnings ratio increases with increasing return-on-equity, and that the price-to-book ratio also increases with increasing return-on-equity. Thus, given this positive relationship between return-on-equity and both the price-to-earnings ratio and the price-to-book ratio, it should not be surprising that the average return-on-equity for the comparable sample exceeds that of the sample of utilities. A higher price-to-book ratio is an indication that investors think a firm has opportunities to earn a rate of return on their investment that exceeds the market

[143] The literature using the Sharpe ratio to measure portfolio performance using market (not accounting) data is extensive. This literature includes S. Lalancette, L. Kryzanowski and M.C. To, Performance attribution using an APT with pre-specified macrofactors and time-varying risk premia," *Journal of Financial and Quantitative Analysis* 32:2 (June 1997), page 205-224; S. Lalancette, L. Kryzanowski and M.C. To, Performance attribution using a multivariate intertemporal asset pricing model with one state variable," *Canadian Journal of Administrative Sciences* 11:1 (March 1994), page 75-85; and L. Kryzanowski and A.B. Sim, Hypothesis testing with the Sharpe and Treynor portfolio performance measures given non-synchronous trading," *Economic Letters* 32 (1990), page 345-352.

capitalization rate. While Canadian Boards have appeared to be generous to utilities when viewed in hindsight, there is still an upper cap on how much their rate of return can exceed their true cost of capital. A higher price-to-earnings ratio is an indication that investors think that a firm has considerable and profitable future growth opportunities.

Tenth, while the current cost of new capital is based on current market values and inflation causes deviations between book and market values on the asset side, inflation also decreases the real value of long-term liabilities and part of the interest payment that represents a payment to debt holders for the depreciation of the real value of their holdings (i.e., a return of capital) is tax deductible. Thus, if the comparable earnings test were to be used, one would have to remove the benefit that utilities receive from the decrease in the real value of their liabilities resulting from inflation, and the tax benefit the utilities receive from the "interest" payments which represent a return of capital and not a return on capital. As firms with relatively higher debt ratios, the sum of both of these items is likely to be material.[144] Furthermore, much of the deviation between book and market values of assets for firms, including utilities, is caused by rates of return exceeding the cost of capital. The abnormal returns identified for Canadian utilities support this statement.

Eleventh, unlike the sample of non-utility comparables, regulated utilities are fully compensated for the actual cost of debt through the regulatory process even when they have a high embedded cost of debt.

Twelfth, and finally, as explained in Section 3 of our evidence, the use of regulatory deferral accounts reduces the business risk of utilities below that of comparable non-utilities.

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[144] These items are primarily ignored by Ms. McShane in her evidence.

6.7.1.3 The "Free Lunch" Associated with Ms. McShane's Sample of 20 Low Risk Canadian Industrials

We calculated the performance of the sample of 20 low risk Canadian industrials used by Ms. McShane to illustrate the net effect of these problems using one of the samples used by Ms. McShane in her evidence to test whether or not this control sample of 20 Canadian industrials satisfies the comparable return standard based on realized returns.[145] Based on *ex post* tests of risk-adjusted returns, we find that this control sample of 20 Canadian industrials exceeded the minimum requirements for the comparable return standard in that they have earned an abnormal or "free lunch". For this purpose, we use test methodologies that satisfy all four Daubert criteria for evaluating the admissibility (scientific merit) of expert testimony that has been adopted by federal and many state courts in the U.S.

We first calculated the average monthly return and standard deviation of monthly returns for her sample of 20 firms and for the S&P/TSX Composite over the 1994-2006 period that she used for calculating accounting ROEs. Based on the results reported in Schedule 6.2, we find that not only is the annualized mean return of 15.08% for her sample considerably larger than the corresponding value of 11.51% for the S&P/TSX Composite but also that the annualized standard deviation of returns for her sample of 12.14% is considerably smaller than the corresponding value of 15.40% for the S&P/TSX Composite. Thus, Ms. McShane has used a sample that has outperformed the S&P/TSX Composite over her test period both in terms of realized return and risk. In fact, the Sharpe ratio as measured by excess return over the risk-free rate divided by the standard deviation of return of 0.26 for Ms. McShane's sample of 20 low risk Canadian industrials is almost two times the Sharpe ratio of 0.14 for the S&P/TSX Composite Index over the 13-year period she examined.

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[145] Ms. McShane's Evidence, EB-2007-0905, Exhibit C2, Tab 1, Schedule 1, Schedule 17, page 236 of 261.

When we examine the Jensen alpha measure of portfolio performance reported in Schedule 6.2, her sample of 20 firms has once again outperformed the S&P/TSX Composite. The estimated alpha or free-lunch as measured by the **abnormal** market- and risk-adjusted annualized return is 7.73% (i.e., 0.644% times 12) and is highly significant.

6.7.1.4 Recommendation Not to Put Any Weight on the Comparable Earnings Estimation Evidence Submitted by Ms. McShane

We recommend that the Board should not apply any weight to the Comparable Earnings Estimation evidence submitted by Ms. McShane. The method is not only devoid of scientific merit and theoretical underpinnings but its substantive implementation difficulties make it unsuitable to play a role in the determination of a fair rate of return for a utility. Also, the applications of the Comparable Earnings Estimation Method will lead to unfairness in that the allowed ROE of regulated utilities would be far too generous.

6.8 WEIGHTING THE ROE FROM VARIOUS ESTIMATION METHODS

Ms. McShane uses three estimation methods to arrive at her recommended ROE for OPG for the test years 2008 and 2009.[146] She places “some significant weight” on the Comparable Earnings Estimation Method, which we argue both in Section 4 and subsequently in this section of our evidence is inappropriate for arriving at a recommended ROE. She gives primary weight also to the DCF Estimation Method, which we argued earlier in this section is appropriate at the market and not individual utility level, especially when the latter uses the earnings forecasts of financial analysts.

[146] Ms. McShane’s Evidence, EB-2007-0905, Exhibit C2, Tab 1, Schedule 1, page 6 of 261.

The general theory is that one can reduce estimation error by increasing the number or set of estimation methods provided they are not highly correlated and they do not include methods that are known to be relatively inferior with known bias. Adding the estimates from inferior methods (such as the Comparable Earnings Estimation Method or the DCF Estimation Method applied to individual firms using the forecasts of analysts) to those from superior estimation methods (such as the Equity Risk Premium Estimation Method) will increase estimation error and bias. This notion appears to be well accepted by most Canadian Boards given the weight that they have placed on the estimates generated by experts using various ROE estimation methods.

6.9 ONGOING "FREE LUNCH" FROM INVESTMENT IN CANADIAN UTILITIES

6.9.1 Canadian Utilities

We now test whether or not investors in Canadian gas and electric utilities earned a return that is commensurate with the investment risk borne by such an investment. This is a formal test of whether Canadian utilities satisfied the comparable return standard based on realized returns. Based on *ex post* tests of risk-adjusted returns, we find that Canadian utilities have exceeded the minimum requirements for the comparable return standard in that they have earned an abnormal or "free lunch" or have been unfairly compensated in a generous fashion. For this purpose, we use test methodologies that satisfy all four Daubert criteria for evaluating the admissibility (scientific merit) of expert testimony that has been adopted by federal and many state courts in the U.S.

We arrive at this conclusion using two standard portfolio performance measurement metrics to evaluate the performance of holding the Sector sub-index 55, Utilities, of the S&P/TSX Composite index over the periods, 1988-2007 and 1998-2007 based on data from the TSX. These performance metrics are commonly used to measure the investment performance of a managed portfolio such as a pension or mutual fund.

As shown in Schedule 6.3, the utilities sector index had both a higher annualized mean return (11.83% versus 10.78%) and a lower standard deviation of return (12.94% versus 14.04%) than the S&P/TSX Composite Index over the period of 1988-2007. Similarly, over the most recent ten-year period, the utilities sector index also had both a higher annualized mean return (12.15% versus 10.38%) and a lower standard deviation of return (14.70% versus 15.96%) than the S&P/TSX Composite Index.

We find that the utilities sector index outperformed the S&P/TSX Composite in terms of both the Sharpe and Jensen alpha measures of performance over the 20- and 10-year periods. The respective Sharpe ratios are 0.49 (utilities) versus 0.38 (index) over the most recent 20-year period and 0.58 (utilities) versus 0.42 (index) over the most recent 10-year period. The utilities index outperformed the market on a risk-adjusted basis by a statistically significant annualized 4.96% over the 1988-2007 period, and by a statistically significant annualized 8.13% over the ten-year period 1998-2007 based on the estimated Jensen alpha measure of abnormal performance. Thus, investors that invested in a portfolio that mimicked this sector achieved an excess return or free lunch of over 8% on an annualized basis over the most recent ten-year period of 1998-2007.

These results show with statistical significance that investors in these utilities have achieved results significantly higher than that intended by regulators when the regulators determined the allowed ROE, and additionally that the allowed returns exceeded what investors required to bear the investment risk of these Canadian utilities.

In other words, providing generous rates of return allowances to enhance the financial integrity and flexibility of these utilities without requiring these utilities to establish a reserve to account for these insurance premiums, just over-compensates investors given the high dividend payout practices of many Canadian utilities.

6.9.2 U.S. Utilities

Although we do not conduct any tests ourselves, there is similar but not as rigorously conducted evidence that investors in U.S. utilities had a similar superior investment performance from utility investment. In a study that received much media coverage, Mr. Richard Bernstein and Ms. Lisa Kirschner, two prominent strategists at Merrill Lynch in New York, find that the S&P Utility Index outperformed the NASDAQ Index since NASDAQ's inception in 1971.[147] The Utilities outperformed NASDAQ over the 30-year period while incurring less risk. From NASDAQ's inception through the end of September 2001, NASDAQ returned a compound annualized rate of return of 11.2% per year, whereas the S&P Utility Index returned a compound annualized rate of return of 12.0% per year. The authors of this report measure risk using both the standard deviation of rolling 12-month returns (about 26% for NASDAQ versus about 16% for the S&P Utility Index), and alternatively as the percent of the returns that were negative over a 12-month time horizon (over 23% for NASDAQ versus over 15% for the S&P Utility Index).[148]

6.9.3 Implications for Assessing the Statements Made by Buy-side or Otherwise Compensated Professionals

Ms. McShane quotes a number of comments by buy-side or commissioned professionals that the allowed ROE for Canadian utilities is low compared to the

[147] Richard Bernstein and Lisa Kirschner, 2001, Believe it or not: Utilities have outperformed NASDAQ since '71, *Quantitative Strategy Update*, October 25.
[148] This is based on a visual estimation of the values depicted on page 2 of Richard Bernstein and Lisa Kirschner, 2001, Believe it or not: Utilities have outperformed NASDAQ since '71, *Quantitative Strategy Update*, October 25.

allowed ROE for comparable U.S. utilities.[149] All of these commentators make the implicit but untested assumption that U.S. regulators are better at determining the correct ROE than Canadian regulators so that the awarded rates in the U.S. should be used as the benchmark for comparison purposes. Furthermore, when rates of return are declining, we would expect the Canadian rate of return formulas, since they are implemented annually, to produce a quicker decline in the average rates of return than the case-by-case method used in the U.S., whose implementation timing is generally not annual and is determined by utility applicants and not intervenors. In turn, this would cause any disparity between Canadian and U. S. rates of returns to widen.

Furthermore, at least one Board, the Alberta Utilities Commission (UCA) took the position in its Decision 2004-052 on page 26 that this was an "oranges to apples" comparison:

> "In the Board's view, the Applicants did not demonstrate that the regulatory regimes in the two countries are sufficiently comparable that the Board should place significant weight on the return awards for U.S. utilities. For example, the Board notes differences in legislation, public and regulatory policies, the higher prevalence of longer-term settlement arrangements, the federal/state jurisdictional divisions, the development of RTOs and other differences in the structure of regulated industrial sectors, and differences in national fiscal, tax and monetary policies…"

Our finding of positive abnormal returns or free-lunches for Canadian utilities shows that these opinions are ill informed since the average Canadian utility outperformed the benchmark on a market- and risk-adjusted basis, which is a difficult task that the average Canadian mutual fund manager can only dream about.

[149] Ms. McShane's Evidence, EB-2007-0905, Exhibit C2, Tab 1, Schedule 1, starting on page 103 of 261.

6.10 COMPARISON OF WITNESSES' RATE OF RETURN EVIDENCE AGAINST ADJUSTMENT FORMULAS

As a further test of the reasonableness of Ms. McShane's recommended ROE we compare the ERP implied in her ROE against the generic formulas used for groups of utilities by two Canadian regulators: the Alberta Utilities Commission (AUC, formerly the Alberta Energy and Utilities Board) and National Energy Board (NEB). In making this comparison, we briefly review the formulas employed by these two regulators drawing on our more complete discussion in Section 5 of this evidence.

In its RH-2-94 Multi-Pipeline Cost of Capital Decision issued in March 1995, the National Energy Board adopted a formula to compute an equity risk premium over the consensus forecast of the rate on long Canada's. While this formula was adopted as an administrative convenience, it has been used by the NEB since 1995. The current version is based on a minor revision in March 1997 to eliminate rounding. The AUC adopted a similar formula in its Decision 2004-052.

As discussed in Section 5, we believe that, despite their limitations, these formulas provide useful benchmarks of the thinking of regulators in Canadian jurisdictions. With these benchmarks, we can assess the extent to which recommendations offered by particular witnesses lie within or beyond what these regulators regard as a reasonable range.

We begin with the NEB formula. This procedure takes the average 3-month out and 12-month out forecasts of 10-year Government of Canada bond yields as reported in the November issue of *Consensus Forecasts* (Consensus Economics, Inc., London, England.) To this is added the average daily spread between 10-year and 30-year Canada's as reported in the *National Post* for October. An equity risk premium of 300 basis points was determined to be appropriate for the particular group of pipeline companies in 1995. This equity risk premium is added to the determined rate for 30-year Canada's to give a final allowed return on equity.

In order to acknowledge the NEB's belief that equity risk premiums decrease when rates are rising and increase when rates are falling, an adjustment mechanism allows for the cost of capital to be adjusted upwards or downwards by 75% of the increase in the long Canada rate occurring after 1995. The NEB decision also notes that the adjustment mechanism is not restricted to the range of rates in its table.

For calendar 2007, the NEB formula produced a rate of return on common equity of 8.46% based on a long-Canada forecast of 4.22% according to an NEB letter of November 23, 2006, File 4750-A000-11. These figures appear in Schedule 6.4 under Regulatory Boards, 2007 Actual.

However, it should be noted that the NEB acknowledged that the adjustment mechanism which it had approved "... should produce fair results and prove durable during the target period *for at least three years*."[150] [Emphasis added].The NEB reaffirmed its formula in June 2002. The only variable reflected in the adjustment mechanism relates to changes in forecast long-term Government of Canada bond yields. It does not in effect reflect changes in the level of risk premiums and, in particular, the lower levels currently being experienced and forecast into the future.

We can illustrate the workings of the NEB formula using our 2008 forecast of 3.85% for 30-year Canada's. As stated earlier, the NEB's forecasted rate for long Canada's for 2007 was 4.22%, resulting in an allowed return on equity of 8.51%. For our forecast of 3.85% for test year 2008, the new rate is 8.18%. Put into words, the NEB formula states that as rates fall from 4.22% to 3.85% (a drop of 37 basis points), 75% of that drop is reflected by lowering the new rate, and

[150] RH-2-94, p. 31.

the remaining 25% of the drop is added to the risk premium. Following the same logic, inputting our forecast long Canada rate for 2009 of 4.25% into the NEB formula gives a recommended return on common equity of 8.48%. These figures appear in Schedule 6.4 under Regulatory Boards, for 2008 and 2009 projected based on Kryzanowski and Roberts' long-Canada forecast.

Turning to the AUC formula, we see that it follows a similar logic. In its Generic Cost of Capital Decision, the Commission set the return at 9.60% in 2004 when the long-Canada rate was 5.68% for a risk premium of 392 basis points. The determination of the long-Canada forecast and 75% adjustment are similar to the NEB formula. Applying the formula for 2007, the AUC set the long-Canada forecast at 4.22% and its return on equity at 8.51%. This figure is shown in Schedule 6.4 under Regulatory Boards 2007 Actual.

Schedule 6.4 also displays projections for the two test years using our long-Canada forecasts and the AUC formula. For test year 2008, the AUC formula produces an allowed return of 8.23%. For 2009, the allowed return is 8.53%.

In summary, Schedule 6.4 shows that applying the two adjustment formulas for our test years using our interest rate forecasts produces rates in a narrow range from 8.18% to 8.23% for 2008 and 8.48% to 8.53% for 2009.

In our view the NEB formula provides an upwardly biased estimate of the allowed return on equity. The reason is that not only has the forecasted long-Canada rate dropped since 1995 but the current and future expected risk premiums are considerably lower than they were in 1995. The same comment applies to the AUC formula as the risk premium is on the same order of magnitude.

Setting aside our comments on the bias in the regulatory formulas, we draw on their results to benchmark Ms. McShane's recommendations. To do this we must first establish how the risk of the utilities for which the formulas were designed compares to the risk of OPG. As discussed in detail in Section 3 of this evidence, the risk of OPG lies somewhat above that of an average-risk utility such as those used to establish the NEB and AUC formulas. However, there are two reasons why this difference in risk does not invalidate the NEB and AEUB formulas as useful comparisons. First, as discussed in Section 1 of this evidence, we follow the practice of the AUC in making an upward adjustment in common equity in the capital structure to adjust for this risk. Second, as explained above, the formulas have a built-in upward bias that removes the need for any further adjustment to the rate of return.

Turning to the numbers in Schedule 6.4, it is apparent that the risk premium numbers recommended by the witnesses in this hearing and those resulting from regulatory formulas vary significantly. That said, the schedule reveals that the numbers fall into three distinct sets. At the high end are the recommendations of Ms. McShane, which are clearly substantially higher than the results of regulatory formulas. In the middle, lie the regulatory formulas. Below them are our own recommendations.

Putting these differences in perspective, we note that the regulatory formulas are drawn from the era of significantly higher risk premiums. Our earlier evidence presented a large body of argument showing that the equity risk premium has declined more recently and is expected to be lower in the future. Because they do not take this important trend into account, recommended returns drawn from regulatory formulas should be regarded as a generous upper bound. Our own recommendation reflects the current trend towards a lower equity risk premium. Our recommendation represents a reasonable choice should the Board wish to embrace our argument and adjust to the new market regime. If, however, should the Board wish to move more cautiously, it could choose to set the allowed equity return in the range between our recommendation and the average of the regulatory formulas. Either way, our examination of the regulatory formulas and other evidence suggests that the Board should attach little weight to the rate of return recommendations of Ms. McShane.

APPENDICES

APPENDIX 1.A

BRIEF CURRICULUM VITAE FOR LAWRENCE KRYZANOWSKI

Dr. Lawrence Kryzanowski is currently a Full Professor of Finance and Concordia University Research Chair in Finance (previously Ned Goodman Chair in Investment Finance) at Concordia University. He was until June 2002 the Co-Director of the Concordia-McGill-Xiamen (CMX) Project of the Canada-China University-Industry Partnership Program in Financial Services. He is currently a member of CIRPÉE, a Principal Researcher at CREF, a scientific committee member of Institut de Finance Mathématique de Montréal (IFM2), and the representative of retail investors on the Regulation Advisory Committee (RAC) of Market Regulation Services Inc. He is a member of the Board of Governors and its Executive Committee, and the Pension Committee at Concordia University. He has been a visiting scholar at the University of British Columbia, a research associate at the University of Rochester, and a resident consultant at the Federal Department of Finance.

Dr. Kryzanowski has extensive experience teaching undergraduates, MBA, MSC and Ph.D. students, and executives for the Institute of Canadian Bankers, Shanghai Banking Institute, CMX, Concordia University, Dalhousie University, McGill University and York University. He has taught “asset allocation and performance measurement” in Concordia’s Goodman Institute Program (a private program at the MBA level). This third year course deals with a major component of the level III curriculum of the CFA program. Dr. Kryzanowski has extensive experience in developing or managing the development of instructional textbooks for the Institute of Canadian Bankers (ICB) and the Canadian Securities Institute (CSI), which includes the *Business Solvency Analysis* and *Investment and Portfolio Management* texts for the ICB, and the *Canadian Securities Course* text for the CSI.

Dr. Kryzanowski is an active educator, mentor, consultant and expert witness in financial economics, including investment management, risk pricing and management, and regulation and operations of global financial markets, institutions and participants. He is author or co-author of over 100 refereed journal articles, seven books or monographs, and over 180 papers presented at academic conferences. Dr. Kryzanowski is the first recipient of Prix ACFAS/Caisse de dépôt et placement du Québec, which recognizes an exceptional contribution to research in finance. Dr. Kryzanowski was the inaugural recipient, with co-authors, of the BGI Canada Award and OSFI Award (latter with Dr. Roberts) for excellence in research on capital markets and on regulation of financial institutions, respectively. His 13 other paper awards for co-authored work are from the *Multinational Finance Journal* and various North American academic conferences. Dr. Kryzanowski is a former Editor of the *Multinational Finance Journal*, co-editor of finance with Dr. Roberts at the *Canadian Journal of Administrative Studies*, and founding chairperson of the Northern Finance Association. Dr. Kryzanowski is currently an Advisory Editor of the *European Journal of Finance*, an Associate Editor of the *International Review of Financial Analysis* and of *Frontier of Finance and Economics*, and is on the editorial boards of the *Canadian Investment Review* and *Finance India*.

Dr. Kryzanowski has experience in preparing evidence as an expert witness in utility rate of return applications, stock market insider trading court proceedings, and confidential final offer arbitration hearings for the setting of fair rates for the movement of various products by rail. Together with Dr. Roberts, he prepared a report and briefed counsel on rate of return considerations in the pipeline application in 1997 of Maritimes and Northeast, and prepared evidence on the fair return on equity and the recommended capital structure for the 2001/2002 Distribution Tariff Application (DTA) of Atco Electric and the 2001/2002 DTA and the 2002 DTA (No. 1250392) of Utilicorp Networks Canada (Alberta) Ltd. before the Alberta Energy and Utilities Board. Together with Dr. Roberts, and on behalf of the Province of Nova Scotia, he provided evidence and testified before the Nova Scotia Utility and Review Board in the matter of Nova Scotia Power Inc. in 2002. Together with Dr. Roberts, and on behalf of the Fédération canadienne de l’entreprise indépendante (“FCEI”) / Union des municipalities du Québec (“UMQ”) & Option consommateurs (“OC”), he prepared testimony and testified on capital structure and fair return on equity in the matter of Hydro Québec Distribution before the Régie de l'Energie du Québec in 2003. Together with Dr. Roberts, and on behalf of Consumers Group, he prepared testimony and testified in Generic Hearing No. 1271597 before the Alberta Energy and Utilities Board in 2003-2004. Together with Dr. Roberts, and on behalf of the Hydro Communities (Hay River, Yellowknife and Fort Smith), he prepared testimony and testified in NTPC GRA 2006/07 and 2007/08 before the Public Utilities Board of the Northwest Territories in 2007.

Dr. Kryzanowski is often sought for his technical ability and advice on various matters in financial economics. He has consulted for the Superintendent of Financial Institutions, Federal Department of Finance, CMHC, CDIC, External Affairs Canada, Canada Investment and Savings, Hydro Quebec, the National Bank, Bombardier, and others.

Dr. Kryzanowski received a B.A. in Economics and Mathematics from the University of Calgary and earned his Ph.D. in Finance at the University of British Columbia.

BRIEF CURRICULUM VITAE FOR GORDON S. ROBERTS

Dr. Gordon S. Roberts is currently CIBC Professor of Financial Services at York University's Schulich School of Business. Prior to joining York University, he was Bank of Montreal Professor of Finance at the School of Business, Dalhousie University. Dr. Roberts has held positions as Visiting Professor and Visiting Scholar at the National Institute for Development Analysis (Bangkok, Thailand), the University of Chile, Tilburg University (the Netherlands), Deakin University (Melbourne, Australia), University of Toronto, University of Arizona, Xiamen University (China) and the University of Zimbabwe.

In addition to teaching undergraduates, MBA and Ph.D. students at these universities, Dr. Roberts has extensive experience in executive teaching for the Kellogg–Schulich Executive MBA Program, the Institute of Canadian Bankers and in the Pension Investment Management School sponsored by the Schulich School jointly with pension consulting firms William Mercer Inc. and Frank Russell.

An active researcher in the areas of corporate finance, bond investments and financial institutions, Dr. Roberts is author or co-author of over forty journal articles and three corporate finance textbooks. In 2000, he shared with Dr. Kryzanowski the OSFI award for excellence in research on the regulation of financial institutions. Dr. Roberts is a former co-editor of finance with Dr. Kryzanowski of the *Canadian Journal of Administrative Studies*. He is a former Associate Editor of the *Journal of Banking and Finance*, and currently serves on the editorial boards of *FINECO* and the *Banking and Finance Law Review*.

Dr. Roberts is experienced in preparing evidence for utility rate of return hearings. From 1995–1997 he submitted prefiled testimony as a Board witness in rate hearings for Consumers' Gas. In 1996, he served as an expert advisor to the Ontario Energy Board in its Diversification Workshop. In 1997, he co-prepared (with Dr. Kryzanowski) a report for the Calgary law firm, MacLeod Dixon, on rate of return considerations in the pipeline application by Maritimes and Northeast. With Dr. Kryzanowski, he filed evidence on three electricity regulatory matters in Alberta in 2001, evidence on regulatory matters before the Alberta Energy and Utilities Board and the Nova Scotia Utility and Review Board in 2002, evidence on regulatory matters dealing with Hydro Quebec Distribution in 2003, evidence in Generic Hearing No. 1271597 before the Alberta Energy and Utilities Board in 2003-2004, and evidence in NTPC GRA 2006/07 and 2007/08 before the Public Utilities Board of the Northwest Territories in 2007.

Often sought for his advice on financial policy, Dr. Roberts has consulted for the Superintendent of Financial Institutions, the federal Department of Finance, Canada Investment and Savings, Canada Mortgage and Housing Corporation, and Canada Deposit Insurance Corporation, among others.

Dr. Roberts received a B.A. in Economics from Oberlin College and earned his Ph.D. at Boston College. He has been listed in the Canadian Who's Who since 1990.

APPENDIX 3.A

RECENT THINKING AND PRACTICE ON CAPITAL STRUCTURE

In formal academic research, the approach to determining capital structure taken in this evidence is called the trade-off theory. The name describes the central idea of this theory: firms determine a target optimal capital structure by balancing the tax-reduction benefits of debt against the expected costs of financial distress and loss of financial flexibility. This appendix reviews the standing of this theory in the academic literature and its following among financial executives.

The main conclusions are three-fold: first, among academic researchers, the trade-off theory enjoys reasonable support but faces serious challenges from a number of competing theories. Second, while it has moderate support among financial executives, a recent survey in the U.S. shows that executives look outside the implications of this theory when setting capital structures for their firms. Third, while the trade-off theory can offer useful qualitative guidance, it is a mistake to treat capital structure as if it were amenable to precise analysis by a formula.

To establish this conclusion, we draw importantly on survey papers by Barclay and Smith (2001) and by Graham and Harvey (2001).[151] Further, in addition to the papers they review, we add a discussion of selected research released after these papers were published. We follow their lead in organizing the discussion around theories or concepts argued to influence capital structure. Our review focuses on the findings for large, investment grade firms, as these are most relevant for the utilities industry.

[151] References cited are listed at the end of this appendix.

3A.1 TRADE-OFF THEORY

As stated earlier, the trade-off theory holds that firms determine their capital structures through a trade-off of the principal benefit of debt, tax deductibility (Modigliani and Miller, 1963) against the costs: increased expected cost of financial distress (Scott, 1976, inter alia) and the tax disadvantage of interest income for investors as compared with dividends or capital gains (Miller, 1977).

A number of researchers find support for the trade-off theory by testing its empirical implications. Bradley, Jarrell and Kim (1984), MacKie-Mason (1990) and Wald (1999), among others, find that riskier firms use less debt as suggested by the theory. Long and Malitz (1985) examine the most and least highly leveraged industries in the U.S. and find that industries with high leverage use fixed assets intensively and are mature and less risky. Barclay, Smith and Watts (1995) and Frank and Goyal (2003) find that higher-growth, riskier firms use less debt. Flannery and Rangan (2006) report that firms do have target capital structures when they use a more general, partial-adjustment model of firm leverage.

There is consensus in the finance literature that leverage exhibits mean reversion. Hovakimian *et al.* (2001) show that firms issue debt when actual debt ratios are below target debt ratios and they reduce debt when actual debt ratios are above the target. Kayhan and Titman (2006) find that, although firms' histories strongly influence their capital structures, they tend to move towards target debt ratios over time, consistent with the tradeoff theory of capital structure. Jalilvand and Harris (1984), Roberts (2001), Frank and Goyal (2003), Leary and Roberts (2005a), Flannery and Rangan (2006) and Alti (2006) all report evidence that firm leverage reverts to its target level, even in the presence of adjustment costs.

On the other side of the ledger, two studies document firm behavior inconsistent with the theory. Graham (2000) finds that firms use considerably less debt than implied by the trade-off theory given observed expected financial distress costs. Opler and Titman (1998) report that when share prices increase, firms tend to issue more equity. In contrast, the theory implies that, with higher prices, smaller or less frequent equity issues are appropriate to maintain a target debt-equity ratio.

The survey by Graham and Harvey (2001) reports similarly mixed results. Four factors central to the trade-off hypothesis received only moderate emphasis as very important by financial executives: volatility of earnings and cash flows (rated as “important” or “very important” by 48.08% of executives), tax deductibility of interest (44.85%), industry average debt ratio (23.40%) and financial distress costs (21.35%). Balancing these responses, credit ratings, which attempt to incorporate all four factors, are the second most important debt factor and are rated as important or very important by 57.10% of executives. When asked whether they have “somewhat strict” target debt-equity ratios, 55% of large firms answer positively. This percentage increases to 64% for investment grade firms and 67% for regulated firms. This is more supportive of the trade-off theory but hardly conclusive.

A recent study by Faulkender and Petersen (2006) shows that, in addition to the firm characteristics which determine a firm’s target debt-equity ratio under the trade-off theory, access to capital markets also encourages companies to borrow more. Kisgen (2006) and Kisgen (2007) show that the discrete costs (benefits) associated with credit downgrade (upgrade) directly affect firms’ capital structure as firms reduce borrowing to avoid a downgrade. Mittoo and Zhang (2006) demonstrate that this effect is particularly important for Canadian firms particularly those of low credit quality. Rauh and Sufi (2008) examine fallen angels that experienced a downgrade from an investment grade to a speculative (junk) rating. Consistent with the costs of downgrades research, they find that fallen angels reduce their use of unsecured debt and discretionary sources of debt which include revolving bank credit facilities, commercial paper and medium-term notes. However, they report that such firms increase financing from secured debt and subordinated private placements and convertibles. Their results suggest that prior research underestimates the ability of firms to access debt after a downgrade.

Because the evidence backing the trade-off theory is less than overwhelming, academics have developed a number of competing theories and we review these next.

3A.2 COMPETING THEORIES

3A.2.1 Pecking Order Theory

According to the pecking order theory firms prefer internal financing and raise external funding as a last resort when internal funds are exhausted (Myers and Majluf, 1984; Myers, 1984). Managers have private information about the future prospects of their firms. Assuming that this private information is positive, the firm's securities are undervalued and equity is more undervalued than debt. As a result, firms first draw on internal funds, followed by debt and finally equity as the last choice. Since firms wish to avoid external financing according to this theory, they value financial flexibility. Shyam-Sunder and Myers (1999) find support for the pecking order model. Rajan and Zingales (1995), Titman and Wessels (1998) and Fama and French (2002) show that firms that have been more profitable in the past use less debt. Hennessy and Whited (2005) find that leverage is path dependent and that profitable firms tend to be less highly levered. Frank and Goyal (2007a) also find a negative relation between leverage and dividends. This is consistent with the pecking order theory but not with the trade-off approach.

However, other empirical studies show mixed results or fail to support the pecking order theory. Frank and Goyal (2003) find that large firms use more debt, while small high-growth firms are more likely to use equity financing. Fama and French (2005) show that most firms issue or retire equity each year, and the issues are on average large and not typically done by firms under distress. Leary and Roberts (2005b) find that when firms use external finance, less than 40% of the issues match the pecking order's prediction. Korajczyk et at. (1990), Eckbo and Masulis (1995) and Alti (2006) all find that debt issue does not come before equity issuance.

In their survey of executives, Graham and Harvey discover that financial flexibility and avoiding the sale of undervalued equity are important to financial executives. These factors are central to the pecking order theory. However, the pecking order theory holds that these factors are of greatest importance to firms most likely to have private information, small firms with significant growth opportunities, and this implication is not supported in the survey. Rather the survey reports that firms paying dividends (generally large, well established firms with less private information) are the ones that value the two factors most highly.

In addition, new studies reexamine the argument that when researchers find that more profitable firms use less debt this constitutes evidence against the trade-off theory. Sarkar and Zapatero (2003) point out that high earnings today can be coupled with expected low earnings in the future assuming that earnings follow mean reversion. In this case, we would expect profitable firms to use less debt and the trade-off theory could still hold. Their research supports the conclusions of Hovakimian, Opler and Titman (2001) that pecking order considerations influence firms' short-term adjustments toward target capital structures as envisaged under the trade-off theory.

3A.2.2 Market Timing or "Window of Opportunity"

Managers attempt to issue common shares when the market is high and repurchase their shares in poor markets according to Loughran and Ritter (1995). Rajan and Servaes (1997) also show that firms are more like to issue equity when financial analysts are overoptimistic about the market. Denis and Sarin (2001) provide evidence that firms issue equity when the market overestimates the firm's future earnings performance. Valuation is measured relative to book values or to past levels of the firm's share price. Firms that succeed in timing the market issue equity at high prices and consequently have low leverage ratios. To the extent that it is based on rational factors, such success could arise from waiting until yesterday's private information is reflected in today's stock price (Lucas and McDonald, 1990). Unsuccessful market timers have higher leverage ratios. Baker and Wurgler (2002) measure the relationship between leverage and shifts in market-to-book ratios over time arguing that their results are most consistent with the market timing explanation. Huang and Ritter (2005) show that firms fund a large proportion of their financing deficit with external equity (debt) when the cost of equity is low (high), and past securities issues have strong and long lasting effects on capital structure. On the other hand, Alti (2006) finds that although hot IPO markets induce firms to issue more equity and reduce leverge, the impact of market timing vanishes in two years through debt issue.

Further support for this view is in Graham and Harvey which identifies recent stock price performance as number three in the list of factors explaining when firms issue equity. Stock price performance is particularly highly ranked for less established firms that do not pay dividends.

3A.2.3 Signaling

In a variation on the theme of private information, signaling theory argues that firms with good prospects that are not widely recognized issue debt to create a credible signal to the market that they will enjoy strong cash flows sufficient to meet their increased debt servicing obligations (Ross, 1977; and Leland and Pyle, 1977). The survey by Graham and Harvey finds little support for this theory.

3A.2.4 Free Cash Flow

Jensen's (1986) free cash flow theory of leverage is rooted in agency conflicts between managers and shareholders. Managers of a firm with plentiful free cash flow enjoy an opportunity to waste the cash in excessive consumption of managerial perquisites, through empire building or other unproductive investments. Under the free cash flow theory, managers take on additional debt using the free cash flow for debt service. In this way, they make a commitment to avoid wasteful uses of the firm's cash flow. This argument is widely advanced in support of leveraged buyouts. By studying firms' operating performance after stock repurchase, Nohel *and* Tarhan (1998) find support for the free cash flow argument, while rejecting the signaling hypothesis. In the survey of financial executives, however, free cash flow received a low rating.

3A.2.5 Product Market and Industry Factors

As stated earlier, the use of leverage varies systematically across industries. While this has been viewed as evidence for the trade-off theory as discussed earlier, researchers have developed alternative theories as well. For example, Titman (1984) argues that prospective product purchasers are concerned with the firm's ability to stay in business and make good on product guarantees. As a result, he holds that firms producing unique products should use less debt. Graham and Harvey report mixed results on this theory. Although high tech firms produce unique products, they do not address such customer concerns in setting debt levels. However, growth firms do report considering such concerns in their debt policies.

3A.3 SYNTHESIS

A number of capital structure theories are supported in academic research and while the trade-off theory enjoys the greatest popularity due to seniority and coverage in textbooks, there are a number of competing theories challenging its conclusions. This disparity is reflected in practice by financial executives. Further, perhaps due to the lack of consensus among researchers, “best practices” managers focus on practical factors only loosely related to theory, such as financial flexibility and credit ratings, when they set capital structures for their firms. Barclay and Smith (2001) provide a clear statement on this point:

> “Empirical methods in corporate finance have lagged behind those in capital markets for several reasons. First, our models of capital structure decisions are less precise than asset pricing models. The major theories focus on the ways that capital structure choices are likely to affect firm value. Rather that being reducible, like the option pricing model to a precise mathematical formula, the existing theories of capital structure provide at best qualitative or directional predictions (p.198).”

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APPENDIX 4.A

SHOULD THE ARITHMETIC OR GEOMETRIC MEAN BE USED TO ESTIMATE IMPLIED RISK PREMIUMS USING HISTORICAL REALIZED RETURNS?

1. The Choice:

It is preferable to use the geometric average (mean) historical risk premium when measuring historical holding period performance. The reason is that the geometric mean exactly represents the constant rate of return that is needed in each year to exactly match actual performance over that past investment period.[152] This is the reason why Canadian mutual funds are required to disclose compound rates of return, which is just a different name for a geometric mean return. Similarly, the annual yield-to-maturity quoted on a long-term bond is an annual geometric return.

It is preferable to use the arithmetic mean historical market equity risk premium (MERP) when making investment decisions for a one-period investment horizon when the investment horizon is identical to the interval of time over which the historical returns are measured. The reason is that the arithmetic mean is an unbiased estimate of an investment's expected future risk premium for a single period investment horizon. Thus, if historical MERPs are measured using annual returns, then the future investment horizon should be one year.

The arithmetic mean also is preferred when historical returns are normal IID or independently and identically distributed over the estimation period. This is the

[152] The superiority of the geometric mean over the arithmetic mean is easily shown using an example drawn from L. Kryzanowski, *Investment and Portfolio Management* (Montreal: Institute of Canadian Bankers, 1996), page 82. The example concerns the investment portfolio of Mr. John Velco whose investment portfolio increases from $200,000 to $400,000 during the first year for an annual return of 100%, and then returns to its original $200,000 value during the second year for an annual return of –50%. The arithmetic and geometric mean annual returns are 25% and 0%. Of course, the correct constant annual return has to be 0% since the beginning and ending portfolio values are identical.

assumption implicitly invoked by the advocates of the use of the arithmetic average, such as Drs. Brealey and Myers, and Drs. Dimson, Marsh and Staunton (2003), and others, when they recommend the use of the arithmetic mean of historical premiums as the looking-forward expected MERP.[153] Unfortunately, the normal IID assumption is not appropriate for asset returns over long estimation periods. This assumption suffers from various important drawbacks. First, even if single-period returns are assumed to be normal, then multiperiod returns cannot also be normal since they are products (not sums) of the single-period returns. Second, several studies using longer-horizon or multi-year returns conclude that there is substantial mean-reversion in stock market prices at longer horizons. Third, the plausibility of the assumption that returns are IID diminishes as the estimation time period gets longer.

The geometric mean or some weighted-average of the geometric and arithmetic mean is preferred when returns are not normal IID due to, for example, long-run mean reversion in some asset returns (as has been found for stocks) and in MERPs, and mean aversion in others (as has been found for bonds). Dr. Siegel notes that his work on the risk premium using data for the period 1802-2001 provides support for mean reversion for a 30-year horizon (i.e., the horizon used for Long Canada's in rate of return regulation).[154]

We provide further empirical support for mean reversion in the Canadian market in section 4 of our evidence based on the variance-ratio test. The test is based on the fact that if returns follow a random walk (are independent), then the variance should be proportional to the return horizon. The Variance-Ratio or VR measure is:

$$VR(T) = Var[r_t(T)] \div N\ Var[r_t] = 1$$

[153] Elroy Dimson, Paul Marsh and Mike Staunton, Global evidence on the equity risk premium, forthcoming *Journal of Applied Corporate Finance* 15:4 (Summer 2003), page 15.
[154] Jeremy J. Siegel, Historical results: Discussion, *Equity Risk Premium Forum*, November 8, 2001, page 46.

where T is the multi-year period being examined, $Var[r_t(T)]$ is the variance of a T-period continuously compounded return, and $Var[r_t]$ is the variance of a one-period or benchmark return r_t. A variance ratio of one indicates no aversion or reversion of the mean of the series. A variance ratio greater than one indicates mean aversion. Mean aversion increases as the VR moves towards larger values above one. Thus, a VR of 3 indicates greater mean aversion in the series of returns or risk premiums than a VR of 2. Similarly, a variance ratio less than one indicates mean reversion. Mean reversion increases as the VR moves away from one towards zero.

Dr. John Campbell at an *Equity Risk Forum* has aptly stated this argument as follows:[155]

> "Which is the right concept, arithmetic or geometric? Well, if you believe that the world is identically and independently distributed and that returns are drawn from the same distribution every period, the theoretically correct answer is that you should use the arithmetic average. Even if you're interested in a long-term forecast, take the arithmetic average and compound it over the appropriate horizon. However, if you think the world isn't i.i.d., the arithmetic average may not be the right answer.
>
> I think that the world has some mean reversion. It isn't as extreme as in the highway example, but whenever any mean reversion is observed, using the arithmetic average makes you too optimistic. Thus, a measure somewhere between the geometric and the arithmetic averages would be the appropriate measure."

Similarly, Dr. Damordaran, author of numerous books on valuation, states:[156]

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[155] John Campbell, Historical results: Discussion, Equity Risk Premium Forum, November 8, 2001, page 45.
[156] Aswath Damodaran, Discussion issues and derivatives, found on his website at: Hhttp://pages.stern.nyu.edu/~adamodar/New_Home_Page/AppldCF/derivn/ch4deriv.html#ch4.3H.

> "The conventional wisdom is that the arithmetic mean is the better estimate. This is true if
>
> (1) you consider each year to be a period (and the CAPM to be a one-period model)
> (2) annual returns in the stock and bond markets are serially uncorrelated As we move to longer time horizons, and as returns become more serially correlated (and empirical evidence suggests that they are), it is far better to use the geometric risk premium. In particular, when we use the risk premium to estimate the cost of equity to discount a cash flow in ten years, the single period in the CAPM is really ten years, and the appropriate returns are defined in geometric terms.
>
> In summary, the arithmetic mean is more appropriate to use if you are using the Treasury bill rate as your riskfree rate, have a short time horizon and want to estimate expected returns over that horizon.
>
> The geometric mean is more appropriate if you are using the Treasury bond rate as your risk free rate, have a long time horizon and want to estimate the expected return over that long time horizon."

Dr. Jay Ritter in his keynote address at the 2001 meetings of the Southern Finance Association states that "with mean reversion, the multiperiod arithmetic return will be closer to the geometric return".[157] He notes that stock returns show a tendency towards mean reversion and bond returns show a tendency towards mean aversion in the U.S. In turn, based on the standard deviations of returns for data starting in 1802 (the Siegel data set), he shows that stocks are twice as risky as bonds for one-year holding periods, and stocks are less risky than bonds for holding periods of twenty or more years.

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[157] Address published subsequently as: Jay R. Ritter, The biggest mistakes we teach, *The Journal of Financial Research* 25:2, Summer 2002, pages 159-168.

The use of the geometric mean is supported empirically. Drs. Fama and French estimate the nominal cost of capital for U.S. nonfinancial corporations for 1950-1996 as 10.72%. Since this is smaller than the nominal return on investment of 12.11%, average corporate investment has been profitable.[158] If the arithmetic mean of the simple annual returns is used instead to obtain an estimate of the nominal cost of capital, the resulting value of 12.12% is about the same as the return of investment of 12.11%. This implies that average investment by corporate U.S. has added no value over the 1950-1996 period, which seems unreasonable to Drs. Fama and French and ourselves given stock market performance over this period of time. Thus, Drs. Fama and French conclude that the geometric mean estimate of the cost of capital is more consistent with the data than the arithmetic mean estimate of the cost of capital over this period of time.

The expected one-period simple return (i.e., the arithmetic mean of the one-period simple return) is only an appropriate return concept for the cost of equity capital for a short future time horizon of one period (usually a year).[159] For multiple-period horizons, expected return estimates enter the present value expressions in a nonlinear manner. Thus, numerous articles have documented the biases in using arithmetic or geometric means of one-period returns or risk premia to assess long-run expected rates of return or risk premia.

Other studies have documented the biases in using arithmetic or geometric means of one-period returns or risk premia to assess long-run expected rates of return or risk premia, without any reference to mean-reversion.

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[158] These two values are the IRRs on value and on cost, respectively. The geometric mean of simple annual returns on cost is almost identical. Eugene F. Fama and Kenneth R. French, 1999, The corporate cost of capital and the return on corporate investment, *The Journal of Finance* December, pages 1939-1967. As in Copeland et al. (1990), the return on value is an estimate of the cost of capital when the cost of capital is taken to be an expected compound return. Tom Copeland, Tim Koller and Jack Murrin, 1990, *Valuation in measuring and managing the value of companies* (John Wiley and Sons, New York).

[159] Eugene F. Fama, 1996, Discounting under uncertainty, *Journal of Business* 69, pages 415-428.

The first group of studies that examine which type of mean is appropriate for long horizon decision-making examines the biases caused by the fact that discount factors involve powers of the reciprocal of the rate of return. Dr. Blume (1974) and Drs. Indro and Lee (1997) show mathematically that for long-run expected returns and risk premia, the arithmetic average produces an estimate that is upwardly biased, and that the geometric average produces an estimate that is downwardly biased.[160] The simulation results of Drs. Indro and Lee (1997) support the use of a horizon-weighted average of the arithmetic and geometric averages proposed by Dr. Blume (1974). In the Dr. Blume average, the arithmetic average receives all the weight when the time horizon or project life (denoted by N) is one period, and the geometric average receives all the weight when the time horizon is equal to the number of time periods (denoted by T) used to obtain a historical estimate of average returns or risk premia.

To illustrate, if we deem that 30 years constitutes the long-run as is assumed for the cost of debt and we use the longest available time period up to 2002 without serious measurement errors to estimate the market risk premium in Canada (namely, the 45 year period, 1957-2001), the weight placed on the geometric average, w_G, is:

$$w_G = (N - 1) / (T - 1) = (30 - 1) / (45 - 1) = 29 / 44 = .66 \text{ or } 66\%.$$

Similarly, if we use the longest available time period up to 2002 for which we have data in Canada to estimate the MERP from the CIA (namely, the 78 year period, 1924—2001), the weight placed on the geometric average, w_G, is:

$$w_G = (N - 1) / (T - 1) = (30 - 1) / (78 - 1) = 29 / 77 = .38 \text{ or } 38\%.$$

Of course, the long run is longer than 30 years, and we would use it for bonds if such maturities were available.

[160] M.E. Blume, Unbiased estimators of long-run expected rates of return, *Journal of the American Statistical Association* 69:347 (September 1974), pages 634-638; and D.C. Indro and W.Y. Lee, Biases in arithmetic and geometric averages as estimates of long-run expected returns and risk premia, *Financial Management* 26:4 (Winter 1997), pages 81-90.

The second group of studies that examine which type of mean is appropriate for long horizon decision-making assesses the effect of estimation errors when the estimate is used for multi-period forecasting or decision-making. Drs. Jacquier, Kane and Marcus show that the use of the sample arithmetic mean produces an upward-biased forecast, and that this bias does not disappear, even if the sample mean is computed using long data series and *returns come from a stable distribution with no serial correlation*.[161] They show that, while a weighted-average of the arithmetic and geometric average returns provides an unbiased estimate of long-term returns, the best estimate of cumulative returns is even lower. They conclude that this “further compounds the recent sobering message in Drs. Fama and French (2002) and Drs. Jagannathan *et al.* (2000) who suggest that the equity risk premium is lower than once thought”. They further conclude that:

> “Strong cases are made in recent studies that the estimate of the market risk premium should be revised downward. Our result compounds this argument by stating that even these lower estimates of mean return should be adjusted further downward when predicting long-term cumulative returns.”

Thus, until the issue is resolved, a weighted-average of the arithmetic and geometric means is best. To err on the side of being conservative, a weighted average that places an equal or greater weight on the arithmetic mean appears to be most reasonable.

[161] Eric Jacquier, Alex Kane and Alan J. Marcus, 2003, Geometric or arithmetic means: A reconsideration, *Financial Analysts Journal* 59: 6 (November-December), pages 46-53; and working paper version of paper.

APPENDIX 4.B

SOME MORE RECENT THINKING AND ESTIMATES OF U.S. AND OTHER COUNTRY EQUITY RISK PREMIA

1. Estimates on a Point-forward Basis:

There are three approaches to estimating the market equity risk premium (MERP) on a point-forward basis. The first approach extrapolates historical returns based on the premise that realized and expected returns are equivalent, and that the future will be like the past. The second approach uses a theoretical model to determine what the MERP should be based on plausible assumptions about investor risk tolerance. The third approach uses forward-looking information on current dividend yields and interest rates to forecast expected MERP.

Reichenstein (2001) summarizes the predictions of several academic and professional scholars that long-run real stock returns will be below historical standards and that the MERP will be well below historical standards, and even negative according to some scholars.[162] The academic studies are by Drs. Jagannathan, McGrattan and Scherbina (2000), Dr. Siegel (1999) and Drs. Fama and French (2001). The practitioner studies are by Mr. Brown (2000) and by Mr. Arnott and Mr. Ryan (2001). The real stock return estimates are 2.9% to 4.4% for Drs. Fama and French, 3.2% for Mr. Arnott and Mr. Ryan, 3.3% for Dr. Siegel, 4.8% for Drs. Jagannathan *et al.*, and 5.2% for Mr. Brown.

Drs. Fama and French (2001) obtain estimates of the U.S. equity MERP of 2.55% and 4.32% for 1951-2000 when they use rates of dividend and earnings growth to measure the expected rate of capital gain. These MERP estimates are much lower than the 7.43% estimate produced by using the average stock return

[162] Cited articles in this appendix are listed in the references found between the text and the tables to this appendix.

over this period of time. They conclude that their evidence shows that the high average realized return for 1951-2000 is due to a decline in discount rates that produces large unexpected capital gains. Their main conclusion is that the stock returns (and realized MERPs) of the last half-century are a lot higher than what was expected by investors *ex ante*. The lower estimates of expected stock returns are less than the income return on investment that suggests that investment by corporate U.S. is on average profitable. In contrast, the much higher estimates of expected stock returns from using the traditional time-series means suggests that investment by corporate U.S. is on average unprofitable (its expected return is less than its cost of capital).

According to Drs. Fama and French (2001), "many papers suggest that the decline in the expected stock return is in part permanent, the result of (i) wider equity market participation by individuals and institutions and (ii) lower costs of obtaining diversified equity portfolios from mutual funds (Diamond, 1999; Heaton and Lucas, 1999; Siegel, 1999)".

Drs. Jagannathan *et al.* (2000) demonstrate that the U.S. MERP has declined significantly during the last three decades. They calculate the MERP using a variation of a formula in the classic Gordon stock valuation model. While the premium averaged about 7 percentage points during 1926-70, it only averaged about 0.7 of a percentage point after that. They support this result by demonstrating that investments in stocks and consol bonds of the same duration would have earned about the same return between 1982 and 1999, a period over which the MERP estimate is about zero.

There are a number of studies not reviewed by Reichenstein (2001). These are reviewed next.

In a conference presentation on October 15, 2001, Mr. Robert A. Arnott of First Quadrant (and a former editor of the *Financial Analysts Journal*) estimates the U.S. MERP for the 75 years from December 1925 to be 4.7%, and to have oscillated around zero beginning in the early 1980s.[163] He estimates the forward-looking U.S. MERP from October 2001 to be 0.3%±.

In a study (undated) by Deutsche Asset Management, the expected long-run MERPs are 2.5% over government bonds or 3.0% over cash for the U.S., Euroland, Japan and the U.K. (see Schedule 4.B1). These MERPs are based on two approaches, where the first estimates what equities can return based on free cash flows that they generate, and the second estimates what equities need to return to get investors to hold them instead of less risky assets.

Drs. McGrattan and Prescott (2000) conclude that the case for a positive MERP appears weak based on a model that measures the value of corporate capital. They show that including intangibles reduces corporate profits. Since the values of overall productive assets and equity are nearly equal in the United States, they conclude that the MERP is close to zero percent.

Drs. Claus and Thomas (2001) use the implied risk premium methodology to derive an upper bound for the MERP for Canada, France, Germany, Japan, U.K., and the U.S. over the period from 1985-1998. Drs. Claus and Thomas find that MERP estimates are <u>close to three percent</u> rather than the eight percent MERP that have been reported based on the data from Ibbotson & Associates. They <u>consider their estimates as being an upper bound because they use the earnings forecasts of analysts, which are typically optimistic, to forecast the MERP</u>.

Based on reasonable priors and allowing for structural breaks, Drs. Pastor and Stambaugh (2002) obtain estimates of the U.S. MERP of between 3.9 and 6.0 percent over the period from January 1834 through June 1999. The estimated premium rises through much of the nineteenth century and the first few decades of the twentieth century. It declines fairly steadily after the 1930's except

[163] Specifically, Exhibit 4a on page 21 of Arnott (2001).

for a brief period in the mid 1970s. The estimated MERP exhibits its sharpest decline to 4.8% during the decade of the 1990s.

Drs. Ibbotson and Chen (2001) forecast the MERP through supply side models using historical information. They conclude that "contrary to several recent studies on equity risk premium that declare the forward looking equity risk premium to be close to zero or negative, we find the long-term supply of equity risk premium is only slightly lower than the straight historical estimate". Based on his co-authored paper with Dr. Chen, Dr. Ibbotson concluded that:[164]

> "My estimate of the average geometric equity risk premium is about 4 percent relative to the long-term bond yield. It is, however, 1.25 percent lower than the pure sample geometric mean from the risk premium of the Ibbotson and Sinquefield study (Ibbotson Associates 2001)."

Dr. Ibbotson goes on to state:[165]

> "The 4 percent (400 bps) equity risk premium forecast that I have presented here today is a geometric return in excess of the long-term government bond yield. It is a long-term forecast, under the assumption that today's market is fairly valued."

Hunt and Hoisington (2003, p. 28) conclude that their study "sheds new light on the risk premium of stocks over U.S. Treasury bonds, which indicates most research overstates the advantages of stocks over bonds". They go on to note that:

[164] Roger Ibbotson, Moderator, Implications for asset allocation, portfolio management, and future research: Discussion, *Equity Risk Premium Forum*, November 8, 2001, page 103.
[165] Roger Ibbotson, Summary comments, *Equity Risk Premium Forum*, November 8, 2001, page 108.

> "While results may be overstated due to the beginning-period bias, studies based upon past data have conclusively shown that stock returns are superior to bonds over very long time periods. On average, during these time periods, the better performance of stocks is due to inflationary situations, spreads between dividend and bond yields, and P/E ratios that currently do not exist."

Drs. Jacquier, Kane and Marcus (2003) show that, while a weighted-average of the arithmetic and geometric average returns provides an unbiased estimate of expected long-term returns, the best estimate of cumulative returns is even lower. They conclude that:

> "Strong cases are made in recent studies that the estimate of the market risk premium should be revised downward. Our result compounds this argument by stating that even these lower estimates of mean return should be adjusted further downward when predicting long-term cumulative returns."

Using the third approach to estimating MERPs, Dr. Ritter estimates that the MERP is only about 0.7% or 1 percent rounded up. He points out that lower future real stock returns have squeezed the MERP from the top and a higher real return on bonds has squeezed the MERP from the bottom.[166]

2. Actual versus Expected Equity Risk Premiums:

A few studies examine whether or not actual or realized MERPs are a good proxy for expected or required MERPs. The findings of two of these studies are summarized in Schedule 4.B2. The study (undated) by Deutsche Asset Management aptly summarizes these findings as follows:

> "In sum, a wealth of theoretical and empirical evidence suggests that the historical, realized equity premium (5% - 7%) exceeded what equities

[166] Jay R. Ritter, The biggest mistakes we teach, *The Journal of Financial Research* 25: 2, Summer 2002, page 163.

were expected to deliver in the past, and very likely exaggerates what they should be expected to deliver in the future. An equity premium of 3% - 4% may have been closer to the true, ex-ante premium in the past, and the lower end of that range seems the most that we should anticipate (and that investors will require) now that economic/political conditions are more stable and people are more 'plugged in' to the benefits of equity investing. So we take 3% as an upper bound for the equity premium going forward."

It should also be kept in mind that these equity risk premia are calculated in reference to short-term government bonds (such as T-Bills) and **not long-term government bonds**.

Mr. Arnott and Mr. Bernstein (2002) show that the realized MERP over the last 75 years in the U.S. is overstated due to various accidents. Equity and bond investors obtained returns higher and lower than what they expected, respectively, due to a series of favourable accidents for equity holders and one major unfavourable accident for bondholders.

Mr. Oliver and Mr. Doyle of AMP Henderson Global Investors Limited note:

"A strong case can be made that favourable forces now justify a lower share-risk premium than the 5% or 6% that prevailed over the past 100 years … The favourable forces include low inflation and a more stable business cycle that are expected to result in higher-quality and steadier earnings and share prices. As well, baby boomers saving for their post-work lives are buying shares. They are arguably less fearful of shares than previous generations and have (hopefully) longer-investment horizons….

Our assessment is that the appropriate risk premium for U.S. shares is about 3% [relative to bonds]. For the Australian shares, fewer opportunities for diversification justify a slightly higher premium of about 4%." [our insertion]

This was re-enforced by Mr. Dyer (2003) of the same firm more recently as follows:

> "For these reasons, **the historically realised ERP of the last 50 years or so is probably an exaggeration of what investors actually require and is absolutely no guide to what the likely ERP will be going forward."** [his emphasis]

Drs. Clarke and de Silva (2003) note that all of the expected MERPs by practitioners from such firms as Frank Russell (3%), Goldman Sachs (3%), Ibbotson (4%) and Alliance Bernstein (4.5%) are lower than the historical experience in the U.S. Drs. Clarke and de Silva conclude their study by noting: "What seems clear from the historical evidence is that a reasonable expectation for the long-run equity risk premium is probably in the 3-6% range." Interestingly, the **expected MERP estimates** of Drs. Clarke and de Silva and the others are based on **geometric means**.

3. Synthesis:

All of the studies conclude that the U.S. MERP has narrowed (most conclude substantially), and is expected to be lower in the future. The U.S. MERP estimates vary from zero or slightly negative (Jagannathan *et al.*, 2000) to about 6% (Ibbotson and Chen, 2001). These studies strongly suggest that any forecast **for the U.S.** over 5% based on T-Bills is in the optimistic tail of the distribution of possible MERP estimates.

The two studies dealing with realized and expected MERP find that the expected equity MERP when measured **against short-term** government bonds in the U.S. has ranged between 3.4% and 4.2% depending on the time period considered, and has averaged 3.5% over 101 years for a sample of 15 developed countries.

4. Relative Risk of Equities Versus Bonds

It would appear on the surface that a zero or negative required MERP going forward is inconsistent with the belief that equities are more risky than bonds. However, some market professionals believe that equities may not be more risky than bonds in terms of investment risk. Studies find that the ratio of the standard deviations of returns on equities to bonds is above one, approaches one, and goes below one as the measurement period over which returns are measured gets longer. The ratio would remain constant, as the measurement period over which returns are measured gets longer, if stock and bond returns did not exhibit mean reversion/aversion.

In a 2001 study, W.M. Mercer evaluated the investment riskiness of Canadian stocks, bonds and cash over varying time horizons.[167] These results confirm existing U.S. results that:[168]

- Stocks are riskier than both bonds and cash over shorter time horizons, such as one year;
- Stock returns exhibit decreasing variability (measured by the standard deviation of returns) over time;[169]
- For 20-year rolling time periods, stocks outperform bonds in terms of returns, and both asset classes have about the same risk;
- For 30-year rolling time periods, stocks outperform both bonds and cash, and stocks are less risky than both bonds and cash.

[167] William M. Mercer Limited, Are stocks riskier than bonds? New Mercer research indicates that stocks become less risky in the long run, news release, February 15, 2001. Available at Hwww.wmmercer.com/Canada/english/resource/resource_news02152001.htmlH.
[168] The historical results reported by the CIA suggest that the standard deviation results are obtainable for periods as short as 5 years. Over 5-year periods, they report standard deviations of returns of 6.75%, 5.69% and 3.53% for stocks, long Canada's and 91-day T-Bills, respectively. Over 10-year periods, the corresponding standard deviations are 2.98%, 4.59% and 3.26%. Canadian Institute of Actuaries, *Report on Canadian Economic Statistics*, 1924-2000, September 2001, Table 2A, page 8.
[169] This is consistent with mean reversion in stock returns.

In their book, Drs. Campbell and Viceira (2002, pp. 108 and 109) provide evidence that the annualized standard deviation of K-period returns is lower for equities than T-Bills (rolled) or long bonds (rolled) for long holding periods in the United States. Drs. Campbell and Viceira (2002, p. 108) state that: “We see that stocks are mean-reverting – their long-horizon returns are less volatile than their short-horizon returns – while bills are mean-averting – their long-horizon returns are actually more volatile than their short-horizon returns.” Drs. Campbell and Viceira (2002, p. 108) draw the following inference from their analysis: “These effects are strong enough to make bills actually riskier than stocks at sufficiently long investment horizons, a point emphasized by Siegel (1994)”.

Thus, based on the long-run perspective underlying rate-of-return rate-setting, equities may in fact not be more risky than traditional debt instruments from an investment risk perspective. Since the MERP is based on the notion that stocks are riskier than bonds, these results attack the validity of a fundamental notion behind the existence and magnitude of a MERP.

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Schedule 4.B1. Expected long-run returns in local currency terms (annualized, percent)

	Cash		Gov't Bonds		Equities	
	Nominal	Real	Nominal	Real	Nominal	Real
U.S.	4.50	2.00	5.00	2.50	7.50	5.00
Euroland	3.75	2.00	4.25	2.50	6.75	5.00
Japan	3.00	2.00	3.50	2.50	6.00	5.00
U.K.	4.50	2.00	5.00	2.50	7.50	5.00

Source: Deutsche Asset Management, undated, 2.

Schedule 4.B2. Actual versus 'expected' equity risk premium in %[a]

Study	Country	Dates	Actual	Expected
Fama & French (2001)	U.S.	1872-2000	5.6	3.5
Fama & French (2001)	U.S.	1872-1950	4.4	4.2
Fama & French (2001)	U.S.	1951-2000	7.4	3.4
Dimson *et al.* (2000)	U.S.	1900-2000	5.6	4.0
Dimson *et al.* (2000)	15 countries[b]	1900-2000	5.1	3.5

[a]The actual premium is the compound, annualized rate of return less the compound, annualized return on short-term government debt. The expected premium uses dividend growth and earnings growth models to estimate equity returns.
[b]Australia, Belgium, Canada, Denmark (from 1915), France, Germany (ex. 1922/23), Ireland, Italy, Japan, Netherlands, Spain, Sweden, Switzerland (from 1911), U.K. and U.S.

Source: Deutsche Asset Management, undated.

APPENDIX 4.C

INDIRECT DECOMPOSITION METHOD TO ESTIMATE INDUSTRY-LEVEL MONTHLY VARIANCES

An interesting feature of the indirect volatility decomposition method proposed by Drs. Campbell *et al.* (2001) for those that are opposed to using an asset pricing model (APM) is that neither covariances nor betas need to be estimated.[170] In the decomposition, the value-weighted variance for a representative industry *i* for month *t* (i.e., $\sigma_{I,t}^2$) is given by $\sigma_{I,t}^2 = \sum_i w_{i,t} \cdot \sigma_{\varepsilon_{i,t}}^2$, where $\sigma_{\varepsilon_{i,t}}^2 = \sum_{d \in t} \varepsilon_{i,d,t}^2$ is the aggregation of the daily squared excess returns for industry *i* over those of the market over the days *d* in month *t*; $\varepsilon_{i,d,t} = R_{i,d,t} - R_{m,d,t}$ is the excess return for industry *i* over that of the market for day *d* in month *t*; and $R_{m,d,t}$ is the value-weighted excess return for all stocks for day *d* in month *t*. An interesting feature of this decomposition method is that it minimizes selection and survivorship biases by using all stocks that have at least one month of publicly available trade data.

[170] As in Campbell et al. (2001), the closing numbers of outstanding shares for the previous month are used to compute all market capitalization weights. John Y. Campbell, Martin Lettau, Burton Malkiel and Yexiao Xu, 2001. Have individual stocks become more volatile? An empirical exploration of idiosyncratic risk, *Journal of Finance* 56:1, pages 1-43.

APPENDIX 4.D
BETA ADJUSTMENT TO REFLECT SENSITIVITY TO INTEREST RATE CHANGES

One of the mainly flawed rationales for using a variant of the adjusted beta method for utilities is that unadjusted utility betas need to be adjusted upward due to their sensitivity to interest rate changes, and that the appropriate adjustment is one that is intermediate between the unadjusted and adjusted (inflated) betas.

As is the case for the S&P/TSX Composite index, the returns of utilities are sensitive to changes in both market and bond returns. This suggests that utility returns may be better modeled using these two potential return determinants or factors. However, one should not confuse the sensitivity of utility returns with the premium required by investors to bear market and interest rate risk when investing in utility equities.

In the traditional one-factor CAPM, where the only factor is the market, one measures relative risk by estimating the utility's beta by running the regression $r_i = a_i + b_i R_m + e_i$, where r_i and R_m are the return on utility *i* and the market *m*, respectively; and b_i is the beta coefficient of utility *i*. The utility's required rate of return then is given by $\bar{r}_i = r_f + b_i(\bar{R}_m - r_f)$, where r_f is the risk-free rate, which is proxied here by the yield on a long-term Canada; $(\bar{R}_m - r_f)$ is the so-called market equity risk premium; and all the other terms are defined as before.

In a two-factor CAPM, one obtains the relative priced risks for utility *i* by estimating the utility's betas by running the regression $r_i = a_i + b_{1i} R_m + b_{2i} R_b + e_i$, where r_i, R_m and R_b are the return on utility *i*, the equity market *m*, and long

Canada's, respectively; and b_{1i} and b_{2i} are the beta coefficients of utility *i* (i.e., the sensitivities to market and interest rate risk, respectively).[171]

The utility's required rate of return then is given by: $\bar{r}_i = r_f + b_i(\bar{R}_m - r_f) + b_i(\bar{R}_b - r_f)$, where r_f is the risk-free rate, which is proxied here by the yield on a long Canada's; $(\bar{R}_m - r_f)$ is the so-called market equity risk premium; $(\bar{R}_b - r_f)$ is the so-called interest rate risk (bond market) premium; and all the other terms are defined as before.

While one would expect the estimates of R_m, R_b and $(\bar{R}_m - r_f)$ to be positive and significant, such is not the case for $(\bar{R}_b - r_f)$. Over the long run, we would expect the average return on 30-year Canada's to be equal to the yield on 30-year Canada's (the proxy for the risk-free rate in rate of return settings). This is because our expectation is that interest rates would fluctuate randomly so that bond returns would be above yields to maturity in some periods and below them in other periods. Thus, while it is true that utility equity returns are sensitive to interest rate changes, it is not true that interest rate risk will have a materially positive equity risk premium over the long run.

We now illustrate the above by first calculating the betas for the two-factor CAPM for a sample of seven utilities over the 1990-2002 period that have full data. In doing so, we use correct econometric procedures by using the orthogonalized long Canada bond returns. When this correct econometric procedure is used, **the market betas are the same as those obtained using the single-factor CAPM for each utility**, and the interest rate betas are the same as those obtained using the two-factor CAPM (without orthogonalization)

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[171] This two-step procedure for testing asset pricing models, such as the CAPM, originates with Eugene Fama and James MacBeth, Risk, return, and equilibrium: Empirical tests, *Journal of Political Economy* 71 (1973), pages 607-636.

for each utility. These results are reported in Schedule 4.D1. As expected, the beta estimates for each factor are positive (and generally) statistically significant at conventional levels.

Next, we calculate the bond market risk premia over various time periods up to 2003 that correspond to those used previously to calculate the MERPs. These results are reported in Schedule 4.D2. As expected, over long periods, such as 1965-2002, the mean bond market risk premium is only 30 basis points, and it becomes negative over the three progressively longer time periods of 1957-2002, 1951-2002 and 1936-2002. While it is positive and quite material over the 1980-2002 period at 1.745%, this is offset by the relatively low MERP of 2.797%. Furthermore, according to our expectations, all of the mean bond risk premiums are not significantly different from zero at conventional levels. In contrast, the mean MERPs are significantly different from zero for the two longest time periods of 1936-2002 (at 5% level) and 1951-2002 (at 12% level).

The two series of risk premiums (i.e., equities and bonds) are essentially uncorrelated at 0.02 over the full time period of 1936-2002. The highest correlation between these two series of risk premiums is 0.04 for the 1965-2002 time period.

Schedule 4.D1

This table provides the market and bond return betas for a sample of seven utilities based on the estimation of a two-factor CAPM over the period, 1990-2002. The three utilities that do not have data for the full time period are eliminated from the sample. They are Emera (Nova Scotia Power), Pacific Northern Gas and Enbridge. All betas are calculated using monthly total returns for the utility and the S&P/TSX Composite index.

Variable	BC Gas	Cdn Util.	Trans Alta Corp.	Trans Canada	Westcoast Energy	Atco Ltd.	Fortis Inc.	Mean, with Atco: In	Mean, with Atco: Out	Highest, with Atco in
Market beta	0.260	0.345	0.242	0.112	0.197	0.397	0.220	0.253	0.229	0.397
Orthogonalized bond return beta	0.364	0.443	0.568	0.756	0.409	0.494	0.415	0.493	0.493	0.756

Schedule 4.D2

This table provides the equity and bond market premiums over yields on 30-year Canada's (or their proxy) for various time periods. Since the data are drawn from the Canadian Institute of Actuaries, the longest time series with Canada bond data is for the time period, 1936-2002

Time Period	Equity market risk premia	Bond market risk premia	Total risk premia[a]: Atco In	Total risk premia[a]: Atco Out	Total risk premia[a]: Atco In; Highest Individual Beta
1936-2002	4.659	-0.069	1.147	1.035	1.798
1951-2002	3.653	-0.240	0.807	0.719	1.269
1957-2002	2.273	-0.013	0.569	0.515	0.893
1965-2002	1.574	0.301	0.547	0.509	0.852
1977-2002	2.797	1.745	1.568	1.501	2.430

[a]This is calculated using the mean betas for the utility sample given in Schedule 4.D1. For example, 1.147 = (.253 *x* 4.659) + (0.493 *x* -0.069).

APPENDIX 6.A

ADJUSTMENT FOR THE EARLY EMPIRICAL EVIDENCE OF A FLATTER-THAN-EXPECTED SML

In this appendix, we discuss the type of adjustment that should be made if, for the sake of argument, one accepted the argument that there should be an adjustment for the early empirical evidence of a flatter-than-expected SML.

If one was to make an adjustment to account for the empirical evidence for the traditional (static) CAPM, then the slope of the estimated security market line or SML of the traditional CAPM (i.e., MERP) needs to be reduced to account for its "flatter-than-expected" value. In other words, it is the slope of the SML and not the betas of the individual assets or portfolios that need to be adjusted.

We arrive at this recommended adjustment by using first principles, and by adding what we learn from an examination of the more recent evidence on the relationship between the MERP that was realized over past periods and what the MERP expectations of investors were estimated to be. We now detail our argument on this point.

First, one of the major assumptions made when testing the CAPM using realized returns is that realized returns are an unbiased estimate of expected returns. In other words, what happened was what investors expected, at least on average. Based on the assumption that realized returns are unbiased estimates of expected returns, the early empirical evidence is interpreted as showing that the estimated CAPM relationship has an estimated intercept that is higher than expected and has an estimated slope that is lower (or flatter) than expected. These tests generally consist of regressions of the realized returns or realized excess returns on portfolios formed to maximize the spread across portfolios in their betas. The interpretation that the estimated intercept is higher than expected is based on a comparison of the estimate against the average T-Bill *yield* over the period. The interpretation that the estimated slope is lower (flatter) than expected is based on a comparison of the estimate against the average realized MERP over the period.

Second, the more recent evidence indicates that realized returns are not unbiased estimates of expected returns, even over very long periods of time. In other words, what happened is not what investors expected, even over very long periods of time. As we discussed in Section 4 and Appendix 4.B of our evidence, the more recent literature concludes that the realized MERP that investors earned exceeded the MERP that investors expected to earn. This is based on the finding that equity investors earned more than what they expected, and bond investors earned less than what they expected.

Third, it then follows that combining the literature referenced in our first and second points leads to the following conclusions:

- The finding that the estimated slope of the CAPM is flatter than expected is what one would expect given that the realized MERP exceeded the expected MERP over the period. This is prior to making any adjustment for the fact that these tests generally use T-Bills and not long Governments as a proxy for the risk-free rate.
- The finding that the estimated intercept of the CAPM is higher than expected is also expected given that using lower MERPs for all the portfolios would shift the SML downwards if we assume that the true expected risk-free rate remains constant, and would result in a lower estimated intercept for the SML. Again, this is prior to making any adjustment for the fact that these tests generally use T-Bills and not long Governments as a proxy for the risk-free rate.

This discussion has a two-fold implication for the determination of the ROE using the MERP method. First, the expected yield on the long Canada should be used since we have no evidence that it is not an unbiased expectation of the future one-period return for the true risk-free rate. Second, the realized mean MERP needs to be revised or adjusted downwards since the upward bias in mean realized equity returns exceeds the downward bias in mean realized bond returns when each is used as a proxy of investor expectations.

SCHEDULES

Schedule 2.1
Canada Yield Spreads

Date	10 Year Yield (%)	30 Year Yield (%)	Spread (basis points)
01/2008	3.88	4.19	31
02/08	3.81	4.18	37
03/08	3.46	3.96	50
Average			**39**

Source: Bank of Canada, Monthly Series V122543 and V122544.

Schedule 3.1

Electric Utilities Business Risk Rating

Risk	Transmission		Distribution	
Market				
Competition/ demand	Low	1	Low-moderate	2
Credit	Low	1	Low-moderate	2
Operational				
Operating Leverage	Low	1	Moderate	3
Technology	Low	1	Low	1
Capacity	Low	1	Low	1
Asset retirement/construction	Low	1	Low	1
Deferral accounts	Low	1	Low	1
Regulatory				
Primary regulation	Low	1	Low	1
Environmental/safety	Low	1	Low	1
Overall	**Low**	**1**	**Low-moderate**	**1.4**

Schedule 3.1 continued

Electric Utilities Business Risk Rating

Risk	OPG Hydro		Integrated*
Market			
Competition/demand	Low	1	1.3
Credit	Low	1	1.3
Operational			
Operating Leverage	Moderate	3	2.6
Technology	Low-moderate	2	1.5
Capacity	Moderate	3	2
Asset retirement/construction	Low-moderate	2	1.5
Deferral accounts	Low	1	1
Regulatory			
Primary regulation	Low	1	1
Environmental/safety	Low-moderate	2	1.5
Overall	**Low-moderate**	**1.8**	**1.5**

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* Weighted average of transmission 20%, distribution 30% and generation 50% based on Emera 2006 rounded, Annual Report, Note 14.

Schedule 3.1 concluded

Electric Utilities Business Risk Rating

Risk	OPG Nuclear	
Market		
Competition	Low	1
Credit	Low	1
Operational		
Operating Leverage	Moderate-high	4
Technology	Moderate-high	4
Capacity	Moderate	3
Asset retirement/construction	Moderate	3
Deferral accounts	Low	1
Regulatory		
Primary regulation	Low	1
Environmental/safety	Moderate	3
Overall	**Moderate**	**2.3**

Schedule 3.2

Senior Unsecured Debt Ratings for the Sample of Canadian Utilities

Corporate Issuer	DBRS		Standard & Poor's Rating
	Rating	Debt Rated	
Atco Ltd.	A (low)	Corporate	A
Canadian Utilities	A	Corporate	A
Emera Incorporated Nova Scotia Power	BBB (high) A (low)	MTN	BBB BBB
Enbridge Gas Distribution Inc. / Enbridge Inc.	A	MTN and Unsecured Debentures	A-
Fortis Inc. Fortis Alberta Fortis BC Newfoundland Power Maritime Electric	BBB (high) A (low) BBB (high) A --	Unsecured Debentures 1st Mortgage Bonds Corporate	A- -- -- -- BBB
Pacific Northern Gas	BBB (low)	Secured Debentures	--
TransAlta Corp.	BBB	MTN and Unsecured Debentures	BBB
TransCanada Pipelines	A	Unsecured Debentures & Notes	A-
Median	**A (low)**		**A-**

Sources: Dominion Bond Rating Service website: www.dbrs.com, Standard & Poor's website: www.standardandpoors.com, March 27, 2008.

Schedule 3.3

Capital Structure for Utilities 2005-2007 (percentage of long-term capital).

	Long term debt and debentures			Preferred Shares			Common Equity		
	2005	2006	2007	2005	2006	2007	2005	2006	2007
ATCO LTD.	67.51%	66.97%	65.23%	3.29%	3.13%	3.03%	29.19%	29.90%	31.75%
CANADIAN UTILITIES LTD.	50.20%	50.64%	49.47%	11.04%	10.61%	10.04%	38.57%	38.75%	40.49%
EMERA INC.	50.00%	49.84%	49.70%	8.00%	7.82%	8.07%	42.03%	42.34%	42.23%
ENBRIDGE INC.	58.83%	64.64%	62.98%	1.17%	0.93%	0.85%	40.00%	34.43%	36.17%
FORTIS INC.	58.09%	59.82%	60.31%	8.72%	7.48%	4.17%	33.16%	32.69%	35.52%
PACIFIC NORTHERN GAS LTD.	48.07%	46.16%	45.78%	3.14%	3.18%	3.14%	48.79%	50.67%	51.07%
TRANSALTA CORP.	41.09%	43.09%	42.59%	3.81%	3.83%	0.00%	55.10%	53.08%	57.41%
TRANS CANADA PIPELINES LTD.	55.93%	59.34%	59.25%	2.26%	2.65%	0.00%	41.81%	38.01%	40.75%
Average	**53.72%**	**55.06%**	**54.41%**	**5.18%**	**4.95%**	**3.66%**	**41.08%**	**39.98%**	**41.92%**

Source: Annual reports

Schedule 3.4

Coverage ratios, earned ROEs for selected utilities 2005-2007

Utility	Interest Coverage			Cash Flow to Debt			ROE		
	2005	2006	2007	2005	2006	2007	2005	2006	2007
ATCO LTD.	3.13	3.36	3.31	24.82	21.33	23.71	11.57	14.98	16.69
CANADIAN UTILITIES LIMITED	3.24	3.32	3.25	25.30	19.95	22.46	12.24	14.24	15.96
EMERA INCORPORATED	2.46	2.85	2.91	8.71	19.28	16.85	9.03	9.07	10.93
ENBRIDGE INC.	2.41	2.35	2.37	9.57	12.87	13.19	13.90	14.26	14.53
FORTIS INC.	2.24	2.04	1.70	11.97	8.60	--	12.39	11.83	9.99
PACIFIC NORTHERN GAS LIMITED	2.46	2.06	2.10	12.89	21.53	--	8.34	5.86	5.00
TRANSALTA CORPORATION	2.24	0.84	3.17	22.18	17.75	33.75	7.45	1.81	13.07
TRANS CANADA CORPORATION	3.03	2.58	2.60	15.21	15.05	18.62	17.56	14.10	13.99
Average	2.65	2.43	2.68	16.33	17.05	21.43	11.56	10.77	12.52

Source: Financial Post Advisor. 2007 ratios from Annual Reports for Pacific Northern Gas and Fortis.

Schedule 3.5

Allowed vs. Actual Rates of Return on Equity for 2007

Utility	Allowed Return (%)	Actual ROE for Consolidated Company (%)
ATCO LTD.		16.69
ATCO ELECTRIC TRANSMISSION	8.51	
ATCO ELECTRIC DISTRIBUTION	8.51	
ATCO GAS	8.51	
ATCO PIPELINES	8.51	
CANADIAN UTILITIES LIMITED		
EMERA (NOVA SCOTIA POWER)	9.55	10.93
ENBRIDGE GAS DISTRIBUTION	8.39	14.53
FORTIS INC.		9.99
ALBERTA	8.51	
BRITISH COLUMBIA	8.77	
MARITIME ELECTRIC		
NEWFOUNDLAND POWER		
PACIFIC NORTHERN GAS LIMITED	9.02	5.00
TRANSALTA CORPORATION	8.51	13.07
TRANS CANADA PIPELINES LTD.	9.46	13.99
Average	**8.75**	**12.03**

Sources: Schedule 3.4, Board decisions, Ms. McShane’s Statistical Supplement, TransAlta rate is AUC Generic rate for comparison purposes since this company is not regulated.

Schedule 3.6

Allowed Common Equity Ratios

Utility	Allowed	Decision
ATCO LTD.		
ATCO ELECTRIC		
TRANSMISSION	33.00	EUB 2004-052,
DISTRIBUTION	37.00	U2005-410
ATCO GAS	38.00	
ATCO PIPELINES	43.00	
CANADIAN UTILITIES LIMITED		
ENBRIDGE GAS DISTRIBUTION	36.00	EB-2006-0034
EMERA (NOVA SCOTIA POWER)	40.00	2007-NSUARB-8
FORTIS INC.		
ALBERTA	37.00	EUB 2004-052
BRITISH COLUMBIA	40.00	G-14-06
MARITIME ELECTRIC	42.70	UE 20934
NEWFOUNDLAND POWER	44.50	PU40 (2006)
PACIFIC NORTHERN GAS LIMITED	40.00	G-14-06
TRANSALTA CORPORATION	45.00	U99099
TRANS CANADA PIPELINES LTD.	36.00	RH-2-2004
Average	**39.40**	

Source: Board decisions.

Schedule 3.7

Electric Utilities Business Risk Rating and Capital Structures

	Transmission	Distribution	OPG Hydro	Integrated	OPG Nuclear	OPG Regulated
Business risk[a]	L 1	L-M 1.4	L-M 1.8	L-M 1.5	M 2.3	M 2.1
Equity Component Deemed by Regulators						
EUB 2004	33%	37%				
NSUARB 2007				40%		
OEB 29006, 2007	40%	40%				
Fortis Alberta		37%				
Fortis BC				**40%**		
Maritime Electric				42.70%		
Newfoundland Power				44.50%[172]		
Recommended by Drs. Kryzanowski And Roberts Prior Evidence	30%[173]	35%[174]		35%[175] 42%[176]		
For OPG			**40%**		**50%**	**47%**[177]

[a]L refers to low business risk; L-M refers to low to medium business risk; and M refers to medium business risk. L 1 refers to low business risk based on a business risk rating of 1 to 5 where 5 is the highest numerically business risk rating.

[172] Integrated company, buys 90% of power from Newfoundland and Labrador Hydro.
[173] Generic hearing, Alberta, 2004.
[174] Generic hearing, Alberta, 2004.
[175] NSPI 2002.
[176] Northwest Territories Power Corporation 2007, included business risk premium for size and isolation.
[177] 6,606 regulated MW nuclear (66.47%), 3,332 MW hydro (33.53%).

Schedule 3.8
Capitalization and the Cost of Capital ($M)

December 31, 2008

Capital Structure	Principal	Component (%)	Cost (%)	Cost of Capital ($)
Total Debt	3,922.4	53.0%	5.76%	225.9
Common Equity	3,478.4	47.0%	7.10%	247.0
Rate Base	7,400.8	100.0%	6.39%	472.9
Interest Coverage Ratio	2.1X			

December 31, 2009

Capital Structure	Principal	Component (%)	Cost (%)	Cost of Capital ($)
Total Debt	3,897.5	53.0%	5.92%	230.7
Common Equity	3,456.2	47.0%	7.25%	250.6
Rate Base	7,353.7	100.0%	6.55%	481.3
Interest Coverage Ratio	2.1X			

Source: EB_2007-0905, Exhibit C1, Tab 2, Schedule 1, Tables 2 and 3, Updated 2008003-14

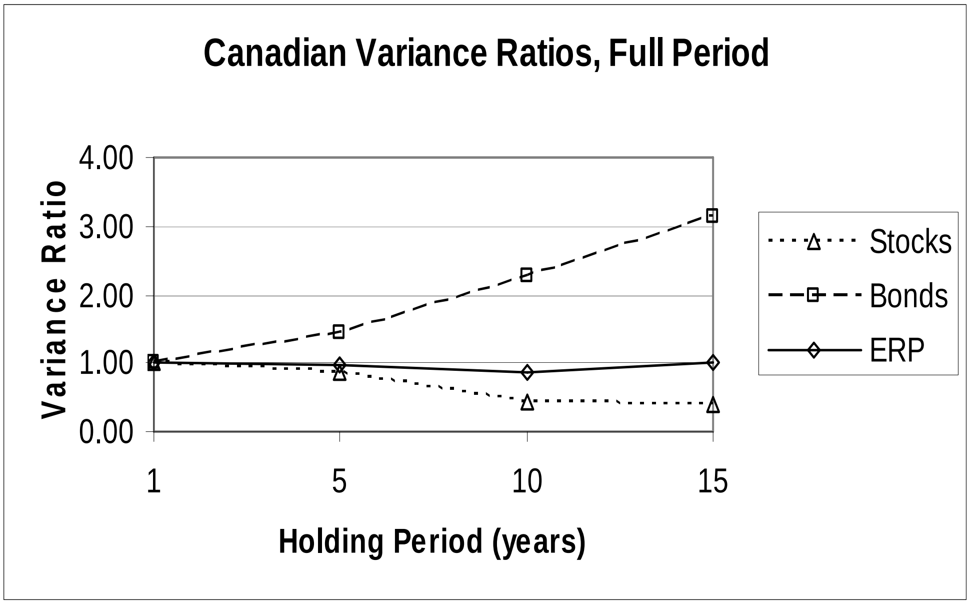
Schedule 4.1

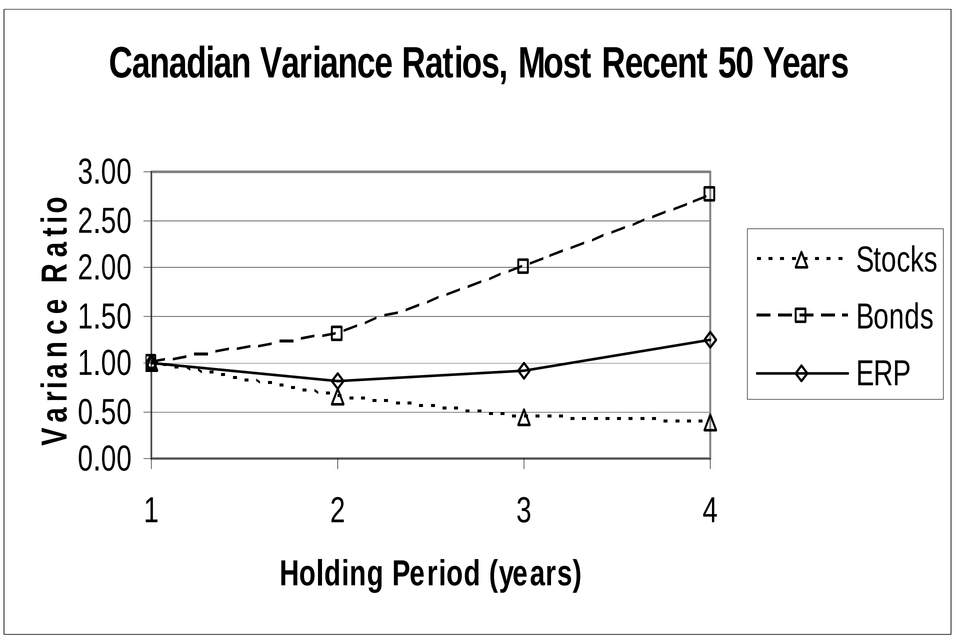
This schedule reports the variance ratios for holding periods of 5, 10 and 15 years relative to a benchmark holding period of 1 year for stocks, long bonds and risk premiums for Canada. The Canada data are annual from the Canadian Institute of Actuaries for the period 1924-2007. A variance ratio of one indicates no aversion or reversion of the mean of the series. Variance ratios less than one indicate mean reversion, and variance ratios greater than one indicate mean aversion. MERP is the market equity risk premium.

	1 year Holding Periods			**5 Year Holding Periods**			**10 Year Holding Periods**			**15 Year Holding Periods**		
	Stocks	**Bonds**	**MERP**	**Stocks**	**Bonds**	**MERP**	**Stocks**	**Bonds**	**MERP**	**Stocks**	**Bonds**	**MERP**
Panel A: CIA data, 1924-2007 (84 years)												
Var.	0.0332	0.0077	0.0393	0.1422	0.0551	0.1937	0.1465	0.1731	0.3457	0.2009	0.3618	0.6047
Var. Ratio				0.8553	1.4372	0.9849	0.4405	2.2576	0.8790	0.4028	3.1452	1.0249
Panel B: CIA data, 1958-2007 (Most recent 50 years ending with 2007)												
Var.	0.0237	0.0106	0.0329	0.0766	0.0681	0.1324	0.1005	0.2100	0.3032	0.1311	0.4377	0.6200
Var. Ratio				0.6475	1.2889	0.8034	0.4245	1.9876	0.9202	0.3691	2.7616	1.2546

Schedule 4.2

The following are plots of the variance ratios presented in Schedule 4.1. A variance ratio of one indicates no aversion or reversion of the mean of the series. Variance ratios greater than one indicate mean aversion, and a variance ratios less than one indicate mean reversion. ERP is the equity risk premium at the market level.





Schedule 4.3
This table contains various estimates of the historical annual risk premiums of stocks over the risk-free rate for various time periods using both nominal and real returns. Stocks are proxied by the returns on the S&P/TSX Composite index or its counterpart for more distant time periods. The risk-free rate is proxied by the returns on 30-year Canada's or its counterpart for more distant time periods.

Time Period	Arithmetic Mean			Geometric mean			Weighted Risk Premium[a]
	Stock Returns	Long Canada Returns	Risk Premium	Stock Returns	Long Canada Returns	Risk Premium	
Panel A: Based on updated Dimson *et al.* data (N for nominal returns; R for real returns)[b,c]							
1900-2007 (107 yrs), N			5.76%			4.27%	5.39%
1900-2007 (107 yrs), R			5.02%			3.45%	4.63%
Panel B: Based on CIA nominal return data[c]							
1926-2007 (82 yrs)	11.64%	6.46%	5.19%	10.07%	6.11%	3.24%	4.70%
1936-2007 (72 yrs)	11.64%	6.48%	5.17%	10.45%	6.11%	3.55%	4.76%
1951-2007 (57 yrs)	11.78%	7.26%	4.52%	10.64%	6.83%	2.88%	4.11%
1957-2007 (51 yrs)	11.09%	7.95%	3.14%	9.94%	7.50%	1.50%	2.73%
1965-2007 (43 yrs)	11.21%	8.80%	2.41%	10.12%	8.31%	0.81%	2.01%
1977-2007 (31 yrs)	13.13%	10.47%	2.66%	12.08%	9.94%	0.98%	2.24%
Panel C: Based on CIA real return data[c]							
1926-2007 (82 yrs)	8.32%	3.38%	4.95%	6.79%	2.94%	3.07%	4.48%
1936-2007 (72 yrs)	7.60%	2.62%	4.99%	6.36%	2.18%	3.52%	4.62%
1951-2007 (57 yrs)	7.69%	3.35%	4.34%	6.53%	2.86%	2.85%	3.96%
1957-2007 (51 yrs)	6.80%	3.80%	3.00%	5.63%	3.29%	1.52%	2.63%
1965-2007 (43 yrs)	6.45%	4.18%	2.26%	5.35%	3.61%	0.83%	1.91%
1977-2007 (31 yrs)	8.63%	6.16%	2.48%	7.63%	5.58%	0.98%	2.10%

[a]The weighted risk premium is found by taking 75% of the arithmetic mean risk premium plus 25% of the geometric mean risk premium.
[b]Updated using data from Ibbotson.
[c]Updated using data from Ibbotson.

Source: Canadian Institute of Actuaries (CIA), *Report on Canadian Economic Statistics, 1924-2007*. DMS module, Ibbotson Associates, 1900-2003.

Schedule 4.4

This schedule reports historical returns (%) for stock and long governments and equity risk premia for the United States for the period, 1900-2007, and various subsets thereof.

Time Period	Arithmetic Mean Returns			Geometric Mean Returns			Weighted Risk Premium [a]
	Stock	Long Gov't	Risk Premium	Stock	Long Gov't	Risk Premium	
Panel A: Based on updated Dimson *et al.* data (N for nominal returns; R for real returns)[b]							
1900-2007 (107 yrs), N			6.47%			4.53%	5.98%
1900-2007 (107 yrs), R			6.10%			4.09%	5.60%
Panel B: Based on nominal return data from Ibbotson Associates							
1926-2007 (82 yrs)	12.26%	5.84%	6.42%	10.36%	5.47%	4.28%	5.88%
1936-2007 (72 yrs)	12.46%	5.94%	6.53%	11.00%	5.54%	4.78%	6.09%
1951-2007 (57 yrs)	12.86%	6.58%	6.28%	11.56%	6.10%	4.56%	5.85%
1957-2007 (51 yrs)	11.78%	7.33%	4.45%	10.52%	6.83%	2.80%	4.04%
1965-2007 (43 yrs)	11.59%	8.10%	3.48%	10.34%	7.55%	1.97%	3.11%
1977-2007 (31 yrs)	13.30%	9.63%	3.67%	12.24%	9.00%	2.17%	3.29%
Panel C: Based on real return data from Ibbotson Associates							
1926-2007 (82 yrs)	9.03%	2.84%	6.18%	7.10%	2.35%	4.09%	5.66%
1936-2007 (72 yrs)	8.50%	2.12%	6.38%	6.89%	1.62%	4.75%	5.97%
1951-2007 (57 yrs)	8.87%	2.76%	6.12%	7.47%	2.21%	4.52%	5.72%
1957-2007 (51 yrs)	7.55%	3.24%	4.31%	6.21%	2.66%	2.79%	3.93%
1965-2007 (43 yrs)	6.88%	3.54%	3.34%	5.56%	2.89%	1.97%	3.00%
1977-2007 (31 yrs)	8.76%	5.33%	3.43%	7.69%	4.58%	2.04%	3.08%

[a] The weighted risk premium is found by taking 75% of the arithmetic mean risk premium plus 25% of the geometric mean risk premium.
[b] Updated using data from Ibbotson.
Source: Ibbotson Associates.

Schedule 4.5

This schedule reports historical real returns and equity risk premia for the United States for the period, 1802-September 2001. “Comp.” refers to the compound or geometric mean annual rate of return; “Arith.” refers to the arithmetic mean annual rate of return; and “Weighted” refers to our equal-weighted average of the geometric and arithmetic mean annual rates of return. The data are drawn from Table 1 in Jeremy J. Siegel, Historical results I, *Equity Risk Premium Forum*, November 8, 2001, p. 31, available on the AIMR website.

	Real Return				Equity Risk Premium Over Bonds		
	Stocks		Bonds				
Period	**Comp.**	**Arith.**	**Comp.**	**Arith.**	**Comp.**	**Arith.**	**Weighted**
1802-2001	6.8%	8.4%	3.5%	3.9%	3.4%	4.5%	4.0%
1871-2001	6.8%	8.5%	2.8%	3.2%	3.9%	5.3%	4.6%
Major Subperiods							
1802-1870	7.0%	8.3%	4.8%	5.1%	2.2%	3.2%	2.7%
1871-1925	6.6%	7.9%	3.7%	3.9%	2.9%	4.0%	3.5%
1926-2001	6.9%	8.9%	2.2%	2.7%	4.7%	6.2%	5.5%
Post World War II							
1946-2001	7.0%	8.5%	1.3%	1.9%	5.7%	6.6%	6.2%
1946-1965	10.0%	11.4%	-1.2%	-1.0%	11.2%	12.3%	11.8%
1966-1981	-0.4%	1.4%	-4.2%	-3.9%	3.8%	5.2%	4.5%
1982-1999	13.6%	14.3%	8.4%	9.3%	5.2%	5.0%	5.1%
1982-2001	10.2%	11.2%	8.5%	9.4%	1.7%	1.9%	1.8%

Schedule 4.6

This schedule reports the implied market cost of equity for the S&P/TSX Composite and S&P500 index using various forecasts of future growth in dividends based on the one-stage dividend discount model or DDM. The dividend yields (Ylds) for the various indexes are obtained from Bloomberg as of the date of the *Consensus Forecasts* as per the Scenario column. The dividend yields as of November 15, 2007 are used with the predictions from the Watson Wyatt survey to correspond to the mid-November 2007 survey.[a]

Case	Dividend Yield	Real GDP	Inflation	Equity Cost	Scenario
Panel A: Based on the S&P/TSX Composite (Canada)					
1a	2.66%	1.50%	1.60%	5.76%	*Consensus Forecasts* (20080310): mean GDP & inflation forecasts for 2008; Dividend Ylds from Bloomberg.
2a	2.66%	2.30%	1.90%	6.86%	*Consensus Forecasts* (20080310): mean GDP & inflation forecasts for 2009; Dividend Ylds from Bloomberg.
3a	2.66%	2.80%	2.30%	7.76%	*Consensus Forecasts* (20080310): highest GDP & inflation forecasts for 2008; Dividend Ylds from Bloomberg.
4a	2.66%	3.00%	2.30%	7.96%	*Consensus Forecasts* (20080310): highest GDP & inflation forecasts for 2009; Dividend Ylds from Bloomberg.
5a	2.66%	2.93%	2.05%	7.64%	*Consensus Forecasts* (20080310): average annual historical GDP & inflation for 2004-7; Dividend Ylds from Bloomberg.
6a	2.49%	2.8%	2.0%	7.29%	Watson Wyatt (220711mid): median projection for mid-term (2009-2012)
7a	2.49%	2.8%	2.3%	7.59%	Watson Wyatt (220711mid): median projection for long-term (2013-2022)
1b	2.29%	2.80%	2.20%	7.29%	*Consensus Forecasts* (20070611): mean GDP & inflation forecasts for 2008; Dividend Ylds from Bloomberg.
3b	2.29%	3.40%	2.90%	8.59%	*Consensus Forecasts* (20070611): highest GDP & inflation forecasts for 2008; Dividend Ylds from Bloomberg.
5b	2.29%	2.73%	2.18%	7.19%	*Consensus Forecasts* (20070611): average annual historical GDP & inflation for 2004-7; Dividend Ylds from Bloomberg.
6b	2.49%	3.0%	3.0%	8.49%	Watson Wyatt (220711mid): Extremely optimistic scenario (90th percentile) projection for mid-term (2009-2012)
7b	2.49%	3.5%	3.0%	8.99%	Watson Wyatt (220711mid): Extremely optimistic scenario (90th percentile) projection for long-term (2013-2022)

[a]Watson Wyatt, Economic Expectations 2008, 27th Annual Canadian Survey, p. 14. Based on a survey of the "country's leading business economists and portfolio managers in 42 organizations, such as chartered banks, investment management firms and other corporations" in mid-November 2007.

Schedule 4.6 Continued

Case	Dividend Yield	Real GDP	Inflation	Equity Cost	Scenario
Panel B: Based on the S&P 500 (U.S.)					
1a	2.36%	1.40%	3.40%	7.16%	*Consensus Forecasts* (20080310): mean GDP & inflation forecasts for 2008; Dividend Ylds from Bloomberg.
2a	2.36%	2.30%	2.30%	6.96%	*Consensus Forecasts* (20080310): mean GDP & inflation forecasts for 2009; Dividend Ylds from Bloomberg.
3a	2.36%	2.10%	4.40%	8.86%	*Consensus Forecasts* (20080310): highest GDP & inflation forecasts for 2008; Dividend Ylds from Bloomberg.
4a	2.36%	3.50%	3.70%	9.56%	*Consensus Forecasts* (20080310): highest GDP & inflation forecasts for 2009; Dividend Ylds from Bloomberg.
5a	2.36%	2.95%	3.05%	8.36%	*Consensus Forecasts* (20080310): average annual historical GDP & inflation for 2004-7; Dividend Ylds from Bloomberg.
6a	1.93%	2.7%	2.5%	7.13%	Watson Wyatt (220711mid): median projection for mid-term (2009-2012)
7a	1.93%	3.0%	2.5%	7.43%	Watson Wyatt (220711mid): median projection for long-term (2013-2022)
1b	1.79%	2.90%	2.40%	7.09%	*Consensus Forecasts* (20070611): mean GDP & inflation forecasts for 2008; Dividend Ylds from Bloomberg.
3b	1.79%	3.30%	3.30%	8.39%	*Consensus Forecasts* (20070611): highest GDP & inflation forecasts for 2008; Dividend Ylds from Bloomberg.
5b	1.79%	3.23%	2.90%	7.92%	*Consensus Forecasts* (20070611): average annual historical GDP & inflation for 2004-7; Dividend Ylds from Bloomberg.
6b	1.93%	3.2%	3.1%	8.23%	Watson Wyatt (220711mid): Extremely optimistic scenario (90^{th} percentile) projection for mid-term (2009-2012)
7b	1.93%	3.5%	3.2%	8.63%	Watson Wyatt (220711mid): Extremely optimistic scenario (90^{th} percentile) projection for long-term (2013-2022)

Schedule 4.7

This table summarizes the forecasts of two samples of professionals for the yields and total returns on a number of asset classes, and the MERP implied by the total returns on stock indexes and long bonds.

TR Index	5-year Forecast Ending Dec. 2012 from Mercer[a]			
	5th percentile	**median**	**mean**	**95th percentile**
Panel A: Distribution for mid-term return expectations from Mercer[a]				
DEX Long Bond TR	3.2%	4.5%	4.6%	6.4%
S&P/TSX Composite	5.0%	8.0%	8.1%	11.4%
S&P500 ($ Cdn)	6.4%	8.5%	8.6%	11.3%
Implied MERP S&P/TSX[b]	1.8%	3.5%	3.5%	5.0%

Index	Sample size	Percentiles				
		10th	**25th**	**50th (median)**	**75th**	**90th**
Panel B: Distribution of mid-term (2009-2012) return expectations from Watson Wyatt[c]						
30-yr Canada Bonds	25	4.5%	4.5%	4.8%	5.5%	6.0%
S&P/TSX Composite Index	26	6.0%	7.0%	8.0%	9.0%	12.0%
S&P 500 Index	27	6.0%	7.0%	8.0%	9.0%	10.0%
Implied MERP S&P/TSX		1.5%	2.5%	3.2%	3.5%	6.0%
Panel C: Distribution of long-term (2013-2022) return expectations from Watson Wyatt[c]						
30-yr Canada Bonds	23	4.5%	4.6%	5.2%	6.0%	6.6%
S&P/TSX Composite Index	24	7.0%	7.3%	8.0%	9.8%	10.0%
S&P 500 Index	25	7.0%	7.5%	9.0%	10.0%	10.0%
Implied MERP S&P/TSX		2.5%	2.7%	2.8%	3.8%	3.4%

[a]Mercer, *2008 Fearless Forecast*, 17th edition. This survey captures the views of 54 Canadian and global investment managers on the economy and capital markets.

[b]The DEX long bond index was formerly the SCI Long bond index. It consists of government and corporate bonds with maturities in excess of 10 years.

[c]Watson Wyatt, *Economic Expectations 2008*, 27th Annual Canadian Survey, p. 15. Based on a survey of the "country's leading business economists and portfolio managers in 42 organizations, such as chartered banks, investment management firms and other corporations" in mid-November 2007.

Schedule 4.8

This table provides the rolling five-year betas for our sample of ten utilities. If thin or no trading plagues any five-year period, we do not calculate a beta for that utility. This was the case for Emera for the first three rolling five-year time periods, for Pacific Northern Gas for the first six rolling five-year time periods, and Enbridge for the first two rolling five-year time periods. All betas are calculated using monthly total returns for the utility and the S&P/TSX Composite index. "w/o" refers to without. Although AltaGas Utility Group Inc. became a new, publicly traded corporation on November 17, 2005, it is not included because less than 3 years of market data were available for beta estimation.

Five-year period	Terasen[c]	Cdn Utilities	Emera[a]	Pacific Northern Gas	TransAlta Corp.	Trans Canada Pipe	Duke[b]	Enbridge Inc.	Atco Ltd.	Fortis Inc.	Mean	Mean, w/o Duke	Mean, w/o Atco	Mean, w/o Duke & Atco	Mean, w/o Terasen & Duke
1990-94	0.608	0.592			0.558	0.574	0.571		0.715	0.462	0.583	0.585	0.561	0.559	0.580
1991-95	0.635	0.498			0.606	0.540	0.557		0.712	0.533	0.583	0.587	0.561	0.562	0.578
1992-96	0.562	0.561			0.585	0.489	0.611	0.498	0.600	0.390	0.537	0.526	0.528	0.514	0.520
1993-97	0.474	0.634	0.405		0.462	0.338	0.531	0.440	0.546	0.310	0.460	0.451	0.449	0.438	0.448
1994-98	0.479	0.616	0.564		0.536	0.544	0.453	0.478	0.623	0.484	0.531	0.540	0.519	0.529	0.549
1995-99	0.352	0.530	0.415		0.265	0.224	0.253	0.237	0.509	0.320	0.345	0.357	0.325	0.335	0.357
1996-00	0.243	0.361	0.276	0.457	0.048	0.170	0.128	0.046	0.377	0.216	0.232	0.244	0.216	0.227	0.244
1997-01	0.168	0.249	0.206	0.437	0.061	-0.068	-0.098	-0.128	0.280	0.133	0.124	0.149	0.107	0.132	0.146
1998-02	0.115	0.184	0.155	0.453	0.082	-0.079	-0.011	-0.199	0.210	0.132	0.104	0.117	0.093	0.106	0.117
1999-03	0.020	0.050	-0.053	0.354	-0.063	-0.377	-0.087	-0.398	0.039	-0.046	-0.056	-0.053	-0.067	-0.064	-0.062
2000-04	-0.007	0.033	-0.015	0.468	0.138	-0.170	0.006	-0.318	0.092	0.031	0.026	0.028	0.018	0.020	0.032
2001-05	0.074	0.112	0.054	0.507	0.417	-0.173	0.094	-0.182	0.282	0.227	0.141	0.146	0.126	0.129	0.156
2002-06		0.210	0.084	0.472	0.427	0.318	0.817	0.221	0.354	0.480	0.376	0.321	0.378	0.316	0.321
2003-07		0.445	0.216	0.235	0.495	0.503	0.112	0.509	0.662	0.611	0.421	0.460	0.391	0.431	0.460
Mean	0.310	0.362	0.210	0.423	0.330	0.203	0.281	0.100	0.429	0.306	0.315	0.318	0.300	0.302	0.318
First four rolling periods											0.541	0.537	0.525	0.518	0.532
Middle five rolling periods											0.267	0.281	0.252	0.266	0.283
Last (most recent) five rolling periods											0.182	0.180	0.169	0.166	0.181

[a]Holding company for Nova Scotia Power. [b]Holding company for Westcoast Energy. [c]Formerly B.C. Gas & bought by Kinder Morgan Inc. in November 30, 2005, and acquired by Fortis as announced on February 26, 2007. The Kinder Morgan family trades as 3 separate firms on the NYSE.
Source: *CFMRC*. Updated using Bloomberg for 2007.

Schedule 4.9

This table provides the rolling five-year correlations (rho) for our sample of ten utilities with the market. If thin or no trading plagues any five-year period, we do not calculate a correlation for that utility. This was the case for Emera for the first three rolling five-year time periods, for Pacific Northern Gas for the first six rolling five-year time periods, and Enbridge for the first two rolling five-year time periods. All correlations (rhos) are calculated using monthly total returns for the utility and the S&P/TSX Composite index. Although AltaGas Utility Group Inc. became a new, publicly traded corporation on November 17, 2005, it is not included because less than 3 years of market data were available for rho estimation.

Five-year period	Terasen	Cdn Utilities	Emera	Pacific North. Gas	Trans Alta Corp.	Trans Canada Pipe	Duke	Enbridge Inc.	Atco Ltd.	Fortis Inc.	Mean Rho				
											All In	Atco Out	DukeOut	Atco & Duke Out	Terasen & Duke Out
1990-94	0.571	0.581			0.458	0.492	0.407		0.468	0.485	0.495	0.499	0.509	0.517	0.497
1991-95	0.544	0.485			0.523	0.506	0.362		0.447	0.494	0.480	0.486	0.500	0.510	0.491
1992-96	0.513	0.512			0.579	0.481	0.415	0.440	0.439	0.391	0.471	0.476	0.479	0.486	0.474
1993-97	0.476	0.619	0.445		0.456	0.310	0.414	0.325	0.451	0.361	0.429	0.426	0.430	0.428	0.424
1994-98	0.557	0.655	0.605		0.553	0.464	0.440	0.442	0.571	0.603	0.543	0.540	0.556	0.554	0.556
1995-99	0.363	0.554	0.427		0.229	0.171	0.282	0.221	0.480	0.424	0.350	0.334	0.359	0.341	0.358
1996-00	0.238	0.358	0.300	0.289	0.043	0.117	0.114	0.042	0.291	0.311	0.210	0.201	0.221	0.212	0.219
1997-01	0.167	0.274	0.236	0.233	0.050	-0.049	-0.085	-0.110	0.237	0.188	0.114	0.101	0.136	0.124	0.132
1998-02	0.114	0.204	0.180	0.224	0.068	-0.058	-0.008	-0.201	0.173	0.180	0.087	0.078	0.098	0.089	0.096
1999-03	0.042	0.023	-0.074	0.137	-0.036	-0.216	-0.021	-0.289	0.103	0.039	-0.029	-0.044	-0.030	-0.047	-0.039
2000-04	-0.006	0.032	-0.017	0.185	0.106	-0.136	0.003	-0.260	0.064	0.035	0.001	-0.006	0.000	-0.008	0.001
2001-05	0.065	0.062	0.055	0.211	0.300	-0.188	0.049	-0.162	0.230	0.187	0.081	0.064	0.084	0.066	0.087
2002-06		0.089	0.071	0.223	0.300	0.303	0.367	0.201	0.208	0.291	0.228	0.231	0.211	0.211	0.211
2003-07		0.159	0.153	0.138	0.287	0.381	0.051	0.342	0.334	0.319	0.240	0.229	0.264	0.254	0.264
Mean		0.304	0.329	0.217	0.205	0.280	0.184	0.199	0.083	0.321					
First four rolling periods											0.469	0.472	0.480	0.485	0.471
Middle five rolling periods											0.261	0.251	0.274	0.264	0.272
Last (most recent) five rolling periods											0.104	0.095	0.106	0.095	0.105

Source: *CFMRC*. Updated using Bloomberg for 2007.

Schedule 4.10

This schedule reports time-series mean monthly variances (in decimal) at the industry-level using the indirect decomposition method of Campbell *et al.* (2001) based on all firms on the TSX for the 1975-2003 and 1994-2003 periods. The 47 industry groups, which are arranged in alphabetical order, are those used by Fama and French (1997). The number of firms is based on the total period. "Utilities as % of 44-industry mean" results from the elimination of the 3 industries with the highest variances. "40-Industry mean" is the cross-sectional mean of the time-series means of all industries with at least 10 firms in them. "Utilities as % of 39-industry mean" results from the elimination of the industry with the highest variance from the 40-Industry mean.

Industry	**# Firms**	**1973-2003**	**1994-2003**	**Industry**	**# Firms**	**1973-2003**	**1994-2003**
Agriculture	3	0.0135	0.0259	Nonmetallic Mining	240	0.0022	0.0019
Aircraft	17	0.0062	0.0083	Personal Services	13	0.0114	0.0090
Alcoholic Beverages	26	0.0028	0.0027	Petrol & Natural Gas	656	0.0017	0.0019
Apparel	22	0.0048	0.0055	Pharmaceutical	59	0.0077	0.0064
Automobiles & Trucks	50	0.0032	0.0030	Precious Metals	366	0.0071	0.0098
Banking	98	0.0019	0.0024	Printing & Publishing	26	0.0761	0.2158
Business Services	218	0.0034	0.0034	Real Estate	90	0.0025	0.0018
Business Supplies	52	0.0019	0.0019	Recreational Products	15	0.0092	0.0129
Candy and Soda	6	0.0083	0.0153	Restaurants, Hotel, Motel	34	0.0034	0.0035
Chemicals	44	0.0029	0.0032	Retail	117	0.0015	0.0015
Coal	9	0.0373	0.0853	Rubber & Plastic	13	0.0040	0.0046
Computers	48	0.0036	0.0056	Shipbuilding, Railroad	3	0.0704	0.0124
Construction	23	0.0050	0.0065	Shipping Containers	4	0.0196	0.0290
Construction Materials	42	0.0029	0.0019	Steel Works, Etc.	43	0.0025	0.0037
Consumer Goods	24	0.0034	0.0031	Telecommunications	93	0.0026	0.0039
Defense	1	0.0137	0.0065	Textiles	15	0.0086	0.0118
Electrical Equipment	21	0.0079	0.0154	Tobacco Products	1	0.0881	0.2452
Electronic Equipment	73	0.0064	0.0119	Trading	331	0.0016	0.0010
Entertainment	45	0.0036	0.0045	Transportation	66	0.0019	0.0018
Food Products	34	0.0030	0.0040	Utilities	52	0.0017	0.0020
Healthcare	16	0.0056	0.0056	Wholesale	120	0.0021	0.0018
Insurance	41	0.0019	0.0018	47-industry mean		0.0109	0.0180
Machinery	91	0.0023	0.0018	Utilities as % of 47-industry mean		15.33%	11.19%
Measure & Control Equip.	11	0.0190	0.0199	Utilities as % of 44-industry mean		26.54%	29.51%
Medical Equipment	13	0.0171	0.0160	40-industry mean		0.0065	0.0107
Miscellaneous	11	0.0036	0.0039	Utilities as % of 40-industry mean		25.64%	18.87%
				Utilities as % of 39-industry mean		35.35%	37.16%

Schedule 4.11

This table reports the % issue fees for Canadian utilities based on issues over the five-year period, 1997-2001

Type of financing	Maturity[a]	Number of issues	Median %Fee	Amortization period in years	Annual Amortized % Fee
Debt	< 10 years	52	0.37%		
Debt	> 10 years	52	0.50%	20	0.025%
Preferred		16	3.00%	50	0.06%
Common		15	4.00%	50	0.08%

Issuers with following SIC codes: 4612 (crude petroleum pipelines), 4911 (electric services), 4922 (natural gas transmission), 4923 (natural gas transmission and distribution), and 4924 (natural gas distribution). Debt maturity is measured as maturity date compared to announcement date of the issue.

Source: *Financial Post Data Group*.

Schedule 6.1

This table uses data drawn from the evidence of Ms. McShane to show that stock returns exhibit mean reversion and bond returns exhibit mean aversion in both Canada and the United States over the 1947-2006 period of time. "Stdev." refers to the standard deviation of returns; and "Range" refers to the difference between the highest and low returns.

Measure of Risk	Based on one-year returns[1]			Based on 25-year returns[3]		
	Stocks	L.T. Bonds	Ratio	Stocks	L.T. Bonds	Ratio
Panel A: Based on Canadian returns for stock and long government (L.T.) bonds						
Stdev.	16.13%	9.75%	1.65	1.10%	3.50%	0.31
Range	74.36%	53.44%	1.39	4.90%	10.00%	0.49
Panel B: Based on U.S. returns for stock and long government (L.T.) bonds						
Measure of Risk	Based on one-year returns[2]			Based on 25-year returns[3]		
	Stocks	L.T. Bonds	Ratio	Stocks	L.T. Bonds	Ratio
Stdev.	16.72%	10.30%	1.62	2.10%	3.50%	0.60
Range	79.09%	49.54%	1.60	8.60%	9.80%	0.88

[1] Ibbotson Associates.
[2] Canadian Institute of Actuaries.
[3] Ms. McShane's Evidence, EB-2007-0905, Exhibit C2, Tab 1, Schedule 1, Schedule 4, page 218 of 261.

Schedule 6.2

This table provides the market performance of the sample of 20 Canadian companies used by Ms. McShane in her Comparable Earnings Estimation Method. The returns for Ms. McShane's sample are based on equal weights to conform to the equal weights used in implementing her Comparable Earnings Estimation Method. Performance as reported in panel A is measured using annualized monthly returns. The Sharpe ratio is obtained by dividing the mean excess return by the standard deviation of returns. Performance as reported in panel B is measured using monthly excess returns (i.e., actual returns minus the risk-free rate) to obtain the Jensen or Alpha measure of abnormal returns. Performance is measured using monthly (excess) over the period 1994-2006.

	Annualized Monthly Returns	
Statistic	**Ms. McShane's Sample**	**S&P/TSX Composite**
Panel A: Mean, standard deviations and Sharpe ratios		
Mean	15.08%	11.51%
Standard Deviation	12.14%	15.40%
Sharpe Ratio	0.26	0.14

	Alpha (intercept)	**Beta (of Market)**	**F-test**		**Adjusted R^2**
			Value	**Significance**	
Panel B: Results for regression of excess returns on Ms. McShane's sample with those for the S&P/TSX Composite					
Coefficient	0.0064	0.4462	72.1590	0.0000[a]	0.3146
T-statistic	2.7414	8.4946			
p-value	0.0068	0.0000			

[a]Actual significance is 1.5813E-14.

Schedule 6.3

This table provides the market performance of holding the Sector sub-index 55, Utilities, of the S&P/TSX Composite index over the 20-year period, 1988-2007, and over the 10-year period, 1998-2007, based on trade data from the TSX. Performance as reported in panels A and B is measured using (annualized) monthly returns. The Sharpe ratio is given by the monthly excess returns (i.e., actual returns minus the risk-free rate) divided by the monthly standard deviation of returns. Performance as reported in panels C and D is measured using monthly excess returns (i.e., actual returns minus the risk-free rate) to obtain the Jensen or Alpha measure of abnormal returns.

	Annualized Return	
Statistic	**Utilities**	**S&P/TSX Composite**
Panel A: 20-year period, 1988-2007		
Mean	11.83%	10.78%
Standard Deviation	12.94%	14.04%
Sharpe Ratio	0.49	0.38
Panel B: 10-year period,1998-2007		
Mean	12.15%	10.38%
Standard Deviation	14.70%	15.96%
Sharpe Ratio	0.58	0.42

	Alpha (intercept)	**Beta (of Market)**	**F-test Value**	**F-test Significance**	**Adjusted R^2**
Panel C: 20-year period, 1988-2007					
Coefficient	0.0041	0.2597	20.4619	0.0000	0.0753
T-statistic	1.7633	4.5235			
p-value	0.0791	0.0000			
Panel D: 10-year period,1998-2007					
Coefficient	0.0068	0.0516	0.3721	0.5430	-0.0053
T-statistic	1.7303	0.6100			
p-value	0.0862	0.5430			

Schedule 6.4
Comparison of Witnesses' Rate of Return Evidence Against Selected Adjustment Formulas

Source	Long-Canada Forecast	Recommended Return	Risk Premium (Basis Points)
I. Witnesses			
2008			
Kryzanowski/ Roberts	3.85%	7.10%	325
McShane	5.00%	10.50%	550
2009			
Kryzanowski/ Roberts	4.25%	7.25%	300
McShane	5.00%	10.50%	550
II. Regulatory Boards[a]			
2007 Actual			
AUC	4.22%	8.51%	429
NEB	4.22%	8.46%	424
2008 Projected based on Kryzanowski / Roberts Long-Canada forecast			
AUC	3.85%	8.23%	438
NEB	3.85%	8.18%	433
2009 Projected			
AUC	4.25%	8.53%	428
NEB	4.25%	8.48%	423
Average-risk Premium for Boards			431

[a] "AUC" refers to the Alberta Utilities Commission, and "NEB" refers to the National Energy Board.

Before the Alberta Utilities Commission (AUC)

In the matter of:

AUC-1578571/ 2009 Generic Cost of Capital Proceeding No. 85

Evidence on Behalf of
Office of the Utilities Consumer Advocate (UCA)

On Cost of Equity and Capital Structures for Applicant Utilities

Text, Appendices and Schedules

Prepared Testimony of

Dr. Lawrence Kryzanowski and Dr. Gordon S. Roberts

Concordia University Research Chair in Finance, John Molson School of Business, Concordia University, Montreal; and CIBC Professor of Financial Services, Schulich School of Business, York University, Toronto.

March 2, 2009

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1. INTRODUCTION AND SUMMARY

1.1 QUALIFICATIONS

Q. Please introduce yourselves and state your qualifications.

A. This evidence is the work of Dr. Lawrence Kryzanowski of Concordia University and Dr. Gordon S. Roberts of York University. Dr. Kryzanowski is currently a Full Professor of Finance and Concordia University Research Chair in Finance (previously Ned Goodman Chair in Investment Finance) at Concordia University. He earned his Ph.D. in Finance at the University of British Columbia. Dr. Gordon S. Roberts is currently CIBC Professor of Financial Services at York University's Schulich School of Business. He earned his Ph.D. in Economics at Boston College.

Dr. Kryzanowski has experience in preparing evidence as an expert witness in utility rate of return applications, court proceedings for alleged stock market insider trading and price distortion due to alleged misrepresentation, and confidential final offer arbitration hearings for the setting of fair rates for the movement of various products by rail.

Together with Dr. Roberts in 1997, he prepared a report for the Calgary law firm, MacLeod Dixon, on rate of return considerations in the pipeline application by Maritimes and Northeast. For a group of organizations collectively and most recently referred to as the Consumers Group (formerly UNCA Intervenor Group and FIRM Customers), Drs. Kryzanowski and Roberts provided evidence on the fair return on equity and the recommended capital structure for ATCO Electric Limited in its 2001/2002 Distribution Tariff Application and for Aquila Networks Canada (Alberta) Ltd. ("ANCA") in its 2001/2002 Distribution Tariff Application and its 2002 Distribution Tariff Application (DTA) No. 1250392 before the Alberta Energy and Utilities Board. On behalf of the Province of Nova Scotia, they provided evidence and testified before the Nova Scotia Utility and Review Board in the matter of Nova

Scotia Power Inc. in 2002. They filed evidence and testified before the Régie de l'Enérgie du Quebec for the Fédération canadienne de l'entreprise indépendante ("FCEI") / Union des municipalities du Québec ("UMQ") & Option consommateurs ("OC") in the 2003 application of Hydro Quebec Distribution. Together with Dr. Roberts, and on behalf of Consumers Group, he prepared testimony and testified in Generic Hearing No. 1271597 before the Alberta Energy and Utilities Board in 2003-2004. They submitted evidence and testified before the Public Utilities Board of the Northwest Territories in the General Rate Application of Northwest Territories Power Corporation in 2007. Most recently, Drs. Kryzanowski and Roberts, prepared testimony and appeared before the Ontario Energy Board in Hearing EB-2007-095 on Ontario Power Generation.

Dr. Roberts is also experienced in preparing evidence for utility rate of return hearings. From 1995-1997, he submitted prefiled testimony as a Board witness in rate hearings for Consumers Gas. In 1996, he served as an expert advisor to the Ontario Energy Board in its Diversification Workshop. As noted above, together with Dr. Kryzanowski, he has also prepared evidence on rate of return and capital structure considerations and appeared before regulatory boards in Alberta, Nova Scotia, Ontario and Quebec.

More broadly, Drs. Kryzanowski and Roberts often provide technical expertise and advice on financial policy. Among our consulting clients in recent years are the Superintendent of Financial Institutions, the federal Department of Finance, Canada Investment and Savings, Canada Mortgage and Housing Corporation, and Canada Deposit Insurance Corporation. Our brief curricula vitae are attached as Appendix 1.A

1.2 PURPOSE OF EVIDENCE

Q. Who is sponsoring your evidence in the present proceeding?

A. The Office of the Utilities Consumer Advocate (UCA) has retained us to provide expert evidence on the fair return on equity, recommended capital structures, and the automatic adjustment mechanism for the applicant utilities in the present hearing, no. 1578571, proceeding ID 85.

Q. Please describe the general approach that you have used in preparing your evidence.

In preparing our evidence we considered and used various techniques for determining an appropriate capital structure and for measuring the fair return on equity for a regulated utility. Although some of the applicant utilities are owned by municipal governments and others are subsidiaries of shareholder-owned companies, we follow the stand-alone principle under which capital structure and the fair return on equity are determined as if each company were "standing alone" as a shareholder-owned entity. Consistent with past practice in Alberta and most other Canadian jurisdictions, we recommend a common allowed equity return for all utilities and employ adjustments to capital structures to true up differences in business risk among utilities.

Q. Please provide a summary of the principal findings in each section of your evidence.

A. In setting capital structures in Section 2, we begin with an overview of finance theory explaining why capital structures depend on business risk and why their determination does not follow a quantitative formula but is rather a qualitative exercise. We employ a qualitative framework to assess business risk in two steps: first, for each sector of the industry represented in this hearing (electricity transmission and distribution and gas transmission and distribution) and second, for each individual applicant utility. Examination of actual and allowed capital structures for a sample of Canadian utilities produces a number of benchmarks for industry equity ratios. Review of bond ratings reveals that the median bond rating for this sample is A(low) from Dominion Bond Rating Service (DBRS) and A- from Standard & Poor's (S&P) with a number of the companies receiving a rating in the BBB-range from at least one agency. Returning to our business risk analysis, for each industry sector we set an appropriate equity ratio and go on to adjust these ratios to reflect differences among utilities within each sector.

The following table summarizes our recommended equity ratios:

Applicant	Recommended Equity Ratio
AltaGas Distribution (status quo)	40%
AltaGas Distribution (weather deferral account)	37%
AltaLink	33%
ATCO Gas Distribution	34%
ATCO Electric Distribution	35%
ATCO Electric Transmission	33%
ATCO Pipelines (status quo)	42%
ATCO Pipelines (agreement in place)	34%
ENMAX Power Corp. Distribution	35%
ENMAX Power Corp. Transmission	30%
EPCOR Distribution	35%
EPCOR Transmission	30%
FortisAlberta Distribution	35%
NOVA Gas Transmission	34%

Underpinning our recommendation for the rate of return on common equity for the 2009 test year in Section 3 is a review of the general regulatory principles appropriate for setting a fair rate of return. Our methodology for estimating the required ROE for an average-risk utility begins with the estimation of a forward-looking market equity risk premium (MERP) for the S&P/TSX Composite (our domestically diversified market proxy) (input #1) of 5.1%. Since our primary approach begins with an examination of historical data, we provide checks by employing, in turn, a literature survey as well as the discounted cash flow (DCF) method implemented at the market level and surveys of knowledgeable individuals. These checks support the view that our principal estimation method produces a MERP that is conservatively high.

Next, we develop a forward-looking forecast of the investment riskiness of an average-risk utility relative to the market portfolio as proxied by the S&P/TSX Composite or relative to other Canadian industries or a typical firm in a representative market proxy (input #2) of 52%. Input #3 is the normalized yield forecasted for 30-year Canada bonds for 2009 which we determine at 4.75% as the long Canada yield used by the National Energy Board for 2009 plus an upward adjustment to normalize this yield in light of extraordinary current market conditions. Finally, we make an upward adjustment of 50 basis points to cover fees involved with potential equity offerings or issues by an average-risk utility and to ensure its financial flexibility and integrity (input #4).

The following equation shows how we combine the four inputs to obtain our recommendation:

[(Input #1) *x* (Input #2)] + (Input #3) + (Input #4) = recommended rate of return on equity or ROE for an average-risk utility.

The Generic Formula-Based Adjustment (GFBA) mechanism is the focus of Section 4 of our evidence. We review the implementation of such mechanisms in Canada and in California and summarize their advantages and disadvantages. We then study whether the investment performance of Canadian utility shares has suffered as a result of GBFA ratemaking. This study turns up no support for this conjecture. On the contrary, there is considerable evidence that investors in utilities have enjoyed superior returns during the period when GFBA ratemaking has been in place. In conclusion, this section of our evidence recommends that, after setting the test year return on equity and capital structures at the levels we advise, the Commission should reaffirm the use of its present formula for a further period of five years.

Section 5 of our evidence contains our critique of key aspects of the evidence presented by utility sponsored experts. We focus on three key areas in our critique: recommended capital structures, allowed return on equity in comparison to GFBA mechanisms in place, and recommended return on equity for the 2009 test year.

Turning to the first area, we assess ATWACC and show that a number of inherent conceptual problems make it unsuitable for use in determining capital structures and return on equity in this hearing. We also provide a detailed critique of the claims by other experts and by utilities that it is necessary to maintain a bond rating in the A-range in order to ensure access to financing. The evidence does not support this claim: on the contrary, Canadian utilities with BBB-level ratings are successfully accessing financing both domestically and in the U.S. Further, we provide several reasons why the Commission should attach little weight to the argument that non-taxable utilities be awarded an increase in their allowed equity ratios.

The second major area of disagreement revolves around the divergence between the inflated equity returns requested by the applicant utilities and the far more moderate returns for 2009 produced by GFBA mechanisms in place in Canada. Closely related, the third major area of disagreement focuses on the details of implementation of standard return on equity methodologies by various utility-sponsored experts. We document a number of biases either introduced or ignored by these experts and show how each bias has the effect of inflating the estimated return on equity. Our analysis demonstrates that, if they were corrected for all of these biases, the fair return estimates of these experts would be quite similar to our own recommended rates.

Q. Please summarize your recommendations for the rate of return portion of your evidence using a format that is suitable for comparing your recommendation with those of the other witnesses.

A. The following table contains the summary.

Panel A: Determination of Market Equity Risk Premium (MERP) for S&P/TSX Composite Index

MERP Estimation Method	**Estimate**	**Weight**
Equity Risk Premium Method	5.10%	Primary
Survey of Estimates Reported in the Literature	Risk Premium of 5.10% for S&P/TSX Composite is Conservatively High	Directional for bench-marking purposes
Discounted Cash Flow Estimation Method at Market Level Only	Risk Premium of 5.10% for S&P/TSX Composite is Conservatively High	Directional for bench-marking purposes
Survey Expectations of Investment Professionals (Watson Wyatt)	Risk Premium of 5.10% for S&P/TSX Composite is Conservatively High	Directional for bench-marking purposes

Panel B: Determination of Risk of an Average-risk Canadian Utility Relative to the Market (S&P/TSX Composite Index)

Relative Risk Estimation Method	**Estimate**	**Weight**
Beta	0.52	Primary
Standard Deviation of Utilities relative to Sample of Industries and Non-utility Firms	Relative Risk of 0.52 for Average-risk Utility is Conservatively High	Directional for bench-marking purposes

Panel C: Determination of Recommended Return on Equity (ROE) for an Average-risk Utility and each Applicant Utility when risk differences are accounted for by Adjusting the Equity Ratio for each Applicant Utility in the Generic Proceeding

Test Year	**Recommended Market Equity Risk Premium**	**Recommended Relative Risk Adjustment to the MERP**	**Recommended Equity Risk Premium for OPG**	**Recommended Risk-free rate**	**Flotation, Financial Flexibility & Integrity Allowance**	**Recommended Generic ROE**
2009	5.10%	0.52	5.10% x 0.52 = 2.65%	4.75%	0.50%	7.90%

2. CAPITAL STRUCTURE

2.1 OVERVIEW OF THIS SECTION AND METHODOLOGY

2.1.1 Summary

Q. Please provide an overview of this section of your evidence.

A. The goal of this section is to assess the business risks of the applicant companies and to recommend for each a capital structure commensurate with that risk. In forming our assessments we examine current evidence with a focus on identifying any changes that may have occurred since the last Generic hearing in 2004. The business risk ratings that we develop constitute an important input into setting the recommended capital structure for each Applicant. Our methodology follows past practice in Alberta and most other Canadian jurisdictions in determining an allowed equity return common to all companies and subsequently employing adjustments to deemed capital structures to compensate for differences in business risk and to preserve financial integrity.

We begin the analysis with a brief review of the key implications of finance theory for setting recommended capital structures in this proceeding. First, we show that research establishes that setting capital structure is a qualitative exercise not amenable to the use of precise formulas. Second, we review several factors that have been demonstrated to be important determinants of capital structure for best practices non-regulated firms and explain how they apply in the context of utility regulation. Our focus is on the importance of business risk as an input.

The following section introduces our qualitative business risk rating model and goes on to apply it in two steps. In the first step, we assess business risk for each of the four sectors of the regulated utility industry represented in this hearing: electricity transmission and distribution, and gas transmission and distribution. The second step is to orient each individual applicant utility relative to the business risk of its sector.

Next we turn to an examination of the bond ratings and capital structures, both actual and allowed for a sample of Canadian utilities. Our purpose is to develop benchmarks of capital structures for different segments of the industry. With these benchmarks in hand, we draw on our analysis of business risk above to recommend an appropriate equity ratio for the benchmark average-risk utility in each sector. We then adjust the benchmark equity ratios to obtain the equity ratios for those utilities whose business risk differs from the average.

2.1.2 Methodology

Q. Please explain the methodology on which you base the analysis in this section.

A. Our approach is to determine a common allowed return on equity for an average-risk utility and to adjust for differences in business risk across utilities through varying the allowed common equity ratio. The method that we employ follows past practice in Alberta in Decision 2004-052. It is also consistent with practice at the National Energy Board and the Ontario Energy Board. For example, in its Decision with Reasons, EB-2007-095, the OEB states on page 161:

> “The Board concludes that this [setting of different costs of capital for OPG’s regulated nuclear and hydro generation operations] is an approach worthy of further investigation which will be explored in OPG’s next proceeding. In examining whether to set separate costs of capital, the Board intends only to examine whether separate capital structures should be set for the regulated hydroelectric and nuclear businesses. The Board expects that the same ROE would be applicable to both types of generation. This is consistent with the general approach of setting a benchmark ROE and recognizing risk differences in the capital structure.”

In choosing our method, we reject the alternative of switching to an approach under which both capital structure and cost of equity jointly adjust to reflect differences in business risk across utilities. While this method is employed by the BCUC, it suffers from the disadvantage of greater complexity arising from the need to make two adjustments instead of one as well as from the multitude of issues arising from the imprecise relationship between capital structure and return on equity documented in the next section of our Evidence. In Decision 2004-052, the AEUB stated on page 54:

> "…the Board considers that unique utility-specific adjustments to the generic ROE should only be made in exceptional circumstances where adjusting capital structure alone is not sufficient to reflect the investment risk for a particular Applicant… The Board concludes that there is no need for utility-specific adjustments to the common ROE for any of the Applicants."

2.2 IMPLICATIONS OF FINANCIAL THEORY

Q. What does corporate finance theory tell us about setting capital structures?

A. Finance theory and best practices have several important implications for setting the appropriate level of the equity ratio for a regulated utility. First, theory teaches us to be suspicious of attempts to determine an appropriate equity ratio using a formula. Unlike other areas in finance, research on capital structure can offer only qualitative policy advice. To quote a leading, current corporate finance textbook:

> "No exact formula is available for evaluating the optimal debt-equity ratio."[1]

While we expect an introductory textbook to contain an element of simplification in order to present material to beginning students, this statement has yet to be

[1] S.A. Ross, R.W. Westerfield, J. F. Jaffe and G.S. Roberts, 2008, *Corporate Finance*, Fifth Canadian Edition, Toronto, McGraw-Hill Ryerson, page 500.

superseded by advanced research. We review selected research on capital structure in Appendix 3.A.

This important implication of finance theory has been accepted by Canadian regulators including the Alberta Utilities Commission (formerly the Alberta Energy and Utilities Board). In Decision 2004-052, page 35, it wrote:

> "In the Board's view, setting an appropriate equity ratio is a subjective exercise that involves the assessment of several factors and the observation of past experience. The assessment of the level of business risk of the utilities is also a subjective concept. Consequently, the Board considers that there is no single accepted mathematical way to make a determination of equity ratio based on a given level of business risk."

Although it does not offer a formula, finance theory does highlight key considerations in determining capital structure. In the same textbook we find the following:

> "How should companies establish target debt-equity ratios? While there is no mathematical formula for establishing a target ratio, we present three important factors affecting this ratio:[2]
>
> - Taxes. As pointed out earlier, firms can only deduct interest for tax purposes to the extent of their profits before interest. Thus, highly profitable firms are more likely to have larger target ratios than less profitable firms.
> - Types of assets. Financial distress is costly, with or without formal bankruptcy proceedings. The costs of financial distress depend on the types of assets that the firm has. For example, if a firm has a large investment in land, buildings, and other tangible assets, it will have smaller costs of financial distress than a firm with a large investment in research and

[2] S.A. Ross, R.W. Westerfield, J. F. Jaffe and G.S. Roberts, 2008, *Corporate Finance*, Fifth Canadian Edition, Toronto, McGraw-Hill Ryerson, page 502.

development. Research and development typically has less resale value than land; thus, most of its value disappears in financial distress. Therefore, firms, with large investments in tangible assets are likely to have higher target debt-equity ratios than firms with large investments in research and development.

- Uncertainty of operating income. Firms with uncertain operating income have a high probability of experiencing financial distress, even without debt. Thus, these firms must finance mostly with equity. For example, pharmaceutical firms have uncertain operating income because no one can predict whether today's research will generate new drugs. Consequently, these firms issue little debt. <u>By contrast, the operating income of utilities generally has little uncertainty. Relative to other industries, utilities use a great deal of debt</u> [emphasis added]."

Taken together, these three factors are central to establishing the appropriate amount of debt for a utility. If we set aside the second and third factors for a moment, the first factor tells us that a company should use a large proportion of debt financing to reduce its cost of capital. Simply stated, factors 2 and 3 determine the level of business risk which restrains the company's use of debt in order to reduce the cost of financial distress and the probability that it will occur due to low operating income. Turning from speaking in general about any company to focusing on a regulated utility, we believe that factors 2 and 3 are largely mitigated by the special features of this industry.

For an electric utility, the costs of financial distress (factor 2) are reduced because its assets make excellent collateral. Further, the regulation process virtually ensures that the company will recover its debt payments and other costs. Further, regulation allows the company to go back to its regulator to apply for relief in the unlikely event that it does not earn its fair rate of return in a given year, and especially if its ability to service its debt were in jeopardy. Additionally, in the extreme event that a utility became insolvent, it is highly likely that the regulator (and other governmental bodies) would work with the company to find new investors or a merger partner so that service (and thus, asset usage) would not be interrupted. This is what occurred with the bankruptcy of Pacific Gas and Electric Company in California.[3] Similarly, we would expect a regulator to be supportive in the last drastic event of financial distress short of insolvency. As a result, the cost of financial distress is far lower than for a unregulated firm.

The third factor is the probability of financial distress. As stated in the quotation, this probability is low for utilities because operating income has low variability as measured (looking forward) by the degree of operating leverage or (historically) by the variability of realized earnings before interest and taxes (EBIT). EBIT volatility is further diminished if the utilities make extensive use of deferral accounts. We return to EBIT volatility and deferral accounts later in our evidence.

The special nature of regulated utilities was clearly reflected in the 2008 decision by S&P to change its application of notching criteria for U.S. utility companies from relative to absolute, and to increase the rating of the senior unsecured debt of 32 utilities to be the same as each utility's corporate credit rating, even when a considerable amount of secured debt is outstanding.[4] The press release on page one states that:

> "… our criteria have evolved so that the notching analysis can also focus on the value of assets available in a bankruptcy and whether those assets are sufficient to satisfy claims, regardless of the debt's priority. This approach is beneficial for the debt ratings of utilities because the value of their regulated assets is resilient and because their ability to add debt is restricted. As a result, creditors of defaulted utilities have realized higher average recovery rates than the creditors of companies in other sectors."

[3] K. Gaudette, 2002, Bankrupt Pacific Gas and Electric hopes to avoid state laws, Associated Press, *The Nando Times*, January 25, www.nando.net/business/story/228567p-2199342c.html.
[4] Standard and Poor's, Criteria | Corporates | Utilities: Notching Of U.S. Investment-Grade Investor-Owned Utility Unsecured Debt Now Better Reflects Anticipated Absolute Recovery, November 10, 2008. Available at:
http://www2.standardandpoors.com/portal/site/sp/en/us/page.search/search/0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0.html.

The press release provides the following justification for this change on page two:

> "In our view, this conclusion and the recovery prospects of unsecured regulated utility obligations benefit from several unique factors. First, utility assets are more likely to retain value in a bankruptcy scenario because of the essential nature of the service those assets provide. The experience of pure utility defaults (albeit few in number) shows that bankruptcy is normally caused by management missteps that lead to regulatory problems that in turn constrain cash flows. The situation is rehabilitated in the post-bankruptcy restructuring in a way that leaves regulated asset values essentially intact.
>
> Second, most utilities must obtain regulatory permission to issue new debt, and this requirement acts as a constraint on the utilities' ability to add debt in the event of a default spiral.
>
> Third, utility mortgage indentures restrict the issuance of FMBs to a percentage of bondable property, as defined in the indenture. The bondable property definition is normally tied to a utility's physical plant, and the percentage is typically 70% or less. Other indenture provisions may be more expansive, but usually not to a significant degree. These industry-specific and jurisdictional factors indicate that in most distressed situations we can reasonably anticipate recovery above 30% for utility unsecured debt."

In conclusion, we come back to the beginning of our answer to this question. If we set aside factors 2 and 3 (the costs of financial distress and the probability of financial distress), the theory suggests that a company should use a high proportion of debt. Our comments on factors 2 and 3 explain why it makes sense to expect them to carry less importance in practice for this industry. With the focus then on the first factor, taxes, we would expect regulated utilities to be among the most highly leveraged industries.

2. 3 BUSINESS RISKS OF UTILITIES

Q. What do you address in this section?

A. We now turn from utilities as an industry to examine the business risks of the industry sectors and individual applicants represented in this hearing. First, we explain our framework for analysis – a qualitative risk scoring model. Second, we begin with electricity transmission and distribution at the sector level and assess the level of business risk characteristics of each sector. We then use these sector assessments as benchmarks in evaluating business risk for individual applicants within each sector. Our approach follows that of the AEUB in its Decision 2004-052. Third, we apply this approach to the gas distribution and transmission utilities.

2.3.1 Framework for Analysis

Q. What framework guides your analysis of business risk?

A. Our assessment of business risk focuses on uncertainty of operating income introduced earlier in our overview of important factors in the determination of capital structure. Our approach is consistent with the Commission's definition in the Final Scoping Document for this hearing: "Business risk encompasses all the operating factors that collective[ly] increase the probability that expected future income flows accruing to investors may not be realized, because of the fundamental nature of the company's business".[5] Factors that increase costs to a utility such as higher fuel prices do not necessarily translate directly into increased business risk. Management can prevent these factors from increasing the uncertainty of operating income in several ways. First, it can forecast their impacts and build them into proposed pricing. In a fair regulatory environment, such costs will be allowed and passed on to

[5] AUC, Final Scoping Document, 2009 Generic Cost of Capital Proceeding, Application No 1578571 / Proceeding ID. 85, page 1.

customers. Second, management can engage in risk control to moderate the impact of such factors on operating income. Third, risk can be mitigated by use of deferral accounts. Business risk is only increased to the extent that these three approaches to control risk only work incompletely.

We introduce each of the three major categories of business risk for utilities: market, operational and regulatory, and discuss each in detail providing a detailed breakdown of the components of business risk within each category. We also develop a qualitative scoring model which ranks each component of risk on a scale of low, moderate or high. We create a summary table, Schedules 2.1 – 2.4, displaying the rankings of each of 9 individual risks and combine these to obtain a ranking for each of our three major categories. The model in this evidence is adapted from an earlier version which underpinned our recommendation of a capital structure of 47% equity for Ontario Power Generation which was adopted by the OEB.[6]

Our use of a scoring model is validated by research documenting the effectiveness of quantitative credit scoring and its widespread use by financial institutions for assessing the credit risk of loans to individuals and small businesses.[7] For these small loans, large sample sizes allow the development of quantitative scoring. For utilities, smaller numbers make it more appropriate to employ a qualitative approach. For example, Standard & Poor's identifies five factors on which it bases its business risk assessments for utilities: regulation, markets, operations, competitiveness and management. Examination of ratings reports from DBRS and Moody's confirms that these agencies address the same factors in appraising business risk. In November 2007, S&P discontinued its use of a 10-point rating of

[6] Evidence on Behalf of Pollution Probe On Capital Structure, Return on Common Equity, Automatic Adjustment Formula, Prepared Testimony of Dr. Lawrence Kryzanowski and Dr. Gordon S. Roberts, EB-2007-0905- OPG-2008-09 Payments, Exhibit M, Tab 12, April 2008.
[7] A.N. Berger, W.S. Frame and N.H. Miller, Credit scoring and the availability, price and risk of small business credit, Federal Reserve Bank of Atlanta Working Paper No. 2002-6, Available at SSRN: http://ssrn.com/abstract=315044 or DOI: 10.2139/ssrn.315044 . L. Kryzanowski, M.C. To and Roger Seguin, 1990, Chapter 4: An analytical framework for the assessment of solvency risk, *Business Solvency Risk Analysis* (Montreal: Institute of Canadian Bankers, Volume 1, Revised September).

each factor and began using a qualitative assessment of each to categorize a utility's business risk profile as Excellent, Strong, Satisfactory, Weak or Vulnerable. S&P comments on the range of outcomes as follows:[8]

> "Regulated utilities and holding companies that are utility-focused virtually always fall in the upper range ["Excellent" or "Strong") of business risk profiles. The defining characteristics of most utilities --- a legally defined service territory generally free of significant competition, the provision of an essential or near-essential service, and the presence of regulators that have an abiding interest in supporting a healthy utility financial profile---underpin the business risk profiles of the electric, gas, and water utilities."

We next use our framework to measure the business risks of each sector of the utilities industry represented in this hearing. Like S&P, we find that the regulated utilities that we consider all enjoy business risk profiles at the low risk end of the scale (low to moderate in our classification scheme). Continuing, we explain why we agree with the commonly held view that transmission (wires) carries the lowest business risk followed by distribution and then by generation with the highest business risk. We assess the business risk of transmission utilities as low and distribution utilities as somewhat higher at low to moderate. These assessments form the basis for our capital structure recommendations for the individual applicants in this hearing.

2.3.2 Capital Markets and Economic Conditions: Background to Business Risk

2.3.2.1 Overview of Section

Q. Please provide an overview of this section of your evidence.

[8] Standard & Poor's, 2007, U.S. utilities ratings analysis now portrayed in the S&P corporate ratings matrix, *Ratings Direct*, November 30.

A. The electric transmission and distribution and gas distribution utilities in this hearing serve the Alberta market. The gas transmission pipelines are connected to markets in eastern Canada, and the U.S. as well as serve the Alberta Market. As a result, economic forecasts for the U.S., Canada and Alberta are all relevant to assessing the business risks of the applicant utilities.

We present our views on the global credit crisis and its impact on capital markets. Starting in mid-2007 in the United States, the credit crisis spread globally with adverse impact on both the global economy and the global equity market. The flight to quality in the fixed income market has kept credit spreads in both Canada and the United States high by historic standards. In terms of currencies, the U.S. dollar was a beneficiary of the credit crisis. Investors around the world retreated into U.S. Treasuries, as a perceived safe haven.

We note that some credit market indicators are improving of late. For example, there is a narrowing of the TED (U.S. Treasury/ Eurodollar) spread. Also, LIBOR (London Interbank Offered Rate) is declining and corporate bond spreads are starting to narrow from their historic highs.[9] Royal Bank of Canada reported lower but positive profits of $1 billion on February 26, 2009.[10]

The global economic slowdown, which started in the United States in late 2007, spread to Canada, Europe and Japan. This weakness in advanced economies has muted the former stellar performance of emerging economies, most notably China and India, making for a synchronized global recession. Against this backdrop, many commodity prices including those of base metals and oil and natural gas, declined sharply from their record highs in mid-2008. The global recession has reduced concerns about rising inflation and, in the case of some countries, raised the possibility of deflation.

[9] RBC Capital Markets, 2009, *Credit Weekly*, 53, January 30.
[10] Royal Bank profit drops 15 per cent, http://www.canada.com/Royal+Bank+profit+drops+cent/1331501/story.html .

Governments and central banks in key countries around the world have been adopting/introducing significant stimulatory monetary and fiscal policies to counter the retrenchment by business and consumers. A priority has been for governments to shore up troubled financial institutions so as to prevent systemic failure and to revive lending. In addition, to their general economic stimulus packages, governments have been offering specific financial support to certain sectors of the economy. An example is the ailing auto industry in the United States and Canada.

Although extensive and ambitious, these government and central bank initiatives, once fully implemented, will take time to work their way through the system, and there is therefore a high degree of uncertainty as to when they will gain traction. With many advanced countries experiencing rising unemployment, there is an unfortunate resurgence of pressure on individual governments to introduce protectionist policies.

Economic forecasts from a range of sources call for a severe economic slowdown in 2009, with global growth down sharply through most of the year and reviving towards the end of the year into 2010. The global economic slowdown, particularly the slowdown in the United States, coupled with weak commodity prices, has pushed the Canadian economy into recession. The steep decline in the Canadian dollar against its U.S. counterpart in the second half of 2008 has been a mitigating factor. During December 2008, Canada had its first monthly trade deficit since 1976.

For Alberta, the negative factors impacting the Canadian economy have been magnified by the province’s heavy reliance on energy prices. The oil price, for example, dropped from an all-time high of US$147 per barrel in June of 2008 to end the year at US$44.60 and natural gas prices have weakened substantially. Alberta’s real GDP is expected to decline in 2009 and rebound in 2010. Given the persistent weakness in both oil and natural gas prices, it is expected that a number of projects in western Canada will be delayed or shelved.

2.3.2.2 Global Credit Crisis

Q. Please provide a brief review of the global credit crisis.

A. Prior to the global credit crisis, global capital markets enjoyed a period of stability through the first part of 2007. Higher energy and commodity prices fueled by economic growth in China and India led to booms in energy and mining. Combined with the decline of the U.S. dollar, the result was a substantial strengthening of the Canadian dollar and strong equity and debt markets.

The global credit crisis, which started in the United States in mid-2007, persisted into 2008. Weakness in the U.S. housing market and the complex/opaque structured financial products, some of which were based on the troubled U.S. sub prime mortgages, were major contributors. The problems were magnified by structured products' reliance on bond rating agencies, as opposed to traditional lenders, in assessing credit risk. Unlike bank lenders, rating agencies do not have long-term relationships with borrowers. Further, bond-rating agencies do not pay for their mistakes as severely as do lending officers and face potential conflicts of interest as agents of both issuers and investors. This "outsourcing of risk assessment" reinforced the general trend toward underestimating credit risk and contributed to the collapse of some securitization structures most notably collateralized debt obligations (CDOs) supported by subprime mortgages and commercial paper. A similar rating debacle in the Maple bond market is discussed further in section five of our evidence.

A wide range of institutional investors and financial institutions around the globe were involved in these structured products. In large measure, exposure to them has been the cause of serious problems at a number of high profile U.S. financial and U.K/European financial institutions. There have been large write-downs of these assets by financial institutions and bank lending in many parts of the world has been curtailed. In the wake of the collapse of Lehman Bros. in mid-2008, the commercial paper market all but seized up putting substantial strain on corporate borrowers looking for ongoing operating finance.

The collapse of Lehman was one of the biggest shocks to the already weakened global financial system since the beginning of the credit crisis. The bankruptcy of this 158-year-old U.S. investment bank took the global financial market by surprise. Contrary to expectations, the U.S. government, which had already bailed out and/or arranged shot gun marriages for a range of high profile financial institutions, such as investment bank, Bear Stearns, and mortgage companies, Fannie Mae and Freddie Mac, decided to allow Lehman Brothers to fail. At the time of its collapse, Lehman Bros. was highly leveraged and had considerable exposure to these so-called toxic assets. The investment bank owed US$613 billion to 100,000 creditors globally including bondholders, who were owed US$155 billion. Thus, a concern was would "Lehman's downfall spread financial loss and psychological pain around the globe, shrinking credit and crimping the capacity of both the U.S. and global economies to grow."[11]

As a result of this bankruptcy, interbank rates rose sharply reflecting concerns amongst lenders that another of their counterparties would follow Lehman Bros. It appears that confidence within the ranks of the global financial industry is finally improving. Thanks, in large part, to government initiatives such as guaranteeing interbank loans and injecting capital into banks, LIBOR, is coming down. According to RBC Economics in 2009: "There are glimmers of light at the end of the tunnel with LIBOR rates slowly but surely moving lower, which augurs well for other credit spreads to narrow."[12]

Indeed, the TED spread (calculated by subtracting the U.S. Treasury bill rate from the three-month dollar LIBOR rate) which hit a record high of 460 basis points on October 10, 2008, reflecting the breakdown in interbank lending and investor flight to quality, has narrowed dramatically since. At the beginning of 2009, this key spread

[11] The Lehman lesson when it came to bailing out Wall Street, Washington had to stop somewhere, *Washington Post*, September 16, 2008, page A20.
[12] A bumpy start to 2009!!, *Financial Markets Monthly Report by RBC*, January 9, 2009. Available at: http://www.rbc.com/economics.

was 100 basis points roughly where it was at the beginning of September 2008.[13] While this is considerably lower than the October 2008 peak, the TED spread was some 20 basis points in early 2007.[14]

2.3.2.3 U.S. Financial Markets

Q. What is the situation in U.S. financial markets?

A. The U.S. financial markets continue to be challenged by poor economic data. This includes high U.S. unemployment numbers, a decline in nonfarm payrolls and a record number of residential mortgage foreclosures. Home price deflation, which is now the highest since WWII and the Great Depression, and the meltdown in equity markets around the world in 2008 have certainly dampened consumer/investor confidence. Investor confidence has been further impacted by a series of failed margin calls which drove up credit spreads and resulted in the demise of a large number of hedge funds. Finally, the recent uncovering of an alleged US$50 billion Ponzi scheme by a Wall Street investment house which had attracted money from both within the United States and elsewhere for many years, has heightened investor skepticism.

Having learned lessons from government activities in the U.S. and Canada during the Great Depression,[15] the U.S. Federal Reserve Board has flooded the markets with liquidity and cheaper funds. Both the Fed and former President Bush introduced far-reaching policies to address the financial crisis and the accompanying U.S. economic slowdown and President Obama is continuing this process. On December 16, 2008,the Fed funds rate was reduced to 0%- 0.25% from 1%, capping more than 500

[13] Bloomberg.com, Chart of the TED Spread. (TEDSP:IND).
[14] The Economist, 2008, Blocked pipes; When banks find it hard to borrow so do the rest of us, *Money Markets*, October 2. http://www.economist.com.
[15] Some of these lessons were used successfully by Canadian regulators during the Great Depression. See L. Kryzanowski and G.S. Roberts, 1998, Capital forbearance: Depression-era experience of life insurance companies. *Canadian Journal of Administrative Sciences* 15:1 (March), pages 1-16; and L. Kryzanowski and G.S. Roberts, 1993, Canadian banking solvency, 1922-1940, *Journal of Money, Credit and Banking* 25:3 (August, Part 1), pages 361-376.

basis points of interest rate cuts since the credit crisis began in 2007. The U.S. central bank continues to be committed to maintaining its stimulus stance and keeping interest rates low for some time.[16]

In an effort to prop up the large number of troubled U.S. financial institutions, the Bush Administration introduced its US$700 billion Troubled Asset Relief Program, (TARP). Shortly after taking office, U.S. President Obama, who has identified the economic downturn as a priority for his administration, undertook to overhaul TARP, while simultaneously cautioning that there could be further hefty write-downs of toxic assets by financial institutions and additional bank failures. In early February 2009, Obama unveiled his proposed wide-reaching US$787-billion plus economic recovery bill to stimulate the economy. This bill contains “watered-down” Buy American restrictions and has raised concerns in Canada and elsewhere about U.S. protectionism.[17]

2.3.2.4 <u>The Canadian credit crisis</u>

Q. Please discuss the credit crisis in Canada.

A. The Bank of Canada has been in an easing mode since late 2007. On January 20, 2009, the central bank lowered its benchmark overnight lending rate by 50 basis points to 1%, leaving the door open for a possible further rate cut in March. Since the easing cycle began in late 2007, the Bank of Canada has lowered the overnight rate by 350 basis points.

At the beginning of 2009, the federal government took a significant step to address Canada’s recession. On January 27, the government tabled its ‘Budget 2009: Canada’s Economic Action Plan,’ which will provide almost $30-billion in support to

[16] RBC, Economics Research, Central Bank Watch, January 9, 2009, http://www.rbc.com/economics.
[17] Barrie McKenna, 2009, U.S. pledge leaves Canada exposed, *Globe & Mail*, February 6, page A11.

the Canadian economy this year, "an amount equivalent to 1.9 per cent" of real gross domestic product.[18]

A distinct positive for Canada during this credit crisis, is that its financial institutions have proven to be better managed/regulated than many of their peers in Europe and the United States. The major Canadian chartered banks had relatively modest exposures to the U.S. sub-prime market and other complex structured products (toxic assets). They were also better capitalized and had less leverage than their international counterparts. As stated by Bank of Canada Governor, Mark Carney: [19]

> "In contrast to many international banks, which face enormous pressures to scale back their assets and liabilities to bring them in line with their capital, Canadian banks have actually been raising private capital to grow their businesses. Indeed, over the past year, they have raised over $15 billion in Tier 1 capital from the private capital markets. Consequently, Canadian banks continue to lend."

In Canada, the credit crisis initially manifested itself in mid-August 2007 with the freezing of the $32 billion market for asset-backed commercial paper (ABCP). Investors in ABCP included individuals, corporations, some of Canada's biggest pension funds, such as the Caisse de depot et placement du Quebec, government bodies and banks. At the same time that the ABCP crisis struck, the broader short-term debt market came under extreme pressure and it was difficult for companies to raise financing in the commercial paper market. These problems in the commercial paper market persisted well into 2008 both in Canada and globally. The asset-backed commercial paper challenge in Canada was finally put to rest at the beginning of 2009, when after a 17-month complex restructuring process, an Ontario court judge approved the resultant plan. This allows retail investors each holding less than $1 million of the ABCP to have 100% of their principal returned plus accumulated

[18] Department of Finance Canada, Ottawa, January 27, 2009. http://www.fin.gc.ca
[19] Remarks by Mark Carney, Governor of the Bank of Canada to the Halifax Chamber of Commerce, Halifax, Nova Scotia, 27, January 2009. Bank of Canada, Publications and Research – Speeches. http://www.bankofcanada.ca.

interest. Investors with assets greater than $1 million each, mainly institutional investors, will receive notes with maturity dates of up to nine years.

Turning to equities, the Canadian equity market along with other major equity markets around the globe produced dismal returns in 2008. The S&P/TSX composite index which has a heavy weighting in financial services and natural resource stocks had a total return of minus 33% in 2008. In Canadian dollar terms, the S&P 500 Index's total return was minus 21.2% for 2008 and the MSCI EAFE (Europe, Australasia and Far East) Index's total return was minus 28.8%. Emerging markets also fared poorly in 2008. The MSCI Emerging Markets Index total return for 2008 in Canadian dollar terms was minus 41.4%. As in the United States and globally, uncertainty remains at a high level in the Canadian equity market and volatility in the global equity markets has been extremely high by historic standards.

Traditionally equity markets lead changes in economic activity, thus the global equity market is expected to recover in advance of the economic rebound predicted by many economists for the end of 2009 or 2010.

The Canadian dollar declined sharply in the wake of the global slowdown and the steep drop in commodity prices. It was roughly at par with its U.S. counterpart for the first half of 2008, but weakened in the second half of the year reflecting both the collapse in commodity prices and US$ strength.

The reversal in the price of many of Canada's main commodities was dramatic in 2008. Scotiabank's Commodity Price Index dropped 39% from its peak in July 2008 and ended the year down 16.9%. "The shift from 'boom' to 'bust' has been the most rapid in the history of the Scotibank Commodity Price Index," which has data back to 1972. At the end of January 2009, Scotiabank's global economic research department's view was that while commodity prices had not yet bottomed, the pace of the decline was slowing: "Many prices are approaching average world cash costs, triggering substantial production cuts, new project deferral and tighter supplies."[20] Commodity prices are expected to remain under pressure for much of 2009, given the recession in developed economies and the slowing growth in China and India. But once the global economic outlook improves, commodity prices should revive "pointing to a better second half of 2009 and 2010."[21]

2.3.2.5 Implications

Q. What are the implications of your analysis for the present hearing?

A. When the global economy goes into recession, it creates temporary economic and market uncertainty. This has had a short-run adverse effect on stock market prices and realized returns along with credit spreads. As long as the crisis is of the magnitude of such crises in the past (i.e., short-run with the exception of the Great Depression), it will not have a long-lasting effect on either the global economy or equity markets. Thus, there is little reason to believe that the current global economic downturn will have a material effect on the long-run cost of equity for Canadian utilities. Furthermore, one must carefully consider the logical inconsistency between the argument that the cost of equity has increased because realized returns are lower (when equity prices are lower due to increased uncertainty) and the argument that, at other times, the cost of equity has increased because realized returns have increased (when times are good and uncertainty has decreased).

Similarly, the ongoing credit crisis in the U.S. should not restrict utilities' abilities to obtain debt funding. Given an investment grade rating, the plain vanilla character of Canadian utility debt, and the growing interest in infrastructure investments, these issuers should be in a position to benefit from the present flight to quality and away from exotic derivatives.

[20] Scotiabank Group, Global Economic Research, Commodity Price Index, January 29, 2009, wwwscotiabank.com.
[21] BMO Capital Markets Economics Department, 2009 Outlook: A World of Challenges, December 19, 2008, http://www.bmonesbittburns.com/econimcs.

2.3.2.6 Forecasts for the Canadian and Global Economies

Q. What is the economic outlook for Canada and globally?

A. The Canadian and U.S. economies are currently in recession and are expected to remain in contraction mode for 2009 with a recovery beginning in 2010. As stated earlier, key contributing factors are the global credit crisis and loss of consumer confidence. For Canada, weakened export demand plus the collapse of key commodity prices (with the exception of gold) are reinforcing the economic contraction.

As a result, unemployment and job losses are expected to be elevated in both 2009 and 2010 and inflation will be low or negative. In the latest forecast available at the time of writing, TD Economics forecasts a decline in real GDP of 1.6% for the United States and 1.4% for Canada for 2009. The forecasts from Scotia Economics are similar with contractions of similar magnitude predicted: 2.6% for the United States and 1.6% for Canada.[22] The Bank of Canada's 2009 forecast for the Canadian economy is the same as Scotiabank's.[23] Consumer prices are expected to decline slightly (under 1% drop) accompanied by significant job losses in both countries. Economic forecasters are cautiously optimistic for 2010 with moderate real GDP growth on the order of 1.9% - 2.4% according to the same two banks. The Bank of Canada appears to be alone in forecasting a stronger turnaround of 3.8% in real GDP growth for 2010.

On the outlook for the global economy, an important factor is the outlook for commodity prices. TD Economics, for example, is forecasting real GDP growth of a mere 0.5% for 2009 versus its forecast of 3.2% for 2008. TD is looking for the world

[22] Revised Economic Forecast, February 4, 2009, TD Economics, www.tdeconomics.com ; Global Forecast Update, February 2, 2009, Scotia Economics, www.scotiacapital.com .
[23] BOC monetary policy update – Recession in 2009, Recovery in 2010, *TD Economics*, www.td.com/economics, January 22, 2009.

economy in 2010 to replicate its performance of 2008, i.e., a 3.2% rise in real GDP growth.[24]

2.3.2.7 Forecast for Alberta

Q. Please provide your economic forecast for Alberta.

A. Falling oil and natural gas prices are having a severe impact on the economy of Alberta according to TD Economics:[25]

> "Now that the energy and mining sectors, concentrated mostly but not exclusively in the Prairies, have weakened considerably after a solid six year run, it is only natural to expect a most dramatic turn of fortunes to be experienced in exactly those same regions, particularly in oil & gas fuelled Alberta. While government spending can be expected to soften the blow, it remains more likely than not that Alberta will also experience a recession. With an increasing number of large commodity-related projects being put on hold, overall business investment will likely suffer more there than anywhere else outside of Ontario. After performing as a locomotive of Canadian economic activity for the better part of the last six years, Alberta will take a breather in 2009-10."

TD's forecast for Alberta calls for a sharper decline in the province's real GDP in 2009 (-1.8%) and a weaker recovery in 2010 (1.8%) than for the country as a whole. It expects Canada to see its real GDP decline by 1.4% in 2009 and rise by 2.8% in 2010. By contrast, Scotiabank is forecasting that Alberta's real GDP will decline by 1.2%% in 2009 compared with a 1.6% decline for the country as a whole and grow by 1.7% in 2010 versus 1.6% for Canada.[26]

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[24] TD Quarterly Economic Forecast, Pessimism Prevails, Dec. 10, 2008, page 7.
[25] O growth, where art thou? Provincial economic outlook, *TD Economics*, December 23, 2008, www.td.com/economics, page 3.
[26] Forecast update; Lower and leaner for longer, *Scotia Economics*, www.scotiabank.com, December 17, 2008, Provincial Forecast Update.

A key issue for the province is that many resource investments in western Canada are unlikely to remain economic at current commodity prices. The Canadian Association of Petroleum Producers estimates that project deferrals in the Alberta oils sands will reduce capital spending on these projects to $11 billion in 2009 from $20 billion in 2008.[27] A report released by the Canadian Energy Research Institute in early February underscored this: "The Alberta oil rush is likely to be characterized as the Alberta oil slumber over the next few years as development stagnates."[28]

In addition to the sharp decline in the oil price, natural gas prices have weakened too. At the end of January 2009, the Nymex natural gas price was US$4.48 per MMBTU (million British thermal units) versus US7.99 per MMBTU at the end of January 2008. This is expected to sharply reduce the level of drilling for conventional natural gas in western Canada in 2009.[29]

Reflecting the expected slowdown in the oil patch, the forecast annual average unemployment rates for Alberta for 2009 and 2010 by TD at 5% and 6% (4.6% and 4.5% for Scotiabank) represent significant increases over the approximately 3.5% rate in 2008.

2.3.3 Risks of Electricity Sectors

2.3.3.1 <u>Market Risk</u>

Q. Please provide your analysis of market risk.

A. Market risk is the risk that a utility will not be able to meet its target sales due to weak markets, to competition or to other related factors. Market risk has three components:

[27] Scotiabank Group, Global Economic Research, Commodity Price Index, January 29, 2009, wwwscotiabank.com.
[28] Claudia Cattaneo, ‚Oil sands to 'slumber,' Financial Post's Calgary Bureau Chief, *National Post*, February 6, 2009, http://www.nationalpost.com.
[29] Scotiabank Group, Global Economic Research, Commodity Price Index, January 29, 2009, wwwscotiabank.com, page 2.

competition / demand risk, credit risk and supply risk. Competition / demand risk is low for electricity transmission because of its status as a natural monopoly. Further, transmission costs constitute "less than 6% of the average electricity bill in Alberta".[30] Our view is consistent with that of DBRS: "The business is low risk, with no direct competition within the franchise areas."[31] While demand risk could affect transmission in the case of a severe economic downturn, this is not expected. As detailed earlier, the province has experienced a surge in economic growth with a slowdown currently underway. In December 2007, the AESO forecasted long-term annual growth in Alberta Interconnected Electrical Load of 3.2% for the period 2008-2014 up slightly from the rate of 2.7% experienced between 2003 and 2008. In the short term, transmission utilities in Alberta are shielded from economic fluctuations as stated by the Board in EUB Decision 2004-52:

> "Further, the Board notes that the AESO pays the electric transmission companies 1/12 of their approved revenue requirement on a monthly basis with no adjustment for changes in demand or supply of electricity carried by the TFO."[32]

Ms. McShane confirms that this practice continues:

> "With respect to the relative risk of ATCO Electric Distribution and Transmission, Transmission faces lower business and regulatory risk than Distribution. ATCO Electric Transmission collects its approved revenue requirement monthly from the AESO, and thus is not exposed to shortfalls in revenue due to weather or economic conditions."[33]

Our discussion of the business risks of the electricity transmission and distribution sectors in Alberta repeatedly draws on ATCO Electric as a benchmark. With both transmission

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[30] AltaLink, Management's Discussion and Analysis of Financial Conditions and Results of Operations, October 28, 2008, page 2, www.sedar.ca .
[31] DBRS, Rating Report, CU Inc., May 13, 2008, page 8.
[32] EUB Decision 2004-52, page 37.
[33] Direct Testimony of Kathleen C. McShane, November 20, 2008, page 35, line 906 through page 36, line 909.

and distribution assets, ATCO provides service in the east-central regions of the province and in the northern oil sands region. We choose ATCO as a benchmark because, like the Board in Decision 2004-052 and Ms. McShane, we believe that this Applicant exemplifies average risk in both sectors.[34]

While electricity distribution also has the characteristics of a monopoly it carries higher market competition risk (rated as low-moderate) due to the possibility of customers switching to natural gas or increasing reliance on co-generation. The Alberta economy is facing slowing growth in the short-run particularly in the energy sector as discussed in Section 2 but residential growth remains steady. Our view of competition risk also draws on the evidence of Mr. Marcus who writes on competition risk:[35]

> "This is not a serious long-term risk for either the electric distribution business or the gas distribution business. While there is clearly some competition, electricity use per customer has been generally growing in Alberta for the last 15 years. If competition means that it did not rise at a higher rate, shareholders have not been harmed. Electricity is a growing business."

The second component, credit risk, also differs between the two sectors. Because distribution companies sell to wholesale and retail customers, they face credit risk at a low-moderate level. In contrast, the sole customer of transmission companies is a distribution firm resulting in a low level of credit risk. This point was documented in EUB Decision 2004-52 (page 37):

> "The electric transmission companies have a single customer, the AESO. The Board considers the AESO [Alberta Electric System Operator] to be of minimal credit risk."

[34] EUB Decision 2004-052, pages 44 and 52.
[35] Written Evidence of William B. Marcus, March 2, 2009, page 4.

The Ontario Energy Board also noted "that distribution has greater and more immediate exposure to the possibility of bad debts".[36] Ms. McShane takes a similar view for ATCO Electric:[37]

> "Since ATCO Electric Distribution collects revenues from retailers, including large commercial and industrial customers who are designated as self-retailers, it faces higher credit risk than ATCO Electric Transmission."

Although credit risk is higher for electricity DISCOs as compared to TFOs, this risk is mitigated in two ways. First, a "large fraction of Disco revenue" comes from large customers with "little or no default risk". Second, "regulations allow the utility to keep deposits for retailers."[38]

Supply risk is the third dimension of market risk and arises when uncertainty of electricity supply creates the possibility of failure to meet revenue targets. For Alberta transmission utilities, supply risk is low because the impact of any supply variations is mitigated by the revenue arrangements quoted above. In contrast, for electricity distribution companies, this revenue apportionment can create supply risk in the event of system failures in transmission such as occurred during the ice storm in Ontario, Quebec and New Brunswick in 1998. Our discussion of operational risk for transmission below rates the risk of such failures as low leading to a similar rating for supply risk for distribution companies.

In summary, market risk is low for electricity transmission utilities due to uniformly low levels of competition, credit and supply risks. For electricity distribution, market risk is low-moderate resulting from low-moderate levels of competition and credit risks.

2.3.3.2 Operational Risk

[36] EB-2006-0501, Decision with Reasons, page 73.
[37] Direct Testimony of Kathleen C. McShane, November 20, 2008, page 36, line 906 through page 36, lines 912-914.
[38] Written Evidence of William B. Marcus, March 2, 2009, page 11.

Q. Kindly discuss operational risk for Alberta electricity transmission and distribution companies.

A. Operational risk represents the risk that a utility will not meet targets for operations and profitability. We identify three elements of operational risk relevant to transmission and distribution utilities and discuss them in turn.[39] Under regulatory risk below, we discuss how deferral accounts serve to mitigate the various elements of operational risk.

The first component of operational risk is operating leverage which arises when operations are characterized by a high level of fixed costs which make operating cash flow more sensitive to changes in production. Although transmission does require a high level of fixed costs, we assess operating leverage as low for two reasons. First, the fixed payment rate design discussed above mitigates any risk associated with high operating leverage. Second, due to steady, predictable demand, there is little risk that a high level of fixed costs will lead to losses. As explained by Brookfield Asset Management:[40]

> "Infrastructure assets [e.g., electricity transmission networks] are generally highly capital-intensive with relatively low operating and maintenance expense required. This typically translates into high operating margins once operations commence and enhances the ability to support debt commitments and make equity distributions."

For electricity distribution companies operating leverage is higher at a moderate level because distribution companies levy variable charges to cover fixed costs for some classes of customers. Ms. McShane documents this difference:

[39] A fourth element, capacity risk related to forced outages due to unanticipated breakdowns or prolonged maintenance, is more relevant to generation utilities.
[40] Why infrastructure? The global infrastructure investment thesis, Brookfield Asset Management, www.brookfield.com.

"ATCO Electric Distribution, in contrast [with ATCO Transmission], collects its forecast revenue requirement from retailers in rates that are, depending on the customer class, a combination of basic customer charges, peak demand and energy."[41]

Mr. Marcus also discusses how operating leverage risk is mitigated by rate design:[42]

"In the previous generic cost of capital proceeding, we found that the electric and gas distribution utilities typically collected 40-50% of their costs (excluding all transmission charges to T-Connect electric customers and the volumetric transmission charges from the AESO that are simply passed through to customers in volumetric rates) in fixed charges. Electric utilities collected over 75% in the combination of demand charges and fixed charges.

Little appears to have changed since then. Data from ATCO Electric's current GRA indicates that it is collecting approximately 40% of its charges (excluding transmission connect and pass-through volumetric charges from the AESO rate design) in fully fixed charges (customer charges and demand charges that are based on fixed amounts such as breaker sizes, as well as minimum demand charges), and 78% in fixed charges plus demand charges.

ATCO Gas has increased its fixed charge revenue recovery (including customer and demand charges) from 47% at the time of the last GCOC case to 56% in this case.

The only company that appears to be going in the other direction is ENMAX, which reports that it is developing a rate design for the distribution company with more variable charges.

This level of fixed charges limits demand risks relative to rate structures with a higher level of variable charges."

[41] Direct Testimony of Kathleen C. McShane, November 20, 2008, page 3, lines 910 – 912.
[42] Written Evidence of William B. Marcus, March 2, 2009, page 19.

Electricity DISCOs are also exposed to risk variable demand due to weather but "electric utilities are far less weather sensitive than gas utilities" with weather sensitivity limited to residential, farm and commercial rate classes.[43]

Technology risk is the second component of operational risk. Related to operating leverage, advanced technology also impacts fixed costs as well as making production more sensitive to technical breakdowns. For example, in electricity generation, nuclear power employs more advanced technology than hydro generation and is thus subject to greater technology risk. In contrast, both transmission and distribution of electricity utilize standard technology and we assign a risk rating of low to technology risk for both sectors. According to Mr. Marcus:[44]

> "All of the utilities appearing in this proceeding are sufficiently mature to have components of their system that require replacement or significant maintenance, which the utilities undertake, to ensure continued safe operation. There is no evidence of any basis for the Board to assign significant operating risk to any of the utilities appearing in this proceeding."

Q. Are there any other aspects of operational risk?

A. A third aspect of operational risk arises from costs associated with the obligatory retirement of assets and construction of new facilities. For electricity transmission and distribution, environmental issues related to asset retirement are not a major concern as they are for coal burning and nuclear generation. For example, in its 2007 annual report, EPCOR states that its power generation business faces the risk of significant capital and operating expenditures in the event of more stringent future regulations on

[43] Written Evidence of William B. Marcus, March 2, 2009, page 22.
[44] Written Evidence of William B. Marcus, March 2, 2009, page 13.

greenhouse gas emission.[45] However, the company does not associate this risk with the transmission business. Further, such risk can be mitigated in future GTAs.

Q. Please comment on the risks associated with asset replacement and growth.

A. Transmission and distribution companies do face risks with regard to capital expenditures and this is particularly relevant to Alberta as system expansion is underway to address the needs generated by the recent surge in economic growth. To illustrate, we continue our practice of employing ATCO as a benchmark and examine its forecasts for new construction.

We focus on the transmission operation as this is where major construction is projected. Ms. McShane forecasts capital expenditures of $1.3 billion for the period 2009-2011 in order to meet needs projected by the AESO and notes that these could "potentially double."[46] To put this in perspective, we treat these as evenly distributed over the three years as $433 million per year. Compared against the 2007 actual rate base of $841 million this represents a projected growth in assets of 51.4%.

To provide perspective on this projected growth, we draw on the discussion by DBRS of CU Inc. focusing on ATCO Electric and written in May 2008 before the end of the Alberta economic boom:

> "Growth within the province of Alberta and Company's franchise area continues to drive the need for significant capital investment in transmission-system upgrades and expansion. CUI estimates that capital expenditure will total approximately $3 billion between 2008 and 2010, compared with approximately $2 billion in the past three years. A significant portion of the anticipated capital projects will be on the transmission and distribution side of CUI's business.

[45] http://www.epcor.ca/SiteCollectionDocuments/Corporate/pdfs/corporate%20reports/EPCOR%202007%20AR%20full.pdf – page 62 under the title "Environment, health and safety risk".
[46] Direct Testimony of Kathleen C. McShane, November 20, 2008, page 34, lines 865-870.

> Higher capital expenditures … are necessary to maintain capacity and meet planned growth …which will result in significant free cash flow deficits. CUI's regulated electric transmission business is expected to account for a significant portion of the Company's projected capital expenditures in the medium term."[47]

The DBRS discussion documents how, when viewed from the perspective of May 2008, economic growth and the need for system expansion had somewhat increased construction risk as compared to 2004. Rapid economic growth was also expected to increase construction cost and heighten the challenges in completing major transmission projects on time according to Ms. McShane:[48]

> "Since the last generic proceeding, Alberta has experienced an economic boom without parallel in Canada. In addition to the shortage of technically experienced workers in Alberta, the economic conditions have resulted in contractor and material shortages and cost pressures unique to the Alberta utilities. For example, to meet its staffing challenges resulting from the unprecedented growth, ATCO Electric has contracted with firms from overseas [resulting in a. … significant increase in risk faced by the Alberta utilities resulting from the changes in the Alberta economy."

Even at the time of the economic boom, DBRS took a more optimistic view and believed that these risks would be mitigated by strong management, financial structuring and regulation:[49]

> "DBRS believes that CUI's parent, Canadian Utilities Limited (CUL), has the financial flexibility to provide support to CUI during this period of heightened capital expenditures, given its financial strength and strong cash position and, as such, CUI's current financing plan remains reasonable.

[47] DBRS Rating Report, CU Inc., May 13, 2008, page 1.
[48] Direct Testimony of Kathleen C. McShane, November 20, 2008, page 34, lines 851-855.
Submission of the ATCO Utilities, Generic Cost of Capital, Preliminary Questions Proceeding, April 4, 2008, page 29.
[49] DBRS Rating Report, CU Inc., May 13, 2008, page 2.

> DBRS expects CUI to start to earn on the increased rate base in a timely manner. CUI's ability to manage its investment projects to avoid substantial cost overruns in the face of price escalation in Alberta, to adhere to its current financing strategy, to continue to have access to the debt capital markets and to continue to maintain a constructive working relationship with the AUC remain key in maintaining its strong credit profile."

The boom conditions in 2007 did not prevent the company from turning in a strong performance in construction management according to the 2007 Annual Report (page 14):

> " 'At ATCO Electric, all of the in-service date targets for transmission capital construction programs were met, except for one, which is quite a track record given what's going on in the province today,' said Mr. [Sigfried] Kiefer [Managing Director, Utilities and Chief Information Officer, ATCO]. The in-service date target that was not met was delayed as a result of the regulatory process, so I feel very good about our people and their determination to deliver on our commitments."

Q. Your discussion emphasizes that the forecasts for growth have become dated. What is your current view of the risks associated with asset replacement and growth?

A. As detailed earlier, the Alberta boom has ended and has been replaced by an economic downturn with further contraction in the forecast as documented earlier in our evidence. As a result, it is highly likely that some projects in the transmission sector will be delayed or scaled back. Reductions in project scale are likely to result either due to downsizing or as a result of downward revisions to inflation rates used in forecasting expenditures.

Further, a growing interest in infrastructure investment will provide further access to equity and debt financing for transmission utilities. For example, Canada Pension

Plan Investment Board (CPPIB) and Brookfield Asset Management are among Canadian and international institutional investors targeting infrastructure investment. As of the end of 2008, these two funds had over $200 billion under management. CPPIB regards such investment as an attractive way to hedge against inflation risk while carrying lower risk and return than other investments. According to CPPIB, infrastructure investments are:[50]

> "… typically characterized by strong regulatory and monopolistic elements, and with low substitution risks. Such investments might include electricity transmission and distribution, gas transmission and distribution, water utilities, toll roads, bridges and tunnels, airports, and ports."

Brookfield Asset Management also includes electricity transmission networks among its targeted infrastructure categories. It includes five additional desirable key characteristics in addition to the high operating margins discussed earlier:[51]

> "Large, long-term assets providing essential services, limited or no competition and high barriers to entry, predictable and steady cash flows with a strong yield component, inflation-correlated revenues [and] low volatility and correlation to other asset classes."

These more recent developments support an assessment of risks associated with asset retirement and construction as moderate for the transmission sector in Alberta.

Q. Please discuss the issue of construction work in progress.

A. During a multi-year construction phase, funds are committed by utilities to construction but the corresponding assets are not yet commissioned. If assets are not

[50] CPP Investment Board, Infrastructure, http://www.cppib.ca/Investments/Inflation_Sensitive_Investments/infrastructure.html.
[51] Why infrastructure? The global infrastructure investment thesis, Brookfield Asset Management, www.brookfield.com .

included in the rate base until the commissioning date and investors are not compensated for invested funds prior to the commissioning date, this would create a disincentive to invest and lead to an under-investment problem.

This issue can be handled by either of two approaches, which if consistently applied are net present value neutral since they lead to the same rate of return on capital investment. The construction work in progress (CWIP) approach includes all investment in the regulatory rate base as funds are committed regardless of whether or not the capital assets have been commissioned. In contrast, the allowance for funds used during construction (AFUDC) approach capitalizes the return on invested capital that is forgone during the construction phase and is included in the rate base upon commissioning of the capital asset. Thus, while rate payers begin bearing the cost of financing the capital asset during the buildup stage without receiving any service in return under the CWIP approach, rate payers only begin bearing the cost of financing the capital asset during the buildup stage when they begin receiving service from the capital asset under the AFUDC approach. The CWIP approach can result in substantial intergenerational shifting of costs when the investment program of a utility varies considerably over time.

Q. Although the two approaches have the same NPV, would suppliers of capital prefer one approach over the other approach?

A. Suppliers of capital should not prefer one approach over the other if they have the same NPV unless the utility is subject to severe capital rationing or the uncertainty due to regulatory and environment factors is expected to increase over time. An increase in uncertainty can occur, for example, if the industry is experiencing partial or total deregulation. This would reduce the value relevance of AFUDC compared to the quicker realization of their equivalent value-neutral earnings stream. According to note 3 in AltaLink's Financial Statements for the years ended December 31, 2006 and 2005 included in volume 2 of its GTA Application, rate regulation allows the regulated entity to have a higher capitalized AFUDC value compared to its unregulated counterpart. Specifically, the note states that:

> "Since AFUDC includes not only an interest component, but also a cost-of-equity component, it exceeds the amount allowed to be capitalized in similar circumstances in the absence of rate regulation."

Q. Are the two approaches neutral in terms of their impact on a utility's bond rating?

A. If the application of AFUDC causes a material liquidity problem, it could lead to a downgrade of the issuer and a resulting increase in the cost of its new debt issues. If the application of AFUDC merely lowers the issuer's coverage ratios, then it is less likely that the credit rating of the issuer will be downgraded, especially if the issuer's regulatory and environmental risks have not increased materially. Based on the analysis above, it is our opinion that the regulatory and environmental risks have not increased and are not expected to increase materially for AltaLink over the test period. In fact, AltaLink in its response to Information Request UCA.AML-128(a) states that the AUC or its predecessor has been very accommodating in the past as the "allocation of certain proportions of AltaLink's historical debt to the financing of goodwill has been approved by the AUC in prior GTA's".

While rating agencies such as S&P technically treat AFUDC in a similar fashion to goodwill by excluding them from their definition of "core earnings", they are aware that unlike goodwill whose intrinsic value has a great risk of wasting away through impairment charges, such is not likely to be the case for AFUDC for a Canadian regulated utility. Thus, bond rating agencies allow for deviations from minimum quantitative rating criteria before actually downgrading a regulated utility operating in a hospitable (fair) regulatory environment such as Alberta.

Q. If this build up in invested capital prior to its inclusion in the rate base is material due to a unusually large capital spend program, are there possible options that may be less expensive to ratepayers than increasing the equity ratio for the applicant utility?

A. Increasing the equity ratio may not be fair in that it may unduly favor the interests of shareholders over those of ratepayers. If for the sake of argument, a credit rating downgrade is eminent, then alternative mechanisms that may better balance the interest of shareholders and ratepayers need to be considered. One such possibility may be to establish a Capital Build Debt Rating Stabilization Account that would capture the additional equity cost paid by ratepayers from a temporary increase in the equity ratio during a rapid capital build period that would be used for debt repayment if so needed based on a first priority basis, and would be returned to ratepayers as such stabilization was no longer required. While this would involve some intergenerational transfer of wealth among ratepayers, it would at least minimize the undue transfer of wealth from ratepayers to shareholders in the non-default scenario. A concern with this possible remedy is how it would be perceived by the rating agencies.

If the incremental costs to ratepayers associated with requested remedies, such as an increase in the equity ratio, are viewed as advance payments of the amounts that would be paid when capital assets are commissioned and included in the rate base, then an alternative remedy would be to reduce the AFUDC (or CWIP) account by the amount of the advance payments in the years they are paid by ratepayers. While this would again involve some intergenerational transfer of wealth among ratepayers, it would at least minimize the undue transfer of wealth from ratepayers to shareholders in the non-default scenario.

Q. How material is CWIP for Alberta electricity TFOs and DISCOs?

A. It is material for two CFOs: ATCO Transmission and AltaLink. Because distribution does not have capital projects on the same scale, CWIP is not a major issue. Further, ENMAX and EPCOR do not have projects on the same scale due to their concentration in urban areas. For ATCO Transmission, CWIP is projected at 23% of capitalization for 2009 and at 17% for 2010. For AltaLink, the corresponding percentage is "around 20% for several years around 2010-2012".[52]

Q. What is your conclusion regarding the risk relating to asset replacement/addition?

A. This risk is low-moderate for electric DISCOs and for ENMAX and EPCOR. For ATCO, our benchmark TFO, the risk is moderate as it is for AltaLink as well. For these latter companies, this element of risk "has increased moderately" since 2004.[53]

Q. How does your overall assessment of business risk for electricity compare with that of company witnesses?

A. Ms. McShane sees an increase in business risk since 2004:[54]

> "On balance, it is my judgment that the level of business risk faced by both ATCO Electric's transmission and distribution operations has increased since Decision 2004- 05, largely due to higher short-term forecasting risks, deferral of cost recovery related to large scale projects (applicable principally to transmission), and higher exposure in the longer-term to the fortunes of the oil sands. Other business risk factors (e.g., reliance on deferral accounts, cost recovery through rate design) have not changed materially, that is, there have been no offsetting reductions in business risk."

Contrary to her views, our analysis above shows that risks arising from forecasting, large scale projects and the oil sands are low-moderate. Rate design is unchanged while increasing coverage of deferral accounts has lowered business risk since 2004.

[52] Written Evidence of William B. Marcus, March 2, 2009, pages 15-16.
[53] Written Evidence of William B. Marcus, March 2, 2009, page 16.
[54] Direct Testimony of Kathleen C. McShane, November 20, 2008, page 35, lines 898-904.

In brief, our assessment of risks associated with asset retirement and construction leads us to conclude that this risk is low to moderate for both the transmission and distribution sectors in Alberta.

In summary, our view of the relative risks of electricity distribution vs. transmission is consistent with the opinion of the Alberta Utilities Commission (formerly the Alberta Energy and Utilities Board) in EUB Decision 2004-052 (July 2, 2004), page 48:

> "The Board notes the consensus that electric distribution companies are subject to more business risk than electric transmission companies, principally due to their recovery of a significant amount of fixed costs in variable charges and their greater exposure to credit risks."

Our relative business risk assessment is also consistent with the views of expert witnesses sponsored by Applicant electric utilities including Ms. McShane.[55]

2.3.3.3 Regulatory Risk

Q. Please discuss regulatory risk.

A. Regulatory risk can arise when costs are disallowed, allowed returns do not fit market expectations or rate design (including allowed capital structures) varies from what is fair and reasonable in view of business risks. Alternatively, regulation can mitigate risks through the introduction of deferral accounts and by mandating generous allowed returns and capital structures as discussed in other parts of this evidence.

We believe that regulation by the Commission plays the second, positive role and assess the regulatory risk as low for a number of reasons. First, deferral and variance accounts allowed by the Commission in the past and likely to be continued reduce

[55] Direct Testimony of Kathleen C. McShane, November 20, 2008, page 35, lines 906-907.

operational risk. The continual annual granting of rate relief to cover changes in non-capital costs will alleviate an important component of business risk for Alberta regulated utilities. Further, since the last GCOC, there has been a generally increasing trend to allow more costs in deferral accounts for all utilities in Alberta (gas and electric), which reduces the risk that earnings will not be achieved. Although the capital programs of AltaLink and ATCO Electric Transmission have significantly increased in recent years, the risk associated with asset growth has been partially offset by growth in the level of Alberta Electric System Operator-related investment that is treated in a deferral account. This further reduces the risk of not achieving earnings for these utilities over the longer run.

Our view that deferral accounts significantly mitigate risk is supported up to a point by Mr. Coyne:[56]

> "Deferral accounts arguably reduce, to some extent, the risk of utilities because the accounts are intended to allow for the recovery of certain costs over a specified period of time. The deferral account helps the utility to stabilize the volatility of its quarterly cash flows and earnings, and to improve the utility's opportunity to earn its authorized rate of return."

Mr.Coyne goes on to indicate "However, deferral accounts cannot fully eliminate the utility's risk because they are subject to a prudency standard."[57] Given our presumption that the Commission regulates fairly, this point is moot.

Second, normal procedure in Alberta calls for regulated utilities to file annually with the Commission promoting a streamlined process with a regulatory lag that is shorter than in other jurisdictions. With a system of frequent reviews in place, the Commission could offer timely relief for any shifts in the economic environment (such as the decline in oil sands activity mentioned by Ms. McShane on page 35, lines 886-896).

[56] Direct Testimony of James M. Coyne, page 56, lines 26-29.
[57] Direct Testimony of James M. Coyne, page 56, lines 30-31.

Third, as also explained above, we expect that the Commission will approve appropriate structures that will mitigate the risk of future construction. In addition, a recent Supreme Court of Canada (SCC) decision in the Stores Block case further reduced risk related to construction which may involve the sale of existing property from the rate base. Regarding sale of land, the SCC decision effectively eliminated any power on the part of the Commission to allocate to ratepayers part of gains from sale of property from the rate base.[58] In so doing, the SCC gave the companies a valuable timing option to determine when it is advantageous to sell such property. In the event that the property value has declined below its original cost, the company has the option to retain it in the rate base and to collect the allowed rate of return on the original cost. In this case, the company benefits at the expense of the ratepayer. On the other hand, if the property has increased in value above original cost, the company can elect to sell and realize a capital gain.

Fourth, it is our understanding that the Commission regulates in a fair manner. The implication is that DBRS' concern over disallowed construction costs can be mitigated by good management of construction projects by the applicant utilities. In support of this view, we note that regulatory boards in Canada are reluctant to disallow costs. For example, in 2008 the OEB ruled that ratepayers must assume the cost of a legal settlement by Union Gas for illegally overcharging customers for late fees on their gas bills.[59] Further, in the example of the disallowed costs listed by ATCO, there is strong reason to believe that these disallowances were predictable based on past regulatory practice.[60]

Our discussion of regulatory risk for electric transmission and distribution utilities supports the conclusion that this risk is low. Our view is consistent with that of DBRS:[61]

[58] ATCO Gas and Pipelines Ltd. v. Alberta (Energy and Utilities Board), 2006 SCC4.
[59] S. Kari, "Utility agrees to $9.2 million settlement, customers will pay", *NationalPost*, page A13, February 12, 2009.
[60] Written Evidence of William B. Marcus, March 2, 2009, pages 25-26.
[61] DBRS, Rating Report, CU Inc., May 13, 2008, page 8.

> "• The [Alberta] regulatory environment is viewed by DBRS as stable, with a reasonable regulatory lag for the recovery of operating costs.
>
> • Allowed 2008 ROE for ATCO Electric is 8.75%, higher than 8.51% in 2007, but historically lower than previously granted. The rate remains acceptable on a 37% common-equity component for distribution and 33% for transmission."

Regulatory risk may also arise due to unanticipated shifts in environmental or safety regulations or in their enforcement. Because electricity transmission and distribution, unlike generation does not involve the burning of fossil fuels or the potential dangers of nuclear generation, we rate this element of risk as low.

We conclude that regulation risk is low for both electricity sectors.

Q. How do you summarize your analysis of business risk of the electricity sector?

A. We summarize our assessments of the elements of market, operational and regulatory risks for electricity transmission and distribution in Schedule 2.1. Market and regulatory risk are both rated "low" for electricity transmission while operational risk is low-moderate producing an overall business risk rating of "low" for this sector. For electricity distribution, market and operational risks are both assessed as "low-moderate" while regulatory risk is low for an overall rating of "low-moderate".

Our analysis of the relative risks of the two electricity sectors is that they are unchanged since 2004 when the Board stated:[62]

> "The Board notes the general consensus that the electric and gas transmission sectors had the least risk of all Applicants in this Proceeding. Further, the Board notes that no party argued otherwise."

[62] EUB Decision 2004-52, page 36.

Our evidence suggests that business risk for transmission is increased somewhat since 2004 due to construction programs while the level for distribution is unchanged since the last generic hearing.

2.3.4 Business Risk Assessments for Individual Electric Transmission and Distribution Utilities

Q. Please provide the organizational plan for this section.

A. This section considers the individual electric transmission operators (TFOs) and distribution companies (DISCOs) in turn. We organize our discussion by company in order to avoid repetition. As indicated above, there is common ground among our ourselves, Ms. McShane and the Board in Decision 2004-052, that ATCO Electric Transmission and ATCO Electric Distribution are benchmarks for the average business risks in their respective sectors. Based on this conclusion, in Schedule 2.2 we set the levels of each business risk component for this Applicant at the same level as the corresponding component for the transmission sector. The discussion of individual electric transmission companies now turns to the remaining companies in this sector. For ease of exposition, we compare the other companies against ATCO Electric Distribution, our sector benchmark.

2.3.4.1 ATCO Electric Distribution

Q. Earlier you used ATCO Electric Distribution as a benchmark for the business risk of this sector. Do you have anything to add to your earlier comments?

A. Yes, we do. As we explain in detail above, market and operational risks for this company are low-moderate typical of that of an Alberta electric distribution company as discussed above. In addition to the points on operational risk above, the company identifies two further dimensions of this risk.[63] The first is a contingent liability to supply electricity to retail customers in the event of a performance failure by Direct Energy which took over ATCO's retail operations in 2004:

> "Centrica plc, Direct Energy's parent, has provided a $300 million guarantee, supported by a $235 million letter of credit in respect of Direct Energy's obligations to ATCO Gas, ATCO Electric and ATCO I-Tek in respect of the ongoing relationships contemplated under the transaction agreements. However, there can be no assurance that the coverage under these agreements will be adequate to cover all of the costs that could arise in the event of a reversion of such functions."

Second, the same document highlights a Supreme Court of Canada decision (Garland vs. Consumer's Gas Co.) as introducing uncertainty over the company's ability to impose penalties for the late payment of utility bills.

Neither of these operational challenges is regarded as major by DBRS which states that, for ATCO Electric Transmission and Distribution: "Returns on investments are regulated and, as such, regulatory risk is the most significant business risk."[64]

We chararacterize regulatory risk as low for ATCO Distribution based on the discussion above.

Our conclusion is that the overall level of business risk for this applicant is low-moderate and typical of an electric distribution company. The applicant's business risk is unchanged since EUB-2004-052 when the Board stated: "ATCO Electric Distribution does not have any material differences in business risk from the typical electric distribution company".[65]

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[63] ATCO Group, ATCO Ltd, Management Discussion and Analysis For the Six Months Ended December 31, 2007, pages 31 and 32 and reconfirmed in ATCO's MD&A of June 30, 2008, page 27.
[64] DBRS, Rating Report, CU Inc., May 13, 2008, page 8.
[65] EUB Decision 2004-052, July 2, 2004, page 52.

Schedule 2.2 displays our rankings for the business risk components of ATCO Electric Distribution.

2.3.4.2 AltaLink

Q. Does your assessment of low business risk for Alberta TFOs apply to AltaLink?

A. Yes, it does.

Q. Please discuss how you view AltaLink's business risks other than that of asset replacement.

A. The first type of risk is market risk. Like ATCO Transmission and other Alberta TFOs AltaLink is a natural monopoly with little competition risk. As a transmission utility, the company provides wires service to areas where 85% of Alberta's population lives. The two companies are comparable in size with 2007 mid-year rate bases of $841.8 million for ATCO and $903 million for AltaLink.[66] Again, like ATCO, AltaLink is insulated from demand risk by the revenue arrangements of the AESO which also shield the company from supply risk. With the AESO as its sole customer, AltaLink is also protected from credit risk. All these factors combine to create low market risk for AltaLink.

Deferring our discussion of operational risk, we note that our analysis of regulatory risk above applies to all Alberta TFOs and hence this risk is low for AltaLink.

We now return to the second category in our business risk rating, operational risk, and comment on areas other than asset replacement and addition. As we discussed earlier, Alberta TFOs face low risk from operating leverage due to predictable demand and because rate design mitigates their high level of fixed costs. Further, despite advances

[66] ATCO and AltaLink Evidence, Minimum Filing Requirement 3.

in transmission technology planned for the Edmonton to Calgary 500KV transmission development, technology risk remains low as confirmed by the absence of any discussion of technology risk as important in the company submissions.[67] A similar statement applies to environmental risk.

Q. To this point you have stated that market and regulatory risks for AltaLink are low and identical to those of the TFO sector. You have also indicated why the same rating applies to two of the three aspects of operational risk – the risks arising from operating leverage and technology. What are your views on the remaining aspect of operational risk: asset replacement and addition risk?

A. This is the main aspect of operational risk according to company and rating agency submissions. Altalink's submission states:[68]

> "In the case of multi-year capital projects, cash payments related to a utility's return on investment are deferred until the end of the construction period. …Given that construction periods for multi-year capital projects may extend over three years or more, the lack of cash flow has a material impact on the utility's cash flow credit metrics, thereby increasing risks associated with both debt and equity investments in such utilities…in its recently-filed 2009-10 GTA, AltaLink forecasts that its capital expenditures will be almost $5 billion during the next five years which includes significant multi-year capital projects."

Similarly, DBRS identifies "free cash flow deficits resulting from high capital expenditures" as a "challenge".[69]

Q. What is your view on the risk to AltaLink arising from high planned capital expenditures?

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[67] AltaLink, Management's Discussion and Analysis of Financial Conditions and Results of Operations, page 6, October 28, 2008, www.sedar.ca .
[68] Written Evidence of AltaLink Management, pages 13 and 14, November 20, 2008.
[69] DBRS Rating Report, AltaLink L.P., May 28, 2008, page 1.

A. We analyze the financing needs of AltaLink, L.P. (ALP) based on its estimated capital build program as detailed in its GTA Application and answers to Information Requests in that application. We focus on the GTA material because it was the basis of the concerns by AltaLink above and by rating agencies (discussed below). Based on this analysis, we conclude that the estimated capital build program of AltaLink is based on a needs assessment by the AESO that is predicated on the continuation of vibrant (if not overheated) future growth of the Alberta economy. A more realistic, needs assessment based on current economic conditions would lead to lower estimates blunting the concerns about capital building risk.

Q. How does the estimated capital build program of AltaLink compare with the needs assessment reported in the 2007 report of the AESO (henceforth 2007 AESO Report) entitled: Planning for Alberta's power future?[70]

A. On page 9-7 of Volume 1 of its GTA Application, AltaLink notes that:[71]

> "… expected future growth in demand have given rise to unprecedented requirements for transmission investment in Alberta. In its 10-Year Transmission System Plan 2007-2016 published in January 2007, the AESO identified a potential need for \$3.5 billion in transmission investment in the province over the next decade in addition to the \$1.2 billion in projects that were already underway."

Thus, the total value of needed and underway transmission investments according to the *2007 AESO Report* is about \$4.7 billion (\$3.5 billion needed and \$1.2 billion underway).

[70] AESO, Planning for Alberta's power future, January 2007. Available at: http://www.aeso.ca/transmission/8635.html.
[71] AltaLink Management Ltd., GTA2009-2010 Application, September 16, 2008, Volume 1, page 9-7.

In contrast, in Volume one of its GTA Application on page 9-7, AltaLink's states that its capital expenditure program (i.e., for it alone) embodies a total of approximately $6.3 billion in gross capital expenditures from 2009 to the end of 2016. On the same page of its application, AltaLink goes on to state that: "Approximately $5.6 billion of the total anticipated capital expenditures relates to direct assigned projects from the AESO; the remainder relates to investment required to maintain, improve and replace the existing transmission assets." On page 9-8 of its Vol. 1 application, AltaLink states: "Of the total $6.3 billion of forecast gross capital expenditures during 2009-2016, over 75% ($4.8 billion) are expected to be incurred during the five-year period 2009-2013, which equates to close to $1 billion per year". On page 9-30 of its Vol. 1 application, AltaLink further notes that:

> "It is important to point out that all of these estimates are based on the published AESO 10-year transmission plan and AltaLink's best estimates of the costs of carrying out that plan. There is no contingency built into the estimates for higher than anticipated costs or other factors (e.g., delays in cost recovery) that could result in the credit metrics falling below the estimates."

Q. Are the anticipated dollar amounts in AltaLink's capital expenditure program consistent with those projected by the 2007 AESO Report?

A. On first analysis, we find that AltaLink is projecting capital expenditures of about $5.6 billion over the eight-year period, 2009-2016, which exceeds the projected capital expenditures of $4.7 billion (for needed and underway) or $3.5 billion (for only needed) capital expenditures for the ten-year period, 2007-2016 for all transmission investments in Alberta.

Q. What could explain this discrepancy where the value for a part of the whole exceeds the value of the whole?

A. On page 9-7 of volume one of its application, AltaLink notes that "AltaLink's extended capital expenditure forecast incorporates more recent cost estimates and timelines, which have been provided to the AESO". This suggests that the discrepancy is due to an increase in cost estimates for 2009 onwards compared to those embodied in the estimates in the *2007 AESO Report* and/or a systematic earlier commencement of the needed projects due to an increase in the expected future growth of the Alberta economy compared to that embodied in the estimates in the *2007 AESO Report*.

Q. Is either assumption reasonable for the 2009 and 2010 test period?

A. Neither assumption is reasonable for the 2009 test year and most likely is not reasonable for the 2010 test year. The relationship between the growth in energy demand and GDP is described in the 2007 AESO Report on page 3 as follows:

> "Growth in electricity demand in Alberta is strongly correlated with the growth in gross domestic product (GDP) and the GDP in Alberta has grown by almost 16% between 2001 and 2005. The strong economy means Albertans will likely continue to increase their power consumption."

It goes on to state on page 27 that:

> "In general, the load forecast is based on the correlation between economic activity and the demand for electricity. While this trend is expected to continue, some customers have recently indicated that there will be a substantial increase in oil sands related projects during the next ten years. Given that the AESO has a mandate to develop a plan that identifies transmission facilities that will meet the forecast load in a timely and efficient manner, the AIL load forecast has been adjusted for the purposes of this 10-Year Plan. The additional load levels included a 650 MW increase at Fort Saskatchewan and a 1,800 MW increase at Fort McMurray by 2016."

Our economic forecast above documents a major slowdown. A recent article characterized the changed environment for the energy sector in Alberta as follows:[72]

> "A five-year energy boom here in the administrative heart of Canada's oil patch and in the tar sands far to the north has ended. The only debate is how painful and persistent the bust will be -- not just for the biggest city in Canada's richest province, Alberta, but for the whole country."

Recently, there has been a big downsizing in capital expenditure intentions for energy projects (particularly in oil sands projects) in Alberta with resulting job losses in service providers (e.g., Flint Energy Services Ltd.) and steel markers (e.g., Evraz Group SA; Schlumberger Ltd.; Halliburton Co.). According to the Canadian Energy Research Institute (CERI), about $200 billion in planned developments have been deferred, delayed or cancelled in the latter half of 2008. Exemplifying the general trend of downsizing, according to the Canadian Association of Petroleum Producers (CAPP), oil sands investment in Alberta will fall to about $11 to $12 billion in 2009, or about one-half of the $20 billion that was projected in July of 2008 due to deferred projects.[73] Delayed projects include StatoilHydro's multibillion-dollar oil sands upgrader, Royal Dutch Shell's Carmon Creek thermal oil sands project and its proposed second oil sands mining expansion, Petro-Canada's $24-billion integrated Fort Hills oil sands project and Connacher Oil and Gas Ltd.' s $345-million Alger project.

Affected parties in recent reports agree that the "oil sands slowdown will result in lower costs" and that "costs are already coming down in terms of materials, and both predicted labour costs will also begin to decline".[74] A spokesperson for the

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[72] Sticky ending; Canada's tar sands oil boom goes bust, *The Economist*, January 17, 2009. Available at: http://www.thespec.com/News/Discover/article/497716.
[73] Dan Healing, Oil sands spending tumbles; Outlays about half of earlier forecast, *Calgary Herald*, January 23, 2009, Page D4. Available at: http://www.calgaryherald.com/cars/Oilsands+spending+tumbles/1209601/story.html.
[74] Ibid.

Construction Owners Association of Alberta cut its October 2008 forecast of an increase in demand for workers of 43 thousand by the second quarter of 2010 by about one half. A spokesperson for the Association was quoted in a *Globe and Mail* article as follows: "If these projects aren't running, there's going to be significantly less demand for heavy industrial labour for the future."[75] A December 2008 CP broadcast wire release characterized the sudden change from a labour shortage to excess as follows:[76]

> "Thousands of tradesmen and labourers have watched their jobs in Alberta evaporate as the richest oil boom in the province's history has virtually gone bust.
>
> The massive influx of workers into northern Alberta over the last few years was suddenly reversed this fall as nearly every major project was either delayed, cancelled or scaled back."

This shift in the labour market is confirmed by the announcement earlier this month of the cancellation of charter flights for oil workers from Cape Breton to Fort McMurray. Specifically:

> "President Cliff Murphy of the Cape Breton Building Trades Council said the flight news comes as no surprise to him. 'It's all got to do with supply and demand," Murphy said. "Companies in order to get people, had to pay people's way out. Now it's the other way around, there's more people than there is jobs, so they know people will go on their own to Alberta to get work.'"[77]

In response to GTA Information Request UCA.AML-047(c), AltaLink states that it "believes that the current economic climate will put downward pressure on these

[75] Nathan Vanderklippe, Oil sands layoffs coming down pipeline, *The Globe and Mail*, January 23, 2009, B5. Available at: http://www.theglobeandmail.com/servlet/story/RTGAM.20090122.wroilsands23/BNStory/energy/home.
[76] The Canadian Press, Broadcast Wire, December 29, 2008.
[77] Erin Pottie, Flights between Fort McMurray, Cape Breton to end, *Nova Scotia Business Journal*, Daily Business Buzz, http://www.novascotiabusinessjournal.com/index.cfm?sid=210771&sc=107, January 14, 2009.

general market indicators". The general market indicators include average hour wages, CPI and real GDP growth in both Alberta and Canada. As discussed in Section 2.1 above, call for dramatic reductions in both inflation and real GDP.

Q. How are the changes in economic conditions reflected in AltaLink's revisions to its forecasts provided in its Responses to Information Requests?

A. AltaLink provides revised forecasts of capital expenditures in its response to GTA Information Request IPCAA.AML-026: $556 million for 2009 and $744 million for 2010.[78] The company also states that it has "revised its capital escalation forecast from 10% to 6% per year in 2009 and 2010".[79] However, comparing the revised forecasts for 2009 and 2010 against the original forecasts leaves open to question whether the revisions fully reflect the changed economic and industry environment.[80]

Q. What conclusions do you draw from your above analysis of AltaLink's capital build program?

A. We draw two conclusions. First, the anticipated dollar amounts in AltaLink's capital expenditure program both in its Application and the revised amounts provided in response to the January 27, 2009 updates and the related updated Information Requests do not appear to be consistent with those projected in the out-of-date 2007 AESO Report given the current and forward-looking financial and economic climate over the test period 2009-2010. Second, the apparent discrepancy between AltaLink's capital expenditure program and the projections in the out-of-date *2007 AESO Report* appear to be due to a combination of two factors that are not supported by current and expected forward-looking economic conditions. The two factors are an increase in cost estimates for 2009 onwards compared to those embodied in the estimates in the *2007 AESO Report* and a systematic earlier commencement of the needed projects

[78] AltaLink Response to Information Request IPCAA.AML-026, Figure 6.8b Revised – GTA File Capital Expenditures.
[79] AltaLink Response to Information Request IPCAA.AML-046(a) Attachment.
[80] AltaLink Management Ltd., GTA2009-2010 Application, September 16, 2008, Volume 1, page 6-2.

due to an increase in the expected future growth of the Alberta economy compared to that embodied in the estimates in the 2007 AESO Report.

Q. What do these conclusions tell us about the asset replacement and addition risk faced by the company?

A. First, like those of the transmission sector in general discussed earlier, AltaLink's projections are based on extrapolation of trends from the Alberta boom that ended in 2008. In particular, assumptions on project scale, timing and cost inflation need to be revised in light of current economic conditions. Properly executed, such revision is highly likely to produce downward revisions in financing needs. Second, long-term financing needs estimated from projected capital projects can be delayed until markets return to normal by employing bridge financing.

Q. How does asset replacement risk compare between AltaLink and ATCO Transmission, your benchmark TFO?

A. We pointed out earlier based on calculations by Mr. Marcus (accepting the capital expenditure projections provided by the companies) that CWIP to capitalization ratios were similar for the two companies for 2009. For 2010-2012 the ATCO ratios are somewhat lower.

Q. What conclusions do you draw from this comparison?

A. First, we note that the comparison is only approximate because we use the company estimates without adjustment and also consider only the three years for which we have data for both companies. The ratios suggest that both companies are facing moderate levels of construction risk.

Q. Please summarize your evidence on business risk for AltaLink.

A. We rate the business risk as low and typical for an Alberta TFO. Our ratings for individual categories of business risk are given in Schedule 2.2.

2.3.4.3 ENMAX Transmission

Q. Please provide your views on the business risk of ENMAX Transmission.

A. ENMAX Transmission is part of ENMAX Power which operates the transmission system in the Calgary area. The company is owned by the City of Calgary. As a natural monopoly, ENMAX enjoys low market risk as well as protection from credit risk through rate design.

Under the category of operational risk, rate design mitigates risk arising from operating leverage and there is no evidence of technology risk beyond the norm for this sector. Although ENMAX enumerates risks of obsolescence of transmission assets and elevated environmental costs associated with soil and groundwater remediation and the possibility of tighter controls on the release of sulfur hexafluoride gas and PCBs, there is no reason that these costs could not be recovered in future rates should they occur.[81]

Q. Is asset replacement risk an issue for ENMAX Transmission?

A. Yes, this is the main risk identified by DBRS for the transmission operation under "Challenges":[82]

> "(2) Expected significant free cash flow deficit from increased capital expenditures and investments
> (3) Construction and development risk"

[81] ENMAX Power Corporation, Generic Cost of Capital Application, November 20, 2008, page 16, lines 13-15 and line 6, page 20 through line 14, page 21.
[82] ENMAX Corporation, Rating Report, DBRS, page 1, August 6, 2008.

Asset replacement and addition risk is also discussed in the ENMAX submission which notes higher labour and input costs and land costs as risk factors.[83] Dr. Neri also refers to these risks.[84]

Q. Do the financing demands from asset replacement and growth pose problems for ENMAX?

A. The risks associated with higher prices and labour shortages are mitigated by the economic downturn as discussed earlier with respect to AltaLink. Further, a large portion of capital expenditure is associated with ENMAX's unregulated generation operations and not transmission. As DBRS notes:[85]

> "ENMAX's capital expenditures have increased as it has continued to invest in its regulated businesses in 2007 and additional generation capacity. Capex and investments in generation capacity for 2007 totalled $285 million, which included $100 million in its regulated business, $69.5 million for costs to complete the construction of the Taber wind farm and $59.1 million for an additional 10% interest in the Battle River PPA."

Neither the company nor DBRS is predicting any risk of a rating downgrade:[86]

> "As significant amounts of debt are used to fund non-regulated growth, the ability of the stable cash flows derived from the regulated utility business to support the Company's debt load will diminish. With no equity funding or dividend reduction proposed over the medium to long term, the Company's credit metrics are expected to worsen from current levels but remain adequate for its current A (low) rating."

[83] ENMAX Power Corporation, Generic Cost of Capital Application, November 20, 2008, page 15, lines 13-15 and page 18, line 15 through page 19, line 1.
[84] Capital Structure for ENMAX Power Corporation, John A. Neri, Ph.D., November 20, 2008, page 10, lines 9-13.
[85] ENMAX Corporation, Rating Report, DBRS, page 7, August 6, 2008.
[86] ENMAX Corporation, Rating Report, DBRS, page 8, August 6, 2008.

As stated earlier, asset-replacement risk is lower for ENMAX than for ATCO TFO, our benchmark. Because ENMAX has a concentrated service area, its capital projects are more modest. As a result, CWIP at the end of 2007 was 12.4% of capitalization, below figures given above for AltaLink and ATCO TFO.[87]

We conclude that asset replacement risk is low-moderate and somewhat below that of AltaLink and ATCO TFO.

Q. What is your overall assessment of business risk for ENMAX Transmission?

A. Market and operational risk are low as discussed earlier as is regulatory risk for all Alberta utilities. Our overall risk rating for ENMAX Transmission is low, as summarized in Schedule 2.2.

Q. How does your risk rating compare with the views of the Board in 2004?

A. ENMAX Transmission was not included in the last generic hearing.

2.3.4.4 ENMAX Distribution

Q. Please provide your views on the business risk of ENMAX Distribution.

A. The company operates electricity distribution in the Calgary area and is owned by the City. As a typical electricity distributor, ENMAX Distribution faces low-moderate level of market risk as we discussed earlier. Competition risk of customers' switching to natural gas or on-site generation is low-moderate as documented by DBRS:[88]

[87] Written Evidence of William B. Marcus, March 2, 2009, page 16.
[88] ENMAX Corporation, Rating Report, DBRS, page 6, August 6, 2008.

> "Electricity margins in particular remain very strong, primarily due to strong marketing efforts for the commercial, institutional and industrial customer segments in late 2007 and into 2008 and the continued success of its EasyMax program, which markets fixed price electricity and natural gas contracts to residential and small commercial customers."

With a mix of commercial (57% of revenue) and retail customers (42% of revenue) ENMAX has a diversified customer base.[89] Supply comes from ENMAX Transmission. There is no indication that either credit risk or supply risk lie above the normal low-moderate level for an electric DISCO.

Turning to operational risk, ENMAX faces a moderate degree of operating leverage risk from variable charges to customers mitigated by its success in marketing fixed price contracts. There is no evidence that technology risk is above the typical low level of electricity DISCOs.

Q. Is capital replacement and growth a risk factor for ENMAX Distribution?

A. Our earlier discussion set this risk as low-moderate for the electricity distribution sector – below the level for electricity transmission as benchmarked by ATCO TFO. We discuss asset replacement and growth requirements for ENMAX Transmission above and find asset replacement and growth risk is low-moderate. ENMAX provides a forecast for capital expenditures of $105.15 million annually from 2008-2012 for transmission and distribution combined. We conclude that a similar low-moderate risk rating applies to this risk category for ENMAX Distribution.

Q. Please summarize your view of the business risk of ENMAX Distribution.

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[89] ENMAX Power Corporation, Generic Cost of Capital Application, November 20, 2008, page 8, lines 20-26.

A. Market and operational risks are low-moderate as explained above. Regulatory risk is low as for all entities regulated by the Commission. Low-moderate overall business risk makes ENMAX Distribution a typical Alberta electricity DISCO as shown in Schedule 2.2.

Q. How does your assessment compare with that of the Board in 2004?

A. Our assessment is in accord with Decision 2004-052:[90]

> "The Board considers that ENMAX Distribution does not have any material differences in business risk from the typical electric distribution company."

Further, as a typical electric DISCO, ENMAX Distribution has not experienced an increase in business risk since 2004.

2.3.4.5 EPCOR Transmission

Q. Does EPCOR Transmission also enjoy low business risk?

A. Yes, it does. EPCOR Transmission operates transmission facilities mainly in Edmonton and makes up around 9% of the wires grid in Alberta. The company is owned by the City of Edmonton and faces business risks typical for its sector. Market risk is low because the company is a natural monopoly with no competition and no credit risk due to rate design as discussed above. DBRS notes as a strength:[91]

> "Low business risk reflecting: (a) no exposure to volume risk; (b) limited counter-party risk; (c) full recovery of prudently incurred operating costs and approved capital expenditures."

[90] EUB Decision 2004-052, July 2, 2004, page 52.
[91] DBRS Letter, "Indicative Credit Rating for EPCOR Distribution & Transmission Inc. (EDTI) Transmission Function, March 27, 2007, page 1.

Operational risk arising from operating leverage is mitigated by rate design while technology risk is low for transmission. Combining transmission and distribution, Standard & Poor's comments:[92]

> 'Operating risk is low for these relatively simple regulated assets. Lost revenues and increased costs linked to operational risk are not material to the segment's long term profitability given the company's track record. Operational failures generally involve only a portion of the system and are infrequent. Risk to these assets include weather events, operational error that could damage large ticket items (such as transformers), and poor maintenance practices. The owners would absorb related costs, although regulatory relief is often available for force majeure events upon request. As evidenced by the company's reliability statistics, EUI manages these risks within accepted industry norms."

Q. Is asset replacement and growth risk an issue for EPCOR Transmission?

A. Standard & Poor's mentions this risk in connection with the parent company's generation business but not regarding transmission while DBRS highlights the issue without expressing concern:[93]

> "DBRS notes that the significant increase in debt levels in 2007 and 2008 to fund capital expenditure programs will put substantial pressure on the unit's coverage-related credit metrics, and the magnitude and size of the transmission projects exposes the unit to some execution risk."

Q. How does asset replacement and growth risk compare between EPCOR and ATCO Transmission, your benchmark TFO?

[92] EPCOR Utilities Inc., Ratings Direct, Standard & Poor's, April 1, 2008, page 6.
[93] DBRS Letter, "Indicative Credit Rating for EPCOR Distribution & Transmission Inc. (EDTI) Transmission Function, March 27, 2007, page 1.

A. As stated above, the CWIP analysis conducted by Mr. Marcus shows that this risk is smaller for EPCOR TFO:[94]

> "EDTI completed a one-off large transmission project called the Downtown Energy Supply System (DESS) which raised its CWIP-to-capitalization ratio to 22.5% in 2007 but was completed in 2008.[95] Aside from DESS, the CWIP-to-capitalization ratio for EDTI's transmission function would have been under 5%."

We conclude that the risk associated with asset replacement and growth is low-moderate.

Q. Please complete your assessment of business risk for EPCOR Transmission.

A. With asset replacement and growth risk at a low-moderate level, we may conclude that the overall level of operational risk is low. Coupled with low market risk as discussed above and the overall low level of regulatory risk for all sectors, this produces a rating of low for business risk of EPCOR Transmission.

In summary, EPCOR Transmission is characterized by the low business risk level of a typical Alberta TFO and we summarize our risk ratings in Schedule 2.2. Because, unlike our benchmark (ATCO TFO), EPCOR TFO is not exposed to elevated construction risk, this level is unchanged since EUB Decision 2004-052 (page 44): "The Board considers that EPCOR Transmission does not have any material differences in business risk from the typical TFO."

Q. You conclude that with the exception of lower construction risk, EPCOR Transmission carries the level of business risk of a typical TFO in the province. Do the company and its expert agree?

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[94] Written Evidence of William B. Marcus, March 2, 2009, page 16.
[95] http://www.epcor.ca/en-ca/about-epcor/news-publications/NewsReleases/2008/Pages/121908.aspx

A. Dr. Vander Weide identifies only one factor differentiating EPCOR Distribution and Transmission Inc. from other companies in their respective sectors: alleged increased risk due to the impact of its nontaxable status on the volatility of return on equity. This factor is associated with financial risk, not business risk, and we refute it later. As a result, nothing in the evidence of the company or its expert challenges our assessment of business risk.

2.3.4.6 EPCOR Distribution

Q. What is your opinion of the business risk of EPCOR Distribution?

A. Decision 2004-052 states:

> "The Board considers that EPCOR Distribution does not have any material differences in business risk from the typical electric distribution company."[96]

We maintain that this view is still valid today: the company's business risk level is low-moderate, typical of an electric DISCO in the province and unchanged since 2004 as we summarize in Schedule 2.2.

As we showed earlier, our opinion on business risk is not challenged by anything in the evidence of Dr. Vander Weide.

Our prior discussion of EPCOR Transmission documents the opinion of the rating agencies on the combined operations of the two regulated EPCOR entities. Comments by DBRS specifically on the distribution function are consistent with our assessment:[97]

> "Strengths

[96] EUB Decision 2004-052, July 2, 2004, page 53.
[97] DBRS Letter, "Indicative Credit Rating for EPCOR Distribution & Transmission Inc. (EDTI) Distribution Function, March 27, 2007, page 1.

- Regulated distribution provides relatively stable earnings and cash flow.
- Favorable franchise area in a robust economic environment.
- Ultimate parent (City of Edmonton) is highly rated.
- Modest rate base growth which will enhance earnings profile going forward.

Challenges:

- Earnings sensitivity to weather and long-term interest rates. Approved ROE for 2007 is 8.51% down from 8.93% in 2006.
- Demand risk with variance in weather patterns and general economic conditions.
- Small size relative to peers."

2.3.4.7 FortisAlberta Distribution

Q. What is your business risk rating for Fortis Alberta Distribution?

A. We regard this company as typical for its sector with an overall rating of low-moderate. There has been no material increase in the company's business risk since 2004 when the Board stated that it "considers that FortisAlberta (formerly Aquila) does not have any material differences in business risk from the typical electric distribution company."[98]

Q. Please provide the rationale for your rating.

A. Fortis Alberta is an electricity distribution utility operating outside the major cities in the south and central parts of the province. Its revenue is generated mainly from commercial, industrial and farm customers with around 30% coming from residential accounts. Moody's summarizes its view as follows: [99]

[98] EUB Decision 2004-052, July 2, 2004, page 52.
[99] Credit Opinion: FortisAlbert Inc., Moody's Investors Services, April 1, 2008, pages 1-2.

> "FAB is considered to be at the border of the low and medium industry risk categories given that its operations are exclusively distribution, wholly regulated, and located in Canada, a jurisdiction that Moody's generally views as being one of the more supportive regulatory environments for utilities on a global basis.
>
> In addition to operating in a supportive regulatory environment with little to no commodity price, volume, industry restructuring or political interference risk, the company further benefits from regulatory transparency on its allowed ROE and target capital structure."

Market risk is low-moderate mainly due to mitigation of competition risk:

> "… Moody's believes that FAB's lack of diversification is somewhat offset by certain characteristics of its business, market and regulatory regime. The company's dominant position as cost-of-service regulated owner and operator of more than 60% of the total electric distribution network in Alberta, a province with above average economic growth, mitigates potential loss of market share by competition."

Supply risk is similarly low as there is "little or no commodity price [and] volume.. risk".[100]

Operational risk is typical for an Alberta DISCO. In particular, Moody's comments on asset replacement and growth risk:[101]

> "Moreover, the strong growth within FAB's franchise area has not historically taxed the company either operationally or financially and net equity injections from FTS have been received on a consistent basis allowing the company to remain close to its target 60/40 capital structure."

[100] Ibid, page 3.
[101] Ibid, page 3.

Schedule 2.2 contains a summary of our risk ratings for FortisAlberta Distribution.

Q. Your analysis draws on Moody's. Do other rating agencies also agree with your assessment of business risk for FortisAlberta Distribution?

A. They do. Standard & Poor's states:[102]

> "FortisAlberta's assets have an excellent competitive position and low operating risk. The company has a highly competitive operating position with regulatory protection that prevents the establishment of alternative distribution networks. Furthermore, it has a sound operating track record and no material friction with its regulator."

According to DBRS:[103]

> "The regulatory environment continues to provide a reasonable cost-of-service methodology that allows for a recovery of all forecast operating expenses and capital expenditures within a reasonable time frame.
>
> … The demand for electricity in Alberta and, more specifically, for the Company, is only moderately sensitive to changes in the weather because the majority of the province uses natural gas for heating purposes and the summer months do not tend to require air conditioning to the same extent as in other regions. This mitigates the Company's demand forecast risk somewhat and further increases the stability of earnings and cash flows.

[102] FortisAlberta Inc., Ratings Direct, Standard & Poor's, March 26, 2008, page 2.
[103] FortisAlberta Inc., Rating Report, DBRS, May 30, 2008, pages 1-3.

> …Earnings stability is further bolstered by the favourable customer mix, with residential and commercial customers providing the bulk of the Company's margin."

2.3.5 Business Risks of Gas Utilities

2.3.5.1 Gas Transmission

Q. Please explain the approach you take in your analysis of the business risk in gas transmission.

A. Our discussion of generic risks in gas transmission follows the Board's approach in EUB 2004-052 (page 39) in identifying TransCanada Mainline as a benchmark utility representative of the average level business risk in this sector:

> "…in the Board's view, Canadian federally regulated natural gas transmission pipelines are of some assistance in drawing comparisons to both NGTL and the taxable electric transmission companies.

As stated in its business risk profile:[104]

> "The Mainline consists of approximately 14,957 km of pipeline system, with an average throughput of 8.1 Bcf/d [billion cubic feet per day] in 2006. The Mainline transports natural gas from the Alberta border east to various delivery points in Canada and at the United States border."

Our analysis draws on National Energy Board (NEB) Decision RH-2-2004 in April 2005 which concluded that the business risk of the Mainline had increased "as a result of increases in supply risk and competitive risk".[105]

[104] Written Evidence of TQM (Appendix 2): Business Risk and Total Return Comparison, Business Risk Profiles, Proceeding RH-1-2008 (TransQuebec and Maritimes Pipeline Inc (TQM) 2007 and 2008 Cost of Capital, page 20.

Q. How do you rate the market risk in gas transmission?

A. Following the example of the Board in its Decision EUB 2004-052, we begin with a comparison against the risk levels of electricity transmission assessing the business risk of gas sectors. Drawing on our earlier discussion, the low risk of electricity transmission arises from its business model under which operators source electricity from unregulated generators, transmit power over wires that are largely a monopoly and sell to the AESO. In contrast, gas transmission pipelines transport gas for a number of producers who exercise some choice among competing pipelines and markets and from whom they collect tolls. As a result, gas pipelines face higher competition risk and to a lesser extent, higher credit risk. Further, because natural gas, unlike electricity, is an exhaustible resource, pipelines also face supply risk under which a shortfall in the physical availability of natural gas could reduce a pipeline's earnings. We discuss competition, supply and credit risks in gas transmission in turn.

As treated here, competition risk has two aspects. First, there is the risk that a pipeline might suffer underutilization and be unable to recover its capital costs due to a drop in demand for natural gas at the "end of the pipe". The NEB commented as follows (page 42):

> "With respect to the risk associated with the overall size of the natural gas market, the Board acknowledges that projections of natural gas demand growth in North America are lower now than at the time of the RH-4-2001 Proceeding. However, market growth is still expected to be sufficiently strong that it is not a constraint to the utilization of the Mainline. Consequently, the Board does not consider that there has been any change associated with the Mainline's risk related to the overall size of the market."

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[105] National Energy Board, Reasons for Decision, TransCanada Pipelines Limited, 2004 Mainline Tolls and Tariff Application, RH-2-2004, Phase II, page 47.

The second dimension of competition risk for the Mainline relates to possible underutilization caused by shippers switching to competing pipelines in order to attain higher netbacks.[106] Decision RH-2-2004 identifies a reduction in the percentage of throughput associated with long-term contracts as increasing competition risk. Further, competition from LNG and potential competing suppliers into eastern Canada such as Alliance and Vector could erode the Mainline's markets. The Decision concludes on page 45:

> "…the Board finds that, on balance, the Mainline's competitive risk has increased since RH-4-2001, although not to the extent suggested by TransCanada."

Studies conducted by TransCanada and vetted at the NEB's 2004 hearing estimated total supply and subtracted natural gas usage in western Canada to obtain predicted export volumes from the Western Canadian Sedimentary Basin (WCSB) and the Mainline's share. Due to flattening supply and increased demand in western Canada, the Board accepted TransCanada's contention that maintaining throughput will require supply either from unconventional sources (coalbed methane and tight gas) or from areas to be developed in the future such as the Mackenzie Delta and Alaska. Because predicting future supply from unconventional sources and undeveloped areas is risky, the Board concluded that supply risk was increased. These factors are also mentioned in the business risk profile for the TCPL Mainline filed by TQM in December 2007.[107]

More recently, DBRS took a more positive view of supply and competitive risks for the Mainline:[108]

[106] Netback is defined as the price that a producer of natural gas receives, based on the downstream market price less any charges for delivering the gas to market.
[107] Written Evidence of TQM (Appendix 2): Business Risk and Total Return Comparison, Business Risk Profiles, Proceeding RH-1-2008 (TransQuebec and Maritimes Pipeline Inc (TQM) 2007 and 2008 Cost of Capital, page 21.
[108] DBRS, Rating Report, TransCanada Pipelines Limited, Novermber 14, 2008, page 4.

> "There is sufficient supply of natural gas in Western Canada to support current pipeline capacity based on the National Energy Board's (NEB) 2007 estimates of more than nine years reserve life at current production levels. Longer-term increased demand for natural gas should generate incremental supply, resulting in sustained demand for pipeline capacity. Despite the recent softening of prices after a strong showing for the first part of the year, drilling activities in Western Canada remain stable, helped by unconventional gas developments (TCPL's Mainline throughput volume was up 10% in 9M 2008, although Alberta's volume was down 5%). The Alberta new royalty regime, starting on January 1, 2009, is not expected to have a material impact on drilling activities based on current commodity prices and unconventional gas projects. Furthermore, growing U.S. demand driven by gas-fired electricity generation projects, the still-constructive commodity pricing environment and growing oil sands developments (despite the recent announcement of postponement of some longer-term projects) provide strong impetus for potentially higher drilling activities in Western Canada over time, where the Alberta System dominates. Longer-term supply prospects are underpinned by northern gas developments, in which TCPL retains ownership interests or construction rights."

Further, LNG, seen as competing with natural gas demand above, may also provide new supply. For example, the NEB has granted permission for the construction of an LNG site in Quebec which will be a receipt point on the TransCanada system. In addition, several proposals under consideration contemplate building pipelines from the U.S. Rockies to link with the Mainline to transport gas across Canada to eastern markets in Canada or the U.S.[109]

In summary, we conclude that competition and supply risks for gas transmission, as exemplified by TransCanada's Mainline are moderate.

[109] "Alliance and Questar Announce Plans to Develop a Natural Gas Pipeline from Wamsutter, Wyoming to the U.S. Canadian Border," Press Release, March 25, 2008 and TransCanada Plans Rockies-to-Midwest Pipeline," *Gas Daily*, April 8, 2008 both cited in Written Evidence of Dr. Andrew Safir in RH-1-2008, June 5, 2008, page 19.

Credit risk arises for gas pipelines in the event of shipper default or bankruptcy and is documented in the case of losses by Alliance Pipeline on the bankruptcy of Calpine in the U.S. in 2005.[110] Shipper default appears to be an isolated event for gas pipelines. TQM conducts an analysis of 11 gas pipelines and mentions shipper default only once in the case of Alliance.[111] DBRS does not mention shipper default in its analysis of TCPL. In addition, pipelines mitigate any default risk by requiring financial guarantees from shippers. We conclude that credit risk is low for gas pipelines. Further, due to the infrequency of credit events for gas pipelines we attach more weight to competition and supply risks in assigning market risk ratings.

Our overall rating for market risk of gas transmission is moderate.

Q. How do you rate the operational risk of gas transmission?

A. In its Decision RH-2-2004, Phase II, the NEB viewed operational risk for the Mainline as unchanged since RH-4-2001 and since 1994 as well (page 28):

> "Operating risk is the risk to the income-earning capability that arises from technical and operational factors. The Board agrees with TransCanada that, while there may have been a slight reduction in operating risk [since 1994] due to the fact that Mainline is presently operating at a lower utilization rate, it would be offset by an increase in risk to the security of the Mainline."

[110] Written Evidence of TQM (Appendix 2): Business Risk and Total Return Comparison, Business Risk Profiles, Proceeding RH-1-2008 (TransQuebec and Maritimes Pipeline Inc (TQM) 2007 and 2008 Cost of Capital, page 6.
[111] The gas pipelines in TQM's sample are: TQM, Maritimes and Northeast, Alliance, Enbridge Mainline, Alberta Clipper, Enbridge's Line 4 Extension, Trans Mountain Pipeline, Enbridge's Southern Lights, TransCanada Mainline, and Foothills System.

In the short term, the Mainline faces the risk that its business could be interrupted by an uncontrollable event such as an act of God or a terrorist attack. Business interruption insurance in place mitigates this risk.[112]

As explained earlier, operating leverage arises when utilities recover fixed costs from variable charges which may prove to be insufficient due to market risk deriving from deficiencies in demand or supply. Our analysis above identifies a moderate level of market risk for the Mainline which could potentially drive operating leverage risk. While present, such risk is mitigated by rate design under which shippers contract to make payments independently of actual usage. As a result we rate operating leverage risk as low to moderate.

Gas pipeline technology is standard and low risk. With only modest growth forecast and some excess capacity, significant asset growth is not predicted. While construction costs in Alberta have increased as documented by NGTL, we predict an easing due to the recession as discussed in detail earlier.[113] We rate asset replacement and growth risk as low-moderate.

Our overall rating of operational risk is low-moderate.

Q. Please provide your assessment of regulatory risk for gas pipelines.

A. Our discussion of regulatory risk for electric utilities also applies to gas utilities. In brief we identified four dimensions along which regulation by the Commission reduces risk for Alberta regulated utilities. First, operational risk is mitigated by deferral and variance accounts. For example, profiling short-term business risk for TCPL Mainline, TQM states:

[112] Written Evidence of TQM (Appendix 2): Business Risk and Total Return Comparison, Business Risk Profiles, Proceeding RH-1-2008 (TransCanada Mainline), page 20.
[113] Written Evidence of Nova Gas Transmission Ltd., Section 2.2, Business Risk and Total Return Comparison, November 20, 2008, page 16, lines 9-11 and Figure 3-1.

> "Revenue variances have been subject to deferral account treatment, with scrutiny of deferral account balances in a subsequent regulatory proceeding. All costs with the exception of OM&A are subject to deferral account treatment, with scrutiny of deferral accounts balances at a subsequent regulatory proceeding. TransCanada has 90% of its cost of service covered by deferral accounts."[114]

Second, although annual GRAs are not required for gas utilities as they are for electric, Alberta gas utilities face a shorter regulatory lag than in other jurisdictions. Third, Commission approval of appropriate structures for construction financing and a recent Supreme Court of Canada decision mitigate asset disposal risk. Fourth, we believe that the Commission regulates in a fair manner.

Gas pipelines are subject to environmental and safety regulation. In particular, stricter possible future climate change policy in Canada could adversely impact pipelines with gas fired compressor stations as opposed to more environmentally friendly electric drive pump technology.[115] Such tighter regulation does not appear likely in the next five years. Should stronger rules be instituted, the gas pipelines could apply to the Commission for relief for additional costs. We rate environmental and safety risk as low.

In brief, regulatory risk is low for gas pipelines both from the primary regulator and from environmental and safety regulators. Moody's shares our assessment:

> "Moody's believes that TCPL's Canadian based assets benefit from the supportiveness of Canada's business and regulatory environments relative to other jurisdictions."[116]

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[114] Written Evidence of TQM (Appendix 2): Business Risk and Total Return Comparison, Business Risk Profiles, Proceeding RH-1-2008 (TransQuebec and Maritimes Pipeline Inc (TQM) 2007 and 2008 Cost of Capital, page 20.

[115] Written Evidence of TQM (Appendix 2): Business Risk and Total Return Comparison, Business Risk Profiles, Proceeding RH-1-2008 (TransQuebec and Maritimes Pipeline Inc (TQM) 2007 and 2008 Cost of Capital, page 14.

[116] Credit Opinion, TransCanada PipeLines Limited, Moody's Investors Service, June 24, 2008, page 3.

Q. Please discuss your overall business risk rating for gas pipelines based on your analysis of the TransCanada Mainline as a proxy for this level of business risk.

A. As shown in Schedule 2.3, gas transmission faces moderate market risk reflecting increases in competition and supply risks since 2004. Operational risk is low to moderate while regulatory risk is low. The latter two risks are largely unchanged for this industry sector since Decision 2004-052. In summary, a rating of low to moderate is appropriate for the business risk of gas transmission.

2.3.5.2 Business Risk Assessments for Individual Gas Transmission Utilities

2.3.5.2.1 NOVA Gas Transmission Ltd. (NGTL)

Q. Please explain why you include NGTL in this analysis now that the NEB has ruled that the utility falls under its jurisdiction?

A. We include NGTL because its business risk level will continue to serve as a benchmark for ATCO Pipelines under the proposed NGTL / ATCO Pipelines Integration agreement assuming that it receives regulatory approval and is implemented in 2010 and beyond. In the present section of our evidence, we assess the business risk of NGTL as a standalone entity in advance of the agreement. In a later section, we discuss ATCO Pipelines and the proposed “seamless service” agreement in more detail. Since both the NEB ruling and the NGTL-ATCO proposed agreement remain open to legal and regulatory interpretation, we will update our evidence on these points prior to the hearing.

Q. What approach do you take to determining the business risk of NGTL as a standalone entity?

A. NGTL is a subsidiary of TCPL and owns its Alberta system representing around 68% of gas transportation in western Canada with 23,570 km of pipeline. The Alberta system "gathers natural gas for use within the province and delivers it to provincial boundary points for connection with the Company's Canadian Mainline and Foothills natural gas pipelines as well as the natural gas pipelines of other companies."[117]

In the last generic hearing, the Board determined that NGTL had somewhat higher business risk due to elevated levels of competition and supply risks in comparison with the benchmark TCPL Mainline. We reexamine this comparison in light of current conditions in order to arrive at our view of the business risk of NGTL.

Q. What is your rating of supply risk for NGTL?

A. As we explain earlier, we share the NEB's assessment of a moderate elevation of supply risk for the benchmark Mainline. From this vantage point, we do not see any material difference in supply risk between NGTL and the Mainline. In Decision 2004-052 the Board wrote (page 39):

> "The Board considers that the nature of NGTL as a gathering system, with numerous receipt and delivery points, a diverse customer base, and other related factors demonstrates an additional degree of business risk for NGTL when compared to the TCPL Mainline. However, the breadth of NGTL's diverse customer base mitigates the additional risk to a large degree, since the loss of any one customer or point of supply would likely not be material to the long-term risks faced by NGTL."

Westcoast Energy is an additional benchmark identified by the Board in EUB Decision 2004-052 (page 39) as comparable in competition and supply risks to NGTL:

[117] DBRS Rating Report, NOVA Gas Transmission Ltd., October 30, 2007, page 1 and TransCanada 2007 Annual Report.

> "The Board also notes the NEB's view that Westcoast had higher risks [than the Mainline] due to the nature of its gathering system and processing plants and due to the hydrogen sulfide content of the gas it transports."

However, in RH-2-2004, the NEB revised downward its assessment of the relative risk of Westcoast stating that "Westcoast is of similar, albeit not necessarily identical risk to the Mainline".[118] Further, as noted above, gas use in Alberta has increased since 2004 and further increases are projected shifting NGTL's role away from that of a pure gathering system. As a result, we rate supply risk as moderate—at the same level as the benchmark Mainline.

Q. How does your view of supply risk compare with that of NGTL's witness, Dr. Carpenter?

A. Dr. Carpenter shares our view that supply risk has increased since 2004 due to the weaker supply forecasts for the WCSB.[119] This risk is fully reflected in our sector benchmark level of moderate supply risk.

Q. Please discuss the competition and credit risks faced by NGTL.

A. Competition from Alliance (11% of NGTL's capacity in 2007) and, secondarily from Vector continues to be significant for NTGL. Excess system capacity exists and makes it more difficult for NGTL to replace lost contracts according to DBRS.[120] Dr. Carpenter also comments on competition risk:[121]

> "While the Alberta System has faced competition from other pipeline systems to transport WCSB supplies for some time, the evidence suggests increased

[118] RH-2-2004, Phase II, page 69.
[119] Written Evidence of Paul R. Carpenter for Nova Gas Transmission, November 20, 2008, page 23, lines 9-23.
[120] DBRS Rating Report, NOVA Gas Transmission Ltd., November 14, 2008, page 3.
[121] Written Evidence of Paul R. Carpenter for Nova Gas Transmission, November 20, 2008, page 30, lines 1-13.

> competitive pressure for the Alberta System in the future. As discussed in the Company's evidence, TransCanada and ATCO Pipelines recently announced a proposed agreement that, if finalized and approved, would result in NGTL and ATCO Pipelines acting cooperatively to serve the intra-Alberta market. However, NGTL faces increased competition with Alliance for supply and intra-Alberta markets. Alliance has put facilities in place (including a number of dually connected gas plants) that enable it to transport significant volumes of gas from areas traditionally served by NGTL. Alliance has also announced plans to initiate short-haul delivery service in Alberta. Finally, the North Sable Extraction Plant is being proposed to extract ethane from the Alliance Pipeline gas stream. This may require additional WCSB gas receipts on the Alliance Pipeline, making less WCSB supply available to the Alberta System than would otherwise be the case."

We note that Dr. Carpenter fails to mention any specific instances in which NGTL has lost business to Alliance or other competitors. The elevated competition is in the future. Further, aggressive expansion plans by Alliance detailed in NGTL's evidence are likely under review due to the current recession.[122] Nonetheless, we rate competition risk as moderate to high, above that of the TCPL Mainline.

Similarly to other gas pipelines as discussed above, credit risk does not appear as a significant risk in any of independent assessments of NGTL quoted.

In summary on market risk for NGTL, competition risk is moderate to high while supply and credit risks are similar to those of the Mainline and both are rated as moderate and low, respectively. We combine these three ratings into a market risk calibration for NGTL somewhat above that of the Mainline but still falling into the moderate category.

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[122] Written Evidence of Nova Gas Transmission Ltd., Section 2.2, Business Risk and Total Return Comparison,page 24, lines 5-21.

Q. Are there any notable differences between NGTL and the gas transmission benchmark in terms of operational or regulatory risks?

A. We find that both these risks are at benchmark levels.

Operating leverage and technology risks are both low to moderate similar to the Mainline. With only modest growth forecast and some excess capacity, significant asset growth is not forecast. According to DBRS:[123]

> "Medium-term growth is driven by increased capital expenditures totaling approximately $2 billion for 2008 to 2010. In the medium term, capital investments in the NCC and Fort McMurray area should enhance earnings. NGTL remains protected from short-term throughput risk."

Our overall rating of operational risk is low-moderate similar to that for the sector.

NGTL is regulated by the Commission and our comments assessing regulatory risk as low apply to this applicant. DBRS notes a number of respects in which regulation by the Commission mitigates the business risks of NGTL:[124]

> "Tolls are effectively based on cost-of-service and distance shipped, with all realized operating and maintenance expense cost savings accrued to NGTL. The Alberta System is protected from short-term throughput risk. In March 2008, NGTL reached an agreement with shippers on revenue requirements for 2008 and 2009, with approval expected in Q4 2008. In June 2008, NGTL also filed an application with the NEB to establish federal jurisdiction over the Alberta System, allowing it to provide integrated service to Alberta and BC customers, as well as northern natural gas producers. A decision on the application is expected in Q1 2009."

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[123] DBRS Rating Report, NOVA Gas Transmission Ltd., November 14, 2008, page 4.
[124] DBRS Rating Report, NOVA Gas Transmission Ltd., November 18, 2008, page 4.

Q. NGTL has applied to shift from regulation by the Commission to the purview of the NEB and this application has been approved by the NEB. How does this affect its regulatory risk?

A. We make no adjustment for this application for two reasons. First, the Commission must make its decision based on the status quo as long as it remains in place. Second, joint regulation of pipelines is currently in place with NGTL and ATCO Gas and Pipelines regulated by the Commission and the Mainline by the NEB. Our discussion of the Mainline above documents the manner in which regulation in Alberta has historically sought to coordinate with practice by the NEB.

Q. Does NGTL agree with your view of regulatory risk by the Commission as presented earlier?

A. Yes, it does. The company states: "The Alberta system's regulatory risk has not increased significantly."[125]

Q. What is your overall rating for the business risk faced by NGTL?

A. In summary, we rated market risk for NGTL as moderate (somewhat above that of the Mainline), operational risk as low-moderate and regulatory risk as low. These rankings (summarized in Schedule 2.4) lead to an overall business risk ranking of low-moderate and somewhat above that of the Mainline.

2.3.5.2.1 ATCO Gas Pipelines

Q. Please provide an overview of your analysis of the business risk of ATCO Gas Pipelines.

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[125] Written Evidence of Nova Gas Transmission Ltd., Section 2.2, Business Risk and Total Return Comparison, page 29, lines 22-23.

A. ATCO Pipelines is the operator of 8,400 kilometers of natural gas pipelines across Alberta. In comparison with NGTL, ATCO Pipelines is far smaller with 36% of the pipeline distance and smaller diameters of pipe. Of the three aspects of business risk, like NGTL, ATCO Pipelines conforms to the sector norms in two areas: operational risk is low-moderate and regulatory risk is low. The only area of difference is in market risk and, in the interests of brevity, we focus our discussion on this area.

Within market risk, supply risk, is moderate similar to NGTL as it depends on the evolution of the WCSB as discussed earlier. Further, credit risk is low for both companies. The key factor differentiating ATCO Pipelines from our benchmark and from NGTL is high competition risk.

Q. How does your focus on competition risk for ATCO Pipelines compare with the approaches taken by the Board in Decision 2004-052 and by the company's witness on business risk, Ms. McShane?

A. Our focus is consistent with both. In 2004, the Board viewed ATCO Pipelines as facing higher competition risk than NGTL due to system growth and competition from NGTL. It also stated that the company faces little credit risk because it sells to ATCO Gas Distribution as its main customer.[126] Ms. McShane summarizes her discussion of four aspects of competition risk on page 51, lines 1336 to 1348 in summarizing her evidence. She also discusses supply and regulatory risks briefly.

Q. Now that you have established that competition risk is central to evaluating ATCO Pipelines, please provide your views on this topic.

[126] EUB Decisions 2004-052, page 46.

A. Competition risk for ATCO changed on the signing of its integration agreement with NGTL:[127]

> "ATCO Pipelines and NGTL will collaborate and structure an agreement (the "Arrangement") that utilizes NGTL assets located either within or outside Alberta and the Alberta assets of ATCO Pipelines in a single gas transmission enterprise (the "Alberta system")…The Alberta System will be operated as a commercially integrated system with common rates and services that are used to serve all customers that transport gas on the Alberta system."

When it goes into effect, this agreement will align the competition and business risks of ATCO Pipelines with that of NGTL. Because final regulatory approval for the agreement is not yet in place, we analyze the present, pre-agreement competition risk for ATCO Pipelines and assess its current level of business risk which is applicable for the interim.

Q. Do ATCO Pipelines and Ms. McShane agree with your view of the agreement?

A. No, they do not. Ms. McShane's analysis sets aside any impact of the agreement:[128]

> "As regards 2010 and beyond, ATCO Pipelines has signed a Memorandum of Agreement with NGTL to provide integrated gas transmission services in Alberta. As there are significant steps which must be taken in order for the agreement to be finalized, there remains considerable uncertainty whether the agreement will be implemented, and if it is, the timing thereof. As a result, the business risk profile of ATCO Pipelines has been assessed assuming the status quo."

Q. Why do you not share Ms. McShane's pessimism on the probability that the agreement will be implemented?

[127] Information Response CAPP-ATCO-3(a) Attachment, Schedule A, NGTL/ATCO Pipelines Integration Preamble and Term Sheet, 08-10-19, page 1.
[128] Direct Testimony of Kathleen C. McShane, November 20, 2008, page 45, footnote 50.

A. ATCO Pipelines cited regulatory approval and implementation at the companies' level as examples of the "significant steps" underlying the "uncertainty whether the agreement will be implemented, and if it is, the timing thereof." While both will take time, denial of regulatory approval is highly unlikely given that the Commission (and its predecessor Board) have already indicated their support in principle:[129]

> "The firms said both Canadian Utilities subsidiary ATCO Pipelines and NGTL have been encouraged by their regulator to explore collaborative concepts to streamline the provision of natural gas transmission across Alberta and to address competitive pipeline issues."

Q. Please describe the competition risk facing ATCO Pipelines prior to the agreement.

A. Ms. McShane's evidence describes the competition presently facing the company:[130]

> "ATCO Pipelines competes with NGTL for both producer and industrial deliveries. ATCO Pipelines charges a receipt toll to producers for volumes entering its transmission system and a delivery toll to end users (industrials and core customers) taking delivery of gas from its system. The delivery toll is based on ATCO Pipelines' fully allocated cost of service. NGTL charges a receipt toll for volumes entering its system, and a delivery toll for intra-Alberta industrial deliveries of approximately 1.3 cents per GJ based solely on NGTL's metering costs. To retain and attract industrial load, ATCO Pipelines' fully allocated cost of service toll plus the commodity cost of gas on the AP system must compete with NGTL's 'metering costs only' toll plus the commodity cost of gas on the NGTL system.

[129] TransCanada and Canadian Utilities reach deal on natural gas transmission, Canadian Press, Oilweek, September 8, 2008, http://www.oilweek.com/news.asp?ID=18476 .
[130] Direct Testimony of Kathleen C. McShane, November 20, 2008, page 45, lines 1172-1181 and excerpts from lines1190-1200, page 46.

> To attract and maintain producer receipts on its system, ATCO Pipelines needs to retain its industrial load… ATCO Pipelines has recently experienced decontracting by three industrial customers due to facilities closures, project deferral and reduced demand…"

Her evidence goes on to describe how ATCO Pipelines has been largely successful in meeting competition from NGTL through designing contracts and by Transportation-by-Others arrangements. Despite success in the past, competition risk is elevated and we set our rating for this risk as high.

Q. In addition to competition risk, Ms. McShane argues that supply and regulatory risks are also elevated for ATCO Pipelines. Do you agree?

A. No, we do not. Ms. McShane's views on supply risk simply refer to the situation in the WCSB that is no different for ATCO Pipelines than for our benchmark pipeline.[131] She refers to NGTL's application to transfer its regulation to the NEB as a risk factor. We refute this earlier in our discussion of NGTL.

Q. What is your risk rating for market risk for ATCO Pipelines prior to the implementation of the agreement with NGTL?

A. Placing the primary weight on competition risk for the reasons explained above, these rankings produce an overall ranking of moderate-high market risk for ATCO Pipelines.

Q. Please summarize your overall rating for the present business risk of ATCO Pipelines.

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[131] Direct Testimony of Kathleen C. McShane, November 20, 2008, page 48, lines 1248-9 and 1263-4; page 50, lines 1318-1324.

A. We rate operational risk as low-moderate and regulatory risk as low, both at benchmark levels for gas transmission and the same as for NGTL. Turning to market risk, credit risk is low and supply risk moderate; again both are at benchmark levels. The key risk factor differentiating ATCO Pipelines is elevated competition risk which we rate as high. Combining the three factors comprising market risk gives a rating of moderate-high for this dimension and an overall business risk rating of moderate for ATCO Pipelines. A summary of our rankings is in Schedule 2.4 labeled Status Quo as they pertain to the present situation prior to the implementation of the agreement.

Q. How will the business risk of ATCO Pipelines change when the agreement is approved and implemented?

A. As we explain earlier, the only element of business risk that is presently different between ATCO Pipelines and NGTL is elevated market / competition risk for the former. The agreement will lower these risks to the same level as presently enjoyed by NGTL. As a result, with the agreement in place, ATCO Pipelines will have the same business risk as NGTL does presently.

2.3.5.3 Business Risk for Gas Distribution Sector

Q. How do you organize your discussion of business risk for gas distributors in Alberta?

A. Taking the same approach as we did for the electricity sectors, we identify one of the applicant companies as typical in business risk for the gas distribution sector. That company is ATCO Gas and we use it as our benchmark covering market, operational and regulatory risks in turn.

Q. Is your view of ATCO Gas as a benchmark for its sector shared by other experts?

A. Yes, it is. Ms. McShane states: “As the principal natural gas distributor in the Province of Alberta, ATCO Gas is effectively the benchmark Alberta gas distributor".[132] In Decision 2004-052, the Board wrote that "ATCO Gas does not have any material differences in business risk from the typical gas distribution company."[133]

Q. How do you view the market risk in gas distribution using ATCO Gas as your benchmark?

A. The customer base of ATCO Gas is diversified across large and mid-sized urban and rural areas as well as between residential and commercial customers. Gas distributors face potential competition from residential customers' efforts to conserve energy as well as bypass risk of customers switching to electricity or on-site generation. Offsetting these risks is the growth in the Alberta economy and as a result, over the period 1993-2007 ATCO Gas has not experienced any reduction in average residential usage.[134] Competition risk is low-moderate.

A relevant precedent is the Decision With Reasons Phase 1 of the OEB for Enbridge Gas (EB-2006-0034) in which Dr. Paul Carpenter appeared on behalf of the company and advanced arguments similar to those of Terasen:

> "Dr. Carpenter contends that equity investors would consider investment in Enbridge to be more risky than it was in 1993 because of a) changes in the commodity market for natural gas, b) increased risk of bypass, c) new gas-fired generation, and d) uncertainty as to the future rate regulation framework" (page 59).

In granting a marginal increase in equity thickness from 35% to 36%, the OEB emphasized financial (as opposed to business) risk (Decision With Reasons, EB-2006-0034, page 63):

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[132] Direct Testimony of Kathleen C. McShane, November 20, 2008, page 40, lines 1032-3.
[133] EUB Decision 2004-052, page 53.
[134] Direct Testimony of Kathleen C. McShane, November 20, 2008, page 42, lines 1083-4 and Written Evidence of William B. Marcus, March 2, 2009, page 4.

> "With respect to the risk of bypass noted by the Company, the Board is of the view that the Company has under-estimated the risk mitigation through the development and approval for rate options to specifically address the need of gas fired generators and mitigate any potential for bypass risk."

> "Even if there was some recognition of increased business risk in the totality of the Company's arguments, this must be weighed against other positive considerations. For example, the Company's evidence indicates that customer growth continues to be strong and natural gas remains the predominant fuel of choice in Enbridge's franchise area. Enbridge's customer base is consistently growing year after year. The Board does not see this as indicative of increased business risk."

Our review of the recent Enbridge decision in Ontario reinforces the conclusion that competition risk is low-moderate.

Because gas distributors sell to businesses and households, they face credit risk but there is nothing in the evidence submitted by ATCO or its experts to indicate that this risk is more than low-moderate. Finally, our analysis of supply risk above shows that it is an issue for pipelines, not distributors, and we rate this risk as low. Overall, market risk is considered low-moderate for gas distributors and largely unchanged since 2004.

Q. Please provide your analysis of operational risk for gas distribution.

A. Gas distribution carries higher operational leverage risk than transmission. Since 2004, the introduction of a weather deferral account and a change in rate design increasing the fixed charge component, have moderated the operational leverage risk for ATCO. Writing prior to its approval, DBRS states the rationale for a weather deferral account as a risk-reducing tool:[135]

> "The Company's earnings and cash flows, particularly at ATCO Gas where residential customers account for nearly 50% of volume distributed, are sensitive to the weather. Significant changes in weather from one year to the next can impact earnings and cash flows. A 10% change in normal temperatures impacts annual earnings by approximately $10 million. ATCO Gas is seeking approval from the AUC to set up a deferral account mechanism that would, if approved, eliminate the impact of temperature on ATCO Gas' earnings."

Commission approval is now in place as documented in Ms. McShane's Evidence:[136]

> "In Decision 2008-113 dated November 13, 2008 the AUC approved ATCO Gas' requested weather normalization deferral account which further mitigates earnings volatility arising from unpredictable variations in weather. The impact of the proposed weather deferral account, in isolation, on ATCO Gas' cost of capital is largely judgmental. There are no market data that permit the segregation of the effect of the account on the overall cost of capital. For those utilities in Canada that have such accounts, there have been only two for which the regulator has ascribed a specific value to an account designed to adjust for weather fluctuations. In the case of both Terasen Gas (1994) and Pacific Northern Gas (2003), the BCUC deducted ten basis points from the utilities' equity risk premiums when it approved their Revenue Stabilization Adjustment Mechanisms (RSAMs). However, the RSAMs approved for the two utilities are more comprehensive than the weather deferral account proposed by ATCO Gas. The RSAMs also take account of variances in revenues from weather-sensitive customer classes due to variances in per customer usage from other sources (e.g., conservation)."

[135] DBRS, Rating Report, CU Inc., May 13, 2008, page 3.
[136] Direct Testimony of Kathleen McShane, page 41, lines 1051- 1065.

While Ms. McShane stops short of ascribing any significant risk reduction to the weather deferral account, her view is inconsistent with that of DBRS quoted above as well as those of the Board which, prior to the introduction of the deferral account, identified weather risk as a significant factor:

> "The Board notes that Calgary/CAPP and CG considered that ATCO Gas [Distribution] has the same or slightly higher business risk than a fully taxable electric distribution company, due to higher volatility of revenue resulting from a different rate design and higher sensitivity to fluctuations in weather conditions. The Board agrees that a gas distribution company has slightly more risk than a taxable electric distribution company due to higher revenue volatility."[137]

Further, another change in rate design mitigates operational leverage risk:[138]

> "The weather-related volatility has been partially mitigated through rate design, which allows ATCO Gas to recover approximately 56% [vs. 47% earlier] of its fixed costs through fixed charges."

Our view of weather deferral accounts and fixed charges as risk mitigating is consistent with the views of Mr. Marcus:[139]

> "Loads of gas utilities are likely to be considerably more variable than those of electric utilities, due to weather. However, this risk has been first reduced through increases in fixed charges and then entirely covered off for ATCO Gas with the weather normalization adjustment adopted by the Board."

[137] EUB Decisions 2004-052, page 49.
[138] Direct Testimony of Kathleen McShane, page 40, lines 1044 through page 41, line 1046.
[139] Written Evidence of William B. Marcus, March 2, 2009, page 22.

It also finds support in regulatory practice in Ontario and British Columbia.. OEB Decision With Reasons for Enbridge Gas Distribution (EB-2006-0034, page 39) details how gas distribution rate design in Ontario also includes mechanisms to stabilize rates which can create a short-term divergence between rates and actual costs. A recent BCUC Decision addressing business risk for Terasen, its generic, low-risk utility, discusses Terasen's Revenue Stabilization Adjustment Mechanism (RSAM):

> "The RSAM account deals with the Company's delivery margin and stabilizes the margins recovered from residential and commercial customers. The RSAM stabilizes delivery margin received from these customer classes on a use per customer basis. If customer use rates vary from the forecast levels used to set the rates, whether due to weather variances or other causes, the Company records the delivery charge differences in the RSAM account for refunding or charging through a rate rider to the RSAM rate classes over the ensuing three years. Having an RSAM mechanism does not offer the company protection against forecasting errors due to variances between recorded and forecast number of customers nor does it mitigate any forecasting risks associated with the non-RSAM customer classes such as industrial customers" (Exhibit B-3, Response to BCUC IR1 26.4.1) (Decision, page 22).

The discussion continues on page 26:

> "The RSAM acts as a weather normalization account. In this regard, TGI is similar to a number of utilities in North America (including Gaz Metro and Newfoundland Power Inc., in Canada) that can defer the effects of temperature when and where it differs from a long-term norm used to set rates. The Commission Panel agrees with Dr. Booth and Ms. McShane that weather is a symmetrical risk, with equal odds of over and underachieving, that should not be taken into account when establishing the ROE for a benchmark low-risk utility.

> The second function of the RSAM is to enable TGI to defer margin variances arising from residential and commercial customers consuming more or less gas than forecast. The Commission Panel considers this aspect of the RSAM to be a short-term business risk mitigant, which is not available to TGI's comparators. By "short term", the Commission Panel means that it agrees with the Applicants that "the RSAM does not provide for recovery of the return on, or of, capital in the longer-term."

In summary, gas distribution has somewhat higher operating leverage although this risk is fully mitigated by weather deferral accounts and rate design. We assess this risk as low-moderate.

The second dimension of operating risk relates to technology and we assess this as low reflecting the standard technology involved in gas distribution.

Risks arising from asset replacement and growth constitute the final aspect of operational risk. We discuss these risks in detail in our earlier analysis of electricity transmission and explain why we believe it is not beyond the level of low-moderate. These comments also apply to gas distribution. ATCO Gas takes a similarly positive view of growth in its 2007 Annual Report (page 11):

> "ATCO Gas grew with Alberta in 2007, completing a record number of installations while at the same time establishing new safety performance standards. The numbers are significant. In 2007, capital expenditures surpassed $191 million as the company expanded and maintained its extensive natural gas delivery system consisting of 36,487 kilometres of pipeline to support Alberta's booming economy."

Our overall assessment for operational risk is moderate and higher than similar risk for gas transmission principally due to expanded operational risk.

Q. How do you view the regulatory risk of gas distribution?

A. Earlier in our evidence, we enumerate four dimensions of regulation and explain how each reduces risk for Alberta regulated gas pipelines. These same factors apply to gas distributors in the province as well. First, operational risk is mitigated by deferral and variance accounts as discussed above. Second, as with other utility segments discussed earlier, Alberta gas distributors also benefit from the requirement for annual GRAs which shorten the regulatory lag relative to other jurisdictions. Third, gas utilities also benefit from Commission approval of appropriate structures for construction financing and a recent Supreme Court of Canada decision that mitigates asset disposal risk. Fourth, we believe that the Commission regulates in a fair manner.

Turning to regulatory risk beyond their primary regulator, gas distributors face environmental and safety regulation. As discussed above, tighter regulation in these areas does not appear likely in the next five years and we rate environmental and safety risk as low.

In brief, regulatory risk is low for gas distributors both from the primary regulator and from environmental and safety regulators.

Q. Please summarize your views on business risk for gas distribution.

A. For the reasons provided, we rate market risk and operational risks both as low-moderate and regulatory risk as low for an overall rating of low-moderate business risk for gas distribution. Schedule 2.3 summarizes our rankings.

2.3.5.4 Business Risk Assessments for Individual Gas Distribution Utilities

2.3.5.4.1 ATCO Gas Distribution

Q. In your analysis of business risk for the Alberta gas distribution sector, summarized in Schedule 2.3, you use ATCO Gas as a benchmark. Do you have anything to add?

A. Ms. McShane shares our conclusion that there has been no increase in business risk for ATCO Gas since 2004:[140]

> "On balance, it is my judgment that, assuming the proposed change in rate design and weather deferral account are approved, the level of business risk that ATCO Gas faces has not materially changed since Decision 2004-052."

However, our conclusion takes into account the new weather deferral account of ATCO Gas and goes further than Ms. McShane's to assess a reduction in business risk since 2004. We agree with Mr. Marcus who states:[141]

> "On balance, the demand risk factors alone would position the ATCO Gas distribution company as slightly less risky than the electric distribution companies. This is a change from the last GCOC. This change is specifically due to the Commission's adoption of a weather normalization adjustment for ATCO Gas."

2.3.5.4.2 Alta Gas Utilities

Q. Please summarize your view of the business risk of AltaGas Utilities.

A. AltaGas Utilities differs from the sector benchmark levels of business risk in two areas: operating leverage (operational risk) and competition (market risk). Both of these differences stem from the company's unique market area. According to its Management Discussion and Analysis for Q3 2008:[142]

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[140] Kathleen D. McShane, Appendix F, Capital Structure for ATCO Gas, September 2007,
[141] Written Evidence of William B. Marcus, March 2, 2009, page 24.
[142] AltaGas Utility Group Inc., Management Discussion and Analysis, Q-3, 2008, page 7, www.sedar.com.

> "AUI's market consists primarily of residential and small commercial consumers located in smaller population centres or rural areas of Alberta. AUI completed the period with 67,188 active service sites (2007 – 64,795). In 2008, the growth of AUI's service sites and business was driven by economic growth in established franchises creating infill and expansion opportunities. Infill growth demand for space and water heating fuel within AUI's franchise service areas continues to be concentrated in town distribution systems and relates to servicing new homes and commercial developments with natural gas. AUI serves almost all of the potential market in its existing service areas."

A market in smaller centres and rural areas results in "low customer density" and "geographic dispersion". As documented by Dr. Vilbert, these market features result in:[143]

> "The need for an extensive infrastructure to allow it to operate throughout its service territories makes AUI's business more capital intensive than that of ATCO Gas, which means that AUI's operating leverage is higher… It is important to note that a large part of the operating costs for gas utilities stem from the amount of pipe that has to be maintained and operated… AUI services as many customers with 19,850 kilometers of pipeline as a large utility may serve in one city."

We agree with Dr. Vilbert's assessment that operating leverage risk is elevated and set our risk rating at medium-high for this risk dimension.

We also note that low customer density and geographic dispersion have an additional, risk-mitigating effect: they create a barrier to entry for competition for the same reason that they increase operating leverage risk. As a result, we rate competition risk

[143] Written Evidence of Michael J. Vilbert for AltaGas Utilities Inc., November 20, 2008, excerpted from page 8, lines 12-23.

at low, below the sector benchmark. In addition, geographic dispersion mitigates event risk associated with a natural disaster.

For the other aspects of business risk, we set the risk levels at the sector benchmark. We are aware of no solid evidence from the company's expert or from any other source to the contrary.

Our rankings (summarized in Schedule 2.4) produce an overall ranking of moderate for the business risk of AltaGas.

Q. Please compare your conclusions on business risk for AltaGas Utilities to those of the Board in Decision 2004-052.

A. We concluded that AltaGas has higher business risk than ATCO Gas (our sector benchmark due to higher operating leverage arising from its widely dispersed service territory. This dovetails with the view of the Board:[144]

> "AltaGas and ATCO Gas considered the business risks of AltaGas to be higher than the business risks of ATCO Gas, due to AltaGas' relatively small size, rural service area, geographically dispersed customers and high level of customer contributions.
>
> Calgary/CAPP was the only party who took the position that AltaGas did not have higher business risks than ATCO Gas. Calgary/CAPP considered the main risk to AltaGas to be commodity cost risk, for which AltaGas has a deferral account.
>
> …the Board is persuaded that the business risks of AltaGas are greater than the business risks of a typical gas distribution company because of the nature of its service territory, not necessarily because of its smaller size."

[144] EUB Decision 2004-052, pages 53-54.

Q. Have you identified any changes in the business risk of AltaGas Utilities since 2004?

A. No, all our evidence supports the view that the risk is unchanged given that, unlike ATCO Gas, AltaGas does not have a weather deferral account. Consistent with the views of Mr. Marcus, we believe that if such an account should be adopted, business risk would decline.[145]

Q. How do Dr. Vilbert's views compare with your own?

A. Dr. Vilbert also believes that business risk is elevated due to the higher operating leverage associated with service area dispersion as stated above. However, he also holds that "the fact that AUI's corporate structure includes only regulated assets increase[s] regulatory risk".[146]

This view on regulatory risk is incorrect for two reasons. First, a higher percentage of regulatory assets has the effect of **reducing** business risk, not increasing it as we explain in detail earlier in our evidence in discussing the positive role played by the Commission. Second, the examples of disallowed expenses provided by Dr. Vilbert do not constitute business risk but rather illustrate failures on the part of management in operating the business in a prudent fashion. As such, these expenses are properly the responsibility of shareholders, not ratepayers.

2.4 BOND RATINGS AND CAPITAL STRUCTURES FOR CANADIAN UTILITIES

Q. Please explain how this section of your evidence is organized.

A. Our analysis in this section begins with analysis of the bond ratings and access to financing. We find that the average utility in Canada is rated A (low) by DBRS and

[145] Written Evidence of William B. Marcus, March 2, 2009, page 24.
[146] Written Evidence of Michael J. Vilbert for AltaGas Utilities Inc., November 20, 2008, page 4, lines 12-13.

A- by S&P. A number of companies have a rating in the BBB range from at least one agency. Next we examine research by academics and practitioners that shows that companies with ratings in the BBB (and especially companies in low risk industries like regulated utilities) continue to enjoy access to financing. We review the practices of bond rating agencies showing that ratings are not determined by a formula and that institutional investors are skeptical of ratings in many instances.

A review of financial ratios with focus on return on equity follows. The principal conclusion here is that regulated utilities in Canada typically earn ROEs above the allowed level consistent with our view of the favourable role of regulation discussed earlier in this evidence. We support this conclusion with quantitative analysis of before tax profitability and ROE for utilities in comparison with a sample of large capitalization Canadian companies. Our analysis supports the conclusion that utilities enjoy lower business risk (volatility of before tax profitability) as well as lower total risk (volatility of return on equity) as compared to non-utilities in Canada.

We examine various benchmarks for the common equity ratios of utilities in Canada and discuss why the process of regulation results in “overly conservative” allowed ratios. Employing our benchmark equity ratios, we draw on our analysis of business risk above to set the recommended equity ratio for each applicant company. Finally, we calculate the interest coverage ratios implied by our recommendation and show that they are not incompatible with an acceptable, BBB-level bond rating.

Q. Please review your bond rating analysis.

2.4.1 Bond Rating Analysis

Q. How do bond rating agencies rate Canadian utilities?

A. Schedule 2.5 displays Dominion Bond Rating Service (DBRS), Standard & Poor’s (S&P) and Moody’s bond ratings in January 2009 for our eight Canadian utilities and their regulated subsidiaries spanning different parts of the industry: gas, electric and pipelines. These companies represent a current sample of utilities with publicly traded shares. In forming this sample we seek to measure ratings and financial ratios for the traded entity associated with the regulated utility. In focusing on traded companies, our goal is to maintain sample consistency throughout our evidence. We recognize, however, that many of the traded companies include nonregulated businesses in addition to the regulated utility. One company, TransAlta, is currently completely unregulated and is included as a comparison. We control for any bias by commenting on the differences as well as comparing our conclusions to those drawn strictly for regulated entities.

The bond ratings are from the websites of DBRS, Moody's and S&P. Because Moody's only rates a subsample of companies, our analysis focuses on ratings by the other two agencies. Starting with the DBRS ratings, Schedule 2.5 shows that these range from A for Canadian Utilities, Enbridge, Newfoundland Power and TransCanada Corporation down to BBB (low) for Pacific Northern Gas. The Schedule shows that the typical Canadian energy utility is rated A (low) by DBRS. We next turn to the S&P ratings and make a similar comparison. The S&P ratings for the utilities in our sample range from A for ATCO and Canadian Utilities down to BBB+ for Emera, Nova Scotia Power, Maritime Electric and BBB for TransAlta. S&P does not rate Pacific Northern Gas or Fortis BC. The schedule shows that the typical Canadian energy utility is rated A- by S&P. Split ratings (agencies disagreeing) are common; 10 companies are rated by at least two agencies and of these 6 have split ratings.

Of the eight traded companies and five subsidiaries in our sample, six received a rating of BBB from at least one of the agencies. Yet, despite their lower ratings, with the exception of Pacific Northern Gas, we are not aware of any cases in which these companies have experienced difficulties in accessing capital markets to raise long-term financing. Our understanding was confirmed by Ms. Kathleen McShane in her role as a witness for Ontario Power Generation in its recent hearing.[147]

Q. Please compare your findings on typical bond ratings for Canadian utilities to the views of other witnesses in this hearing.

A. Reviewing the evidence of expert witnesses sponsored by applicant companies we found three who provided samples of Canadian utilities and their bond ratings. The closest to our own conclusions are those of Ms. McShane whose sample of 26 Canadian utilities has median ratings of A from both DBRS and S&P (marginally higher than our medians of A(low) and A-, respectively) and Baa1 from Moody's (identical to ours).[148] Of her 26 companies, 10 have a rating in the BBB-range from at least one rating agency.

Mr. Coyne presents a sample of 9 Canadian companies with a median rating of A- from DBRS (identical to ours).[149] Of these, 3 have ratings in the BBB-range. He does not provide ratings from other agencies.

Finally, Dr. Neri's sample of 7 Canadian utilities has a median rating of A from S&P and contains no BBB-rated companies.[150]

2.4.1.1 <u>Access to Financing by BBB-Level Utilities</u>

Q. In the event of a downgrade to A- or even BBB+, could a utility still access financing?

[147] Ms. McShane's Response to Pollution Probe Interrogatory #54, EB-2007-0905, Exhibit L, Tab 12, Schedule 54, page 1 of 1.
[148] Direct Testimony of Kathleen C. McShane, November 20, 2008, Schedule 3.
[149] Direct Testimony of James M. Coyne, Exhibit JMC-02, pages 3-4.
[150] Capital Structure for ENMAX Power Corporation, John A. Neri, Ph.D., November 20, 2008, Schedule 1.

A. Yes, it could. Based on our examination above of a sample of publicly traded utility holding companies in Canada, we find that having a bond rating of BBB+ or BBB does not prevent a company from profitably conducting its business.

Q. Does academic research support the argument advanced by some experts in this hearing that utilities should target a bond rating in the A-range?

A. No, it does not. On the contrary, Drs. Shivdasani and Zenner conclude that, while many CFOs target an A rating, a lower rating would be optimal:[151]

> "We have found that for many industries, the tradeoff theory suggests a rating in the BBB neighborhood, while, as suggested by Figure 1 earlier, the rating of the median S&P 500 industrial firm tends to be higher. Given that the rating agencies already take into account the variability of an industry's operating performance, a BBB rating corresponds to a substantial market leverage ratio (30-60%) for companies with fairly stable cash flows and limited investment requirements—and food companies and *regulated utilities come to mind here*." [Emphasis added.]

Q. Can you provide any further evidence that a utility could still access financing as a BBB-rated company?

A. Yes, we can. Companies rated in the BBB range regularly access long-term financing in the U.S. For example, the following debt issues by utilities appear in Scotia Capital, *Fixed Income Research*, October 3, 2008 under Selected New Issues: Interstate Power & Light, rated BBB+ by S&P and A3 by Moody's, U.S. $250 million and Union Pacific Corporation, rated BBB by DBRS and S&P and rated Baa2 by Moody's, U.S. $750 million.

[151] A. Shivdasani and M. Zenner, 2005, How to choose a capital structure: Navigating the debt-equity decision, *Journal of Applied Corporate Finance* 17: 1 (Winter), page 30.

More broadly, in the U.S. only a minority of utilities enjoy an A rating. On page 1 of its report, *Credit ratings, Q3 2008 Financial update*, the Edison Electric Institute (EEI) provides S&P utility credit ratings distributions for the 69 U.S. shareholder-owned electric utilities that it tracks. As of September 3, 2008, the distribution is: A or higher (8%), A- (11%), BBB+ (18%), BBB (32%), BBB- (21%) and below BBB- (11%). As of 20071231, the distribution was: A or higher (9%), A- (9%), BBB+ (23%), BBB (27%), BBB- (20%) and below BBB- (12%). These data show that 83% of the firms in the EEI sample of U.S. shareholder-owned electric utilities have a BBB+ or lower rating from S&P.[152]

Q. With a rating in the BBB range, could a utility continue to access bank financing through its credit lines?

A. Yes, it could. To support our view, we take the example of AltaLink and draw on information submitted in the current GTA; namely, credit agreement attachments supplied by AltaLink in its response to Information Request, UCA.AML-139(a). The first agreement dated May 2, 2008, contains a performance pricing grid detailing the margin or spread to be charged by Bank of Nova Scotia depending on AltaLink's bond rating. The grid includes a range of ratings from an upgrade to AA- or higher to a downgrade to below BBB-. The second agreement dated December 1, 2008 shows a range from any upgrade above A- to a downgrade below BBB-. Both agreements document that the Bank of Nova Scotia is willing to provide credit to AltaLink in the event of a downgrade below BBB-. In addition, we note that AltaLink's forecasted balances, as reported in Schedule 8.2.5, have minimal balances of $27.6 million and $4.9 million at year ends 2009 and 2010, respectively, for Bank Credit Facilities.

2.4.1.2 Rating Bonds Does Not Follow a Formula

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[152] http://www.eei.org/industry_issues/finance_and_accounting/finance/research_and_analysis/quarterly_financial_updates/Q3_2008_CreditRatings.pdf).

Q. Please use the example of AltaLink to describe the process followed by bond rating agencies.

A. DBRS issued a news release on September 18, 2008 confirming AltaLink L.P.'s (ALP) rating for its Senior Secured Bonds and Medium-Term Notes at "A": AltaLink's Commercial Paper rating was confirmed at R-1 (low) with the trend remaining stable. At the same time, DBRS changed the trend on the Senior Secured Bonds and MTNs to negative from stable:[153]

> "While current credit metrics are consistent with assigned ratings and with our previous expectations, the trend change is the result of ALP's filing of a General Tariff Application (GTA) with the Alberta Utilities Commission (AUC), in which it has laid out a significantly increased capital expenditure forecast over an extended period of time…The potential stress on the credit metrics as outlined by ALP in the GTA filing is the primary driver of the trend change for Senior Secured Bonds and Medium-Term Notes."

Q. Does DBRS mention any financial ratios as important in its decision to change the trend to negative?

A. Yes, the DBRS letter comments on "forecasted cash flow-to-debt metrics averaging 8.2% in the 2009 to 2014 period, bottoming out in 2011 and improving from that point onward." It goes on to state:

> "While the previously anticipated credit metric deterioration was viewed as acceptable for the rating levels, the updated ALP forecast-coverage ratios are materially lower than previous expectations and would continue at lower levels for longer periods of time."

[153] DBRS confirms AltaLink ratings, Changes bond/MTN trend to negative, *DBRS Press Release*, September 18, 2008, page 1.

Q. Has AltaLink submitted any further evidence in support of the view that a downgrade is imminent based on financial ratio analysis?

A. Yes, Ms. Abbott benchmarks the projected FFO to debt ratios for AltaLink against grids published by Moody's which does not rate AltaLink and by S&P for U.S. corporates in 2007 and for utilities in 2002. In particular, she argues that FFO to debt of 10% or less is not consistent with maintenance of an A or A- rating.[154]

Q. Please provide your views on how much weight the Commission should attach to these two sets of evidence predicting a downgrade based on projected financial ratios unless AltaLink's requests are granted.

A. In our view, the Commission should attach no weight to that evidence because it is based on an overly simplistic view of financial markets and the ratio guidelines employed by bond rating agencies. Although bond rating agencies certainly pay attention to ratios, there is no formula which translates ratios into bond ratings as considerable judgment comes into play. Simply having a key ratio below a certain level is not by itself grounds for a downgrade in practice. Rating agencies state this point. For example, In *Corporate Ratings Criteria*, S&P states:

> "Guidelines are not meant to be precise. Rather, they are intended to convey ranges that characterize levels of credit quality as represented by the rating categories. Obviously, strengths evidenced in one financial measure can offset, or balance, relative weaknesses in another." (page 56)

In *Project and Infrastructure Finance Review*, 2003, page 58, S&P writes:

> "Caution should be exercised when using the ratio ranges because:

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[154] Testimony of Susan D. Abbott, Appendix J6, Volume 2, AltaLink Evidence, line 91, page 6 through line 223, page 12.

- Ratings are designed to be valid over the entire business cycle, and ratios of a particular firm at any point in the cycle may not appear to be in line with its assigned debt ratings…
- Ratios cannot encapsulate all elements of a financial analysis (such as financial policy or financing flexibility); and
- There are many nonnumeric distinguishing characteristics that determine a company's creditworthiness."

In addition to the statements of rating agencies, academic research on pricing of bank loans confirms that bond ratings are generally poorer measures of credit risk than are measures based on financial ratios.[155]

To demonstrate our point with a current example, we refer to Schedule 2.7 which gives cash flow to debt and interest coverage ratios for our sample of companies for three years. Focusing on 2007 because it is the most recent year for which a full set of data is available in Financial Post Advisor, we see that ATCO, Canadian Utilities, Emera and TransCanada had cash flow to debt ratios in a narrow range of 16.85 to 23.71. Further the same four companies had interest coverage ratios lying in a similarly narrow range of 2.60 to 3.31. Yet despite having very similar interest coverage ratios, these companies did not share a common bond rating. Rather, as Schedule 2.5 shows, they display a range of ratings: DBRS rates ATCO and Canadian Utilities as A (high), Emera as BBB(high) and TransCanada as A. Standard & Poor's rates ATCO and Canadian Utilities as A, Emera as BBB and TransCanada as A-. Moody's rates only Emera and TransCanada as Baa2 and A3, respectively.

Further evidence that bond rating agencies exercise considerable judgment in forming ratings comes from observing that of the ten companies in Schedule 2.5 that are rated by at least two agencies, only four have identical ratings from all agencies rating them.

[155] K. Panyagometh and G. S. Roberts, Do lead banks exploit syndicate participants? Evidence from ex post risk, *Financial Management*, forthcoming 2009.

Q. Have the rating agencies conducted any studies dealing with these issues?

A. Yes, they have. Moody's conducted a case study comparison of rating levels, accuracy and stability between North American and Continental Europe. They found that:[156]

"• The meaning of ratings appears to be the same in the two regions. Loss rates and credit spreads by rating category are similar across the two regions. Similarity in meaning, however, does not require similarity in determinants. We find that European industrial firm ratings are not as well explained by – and are in fact higher than would be expected from – a simple accounting-ratio-based model estimated primarily on American data.
• Compared to North American ratings, Continental European ratings have proven more accurate, providing a more powerful rank ordering of subsequent default risk, both absolutely and relative to market-based credit measures. In addition, the correlation between ratings and spreads is greater for Continental European ratings than American ratings.
• Continental European ratings and North American ratings exhibit very similar stability properties."

The report notes on page 5 that "systematic differences between ratings and financial ratios may not point to ratings inconsistencies" but rather that "such differences may in fact provide evidence that systematic differences in qualitative factors – reflecting regionally distinct accounting practices, bankruptcy law, or levels of implicit

[156] Richard Kantor *et al.*, 2004, Measuring the quality and consistency of corporate ratings across regions, *Special Comment*, Moody's Investor Service, November 2004.

government or bank support for borrowers – are being incorporated into the relative ratings assigned in each regions".

Q. What lessons can we learn about bond rating agencies from the credit crisis?

A. Mistakes by bond rating agencies contributed to the credit crisis and have undermined the credibility of bond raters as discussed earlier in our evidence. In addition to this history of mistakes, bond rating agencies face potential conflicts of interest because they receive the major portion of their compensation from companies which they rate:

> "Some point to a lack of objectivity, given that rating agencies earn a healthy portion of their revenue helping companies obtain a certain rating before they take products to market. Agencies generally disclose when they are paid by the companies they rate, but because DBRS is a private company, Mr. [Walter] Schroeder [founder of DBRS] would only confirm the firm earns the 'bulk' of its revenue from issuers, not subscribers."[157]

Fees paid to rating agencies can be substantial. For example, AltaLink's Response to Information Request UCA.AML-133(c) lists the rating agency fees for its new issues (actual and planned) from May 2008 through July 2010. For five issues, the total rating agency fees are $535,000.

Q. Do you have additional evidence to support your view of bond ratings and their impact?

A. We do. Just as bond rating agencies often disagree, institutional investors, bond traders and other sophisticated bond market participants often challenge bond raters' assessments. Academic research documents the lag between information about a company becoming publicly available and the upgrading or downgrading of its debt

[157] Theresa Tedesco and John Greenwood, Credit ratings storm; DBRS faces critics over role in ABCP fiasco, *Financial Post*, *National Post*, June 14, 2008.

by rating agencies. A well-known example of rating lag features Enron's debt which continued to enjoy an investment grade rating until shortly before the company declared bankruptcy. More generally, a number of academic papers have estimated the rating lag as being up to 1 ½ years in length. Additional research suggests that the conflict of interest documented above, causes agencies to take longer on downgrades than upgrades or, in some cases, to postpone downgrades altogether.[158]

This suggests that bond investors form their own views of the risk of individual bonds. Furthermore, those assessments are often more finely tuned and are free of the conflicts of interest facing rating agencies discussed earlier. As a result, investors are not always dissuaded from holding bonds that have been downgraded.

Q. Are there any other examples of systematic inaccuracies by bond rating agencies?

A. Yes, there are. Ms. McShane discusses the Maple bond market as follows:[159]

> The creation of a whole new market for Canadian dollar-denominated foreign bonds highlights the significance of the elimination of the FPR [foreign property rule] for debt issuers. These "Maple" bonds are particularly attractive to pension funds, whose liabilities are in Canadian dollars. Attracted by the low interest rate environment as well as the increasing demand for fixed income securities, foreign issuers raised funds in Canada in record amounts since the FPR was removed. During 2006 and 2007, approximately $55 billion of "Maple bonds" were issued by foreign investors. Approximately 40% of the amount has been raised by U.S. issuers.[160]

[158] M.I. Weinstein, 1978, The effect of rating change announcement on bond price, *Journal of Financial Economics* 6, pages 329-350; and R. Ball, R. Bushman, and F.P. Vasvari, 2008, The debt-contracting value of accounting information and loan syndicate structure, *Journal of Accounting Research* 46 (May), pages 247-287.
[159] Exhibit 975977_1632472, Written evidence of Kathleen C. McShane for Atco Utilities (Atco Electric Ltd., Atco Gas and Atco Pipelines), lines 480-491, page 19.
[160] DBRS, *Maple Newsletter*, Volume 3, Issue 2, April 9, 2008.

> Historically, the existence of the FPR and the high demand in Canada for a relatively limited supply of high quality issues kept high grade Canadian bond spreads relatively low compared to spreads in the U.S."

Q. Were these issues of high quality?

A. Yes, according to the rating agencies but not ex post: [161]

> "The odds of losing a significant amount of money in Maples in 2008 were almost one in six, with 17 of the roughly 110 issues in the Maple index finishing the year trading for less than 80 cents on the dollar.
>
> Some bonds have lost almost all their value, including those sold by Lehman and the Iceland banks. Kaupthing's Maple slumped to 5 cents on the dollar, while one of Lehman's issues dropped to about 9 cents.
>
> Even banks that have survived the turmoil of 2008 in some form, such as Citigroup and Royal Bank of Scotland, have had some of their bonds hammered down to about 50 cents on the dollars.
>
> Over all, the Maple index had a return of negative 1.4 per cent in 2008, as better-performing issues offset the big declines in some bonds in the last half of the year. By comparison, the DEX Universe Bond index, the benchmark Canadian bond-market measure, provided a 6.4-per-cent total return."

Kaupthing Bank and Landsbanki Islands were rated Aaa by Moody's in early 2007.[162]

2.4.3 Financial Ratio Analysis

Q. Please explain the analysis you conducted on financial ratios.

[161] Boyd Erman, Maple bonds lose luster, *Globe and Mail*, February 2, 2009, page B4.
[162] RBC Capital Markets, *Credit Weekly*, Volume 13, April 5, 2007.

A. We examine relevant financial ratios beginning with the actual, long-term capital structures of the companies in our sample for 2005 through 2007, the latest years for which data are available in the Financial Post Advisor and company annual reports. These ratios show common equity, long-term debt and preferred shares as percentages of long-term capital excluding short-term debt. Focusing on the 2007 common equity ratios, Schedule 2.6 reveals that there is considerable variation across companies from a high of 57.41% for TransAlta to a low of 31.75% for ATCO. The average percentage of common equity was 41.92% in 2007 up slightly from 41.08% in 2005. In addition, Schedule 2.6 shows the percentages of long-term debt and preferred shares (separated from common equity) in the capital structures of these companies. Again, there was considerable variation in the proportionate use of financing across companies. On average, the companies employed 54.41% long-term debt and 3.66% preferred shares in 2007.

The presentation of ratios for the same group of companies continues in Schedule 2.7. The first three columns show the coverage ratio, EBIT/Interest expense.[163] The average coverage ratio was 2.68X in 2007. The next three columns display cash flow to debt which averaged 21.43X in 2007.[164]

Q. Do you have any further analysis of coverage ratios?

A. The coverage ratios in Schedule 2.7 are for utility holding companies that include regulated assets in other provinces as well as unregulated activities. In order to investigate coverage for regulated operations in Alberta, Schedule 2.8 provides further data on coverage ratios drawn from the applications. This schedule calculates interest coverage ratios from data supplied in response to Minimum Filing Requirement 2(a), Summary Historical Financial Information. Approved interest coverage (Panel A) is calculated as approved EBIT divided by approved interest for

[163] EBIT are earnings before interest and taxes.
[164] Cash flow from operations divided by the sum of long- and short-term debt. The result is expressed as a percentage.

those companies that supplied this information. Actual interest coverage (Panel B) is actual EBIT divided by actual interest.

Turning first to approved coverage ratios in Panel A of Schedule 2.8, the schedule reveals that this ratio averaged 2.16 times for all the companies for the period 2001-2007. The averages for the individual companies ranged from a low of 1.64 times for EPCOR Transmission to a high of 2.66 times for ATCO Gas Transmission. The actual coverage ratios in Panel B are similar: the average ratio is 2.29 times with a range across companies from a low of 1.74 times for EPCOR Transmission to a high of 2.93 times for ATCO Gas Transmission.

These historical ratios suggest that interest coverage in the range of 1.6 to just under 3 times has been considered a “business as usual” level.

Q. What analysis did you conduct on return on equity for the utilities in your sample and in this hearing?

A. Schedule 2.7 also contains data on ROEs for the companies in our sample. The ROE figures for 2005 through 2007 show that all of the companies earned positive ROEs in all three years. Further, a 2001 study on the Canadian electric utility industry by DBRS concludes that actual earned ROEs typically exceed ROE targets set by regulators.[165]

In Schedule 2.9 we update this comparison for 2007 and broaden it beyond DBRS’ focus on electric utilities to encompass our sample. The update shows that utilities continue to enjoy typical earned ROEs in excess of the target ROEs allowed by regulators. For two companies, ATCO and Fortis, we have allowed returns by divisions giving us a sample of 13 comparisons. The average 2007 allowed return for this sample was 8.85% while the average actual ROE for the consolidated company

[165] G. Lavalee, M. Kolodzie and W. Schroeder, *The Canadian Electric Utility Industry*, Dominion Bond Rating Service, November 2001, page 49.

was 12.03%. The difference, 318 basis points, represents the outperformance of allowed returns. Further, in only 2 of 13 cases (Maritime Electric and Pacific Northern Gas) did holding companies fail to achieve actual ROEs higher than the allowed rates for their regulated subsidiaries.

While our ROE comparison is instructive, an element of imprecision is introduced when we compare allowed returns on regulated subsidiaries with the actual returns on the parent holding companies. This imprecision could arise because the parent holding companies include unregulated activities that generally carry higher levels of business risk and therefore can be expected to earn higher returns. To remove this imprecision, we conduct a further comparison for the subsample of five regulated entities in Alberta for which we have data on actual returns from the GCOC. As Schedule 2.9 shows, the average actual 2007 return on equity for this subsample is 9.33% in comparison to an allowed return of 8.51%. Only one company (ATCO Pipelines) failed to earn its required return in 2007. Our subsample comparisons reinforce our conclusion that regulated utilities almost always enjoy actual ROEs above the level allowed by their regulators.

Q. Your conclusion that actual ROE generally exceeds the allowed level draws exclusively on data for 2007. Does it hold for other years as well?

A. Yes, it does. Schedule 2.10 reports the averages of actual and allowed ROEs for the years 2001 to 2007 for the 12 utilities in this hearing. For 9 of the utilities, the average actual return exceeded the average allowed return, for one company the two averages were equal, and for two the average actual ROE fell below the average allowed return. In brief, for 10 out of 12 utilities, the average actual ROE equaled or exceeded the allowed return. Only two utilities experienced actual average ROEs below average allowed returns. These figures are consistent with our earlier conclusion: regulated utilities almost always enjoy actual ROEs above the level allowed by their regulators.

2.4.3 Quantitative Measures of Business Risk and Return Variability

Q. What further quantitative tests of business risk and return variability did you conduct using financial ratios?

A. We analyze the average level of actual before-tax profitability as measured by the ratio of EBIT to assets for a sample of large, traded Canadian companies, the non-financial companies in the S&P / TSX 60 Index and compare the results to the same measure for various samples of utilities. We also calculate the standard deviation of this ratio as a proxy for business risk.

Q. What do you conclude about business risk based on your analysis of before-tax profitability?

A. Our results, in Schedule 2.11, show that before-tax profitability, EBIT to assets, ranges from 8.10% to 8.90% for three samples of Canadian utilities and is quite similar at 8.93% for the S&P/TSX 60. The difference lies in the volatility of profitability – the standard deviation of the ratio, EBIT to assets. This measure is much higher for the S&P/TSX 60 at 10.31% as compared to a range of 2.69% to 2.99% for the utility samples. This quantitative measure strongly supports our view that utilities enjoy a low level of business risk far below that of the typical large capitalization Canadian company. As discussed earlier in our evidence, utilities enjoy lower business risk due to the nature of the business producing lower market and operational risk as well as to the risk reduction from regulation.

Q. Please explain the details of your analysis in Schedule 2.11.

A. In order to measure business risk for non-utilities, we examine before-tax profitability as measured by EBIT / assets and its variability for the companies in the S&P / TSX-60 excluding financial firms because ratios for these companies are not comparable.. The EBIT to assets ratios are calculated using data from Financial Post Advisor (www.fpinfomart.com) for the years 2001-7. Our first utility sample (labeled 2A in Schedule 2.11) includes the holding companies of the utility companies that submitted evidence in this hearing: Altagas Utility Group, Canadian Utilities, EPCOR Utilities, Fortis Inc. and TransCanada (NGTL). Our second utility sample (2B in Schedule 2.10) includes the 3 utility holding companies that are in the TSX 60 index – Enbridge, TransAlta and TransCanada. Utility sample 2C includes the 7 publicly traded utility holding companies in Schedule 2.6. One-tailed F-tests reveal that the standard deviation of the S&P/TSX 60 (no financials) is greater than the respective standard deviations of each of the utility samples at the 99% confidence level.

Q. What quantitative tests of variability of returns on equity did you conduct?

A. Using the same samples as in our tests on before-tax profitability, we also analyzed the average level of actual return on equity for S&P/TSX 60 (no financials) vs. utilities. In addition, we also calculated the standard deviation of this ratio as a proxy for total risk.

Q. What do you conclude about total risk for utilities relative to the comparison sample of large capitalization Canadian equities based on your analysis of ROE?

A. Our results, in Schedule 2.12, show that average return on equity ranges from 10.38% to 11.90% for three samples of Canadian utilities and was somewhat higher at 12.89% for the S&P/TSX 60 for our sample period of 2001-7. As for before-tax profitability, we discover a much more marked difference in the volatility, in this case, the standard deviation of ROE. This measure is much higher for the S&P/TSX 60 at 33.05% as compared to a range of 3.19% to 3.91% for the utility samples. Put another way, the statistics tell us that almost all of the utility accounting returns on equity were positive and above the yield on 30-year Canada's (the riskless rate which averaged 4.79% for this period). In contrast, the large capitalization Canadian companies often had ROEs below the riskless Canada yield and many times exhibited negative values. This quantitative measure strongly supports our view that utilities enjoy a low level of total risk far below that of the typical large capitalization Canadian company.

Q. Please review your calculations in Schedule 2.12 in detail.

A. This schedule examines return on equity and its variability for the S&P / TSX-60 with financials excluded vs. different utility samples as described above. As before, the ratios are calculated from Financial Post Advisor (www.fpinfomart.com) for the years 2001-7. The 30-year Canada rates are from the Bank of Canada website. One-tailed F-tests reveal that the standard deviation of the S&P/TSX 60 (no financials) is greater than the respective standard deviations of each of the utility samples at the 99% confidence level. The mean ROE on S&P/TSX is not significantly different from either zero or from the riskless 30-year Canada yield. For all utility samples, mean ROEs are significantly larger than riskless 30-year Canada mean at 90% confidence level based on one- tailed student's t-tests.

Schedule 2.13 plots the returns on equity for the samples in Schedule 2.12 after subtracting the long Canada rate from each ROE. For the S&P / TSX 60, the distribution is symmetric with a number of observations less than zero reflecting cases in which the ROE fell below the long Canada rate. In contrast, for each of the utility samples, only a small portion of the cases were negative. In other words, in contrast with the riskier non-utilities, the utilities almost always earned an ROE above the long Canada rate.

2.4.4 Common Equity Ratio Benchmarks

Q. Please explain the principle that guides your analysis of common equity ratio benchmarks.

A. Under the stand-alone principle of regulation, we must place all utilities on an equal footing and set aside the impact of ownership to assess a fair capital structure from the standpoint of an investor-owned utility of comparable risk. This standard is provided by our sample in Schedule 2.6. Our analysis establishes that the sample represents a group of companies which, with appropriate adjustments discussed below, can proxy for the risk that would be faced by an average risk Alberta utility if it were investor owned.

We turn to Schedule 2.6 where we observe that the average actual equity ratio for utilities in our sample was 41.92% for 2007, the most recent year for which we have data. This represents one useful benchmark for the equity ratio for a Canadian utility. Other benchmarks are helpful for two reasons. First, like any sample average, our average equity ratio depends on the sample drawn and can vary somewhat for this reason. Second, as we indicated earlier, the average is based on equity ratios for traded companies which include non-regulated activities.

As a check on our calculations we examine the equity ratios allowed by various Canadian regulatory bodies for the companies in our sample for which we obtained data from past decisions. The sample includes ATCO Electric Transmission and Distribution, ATCO Gas and Pipelines, Enbridge Gas Distribution, Emera (Nova Scotia Power), Fortis Alberta, Fortis British Columbia, Maritime Electric, Newfoundland Power, Pacific Northern Gas, TransAlta, and TransCanada Pipelines. In Schedule 2.14, we report the average allowed equity ratio for these 13 companies as 39.40%. To recognize that TransAlta is no longer regulated, we drop this company and recalculate the average as 38.93%. The analysis in Schedule 2.14 reinforces our conclusion that the average allowed “overly conservative” equity ratio for our sample of electric and gas utilities is around 39%.

Q. Can you validate your conclusion on the average allowed equity ratio?

A. We validate this conclusion by comparing our results against those obtained by Ms. McShane in 2007 using a broader sample of 22 Canadian utilities.[166] Her sample includes 11 of our 13 companies (excluding ATCO Pipelines and TransAlta) and adds 11 further companies. We calculate the average allowed, "overly conservative" equity ratio for her sample as 37.28% slightly below our 39%.

Q. Why do call the average allowed ratio "overly conservative"?

A. We call this average equity ratio "overly conservative" because it represents the result of a regulatory process in which decisions by regulatory bodies take as input the views of opposing parties each representing its own interest. We already showed how the regulatory process may be regarded as overly conservative as it almost always results in the regulated companies earning an ROE in excess of the allowed return. Focusing the discussion of conservativism on the common equity ratio leads to a similar conclusion. Regulated utilities have little incentive to optimize the use of debt in their capital structures. Having a capital structure with insufficient debt increases the weighted cost of capital because equity is the most expensive form of financing. In the case of regulated utilities, this "extra" cost associated with insufficient debt may be recovered through the process of regulation. If the company can persuade its regulator to approve this unwarranted extra equity, there is no cost to the company from a higher cost of capital. If this occurs, then the regulated company has unused debt capacity which can be a benefit to the parent holding company. The assets of the regulated utility can then serve as collateral to increase the borrowing power of the unregulated part of the holding company adding value for the shareholders. If this occurs, the shareholders gain unfairly at the expense of the customers of the regulated utility who have to pay higher rates to "compensate" the regulated utility for the cost of carrying unwarranted extra equity.

Q. What other benchmarks do you have for allowed equity ratios?

[166] Kathleen C. McShane, Opinion on Capital Structure and Fair Return on Equity, Prepared for Ontario Power Generation, November 2007, EB-2007-0905, Exhibit C2, Tab 1, Schedule 1, Schedule 30, page 1.

A. We can develop another benchmark common equity ratio by focusing on one company from a recent decision by a Canadian regulator: Ontario Power Generation (OPG). We select OPG because it represents an example of a utility with greater business risk than a set of comparison companies in Ontario. In its Decision with Reasons (EB-2007-0905, pages 149-150, the OEB stated:

> "The Board finds that the proposed equity ratio [advanced by Ms. McShane on behalf of OPG] of 57.5% is excessive. The incremental level of risk does not warrant the additional 12.5% equity over that of the next highest regulated utility. It is also well in excess of the equity levels of merchant generators, who have higher risk than OPG, as pointed out by Mr. Goulding. The Board concludes that the recommendation of Drs. Kryzanowski and Roberts, namely an equity ratio of 47%, is appropriate in the circumstances. This ratio is higher than the equity ratio of any other regulated Ontario energy utility, thereby recognizing the higher risk of OPG."

In setting our recommended equity ratio for OPG we recognized that it is an electricity generation company with the attendant higher business risk than either transmission or distribution. Further, OPG engages in nuclear as well as hydro generation. Our analysis setting the equity ratio proceeded in two stages. First, we assessed the business risk of OPG's hydro generation as at the high end of the scale for regulated companies and set a target equity ratio of 40%. Second, we rated the risk of OPG's nuclear generation business as higher warranting an equity ratio of 50%. Weighting the assets involved in each part of the business produced an overall recommendation of 47% equity.

The two key risk factors for OPG – generation and nuclear – discussed above make the company riskier than any of the companies in this hearing. Consequently, we believe that its 47% allowed equity ratio lies above what is appropriate for any of the companies in this hearing.

2.4.5 Recommended Capital Structures for Electric Utilities

Q. Please explain the organization of this section of your evidence.

A. We begin by recapping our business risk ratings for the electric utilities in this hearing as shown in the first row of Schedule 2.15. Next we review the allowed capital structure for each utility in Decision 2004-052 along with any update by the Board or AUC. The following row displays our recommendation for the utility in 2004. The final row shows our recommendation in the current hearing which we explain on a case by case basis. In the interest of avoiding repetition, we refer to, but do not repeat in detail, key points in our business risk analysis. In addition, we refute certain arguments advanced by individual utilities in support of higher equity ratios not covered in our earlier discussion. We return to other such arguments in Section 5 of this evidence.

Q. Kindly review your recommendations for the allowed capital structure for each of the electric utilities.

A. We treat the utilities in alphabetical order. For those companies with both a transmission facility operator (TFO) and distribution company (DISCO) we cover the lower-risk TFO first.

2.4.5.1 AltaLink

Q. Please provide your recommendation for the allowed equity ratio for AltaLink.

A. Our business risk rating for AltaLink is Low, typical of the transmission sector and unchanged since 2004. In Decision 2004-052, the Board assessed the business risk of

AltaLink as typical for a TFO. Based on this alone, the Board determined that AltaLink would have an allowed equity ratio of 33% identical to that of ATCO Transmission. However, the Board determined that an adjustment of an additional 2% was necessary to recognize that AltaLink faced an income tax disallowance and set the equity ratio for AltaLink at 35%. In 2006, the tax disallowance was removed and the Board responded by reducing the company's equity ratio to its present level of 33%.

In 2004, we recommended an equity ratio of 30% for AltaLink. In our assessment above, we identified increased asset replacement / construction demands as a factor that has increased the business risk of AltaLink since 2004. As a result, we recommend an equity ratio of 33% for this utility for 2009.

Q. In its evidence, AltaLink requested an increase in its deemed equity ratio to 38% based on an increase in capital expenditures for projects with an extended construction period leading to increases in CWIP which will not earn a cash return until it is added to the rate base.[167] The company argued that this will lead to a decline in its credit metrics and pose the risk of a downgrade. Did you take this into account in your recommendation?

A. Yes, we did. As discussed earlier in our evidence, the projected increases need close scrutiny to ensure that they have been properly adjusted downward to reflect the current recession and slowdown in energy development. Further, a more detailed understanding of the accounting for work in progress reveals that there are other alternatives for addressing this concern without raising the allowed equity ratio. Finally, these points notwithstanding, in the interests of conservatism, we recommend that the Commission maintain AltaLink's allowed equity ratio at 33% as opposed to the 30% which we recommended in 2004.

2.4.5.2 ATCO Electric Transmission

[167] Written Evidence of AltaLink Management Ltd., November 20, 2008, page 12.

Q. What deemed equity ratio do you recommend for ATCO Electric Transmission?

A. Our assessment of the business risk of this TFO is Low, typical and elevated somewhat since 2004 due to increase construction. We employed ATCO Electric Transmission as a benchmark for the business risk in this sector. Schedule 2.15 shows that the Board set the equity ratio for this company at 33% in 2004. At that time, our recommendation was for 30% equity which we now increase to 33%.

2.4.5.3 ATCO Electric Distribution

Q. Please state your recommendation for ATCO Electric Distribution.

A. We rate the business risk as Low-Moderate and unchanged since 2004. ATCO Electric Distribution was our benchmark for its sector. In 2004, the Board determined that an equity thickness of 37% was appropriate for this company. Our own recommendation at that time was for 35% equity and we continue to recommend this level.

2.4.5.4 EMAX Transmission

Q. Kindly review your advice to the Commission on an appropriate equity ratio for ENMAX Transmission.

A. Our business risk analysis rated this company as Low. Because it did not participate in the 2004 Generic Hearing we have no past levels for this company. Finding that the business risk for ENMAX TFO is somewhat lower than for ATCO TFO because ENMAX TFO does not face the same level of construction risk,, we set our recommended equity ratio at 30%.

Q. Why do you not adjust your recommendation for ENMAX upward to reflect its nontaxable status?

A. With respect, we believe that the argument for an adjustment, restated by Dr. Neri, is flawed and recommend that no such adjustment is necessary.[168]

We believe this argument is flawed because it is based on the same overly simplistic view of financial markets that we debunked in our earlier discussion of ratio guidelines employed by rating agencies. We showed that S&P itself neither states nor acts as if it believed that having a key ratio below a certain target level is grounds for a downgrade. To support our argument, we examine the historical coverage ratios for ENMAX as well as for EPCOR, the other nontaxable, municipally owned utility in this hearing. Schedule 2.8 shows that actual interest coverage averaged only 1.94 times for ENMAX Transmission for the period 2001-7 and fell as low as 1.69 times in 2003. Low coverage was also the case for EPCOR Transmission with an average actual ratio of 1.74 times and individual values as low as 1.26 times in 2005.

Further, we provided a range of evidence that even when such downgrades occur; utilities can carry on their businesses profitably as long as they remain investment grade. It follows that lower coverage ratios resulting from non-taxable status should not increase risk for utilities. With no increased risk, the argument for a higher equity component collapses. We return to this issue in Section 5 of our evidence.

No upward adjustment for nontaxable status is required and this holds equally for other nontaxable entities in this hearing: ENMAX Distribution, EPCOR TFO and DISCO and FortisAlberta.

2.4.5.6 ENMAX Distribution

Q. Please review your thinking on an appropriate equity ratio for ENMAX Distribution.

[168] Evidence of John Neri, November 20, 2008, page 9, lines 16-20.

A. The business risk for this company is Low and typical for its sector. In 2004, the Board set its equity ratio at 39%, 2 percentage points above ATCO DISCO which shared the same business risk assessment. The increase in the equity ratio was to recognize the impact of ENMAX' nontaxable status:[169]

> "The Board agrees that a non-taxable entity has a higher volatility of earnings than an otherwise equivalent taxable company, arising from the lack of an income tax component in its forecast revenue requirement. The Board notes that there was no disagreement that the absence of taxation, while lowering costs, increases the volatility of earnings."

In 2004, we recommended 35% as the appropriate equity thickness for ENMAX Distribution and maintain that recommendation today.

2.4.5.7 <u>EPCOR Transmission</u>

Q. Please summarize your finding for EPCOR Transmission.

A. We find that this company has Low business risk, unchanged since 2004 since it is not exposed to significant construction risk. In 2004, the company was similar to ATCO Transmission with respect to business risk and the Board originally considered 33% as an appropriate equity ratio at that time. Recognizing the nontaxable status of EPCOR TFO, the Board increased its equity ratio to 35%. As we discussed for ENMAX DISCO, with respect, we disagree that any such adjustment is warranted and carry forward our 2004 recommended equity thickness of 30%.

2.4.5.8 EPCOR Distribution

Q. What do you recommend for the allowed equity thickness for EPCOR Distribution?

[169] EUB Decision 2004-052, page 45.

A. We see this company as identical to ATCO Distribution for purposes of setting an appropriate capital structure. Its business risk rating is Low-Moderate, typical of the sector and unchanged since 2004. While EPCOR differs from ATCO in its nontaxable status, this is irrelevant for the reasons stated above. As a result, we recommend a reduction from the 39% set by the Board in 2004. Our target for EPCOR Distribution is 35% equity.

2.4.5.9 <u>FortisAlberta Distribution</u>

Q. Please provide your views on the equity level to be set for FortisAlberta Distribution.

A. For capital structure setting, FortisAlberta DISCO should be viewed as the same as ATCO Distribution: Its Low-Moderate business risk level is unchanged since 2004 when it was Aquila and the same as a typical Alberta DISCO. In the last generic hearing the Board set the equity thickness for Aquila at 37% the same level chosen for ATCO DISCO. We recommended 35% equity and make the same recommendation in the present hearing.

Q. Is there any further factor pertaining to the equity ratio for FortisAlberta?

A. In its Evidence, the company notes that it is not in a tax paying position:[170]

> "Since that [2004] Decision, FortisAlberta has become a *de facto* non-taxable entity, which status commenced with the 2006 year, and is expected to persist at least through 2013. This status arises from the combined effects of the flow-through tax approach adopted for ratemaking and the capital programs experienced and anticipated. On any reasonable capital program scenario, the absence of an allowance for income taxes in the forecast revenue requirement of FortisAlberta is expected to continue until at least 2013."

[170] FortisAlberta Evidence, November 20, 2008. page 1, line 25 through page 2, line 2.

The Evidence continues with the argument that the company's equity ratio should be increased by 2 percentage points due this time to a temporary nontaxable status due to an absence of income subject to taxation.

Q. Do you agree with this request?

A. No, for reasons explained earlier, we do not support any increase in allowed equity ratios due to the nontaxable status of a utility.

2.4.6 Recommended Capital Structures for Gas Utilities

Q. Please provide an overview of this section of your evidence.

A. This section addresses recommended capital structures for gas utilities following the approach we used above for electric utilities. We discuss the companies in the order that they appear in Schedule 2.16 which summarizes our discussion.

2.4.6.1 Nova Gas Transmission

Q. What equity ratio do you recommend for Nova Gas Transmission?

A. NGTL is rated Low-Moderate on our business risk ranking scale. As discussed in detail earlier, we carry over the view of the Board in Decision 2004-052 that this company is somewhat riskier than the TransCanada Mainline due to its nature as a gathering system. Further, we accept the view of the NEB that supply risk has increased moderately in recent years due to the maturing of the WCSB. This view formed the basis for the NEB to increase its equity ratio for the Mainline to 36% in 2005.

For these reasons, we see a modest increase in business risk for NGTL since 2004 when we recommended 32% equity and the Board awarded 35%. Currently, we recommend 34% equity for this company.

2.4.6.2 ATCO Pipelines

Q. Please provide your conclusions on the appropriate equity ratio for ATCO Pipelines.

A. For reasons explained earlier, we provide two recommended equity ratios for this company. The first is for the status quo prior to the approval and implementation of its agreement with NGTL and the second is our recommendation after the agreement is in place.

Our status quo business risk rating for this company is Moderate based on a high level of competition risk. Other aspects of market risk as well as operational and regulatory risk are all at benchmark levels and similar to those for NGTL. As noted in our summary on NGTL, one important aspect of market risk – supply risk, is somewhat higher than in 2004. As a result, our assessment of the overall business risk of ATCO Pipelines is that it is elevated relative to 2004 to the same degree as for NGTL. Accordingly, we follow our practice for the latter and add 2 percentage points to our recommendation for 2004. This produces a level of 42% equity as our current recommendation marginally below the 43% set by the Board in 2004.

We showed earlier in this evidence that the agreement will bring the business risk of ATCO Pipelines into line with the present level for NGTL. Based on this assessment, once the agreement is in place, our recommendation for ATCO Pipelines is for 34% allowed equity.

2.4.6.3 ATCO Gas Distribution

Q. What is your recommended allowed equity ratio for ATCO Gas Distribution?

A. We base our recommendation on our assessment of this company as Low-moderate in its business risk, typical of the sector and reduced since 2004 due to the adoption of a weather deferral account. At that time we recommended 37% equity and the Board allowed 38%. Our current recommendation is for 34%.

2.4.6.4 AltaGas Utilities

Q. Please explain your view on the level at which the Commission should set the allowed equity ratio for AltaGas Utilities.

A. Following our approach for ATCO Gas DISCO, we assess AltaGas Utilities twice: without a weather deferral account and with such an account. In the first situation, we show earlier in our evidence that AltaGas Utilities exceeds the sector benchmark levels of business risk in two areas: operating leverage (operational risk) and competition (market risk). The company's unique market area drives both these differences resulting in a risk rating of Moderate in Schedule 2.16 unchanged since 2004 when these two risks were also noted by the Board. At that time the Board allowed an equity ratio of 41% for AltaGas Utilities and we recommended 40% which remains our current position in the absence of a weather deferral account.

Should AltaGas DISCO adopt a weather deferral account, our recommended equity thickness would decline to 37% as shown in Schedule 2.16.

2.4.7 Projected Coverage Ratios

Q. What is the goal of the analysis in this section?

A. The purpose of this section is to examine the implications of our allowed equity ratios for projected coverage ratios. Our recommendations for capital structure flow from our analysis of the business risks as well as from our review of appropriate industry benchmarks. Those benchmarks include bond ratings and we concluded above that a rating of BBB would be sufficient to allow a stand-alone utility to conduct its business properly and to access capital markets. To show that our recommendations are not incompatible with a BBB (or higher) rating, we calculate the implied coverage ratios for 2009 for our range of recommended equity ratios combined with our recommended return on equity.

The analysis determines that projected coverage ratios range from a low of 1.6 times for 30% equity to a high of 2.0 times for a ratio of 42%. Comparing these ratios to those for actual BBB rated companies, we conclude that there is no reason to believe that the level of coverage would not be sufficient to maintain an investment grade bond rating.

Q. Please explain your coverage analysis in detail.

A. To illustrate, we explain our calculations for an allowed equity ratio of 30% in Panel A of Schedule 2.17. We start with a rate base of $1million for illustrative purposes and calculate capital costs per million dollars of rate base. We assume a cost of debt of 5.64% before tax taken for purposes of illustration from AltaLink's 2009-2010 GTA filing.[171] Next we enter our recommended capital structure for this example of 30% common equity and 70% debt. Finally, we use these numbers to calculate the allowed cost of capital for debt and equity. Summing these two amounts, we compute the total allowed cost of capital for the rate base as $63.18 (000) per $1 million of ratebase. To obtain a projected coverage ratio for the rate base, we divide the total allowed cost of capital (allowed earnings on rate base) of $63.18 by the total cost of debt of $39.48 to obtain a projected coverage ratio for rate base of 1.6 times.

Similar calculations provide estimates of projected coverage ratios for 35%, 40% and 42% equity, covering the range of our recommendations.

[171] AltaLink 2009-2010 GTA, Response to Information Request AUC.AML-038, January 20, 2009.

The results show that interest coverage is at a minimum level of 1.6 times for an equity level of 30% and rises to 1.75 times, 1.93 times and 2.01 times for equity ratios of 35%, 40% and 42%, respectively.

We compare this projected coverage ratio against the actual coverage ratios for traded utilities in our sample. Schedule 2.5 reveals that 4 traded companies in our sample are rated in the BBB range by at least one rating agency: Emera Inc., Fortis Inc., Pacific Northern Gas and TransAlta. In Schedule 2.7 shows that the 2007 coverage ratios for these four companies were 2.91 (Emera), 1.70 (Fortis Inc.), 2.10 (Pacific Northern Gas) and 3.17 (TransAlta). Comparing these ratios to our projection for rate base, we conclude that the projected coverage ratios fall just short of the bottom of the range of observed coverage ratios for these 4 BBB rated companies for our lowest recommended equity level of 30%. For higher equity levels, the coverage ratios fall into the range. This comparison suggests that there is no reason to believe that a stand-alone company with our recommended range of common equity in its capital structure could not achieve a BBB bond rating. We qualify this conclusion by noting, as discussed in detail earlier in this evidence, that rating agencies consider other factors in addition to coverage ratios in setting ratings. A further qualification arises from our discussion above of the shortcomings of bond ratings as a timely measure of risk.

Q. What further perspective can you offer on the adequacy of the projected coverage ratios in Schedule 2.17?

A. We can also compare these coverage ratios against approved coverage ratios for the applicant utilities. These ratios are in Schedule 2.8 and we discussed them earlier. In the present context, we return to this schedule and observe that the average approved coverage ratio for all the utilities reporting data for the period 2001–2007 is 2.16 times, somewhat higher than our projected levels. However, when we examine approved coverage ratios for the two utilities with the lowest levels (EPCOR Transmission and Distribution), a different picture emerges. The first had an average coverage ratio of 1.64 times only marginally above our lowest implied level while the second recorded coverage of 1.84 times slightly higher than our projection for 35% equity. We conclude that the Board set a precedent in approving coverage ratios at similar levels to those implied in our recommendations.

3. RATE OF RETURN ON COMMON EQUITY FOR 2009 TEST YEAR

3.1 OVERVIEW OF THIS SECTION

Q. How is this section of your evidence organized?

A. As discussed in Section 1 of our evidence, our general approach is to determine the appropriate return on equity for a utility of average investment risk (henceforth referred to as the "average-risk utility"), and then to use a mixed quantitative and qualitative approach to determine a capital structure for each of the applicant utilities in this Generic Proceeding that accounts for any difference in each applicant utility's business risk from this hypothetical benchmark average-risk utility.

In this section, we begin with the general regulatory principles that are appropriate in conducting our fair rate of return analysis. After reviewing general regulatory principles, we present the two main methodologies for estimating a forward-looking market equity risk premium or MERP. They are *ex post* measurement methodologies that generate a "historical or *ex post* MERP" that with the application of judgment leads to an estimate of an "*ex ante* MERP", and the *ex ante* methodology that generates an "*ex ante* MERP." Based on the merits of the various estimation methods used under each of these methodologies, we recommend that four of these estimation methods have sufficient validity to be used in our determination of the MERP and/or market return in a forward-looking sense. We then present our implementation of each of these four estimation methods to arrive at an appropriate return on equity (henceforth ROE) for our benchmark average-risk utility for the 2009 test year.

3.1.1 Methods to Estimate the Market Equity Risk Premium (MERP)

Q. Would you please describe the findings and methods that you use to estimate the market equity risk premium or MERP?

A. We use four methods to estimate the MERP. The first is the Equity Risk Premium Estimation Method that generates an *ex ante* MERP estimate from an examination of the historical (*ex post)* MERP and expected future economic, market and investor conditions. To this end, we estimate the required MERP for Canadian equities based on historical estimates for Canada, U.S., U.K. and the World, and survey recent evidence that suggests that previous estimates using realized returns as a proxy for expected returns <u>without adjustment</u> have produced an upwardly biased estimate of the required MERP. We argue using finance theory that most of the fundamental changes in the Canadian market imply that the MERP has decreased and will remain below that achieved over the longest historical periods. We explain why some have argued that longer holding periods of ten to twenty years better capture the investment horizons of typical investors in the financial securities of utilities and are, therefore, more appropriate for measuring the MERP. The conclusion that we draw from this estimation method is that a forward-looking MERP for Canada is no greater than 5.1% after allowing for estimation error and the widening gap at this point in time in the risks of the equity market proxy and the risk-free asset as proxied by long-term Government of Canada bonds. We expect that the widening of the gap is temporary and that it will revert to more normal levels as the economy and markets move out of their current malaise.

The second estimation method also generates an *ex ante* MERP estimate that is based on "historical or *ex post* MERP" estimates using a literature survey method. Based on the forward-looking MERP estimates that follow from this survey of the literature, we again conclude that our MERP estimate from the first estimation method is reasonable, if not conservatively high.

The third estimation method generates an *ex ante* MERP using the Discounted Cash Flow (DCF) Estimation Method. This approach is commonly implemented at the market level using a Dividend Discount Model (DDM) where future estimates of dividend growth rates as proxied by expected growth rates of nominal GDP are used to obtain an alternate estimate of the MERP. For this purpose, we rely on a survey by a reputable consultant (Watson Wyatt) of a large and representative sample of investment professionals about their expectations of future GDP growth for Canada and the United States over the medium- and long-term. Many of the participating entities in this survey also contribute to the survey that is commonly used by Canadian regulators as a basis for their forward-looking yield forecasts for 30-year Canada's (namely, *Consensus Forecasts* published by Consensus Economics). We use our estimates from the DDM to determine what adjustment (if any) is required to our forward-looking MERP estimate from our first estimation method. Based on the estimates from this method, we conclude that our MERP estimate from the first method is reasonable, if not conservatively high.

The fourth estimation method also generates an *ex ante* MERP estimate using survey methods. The Watson Wyatt survey elicits responses from a large and representative sample of investment professionals about their expectations of future returns on the Canadian and U.S. equity and fixed-income markets. Since this sample includes representation from both the sell and buy sides of the market and constitutes forecasts for the market as a whole, it should contain considerably less optimism bias than has been documented in the literature for the earnings expectations of (bottom-up) financial analysts for individual firms. This is also supported by empirical studies (subsequently reviewed) that find materially less optimism bias in the forecasts of earnings for the S&P500 index using the top-down forecasts of strategists compared to the aggregated bottom-up forecasts of analysts for individual firms. We also examine the results of surveys of business executives and finance professors on their estimates of the forward-looking MERP. Based on the forward-looking MERP estimates from these surveys, we again conclude that our MERP estimate from the first estimation method is reasonable, if not conservatively high.

3.1.2 Adjusting for Risk Differences between an Average-risk Utility and the Market Proxy used for the MERP Estimate

Q. Would you please provide a summary of your findings and general approach for adjusting for risk differences between an average-risk utility and the market proxy used for your MERP estimate?

A. It is commonly accepted that an average-risk utility is less risky than the market proxy used to obtain the MERP estimate. The debate centers on how much less and what is (are) appropriate method(s) for the determination of how much less risky an average-risk utility is. The premium (or additional return) that equity investors require to bear the investment risk of this average-risk utility is commonly referred to as the own equity risk premium or own ERP for an average-risk utility.

We use two methods for estimating the risk of an average-risk utility relative to the risk of the market proxy used to obtain the MERP estimate. In the first estimation method, we invoke the implicit assumption behind most of the commonly formulated asset pricing models, such as the Capital Asset Pricing Model (CAPM) or Arbitrage Pricing Theory (APT), which is that investors are only compensated for non-diversifiable risk. In these models, the risk of a specific firm relative to the risk of a systematic factor, such as the market factor as proxied by a market index in the case of the CAPM, is given by the estimated regression coefficient (commonly referred to as its “beta”) on the market factor when the returns on the specific utility are regressed against the returns on the market factor over some estimation period (generally 60 months).

Using the first method, we estimate the relative investment riskiness of our average-risk utility as being its forward-looking beta of 0.52, and show that the five-year rolling betas of utilities (and their return correlations with the market proxy) have varied around their longer run mean (normal tendency) for the more recent five-year rolling betas. We then review the two primary rationales that have been given by other witnesses in this hearing for using the non-standard (adjusted- or inflated-) beta method of partially adjusting utility betas towards the market beta of one when calculating the ROE for Canadian utilities and show that neither rationale is valid.

In the second risk estimation method, in order to test the reasonableness of our result in an extreme setting, we invoke the highly unlikely assumption that investors are compensated for total risk including the part that they can diversify away by holding portfolios that contain at least two or more financial assets. We find that the relative total riskiness of utilities is less than 52% of the mean total riskiness of various benchmarks consisting of 39 to 47 industries. This is supported by our finding that the most recent 60-month standard deviation of returns for an average utility in our Canadian sample of utilities represents no more than 60% of its counterpart in both the S&P/TSX Composite and 60 indices. This does not consider that a greater portion of the standard deviation of returns of an average utility in our Canadian sample of utilities is diversifiable compared to its counterpart in both the S&P/TSX Composite and 60 indices. Thus, even if investors require additional compensation for bearing nearly all of the risk that they can diversify away, we find no contradictory evidence to the relative-risk (beta) estimate of 0.52 for an average-risk utility.

3.1.3 Determination of the "Bare-bones" Cost of Equity for an Average-risk Utility

Q. Would you please provide a summary of your findings and general approach for determining the "bare-bones" cost of equity for an average-risk utility?

A. The "bare-bones" ROE is equal to the estimate of the premium (or additional return) that investors (owners) require to bear the risk equivalent to an equity investment in an applicant utility of average risk plus an estimate of the risk-free rate. When we multiply our estimate of the MERP of 5.1% by our estimate of the relative investment riskiness of our average-risk utility of 0.52, we obtain our estimate of the own ERP for our average-risk utility of 2.65%.

For the estimate of the risk-free rate for the 2009 test year, we use the estimate for the normalized yield on 30-year Canada's of 4.75%. This estimate modifies the common practice in Canadian regulatory proceedings and Canadian automatic ROE adjustment mechanisms of estimating a risk-free rate to reflect current market and economic conditions. Specifically, our estimates are grounded in consensus forecasts from *Consensus Forecasts* (published by Consensus Economics) along with an estimate of the appropriate term premium for 30-year versus 10-year Canada's. We then add 40 basis points to normalize this yield for the effects of the current easy money monetary policy designed to stimulate economic activity due to the current global credit and economic crises.

Adding our estimate of the own ERP for an average-risk utility of 2.65% to our risk-free forward-looking forecast yield of 4.75% results in a "bare-bones" cost of equity estimate of 7.40% for 2009.

3.1.4 Determination of the "All-in" Cost of Equity for an Average-risk Utility

Q. Would you please provide a summary of your findings and general approach for determining the "all-in" cost of equity for an average-risk utility?

A. Based on the "stand-alone" principle, we add 10 basis points to the "bare bones" cost to compensate the applicant utilities for potential equity flotation or issuance costs even if they will never incur such costs. Given that it is common regulatory practice in Canada, we add a financial flexibility premium of 40 basis points to further ensure the financial flexibility of the applicant utilities for the 2009 test year.

Putting all the parts together, we end this section of our evidence with our ROE recommendation for an average-risk utility of 7.90% for the 2009 test year. Our ROE recommendation allows an average-risk utility to earn a risk premium (including the flotation cost and financial flexibility and integrity adjustments) of 315 basis points over our forecast for a normalized risk-free yield of 4.75% for the 2009 test year. Our recommendation allows an average-risk utility to earn a premium of 3.54% over the risk-free return of 4.36% set by the NEB for 2009.[172]

3.1.5 Consistency with ROE Recommendations of Financial Analysts

Q. Would you please summarize your findings when you compare your ROE recommendation with the cost of equity discount rate used by financial analysts?

A. We found that financial analysts often did not state that their equity valuations were based on the use of a DCF approach, and when they did they rarely stated the cost of equity discount rate used in their implementation of the DCF approach to valuation. For Enbridge Inc., we found that two financial analysts employed by BMO Capital Markets and CIBC World Markets reported that they used an 8% cost of equity or that this rate was their "middle-of-the-road" or "reasonable" case. The financial analysts for CIBC World Markets also stated that "a *historical* market risk premium of 5% and a beta of 0.5 (typically considered for pipeline & utilities companies)".[173] These values are very close to our recommended ROE of 7.9% based on estimates for the MERP of 5.1% and beta of an average-risk utility of 0.52.

Thus, there appears to be a paradox. On the one hand, some financial analysts argue that the allowed ROEs generated from the generic formula are too low. On the other hand, other financial analysts actually use a cost of equity discount rate that is lower than that generated by the generic formula when valuing Canadian utilities. Is this a case of providing different messages to different audiences?

3.2 DISCUSSION OF GENERAL PRINCIPLES

Q. What regulatory principles have you found appropriate in conducting your analysis of the fair rate of return on equity capital for an average-risk utility?

[172] National Energy Board, NEB approves a Return on Common Equity for 2009, December 4, 2008. Available at: http://www.neb.gc.ca/clf-nsi/rthnb/nwsrls/2008/nwsrls40-eng.html.
[173] CIBC World Markets, Enbridge Inc., *Equity Research Company Update*, December 17, 2008, pages 4-5.

A. According to the fair or reasonable return standard, the allowed return on capital should:

- be comparable to the risk-adjusted return available from the re-allocation of the investment to other enterprises in a competitive (non-monopolistic) environment (the "comparable investment" standard);[174]
- enable the regulated enterprise to maintain its financial integrity by being able to meet its financial obligations (the "financial integrity" standard); and
- allow the regulated enterprise to attract incremental capital on reasonable terms and conditions (the "capital attraction" or "financial flexibility" standard).

The shareholders' (owners') interests must be balanced with the interests of the customers who are entitled to safe and reliable service at reasonable rates.

In preparing our testimony, we identified and evaluated the scientific merit of various techniques that are commonly used for measuring the fair rate of return on equity both before the Board and in other jurisdictions. For this purpose, we used, as a guide for evaluating the admissibility (scientific merit) of expert testimony, the four Daubert criteria that have been adopted by federal and many state courts in the U.S. They are: (1) whether the methods upon which the testimony is based are centered upon a testable hypothesis; (2) the known or potential rate of error associated with the method; (3) whether the method has been subject to peer review and publication; and (4) whether the method is generally accepted in the relevant scientific community, particularly in terms of the non-judicial uses to which the scientific techniques are put.[175]

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[174] In financial economics, the first standard for judging the performance of primary or secondary markets is referred to as "allocational efficiency". It is tested by examining whether investments of similar risk offer their investors or owners similar expected returns, and whether investments of higher (lower) risk offer their investors or owners higher (or lower) expected returns. One of the earliest applications of this concept is: Irwin Friend, The SEC, and the economic performance of securities markets, *Conference on Economic Policy and the Regulation of Corporate Securities*, George Washington University, March 1968.

[175] For a more extensive discussion of this U.S. Supreme court decision, see, for example: Stephen Mahle, The Impact of *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, on Expert Testimony: With Applications to Securities Litigation, April 1999. Available at: http://www.daubertexpert.com/basics_daubert-v-merrell-dow.html.

We have based our conclusions regarding the fair rate of return on common equity or ROE primarily on the Equity Risk Premium Estimation Method. Although we consider the DCF Estimation Method to be generally inferior to the Equity Risk Premium Estimation Method, we use the DCF Estimation Method at the market level to provide additional estimates of MERP using both historical and forward-looking estimates of share price or dividend growth. We use these estimates as further inputs for judging the reasonableness of our estimates of the implied MERP using the Equity Risk Premium Estimation Method. Section 5 includes a detailed discussion of why the DCF Estimation Method as commonly employed in the regulatory setting at the firm and industry levels is deemed to be inferior to the ERP Estimation Method, and why the DCF Estimation Method if applied, is best employed at the market and not individual firm or industry levels. Similarly, we use survey reviews of peer-reviewed and published articles that estimate MERPs or equity costs, and surveys of investment professionals, business executives and finance professors as further inputs for judging the reasonableness of our estimates of the implied MERP using the Equity Risk Premium Estimation Method.

We do not employ the Comparable Earnings Estimation Method because we believe that it is of dubious scientific merit (using, for example, the Daubert criteria) and thus unsuitable for use in determining a fair ROE for a utility. Appendix 3A of our evidence includes a detailed discussion of this point.

3.3 THE DETERMINATION OF THE REQUIRED RETURN (COST OF EQUITY CAPITAL) FOR AN AVERAGE-RISK UTILITY

Q. Please describe how you estimate the required return for an average-risk utility?

A. We use various methods to estimate the components of the required return (or alternately the cost of equity capital) for utility companies based on the other publicly traded investment opportunities that are available to their owners. The resulting estimate is the risk-adjusted "opportunity cost" for investing in the shares of an average-risk utility. In an allocationally efficient market, this risk-adjusted equity return (or cost) should be comparable using marked-to-market returns across firms.

Our methodology for estimating the required ROE for an average-risk utility uses a combination of the following inputs as sequenced:

1. a forward-looking risk premium for the S&P/TSX Composite (our domestically diversified market proxy) (input #1);
2. a forward-looking forecast of the investment riskiness of an average-risk utility relative to the market portfolio as proxied by the S&P/TSX Composite or relative to other Canadian industries or a typical firm in a representative market proxy (input #2);
3. the normalized yield forecasted for 30-year Canada bonds for 2009 (input #3); and
4. an adjustment to cover fees involved with potential equity offerings or issues by an average-risk utility and to ensure its financial flexibility and integrity (input #4).

These four input estimates are subsequently estimated and combined as follows:

[(Input #1) *x* (Input #2)] + (Input #3) + (Input #4) = recommended rate of return on equity or ROE for an average-risk utility.

We now need to detail how we obtained the final estimates of each of the four inputs, and to present the recommended rates of return on equity for an average-risk utility that result from a combination of the final estimates of the four inputs.

3.3.1 Obtaining the Market Equity Risk Premium (MERP) Estimate (Input #1)

Q. Would you please describe how you obtain your MERP estimate?

A. As discussed in the overview to this section of our evidence, we use four methods to estimate the market equity risk premium (MERP). We put primary reliance on the first method, and use the estimates from the other three estimation methods to determine if the estimate from the first method should be adjusted.

The MERP reflects equity investors' assessment of the required return differential from investing in a portfolio that reflects available investment opportunities as compared to investing in the "risk-free" benchmark security. It indicates the total incremental return that equity investors require for bearing the risk of equities relative to investing in a risk-free benchmark security. In Canada, the S&P/TSX Composite Index is usually chosen as being representative of the equity opportunities that are publicly available for investment. This portfolio is well diversified in a relative sense only when viewed from a domestic-only investment perspective. The equity risk premium occurs because risk-averse investors require a positive reward for bearing each unit of risk, and equities exhibit varying degrees of risk. The reward required for bearing each unit of risk increases as investors become less risk tolerant, and decreases as investors become more risk tolerant. The MERP is the total compensation that investors require to bear the total risk of the chosen market proxy given the implicit assumption that the benchmark contains no diversifiable risk. However, it should be kept in mind that the MERP determined in a domestic-only context provides an overestimate of the return that investors require because some portion of the total risk of the chosen domestic market proxy is diversifiable when investors hold internationally diversified portfolios.

3.3.1.1 MERP Estimate: Based on Historical MERPs (First Estimation Method)

Q. Would you please describe your first estimation method for obtaining a MERP estimate?

A. As noted earlier, the first estimation method generates an *ex ante* MERP estimate that is based on an examination of "historical or *ex post* MERPs". Because the forward-looking or *ex ante* risk premium is difficult to observe and depends on future estimates that are subject to considerable error and bias depending upon the source, cost of equity studies typically place a heavy weight on measurement of historical or *ex post* risk premiums.

4.3.1.1.1 Measurement errors caused by divergence between realized and expected returns

Q. Are there potential sources of measurement error when the MERP estimates generated from the first estimation method are used as forward-looking estimates?

A. Yes, there are several potential sources of measurement error when the MERP estimates generated from the first estimation method are used as forward-looking estimates.

The first source relates to the occurrence of negative risk premiums. The expected MERP measures the expected return differential of a well-diversified but risky portfolio of equities over “risk-free” government securities. Since investors are risk averse, they would not invest in equities unless they expected the MERP to be positive. However, since realizations can differ from rational expectations, the historical or realized MERP can be negative for any given period of time. To illustrate, the total return (i.e., dividend yield plus investment value change) for the S&P/TSX Composite for 1990 was minus 14.80%. This results in a negative MERP for 1990 when the risk premium is calculated using the return on 30-year Canada’s of 3.34%. This negative MERP was not a good proxy of the MERP expectation of equity investors at the beginning of 1990. As of January 2, 1990, those investors holding equities must have expected that equities would outperform 30-year Canada’s over the year. Similarly, investors holding equities for the 18 years after the end of 1990 must not have expected the negative total returns achieved by the S&P/TSX Composite in 1992, 1994, 1998, 2001, 2002 and 2008 (i.e., in 6 of the 18 years).

To address this potential difficulty with historical data, return on equity studies generally employ periods of at least ten years to try to ensure that the realized MERP is positive. Also, the difference between the average realized and the average expected MERP should diminish, as the measurement period gets longer if the underlying return distribution is normal and remains unchanged over this longer measurement period. This is commonly referred to as returns being IID normal, or independently and identically and normally distributed, in that they have the same normal distribution at each point in time and returns are independent (not related) over time. This assumption suffers from various important drawbacks. First, even if single-period returns are assumed to be normal, then multiperiod returns cannot also be normal since they are products (**not** sums) of the single-period returns. Second, several studies using longer-horizon or multi-year returns conclude that there is substantial mean-reversion in stock market prices at longer horizons. For example, Campbell and Viceira (2005, p. 39) find that:[176]

> "At very long horizons, holding long-term nominal bonds is even riskier than holding stocks. At horizons of up to 30 years, stocks are still riskier than bills and bonds but the relative magnitude of these risks changes with the investment horizon."

This means that due to fundamental shifts in economies and/or markets (technically, referred to as regime shifts), the use of too distant time periods may result in the inclusion of data that are no longer representative of currently possible market returns and/or market risk premiums in a forward-looking sense. Fundamental changes have occurred over time that have increased the level of market integration across international markets, lowered the level of market frictions (particularly, trade costs), and so forth. For example, much of the impact of the globalization of economies and financial markets, and of financial innovations has occurred since the 1960's.

[176] John Y. Campbell and Luis M. Viceira, 2005. The term structure of the risk-return trade-off, *Financial Analysts Journal* 61:1 (January-February), pages 34-44.

A second source of measurement error arises when returns are not IID (i.e., independently and identically distributed) since both the mean and variance of market risk and its equity risk premium are then time-varying. *Ceteris paribus*, the mean MERP will change over time, and can change drastically with changes in the risk-free rate, risk tolerance of the representative investor, and the set of available investment opportunities. For example, the set of available investment opportunities has expanded significantly since the 1960's due to the large variety of new risk management securities introduced in the 1980's and 1990's.[177]

A third source of measurement error arises because periods with a declining required MERP are likely to coincide with temporarily increased realized MERPs. Peter A. Diamond, Institute Professor at M.I.T., states this as follows for the U.S. market:[178]

> "It is important to recognize that a period with a declining required equity premium is likely to have a temporary increase in the realized equity premium. This divergence occurs because a greater willingness to hold stocks, relative to bonds, tends to increase the price of stocks. Such a price rise may yield a higher return than the required return. For example, the high realized equity premium since World War II may be in part a result of the decline in the required equity premium. Therefore, it would be a mistake during the transition period to extrapolate what may be a temporarily high realized return."

Similarly, in a 2006 presentation, Dr. Mehra stated that:[179]

- "To elaborate, after a bull market, when stock valuations are high relative to fundamentals the ex ante equity premium is likely to be low.

[177] For example, see Merton Miller, Financial innovation: Achievements and prospects, pages 385-392, In: Donald H. Chew, Jr. (Ed.), *The new corporate finance* (New York: McGraw-Hill Irwin, third edition, 2001).
[178] Peter A. Diamond, 1999, What stock market returns to expect for the future?, *An Issue in Brief*, Centre for Retirement Research at Boston College, No. 2, September, page 2.
[179] Rajnish Mehra, 2006, The equity premium: Why is it a puzzle?, Prepared for the Kavli Institute for Theoretical Physics, May 3. Available at: http://online.itp.ucsb.edu/online/colloq/mehra1/pdf/ Mehra_KITP.pdf.

- However, it is precisely in these times, when the market has risen sharply, that the ex-post, or the realized premium is high.

- Conversely, after a major downward correction, the ex-ante (expected) premium is likely to be high while the realized premium will be low. This should not come as a surprise since returns to stock have been documented to be mean reverting."

Of course, it would also be a mistake during a transition period to extrapolate what may be a temporarily low realized return as indicating that the required equity premium has decreased.

A fourth source of measurement error arises because the reliability and comparability of the chosen proxy of the market or the risk-free rate varies considerably over time. To illustrate, most experts use the Canadian stock and Long Canada return series available from the Canadian Institute of Actuaries (CIA) for the period from 1924 onwards. Thus, while the S&P/TSX Composite Total Return Index is used from December 1956, other proxies that are more likely to be contaminated by survivorship and selection biases are used from 1924 to 1957. Similarly, S&P's U.S. dividend yields reported in Ibbotson and Sinquefield (1977) are used for Canada for the period January 1926-December 1933, after adjusting for the 0.17% difference between the S&P and TSX dividend yield index over the period January 1956-December 1965. While the long-term bond series is for bonds with a term-to-maturity of over ten years, the actual average maturity is less than 30 years, and varies over time. In fact, the CIA dataset assumes that a bond with an 18-year maturity is purchased in December and is sold one year latter. Given a positive realized term premium, this results in realized risk premiums that are somewhat too high.

3.3.1.1.3 The appropriate average of historical annual data

Q. How does one decide whether to use the arithmetic or the geometric average historical MERP to obtain a forward-looking estimate of the MERP?

A. We begin with the observation that the use of the geometric average or some weighted-average of the arithmetic and geometric averages has gained much support in the refereed literature. The arithmetic average is preferred for forward-looking decisions when historical returns are normal IID or independently and identically distributed over the estimation period.[180] Some weighted-average of the geometric and arithmetic mean is preferred when returns are not normal IID due to, for example, long-run mean reversion (i.e., a tendency to revert back to the mean) in the returns for some asset classes, as has been found for stocks, and long-run mean aversion (i.e., a tendency to move away from the mean) in the returns for other asset classes, as has been found for bonds.

Dr. Buckley summarizes the debate on this issue as follows:[181]

> "Particularly important in estimating the equity risk premium is whether excess returns are measured using a geometric or an arithmetic mean return. To a significant extent, this question revolves around mean reversion in stock returns. Evidence of mean reversion is substantial, although it cannot be proved unequivocally. Given the weight of evidence of mean reversion, there may be a strong case for the use of a geometric mean with an equity premium of between 3% and 5% - or even less."

Dr. John Campbell at a 2001 *Equity Risk Forum* has aptly stated the argument for a weighted average of the two types of means as follows:[182]

[180] This is the assumption implicitly invoked by the advocates of the use of the arithmetic average, such as Drs. Brealey and Myers, and Drs. Dimson, Marsh and Staunton (2003), and others, when they recommend the use of the arithmetic mean of historical premiums as the looking-forward expected MERP. Elroy Dimson, Paul Marsh and Mike Staunton, Global evidence on the equity risk premium, *Journal of Applied Corporate Finance* 15: 4 (Fall 2003), pages 27-38.
[181] A. Buckley, 1999, *The European Journal of Finance* 5: 3 (September), pages 165-180.

> "Which is the right concept, arithmetic or geometric? Well, if you believe that the world is identically and independently distributed and that returns are drawn from the same distribution every period, the theoretically correct answer is that you should use the arithmetic average. Even if you're interested in a long-term forecast, take the arithmetic average and compound it over the appropriate horizon. However, if you think the world isn't i.i.d., the arithmetic average may not be the right answer.
>
> I think that the world has some mean reversion. It isn't as extreme as in the highway example, but whenever any mean reversion is observed, using the arithmetic average makes you too optimistic. Thus, a measure somewhere between the geometric and the arithmetic averages would be the appropriate measure."

Drs. Mehra and Prescott, who are the authors who first identified the equity premium puzzle, note that they reported arithmetic averages, since the best available evidence at that point in time indicated that (multi-year) stock returns were uncorrelated over time.[183] They now acknowledge that the arithmetic average can lead to misleading estimates when returns are serially correlated, and that the geometric average may be the more appropriate statistic to use. Drs. Mehra and Prescott (p. 57) note that stock returns have been found to be mean reverting.

Dr. Jay Ritter in his keynote address at the 2001 meeting of the Southern Finance Association states that "with mean reversion, the multiperiod arithmetic return will be closer to the geometric return".[184] He notes that stock returns show a tendency towards mean reversion and bond returns show a tendency towards mean aversion in

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[182] John Campbell, 2001, Historical results: Discussion, *Equity Risk Premium Forum,* November 8, page 45.
[183] Rajnish Mehra and Edward C. Prescott, The Equity Premium in Retrospect, forthcoming: G.M. Constantinides, M. Harris and R. Stulz, *Handbook of the Economics of Finance* (Amsterdam: North Holland). Draft of their paper, February 2003.
[184] Address published subsequently as: Jay R. Ritter, 2002, The biggest mistakes we teach, *The Journal of Financial Research* 25:2 (Summer), pages 159-168.

the U.S. In turn, based on the standard deviations of returns for data starting in 1802 (the Siegel data set), he shows that stocks are twice as risky as bonds for one-year holding periods, and stocks are less risky than bonds for holding periods of twenty or more years.

Chen, Ibbotson, Milevsky and Zhu (2006) illustrate their unified framework for making forward-looking asset allocation and demand for life insurance decisions using capital market return assumptions based on geometric mean returns for risk-free bonds and risky stocks of five and nine percent, respectively.[185] In other words, they use a four percent MERP estimate going forward.

Similarly, Dr. Damordaran, author of numerous books on valuation, states:[186]

> "The final sticking point when it comes to estimating historical premiums relates to how the average returns on stocks, treasury bonds and bills are computed. The arithmetic average return measures the simple mean of the series of annual returns, whereas the geometric average looks at the compounded return. Many estimation services and academics argue for the arithmetic average as the best estimate of the equity risk premium. In fact, if annual returns are uncorrelated over time, and our objective was to estimate the risk premium for the next year, the arithmetic average is the best and most unbiased estimate of the premium. There are, however, strong arguments that can be made for the use of geometric averages. First, empirical studies seem to indicate that returns on stocks are negatively correlated over time.[187] Consequently, the arithmetic average return is likely to over state the premium. Second, while asset pricing models may be single period models, the use of these models to get expected returns over long

[185] Peng Chen, Roger G. Ibbotson, Moshe A. Milevsky and Kevin X. Zhu, 2006, Human capital, asset allocation, and life insurance, *Financial Analysts Journal* 62: 1 (January/February), pages 97-109.
[186] Aswath Damodaran, 2008, Equity risk premiums (ERP): Determinants, estimation and implications, Working Paper, Stern School of Business, New York University, September, pages 21-2.
[187] "In other words, good years are more likely to be followed by poor years, and vice versa. The evidence on -negative serial correlation in stock returns over time is extensive, and can be found in Fama and French (1988). While they find that the one-year correlations are low, the five-year serial correlations are strongly negative for all size classes. Fama, E.F. and K.R. French, 1992, *The Cross-Section of Expected Returns*, Journal of Finance, Vol 47, 427-466."

> periods (such as five or ten years) suggests that the estimation period may be much longer than a year. In this context, the argument for geometric average premiums becomes stronger. Indro and Lee (1997) compare arithmetic and geometric premiums, find them both wanting, and argue for a weighted average, with the weight on the geometric premium increasing with the time horizon.[188]
>
> In closing, the averaging approach used clearly matters. Arithmetic averages will yield higher risk premiums than geometric averages, but using these arithmetic average premiums to obtain discount rates, which are then compounded over time, seems internally inconsistent. In corporate finance and valuation, at least, the argument for using geometric average premiums as estimates is strong."

In their examination of which type of mean is appropriate for long horizon decision-making given estimation errors, Drs. Jacquier, Kane and Marcus show that the use of the sample arithmetic mean produces an upward-biased forecast, and that this bias does not disappear, even if the sample mean is computed using long data series and *returns come from a stable distribution with no serial correlation*.[189] They show that, while a weighted-average of the arithmetic and geometric average returns provides an unbiased estimate of long-term returns, the best estimate of cumulative returns is even lower. They conclude that this "further compounds the recent sobering message in Drs. Fama and French (2002) and Drs. Jagannathan *et al.* (2000) who suggest that the equity risk premium is lower than once thought". They further conclude that:

> "Strong cases are made in recent studies that the estimate of the market risk premium should be revised downward. Our result compounds this argument by stating that even these lower estimates of mean return should be adjusted further downward when predicting long-term cumulative returns."

[188] Indro, D.C. and W. Y. Lee, 1997, *Biases in Arithmetic and Geometric Averages as Estimates of Longrun Expected Returns and Risk Premium*, Financial Management, v26, 81-90.
[189] Eric Jacquier, Alex Kane and Alan J. Marcus, 2003, Geometric or arithmetic means: A reconsideration, *Financial Analysts Journal* 59: 6 (November-December), pages 46-53; and working paper version of paper.

Furthermore, corporate practice among the leading U.S. corporate entities is to use the geometric mean if a long-term risk-free rate is used (such as long Treasuries) and to use the arithmetic mean if a short-term risk-free rate is used (such as T-Bills). Specifically, the teaching note to the case study, Grand Metropolitan PLC, states:[190]

> "In practice, two combinations of risk-free rates and equity-risk premiums are seen: (1) long-term risk-free rates plus geometric means or (2) short-term risk-free rates plus arithmetic means. Nothing in the theory of the CAPM dictates the use of these parameters; they are artifacts of practice. A recent survey of leading American corporations and financial institutions suggests greater use of the geometric-mean/long-term risk-free rate approach."

Q. Would you please explain why a period longer than one year is relevant to a determination of the MERP when the MERP that is embodied in the allowed ROE is reset annually?

A. The MERP that is embodied in the allowed ROE is supposed to reflect the equity risk premium that investors require when pricing securities and when making allocation decisions to various asset classes such as equities and bonds. Given a long-term prospective, which is an implicit assumption when the yields on long Canada's are used in the determination of the allowed ROE, the required MERP has to also be multi-period for logical consistency. It is also the approach that experts use when they use the Discounted Cash Flow (DCF) approach to calculate a required rate of return. Thus, the reset frequency is not relevant. Like regulators, long-term investors can update their annual multi-period MERP estimates at different frequencies while still maintaining their multi-year investment horizons.

[190] The referenced study is: R. F. Bruner, K.M. Eades, R.S. Harris and R. Higgins, 1998, Best practices in estimating the cost of capital: Survey and synthesis, *Financial Practice and Education* (Spring/Summer).

Q. Did you conduct any studies to determine if the returns on Canadian stocks and bonds exhibit mean reversion and mean aversion, respectively?

A. Yes, we first considered but ruled out tests for autocorrelation in annual returns, which are of interest to momentum traders and short-term speculators, but are not relevant to the longer-term investors that invest in utilities. To test how the relative risks of equities and bonds change as the investment horizons of investors get longer, we apply a formal test for mean reversion/aversion, the variance ratio test, to Canadian stock and bond returns.

The variance-ratio test is based on the fact that if returns follow a random walk (are independent), then the variance should be proportional to the return horizon. The Variance-Ratio or VR measure is:

$$VR(T) = Var[r_t(T)] \div N\ Var[r_t] = 1$$

where T is the multi-year period being examined, $Var[r_t(T)]$ is the variance of a T-period continuously compounded return, and $Var[r_t]$ is the variance of a one-period or benchmark return r_t. A variance ratio of one indicates no aversion or reversion toward the mean of the series. Variance ratios greater than one indicate mean aversion. Mean aversion increases as the VR moves towards larger values above one. Thus, a VR of 3 indicates greater mean aversion in the series of returns or risk premiums than a VR of 2. Similarly, variance ratios less than one indicate mean reversion. Mean reversion increases as the VR moves away from one towards zero.

We calculate the variance ratios for holding periods of 5, 10 and 15 years relative to a benchmark holding period of 1 year for stocks, long bonds and risk premiums for Canada. The Canada data are annual from the Canadian Institute of Actuaries (CIA) for the period 1924-2007 and augmented from other sources for 2008.

Q. Would you please summarize your findings from conducting these variance ratio tests?

A. We report the results in Schedule 3.1 and depict the results graphically in Schedule 3.2. From Schedule 3.2, it is apparent that:

- Equity returns exhibit mean reversion and bond returns exhibit mean aversion in Canada as the investment horizon increases from 1 to 5 to 10 to 15 years.
- The extent of mean reversion in equity returns and mean aversion in bond returns is similar for the most recent 50 years as for the full time horizon ending with 2008 for Canada.
- The MERP exhibits mean reversion for the most recent 50 years ending with 2008 for Canada.

Q. What conclusion do you draw from these findings for the variance ratio tests?

A. From these findings, we conclude that the exclusive use of the arithmetic mean MERP results in an overstatement of the prospective MERP, and that the exclusive use of the geometric mean MERP results in an understatement of the prospective MERP. This is likely to be the reason why different groups of professionals use one or the other type of mean in their forward-looking analyses. Many financial economists, especially those associated with sell-side investment entities, have historically used the arithmetic mean MERP. As noted earlier, well-run corporations typically use the arithmetic mean MERP with the T-Bill rate as the risk-free proxy, and the geometric mean MERP with a long Treasury as the risk-free proxy.

Q. What is your recommendation on whether the arithmetic or the geometric mean historical MERP should be used when formulating a prospective MERP for purposes of determining the fair rate of return in this hearing?

A. Although we favor a blended average of the arithmetic and geometric mean MERPs, **we formulate our recommended MERP by placing <u>no</u> weight on the geometric average.** The reason is to further ensure that our MERP recommendation is conservatively high.

3.3.1.1.4 Measured over what time period?

Q. Would you please discuss how one should choose the time period over which the historical MERP should be measured?

A. For purely statistical reasons, the error in the MERP estimate will decrease (that is, the estimate will become more precise) with longer estimation periods if returns are IID. However, the statistical niceties of using the longest time period must be balanced against other criteria. First, it is desirable that the chosen time period have data that are reasonably reliable and are for a somewhat comparable proxy of available market investment opportunities over its duration. Second, it is desirable that the chosen time period be a reasonable match for the regimes that can be expected to be possible in the future.

No time period satisfies all of these criteria. To illustrate using the comparable proxy criterion, the time period since 1956 had reliable data for a comparable market proxy (the S&P/TSX Composite Index) until the two-phase inclusion of income trusts in the S&P/TSX Composite Index in 2005 and 2006. The available Canadian equity market data prior to 1956 are usually obtained by splicing together series for equity portfolios with inconsistent formation characteristics as explained earlier. Because of the existence of interest rate controls and the absence of a Canadian money market to price fixed income securities, the data on fixed income securities are also of poor quality prior to 1956. Furthermore, while the period of time since 1956 incorporates much of the impact of globalization, financial market innovation and trade cost competition on the expected returns for equities and bonds, it does not include regimes that occurred prior to 1956 that are not very likely but are still possible in the future (e.g., a depression coming out of the current global credit and economic crisis).

Q. How do you deal with the observation that no time period best satisfies the criteria for choosing a time period for measuring the historical MERP?

A. We calculate the historical MERP over various time periods and observe any trend in these historical MERPs.

3.3.1.1.5 Initial examination of Canadian MERP based on historical data using the first estimation method

Q. Would you please summarize your estimates of the Canadian MERP based on historical data using the first estimation method?

A. We begin with an examination of the 58-year time period of 1951-2008 because, although it does not satisfy the longevity criterion, it is based on a time period that is not contaminated by the first few years of rapid economic and equity market exuberance resulting from the satisfaction of pent-up consumer demand and very low administered interest rates after World War II. However, this period does not include a depression period, whose probability we have learned recently should not be set to zero. We then examine three shorter periods, 1957-2008, 1965-2008 and 1977-2008, and three longer time periods, 1936-2008, 1924-2008 and 1900-2008. The examination of the longer periods is required to capture some of the regimes that are not captured in the 1951-2007 time period but have a chance of occurring in the future.

Based on the results reported in Schedule 3.3, the arithmetic annual nominal MERP for the 58-year period of 1951-2008 is 4.20% based on nominal returns. The arithmetic average annual MERP based on nominal returns is lower at 2.83%, 2.03% and 1.95% for the three shorter time periods, 1957-2008, 1965-2008 and 1977-2008, respectively, and is higher at 4.88%, 4.90% and 5.33% for the three progressively longer time periods, 1936-2008, 1924-2008 and 1900-2008, respectively.

Q. Why do you use measurement periods with an odd number of years?

A. There are two reasons for doing so. First, we want to avoid a selection bias by keeping the starting years for our seven measurement periods unchanged from one expert testimony to another. Second, we believe that our initial choice of starting years for our seven measurement periods all have their own individual justifications. For example, the 1926 starting year coincides with the starting date of such data originally available from Ibbotson Associates under "Stocks, Bonds, Bills and Inflation".

Q. What major observations do you draw from this analysis?

A. We draw two major observations from this analysis. First, we observe that the historical MERP has its highest value of 5.33% for the longest available time period of 1900-2008. Second, we observe that the historical MERP has been declining in Canada over time. We will return subsequently to an examination of this decline in the historical MERP with the passage of time.

Q. What initial conclusion do you draw from this analysis?

A. We conclude that using the historical MERP over the longest available time period as a going-forward MERP estimate is not appropriate although it provides the highest historical MERP estimate.

3.3.1.1.6 Non-Canadian MERP based on historical data using first estimation method

Q. Is there any value in examining the historical MERPs for the U.S. or an international portfolio?

A. Yes, there is some limited value in examining the U.S. or international experience in terms of historical MERPs. First, foreign-exchange and risk-adjusted returns become approximately equal across various world markets as markets become more integrated. This is referred to as the "law of one price". Second, examining other markets provides an imprecise test of how reasonable the Canadian estimates of the MERP are. However, one must be careful not to introduce an *ex post* selection bias when selecting which other market(s) to examine. Choosing the market that has grown to be the largest market or has had an above-average *ex post* performance introduces an *ex post* selection bias. This happens to some extent when the U.S. equity market is chosen for this purpose. We address this issue further in a subsequent part of our evidence. However, we believe that using the U.S. historical MERP experience for Canada is of limited value because Drs. He and Kryzanowski find that the U.S. market does not make a statistically significant contribution to explaining the portion of the return of Canadian utilities that is not explained by the Canadian market.[191]

Q. What historical MERP estimates do you estimate for the U.S.?

A. MERP estimates for the U.S. are commonly based on data from Ibbotson & Associates for the period 1926-2006. Dimson *et al.* use the data series developed by Drs. Wilson and Jones in the data series that they assembled for the 1900-2002 period.[192] The Dimson *et al.* data series are available from Ibbotson Associates, and is referred to as the DMS-Ibbotson data set. The DMS-Ibbotson equity proxy is both more comprehensive and more risky than the Ibbotson equity proxy since the former uses the CRSP capitalization-weighted index of all New York Stock Exchange stocks for 1926-61 that is further enlarged to include AMEX and Nasdaq stocks for 1962-70 and is replaced by the Dow Jones Wilshire 5000 index from 1971.

The estimates using the two Ibbotson data sets are summarized in Schedule 3.4. The arithmetic mean MERPs for the longest time periods for each data set are the same at 5.95%. While the arithmetic mean MERP is 5.73% for the 58-year period of 1951-

[191] Z. He and L. Kryzanowski, 2007, Cost of equity for Canadian and U.S. sectors, *North American Journal of Economics and Finance* 18:2 (August), pages 215-229.
[192] J.W. Wilson and C. P. Jones, 2002. An analysis of the S&P 500 index and Cowles extensions: Price indexes and stock returns, 1870-1999, *Journal of Business* 75: 3 (July), pages 505-533.

2008, the MERPs are less than 5.0% for the three time periods equal to 52 years or less.

Q. What additional factors need to be considered when using these historical U.S. MERP estimates to adjust your historical Canadian MERP estimate?

A. To obtain a forward-looking U.S. MERP from these estimates that can be used in arriving at a recommended forward-looking Canadian MERP, one needs to adjust for the higher risk of the U.S. market and the U.S. MERP over the two longest time periods, the upward bias caused by unsustainable upward equity revaluations primarily over the more recent time periods that may not be fully exhausted yet,[193] the 1% reduction in the MERP estimated by Dr. Jones from the reduction of trade costs over the last 100-plus-years, and about a 20 basis point increase due to bond investors obtaining less than they expected. Doing such would reduce the forward-looking U.S. MERP to no more than 5%.

Q. Did you conduct any tests on the robustness of this conclusion?

A. We conduct two tests of robustness. In the first test of robustness, we convert the annual returns on the S&P500 index using the spot U.S./Cdn FX rate over the period of 1926-2008, and then calculate the MERP using the returns on the Canadian-dollar-denominated S&P500 index and the returns on long Canada's. We obtain a mean Canadian-dollar-based MERP of 5.24% prior to making any adjustment for the FX risk involved in such an unhedged (and thus, more risky investment) strategy.

[193] To illustrate, the removal of equity revaluations due to the average growth in the price-dividend ratio over the 106-year period (1900-2005) studied by Drs. Dimson et al reduces the arithmetic mean MERPs for the U.S., U.K., Canada and World (in USD dollars) by 0.75%, 0.18%, 0.98% and 0.68%, respectively. This reduces the arithmetic mean MERPs for the U.S., U.K., Canada and World (in USD dollars) to 5.74%, 5.11%, 4.69% and 4.47%, respectively. Elroy Dimson, Paul Marsh and Mike Staunton, Chapter 11: The worldwide equity premium: A smaller puzzle, pages 467-514. In: Rajnish Mehra (editor), *Handbook of the equity risk premium* (Amsterdam: North-Holland, 2008).

In the second test of robustness, we calculate the MERP for the Canadian market and the U.S. market index in Canadian dollars starting from the end of 2008 for periods of five years (i.e., 2004-8), then ten years (i.e., 1999-2008), then 15, 20, 25, 30, 40, 50, 60, 70 and finally 83 years (i.e., 1926-2008). As is evident from Schedule 3.5, the MERPs in both countries from the perspective of a Canadian investor are negative for the 5 through 25-year going backward periods. Furthermore, while the MERPs for both countries have trended downwards, the downward trend is steeper for the U.S. market MERPs from the perspective of a Canadian investor.

Q. What is the major observation that you draw from the historical evidence for the U.S. MERP?

A. The major observation that we draw from this historical international evidence is that the U.S. MERP has also been declining over time, and that using the historical MERP over the longest available time period as a going-forward MERP estimate is not appropriate.

Q. What about the historical evidence for the MERPs of countries beside Canada and the United States?

A. In Schedule 3.6, we add the annualized arithmetic and geometric MERPs calculated by Dimson *et al.* for the U.K. and the World (based on 17 countries) to those for Canada and the U.S. for the period, 1900-2005. The arithmetic mean MERPs relative to bonds range from 5.15 percent for the World to 5.29% for the U.K. to 5.67% for Canada to 6.49 percent for the U.S. This is consistent with the risk ranking of these four indexes as measured by the standard deviation of returns that range from a low of 14.96% for the World to 16.60% for the U.K. to 17.95% for Canada to a high of 20.16% for the U.S. Thus, a 5.15 percent MERP relative to bonds represents an upward bound for the estimate of the MERP for a theoretical internationally invested portfolio over this 106 year period if one ignores the substandard (negative) average MERPs over the most recent three-year period, 2006-8.

3.3.1.2 MERP Estimate Based on Survey of the Literature (Second Estimation Method)

3.3.1.2.1 Survey of Canadian Studies

Q. What Canadian MERP estimates are reported in recent studies published in refereed journals?

A. We examine the MERP estimates reported in two more recent studies. Dr. Booth reports a 3.29% MERP for Canada, and a 5.61% MERP for the U.S. over the period of 1957–2000.[194] Drs. He and Kryzanowski report annualized estimates of the MERP of 4.32% and 5.88% for Canada and the U.S., respectively, over the longer period of 1956-2005.[195] Two reasons contribute to the higher estimates reported by Drs. He and Kryzanowski. First, they use a longer sample period in which the Canadian and U.S. markets realized lower average returns than those in Dr. Booth's sample. Second, Dr. Booth determines the MERP with respect to *long-term bond yields* of 8.04% for Canada and 7.32% for the U.S. In contrast, Drs. He and Kryzanowski determine the MERP with respect to the yields of 6.24% for Canada and 5.16% for the U.S. for *short-term treasury bills*.

3.3.1.2.2 Survey of non-Canadian Studies

Q. What non-Canadian (particularly, U.S.) MERP estimates are reported in recent studies published in refereed journals?

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[194] L. Booth, 2001, Equity risk premiums in the U.S. and Canada, *Canadian Investment Review 14*(3), pages 34-43.
[195] Z. He and L. Kryzanowski, 2007, Cost of equity for Canadian and U.S. sectors, *North American Journal of Economics and Finance* 18:2 (August), pages 215-229.

A. A review of the literature on non-Canadian MERP estimates is presented in Appendix 3.B. Two studies estimate realized and expected MERP for 15 countries over more than a century. They find that the expected MERP, when measured **against short-term** government bonds over the 101-year period, is 4.0% and 3.5% for the U.S. and a sample of 15 developed countries including the U.S., respectively. All of the studies reviewed in Appendix 3.B conclude that the U.S. MERP has narrowed substantially, and is expected to be lower in the future. Most of the U.S. forward-looking equity risk premium estimates vary from zero or slightly negative to about 4%. Interestingly, at an equity risk premium forum in November 2001, Dr. Ibbotson made a long-term 4 percent (400 bps) MERP forecast (i.e., geometric return in excess of the long-term government bond yield), under the assumption that the market was fairly valued.[196] As noted earlier in our evidence, this is the same forward-looking MERP estimate that he used in a multi-authored paper published in 2006.[197]

Dr. Jeremy Siegel has conducted extensive studies of the MERP for the U.S. over the past 200 years. Based on his results for the three major sub-periods, which are summarized in Schedule 3.7, the so-called Ibbotson time period, 1926-2001, has generated the highest arithmetic mean MERP of 6.2%. Dr. Siegel notes that this high MERP is due to real stocks maintaining their long-term historical average real return of almost 7%, while real bond and bill returns were below their long-term historical average real returns. In fact, for the 55 years up to 1982, the real return on bills averaged nearly zero. Dr. Siegel goes on to conclude that *the reason why the MERP is too high for this period is that historical real stock returns are biased upward to some extent and government bond returns are biased downwards over this period*.[198]

[196] Roger Ibbotson, 2001, Summary comments, *Equity Risk Premium Forum*, November 8, page 108.
[197] Peng Chen, Roger G. Ibbotson, Moshe A. Milevsky and Kevin X. Zhu, 2006, Human capital, asset allocation, and life insurance, *Financial Analysts Journal* 62: 1 (January/February), pages 97-109.
[198] Jeremy J. Siegel, Historical results I, *Equity Risk Premium Forum*, November 8, 2001, pages 31-32.

Mr. Richard Arnott and Mr. Peter Bernstein reach a similar conclusion that the realized MERP exceeded the expected MERP over this time period.[199] Specifically, equity investors earned 70 basis points annually more than what they expected and bond investors earned 20 basis points annually less than what they expected. According to Mr. Arnott and Mr. Bernstein, one cause of this risk premium windfall was the unanticipated inflation of the late 1960s and 1970s that adversely affected realized bond returns. Another cause was the rise in **price-to-dividend** multiples from 18 to 70 times over the 1926-2001 period, with almost all of this increase occurring in the last 17 years of this period, that favorably affected stock returns. Mr. Arnott and Mr. Bernstein estimate that this rise in the price-to-dividend multiple added about 180 basis points or 1.8% to annual stock returns.[200] We have shown earlier how the historical MERP for the U.S. has declined materially with the addition of data through 2008 with the decline in price-to-dividend multiples to 29.7 times using 12-month-trailing dividends and 32.9 times using indicative dividends for the S&P500 index as of January 15, 2009.

Drs. Dimson *et al.* decompose various MERPs estimated over the 1900-2006 period to unravel the impact of expanding valuation ratios. They report on page 495 that the expansion in the price-to-dividend ratio has increased the **average annual** MERP by 0.68% for the World (USD) index, by 0.18% for the U.K., by 0.98% for Canada and by 0.75% for the U.S. They also report on page 495 that the "typical country has not benefitted from dividends (or, in all likelihood, earnings) growing faster than inflation". [201]

[199] Robert D. Arnott and Peter L. Bernstein, 2002, What risk premium is "normal"?, *Financial Analysts Journal* 58:2 (March/April), pages 64-85.
[200] This is higher than the 1% estimate of Drs. Dimson et al. (2003). Elroy Dimson, Paul Marsh and Mike Staunton, 2003, Global evidence on the equity risk premium, *Journal of Applied Corporate Finance* 15:4 (Summer), pages 27-38.
[201] Elroy Dimson, Paul Marsh and Mike Staunton, Chapter 11: The worldwide equity premium: A smaller puzzle, pages 467-514. In: Rajnish Mehra (editor), *Handbook of the equity risk premium* (Amsterdam: North-Holland, 2008).

A similar point is made by Drs. Goetzmann and Ibbotson when discussing a third way of estimating an expected risk premium by examining the type of returns that the corporate sector supplies. Specifically, they state on pages 522-3:[202]

> "Diermeir, Ibbotson and Siegel (1984) and later Ibbotson and Chen (2003) used this supply approach. They extrapolated the cash flows and earnings growth generated by companies themselves. These forecasts tend to give somewhat lower historical risk premiums, primarily because part of the total return of the stock market has come from price-to-earnings ratio expansion. This expansion is not predicated to continue on indefinitely, and is removed from the expected risk premium."

In a special report (page 3), TD Economics (2009) provides recent MERP estimates for the U.S. based on a review of the literature of between 2.40% (Arnott & Bernstein) and 4.50% (Alliance Bernstein) with a central tendency estimate of 3.3%.[203] TD's long-term MERP estimate over a 4.75% long-run equilibrium yield on GoC (Government of Canada) 10-year bonds is 3.65% (i.e., 8.40 % return on equities minus the 4.75% long-run GoC yield) using the relative financial returns approach (i.e., our first estimation method).[204]

Q. What conclusion do you draw from this literature survey?

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[202] William N. Goetzmann and Roger G. Ibbotson, Chapter 12: History and the equity risk premium, pages 515-529. In: Rajnish Mehra (editor), *Handbook of the equity risk premium* (Amsterdam: North-Holland, 2008).
[203] TD Economics, Evaluating long-run returns in uncertain times, Special Report, February 12, 2009. Available at:
Available at: http://www.td.com/economics/special/ca0209_returns_eng.pdf.
[204] TD Economics, Evaluating long-run returns in uncertain times, Special Report, February 12, 2009. Available at:
Available at: http://www.td.com/economics/special/ca0209_returns_eng.pdf.

A. The conclusion that we draw from this literature survey is that a forward-looking MERP for Canada is not more than 5.1% after allowing for the estimation error contained in the estimates reported in these studies and reflecting current credit and economic conditions.

3.3.1.3 MERP Estimate Based on the DCF Estimation Method (Third Estimation Method)

Q. Would you please discuss the merits of using a DCF Method for estimating the MERP?

A. As is discussed in more detail in Section 5 of our evidence, Discounted Cash Flow (DCF) Estimation Methods have a number of disadvantages that make them much less reliable for estimating the required rate of return or risk premium on equity, particularly for individual companies. This is likely the reason why Graham and Harvey (2001, 2002) based on a survey of a large sample of U.S. corporations find that "few firms used a dividend discount model to back out the cost of equity".[205] Nevertheless, because the DCF approach represents an alternative method of estimating the MERP, it is useful as a check on the reasonableness of our other MERP estimation methods. With this in mind, we conduct DCF Tests using the constant growth version of the Dividend Discount Model or DDM for the Canadian Market as proxied by the S&P/TSX Composite Index and for the U.S. market as proxied by the S&P500 Index. We use various forecasts of future growth as proxied by GDP (Gross Domestic Product), inflation and Corporate Profits. The output of these DCF tests consists of various estimates of the MERP.

The required rate of return in the constant growth DDM or Gordon model is given by:

[205] John Graham and Campbell Harvey, 2002, How do CFOs make capital budgeting and capital structure decisions?, *Journal of Applied Corporate Finance* 15:1 (Spring), page 12. This article was a practitioner version of the following paper that won the Jensen prize for the best *JFE* paper in corporate finance in 2001: John Graham and Campbell Harvey, 2001, The theory and practice of corporate finance: Evidence from the field, *Journal of Financial Economics* 60..

$$k = \left(D_1/P_0\right) + g$$

where D_1 is the expected dividend in the next period, or D_0 (1 + g);

P_0 is the current price or level of the stock or index;

D_1/P_0 is the dividend yield; and

g is the growth rate in dividends, which is assumed to be constant until the end of time.

In this version of the model, the growth rates in dividends, earnings, book value and share price are all assumed to be equal.

In the two-stage DDM, dividends are assumed to grow at a fixed rate g_1 or variable rate g_t for an initial period (often assumed to be the first five years), and then to grow at a different fixed rate g_2 thereafter. In this version of the DDM, the implied required rate of return is found by solving for k in:

$$P_0 = \sum_{t=1}^{5} \frac{D_0(1+g_1)^t}{(1+k)^t} + \left(\frac{D_6}{k-g_6}\right)\left(\frac{1}{(1+k)^5}\right);$$

Or: $$P_0 = \frac{D_0(1+g_1)^1}{(1+k)^1} + ... + \frac{D_4(1+g_5)^1}{(1+k)^5} + \left(\frac{D_6}{k-g_6}\right)\left(\frac{1}{(1+k)^5}\right)$$

Where $D_6 = D_0(1+g_1)^5(1+g_6)$

or $D_6 = D_0(1+g_1)(1+g_2)(1+g_3)(1+g_4)(1+g_5)(1+g_6)$.

The implied MERP is then obtained by subtracting the current or going forward yield on long-term government bonds from the estimate of k derived from the above models.

The commonly held position is that the long-term growth in dividends (earnings) cannot exceed long-term growth in GDP. In the summary comments at an equity risk premium forum, Dr. Leibowitz summarized his viewpoint as follows:[206]

> "I'm very impressed by the level of consensus on the view that earnings can grow only at a somewhat slower rate than GDP per capita and that no one seems to feel it can grow much more – except Roger Ibbotson…"

There are at least four reasons why the long-term growth in the economy (i.e., GDP or in GDP on a per-capita basis) is considered to be an upper bound for the long-term growth in the dividends (earnings) of the market. First, since a disproportionate share of the growth in the economy comes from unlisted firms (i.e., private entrepeneurs), these investment opportunities are typically not available to the general public and are not captured by the indexes used to calculate MERPs.[207] Second, a good portion of the growth in the business sector of the economy cannot be financed by retained earnings and, thus, requires the continual issuance of new shares (referred to as seasoned issues). Third, many firms dilute their share base by issuing stock options, which are generally not offset by share repurchases. Fourth, Siegel (p. 15) argues "the returns to technological innovation have gone to workers in the form of higher real wages, while the return per unit of capital has remained essentially unchanged."[208]

In Schedule 3.8, we assume that cash distributions other than dividends (e.g., share repurchases) are offset by stock option issuance. We do this because many observers have shown that completed repurchases are much less than announced repurchases

[206] Marin Leibowitz, 2001, Summary comments, *Equity Risk Premium Forum*, November 8, page 109.
[207] Jagannathan et al. use the S&P, CRSP and Board of Governors (BOG) portfolios to examine the MERP. The BOG portfolio, which includes stocks that are not publicly traded and all stocks held by U.S. residents, has about two times the value of the CRSP stocks. While they obtain nearly identical MERP estimates using the S&P and CRSP portfolios over the entire sample period and various sub-periods, their estimates using the BOG data are higher on average by roughly two percent. Ravi Jagannathan, Ellen R. McGrattan and Anna Scherbina, 2000, The declining U.S. equity premium, *Quarterly Review of Federal Reserve Bank of Minneapolis*, Fall, pages 3-19.
[208] J. Siegel, 1999, The shrinking equity premium, *Journal of Portfolio Management* 26:1 (Fall), pages 10–17; and W. Reichenstein, 2002, What do past stock market returns tell us about the future?, *Journal of Financial Planning* forthcoming.

and that stock buybacks are offset by share issuances.[209] We also make no adjustment for the inflation in the dividend yield of the S&P/TSX Composite caused by inclusion of income trusts in that index. In Schedule 3.8, we use consensus estimates of real GDP and inflation over the medium and long-term obtained from a survey conducted by Watson Wyatt, a survey of the growth rates in Corporate Earnings conducted by Consensus Economics (as published in *Consensus Forecasts*) and the actual growth rates in pre-tax Corporate Profits for the 2004-7 period reported in *Consensus Forecasts*. If we use the forecasted yield for 30 year Government of Canada bonds for 2009 of 4.36 percent that was used by the NEB in setting its allowed ROE for 2009, we find that all of the MERPs using the consensus forecasts for both the U.S. and Canadian equity markets are at or below 5%, except when we use the most optimistic forecasts (e.g., the forecasts at the most optimistic 90th percentile for growth in real GDP and inflation). The other equity market forecasts are also at the optimistic end of the scale because they assume that the dividend yield based on 12-month trailing dividends will not decline going forward either because prices will rebound somewhat while dividends remain relatively unchanged or that firms will be able to maintain their level of dividends going forward during 2009. In fact, forecasts are that earnings per share on the S&P500 index will be negative for the first time (including 1938) in the fourth quarter of 2008, and are on track to lose $1.65 per share.[210]

We now illustrate how the equity costs in Schedule 3.8 are calculated by detailing how the equity cost of 8.01% for Scenario or Case 1 in panel A is determined. Using the formula, which was described earlier, that states that the cost of equity (k) is equal to the dividend yield (D_1 / P_0) plus dividend growth (g) as proxied by nominal growth in GDP (i.e., real GDP + inflation), we obtain that k is equal to [3.81% times (1.0404)] + 4.04% or 8.01%. Similarly, the equity cost of 9.01% for Scenario or Case 2 in panel A is obtained as [3.81% times (1.0404)] + (2.95% + 2.05%) or 9.01%. The

[209] For examples, see J.C. Bogle, 1995, The 1990s at the halfway mark, *Journal of Portfolio Management* 18:1 (Summer), pages 21–31; and K. Cole, J. Helwege and D. Laster, 1996, Stock market valuation indicators: Is this time different?, *Financial Analysts Journal* 52:3 (May/June), pages 56–64.
[210] David Berman, 2009, Corporate Earnings: S&P 500 veering into the red?, *The Globe and Mail*, February 4, B13.

4.04% is the mean annual growth rate in corporate profits over the five-year period of 2009-2013 based on *Consensus Forecasts* for November 10, 2008, which is used as the proxy for the constant growth rate for dividends.

Q. Has this approach been used by any of the bank financial groups to provide a forward-looking MERP estimate for Canada?

A. Yes. Using this approach (i.e., our third estimation method), TD arrives at a long-term MERP estimate over a 4.75% long-run equilibrium yield on GoC 10-year bonds of 2.75% (i.e., 7.50% return on equities minus the 4.75% long-run GoC yield).[211] This is based on a long-term annual forecast of 5.5% for growth in earnings/dividends and a dividend yield of 2%. As noted by TD Economics on page 4, dividend yield have soared recently due to “the correction in stock prices that were not met by a comparable decline in dividend payments, but this is a temporary event”.

Q. What conclusion do you draw from these DCF estimations?

A. The conclusion that we draw from these DCF estimations is that a forward-looking MERP for Canada is not more than 5.1% after allowing for the estimation error contained in the estimates generated by this estimation method.

3.3.1.4 <u>MERP Estimate Based on the Survey of the Forecasts of Knowledgeable Professionals (Fourth Estimation Method)</u>

Q. Are there any foreign regulatory jurisdictions that place weight on the surveys of knowledgeable professionals for their estimates of MERP?

[211] TD Economics, Evaluating long-run returns in uncertain times, Special Report, February 12, 2009.
Available at:
Available at: http://www.td.com/economics/special/ca0209_returns_eng.pdf.

A. There are some foreign regulatory jurisdictions that place weight on the surveys of knowledgeable professionals for their estimates of MERP. According to a report prepared by NERA,[212] U.K. regulatory estimates of the MERP have generally relied heavily on survey evidence of investor expectations with some consideration usually given to evidence on historic average returns. However, U.K. regulators have generally judged that the historic MERP provides an overstatement of the current risk premium.

Q. Are there any surveys that can be used to derive the forward-looking MERP expectations for Canada?

A. Until this year there were two such forecasts for Canada. However, the *2009 Fearless Forecast* authored by Mercer no longer provides a forecast beyond the upcoming year.[213] The findings, which are summarized in Schedule 3.8, are based on a survey of the "country's leading business economists and portfolio managers in 47 organizations, such as chartered banks, investment management firms and other corporations" conducted in November 2008 by Watson Wyatt.[214] Based on consensus expectations (median), the expected MERP based on the S&P/TSX Composite and 30-year Canada Bonds is 2.7% mid-term (2010-2013) and 2.5% long-term (2014-2023). To examine the MERP derived using the most optimistic scenario drawn from this survey (i.e., has only a 10% chance of occurring), we subtract the 90th percentile estimate of the S&P/TSX Composite return (i.e., the return that has a 90% chance of being lower) from its 30-year Canada Bond counterpart. Doing such for the mid-term (2010-2013), we subtract the 7.5% value in the last column of Panel B of Schedule 3.9 for 30-year Canada Bonds from the 12.0% value in the same column for the S&P/TSX Composite to obtain a MERP estimate of 4.5%. Doing such for the long-term (2014-2023), we subtract the 7.0% value in the last column of Panel C of

[212] NERA, UK water cost of capital, *A Final Report for Water UK*, Prepared by NERA, London, July 2003, page 76.
[213] Mercer, *2009 Fearless Forecast, 18th edition.*
[214] Watson Wyatt, Economic Expectations 2009, 28th Annual Canadian Survey.

Schedule 3.9 for 30-year Canada Bonds from the 10.0% value in the same column for the S&P/TSX Composite to obtain a MERP estimate of 3.0%.

Q. Are there any non-Canadian surveys

A. Yes, there are a number of surveys conducted in the United States.

Drs. Graham and Harvey have elicited the expectations of the equity risk premium measured over a multi-year horizon relative to a 10-year U.S. Treasury bond based on a survey of U.S. Chief Financial Officers (CFOs). The survey has been conducted each quarter from June 2000 to March 2008.[215] A plot of the MERPs derived from this survey is reproduced in Schedule 3.10. We find that the mean MERP forecast has always been less than five percent, and most often has been less than four percent for this sample of U.S. CFOs. Unlike the forecasts of financial analysts, there is no compelling reason to conclude that the expectations of CFOs are biased in one direction or the other.

Dr. Welch has conducted various surveys of academic financial economists. His last survey, which preceded the current credit and economic crisis since it was conducted in December 2007, was based on a "core sample 369 U.S. financial economics professors and the 219 other respondents".[216] He summarized the results on page 5 of his working paper as follows:

> "The average and typical equity premium estimate among the sample of U.S. financial economists was around 5%. This applies both to the geometric 30-year estimate and to the 1-year estimate."

[215] John R. Graham and Campbell R. Harvey, 2008, The equity risk premium in 2008: Evidence from the global CFO outlook survey (July 22, 2008). Available at SSRN: http://ssrn.com/abstract=1162809. A study for a period ending in 2005 was published in: John R. Graham and Campbell R. Harvey, 2005, The long-run equity risk premium, Finance Research Letters 2, 185–194.

[216] Ivo Welch, The consensus estimate for the equity premium by academic financial economists in December 2007, Working Paper, Brown University, January 18, 2008. Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1084918.

On the same page, Dr. Welch characterizes the non-U.S. professors as being more conservative, since:

> "For the 1-year forecast, their average estimate is about 90 basis points lower. For the 30-year forecast, it is about 40-50 basis points lower."

With regard to obtaining the cost of equity for capital budgeting purposes, Dr. Welch found that "75% of finance professors recommend using the CAPM for corporate capital budgeting purposes; 10% recommend the Fama-French model; 5% recommend an APT model." Techniques used by some experts in rate of return proceedings, such as the DCF, ATWACC and Comparable Earnings Approaches, are absent from this list.

Q. What conclusion do you draw from these survey forecast?

A. The conclusion that we draw from these survey forecasts is that a forward-looking MERP for Canada is not more than 5.1% after allowing for estimation error contained in the estimates generated by this estimation method.

3.3.1.5 Other Considerations

Q. Are there any other factors that should be accounted for before arriving at a final *ex post* estimate of the MERP?

A. Yes. In this section, we consider the evolution of a number of factors that affect *ex post* estimates of the MERP. On balance, changes in these factors imply that very long-term estimates of the MERP using historical data will be over-estimates of the forward-looking MERP.

3.3.1.5.1 Survivorship and selection biases

Q. Would you please summarize the current thinking on the effect of survivorship and selection biases on *ex post* estimates of the MERP?

A. *Ex post* estimates of the MERP often suffer from survivorship and selection biases. Some examples follow. First, as proposed by Drs. Brown, Goetzmann and Ross (1995),[217] financial economists concentrate on the performance of surviving markets and so-called "winner" markets like the U.S. stock market. Financial economists ignore other markets that have done poorly or even disappeared. Examples given by Drs. Brown *et al.* include the Argentine market that is considered a comparatively less important emerging market because of its long history of poor performance, and the Russian market where investors at one point had all their wealth expropriated during the last 100 years. Second, when a new index is introduced, the index sponsor generally provides historic data on that index. For example, when the S&P/TSX Composite index was introduced in January 1977, historic ("back-fill") data was provided dating back to January 1956. The historic data was for firms in existence as of the date of the index introduction. Although the effect of survivorship bias of the MERP estimate varies, the lowest estimate appears to be the ten basis point estimate of Drs. Dimson et al.[218]

3.3.1.5.2 Changes in financial markets

Q. Would you please provide your opinion on how changes in financial markets have affected the MERP?

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[217] S. Brown, W. Goetzmann and S. Ross, Survival, 1995, *Journal of Finance* 50, pages 853-873. The following examples are drawn from Brown et al. (1995).
[218] Elroy Dimson, Paul Marsh and Mike Staunton, Chapter 11: The worldwide equity premium: A smaller puzzle, pages 467-514. In: Rajnish Mehra (editor), *Handbook of the equity risk premium* (Amsterdam: North-Holland, 2008).

A. Financial market changes that have had an impact on the MERP include the increased integration of financial markets, the rapid growth of financial innovation, mutual funds, index products, derivative products and exchange-traded funds over the past 30 to 40 years. Since this allows small investors to acquire and manage diversified portfolios at lower cost, the required risk premium is lowered since greater diversification means that these investors attain the same expected returns by bearing less risk. Also, since the reduction in cost has been higher for equity versus fixed income investment vehicles, the MERP relative to historical levels has declined.[219]

3.3.1.5.3 Changes in market frictions

Q. How have changes in market frictions affected MERP expectations of equity investors?

A. Historical MERP studies are based on gross and not net returns, although investors make decisions between investments of different risk based on net and not gross returns. There are at least two frictions that cause a divergence between gross and net returns from investment.

The first major market friction is taxes. As tax rates increase, investors require higher gross returns from investment to get the same net (after-tax) return, and *vice versa* when tax rates decrease. Similarly, if the tax rate reduction differs by type of asset, then their gross returns will change by different amounts to maintain their same net returns. To illustrate, if the effective tax rate on the return of a non-dividend-paying growth stock declines by more than that on the return of a long-term government bond, then the drop in the gross return of the stock to maintain its after-tax return will exceed the drop in the gross return of the bond. In turn, this will decrease the required MERP, all else held equal. Examples include the introduction of a capital gains tax in

[219] Similar points are made about mutual funds by Diamond (1999), page 2.

Canada in 1972 (increases the MERP), and more recent successive reductions in the capital gains inclusion rate (decreases the MERP).

Similarly, while the tax authority shares in both gains and losses on equity investors, a lower tax rate lessens the tax bite on positive returns and lowers the taxing authority's share of negative returns. However, since the mean and median of the return distribution of a typical equity is positive, the net benefit of a tax reduction is positive for equity investors, all else held equal.

The second major market friction is trade costs, which include liquidity costs (as measured, for example, by the effective bid-ask spread), brokerage commissions, and so forth. In general, the gap between gross and net returns increases as trade costs increase, and decreases as trade costs decrease. As noted by Dr. Jones, trade costs drive a wedge between gross equity returns and net equity returns. His analysis shows that the average cost to buy or sell stocks has dropped from over 1% of value as late as 1975 (i.e., before the deregulation of brokerage fees) to under 0.18% today. He concludes that, while trade costs account for a small part of the observed equity premium, the gross equity premium is perhaps 1% lower today than it was earlier in the 1900's.[220]

As a further illustration of how trade costs have decreased, Dr. Wermer finds that "although the trading activity of the average mutual fund has more than doubled over the 20-year period, estimated transaction costs have decreased substantially" (page 1684).[221] Specifically, total transaction costs have "roughly been halved from the first to the last five-year subperiod" (page 1685).

3.3.1.6 The Final Canadian MERP Estimate (Final Input #1)

[220] Charles M. Jones, 2001, A century of stock market liquidity and trading costs, working paper presented at an asset pricing workshop, Summer Institute, National Bureau of Economic Research, July 19-20.
[221] Russ Wermer, 2000, Mutual fund performance: An empirical decomposition into stock-picking talent, style, transaction costs, and expenses, *The Journal of Finance* 55:4 (August), 1655-1703.

Q. What is your final Canadian MERP estimate?

A. Based on a subjective consideration of the estimates from the above four estimation methods and balancing the other considerations just discussed above with providing an allowance for estimation error, we are forecasting a MERP of 5.1% for an average-risk utility for 2009.

3.3.2 Obtaining the Relative Risk Estimate for an Average-risk Utility (Input #2)

3.3.2.1 Conceptual Underpinning

Q. Would you please provide the conceptual underpinning for the methods that you use to obtain the relative risk estimate for an average-risk utility?

A. If the market only rewards investors for bearing non-diversifiable risk (the most commonly accepted view), the relative non-diversifiable risk or beta of the average-risk utility relative to the market proxy needs to be estimated because investments in the securities of individual firms (such as stocks in specific utilities) are not by themselves well-diversified portfolios. Under this assumption, the MERP is adjusted upwards or downwards to reflect the relative **non-**diversifiable risk of the average-risk utility relative to the more diversified market portfolio. The lower non-diversifiable risk of our average-risk utility relative to that for the diversified market portfolio necessitates a downward adjustment in the risk premium added to the forecasted long-term risk-free rate to calculate the cost of equity for our average-risk utility.

If most investors do not hold well-diversified portfolios and thus require an additional premium for bearing diversifiable risk, then the total risk or some portion thereof of the average-risk utility needs to be compared to the total risk of average-risk firms in other industries or in some market proxy such as the S&P/TSX Composite Index. Under this view of the world, the relative ratio of the total risk of the average-risk utility to that of the mean of average-risk firms across industries or in the market proxy can be used as an index to adjust the MERP upwards or downwards to get the appropriate own ERP for an average-risk utility. However, this needs to be done with care because most investment textbooks contain graphs depicting the reduction of total risk with an increase in portfolio size (i.e., the number of securities or firms in the portfolio). Drs. Kryzanowski and Singh provide a recent quantification of how total risk is reduced with an increasing portfolio size, which is reproduced in Schedule 3.11 for various samples of Canadian equities.[222]

Under the commonly accepted risk pricing viewpoint, the overall (investment) riskiness of an average-risk utility is typically determined by measuring its contribution to the risk of the market proxy. In a risk premium framework, this contribution is typically measured by the market beta of an average-risk utility.

Since market betas vary over time, investment professionals prefer to use only the most recent data in order to capture the firm's current risk even for firms with long trading histories. However, to ensure reasonable statistical precision, beta estimations typically are based on approximately 5 years of monthly observations. The betas used herein are based on 60 months of data, and are only calculated if almost all months have returns based on actual market transactions.

3.3.2.2 Beta Measure of Relative Risk of an Average-risk Utility

Q. Please describe the general approach for assessing the relative risk of an average-risk utility?

[222] Lawrence Kryzanowski and Shishir Singh, Should minimum portfolio sizes be prescribed for achieving sufficiently well-diversified equity portfolios?, forthcoming *Frontiers in Finance and Economics*.

A. It is not possible to estimate a reliable beta for the average-risk utility directly. This hypothetical utility does not trade publicly. However, it is possible to make an approximation. We use the same sample of the publicly traded utilities that we used in our capital structure discussion in Section 2. We presented the rationale for the sample selection there. Here we add Westcoast Energy as this company traded throughout 2001, and as exchange units of Duke in 2002. As shown in Schedules 3.12 and 3.13, the average beta for a group of ten utilities is 0.315 for 1992-2008, a sizeable decrease from 0.583 for 1990-1994.[223] The means of the mean cross-sectional betas for the first five, middle five and the last (most recent) five rolling five-year periods are 0.539, 0.150 and 0.255, respectively.

On its website, TransAlta states that it is Canada's largest non-regulated electric generation and marketing company. This follows the completed sale of its transmission business to AltaLink in 2002 and the sale of all of the units of TransAlta Power LP to Stanley Power Inc. in 2007. Not surprisingly, TransAlta' beta has increased from 0.138 for the 2000-2004 period to 0.875 for the 2004-2008 period. This was recognized on page 15 of TransAlta's *2007 Annual Report* as follows:

> "A decade ago, our industry believed it would move to a deregulated wholesale power model. This has not happened. The U.S. in particular is now a patchwork of traditional rate-of-return-based power companies and others with hybrid elements of both market-based and traditional regulation. Recognizing that reality, and consistent with our growth objective and retaining a low-to-moderate risk profile, we must now consider opportunities to acquire regulated assets. These efforts will be focused on the western North American markets as we build an even stronger competitive position."

Q. What is the normal tendency of the rolling-period betas depicted in Schedule 3.13?

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[223] Betas of 0 and 1 correspond to no market risk and a market risk equal to a well diversified portfolio such as the S&P/TSX Composite index, respectively. Thus, a beta of 0.50 for an average-risk utility indicates that this utility has 50% of the investment risk of the S&P/TSX Composite.

A. There is no evidence in Schedule 3.13 that the normal tendency of this sample of utility betas is to revert back to a market beta of one. In fact, there is not one case of a beta above one in this Schedule. The highest beta of 0.875 is for TransAlta for a period where it had already divested of most of its regulated assets. Thus, Schedule 3.13 provides no evidence for using non-standard (adjusted or inflated) betas that are reported by some data suppliers.

Q. Did you conduct any further tests to determine if the rolling five-year betas are robust?

A. Yes, we did. We estimated our betas using two types of excess returns where an excess return is the total return on the utility or market proxy minus the return on a risk-free proxy. We used two risk-free proxies for this purpose; namely, the return on a Canadian T-Bill and the return on long Canadas. The beta results for the excess returns on the utilities and the market proxy over the returns on long Canadas are presented in Schedule 3.14 and plotted in Schedule 3.15. They show that our initial beta results and conclusions drawn therefrom are robust.

Q. Did you conduct any tests to determine why the betas were low?

A. Yes, we also examined whether an average utility was becoming a more desirable investment because of an increase in its potential to diversify investor portfolios. In modern portfolio theory, an asset becomes more desirable for portfolio diversification purposes if its correlations with all the other assets decrease towards zero or even become negative, everything else held constant. This important contribution led to the awarding of a Nobel Prize in Economics to Dr. Harry Markowitz.

Thus, we calculated moving average correlations for our sample of utilities with the S&P/TSX Composite index. These results are summarized in Schedule 3.16. We find that the average correlation between a utility in our sample and the S&P/TSX Composite has declined substantially from the most distant five-year period to the more recent five-year period (0.495 versus 0.247), and is quite low at 0.263 when averaged over the 15 rolling five-year periods. This suggests that an average utility is now more desirable as an investment because of its enhanced potential for portfolio risk reduction. A greater potential for risk reduction leads to a reduction in an asset's own equity risk premium all else held equal. This reduction in the correlations between the returns of the utilities and the market also contributes to the reduction in the betas of the sample of utilities.[224] The adoption of adjustment mechanisms to automatically adjust ROE on a generic basis by various Canadian regulatory bodies has most likely contributed to this reduction in risk.

Q. Why are you so concerned about accounting for estimation error in your measure of relative risk?

A. We are concerned about accounting for estimation error in our measures of relative risk because Drs. He and Kryzanowski conclude that time-variation in the betas is the most important source of variation in the market model for the Canadian Utilities sector.[225] Furthermore, Drs. He and Kryzanowski find that the trend in dynamic betas for Canadian utilities has been for a beta value less than 0.50 since the late 1990's.[226]

3.3.2.3 Total Risk Measure of Relative Risk of an Average-risk Utility

Q. Would you explain how the total risk measures for your sample of utilities have changed over time?

[224] The beta coefficient is given by $\beta_i = (\sigma_i \rho_{im}) / \sigma_m$, where σ_i and σ_m are the standard deviation of returns for utility *i* and the market *m*, respectively; and ρ_{im} is the correlation between the returns for utility *i* and the market *m*, respectively. Thus, if the relative risks of the utility and market remain constant, the beta decreases towards zero as the correlation between their returns moves from 1 to 0.
[225] Zhongzhi He and Lawrence Kryzanowski, 2007. Cost of equity for Canadian and U.S. sectors, *North American Journal of Economics and Finance* 18:2 (August), pages 215-229.
[226] Zhongzhi He and Lawrence Kryzanowski, 2008. Dynamic betas for Canadian sector portfolios, *International Review of Financial Analysis* 17: 5 (December), pages 1110-1122.

A. We examine the time-series behavior of the total risk measures as captured by the standard deviation of returns for our sample of utilities over rolling five-year periods. These results are reported in Schedule 3.17 and plotted in Schedule 3.18. Based on Schedule 3.18, there is no evidence that the total investment risks of our sample of Canadian utilities or the Vilbert sample of five Canadian utilities have increased since the last Generic Proceeding. The mean standard deviation of monthly returns (sigma) for the 2004-2008 period of 5.4% is marginally higher than the mean sigma for all 15 rolling five-year periods of 5.3%, and is actually lower than the mean sigma for the 2000-2004 period of 6.2% for our sample of Canadian utilities.

Q. How can a total risk measure of relative risk of an average-risk utility be used?

A. There is some conflicting evidence in the literature on whether or not the own risk of a firm is rewarded in the market. As pointed out earlier, if enough investors do not hold well-diversified portfolios and thus require an additional premium for bearing all or a part of diversifiable risk, then further confidence in the beta measure is obtained by comparing the total risk of the average-risk utility to the total risk of average-risk firms in other industries or in a market proxy. Under this view, the relative ratio of the total risk of the average-risk utility to that of the mean of the average-risk firms in various industries or a market proxy can be used as an index to adjust the relative risk index as proxied by beta upwards or downwards to get the appropriate ERP for an average-risk utility.

There are three reasons why it is not appropriate to use a relative risk index that compares the variance of an average-risk utility to the variance of the market proxy. First, a relative risk index should have the property that when one finds the weighted average of the firms or industries that comprise the market index the result is the risk of the market proxy. This does not happen if you use a relative risk index that is obtained by dividing the variance of an industry index by the variance of the market proxy. Second, if investors receive a return premium for bearing nondiversifiable risk, then the capitalization-weighted average return premium will be already reflected in the return of the market proxy. This happens because the return on the market proxy is merely a weighted average of the returns on the firms or industries that compose that market proxy. Thus, the market proxy already incorporates the nondiversifiable risk premium for a firm (or industry) of "average" nondiversifiable risk. Third, how the nondiversifiable risk of an average-risk firm in a particular industry compares to such firms in other industries or market proxies is best studied using our approaches.

We first use the indirect decomposition method of Campbell *et al.* to estimate the industry-level monthly variances for 47 industry groups. The specific procedure is detailed in Appendix 3.C. The results for the complete period of 1975-2003 and the most recent 10-year period of 1994-2003 are summarized in Schedule 3.17. We examine various benchmarks that include: (i) the elimination of the three industries with the highest variances, (ii) the elimination of industries with less than 10 firms, and (iii) the elimination of industries with less than 10 firms and the industry with the highest variance after eliminating industries with less than 10 firms. In all cases, we find that the average variance of the utilities is less than 40% of the mean variance of the industry benchmark. Thus, even if we assume that investors need to be compensated for bearing nondiversifiable risk, the relative risk of utilities compared to all industries is less than 50%.

Next, we examine rolling five-year standard deviations of return for the same utilities and for the same overall time period that we observed for the betas. We report these values in Schedule 3.18. In Schedule 3.19, we plot the time-series of standard deviations for the individual utilities and their cross-sectional means, the times series of mean standard deviations for the sample of Canadian utilities used by Dr. Vilbert, and the time series of standard deviations for the S&P/TSX Composite Index. We note that there is no evidence that the total risk of our sample of Canadian utilities has changed in either an absolute or relative sense since the last Generic Proceeding.

As a further test of robustness, we compared the mean and median standard deviation for our sample of utilities to their corresponding means and medians for firms that were in the S&P/TSX Composite and 60 Indexes but were not one of our sample firms. We categorized these index firms into those that had returns for all 60 months and those that had returns for 36 months to less than 60 months over the five-year period of 2004-2008. Based on the results reported in Schedule 3.20, we find that the standard deviation of an average and typical utility in our sample represents less than 50% of the standard deviation of an average and typical non-sample firm in the S&P/TSX Composite Index. The percentage varies between 55 and 59% for an average utility (mean) and between 49% and 56% for a typical utility (median) when benchmarked against the S&P/TSX 60 Index. Before proceeding, it is important to keep in mind that our beta estimate of 0.52 is relative to the S&P/TSX Composite Index.

Q. What conclusion do you arrive at from an examination of relative total risk of an average and typical utility relative to its counterpart in the S&P/TSX Composite and 60 Indexes?

A. We conclude that a relative risk index benchmarked to the S&P/TSX Composite of 0.52 is justified whether or not one assumes that investors are compensated for bearing diversifiable risk.

3.3.2.4 The Relative Risk of an Average-risk Canadian Utility (Input #2)

Q. What is your recommended value for the relative risk of an average-risk Canadian utility?

A. We recommend that a relative risk index of 0.52 is appropriate whether or not investors receive a return premium for bearing nondiversifiable risk when appropriate benchmarks are chosen. We believe that this estimate is conservatively high, and provides sufficient coverage for any estimation errors.

3.3.2.5 The Non-use of the Non-standard or Adjusted or Inflated-Beta Method

Q. Would you please explain why you do not use non-standard beta estimates when estimating the required ROE for an average-risk Canadian utility?

A. Non-standard betas are also referred to as adjusted or inflated betas. There are two primary arguments that have been given for using these adjusted betas when calculating the required rate of return on equity.[227] The first rationale is based on the empirical finding by Dr. Blume (1975) that the betas of individual **U.S.** equities, for a large sample that is representative of the overall market (i.e., a sample whose weighted average beta is one by construction), tend to regress over the long-run towards the mean beta of one for the sample.[228] The second rationale for using a variant of the non-standard or adjusted- or inflated-beta method for utilities is that raw utility betas need to be adjusted upward due to their sensitivity to interest rate changes, and that the appropriate adjustment is one that is intermediate between the raw and adjusted betas. As we show in Appendix 3.D, both rationales are incorrect in a Canadian context.

3.3.3 Long Canada Yield Estimate (input #3)

Q. How did you obtain your estimate of the long Canada yield for 2009?

[227] To illustrate, Dr. Vilbert notes that the “adjustment is designed as a correction for the tendency of companies with low estimated betas to have negative sampling errors and for the tendency of companies with high estimated betas to have positive sampling errors”. He goes on to note that this is not the reason he uses adjusted betas. Instead, he uses “adjusted betas when the sample companies display such unusual interest rate sensitivity”. Nova Gas Transmission Ltd. Evidence Section 2.9, Direct Testimony of Dr. Michael J. Vilbert, page 54, line 15 through page 55, line 1.
[228] M.E. Blume, 1975, Betas and their regression tendencies, *Journal of Finance* 30 (June), pages 785-796.

A. We began with the long Canada yield of 4.36% used by the NEB in setting its allowed ROE for 2009. We then add 40 basis points to normalize this yield for the effects of the current easy money monetary policy designed to stimulate economic activity due to the current global credit and economic crises. Rounding to the nearest five basis points gives our recommended long Canada yield estimate of 4.75%.

Q. How does your forecast compare with the long-term nominal interest rate forecasts provided by Bank Financial Groups?

A. It is the same as a recent forecast by TD Economics that was prepared by Mr. Charles Freedman. Specifically, on pages 22-23, TD Economics states: "If the target rate of inflation remains at 2%, this would imply a long-term nominal rate of interest in the neighborhood of 4¾%".[229]

3.3.4 The "Bare-bones" Cost of Equity Capital Recommendation

Q. What is your "bare-bones" cost of equity capital recommendation for an average-risk Canadian utility?

A. Based on a MERP estimate of 5.1% and at a relative risk factor of 52% of the S&P/TSX Composite index, the ERP required for our average-risk utility (i.e., our final estimate of input #1 multiplied by our final estimate of input #2) is calculated to be 2.65%. Given our forecast of a normalized long-term Government of Canada bond rate of 4.75% for the 2009 test year (our final estimates of input #3), our "bare-bones" cost of equity capital estimate is 7.4% for the 2009 test year.

3.3.5 Adjustment to the "Bare-bones" Cost of Equity Capital Recommendation for an Average-risk Utility

[229] Charles Freedman, 2008, Canadian long-term real interest rates, TD Economics, Special Report, January 11. Available at: http://www.td.com/economics/special/freedman_nontech.pdf.

Q. What adjustments do you make to this "bare-bones" cost of equity capital recommendation for an average-risk utility?

A. Past practice in various regulatory jurisdictions considers the need to adjust from a market-value based rate of return to an accounting-based rate of return in order to preserve the financial integrity and financing flexibility of a utility such as our average-risk utility. The idea is that our average-risk utility should be allowed to maintain its market-to-book value ratio sufficiently above unity (the value of one) in order to attract investment and to recoup flotation costs associated with issuing new equity financing instruments.[230] The notion that each company should maintain a market value above book value is somewhat contradictory as it suggests that each company should plan to earn a return on new investments above the required rate of return. Similarly, many of the applicant utilities neither have nor are expected to undertake public equity offerings. However, we can accept the notion that an additional premium should be included to preserve financial integrity and financing flexibility as well as to cover issue costs. Thus, we add a financial integrity and flexibility premium of 50 basis points to further ensure the financial flexibility of the applicant utilities.

We arrive at our flotation cost adjustment embedded in the 50 basis point financial integrity and flexibility premium as follows. When firms issue or sell new equity to the market, they incur underwriting fees paid for marketing the issue, and other underwriting and issue expenses for legal and accounting services, printing of issuing documents, and applicable registration fees. Research on flotation or issuance costs for new seasoned equity issues for utilities in Canada over the five year period ending with 2008 finds that the mean fee is about 4% of gross proceeds for equity offerings (see Schedule 3.21). When the equity offering fees are amortized over a 50-year period, the annual adjustment needed to compensate the average-risk utility for

[230] For example, see G.R. Schink and R.S. Bower, 1994, Application of the Fama-French model to utility stocks, in *Financial Markets, Institutions and Instruments; Estimating the Cost of Capital: Methods and Practice* 3:3, pages 74-95.

potential equity flotation costs is about 8 basis points annually, which we round up to 10 basis points to cover other issue costs.

3.3.6 The Final Recommended Cost of Equity Capital for an Average-risk Utility

Q. What is your final recommended cost of equity capital for an average-risk utility?

A. Putting all the parts together, we end this sub-section of our evidence with our ROE recommendation for an average-risk utility of 7.90% for the 2009 test year. Our ROE recommendation allows an average-risk utility to earn a risk premium (including the financial flexibility and integrity adjustment) of 315 basis points over our normalized forecast for long Canada yields of 4.75% for the 2009 test year and 355 basis points rounded to the nearest five basis points over the forecast used by the NEB for setting its allowed ROE for 2009.

3.4 COMPARISON OF OUR RECOMMENDED ROE TO THAT USED BY FINANCIAL ANALYSTS

Q. How does your recommended ROE for an average-risk Canadian utility compare to those used by financial analysts?

A. We began by examining the cost of equity that financial analysts for BMO Capital Markets reported that they used in implementing their DCF approach for valuing a share of the firms listed under the categories “Utilities – Gas & Electric Utillities” and “Utilities – Pipelines” in the publication *Red Book – First Quarter 2009*. Surprisingly, we only found the specific cost of equity specified for only one utility, Enbridge, and that there was little mention of the use of the DCF approach as being used to value the utilities included in this issue of the *Red Book.* Most interesting was that the valuation was “based on a DCF approach through 2020 using a cost of equity of 8%, translating to a target P/E of 19x".[231] This is a mere 10 basis points higher than our recommended ROE of 7.9%.

Q. How would you compare the risk of Enbridge to the risk of an average-risk utility?

A. The three quantitative measures that we developed in this section all support the view of Enbridge as an average risk utility. First, for the most recent five year period, systematic risk as measured by the beta of Enbridge was 0.336 marginally below the average of 0.345 for our utility sample in Schedule 3.14. Second, for the same period, total risk (standard deviation of returns) was 0.050 for Enbridge vs. 0.053 for the full sample as seen in Schedule 3.18. Third, the correlation coefficient of Enbridge with the market index for the same period was 0.291 vs. 0.247 for the sample.

In addition to these quantitative measures, our bond rating and financial ratio analysis in Section 2 of this evidence, reinforces the conclusion that Enbridge is an average-risk utility. The bond rating of Enbridge from DBRS is A, one notch above the average rating of A- from that agency for our sample. Standard and Poor's rates Enbridge as A- and Moody's rating is Baa1 both corresponding to the sample averages for these two agencies. Schedule 2.4 shows that for the last three years for which we have complete data (2005-7) the return on equity for Enbridge exceeded the sample average.

Q. Did you conduct any further search of the cost of equity estimates used by Canadian financial analysts?

A. Yes, we did. Based on a search of the reports by financial analysts that were available to us, we found only one report during the current credit and economic crises that reported the cost of equity that was used to value Enbridge. This was a December 17, 2008 report from CIBC World Markets. Specifically, the report concluded that an 8%

[231] Carl Kirst, Enbridge Inc., Utilities Pipelines, BMO Capital Markets, *Red Book – First Quarter 2009*, page B-95.

cost of equity was the “middle-of-the-road” or “reasonable” case. It also stated that “a *historical* market risk premium of 5% and a beta of 0.5 (typically considered for pipeline & utilities companies)”. These three estimates compare favorably with our ROE, MERP and beta estimates of 7.9%, 5.1% and 0.52, respectively, where the latter estimate is for an average-risk utility. The three equity discount rate scenarios presented in the report are described as follows:[232]

> **“Scenarios Defined By Varying Equity Discount Rates**
>
> The other important variable that we examine in this analysis is the discount rate, in light of extremely volatile equity risk premiums in the current market environment. Specifically, three equity discount rate scenarios have been reviewed:
>
> - **6.5%:** This represents the rosiest scenario, implying a risk-free rate assumption of 4% (today’s 30-year GOC bond yield is actually 3.75%, so it is not as aggressive as it could be), a *historical* market risk premium of 5% and a beta of 0.5 (typically considered for pipeline & utilities companies). We call this a ‘rosy’ case because it presumes a return to normal risk premiums, while GOC bond yields stay at current historical lows. It does *not* consider the significant increase (perhaps temporary) in equity risk premiums that may be inferred in today’s markets, which have seen corporate bond yield spreads widen by close to 350 bps in recent months from long-term averages. Moreover, the case also does not consider the mitigating (negative) effect on valuations of likely higher GOC bond yields in the event of some future easing of credit conditions and decline in equity risk premiums towards historical averages.
>
> - **10%:** At the other extreme (the extreme bad case), a discount rate of 10% merely represents the best case discount rate of 6.5% to which we have

[232] CIBC World Markets, Enbridge Inc., *Equity Research Company Update*, December 17, 2008, pages 4-5.

added 350 bps in incremental equity risk premium, as inferred by the recent widening in ‘A’-rated corporate bond spreads. Note that we have already concluded that the recent widening of corporate bond spreads likely over-represents the “appropriate” widening of equity risk premiums for a number of factors unique to the corporate bond market particularly during liquidity crises. These factors have been discussed in greater detail in our recent report: *What Is The Corporate Bond Market Telling Us? Stock Valuations In The Context Of Abnormal Credit Spreads* (November 25, 2008). Perhaps the most important factor in this regard is the comparative illiquidity in the corporate bond market (and corresponding incremental return required by investors), which is only enhanced during periods of *severe* illiquidity in the broader capital markets; today’s level of corporate bond spreads more likely reflect deteriorating business fundamentals and solvency on the part of lenders rather than on the part of borrowers.

- **8%:** Our middle-of-the-road, or “reasonable” case at 8% is indicative of a discount rate that is both somewhere in the middle of the two extremes defined above, and likely indicative of a reasonable intermediate-term expectation for the concurrence of the following:

    - Credit spreads (and equity risk premiums) to ease back to more normal levels, partially mitigated by,

    - Risk-free bond yields to move higher off of current recession depressed levels.”

Q. Does this conclude your ROE evidence?

A. Yes, it does.

4. USE OF GENERIC FORMULA-BASED ADJUSTMENT MECHANISMS FOR THE ANNUAL RESETTING OF THE ALLOWED ROE

4.1 OVERVIEW OF THIS SECTION

Q. How is this section of your evidence organized?

A. In this section, we begin with a discussion of the purpose of Generic Formula Based Adjustment (GFBA) mechanisms and the types of mechanisms used by Canadian regulators to determine an allowed ROE and deemed capital structure for regulated utilities. After discussing how these GFBA mechanisms are implemented in Canada, we discuss the movement to the use of GFBA-like mechanisms in the U.S., and particularly, in California. We then present and critique the advantages and disadvantages attributed to GFBAs that are driven by movements in either of two factors; namely, the risk-free-interest rate or a risky corporate interest rate based on the utility's credit rating. We then discuss other possible factors that have been identified in the refereed literature as being drivers of the MERP, including the factors that we examined in our evidence in the 2004 Generic Proceeding.

We next turn to examining whether GFBA rate-making in Canada has adversely affected the relative investment performance of equity investments in Canadian utilities. Not only do we find no evidence to support this unsubstantiated conjecture but we also report evidence to the contrary. Relative to the non-regulated corporate sector in Canada, the investment performance of Canadian regulated utilities has actually improved with GFBA rate-making. To illustrate, we find that investors earned a higher return by taking less risk by investing in the utilities index than investing in the market index. Not only did the utility index have higher annualized returns than the market index for each of the three periods we examined but the utility index also had a lower standard deviation of return than the market index and its return-to-total risk measure progressively increased when measured over the following three periods: 1988-2008, 1999-2008 and 2004-2008. Unlike investors in the market index represented by the S&P/TSX Composite Index, investors in utilities earned positive returns over long Canadas over each of the three time periods.

We conclude this section of our evidence with our recommendation that the Commission reaffirm the use of the present formula for another five year period resetting the test year utility risk premium and individual capital structures in accordance with the detailed recommendations advanced in other parts of this evidence.

4.2 PURPOSE OF GENERIC FORMULA-BASED ADJUSTMENT MECHANISMS

Q. What is the primary purpose of generic formula-based adjustment (GFBA) mechanisms for the resetting of return on equity (ROE)?

A. The primary purpose of generic formula-based adjustment (GFBA) mechanisms for the resetting of return on equity (ROE) is to avoid reviews consisting of formal proceedings of the allowed return on equity on a utility-by-utility basis at a frequency that could be as short as yearly.

4.3 USE OF GENERIC FORMULA-BASED ADJUSTMENT (GFBA) MECHANISMS BY CANADIAN REGULATORS

Q. Which regulatory jurisdictions in Canada use generic formula-based adjustment mechanisms for the annual resetting of return on equity (ROE) for all or some of the applicant utilities under their jurisdiction?

A. Six different regulatory jurisdictions in Canada use generic formula-based adjustment mechanisms for the annual resetting of return on equity (ROE) for all or some of the applicant utilities under their jurisdiction. Generic formula-based approaches for the determination of ROE have been in place in Canada since 1994 when the BCUC (British Columbia Utilities Commission) and the NEB (National Energy Board) both adopted them.[233] They also are currently in use in Alberta, Manitoba, Newfoundland and Labrador and Ontario.[234] Nova Scotia currently follows the traditional practice of conducting hearings. In Quebec, the Régie de l'Enérgie adopted a formula for Gaz Metropolitain but not for Hydro Quebec.[235]

Q. Have any of these boards recently reviewed and retained their annual ROE adjustment formulas?

A. Yes, three of these boards have reviewed and retained their annual ROE adjustment formulas during the past three years. The BCUC reviewed its formula in a March 2006 decision for Terasen Gas in which it lowered its adjustment factor to a 75 basis point adjustment to the allowed return for each one percent change in the long Canada bond yield. The OEB reviewed its formula in December 2006 when it decided to apply its formula for determining the allowed ROE for electricity distributors. In Decision D-2007-116, which was rendered on October 15, 2007, the Quebec Régie on page 10 of an English version of section 4.1 of its decision "renewed the automatic ROE adjustment formula to be in application as of the year 2009, according to the terms and conditions established in Decision D-99-11". However, the Quebec Régie both reset the risk-free starting rate and marginally increased the own risk premium

[233] British Columbia Utilities Commission, Return on Common Equity Decision, June 10, 1994, Order G-35-94; National Energy Board, Multi-Pipeline Cost of Capital, RH-2-94; National Energy Board's Reasons for Decision, TransCanada Pipelines Limited RH-4-2001, June 2002.
[234] Alberta Energy and Utilities Board, Generic Cost of Capital, Decision 2004-052, July 2, 2004; Manitoba Public Utilities Board Order 49095, page 50; Newfoundland & Labrador, Orders No. P.U. 16 and 36 (1998-99) and No. P. U. 18 (1999-2000); Ontario Energy Board Draft Guidelines on a Formula-Based Return on Common Equity for Regulated Utilities, March 1997.
[235] Quebec Régie de l'Énergie, D-99-11, R-3397-98, February 10, 1999.

by 14 basis points due to increased competition from electricity (i.e., for residential space demand from Hydro Quebec).

4.4 TWO GENERIC APPROACHES FOR ESTABLISHING THE ALLOWED RATE OF RETURN AND ITS ASSOCIATED DEEMED CAPITAL STRUCTURE USED BY CANADIAN REGULATORS

Q. Would you please review the generic approaches used by Canadian regulators to determine the allowed return on equity (ROE) and its associated deemed capital structure (equity ratio)?

A. Canadian regulators generally use one of two approaches to determine the allowed return on equity (ROE) and its associated deemed capital structure (equity ratio). The first approach, which is used by the AUC (formerly called the EUB), NEB and OEB, begins with a determination of the allowed ROE for a benchmark utility of *average* risk that is applicable without any further return adjustment to all applicant utilities. This is followed by a determination of the capital structure (equity ratio) for each applicant utility based primarily on its relative business risk determined by the relative weight and import of various business risk determinants but also on its stand-alone investment grade debt rating (usually in the range of BBB+ to A). This approach approximately equates the total risks of all subject utilities to both themselves and to the benchmark ROE if it is implemented correctly. Under this approach, regulators can change the deemed capital structure in utility-specific proceedings to reflect changes in business risks, and annually change the allowed ROE for all utilities using a GFBA mechanism.

The second approach, which is used by the British Columbia Utilities Commission (BCUC), begins with a determination of the allowed ROE for a benchmark utility of *low* risk that becomes the starting or base ROE for the determination of the allowed ROE for specific applicant utilities. This is followed by a determination of an ROE adjustment and deemed capital structure (equity ratio) for each applicant utility based primarily on its relative business risk but also on its stand-alone investment grade debt rating (usually falling in the range of BBB+ to A). This approach is somewhat more difficult to implement since equating the total risks of all applicant utilities to both themselves and to the (low risk) benchmark used to estimate the unadjusted or starting ROE requires the simultaneous determination of both a reasonable equity ratio as well as an ROE adjustment to the starting ROE. The ROE adjustment under this approach is usually an ROE premium or kicker since the applicant's total risk with the chosen deemed capital structure is deemed to be higher than that for the low-risk utility benchmark. Under this approach, regulators can change both the deemed capital structure and ROE in utility-specific proceedings to reflect changes in business and total risks. However, unlike the first approach, the second approach does not eliminate the time and cost involved in preparing testimony on what is an appropriate ROE at each utility-specific regulatory proceeding.

4.5 IMPLEMENTATION OF GFBAs IN CANADA

Q. How are the GFBAs implemented in Canada?

A. All of the GFBAs currently in use in Canada are based on an initial or seed or starting year ROE. This involves the determination of two components that when added together provide the initial ROE. The first component is the risk-free rate as proxied by the rate on the benchmark long-term (30-year) Government of Canada bond. The second component is the equity risk premium for an average-risk utility in five jurisdictions and a low-risk utility in BC.

The adjustment mechanism then specifies how the ROEs for subsequent years change from the base ROE. The only new input into the adjustment mechanism is a new forward-looking forecast of the risk-free rate. Given this new input, a formula adjustment factor is then used to adjust the ROE on a yearly basis. A 75% adjustment factor is primarily used in the Canadian jurisdictions that rely on this ROE resetting mechanism.[236] If the adjustment factor is set at 0.75, then the annual change in the allowed ROE is 75% of the change in the forecast long-term Government of Canada bond yield.

The actual implementation of a GFBA mechanism can be demonstrated by describing the NEB approach. To obtain the starting ROE, the NEB procedure takes the average 3-month out and 12-month out forecasts of 10-year Government of Canada bond yields as reported in the November issue of *Consensus Forecasts* (Consensus Economics, Inc., London, England.) To this, the NEB adds the average daily spread between 10-year and 30-year Government of Canada bonds as reported in the *National Post* for October to obtain its starting 30-year Canada rate. This procedure provides the starting risk-free rate component of the starting allowed ROE. An equity risk premium of 300 basis points is added to the determined 30-year Canada rate to get the final starting allowed ROE for the sample of pipeline companies.

In order to incorporate the belief of the NEB (as is the case for all other regulatory jurisdictions using a GFBA mechanism) that equity risk premiums decrease when rates on 30-year Canada's are rising and increase when rates are falling, the NEB adopted an adjustment mechanism that allows for the ROE to be adjusted upwards or downwards by 75% of the subsequent annual increases in the consensus estimates of the rate on long Canada's (when calculated using the above procedure).

4.6 USE OF GFBA-LIKE MECHANISMS IN NON-CANADIAN REGULATORY JURISDICTIONS

Q. Are GFBA-like mechanisms used in any non-Canadian regulatory jurisdictions?

[236] In 2006, the BCUC moved from a 100% adjustment for a forecast long Canada yield below 6.0% and a 75% adjustment factor for a forecast long Canada yield above 6%. Terasen Gas Inc./Terasen Gas (Vancouver Island) Inc. – Application to Determine the Appropriate Return on Equity "ROE") and Capital Structure and to Review and Revise the Automatic Adjustment Mechanism (Order Number G-14-06), page 16.

A. Yes, they are. In its comments for the ROE workshop for the staff of the Public Utilities Commission of Ohio (PUCO), Duke Energy Ohio, Inc. noted that: "Such a regulatory mechanism is quite prevalent in most Canadian jurisdictions and increasingly prevalent in U.S. jurisdictions, notably in California."[237]

The process in California has evolved over time. Due to the complexity and burden of issuing year-end decisions on GRC applications, the Public Utilities Commission of the State of California transferred its review of capital structures and ROEs of the major energy utilities to annual cost of capital applications from GRC applications as of January 1, 1990. In 1996, The Commission adopted a Market Indexed Capital Adjustment Mechanism (MICAM) that has had several subsequent modifications. San Diego Gas & Electric Company (SDG&E) was until recently required to file a complete cost of capital application every five years or in May following an off-ramp event, which is triggered when the difference between the current six-month average Aa bond rate and its benchmark exceeded an off-ramp of 260-basis points.

In a proposed decision dated April 29, 2008 and subsequently adopted, Administrative Law Judge Michael J. Galvin establishes a uniform multi-year cost of capital mechanism (CCM) for Southern California Edison Company (SCE), San Diego Gas & Electric Company (SDG&E) and Pacific Gas and Electric Company (PG&E).[238] The proposed CCM is summarized as follows on pages 15-16 of his proposed decision:

> "A uniform CCM shall be adopted for SCE, SDG&E, and PG&E. The CCM shall be based on:

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[237] Comments of Duke Energy Ohio, Inc., Rate of return workshop, PUCO staff, June 12, 2007, page 14. Available at: http://www.puco.ohio.gov/emplibrary/files/legal/RORworkshop/Duke_Comments-06062007.doc.

[238] Proposed Decision of ALJ Galvin, Opinion establishing a multi-year cost of capital mechanism for the major energy utilities, Before the Public Utilities Commission of the State of California, Applications 07-05-003, 07-05-007 and 07-05-008, Mailed 4/29/2008. Available at: http://docs.cpuc.ca.gov/efile/PD/82095.pdf. Adopted in California Public Utilities Commission (Commission) Decision (D.) 08-05-035, dated May 29, 2008.

a. A full cost of capital application due April 20 of every third year with the fourth year being a test year.
b. Capital structure is the most recently adopted.
c. Long-term debt and preferred stock cost is the most recently adopted.
d. Deadband is equal to 100-basis points.
e. Index is Moody's Aa utility bonds for A credit-rated utilities and Moody's Baa utility bonds for B credit-rated utilities.
f. Adjustment ratio is 50%.

In any year where the difference between the current 12-month October through September average Moody's utility bond rates and the benchmark exceeds a 100-basis point trigger, an automatic adjustment to the utilities' returns on equity (ROE) shall be made by an October 15 advice letter to become effective on January 1 of the next year as follows:

a. ROE is adjusted by one-half of the difference between the Aa utility bond average for A credit-rated utilities and Baa utility bond average for B credit-rated utilities and the benchmark.[239]
b. Long-term debt and preferred stock costs are updated to reflect actual August month-end embedded costs in that year and forecasted interest rates for variable long-term debt and new long-term debt and preferred stock scheduled to be issued.
c. The 12-month October through September average that triggered an adjustment becomes the new benchmark."

Q. Are there any other types of GFBA-like mechanisms in the United States?

A. Yes, there are. Some utilities in some U.S. regulatory jurisdictions (e.g., Atmos – MS) have or have applied for an earnings-based Automatic ROE Adjustment Mechanism

[239] As adopted and pursuant to D.08-05-035 Conclusion of Law 11, Moody's Aa utility bond interest rates are used for those utilities under the CCM having an AA credit rating or higher, Moody's A utility bond interest rates are used for those utilities having an A credit rating, and Moody's Baa utility bond interest rates for utilities having a BBB credit rating or lower.

that provides rate stabilization and virtually ensures that the utility will recover authorized revenue within established parameters.[240]

4.7 EVALUATION OF GFBA MECHANISMS

Q. Should GFBA mechanisms produce the same dollar amount of revenue requirements as using a utility-specific method to determine revenue requirements?

A. If properly implemented, the revenue requirements should be the same under either approach.[241]

4.7.1 Risk-free Interest-rate-driven GFBA Mechanism

Q. Would you please comment on the drawbacks that are attributed to GBFA mechanisms, such as those used by Canadian regulators, that are linked to risk-free interest rate movements?

A. We have identified various possible disadvantages that are attributed to an interest-rate-driven GFBA mechanism in various regulatory submissions. Most of our discussion of such possible disadvantages draws heavily on a submission by Duke Energy Ohio, Inc. to PUCO. [242]

First, interest-rate driven GFBAs supposedly do not reflect changes in the market risk premium. In direct contradiction to this assertion, the Duke Energy submission states

[240] See: Questar Gas Company, Docket No. 07-057-13, QGC Exhibit 3.12, Public Service Commission of Utah, Declining use per customer mitigation for proxy group companies. Available at: http://www.psc.utah.gov/utilities/gas/07docs/0705713/55785QGC%20Exhibit%203.12.doc.

[241] This point was also in: Comments of Duke Energy Ohio, Inc., Rate of return workshop, PUCO staff, June 12, 2007, page 5. Available at: http://www.puco.ohio.gov/emplibrary/files/legal/RORworkshop/Duke_Comments-06062007.doc.

[242] The subsequent unreferenced page numbers are from: Comments of Duke Energy Ohio, Inc., Rate of return workshop, PUCO staff, June 12, 2007. Available at: http://www.puco.ohio.gov/emplibrary/files/legal/RORworkshop/Duke_Comments-06062007.doc. Many of these points are identical to those in: Testimony of Roger A. Morin, Fair return on common equity for Newfoundland Power Inc., October 2002, pages 47 and 48. Available at: http://n225h099.pub.nf.ca/nfpower03/Application/RMorin.pdf.

that there is a "well-documented inverse relationship between the risk premium and the level of interest rates…" (Duke Energy, page 12).

Second, in the absence of an incentive plan, interest-rate driven GFBAs supposedly do not provide incentives for productivity gains and cost minimization. We agree with this criticism but note that it applies to any cost of service approach to regulation. Not only is this like the alternative utility-specific method when a specific allowed ROE and deemed capital structure are set but both methods allow utilities to keep any productivity gains or benefits from cost minimization until the GFBA is reseeded or the utility-specific rates are reset.

Third, it is supposedly unfair to apply an interest-rate driven GFBA to all regulated utilities because specific utilities "may be more or less risky than the utilities that are under the ROE formulas" (Duke Energy, page 14). In direction contradiction to this assertion, the Duke Energy submission states on page 7 that the GFBA method produces the same amount of dollars of revenue requirements if implemented properly, and on page 8 that an individual utility's relative business risk is recognized by deeming a higher (lower) equity ratio component for a utility with higher (lower) than average business risk.

Fourth, interest-rate driven GFBAs "developed under one set of particular capital market conditions when long-term government bond yields were much different than they are currently, are not directly transferable to any given utility, for they imply a vastly different risk premium" (Duke Energy, page 14). This also applies to the utility-specific method of setting allowed ROEs and deemed capital structure. In both cases, provisions need to be in place to reset the allowed ROE(s) and deemed capital structures for the base year for applicant utilities.

Fifth, the use of a single-factor driver of ERP changes may be an oversimplification, and the exercise of judgment in the utility-specific approach arrives at better estimates. While the former is true, there is no empirical evidence to support the latter although the latter is definitely more costly. We assess the merits of single- versus multiple-factor drivers of ERP changes in a subsequent part of section four.

Sixth, the use of interest-rate driven GFBAs has resulted in unfairly low ROEs. We address this conjecture in the last subsection of section four.

The disadvantages of a GFBA mechanism can be alleviated if provisions are available for either utilities or customers to seek a review of the GFBA mechanism in order to reseed it at a different initial ROE and/or to realign its adjustment factor and/or modify its adjustment driver(s). For example, if a utility is near a downgrade to speculative grade for its regulated activities, then the utility should have the right to seek a review of the GFBA. Furthermore, concerns about financial flexibility and increased business risk can be addressed by requesting a change in the deemed capital structure at utility-specific proceedings. However, the process for intervenors to provide input is generally reactive and not proactive, and there appears to be little opportunity for ongoing oversight by potential intervenors of whether the current ROE is too high until a utility applies to the regulator to reset the allowed ROE.

Q. Would you please critique the advantages that are attributed to GBFA mechanisms, such as those used by Canadian regulators, that are linked to risk-free interest rate movements?

A. There are two main advantages advanced for the use of a properly formulated and fairly seeded GFBA mechanism for the initial test year.

First, a GFBA mechanism reduces the cost of ROE determination. Since the determination of the unobservable ROE can be subject to wide differences of expert opinion, considerable applicant and intervenor time and cost are incurred in expert testimony preparation, information requests, cross-examination and preparation of final argument. The process also expends considerable Board time and resources. There is no empirical evidence that the net benefit of a utility-specific process over the GFBA process is positive since the incremental benefit is uncertain and may be more or less fair, and the incremental cost is a certain positive value.

Second, a GFBA mechanism increases the predictability, reduces the arbitrariness of allowed returns and should provide greater cross-sectional fairness across the utilities regulated by the same regulator. All else held constant, this should lower the risk profile of an applicant utility as compared to its risk profile under the old traditional approach to rate setting. For example, DBRS characterized the GCOC Formula as follows:[243]

> "Regulation by the EUB, as set out by the generic cost of capital framework, provides long-term certainty for the capital structure of EDI and brings structure to calculation of the return to equity."

However, if an improperly formulated and/or unfairly seeded GFBA mechanism is used, then the allowed ROE may unfairly advantage either the utility or its customers. If it results in too high of an ROE, this enriches the shareholders of the utility at the expense of its customers. Similarly, if it results in too low of an ROE, it favours the customers over the shareholders of the utility, and may even jeopardize the financial integrity, flexibility and cost at which the utility can raise funds.

4.7.2 Risky Interest-rate-driven GFBA Mechanisms

Q. How would you compare the Californian GFBA mechanism, which is linked to large movements in the risky interest rate for the applicant utility's bond-rating, with the Canadian GFBA mechanism, which is linked to all movements in the long term risk-free rate?

[243] DBRS letter to Mr. Grimes, Credit Rating for EPCOR Distributions, Inc., December 20, 2004. Included in EPCOR's responses to Information Requests, Exhibit 20090210c.

A. While the Californian GFBA mechanism might be better at capturing movements in the risk premium if it were linked to all movement in the risky interest rate for the applicant utility's bond-rating, it only indirectly captures movements in the risk-free rate and it reflects liquidity and default risks. The default risk premium is generally measured as the difference between the yield on bonds of a specific rating category and a risk-free proxy such as Long Canada's. The Californian GFBA also depends upon the untested hypothesis that the distribution of differences of 100 basis points and greater between the current 12-month October through September average Moody's utility bond rates and the benchmark are symmetrically distributed. This would not be the case, if for example, risky bond yields movements are slower to adjust on the way down than on the way up.

4.7.3 Other Factor-driven GFBA Mechanisms

Q. What is your assessment of the factors chosen to drive the GFBA mechanisms in use in Canada and California?

A. The formulas currently in use work well in reducing ROE volatility with changing risk-free or risky rates and are simple to implement. However, these formulas are grounded on limited old peer-reviewed scientific evidence on what are the determinants of changes in equity risk premiums. In fact, the peer-reviewed scientific literature identifies other variables as being better predictors of changes in risk premia, such as the dividend yield on a market index like the S&P500 or S&P/TSX Composite or the default spread as measured by the yield spread between long corporates and long governments (i.e., sovereign government bonds with a long term to maturity). While these other predictors are superior technically, they are more contentious in some quarters and marginally more difficult technically to implement.

Q. Based on the literature, what variables have been found to be useful instruments for capturing the time-series variation in the returns and/or risk premium for the market and various multi-factor proxies of priced investment risks?

A. In the multifactor asset pricing and portfolio performance literature, lagged values or innovations in at least five variables have been found to be useful instruments for capturing the time-series variation in the returns and/or risk premia for the market and various multi-factor proxies of priced investment risks. The choice of these variables is based on evidence of their power in predicting stock returns. The variables that have been identified in the literature include the dividend yield on a market index such as the S&P500 or S&P/TSX Composite; the one-month T-bill rate; the risk premium as measured by the yield spread between long corporates and long governments; the slope of the term structure as measured by the yield spread between long governments and the one-month Treasury bill rate; and the variance of the returns on the market. Examples of where these factors have been used in the literature are provided in Schedule 4.1.

In the relatively sparse literature using the more simplistic asset pricing models, such as the DCF model with analyst forecast data to obtain estimates of ex ante equity risk premia, variables identified as being significant determinants of variations in the equity risk premium include changes in long government yields, changes in a consumer confidence index, dispersion of the forecasts of analysts for earnings growth, and the volatility of the S&P500 index. Surprisingly, this literature appears not to test the dividend yield on the S&P500 index as a possible determinant. Drs. Harris and Marston find that much of the variation in the market risk premia in the U.S. can be explained by changes in interest rates or in changes in their forward-looking risk proxies. Since they also find that equity risk premia move inversely with interest rates in the U.S., they conclude that required returns on stocks are more stable than the interest rates themselves.[244] Of concern in this literature is the lack of theoretical justification for the choice of the tested determinants, such as the long government rate, and that the use of a risk-free proxy whose returns are independent

[244] Robert S. Harris and Felicia C. Marston, 2001, The market risk premium: Expectational estimates using analyst's forecasts, *Journal of Applied Finance* 11:1 (2001), pages 6-16.

of the returns on stocks can be shown to result in an estimated beta of –1 between the ERP and that risk-free proxy.

A theoretical link has been established for one of the potential determinants of changes in the equity risk premium. Dr. Rozeff shows that an identity characterizes the relation between the equity risk premium and the dividend yield, where the changes in the equity risk premium are directly related to changes in the dividend yield.[245]

Q. Can the empirical models reported in the literature forecast the equity premium any better than the historical mean?

A. This issue is still being debated in the literature and was the topic of a 2008 issue of the *Review of Financial Studies*.[246] Given the numerous papers critical of empirical asset pricing models, Drs. Goyal and Welch (2008) argue that the historical mean performs as well as any of the more complex empirical models at forecasting the equity premium, and that this conclusion depends on how the 1973–1974 stock market collapse is accounted for. Drs. Campbell and Thompson (2008) argue that the empirical models yield useful out-of-sample forecasts if their parameters are restricted in economically justified ways. Dr. Cochrane (2008) argues that the out-of-sample tests performed by Drs. Goyal and Welch are relatively weak, and that in-sample tests provide far greater power.

[245] Michael S. Rozeff, 1984-85, Dividend yields are equity risk premiums, *Journal of Portfolio Management* 11:1, pages 68-75.
[246] J. Y. Campbell and S. B. Thompson, 2008, Predicting excess stock returns out of sample: Can anything beat the historical average?, *The Review of Financial Studies* 21(4), pages 1509–31; J. H. Cochrane, 2008, The dog that did not bark: A defense of return predictability, *The Review of Financial Studies* 21(4), pages 1533–75; and A. Goyal and I. Welch, 2008, A comprehensive look at the empirical performance of equity premium prediction, *The Review of Financial Studies* 21(4), pages 1455–1508.

Q. Which of these variables did you report in your evidence in the 2004 Generic Proceeding as being significant determinants of Canadian equity market risk premiums using annual data?

A. We reported that we only found two variables as being significant determinants of realized ERPs in Canada using annual data. We found strong significance for the dividend yield on the S&P/TSX Composite and marginal significance for the default premium.

Q. What was your recommended automatic ROE adjustment formula in the 2004 Generic Proceeding?

A. We recommended that the automatic adjustment formula be the summation of two components. The first component is the adjustment designed to capture the change in the intercept of the Security Market Line. It can be proxied by the adjustment factor multiplied by the change in the long Canada yield from its base year value using a variant of the NEB formula described earlier. Specifically, component one is given by:

$$\text{Component One} = X \; x \; (\text{LtCanYld}_t - \text{LtCanYld}_{\text{BaseYear}})$$

where LtCanYld_t is the forecast of the yield for long Canada's for year t subsequent to the base year;

$\text{LtCanYld}_{\text{BaseYear}}$ is the yield for long Canada's determined by the Board for the base year 2004; and

X is the adjustment factor that is equal to 1 if the full impact of the change in the risk-free asset is reflected in the ROE, and is less than 1 otherwise. X should be less than one if a portion of the annual change in the risk-free rate is noise.

The second component is the adjustment designed to capture the change in the equity risk premium of the Security Market Line. The second component can be proxied by the adjustment percentage multiplied by the beta for the utility sector multiplied by the change in either next year's forecasted dividend yield on the S&P/TSX Composite from its base year value or in next year's forecasted default premium from its base year value. If one assumes that changes in the dividend yield or the default premium follow a random walk over time, then the actual annual change in these factors can be used. For expositional purposes, we let Y be the adjustment percentage multiplied by the beta for the average-risk utility.[247] After this change, component two is given by:

$$\text{Component two} = Y\ x\ (DivYld_t - DivYld_{BaseYear})$$

or: $$\text{Component two} = Y\ x \text{ of } (DefPrem_t - DefPrem_{BaseYear})$$

where $DivYld_t$ and $DefPrem_t$ are the forecasts of the dividend yield for the S&P/TSX Composite and the default premium, respectively, for year t subsequent to the base year;

$DivYld_{BaseYear}$ and $DefPrem_{BaseYear}$ are the dividend yield for the S&P/TSX Composite and the default premium, respectively, as determined by the Board for the base year 2004; and

Y is the adjustment factor, which embeds the beta applicable to the average-risk utility. Decreasing values of the adjustment factor indicate that a lower proportion of the full annual impact of the sector's share of the change in the market equity risk premium is reflected in the ROE.

4.7 HAVE CANADIAN UTILITIES SUFFERED UNDER GFBA RATE-MAKING?

Q. Many of the applicant utilities to the Generic Proceeding have argued that Canadian utilities have suffered under GFBA rate-making. Would you agree?

[247] The beta of the average-risk utility appears here because it represents the proportion of the change in the market equity risk premium that should be reflected in the equity risk premium for the average-risk utility.

A. No, we would not agree.

Q. How did you address this issue?

A. In the finance literature, one examines this question by studying how the investments of equity investors in these utilities have performed. Academics and practitioners commonly measure investment performance using the Jensen alpha and/or Sharpe measures.

Jensen's alpha is the estimated intercept of the regression between the excess returns of a utility and the excess returns of a benchmark over some evaluation period, typically five years or longer using monthly returns. An excess return for a utility or benchmark is its monthly return less the monthly return on a risk-free asset, which is typically taken to be a 30- or 90 day treasury bill. The benchmark is typically the S&P/TSX Composite for performance evaluations in Canada. This is often the regression that experts run to obtain their beta estimates for a utility. Alpha measures the average excess return achieved by investors in the asset per unit of nondiversifiable risk (i.e., beta). As such, alpha is a measure of the average market- and risk-adjusted return earned by the utility over the assessment period. It is consistent with the belief that investors only obtain compensation for bearing nondiversifiable risk.

In contrast, the Sharpe measure calculates the average or mean excess return of a firm or benchmark divided by the standard deviation of return of the same firm or benchmark over some evaluation period, typically five years or longer. The measure provides the average excess return achieved by investors in the asset per unit of total risk (i.e., both diversifiable and nondiversifiable risk). The Sharpe ratio of the utility (or index of utilities) being evaluated is then compared to the Sharpe ratio for the benchmark. This measure is used when investors do not hold well-diversified portfolios because they believe that they have superior stock picking or market timing ability.

Numerous studies (including those in which Dr. Kryzanowski is a co-author) find that professional managers, such as those that manage mutual funds, are not able on a greater than chance basis to earn significant positive alphas or to achieve Sharpe ratios that exceed the corresponding ratios for the chosen benchmark.

Q. What did you find when you examined the utilities in your sample?

A. We began by estimating the alphas for the individual utilities in our sample over five-year periods that started with the period of 1990-1994 period and ended with the period of 2004-2008. These results are summarized in Schedule 4.2 and depicted in Schedule 4.3. We find that all of the mean alphas for each utility over the 15 rolling five-year periods are positive and that all of the mean alphas across the utilities for any particular five-year period are also positive. To illustrate how the values should be interpreted, let us take the alpha of 0.010 (i.e., one percent) in the cell given by the row 2004-08 and the column headed by Fortis Inc. This is the abnormal return (commonly referred to as a “free lunch”) that shareholders in Fortis earned per month on their investment in Fortis. If we examine the last three rows in Schedule 4.2, we find that the alphas have actually increased when we examine the first five rolling periods to the most recent five rolling periods. We find similar results for the cross-sectional mean alphas for Dr. Vilbert’s sample of five utilities. In fact, there is some weak evidence that his sample outperformed our sample. Furthermore, it is clear from Schedule 4.3 that the mean alphas for the four samples of utilities (including that of Dr. Vilbert) have been positive for each of the 15 rolling five-year periods that we examined.

Q. Did you conduct any tests of robustness to the choice of the risk-free asset?

A. Yes, we did. Although we are unaware of any study that used the return on a long government bond, we nevertheless replicated our analysis using the return on the JP Morgan Canada Government 10+ year total return as our proxy for the risk-free rate when calculating excess returns on our sample of utilities and the market proxy. These results are summarized in Schedule 4.4 and depicted in Schedule 4.5. Not surprisingly, this reduces the estimated abnormal returns for an average utility. However, most of the mean alphas for the various samples examined in Schedule 4.4 are positive for periods beginning after 1994 when the BCUC (British Columbia Utilities Commission) and the NEB (National Energy Board) both adopted a GFBA for rate setting, and all of the mean alphas are positive for the 2004-2008 period that primarily follows the adoption of a GFBA for rate setting by this Commission.

We also estimated the alphas for the S&P/TSX Sector 55 Utilities Index. We report the annualized abnormal returns in Schedule 4.6 for three periods of 1988-2008, 1999-2008 and 2004-2008. The estimated alphas are large and highly significant for all three periods when using the standard proxy for the risk-free asset (namely, t-bills). Furthermore, the abnormal return (14.67%) is the largest for the most recent of the three time periods we examined (i.e., 2004-2008). As expected, the estimated alphas are smaller but still statistically significant at conventional levels for the two most recent periods of 1999- 2008 and 2004-2008.

As a further test of robustness, we examined the Sharpe ratios for the S&P/TSX Sector 55 Utilities Index and the S&P/TSX Composite Index based on the standard and nonstandard proxies for the risk-free rate. We report these results in Schedule 4.7. We observe that not only did the utility index have higher annualized returns than the market index for each of the three periods we examined but the utility index also had a lower standard deviation of return than the market index. In other words, investors earned a higher return by taking less risk by investing in the utilities index than investing in the market index. Consistent with this observation, we find that the various Sharpe ratios for the utilities always exceed those for the market. In fact, when we use a nonstandard risk-free rate proxy for this type of analysis, we find that the Sharpe ratios are positive for the utilities and negative for the market for all three time periods. Of even more interest is the observation that the Sharpe ratios for the utility index have increased progressively as we move from the longest time period of 1988-2008 to the shortest time period of 2004-2008.

Q. What conclusion do you draw from this assessment of performance?

A. We conclude that these results do not support the conjecture that the returns earned by regulated utilities have been too low since the introduction of GFBA rate-making in Canada. In fact, there is evidence that relative to the non-regulated corporate sector in Canada, the investment performance of Canadian regulated utilities has actually improved with GFBA rate-making.

4.8 RECOMMENDATIONS CONCERNING GFBA RATE-MAKING

Q. What recommendations have you formed based on the analysis in this section of your evidence?

A. Our analysis refutes all of the criticisms levied against the use of a GBFA formula as opposed to setting rates by annual hearings. Further, we find that, contrary to all assertions to the contrary, Canadian utility shareholders have not suffered under the current regime of GBFA formulas.

We review three alternative GBFA arrangements including that of the BCUC under which both allowed return and capital structure vary, the California method of benchmarking the equity risk premium to a yield on risky utility bonds as opposed to the riskless long-term government rate, and the alternative of a multifactor model. While the first two alternatives are, in principle, capable of replicating the results of the present formula in place in Alberta, they are more complex to implement and open to contention. The third alternative enjoys a superior grounding in academic research but requires further testing prior to implementation for ratemaking purposes.

For these reasons, we believe that GBFA ratemaking has proven its merit and do not see any need for a change in the set up of the formula. We recommend that the Commission reaffirm its present formula for another five years and reset the equity risk premium for initial test year and allowed capital structures for the individual applicants following the detailed recommendations contained elsewhere in our evidence. Further, in our opinion, the Commission should allow for a review of the allowed capital structure in the annual GTA for any utility in danger of being downgraded to speculative grade (i.e., below BBB-).

5. CRITIQUE OF EVIDENCE SUBMITTED BY THE APPLICANT UTILITIES AND THEIR EXPERTS

5.1 OVERVIEW OF THIS SECTION

Q. How is this section of your evidence organized?

A. In this section, we begin with a critique of other experts' views on the factors underlying the choice of an appropriate capital structure – the first major area of disagreement. We begin with experts' understandings of business risk: in particular how it is measured and how the business risk potentially arising from utilities' need to finance new infrastructure is mitigated by the increasing interest in infrastructure investment on the part of institutional investors. Next we consider ATWACC and show that it suffers from a number of conceptual problems making it unsuitable for use in determining recommended ROEs and capital structure for regulated utilities in this hearing.

Continuing with the focus on capital structure, we then turn to a critical review of the assertions by other experts that a utility must maintain a rating in the A-range to ensure access to financing. Contrary to this claim, we provide evidence that Canadian utilities rated in the BBB-range are successful in attaining debt financing in both the U.S. and Canada. Our examination of the cost of debt for utilities with such lower ratings reveals that companies can control the increased costs by creative restructuring of their debt. Further, we show that the estimates of downgrade costs provided by AltaLink are overstated and incomplete.

Completing the critique of evidence relating to capital structure, we address and refute the claim advanced by ENMAX, EPCOR, and FortisAlberta that their non-taxable status should result in an increase in allowed equity thickness.

In the second major area of disagreement, we compare our recommendations for the ROE for the 2009 test year by the experts for the applicant utilities and ourselves against the estimates that have been calculated using the various adjustment formulas presently in use by some Canadian regulators. Our recommendation reflects the current trend towards a lower MERP. To summarize, our examination of the regulatory formulas and other evidence suggests that the Board should attach little weight to the inflated ROE recommendations of the various experts for the applicant utilities.

We then precede to the third major area of disagreement, namely, the rate of return on equity or ROE for the 2009 test year. We show that the implementation of various standard methodologies for estimating the ROE by experts for the applicant utilities consistently lead to inflated ROE estimates. After we demonstrate the impact of introducing or not dealing with known biases in the evidence of these experts, we conclude that with the correction for all of these biases, the fair rate of return estimates made by these experts are quite close to our own recommended rates.

This is followed by tests of whether the samples of U.S. utilities studied by the experts for the applicant utilities satisfied the comparable return standard based on realized returns. Based on *ex post* tests of market- and risk-adjusted returns, we find that these samples have exceeded the minimum requirements for the comparable return standard in that they have earned abnormal or “free lunches”. For this purpose, we use test methodologies that satisfy all four Daubert criteria for evaluating the admissibility (scientific merit) of expert testimony that has been adopted by federal and many state courts in the U.S.

5.2 CAPITAL STRUCTURE

5.2.1 Earnings Variability and Changes in Fundamental Factors

Q. Please comment on NGTL’s argument that business risk can be divided into two categories?

A. According to NGTL:[248]

> "NGTL considers business risk in two categories. The first is fundamental risk, which is the risks surrounding the return on and of capital invested in the enterprise. The main categories of fundamental risk are supply, market, competitive, operating and regulatory risk. The second category of risk is variability risk. Variability risk is the risk that earnings will exhibit some volatility from one year to the next. For regulated utilities the primary measure of whether there is variability risk is the extent to which deferral accounts cover differences between forecast and actual costs and revenues."

This attempts to redefine the commonly accepted notion of business risk by arguing that earnings variability as measured or estimated at an annual frequency is not due to changes in fundamental factors (risks). A basic investment book such as *Sharpe et al.* views earnings as having two components.[249] The components that are likely to repeat and not repeat are referred to as permanent and transitory components, respectively. Since the intrinsic value of a share depends on the firm's future earnings prospects, changes in the intrinsic value (and market price) will be correlated with expected changes in its permanent (not transitory) component. In turn, changes in the permanent component of expected earnings will depend upon expected changes in fundamental factors.

Since deferral accounts are set up to deal with items that are expected to repeat but are hard to forecast, it is inconsistent to argue that items subject to deferral accounts are not components of business risk. Just because we can not accurately forecast an item does not eliminate it as a fundamental factor. If that were the case, we would have to eliminate GDP growth or inflation or most macro factors that we can not forecast accurately as fundamental factors.

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[248] Exhibit 976205_1632942, Written Evidence of NGTL, Section 2.2: Business Risk and Total Return Comparison, lines 14-20, page 1.
[249] William F. Sharpe, Gordon J. Alexander and David J. Fowler, 1993, *Investments* (Scarborough, Ontario: Prentice Hall Canada Inc., First Canadian Edition), pages 504-6.

Unlike the case of non-regulated assets, the risk of under-recovery for utilities regulated by this Commission is, in our opinion, minimal. In his reply to Information Request UCA-NGTL 206, Dr. Kolbe states that he is not aware of any instances in which investors in Canadian regulated utilities experienced under-recovery of capital.

5.2.2 Infrastructure Investment: Pension Fund Return Expectations and Involvement

5.2.2.1 Pension Fund Return Expectations from Infrastructure Investment

Q. How do pension funds characterize the returns and risks of infrastructure investment, and especially investment in regulated assets?

A. We have only examined the investment policy statements or other information available on the websites of some Canadian pension funds. The descriptions of two large Canadian pension funds are:

- Canada Pension Plan Investment Board:
  "The infrastructure program's focus is on assets with lower risk and return characteristics, typically characterized by strong regulatory and monopolistic elements, and with low substitution risks. Such investments might include electricity transmission and distribution, gas transmission and distribution, water utilities, toll roads, bridges and tunnels, airports, and ports." (Under "Infrastructure" at CPP website (http://www.cppib.ca/Investments/Inflation_Sensitive_Investments/infrastructure.html)

- Ontario Teacher's Pension Plan:

> "… our global infrastructure portfolio is focused on the long term retention of assets that have a long economic life and offer low-risk, reliable returns linked to inflation to pay inflation-indexed pensions for decades."
>
> "We look for businesses and opportunities in regulated industries that will provide stable returns with low risk. We find good investment opportunities in jurisdictions that have a fair and transparent regulatory framework, creating a strong environment for private investment." (Available at: http://www.otpp.com/wps/wcm/connect/otpp_en/home/investments/inflation+sensitive/infrastructure)

Q. Would you comment on Mr. Engen's equity return requirements for pension funds?

A. In reply to Information Request UCA-NGTL 122, Mr. Engen interpreted the benchmark returns for infrastructure as being returns on capital and not on equity. Thus, we asked a pension fund investment specialist from one of the major pension advisory firms in a private conversation what return Canadian pension funds would expect from an equity investment in the infrastructure of a regulated utility. His response was: "The typical benchmark for conservative infrastructure assets is CPI+5%. However, the expected return on a particular asset could vary due to specifics of the deal, such as leverage, etc." Thus, if one assumes a 3% CPI expectation, for the sake of argument, the expected return from an investment in conservative infrastructure, such as regulated utility assets, would be 8%. Thus, we find that an advisor to the buy side of infrastructure investments has a substantially lower return expectation than an advisor to the sell side of infrastructure investments.

Mr. Engen's argument that benchmarks are not target returns is not valid for passive investments. It is similar to arguing that an investor who makes a passive investment in a market index does not expect to get the market return before reflecting trade and other related costs. Furthermore, anyone that has been involved in preparing a pension fund IPS (Investment Policy Statement) knows that return benchmarks are supposed to be realistic targets that should be extremely difficult to beat on a consistent basis.

5.2.2.2 Pension Fund Involvement in Infrastructure Investment

Q. What is the current involvement and expected future involvement of pension funds in infrastructure investment and what impact would an increase in the allocation of pension funds to infrastructure investments have?

A. According to a recent report by Benjamin Tal of CIBC World Markets:[250]

> "Beyond the short-term stimulus, what will keep the fire going is private money. By now infrastructure is viewed by almost half of global institutional investors as a standalone asset class—up from 10% only three years ago. And rightly so, since the risk/return characteristics of the sector are notably different than any other asset class. In Canada, for example, with more than $700 billion to play with, even a minor change to pension funds' asset allocation can dramatically change the mathematics of infrastructure funding. And it's already happening. We estimate that currently roughly 5% of pension funds' assets are allocated to global infrastructure investment—up from only 2% earlier in the decade. And this allocation is rising.
>
> Look for that rising trend to continue, with pension funds allocating between 10% and 15% of their assets to infrastructure investment by 2017—adding more than $200 billion of fresh money to this capital intensive sector (Chart 9)." (pages 3-4)

Q. Do some of the utilities perceive the strong possibility of teaming up with pension plans to fund some large infrastructure assets?

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[250] Benjamin Tal, 2009, Capitalizing on the upcoming infrastructure stimulus, CIBC World Markets, *Occasional Report #66*, January 26. Available at: http://research.cibcwm.com/economic_public/download/occrept66.pdf.

A. Yes, in attachment 4 of NGTL's response to Information Request CAPP-NGTL 24(a), which contains a transcript of TransCanada 2008 Investor Day that was held in Toronto on November 6, 2008, we find the following question by Andrew Kuske and response from Russ Girling, President, Pipelines:

> "ANDREW KUSKE: Just as a follow-up, do you see an opportunity to partner with pension funds in the context of some of the bigger packages of assets that are out there?
> RUSS GIRLING: Yeah, I think that, you know, obviously the pension funds, if they are going to be interested in those large packages of assets, are going to want somebody that knows how to operate and we're a logical pick for them. They talk to us continuously about they're doing things like that. It is historical we haven't looked at doing those kind of partnerships in the past because we've had access to all the capital that we need through traditional means. The world has changed and there might be a lot stronger rationale to working with those kind of financial partners than they have in the past and obviously, we're a good fit for them in that we can actually do the due diligence, do the analysis and actually operate these things going forward." (Page 42)

5.2.3 ATWACC

Q. Drs. Kolbe and Vilbert employ formulas for ATWACC and estimate a cost of capital for NGTL's requested capital structure of 40% equity as well as for other structures. Please comment on the validity of ATWACC.

A. ATWACC is based on the static trade-off model of capital structure. Dr. Kolbe discusses the trade-off between the corporate tax advantages of debt and increased risk in Appendix C of his evidence.

We believe that the static trade-off theory can serve as a useful tool in qualitative analysis of capital structures. However, Dr. Kolbe badly miscasts the theory when he assigns it a role as a precise equation. As we state in section 2 of this evidence:

> “The first thing we can learn [from finance theory] is to be suspicious of attempts to determine an appropriate equity ratio using a formula. Unlike other areas in finance, research on capital structure can offer only qualitative advice.”

In Appendix 2A, we review current literature on capital structure encompassing theoretical models, empirical academic research and surveys of corporate best practices. Summarizing we state:

> “The main conclusions are three-fold: first, among academic researchers, the trade-off theory enjoys reasonable support but faces serious challenges from a number of competing theories. Second, while it has moderate support among financial executives, a survey in the U.S. shows that executives look outside the implications of this theory when setting capital structures for their firms. Third, while the trade-off theory can offer useful qualitative guidance, it is a mistake to treat capital structure as if it were amenable to precise analysis by a formula.”

The third conclusion clearly shows the erroneous nature of ATWACC in its present application. This conclusion is consistent with views of the National Energy Board:[251]

> “The Board notes that the K&V ATWACC Methodology assumes a specific relationship between a company’s ROE and capital structure through the reliance on the assumption that there is a broad range over which the ATWACC curve is flat. The Board has acknowledged in previous decisions that there is a relationship between ROE and capital structure, but has traditionally <u>addressed this relationship qualitatively, rather than quantitatively</u>. The Board accepts that, over a certain range, the ATWACC curve may be flat or virtually flat. However,

[251] Decision, Phase II, RH-2-2004, National Energy Board, page 55.

in the Board's view, the evidence does not persuasively demonstrate the breadth of this range. Therefore, the Board is of the view that caution should be applied in relying on ATWACC based evidence from companies with capital structures significantly different from that which is deemed for the Mainline." [Emphasis added]

Q. Please comment on how Drs. Kolbe and Vilbert have attempted to address the criticism of ATWACC curves with a hypothetical flat range.

A. Close examination of the responses reveal a number of disconnects between the conceptual underpinnings of ATWACC and scientific evidence as reflected in the results of academic research that has been published in peer-reviewed journals. These disconnects reinforce the NEB's criticism of ATWACC. We provide a number of instances.

In his response to Information Request UCA-NGTL 187, Dr. Kolbe confirms the NEB's concern when he states:

"Dr. Kolbe does not know the range in which the ATWACC is essentially flat for any firm or industry. Instead, Dr. Vilbert ensures that the ATWACC has not gone beyond the flat range by using only sample companies with investment-grade bond ratings." [Emphasis added.]

Further, it is unclear how confining the sample to investment grade companies ensures that ATWACC would be flat given the admission by Dr. Kolbe that the hypothetical flat range is unknown. In contrast, a study published in a peer reviewed journal argues that the optimal capital structure would be in the range of BBB implying that the ATWACC curve could have a minimum within a sample of investment grade firms.[252]

[252] A. Shivdasani and M. Zenner, 2005, How to choose a capital structure: Navigating the debt-equity decision, *Journal of Applied Corporate Finance* 17: 1 (Winter), page 30.

Q. Another argument for the existence of the hypothetical flat range of ATWACC relates to the impact of personal taxes. Do you agree with this argument?

A. No, we do not as it lacks support in published research. Dr. Kolbe makes this point in Appendix C to his evidence:[253]

> "While we cannot pin down the marginal tax advantage of debt precisely, enough information exists to demonstrate that personal taxes materially reduce the potential corporate tax advantage of debt, even without any consideration of the non-tax costs of debt."

NGTL confirms "that the purpose of this analysis is to support the argument that 'ATWACC does not vary within the broad middle range'".[254]

We disagree with Dr. Kolbe's conclusion regarding personal taxes for two reasons. First, the analysis naively assumes away the significant role played by pension funds and other tax deferred institutions in Canadian capital markets in setting prices as marginal investors. For example, AltaGas Utilities reports institutional ownership of 59.4% as of December 31, 2007.[255] After a brief discussion of debt markets, NGTL states "he [Dr. Kolbe] believes that the marginal investor in Canadian equities is also tax-paying".[256] Second, when Dr. Kolbe concludes that "personal taxes materially reduce the potential tax advantage of debt", he ignores published academic research which concludes to the contrary. We review four such studies in Appendix 2A of our evidence where we conclude that "while the impact of personal taxes can theoretically negate the corporate tax advantage of debt, personal taxes have been found to be far less important empirically."

[253] Appendix C to Written Evidence of A. Lawrence Kolbe, page C-14, lines 3-7.
[254] NGTL Response to Information Request UCA-NGTL 216 (a).
[255] AltaGas Utilities Inc., Response to UCA-AUI-13b.
[256] NGTL Response to Information Request UCA-NGTL 213.

Q. Do you have any further examples of the shortcomings of ATWACC?

A. Yes, we have evidence from academic research that questions a fundamental underpinning of hypothetically flat ATWACC curves. Dr. Kolbe states:[257]

> "Since the overall cost of capital is essentially constant as the proportion of risk-bearing equity shrinks, the risk and cost of equity must rise at an ever-increasing rate."

Contrary to this assertion the cost of equity is not always found to increase with leverage as assumed by Dr. Kolbe. We document a contrary finding by Sivaprasad and Muradoglu (2007) in Appendix 2A.

5.2.4 Access to Financing in the Event of a Downgrade

5.2.4.1 Split Ratings

Q. Would you please present your understanding of AltaLink's concern about its credit rating and the risk of a possible downgrade?

A. AltaLink estimates that a credit downgrade to BBB+, given today's view of the markets, would increase the cost of new debt paid by ratepayers and limit its access to debt capital to fund its build program. A downgrade to a BBB+ rating would represent a one notch downgrade in terms of AltaLink's current S&P rating of A- (stable) and a two notch downgrade in terms of AltaLink's current DBRS rating of A (negative trend). Both would be highly unlikely events as we discussed earlier in Section 2 of our evidence.

Q. Why does AltaLink focus on the lower S&P credit rating and not on the higher DBRS credit rating?

[257] Written Evidence of A. Lawrence Kolbe, November 20, 2008, page 34, lines 17-19.

A. AltaLink's focus is based on that of Ms. Abbott whose rationale is that a downgrade by S&P is more likely to place AltaLink into the BBB rating category.[258] It is also based on Ms. Abbott's opinion that the "A-" rating is precipitously close to a "ratings cliff," past which both funding cost and funding availability would be seriously affected. We have dealt with this unsupported conjecture in section three of our evidence. It is also based on Ms. Abbott's opinion that "investors pay the most attention to the lower rating when ratings are split as AltaLink's are".[259] While the AltaLink GTA evidence provides an example, the Investment Policy Statement of the University of North British Columbia, that classifies split-rated debt in the lowest rating of the major credit agencies,[260] in its Response to Information Request UCA.AML-139(a) AltaLink provides two examples, the credit facility agreements with the Bank of Nova Scotia and other lenders, where the higher rating governs. Specifically:[261]

> "(a) if only two Rating Agencies publish ratings of the Borrower and/or the Outstanding Senior Bonds, as applicable, the rating category containing the highest assigned rating shall govern, unless the difference in the ratings published by such two Rating Agencies is (i) two rating levels, in which case the applicable rating shall be the average between such two ratings; and (ii) more than two rating levels, in which case the applicable rating shall be deemed to be the rating one level higher than the lowest of the two ratings;"

5.2.4.2 <u>Access to U.S. Debt Market</u>

[258] AltaLink Management Ltd., GTA2009-2010 Application, Volume 1, September 16, 2008, line 24, page 9-19 through line 2, page 9-20.
[259] Direct Testimony of Ms. Susan D. Abbott, page 20, lines 380-381.
[260] AltaLink Management Ltd., GTA2009-2010 Application, Volume 2, September 16, 2008, Appendix J-3, Investment Policy Statements, unnumbered page.
[261] Attachment "$200M CP Backstop" to AltaLink response to Information Request, UCA.AML 139(a).

Q. Have utilities been able to access debt financing in the U.S. in 2008 and 2009 in the face of the credit crisis?

A. Definitely so according to Dr. Woolridge:[262]

> "Public utility debt in particular has recently found favor with fixed income investors… The worst of the credit crisis appears to be over. The short-term credit market has loosened up considerably. LIBOR rates peaked in the fall and have declined. Likewise, the long-term credit market appears to be loosening up, as credit spreads have declined."

A recent article in the *Wall Street Journal* provides the source for Dr. Woolridge's view that investors take a favourable view of utility debt in the U.S.:[263]

> "Even as credit markets seized last year, the utility industry achieved a noteworthy feat: It sold more bonds than it had in years.
>
> Utilities with investment-grade credit ratings sold $47 billion of corporate bonds last year, 34% more than the $35 billion issued in 2007 and 77% more than the $26.5 billion of 2006.
>
> The 2008 increase marked one of the few bright spots in the overall bond market, which registered a decline in issuance of nearly 35%, to $645 billion from $987 billion in 2007 according to Thomson SDC…
>
> The full-year issuance for utilities is encouraging, analysts said, because it shows a vital sector of the economy has adapted to changing conditions and is getting the money it needs to support basic operations as well as fund expansion…

[262] J.R. Woolridge, 2009, The financial crisis and utility capital cost rates, Working paper, Pennsylvania State University, February, pages 3 and 4.
[263] R. Smith, 2009, Bonds a bright spot for utilities in '08; Debt issuance rose 34% as Investors shunned commercial paper, stocks, *Wall Street Journal*, January 13.

> Key to that effort is the ability of utilities to finance big infrastructure projects. Steve Tulip, a managing director in debt capital markets for Goldman Sachs Group, says utilities stood out in a stormy credit landscape. 'The flight to quality clearly has benefited the power sector', Mr. Tulip said. "Investors are looking for safe havens'…
>
> In the fourth quarter, issuance by investment-grade utilities topped $10 billion. In 2008, utilities widened their share of total U.S. investment-grade bond issuance to 7% from 4% in 2007 and 3% in 2006."

Q. Are Canadian issuers with below A credit ratings able to borrow in the United States?

A. Ms. Abbott suggests incorrectly that a working paper by Dr. Mittoo and Mr. Zhang supports her contention that ""BBB" rated companies in Canada,[264] while not technically "non-investment grade" can have trouble accessing the markets there [i.e., U.S markets], even under normal market conditions. In fact, this cited paper finds that even high-yield or speculative borrowers, which the authors define as having a rating from S&P or DBRS of BB or less are able to borrow in the U.S. market.[265] Specifically, for a sample of firms that exclude financial and utility firms with primary SIC codes ranging between 4000-4999 and 6000-6999, Dr. Mittoo and Mr. Zhang state on pages 8 and 9 of their paper that:

> "Third, the US' well developed high-yield market and its availability of comprehensive credit risk analysis particularly benefit firms with weaker credit ratings. In recent years, Canadian high-yield issuers account for about 40 to 50 percent of the value of the US dollar debt issued by Canadian firms (Andersen, Parker, and Spence (2003)). Thus, tapping into the US high-yield market provides

[264] U. R. Mittoo and Z. Zhang, 2006, Bond market accessibility, credit quality and capital structure: Canadian evidence, Working Paper, University of Manitoba, September 15.
[265] Direct Testimony of Ms. Susan D. Abbott, AltaLink Management Ltd., GTA2009-2010 Application, Volume 2, September 16, 2008, on pages 25, 27 and 37.

> Canadian low credit quality firms with additional sources of external finance, instead of relying on bank loans or private placement."

Thus, the sample examined in this study excludes those low-risk regulated utilities that have the regulatory support of this Commission.

Ms. Abbott also incorrectly uses the findings of the working paper by Drs. Atilgan *et al.* to support her statement that "debt of foreign issuers costs more than that of comparable U.S. issuers in the U.S. market".[266] On page 16 of this working paper by Drs. Atilgan *et al.* "[i]nvestment-grade debt is defined as debt with a rating of Baa3 (BBB-) or higher from Moody's (Standard and Poor's). What Drs. Atilgan *et al.* conclude is that:[267]

> "The relative cost of debt for foreign firms and U.S. firms varies according to the quality of the debt. Non-U.S. firms issuing investment-grade debt have a lower cost of debt relative to their U.S. counterparts, but for speculative-grade debt the cost of debt is higher".

5.2.4.3 <u>Access to Canadian Debt Market</u>

Q. What about Canadian market access for Canadian regulated utilities with a rating in the BBB range?

A. They also have sufficient access to capital. Based on the observation that BBB-rated Canadian issuers only account for a low percentage of Canadian issues, Ms. Abbott concludes that BBB-rated Canadian issuers have poor access to the Canadian debt market. However, she conducts no tests to rule out the strong possibility that the low percentage of Canadian issues accounted for by BBB-rate Canadian issuers (denoted

[266] Direct Testimony of Ms. Susan D. Abbott, AltaLink Management Ltd., GTA2009-2010 Application, Volume 2, September 16, 2008, lines 540-48 on page 27.
[267] Y. Atilgan, P. Y. Davis-Friday and A. Ghosh, 2007, U.S. cross-listing, credit ratings and the cost of debt, Working Paper, Zicklin School of Business, Baruch College, City University of New York, September, Abstract.

as X) is not due to the small percentage of issuers that have such a rating in Canada (denoted as Y). In other words, she provides no evidence that Y is not the cause of X. Thus, there is no empirical basis for the speculative conjecture of Ms. Abbott that "there is a different level of creditworthiness that is minimally acceptable in Canada versus the United States".[268]

In Appendix J-3 of its GTA Application, AltaLink notes that "citations from various pension funds' statements of investment policy indicate that many funds limit the proportion of BBB rated bonds permitted to be held in the pension funds".[269] What AltaLink fails to state is that given the vast amount of assets held by Canadian pension funds, even restricted allocations to BBB-rated bonds represent a sizeable amount of investment dollars. Also, AltaLink completely ignores the large amount of dollars invested in Canadian investment grade bonds by Canadian bond mutual funds. An examination of the annual reports of these bond funds finds that the proportional holdings of BBB and lower rated bonds increases as one moves from a balanced bond fund, to a bond fund to a high yield bond fund. For example, the AGF Canadian High Yield Bond Fund as of September 20, 2008, had 19.6% of its assets in bonds rated at BBB and 67.5% of its asset invested in bonds rated at BBB or lower. Similarly, AltaLink and its expert, Ms. Abbott, also ignore the evidence of a growing interest in infrastructure investment (including utilities) by endowment funds, private equity funds and venture capital funds.

Q. Did other witnesses also suggest that an A rating is necessary to access capital markets?

A. Yes, Mr. Engen makes this argument in its support he states: [270]

[268] Direct Testimony of Ms. Susan D. Abbott, AltaLink Management Ltd., GTA2009-2010 Application, Volume 2, September 16, 2008, line 513 on page 25 through line 523 on page 26.
[269] AltaLink Management Ltd., GTA2009-2010 Application, Volume 2, September 16, 2008, Appendix J-3, not numbered page.
[270] Written Evidence of Aaron M. Engen for Nova Gas Transmission, Section 2.5, November 20, 2008, page 57, lines 10-12 and 19-21.

> "Corporate debt issuance since the beginning of 2003 has been overwhelmingly represented by A-category or higher rated debt, the vast majority of which came from Canadian and foreign-based financial institutions."

In response to Information Request UCA-NGTL 110, Mr. Engen provided charts that for the period 2003-8, 52% of Canadian corporate bonds issued by nonfinancial issuers were rated A or higher and 48% were rated either BBB+ or lower or unrated. Contrary to Mr. Engen's assertion, it is clear that roughly half of the corporate bonds issued in Canada are from companies rated below A or unrated.

Similarly, Mr. Engen supplied a corresponding chart for U.S. debt by Canadian issuers for the same period which reveals that bonds rated BBB+ or lower or unrated comprised 53% of the total. Again, the data reveal that there is a sizeable market for debt from companies rated below A.

5.2.4.4 <u>Absence of Financing Difficulties for BBB-Rated Utilities</u>

Q. In Section 2 of this evidence, you quote Ms. McShane as confirming in 2008 that, with the exception of Pacific Northern Gas, she is not aware of any cases in which regulated utilities in Canada have experienced difficulties in accessing capital markets to raise long-term financing. Has this understanding been confirmed by other witnesses?

A. Yes, it has. When asked for evidence from Mr. Engen of such difficulties in Information Request UCA-NGTL 109, NGTL replied:

> "Details regarding issuers who would have liked to come to the Canadian debt capital market but did not proceed because market conditions would not allow are not public, are confidential to the issuers and their financial advisors."

UCA asked Mr. Coyne for evidence of financing difficulties in the case of TransCanada and received the following answer:[271]

> "Mr. Coyne would conclude that while TransCanada is able to raise capital, there is little doubt that both its cost of equity and debt has risen considerably in the past year."

Q. Has Ms.McShane restated her view in the present hearing?

A. Yes, she updated her response by referring to confidentiality similarly to Mr. Engen. Information Request UCA-ATCO-86 asked for evidence of financing difficulties for 10 companies rated below A by at least one bond rating agency and included in Ms. McShane's sample. The reply was:[272]

> "Of the utilities listed above, the clearest example of a utility which experienced difficulty issuing and for which there is publically available information is Pacific Northern Gas. Details are provided in the attached BCUC decision "In the Matter of Pacific Northern Gas Ltd. Application for Approval to Recapitalize Under an Income Trust Ownership Structure", Decision, September 9, 2005. In the BCUC decision In the Matter of FortisBC Inc., 2005 Revenue Requirements Application, 2005-2024 System Development Plan, 2005 Resource Plan, Decision, May 31, 2005, the BCUC notes FortisBC's statement that it could not raise 30-year debt in 2004, a period of relatively easy credit market conditions. Nova Scotia Power raised five year debt in December 2008 at a 400 basis point spread over the five-year benchmark Canada bond; the treasurer of Emera told Ms. McShane that, at the time, NSPI could not have raised debt with a term of 10 years or more…
>
> While access to debt markets is an important consideration, so too are the cost of the debt and the overall cost of capital. BBB-rated utilities face a higher cost of

[271] Information Response to UCA-ATCO-19.
[272] ATCO Information Response to UCA-ATCO-86.

> capital than A rated utilities and thus there is no cost-based reason for the ATCO Utilities to have financial parameters that would only permit a BBB rating."

In brief, with the exception of PNG which experienced financial distress, all companies cited by Ms. McShane had financing available but stated that they were pressured to finance for shorter terms than originally planned.

5.2.4.5 Cost of Debt for BBB-Rated Utilities

Q. Do you agree with Ms. McShane's view that debt necessarily costs more for BBB-rated companies?

A. We recognize that holding all the features of debt (maturity, covenants, fixed / floating, among others) constant, debt costs generally increase as bond ratings worsen. In Section 2 of this evidence, we note some exceptions related to disagreements about credit quality among rating agencies and investors. An important point to recognize is that yield comparisons holding other features constant overstate the cost of a lower credit rating because companies can adjust other features of debt to compensate. We elaborate on this point in Appendix 2A.

Drs. Shivdasani and Zenner give the example of switching from fixed rate to floating rate debt:[273]

> "Over the last few decades, for example, an exposure to floating-rate debt would have significantly reduced the cost of debt relative to fixed-rate financing. Over the last two decades, a floating-rate debt strategy would have generated savings … roughly comparable to the spread between a AAA and a BBB firm. In other words, BBB firms with mostly floating-rate exposure could have had lower-cost debt than AAA firms with mainly fixed-rate debt."

[273] Anil Shidasani and Marc Zenner, 2005, How to choose a capital structure: Navigating the debt-equity decision, *Journal of Applied Corporate Finance* 17: 1 (Winter), page 29.

Q. You cite floating rate debt as a strategy to reduce costs. Would such a strategy be consistent with debt selection criteria currently in place in the Applicant utilities?

A. Taking AltaLink as an example, there is no contradiction between a floating rate debt strategy and debt selection criteria as described in AltaLink's Information Response to CG. AML-055 b:

> "Term Match – One of the considerations in the selection of debt maturity dates is to allow for better matching between the average life of the underlying asset base and average life of the portfolio…
>
> Refinancing Risk – Another factor in the selection of a particular debt term is whether that term serves to reduce refinancing risk. AltaLink's intention is to 'spread out' our 'stagger" debt maturities in a way that reduces the risk associated with refinancing an existing debt maturity…
>
> Interest Rate Risk – A 'staggered' debt portfolio also serves to reduce interest rate risk.
>
> Market Context – AltaLink forecasts its expected future debt issuance and terms to maturity to the best of its ability. Market conditions at the time of actual debt issuance may dictate a change in strategy."

In Information Response UCA-AML 131 (d), AltaLink raises low rates available today on long-term debt as an objection to shorter term debt. This also constitutes an implicit objection to floating rate debt:

> AltaLink's debt management strategy focuses on the overall coupon rate rather than only the credit spread, taking into consideration the need to diversify interest rate risk and to reduce refinancing risk by spreading debt maturities along the full

spectrum of the yield curve in line with projected future cash flow streams and the longevity of the usefulness of the assets. AltaLink's strategy of diversifying maturities by including 20 and 30 year maturities reflects the fact that Government of Canada 30-year bond yields are at historically low levels. If AltaLink were to limit its debt issuance to shorter 10-year maturities through the big build cycle, future ratepayers would be faced with potentially higher interest rates as several billion dollars of debt matures within a relatively short period of time when Government of Canada bond yields may be substantially higher than current levels."

We submit that this objection is based on the notion that interest rates will revert to average levels a view that has not been supported in over the last 20 years as documented in Section 3 of this evidence.

5.2.4.6 <u>Cost of Potential Downgrade to BBB Range</u>

Q. How would you characterize AltaLink's estimate of the cost of a potential downgrade to ratepayers?[274]

A. We would characterize it as a "back-of-the-envelope" calculation of the cost of an event with a low probability of occurring, or is what is referred to in risk management as a "worst case" or "tail" event. Even as a worst-case exercise, the resulting estimate is seriously flawed.

First, the analysis is based "on today's view of the markets", which embodies a global credit crisis, unusual stress in both financial and real asset markets and the strong possibility of a deeper and more prolonged economic recession, that is assumed to persist over the next five years over which the incremental debt cost is estimated. By assuming that the incremental credit spread can be proxied by the credit spread during

[274] Information Response UCA.Aml-015(a) referencing GTA Information Response UCA.AML-013.

the "current" period as observed in May 2008 after the rescue of Bear Stearns, the analysis is implicitly assuming that the current situation will persist over the full five-year period examined for the assessment. Simultaneously, the analysis assumes that "yesterday's" view of the world, which embodies high credit availability at low cost, strong financial and real asset markets and a vibrant economy, is assumed to persist over the next five years when estimating capital build and resulting debt requirements. In other words, it mixes the forecasts from an optimistic looking-forward view of the world with the forecasts from a pessimistic looking-forward view of the world. In turn, this leads to a serious upward bias in the incremental debt cost to ratepayers if the worst case scenario is realized.

Second, the analysis totally ignores the time value of money in that it merely adds up incremental costs at different points in time as if a $1 paid in incremental interest 20 years from now is equivalent to $1 paid in incremental interest today. At a minimum, we would have expected to see an evaluation that is similar to that commonly done for bond refunding decisions as supporting evidence for AltaLink's claim that ratepayers are better off in the worst case scenario.

Third, AltaLink provides the following rationale for using a 65 bps increased cost for a credit rating downgrade for AltaLink:[275]

> "To illustrate, when the EUB issued Decision 2004-052 in July 2004, the debt markets were very robust. At that time, TD Securities estimated the spreads at which Enbridge Gas (a utility with the same ratings as AltaLink) could issue new debt at 70 and 110 basis points over 10- and 30-year Government of Canada bonds, with the corresponding spreads for EPCOR Utilities (rated A (low)/BBB+ by DBRS and S&P) at 95 and 145 basis points, for an average difference of 30 basis points. At the end of May 2008, coincident with AltaLink's most recent debt issue, the indicated new issue spreads for the same two companies (with no

[275] AltaLink Management Ltd., GTA2009-2010 Application, Volume 1, September 16, 2008, Lines 15-25, page 9-17.

> changes in debt ratings) were 145 and 165 basis points for Enbridge Gas (virtually identical to TD's estimates for AltaLink) and 205 and 235 basis points for EPCOR, an average differential of 65 basis points."

The use of the 65 basis point differential is questionable given that the indicated new issue spreads of 145 and 165 basis points over 10- and 30-year Government of Canada bonds for Enbridge Gas were "virtually identical to TD's estimates for AltaLink" at the end of May 2008. While their bond ratings were the same at A by DBRS and A- by S&P, the bond ratings for Enbridge Gas were for senior <u>un</u>secured while those from AltaLink were for senior secured. The lower bond ratings for EPCOR of A(low) from DBRS and BBB+ from S&P, like Enbridge Gas, were also for senior unsecured debt. Thus, while Enbridge and AltaLink had about the same rating in the eyes of investors, the former was for senior unsecured debt while the latter was for senior secured debt.

Fourth, the analysis is incomplete. If the worst case scenario does occur, ratepayers not only end up paying the difference between the allowed ROE and the cost of debt on the increase in the equity ratio from 33% to 38% but also will in all likelihood pay the incremental deemed interest cost on new debt issues. The analysis is also incomplete because it ignores the cost to ratepayers of a delay in adopting the Flow Through Income Tax (FTT) method and the refunding of the Future Income Tax (FIT) account balance as per *EUB Decision 2007-012* during the heavy build cycle.

Q. AltaLink submitted analysis in support of its claim that a credit downgrade would increase debt financing costs by $350 million over the life of the issue.[276] In your opinion, how much weight should the Commission attach to this claim?

A. The Commission should set aside the claim because the analysis is incomplete as it ignores the increased costs of incremental equity in the capital structure. When we

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[276] AltaLink Application, Volume 1, Section 9.3.2.2 (Maintenance of Current Debt Ratings), pages 9-17 to 9-19 and AltaLink Response to Information Request UCA.AML-131(e).

complete the analysis, the conclusion reverses. Put another way, according to AltaLink, avoiding the credit downgrade would require granting the request to increase the allowed equity ratio from 33% to 38%. In the GCOC AltaLink also argues that a required ROE of 11% is necessary. The combination of these two changes would harm ratepayers because the increased cost of equity would more than offset the alleged higher debt cost.

Q. Please explain how you arrive at this conclusion.

A. In order to conduct a preliminary assessment of the cost of a hypothetical downgrade, we revise the imprecise, "back-of-the-envelope" calculation conducted by AltaLink to incorporate the cost of equity. While this preliminary analysis suffers from the same problems that we identify with the AltaLink calculation, it does allow us to demonstrate the bias introduced when AltaLink ignores the cost of equity. In order to grant the company's claim its full due, for the sake of argument, we accept the cumulative new debt figure of $2,707.8 million calculated by AltaLink based on a 33% allowed equity ratio and a 20-year debt maturity as given on page 9-33 of the Application. To maintain the existing capital structure $2,707.8 million in new debt (67% of total financing) would require $1,333.7 million in new equity (33% of total financing.

In order to estimate the dollar cost of incremental equity, we need an estimate of the cost of equity. Since the cost of equity is not at issue in its GTA, we draw on evidence submitted by AltaLink in the GCOC in which it requests a return on equity of 11%.[277] This request is supported by the evidence of Dr. Vander Weide in which he argues that the current GCOC ROE formula would lead to an insufficient return. He calculates the formula allowed ROE for 2009 as 8.57% based on his forecasted long-Canada yield of 4.30%.[278] While we do not support the request for 11%, we use it here to examine the implications of the company's requests. Based on the evidence

[277] Written Evidence of AltaLink Management Ltd., page 2.
[278] Written Evidence of James H. Vander Weide, page 7, lines 5-7, November 20, 2008.

submitted in the GCOC, these requests include an increase in the cost of equity by 243 basis points from 8.57% to 11%.

Using the existing capital structure of 33% equity (following AltaLink's example in Section 9 of its evidence), we compute the additional cost of equity as follows:

.0243 x $1,333.7 million x 20 years = $648.2 million

Using numbers supplied by AltaLink and its witness, Dr. Vander Weide, this calculation shows that granting the request for an increased ROE would cost more than twice AltaLink's estimated cost of additional debt with a downgrade.

This calculation has a downward bias because it does not factor in the request to increase equity thickness to 38%. With this level of equity, the estimated cumulative new debt of $2,707.8 million would require new equity of $1659.6. As result the increased equity cost would rise to:

.0243 x $1,659.6 million x 20 years = $806.6 million

Q. What conclusions do you draw from this analysis of increased equity costs?

A. We conclude that increased equity costs cannot be ignored in assessing the costs of a hypothetical downgrade. Because the cost of equity is not part of this GTA, the analysis of increased debt costs offered by Altalink is of necessity incomplete and unreliable.

For the sake of demonstration, we import the cost of equity recommendations made by AltaLink's experts in this GCOC hearing. Our analysis shows that the "cure" would be worse than the "ailment": the increased allowed ROE and greater equity thickness requested by AltaLink to prevent a downgrade would cost more than allowing the downgrade. For this reason, the analysis offered by AltaLink of the cost of a downgrade is incomplete and should receive no weight by the Commission.

Q. What other analysis would be required before a decision-maker or arbiter could determine the expected cost to ratepayers associated with a bond rating downgrade?

A. A useable assessment would deal with the expected cost of a downgrade by reflecting the probabilities of no downgrade and the probabilities of various downgrade notches and their associated marginal costs. To illustrate, if there is a 95% chance of no downgrade and a 5% chance of a one notch downgrade and the added incremental debt cost is 65 basis points for each dollar of additional debt, then the expected cost is only 3.25 basis points per dollar of incremental debt. A useable assessment would use the same scenarios when estimating capital expenditures, debt requirements and the availability and cost of debt funding. It would also consider the cost of any incremental equity to support the new debt as well as what allowed ROE would be required to avoid a downgrade.

5.2.5 Impact of Non-taxable Status

Q. What did the AEUB conclude in terms of non-taxable status in Decision 2004-052?

A. In Decision 2004-052, the AEUB concluded (page 45):

> "The Board agrees that a non-taxable entity has a higher volatility of earnings than an otherwise equivalent taxable company, arising from the lack of an income tax component in its forecast revenue requirement. The Board notes that there was no disagreement that the absence of taxation, while lowering costs, increases the volatility of earnings."

Q. Please provide your views on this decision?

A. The argument is correct in as far as it goes. With due respect, it is incomplete because it only addresses the costs and ignores the benefits of having a non-taxable status when an entity on average should earn more than its allowed ROE due to cost savings and productivity improvements. The cost to the regulated utility when it is non-taxable is that it has greater volatility of earnings. However, this should be offset by the expected positive difference, which would be shared if it was taxable, between the returns that it earns on average on its rate base and the returns that are built into its rate based on the allowed ROE. In other words, the non-taxable utility is better off than the taxable utility when average actual ROEs exceed allowed ROEs.

Similarly, this analysis does not reflect the asymmetrical benefits from gains in operating efficiency that favor the non-taxable utility between the points in time at which the allowed ROE is recalibrated.

We provide an illustration in Schedule 5.1 of the benefits and costs of being non-taxable when the utility, on average, earns 3% more, on average, than its base year revenue requirement. This is a slight modification to Exhibit 1 in the supplemental evidence presented by Dr. Vander Weide which reflects the reality discussed in Section 2 of this evidence that utilities almost always over earn their allowed returns.[279] We find for this illustration that the non-taxable utility when benchmarked against its taxable counterpart earns an incremental 9 basis points in its average ROE over the allowed ROE but incurs a 30 basis point incremental downside risk. Thus, there is no reason to expect that the non-taxable utility is worse off relative to its taxable counterparts on a net cost-benefit basis if it is well managed.

5.3 FAIR RATE OF RETURN ESTIMATES

5.3.1 Recommended ROEs

[279] Exhibit 976377_1633295, Supplemental written evidence of James H. Vander Weide for Epcor Distribution & Transmission Inc., page 4.

Q. Would you please compare your recommended ROE with those of the various applicant utilities based on the evidence of their teams of experts for test year 2009?

A. Since the team of Drs. Kolbe and Vilbert was asked to provide a recommended ROE at a specific equity thickness for test year 2009, Dr. Kolbe recommends a ROE of 11 percent at a 40 percent equity ratio for NTGL.[280] The request from ATCO Utilities, which is based on the evidence of its team of experts, also is for different ROEs and different equity thicknesses for four sectors and its entities in each of these sectors for test year 2009. Specifically, relying on the evidence of Mr. Coyne and Ms. McShane ATCO Utilities requests a 10.5% ROE on a 38% equity thickness for both the Generic Electric Transmission sector and for ATCO Electric Transmission; a 10.6% ROE on a 40% equity thickness for both the Generic Electric Distribution sector and for ATCO Electric Distribution; a 11% ROE on a 40% equity thickness for both the Generic Gas Distribution sector and for ATCO Gas; and a 10.9% and 12.0% ROE both on a 43% equity thickness for the Generic Gas Transmission sector and for ATCO Pipelines, respectively. This compares to our recommended ROE of 7.9% for 2009.

Dr. Vander Weide provides ROE estimates of 11% for EPCOR, FortisAlberta and AltaLink for an equity thickness of 40% when assessing whether the ROEs from the Generic Formula Based Adjustments (GFBA) used by Canadian regulators are fair. We address his assessment later in this section of our evidence. Dr. Vilbert recommends an 11% ROE for AltaGas Utilities for an equity thickness of 40%.

Panel A of Schedule 5.2 provides a summary of these recommendations along with our own. Since the focus here is on the cost of equity, we standardize our inputs in order to hold constant the impact of capital structure. This is necessary because, with the exception of our own evidence, the other witnesses summarized in Panel A of Schedule 5.2 adjust both recommended return and capital structure to account for

[280] Exhibit 976205_1632942, Written evidence of A. Lawrence Kolbe for Nova Gas Transmission Limited, section 2.8, lines 9-10 of page 11.

differences in business risk. As we explain in Section 4, this approach is followed by the BCUC alone among the regulatory boards in our schedule. The Commission and the other boards all determine a generic cost of capital for an average risk utility and then adjust only the capital structure to address business risk. Our own evidence follows this approach as well.

We standardize for the impact of capital structure on the recommendations of other witnesses in two ways. First, in cases in which a witness offers a range of recommended costs of equity for a given utility depending on the capital structure selected, we enter the recommendation for a structure of 40% equity. Second, we also show the range of recommended returns for each witness.

Q. How do the rates recommended by Drs. Kolbe and Vilbert and by your team, for example, compare to the allowed ROE for 2009 set by the National Energy Board using the ROE adjustment mechanism approved in the Multi-Pipeline Cost of Capital Decision (RH-2-94), which was revised on 14 March 1997 to eliminate rounding?

A. The allowed ROE set for 2009 by the NEB is 8.57%.[281] As shown in Panel B of Schedule 5.2, it is based on a Consensus long-Canada forecast of 4.36%. The allowed NEB ROE is 67 basis points higher than our recommended ROE of 7.9% and 243 basis points lower than the 11% ROE recommendation of Dr. Kolbe if NGTL obtained its requested equity thickness of 40 percent equity and allowing for "**no** adjustment for the current crisis" [our emphasis].[282] If NGTL's deemed equity thickness remained at 35%, then according to Dr. Kolbe the recommended ROE would increase to generate a higher ATWACC.[283]

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[281] National Energy Board, Rate of Return on Common Equity (ROE) for 2009, December 4, 2008. Available at: https://www.neb-one.gc.ca/ll-eng/livelink.exe?func=ll&objId=541948&objAction=browse.
[282] Exhibit 976205_1632942, Written evidence of A. Lawrence Kolbe for Nova Gas Transmission Limited, section 2.8, lines 15-17 of page 11.
[283] Exhibit 976205_1632942, Written evidence of A. Lawrence Kolbe for Nova Gas Transmission Limited, section 2.8, lines 15-17 of page 36.

Q. How do the rates recommended by Drs. Kolbe and Vilbert and by your team, for example, for 2009 compare to the allowed ROEs by other Canadian regulators and to the ROE set by this Commission as a placeholder for 2009?

A. The allowed ROEs for 2009 set for Terasen Gas Inc., Terasen Gas (Vancouver Island) Inc., FortisBC and Newfoundland Power are 8.47 per cent, 9.17 per cent, 8.87 and 8.95 per cent, respectively.[284] The AUC has set a placeholder ROE of 8.51 percent for 2009 for utilities such as Fortis Alberta. We summarize allowed returns for 2009 from regulatory formulas in Panel B of Schedule 5.2. In comparison, our recommended ROE for 2009 of 7.9% is from 57 to 127 points lower than these already set or current placeholder ROEs while the recommended ROE of Dr. Kolbe for 2009 of 11% is from 183 to 253 basis points higher than the ROEs already set or acting as current placeholders for 2009.

5.3.2 Recommended Utility Risk Premiums

Q. What utility risk premiums are implied in the recommendations of utility sponsored experts?

A. To obtain the risk premiums implied in the experts' recommendations we first identify the long-Canada forecast on which each expert relied. As shown in Schedule 5.2, Panel A, these ranged from a low of 4.13% for Ms. McShane to a high of 4.75% for our own estimate. Next, for each expert or team, we subtract this long-Canada forecast from the corresponding recommended return to obtain the utility risk premium. Schedule 5.2, Panel A, shows that the risk premiums recommended by experts sponsored by utilities fall in a range from 6.07% to 7.87%. With the exception of Mr. Coyne and Ms. McShane's recommendation for ATCO Pipelines, all the company sponsored experts recommend utility risk premiums between 6% and 7%. In contrast, our own recommendation is for a far more modest utility risk premium of 315 basis points.

[284] Fortis Earns Record $245 Million in 2008, Press Release, February 5, 2009, page 2. Available at: http://www.fortis.ca/Attachments/MediaReleases/447.pdf.

Q. How reasonable are the utility risk premium recommendations of company witnesses in this hearing when benchmarked against regulatory formulas in use in Canada?

A. As a further test of the reasonableness of recommended ROE's advanced by company witnesses we compare the ERPs implied in their 2009 ROEs against the ERPs from generic formulas used for groups of utilities by the four Canadian regulators discussed above: the Alberta Utilities Commission (AUC, formerly the Alberta Energy and Utilities Board), the British Columbia Utilities Commission (BCUC), the Ontario Energy Board and National Energy Board (NEB). As discussed in Section 4 of this evidence, we believe that, despite their limitations, these formulas provide useful benchmarks of the thinking of regulators in Canadian jurisdictions. With these benchmarks, we can assess the extent to which recommendations offered by particular witnesses lie within or beyond what these regulators regard as a reasonable range.

Q. Please explain how you develop the data for your comparisons.

A. In Panel B of Schedule 5.2, we report the actual allowed or placeholder returns for 2009 for the four regulatory formulas. To illustrate, the NEB's forecasted rate for long Canada's for 2008 was 4.55%, resulting in an allowed return on equity of 8.71%.[285] The Board adopted a Consensus forecast for the long Canada rate for 2009 of 4.36%. As stated by the NEB:

> "The 19 basis point decrease [from 4.55% to 4.36%] is multiplied by 75 percent to generate a 14 basis point decrease in the allowed ROE to 8.57 per cent in 2009".

[285] National Energy Board, NEB approves a Return on Common Equity for 2009, News Release, December 4, 2008, www.neb.gc.ca .

In the next column we calculate the utility risk premium implied by the regulatory formula. Based on the NEB long-Canada forecast of 4.36% the utility risk premium for the NEB formula is 421 basis points (8.57% minus 4.36%). In order to standardize our comparisons, we use 4.36% as the long-Canada forecast for all the regulatory boards and calculate the utility risk premiums for each.

The data show that the formulas in use by the four regulatory boards in our sample produce similar recommended returns for 2009 averaging 8.51% for the NEB's long Canada forecast. The regulatory formulas produce an average risk premium for utilities in the range of 415 basis points. In other words, the regulatory formulas produce a utility risk premium of slightly more than 400 basis points for 2009.

Q. Does this conclusion change if you input a different long Canada forecast for 2009?

A. No, the conclusion remains the same for reasonable levels of long Canada forecasts for 2009. To illustrate, in Panel C of Schedule 5.2 we recalculate the recommended returns and utility risk premiums that would be produced by the regulatory formulas inputting our long Canada forecast of 4.75%, the highest in Schedule 5.2. The resulting average utility risk premium for the regulatory formulas declines slightly to 408 basis points. Our conclusion is unchanged: the regulatory formulas result in a utility risk premium slightly over 400 basis points for 2009.

Q. What conclusions do you draw from your analysis in Schedule 5.2?

A. In our view the regulatory formulas take an overly conservative approach in allowing a return on equity that is higher than necessary. As we explain in detail in Section 3 of this evidence, not only has the forecasted long-Canada rate dropped since the mid-1990s when the use of formulas in Canada was initiated but the current and future expected risk premiums are considerably lower than they were at that time.

Q. What conclusions do you draw from examining the recommendations of witnesses in light of the results of the regulatory formulas?

A. We begin by setting aside our opinion on the conservatism of the regulatory formulas and employ them as measures of levels of utility risk premiums considered reasonable in Canadian jurisdictions. It is apparent that the risk premium numbers recommended by the witnesses in this hearing and those resulting from regulatory formulas vary significantly. That said, the schedule reveals that the numbers fall into three distinct sets. At the high end are the recommendations of witnesses sponsored by applicant companies, which are clearly substantially higher than the results of regulatory formulas. In the middle, lie the regulatory formulas. Below them are our own recommendations.

Putting these differences in perspective, we note that the regulatory formulas are drawn from the era of significantly higher risk premiums. Our earlier evidence presented a large body of argument showing that the equity risk premium has declined more recently and is expected to be lower in the future. Because they do not take this important trend into account, recommended returns drawn from regulatory formulas should be regarded as a conservative upper bound. Our own recommendation reflects the current trend towards a lower equity risk premium.

We also conclude that the recommendations of the witnesses sponsored by the utilities produce risk premiums that are excessive and out of line with regulatory thinking in Canada.

5.3.3 Comparison of Recommended Utility-specific ROEs with Forecasted Market Returns

Q. Please compare the various recommended utility-specific ROEs of Mr. Coyne to the forecasted returns for the market?

A. Mr. Coyne's recommended utility-specific ROEs are 10.20% for electric transmission, 10.60% for electric distribution, 11.30% for gas transmission and 11.00% for gas distribution. Three of these utility-specific ROEs exceed his market return forecast of 10.38% (i.e., 4.13% 30-year GoC + 6.25% MERP).

Q. Does Mr. Coyne not deal with this in his response to Information Request AUC-ATCO UTL-10?

A. No. In his response to this Information Request, he recalculates his ROEs before the leverage adjustment without making a similar adjustment to the market as if firms in the market proxy are not levered.

5.4 METHODS USED TO ARRIVE AT THE RECOMMENDED ROE ESTIMATES

Q. Could you please provide an overview of the estimation methods that were used by the various experts to arrive at their ROE estimates?

A. Although Drs. Kolbe and Vilbert use four estimation methods in arriving at the recommended ROE, they implement the estimation methods differently and place different weights on the methods. Unlike us, they use the ad hoc ATWACC methodology critiqued earlier in this section to relate their ROEs with various equity thicknesses. The four estimation methods are (1) the ERP (Risk Positioning in the terminology of Drs. Kolbe and Vilbert), (2) Literature Survey Methods to obtain ex post ERP estimates, (3) the DCF applied at the firm and not market level and (4) Surveys of Professionals Methods to obtain ex ante ERP estimates. Mr. Coyne also uses four methods; namely, the DCF Method, a CAPM Method, Risk Premium Method and Comparable Earnings.[286]

[286] Exhibit 975977_1632472, Written evidence of James M. Coyne for Atco Utilities (Atco Electric Ltd. and Atco Gas and Pipelines Ltd., section IV, beginning on 15.

Only one expert for the applicant utilities, Mr. Coyne, uses the Comparable Earnings Method to generate a MERP estimate. We assume that the nonuse of this discredited estimation method by the other experts for the applicant utilities is based on one or more of this method's shortcomings that we discuss in Appendix 3.A.

We now discuss differences in implementing these estimation methods starting with differences in the implementation of the ERP Estimation Method.

5.4.1 Implementation of the ERP Estimation Method

5.4.1.1 <u>Overriding Comments on the ERP Estimates of the Experts for the Applicant Utilities</u>

Q. Would you please provide some overriding comments on the ERP estimates above 30-year Canada's that have been entered into evidence by the experts for the applicant utilities?

A. We obtain ERP estimates above 30-year Canada's that are substantially lower than those entered into evidence by the experts for the applicant utilities. These experts arrive at overly generous estimates of both the betas for an average-risk or particular utility, and of the magnitude or size of the ERP required to adequately compensate equity investors for bearing this level of risk. Basically, we find that these experts do one or more of the following:

- decide between using standard or nonstandard betas based on data snooping;
- do not adjust their market equity risk premium (MERP) estimates for its time-series decline due to the significant reduction in trade costs (e.g., commissions and bid-ask spreads), the benefits of easier and less costly diversification both across investment classes and internationally, and the near consensus view that not only is the realized MERP an overestimate of the MERP that investors expected historically, but also that the forward-looking MERP is expected to be significantly lower than that realized in the past;

- choose one or more inappropriate time periods to focus on to calculate *ex post* MERP; such as the post-World War II period whose early years are not representative due to rapid economic and equity market exuberance due to the satisfaction of pent-up demand for consumer goods and infrastructure (e.g., roads, schools and hospitals), the existence of interest rate controls, the absence of a Canadian money market to price fixed income securities, and the rapid growth in exports due to Canada's participation in the U.S.-led reconstruction of a war-ravaged Europe; and
- recommend ROEs for their utilities for the 2009 test year that not only represent a huge premium over their forecasts for 30-year Canada's but exceed the median mid- and long-term forecasts of investment professionals of 7.5% for the expected mid-term total return on the market (as proxied by the S&P/TSX Composite Index) that is reported in the survey results authored by Watson Wyatt.

5.4.1.2 MERP Estimates

Q. How do the Market Equity Risk Premium or MERP estimates differ?

A. Dr. Vilbert concludes that the "S&P/TSX stocks of average risk today command a premium of about 5.75 percent over the long-term government bond yield".[287] Mr. Coyne uses a MERP of 6.26% "over long-term government bond **income** returns" [our emphasis].[288] Our MERP estimate is lower at 5.1%.

Q. What accounts for the differences in your MERP estimate from that of Dr. Vilbert?

A. While Dr. Vilbert adjusts for the relationship between market volatility and the MERP due to the increased volatility in 2008, he fails to include the large negative

[287] Exhibit 976205_1632942, Written evidence of Michael J. Vilbert for Nova Gas Transmission Limited, section 2.9, lines 15-17 of page 11.
[288] Exhibit 975977_1632472, Written evidence of Mr. James M. Coyne for Atco Utilities (Atco Electric Ltd. and Atco Gas and Pipelines Ltd.), pages 29 and 30.

MERP for 2008 in either his Canadian or American historical MERP estimates. Furthermore, he mixes MERPs calculated over the **returns** on T-Bills minus his estimate of an average maturity premium **yield** and MERPs calculated over the **returns** on Long Governments although Long Government returns are available for all the periods he examines.[289] His estimate of 5.75% exceeds the average Canadian MERP of 5.3% for the longest period for which he had such data (namely, 1924-2006). If he would have extended the period to 2008, the average Canadian MERP would have dropped to 5.1%. He fails to mention that the MERP for his longest time period already includes the effect of extreme market volatility during the 1930's depression. Unless the MERP is only being established for one year, it would not be appropriate to further augment the MERP (i.e., beside incorporating it in the calculation of the long-run average) for a period like the current one where stock market volatility is abnormally high unless one believes that this will persist until the next resetting of the GFBA or unless changes in market volatility are added as one of the drivers in the GFBA Formula.

Dr. Vilbert's recommended MERP of 5.75% exceeds his MERP estimates of 5.1% and 5.6% when he examines the period following the Great Depression (i.e., 1936-2006) and following World War II (i.e., 1948-2006). Both are inappropriately high estimates of the MERP going forward. To illustrate, the choice of the period beginning with 1948 results in an inflated estimate of the going-forward likelihood of achieving the high realized returns on equities and low realized returns on bonds that followed World War II. This period began with rapid economic growth due to pent up demand from the war period and administered low interest rates. The MERP that Dr. Vilbert estimates for Canada for the period of 1948-2006 is materially impacted by the first four years of this period. To illustrate, the annual averages over the first four years (1948-1951) are 6.60% for the Consumer Price Index, -0.20% for long Canada bonds, 0.55% for 91-day Canadian Treasury Bills and 26.80% for the equity market index. The result is an annual average MERP over this four-year period of 27.12%!

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[289] Exhibit 976205_1632942, Written evidence of Michael J. Vilbert for Nova Gas Transmission Limited, section 2.9, lines 3-15 of page C-9.

Furthermore, Dr. Cochrane characterizes the post-1947 performance of equities as being surprisingly strong on page 266:[290]

> "If there is a surprise, then, the surprise is that *economic growth* was so strong in the postwar era, resulting in surprisingly strong *dividend growth*. (In the long run, *all* of the return must be dividend growth since price-dividend ratios are stationary. And, of course, economic growth *was* surprisingly good in the postwar era. Most people in 1947 expected a return to depression."

Dr. Vilbert places minimal or no weight on the declining trend of MERPs for the two markets he examines, nor does he make adjustments for differences in risks across the market proxies used to calculate the MERP in the two countries or for the effect of equity re-valuations over the time periods he examines. Mr. Arnott and Mr. Bernstein find that a good part of the realized MERP over this period was caused by rising valuation multiples. Specifically, Mr. Arnott and Mr. Bernstein report that the U.S. price-to-<u>dividend</u> multiple increased from 18 to 70 times from 1926 to 2001, with most of the increase in the last 17 years of this period.[291] The price-to-dividend multiple on January 22, 2009 that reflects the drop in the U.S. market is 29 times. Thus, an adjustment needs to be made unless one believes that price-to-dividend multiples will exhibit a similar percent increase over the next 59 years.

Q. What accounts for the differences in your MERP estimate from that of Mr. Coyne?

A. Mr. Coyne uses a so-called North American MERP, which he calculates as the average of the MERPs for "the longest period for which data were available from Morningstar Ibbotson for both the U.S. and Canada". Thus, he averages the 7.1% MERP for the U.S. for 1926-2007 and the 5.45% for Canada for 1936-2007. Not only is the MERP calculated "over long-term government bond **income (not total)**

[290] John H. Cochrane, 2008, Financial markets and the real economy, pages 237-321. In: Rajnish Mehra (editor), *Handbook of the equity risk premium* (Amsterdam: North-Holland).
[291] Robert D. Arnott and Peter L. Bernstein, 2002, What risk premium is "normal"?, *Financial Analysts Journal* 58:2 (March/April), pages 64-85.

returns"[292] but it is calculated from the perspective of an American and not Canadian investor since both calculations are in USD.[293] If he had used the 1926-2008 average MERP value over long Government Bond returns of 5.95% for the U.S. and the average MERP of 4.88% for Canada for 1936-2008, his average would **drop to 5.415%**. This would represent a reduction of about 84.5 basis points in his MERP recommendation of 6.26%. We deal with the dubious merits of using an average that includes a foreign market in the next section.

5.4.1.3 Validity of Using Risk Premia from Other Country Markets

Q. What are the major problems with placing some weight on non-Canadian MERP in order to estimate the required Canadian MERP for calculating the required own ERP for an average-risk utility?

A. There are at least three major problems with placing some weight on non-Canadian MERP. First, this approach ignores the benefits from international diversification. While the expected return of a portfolio diversified across markets is linear, the risk is not linear in the risks of the individual markets unless all of the markets are perfectly correlated. In turn, the required MERP for bearing (a lower level of) domestic risk is reduced in an international context. Second, this approach makes no adjustment for the differences in the non-diversifiable or even in the total risks of the various market proxies used in this process. The reduction in total risk from international diversification is substantially higher for the Canadian market proxy than for the U.S. market proxy given the much smaller size of the Canadian market (i.e., about 2% to 3% of the world market). Third, based on recent empirical evidence published in a peer-reviewed scientific journal by Drs. He and Kryzanowski, the contribution of the U.S. market to the explanation of the returns for the Canadian utilities sector is not

[292] Exhibit 975977_1632472, Written evidence of Mr. James M. Coyne for Atco Utilities (Atco Electric Ltd. and Atco Gas and Pipelines Ltd.), lines 11-13, page 31.
[293] Mr. Coyne's response to Information Request CAPP-COYNE-6.

statistically significant. Thus, no weight should be placed on U.S. equity returns or risk premiums when estimating the going-forward MERP for Canadian utilities.[294]

5.4.1.4 Use of Standard or Nonstandard Beta Estimates

Q. How do the beta estimates differ among the various experts?

A. We consistently employ standard beta estimates throughout our implementation of the ERP Method without using a data-snooping exercise to condition our choice on whether standard or nonstandard beta estimates should be used for a particular sample of utilities.

In contrast, Dr. Vilbert obtains the beta estimates for his Canadian Utilities sample from Bloomberg and the estimates for the Gas LDC and MLP Pipelines sample companies from Value Line Investment Survey.[295] The two service providers use different weighted averages in arriving at their nonstandard betas. The weight of the market beta of one and the standard beta of a utility are 33% and 67% for the Bloomberg non-standard betas and 37.1% and 63.5% for the Value line non-standard betas.[296] The Value Line beta is derived from a 5-year regression between the relationship of the weekly percentage changes in the New York Stock Exchange Composite Average and the weekly percentage changes in the price of the stock with no adjustment for dividends. As such, the Value Line beta is a measure of the sensitivity of price changes for a utility to price level changes of the market proxy, and is not a measure of the sensitivity of the total returns for a utility to the changes in the total returns of a market proxy.

[294] Z. He and L. Kryzanowski, 2007, Cost of equity for Canadian and U.S. sectors, *North American Journal of Economics and Finance* 18:2 (August), pages 215-229.
[295] Exhibit 976205_1632942, Written evidence of Michael J. Vilbert for Nova Gas Transmission Limited, section 2.9, lines 6-9 of page C-14.
[296] Bloomberg output for Bloomberg; and Ibbotson Associates, *2006 Yearbook*, *Valuation Edition*, page 116, for Value Line.

Based on an examination of the betas for the Canadian sample, Dr. Vilbert then relies on the non-standard betas provided by Bloomberg based upon 260 weeks (five years) of weekly return data that are adjusted towards one. Based on an examination of the betas for the U.S. samples, Dr. Vilbert finds that the non-standard Value Line betas, which are based on five years of continuously compounded weekly returns, "declined only very slightly over the last few years and have now returned to values in many cases are higher than previous levels…".[297] As a result, Dr. Vilbert changes the Value Line non-standard betas into standard betas by reverse engineering using the Blume finding for non-continuously compounded monthly returns. In doing so, Dr. Vilbert commits a serious error in financial analysis called "data snooping". Wikipedia defines data snooping as follows:[298]

> "In statistics, **data-snooping bias** is a form of statistical bias generated by the misuse of data mining techniques which can lead to bogus results in scientific research. Although data-snooping biases can occur in any field that uses data mining, data snooping biases are a particular concern in finance and medical research, both of which make heavy use of data mining techniques."

It goes on to note that:

> "Data-snooping bias most commonly occurs when researchers have not formed an [sic] hypothesis in advance, and therefore are open to any hypothesis suggestions presented by the data; or when researchers narrow the data used in order to reduce the probability of the sample refuting a specific hypothesis."

He justifies the use of non-standard betas for his Canadian sample as follows: "Yes, the unique factors affecting the stock market and the utility industry make the most

[297] Exhibit 976205_1632942, Written evidence of Michael J. Vilbert for Nova Gas Transmission Limited, section 2.9, lines 14-24 of page 53.
[298] Available at: http://en.wikipedia.org/wiki/Data-snooping_bias.

recent 60 month period un-representative for the sample companies' betas".[299] Since the credit and economic crisis originated in the U.S. and has been more severe in the U.S., it does not seem plausible that the credit and economic crisis did not similarly affect the representativeness of the betas for the two U.S. samples. Furthermore, if one examines our Schedules 3.12 and 3.13, it is obvious that the betas for the most recent 60 month period for the Canadian utilities are as representative as they have been for many years.

In changing the Value Line non-standard betas into standard betas, Dr. Vilbert notes that "[a]djustment moves betas one-third of the way toward a value of one.[300] He provides two reasons for moving the betas toward one. However, as we showed in Appendix 3.D, both reasons are unsupported by logic and the refereed journal literature. Using his method, the non-standard beta for a utility = (2/3) of the standard beta for the utility + (1/3) of the market beta of one, or rearranging this equation, the standard beta for the utility = (the non-standard beta for the utility minus 0.33) divided by 0.67. Throughout his testimony, Dr. Vilbert uses the following incorrect formula for both of his U.S. samples: (Beta - 0.35) / 0.67 so that the weights of the betas add up to 102% and not 100%. To illustrate its impact, the Value Line Beta for Boardwalk in the MLP Sample of 0.80 when unadjusted should be 0.70 instead of the reported 0.67.[301] This error also affects the WACC calculations of Dr. Kolbe that rely on the equity cost calculations of Dr. Vilbert.

Mr. Coyne uses two rationales for adjusting standard betas.[302] First, he refers to empirical studies (the 1971 and 1975 non-utility-specific studies for the U.S.) that provide evidence that betas for all the firms in the market, on average, revert to the market average of one over time. He then incorrectly infers that this evidence

[299] Exhibit 976205_1632942, Written evidence of Michael J. Vilbert for Nova Gas Transmission Limited, section 2.9, lines 1-2 of page 50.
[300] Exhibit 976205_1632942, Written evidence of Michael J. Vilbert for Nova Gas Transmission Limited, section 2.9, lines 1-2 of page 54.
[301] Exhibit 976205_1632942, Written evidence of Michael J. Vilbert for Nova Gas Transmission Limited, section 2.9, Workpaper #1 to Table No. MJV-26.
[302] Exhibit 975977_1632472, Written evidence of Mr. James M. Coyne for Atco Utilities (Atco Electric Ltd. and Atco Gas and Pipelines Ltd.), lines 19-28, page 28.

supports the conjecture that utility betas also vary around one. As we demonstrate in section three of our evidence, research demonstrates that the normal tendency of Canadian utility betas is to vary around a value substantially below one. Second, he refers to the need to incorporate statistical estimation errors in the beta forecast. As we discuss in Appendix 3.D, the Vasicek-shrinkage method, and not the Blume-type of adjustment used by Bloomberg and Value Line deal with incorporating statistical estimation errors into the beta estimate. The Vasicek-shrinkage method is a weighted average of the standard beta for the member of the sample and the standard beta for the sample of utilities where the weighs are based on relative estimation error. However, for the so-called average-risk utility the "member" of the sample and the sample itself are one and the same. Thus, there is no need to make any adjustment.

Q. Are non-standard betas used in the empirical studies published in refereed journals?

A. No, they are not. Tests and applications of asset pricing models (like the CAPM) that are published in the peer-reviewed scientific literature do not use Value Line type of adjusted betas. This literature includes numerous studies by Fama and French, amongst others, about whether or not the traditional CAPM is empirically supported.[303] Furthermore, we are not aware of any use of non-standard (adjusted or inflated) betas in applications of event study methods in academic research or in practice.[304]

Q. Would you please summarize your position on the use of non-standard beta estimates?

[303] Eugene F. Fama and Kenneth R. French, 1996, The CAPM is wanted, dead or alive, *Journal of Finance* 51:5 (December), pages 1947-1958; Eugene F. Fama and Kenneth R. French, 1995, Size and book-to-market factors in earnings and returns, *Journal of Finance* 50:1, pages 131-155; Eugene F. Fama and Kenneth R. French, 1996, Multifactor explanation of asset pricing anomalies, *Journal of Finance* 51:1 (March), pages 55-84; and James L. Davis, Eugene F. Fama and Kenneth R. French, 2000, Characteristics, covariances, and average returns: 1929 To 1997, *Journal of Finance* 55:1 (February), pages 389-406.
[304] Event-study methods are used extensively in class action litigation by expert witnesses for both the plaintiff and the defendant to estimate price inflation due to misrepresentation or fraud.

A. The studies by Drs. Kryzanowski and Jalilvand, Gombola and Kahl, and others cited in Appendix 3.D of our evidence, provide support for the tendency of the betas of individual utilities to regress toward their grand utility mean and not toward the grand or market average of 1.0. However, since Dr. Vilbert already effectively uses the grand utility mean for his benchmark utility, properly accounting for the tendency to regress to itself would not change the standard (i.e., unadjusted or unaltered) beta estimate for the benchmark utility.

5.4.1.5 Use of ERP Estimates from the ECAPM

Q. How does the evidence of the experts in this hearing differ in their use of the so-called ECAPM?

A. Unlike Dr. Kolbe, we do not use the ECAPM to over-compensate for the empirical findings of tests of the unconditional CAPM that the estimated risk-free rate exceeds the T-bill rate. The use of the higher long Canada rate when constructing the Security Market Line or SML increases the intercept and also flattens the slope of the SML. This implies that an over or double adjustment for the same empirical phenomenon occurs if one makes a further adjustment to the beta to account for a flatter-than-expected SML. Thus, this represents another unsupported rationale that some experts use to adjust their beta estimates upwards for a sample of utilities or to attack the validity of the CAPM. In Appendix 5.A, we discuss the relevant findings of some of the tests of (un)conditional CAPMs and the type of adjustment that should be made if, for the sake of argument, one accepted that there should be an adjustment for the early empirical evidence of a flatter-than-expected SML. Furthermore, this empirical evidence for the unconditional CAPM is not very relevant for rate-making purposes because experts are implementing forward-looking conditional models.

Q. Are there any regulatory commissions, boards or régies that have reached a similar conclusion regarding the selective use of the empirical evidence for the CAPM to adjust the beta of the utility upwards?

A. Yes, there are regulatory commissions, boards or régies that have reached a similar conclusion. These regulatory entities have addressed the validity of using a model to implement an upward beta adjustment that is commonly referred to as the Empirical CAPM or ECAPM. Specifically, the Public Utilities Commission of the State of California in "D.99-06-057 rejected the ECAPM financial model because it artificially raises the ROE requirement".[305] Similarly, in its decision for Hydro Quebec Distribution, the Régie de l'Enérgie found insufficient support for the use of the ECAPM by Dr. Morin. It also reaffirmed its earlier decision against the use of adjusted betas, and indicated that it did not support estimates obtained using the comparable earnings method or the DCF for individual firms.[306] In EUB Decision 2004-052 (July 2, 2004), the predecessor to this Commission stated:[307]

> "The Board notes Calgary/CAPP's argument that applying CAPM using long-term interest rates (long-Canada bond yields) in determining the risk-free rate, as was done by all experts in this Proceeding, already corrects for the alleged under-estimation that ECAPM was designed to address. Calgary/CAPP argued that the under estimation would only be present if the CAPM were applied using short-term interest rates, which none of the experts did in this Proceeding."

5.4.1.6 <u>Use of ERP Estimates from Samples of Utilities</u>

Q. Would you please comment on Dr. Vander Weide's use of ex post ERPs from samples of utilities?

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[305] As noted on pages 24 and 33 in the Proposed decision of A.L.J. Galvin (mailed 10/8/2002), Interim opinion on rates of return on equity for test year 2003 before the Public Utilities Commission of the State of California, Application of Pacific Gas and Electric Company for authority to establish its authorized rates of return on common equity for electric utility operations and gas distribution for test year 2003. (U39M), application 02-05-022, filed May 8, 2002. Available at: http://www.cpuc.ca.gov/published/comment_decision/19761.htm.

[306] Régie de L'énergie du Québec, D é c i s i o n, Demande relative à la détermination du coût du service du Distributeur et à la modification des tarifs d'électricité, phase I, D-2003-93, R-3492-2002, 21 mai 2003, pages 71-73.

[307] EUB Decision 2004-052 (July 2, 2004), page 22.

A. Dr. Vander Weide finds that "experienced equity risk premiums on investments in Canadian utilities stocks are in the range of 4.8 percent to 7.8 percent with a midpoint of 6.1 percent, whereas the GCOC ROE Formula implies an equity risk premium of only 4.27 percent".[308] This is based on realized returns for an S&P/TSX Utilities Index for 1956-2007 and the BMO CM Utilities Stock Data Set for 1983-2007 that exceed the corresponding realized returns on the market proxy, and yields (not realized returns) on long GoCs. The unrealizable average 4.8% risk premium for utilities for the period of 1956-2007 is much higher than the 3.95% risk premium realized on the market for that period. Similarly, the unrealizable average 7.8% risk premium for utilities for the period of 1983-2007 is also much higher than the 1.12% risk premium realized on the market for that period.[309] In contrast, the "GCOC ROE Formula implies an equity risk premium of only 4.27 percent" which is substantially better than that realized on the higher risk market proxy during both periods. Of course, the abnormal returns for utilities relative to the market proxy are even higher if one includes 2008.

Q. Do Drs. Vander Weide and Vilbert not agree that Canadian utilities are less risky than the market?

A. Unlike Dr. Vilbert,[310] Dr. Vander Weide does not accept that Canadian utilities are less risky than the market. In his response to part (c) of Information Request AUC-VanderWeide-004, Dr. Vander Weide states:

> "Thus, based on my sample results, Canadian utilities have been more risky than the market, whereas the GCOC determination in 2004 assumed that the utilities were only half as risky as the market."

[308] Exhibit 976254_163304, Written Evidence of James H. Vander Weide for Epcor Distribution & Transmission Inc., Epcor Energy Alberta Inc., FortisAlberta Inc., and Altalink, L.P., November 20, 2008, lines 23-27, page 34.
[309] The updated risk premiums for the utilities are 4.29% and 6.64% for 1956-2008 and 1983-2008, respectively. See excel sheet 104180_1 included with the responses to the information requests.
[310] Response to Information Request UCA-NGTL 253 (c).

We would argue that if one accepted for the sake of argument that Canadian utilities are more risky than the market as a whole, then their higher risk premiums relative to those of the market are not evidence that the GCOC Formulas produce unfair rates of returns. In fact, given the higher Sharpe ratios of Canadian utilities versus those for the market as a whole,[311] this is evidence that supports the hypothesis that the GCOC Formulas produce too high (and not too low) returns.

Q. Does Mr. Engen agree that Canadian utilities are less risky than the market?

A. In his response to Information Request AUC-NGTL 10, Mr. Engen states "not necessarily".

Q. Would you please comment on Mr. Coyne's use of ex post ERPs from samples of utilities?

A. Mr. Coyne utilized four proxy groups for this purpose; namely, (1) a U.S. natural gas distribution proxy group, (2) a U.S. electric distribution proxy group, (3) a U.S./Canada natural gas pipeline group, and (4) a Canadian utilities group.[312]

None of the three U.S. samples are reasonable proxies for an average-risk Canadian utility given that the mean standard (i.e., pre-inflated) betas are 0.69, 0.75 and 0.95 for U.S. natural gas distribution utilities, U.S. electric distribution companies and U.S. gas transmission pipelines, respectively.[313] In Schedule 3.12, we present mean standard betas for 15 rolling five-year periods for Canadian utilities starting with 1990-94 and ending with 2004-2008. The highest mean standard beta of 0.587 is for the sample without Duke (Westcoast) for 1991-95, and the highest standard beta for an individual utility is 0.875 for TransAlta for 2004-8, a period over which it had divested most of its regulated assets.

[311] Response to Information Request AUC-VanderWeide-004.
[312] Exhibit 975977_1632472, Written evidence of James M. Coyne for Atco Utilities (Atco Electric Ltd. and Atco Gas and Pipelines Ltd., lines 16-23, page 18.
[313] Response to Information Request IPCAA-ATCO-13 Attachment 1.

If we examine the members in these three samples, we find that the "all-in" mean ROE estimates increase as the number of utilities with standard betas of one or greater in the U.S. sample increases. To illustrate, three of the five utilities in the U.S. sample, U.S. gas transmission pipelines, have standard betas of 1.0 or higher, and this sample produces the highest "all-in" mean ROE estimate of 10.78% based on a MERP of 6.25%. The three utilities with their standard betas in parentheses are: National Fuel Gas (1.02), Spectra Energy (1.0) and Questar Corp. (1.39). The fragility of the "all-in" mean ROE estimate for this sample is demonstrated clearly by only removing Questar from the sample. This reduces the "all-in" mean ROE estimate by 71 basis points.

If we accept for the sake of argument that Mr. Coyne's ROE estimates are correct for the gas transmission pipelines, then they all have approximately the same Treynor ratios as predicted by the CAPM, which measure the expected return for the utility less the risk-free return, all divided by the beta of the utility:[314]

Gas Transmission Pipeline	Excess return divided by beta
Enbridge ENB	6.28
National Fuel Gas NFG	6.25
Spectra Energy SE	6.24
Questar Corp. STR	6.24
TransCanada Corp. TRP	6.25

In turn, accepting for the sake of argument that Mr. Coyne's ROE estimates are correct for the gas transmission pipelines, this implies that the appropriate returns for Enbridge and TransCanada are 8.59% and 8.19% when benchmarked against "comparable" U.S. utilities in gas transmission.

5.4.1.7 Estimates of the Going-forward Yield on 30-year Canada's

[314] This uses information supplied by Mr. Coyne in the Response to Information Request IPCAA-ATCO-13 Attachment 1, page 3 of 4. Higher Treynor metrics are better because they represent a higher reward per unit of non-diversifiable risk (beta).

Q. How do the estimates for the going-forward yield on 30-year Canada's differ?

A. The going-forward yield estimates on 30-year Canada's are 4.13% for Mr. Coyne, 4.5% for Dr. Vilbert and 4.75% for Drs. Kryzanowski and Roberts.

Dr. Vilbert adds a maturity premium to the one year forecast for 10-year Canada's, where the latter is obtained from the August 11, 2008 issue of *Consensus Forecasts*. Mr. Coyne uses the standard procedures used in the GCOC formula but uses data from the October 2008 issue of *Consensus Forecasts*.

We also use the standard procedure that this Commission and other Canadian regulators such as the NEB have or would have used to calculate the forecasted 30-year Government of Canada (GoC) bond yield for 2009. To the NEB's calculation of this yield of 4.36 percent for 2009, we add 40 basis points to normalize this yield for the effects of the current easy money monetary policy designed to stimulate economic activity due to the current global credit and economic crises. We then round (down) the resulting value to the nearest 5 basis points.

5.4.1.8 Add-ins to the "Bare-bones" Cost of Equity

Q. How do the various expert recommendations differ in terms of add-ins to the "bare-bones" cost of equity?

A. Drs. Vilbert and Kolbe are silent on whether an adjustment should be made to their bare-bones cost of equity for flotation cost and financial flexibility and integrity. In his reply to Information Request UCA-NGTL 257, Dr. Vilbert confirms that "[n]one of Dr. Vilbert's cost of equity estimates include a 50 bps adder for financial flexibility." We follow common regulatory practice in Canada and have included a 50 basis point adjustment to our "bare-bones" cost of equity.

5.4.2 Implementation of the DCF Method

Q. Would you please explain if the experts in this proceeding apply the DCF Method to the same level of firm aggregation?

A. Firm aggregation typically can be at the firm level, industry level or market level. Drs. Vilbert and Kolbe and Dr. Vander Weide implement the DCF Method at the individual utility level while we implement it at the market level. We do so because implementing the DCF method at the individual utility level is fraught with implementation biases.

Q. Is there any evidence that the DCF method is commonly used by firms to estimate the cost of equity capital?

A. No. In fact the evidence indicates otherwise. Based on a survey of a large sample of U.S. corporations, Graham and Harvey (2001, 2002) find that the:[315]

> "Capital Asset Pricing Model (CAPM) was by far the most popular method of estimating the cost of equity capital: 73.5% of respondents always or almost always used it. The second and third most popular methods were average stock returns and a multi-factor CAPM, respectively. Few firms used a dividend discount model to back out the cost of equity."

We assume that these corporations have managements whose competence is comparable to that of the applicant utilities to this proceeding.

5.4.2.1 Use of "Bottom-up" Forecasts of Analysts

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[315] John Graham and Campbell Harvey, How do CFOs make capital budgeting and capital structure decisions?, *Journal of Applied Corporate Finance* 15:1 (Spring 2002), page 12. This article was a practitioner version of the following paper that won the Jensen prize for the best *JFE* paper in corporate finance in 2001: John Graham and Campbell Harvey, The theory and practice of corporate finance: Evidence from the field, *Journal of Financial Economics* 60 (2001).

Q. Do the experts for the applicant utilities use long-term "bottom-up" forecasts of analysts in implementing their DCF approach for individual utilities?

A. Yes, they do even if they do not know if the five-year forecasts are five-year arithmetic means or geometric means.[316] Thus, they may be using historical arithmetic mean estimates going forward when they implement the ERP Method and geometric mean estimates when they implement the DCF Method for determining their recommended ROEs. The long-term forecasts from Value Line are even less dependable because they are 3 to 5 year forecasts. Thus, for one utility they could be a three year forecast and for another a 5 year forecast. To illustrate, in his response to Information Request UCA-VanderWeide-022 a-d, 'If you confirmed in part (c), please advise if the individual analysts reporting to I/B/E/S report the arithmetic or geometric mean annual growth rate of earnings over the next five years?', Dr. Vander Weide replied: 'I/B/E/S does not provide the requested information."

5.4.2.1.1 Merits of analysts' forecasts

Q. Would you please discuss the merits of using the "bottom-up" forecasts of analysts?

A. Drs. Kolbe and Vilbert rely on the bottom-up forecasts of analysts in their DCF analyses for individual utilities. In response to Information Request UCA-NGTL 268, Dr. Vilbert confirms that he made no adjustments to the forecasts of analysts.

Numerous studies show that the bottom-up forecasts of analysts for individual firms are optimistic.

Q. If investors believe the forecasts, why would any bias in the forecasts of analysts be important?

[316] Response to Information Request UCA-VanderWeide-022, EPCOR Evidence, Appendix A - Written Evidence of Dr. James H. Vander Weide, page 52, Equation.

A. Like Dr. Vander Weide, one could argue that the "DCF model requires the use of investors' growth expectations, whether or not their expectations are subsequently found to be optimistic".[317] However, this would attribute considerably irrationality to investors in that they believe forecasts that they know have an optimistic bias. Such irrationality would invalidate a basic assumption of using the DCF method to estimate the cost of equity; namely, that prices are fair. Fair prices are needed to obtain estimates of fair rates of return for utilities using the DCF method.

Q. Does the literature support the conjecture that investors do not make adjustments for the known bias in the earnings forecasts of analysts?

A. No, the literature does not support this conjecture. Even if the recommendations of analysts influence market prices as some expert argue, this does not mean that investors do not make decisions after removing some or a great part of the bias inherent in such forecasts. In fact, a number of studies published in peer-reviewed scientific journals report evidence that investors make adjustments for predictable bias (e.g., Freeman and Tse, 1992; Dugar and Nathan, 1995, Han, Manry and Shaw, 2001).[318] Furthermore, the following question comes to mind: Why use earnings growth forecasts of investment analysts who use a "bottom-up" approach to generate extremely noisy and upwardly biased estimates of future return expectations when you can directly obtain the future return expectations of investment professionals from both the buy and sell sides of the market using "top-down" and not "bottom-up" approaches, as we have done in our evidence for the market proxy (our fourth estimation method)?

5.4.2.1.2 Published literature on analysts' forecast and overconfidence biases

[317] Response to Information Request UCA-VanderWeide-015, EPCOR Evidence, Appendix A - Written Evidence of Dr. James H. Vander Weide, page 30, line 26 to page 32, line 19.

[318] R. N. Freeman and S.Y. Tse, 1992, A nonlinear model of security price responses to unexpected earnings, *Journal of Accounting Research* 30:2, pages 185-209; A. Dugar and S. Nathan, 1995, The effect of investment banking relationships on financial analysts' earnings forecasts and investment recommendations, *Contemporary Accounting Research* 12:1, pages 131-165; and B. H. Han, D. Manry, and W. Shaw, 2001, Improving the precision of analysts' earnings forecasts by adjusting for predictable bias, *Review of Quantitative Finance and Accounting* 17:1, pages 81-98.

Q. Does the empirical evidence published in the refereed academic journals support the notion that the forecasts of analysts are biased?

A. In support of the relevance of the forecasts of analysts, one could refer to a number of dated studies that find that the forecasts of analysts are better than the use of time-series methods or the use of historical growth rates to forecast future growth rates. Almost all of these studies were published before 1990 and typically examine forecasts for horizons of one year or less.[319] In contrast, the experts in this proceeding calculate implied expected rates of return based on forecasts with forecast horizons (i.e., the time period between when a forecast is made and actual earnings that were forecasted are reported) of one, two and up to five years or longer. Since optimism bias increases with an increase in the time between when the earnings forecast is made and actual earnings are reported, the effect of analysts' optimism is exacerbated when the forecasts of analysts are used in a DCF analysis.

Furthermore, the world has changed since these studies were published. First, the information disclosure playing field has been leveled in both the U.S. and Canada as companies are now restricted from disclosing information first to financial analysts and then to the general public. Second, as has been discussed at length in the press, analysts are generally overly optimistic in their forecasts to facilitate the underwriting side of their business, and, more importantly, to maintain access to the firms that they cover. Third, forecasting accuracy has not been a criterion in retaining analysts, at

[319] Lawrence D. Brown and Michael S. Rozeff, 1978, The superiority of analyst forecasts as measures of expectations: Evidence from earnings, *The Journal of Finance*, 33: 1 (March); Dov Fried and Dan Givoly, Financial analysts forecasts of earnings, A better surrogate for market expectations, 1982, *Journal of Accounting and Economics* 4; R. Charles Moyer, Robert E. Chatfield and Gary D. Kelley, 1985, The accuracy of Long-term earnings forecasts in the electric utility industry, *International Journal of Forecasting* 1; Robert S. Harris, 1986, Using analysts' growth forecasts to estimate shareholder required rates of return, 1986, *Financial Management* (Spring 1986); James H. Vander Weide and William T. Carleton, 1988, Investor growth expectations: Analysts vs. History, 1988, *The Journal of Portfolio Management* (Spring); David Gordon, Myron Gordon and Lawrence Gould, 1989, Choice among methods of estimating share yield, *The Journal of Portfolio Management* (Spring).

least in more recent years where the emphasis has been on the revenue they generate for their employers. To illustrate, Hong and Kubik (2003) find that (pages 345-6):[320]

> "We draw a number of conclusions from our findings. First, it appears that analyst career concerns do depend on forecasting expertise, contrary to claims otherwise by some regulators and financial economists. However, brokerage houses do not solely care about accuracy; they also reward relatively optimistic analysts. The latter finding is most likely due to investment bankers and stockbrokers at brokerage houses wanting analysts to promote stocks so as to generate underwriting business and trading commissions. Also, there is some merit to allegations of conflict of interest for analysts covering stocks underwritten by their brokerage houses. We find that for these analysts, job separations depend less on accuracy and more on optimism. Finally, there is some support for claims that Wall Street lost any self-discipline to produce accurate research during the recent stock market mania. Rewards were less sensitive to accuracy and more sensitive to optimism during the stock market boom of the late 1990s."

Easterwood and Nutt (1999) find analysts react to information in a manner that is inconsistent with rationality. Specifically (abstract):[321]

> "The evidence indicates that analysts underreact to negative information, but overreact to positive information. These results are consistent with systematic optimism in response to information."

This issue is explored further by Chen and Jiang (2006) who conclude (page 350) that:[322]

[320] Harrison Hong and Jeffrey D. Kubik, 2003, Analyzing the Analysts: Career Concerns and Biased Earnings Forecasts, *The Journal of Finance* 58: 1 (February), 313-351.
[321] John C. Easterwood and Stacey R. Nutt, 1999, Inefficiency in analysts' earnings forecasts: Systematic misreaction or systematic optimism?, *The Journal of Finance* 54: 5 (October), pages 1777-1797.
[322] Qi Chen and Wei Jiang, 2006, Analysts' Weighting of Private and Public Information, *Review of Financial Studies* 19: 1, pages 319-355.

> "First, on average, analysts overweight private information; and second, analysts weight information optimistically in that between private and public information, they overweight the relatively favorable one. We further explore the potential sources of analysts' misweighting behaviors and find that the degree of misweighting is positively related to the benefits, and negatively related to the costs, of misweighting. We interpret these findings as analysts' incentives playing a larger role in misweighting than their behavioral bias."

Q. Would you please review some of the published literature that finds that the forecasts of analysts and strategists at the market level are biased?

A. It is well documented in the published literature that the bottom-up market forecasts of financial analysts and top-down market forecasts of market strategists contain a material optimism bias, and that the bottom-up forecasts tend to be much more optimistic than their top-down counterparts.

We now discuss two representative studies of the bias in the forecasts of earnings per share (eps) at the market level. Dr. Chopra (1998) finds that the average consensus earnings per share growth forecasts made by analysts for the S&P500 index over the 1985-1997 time period is almost twice the actual growth rate.[323] Drs. Chung and Kryzanowski (2000) find a significant optimism bias in bottom-up and top-down forecasts of earnings per share by analysts for the S&P500 index for the current fiscal year (FY1) and subsequent fiscal year (FY2).[324] They find that the optimism bias is significantly higher in the bottom-up forecasts compared to the top-down forecasts on average. They examine the 218 months of such annual forecasts over the period from January 1982 through February 2000. The bottom-up forecasts of financial analysts

[323] V. K. Chopra, 1998, Why so much error in analysts earning forecasts?, *Financial Analysts Journal* 54: 6, pages 35-42.

[324] R. Chung and L. Kryzanowski, 2000, Market timing using strategists' and analysts' forecasts of S&P500 earnings, *Financial Services Review* 8:3, pages 125-144. Similarly, Chung and Kryzanowski (1999) find that the quarterly EPS forecasts for the S&P400 and S&P500 are, on average, optimistically biased for the top-down forecasts of market strategists that are reported to I/B/E/S. R. Chung and L. Kryzanowski, 1999, Accuracy of consensus expectations for top-down earnings per share forecasts for two S&P indexes, *Applied Financial Economics* 9, pages 233-238.

exhibit a statistically significant mean optimism bias of 17.5% and 30.5% for the next and subsequent fiscal years (FY1 and FY2), respectively.

Q. Is there also evidence of forecast bias at the firm level?

A. Yes, there are numerous papers that report significant optimism bias in the forecasts for individual firms.

In a paper published in the *Journal of Finance* in 2003, Drs. Chan, Karceski and Lakonishok conclude on page 643 that:[325]

> "There is no persistence in long-term earnings growth beyond chance, and there is low predictability even with a variety of predictor variables. Specifically, IBES growth variables are overly optimistic and add little predictive power."

They also observe that (p. 672):

> "Notably, analysts' estimates are quite optimistic over the period 1982 to 1998, the median of the distribution of IBES growth forecasts is about 14.5 percent, a far cry from the median realized five-year growth rate of about 9 percent for income before extraordinary items."

They find that the level of over-optimism in the IBES forecasts varies somewhat but is substantial across all their five quintiles of firms. Based on the results presented in their table IX (p. 673), the over-optimism bias is still high at about 4.0% for quintile 1, which consists of the firms in their lowest growth grouping of firms. The actual and forecasted growth rates for income before extraordinary items are 2.0% and 6.0% for their quintile 1 group, where utilities are 25% of the membership in this quintile.

[325] Louis K.C. Chan, Jason Karceski and Josef Lakonishok, 2003, The level and persistence of growth rates, *Journal of Finance* 58:2 (April), page 643.

This is a 200% overestimate when measured against the actual annual rate of growth of 2.0% for this quintile of firms.

Drs. Easton and Sommers (2007) document the bias and its affect on the ERP on page 1012:[326]

> "We show that, on average, the difference between the estimate of the expected rate of return based on analysts' earnings forecasts and the estimate based on current earnings realizations is 2.84%. When estimates of the expected rate of return in the extant literature are adjusted to remove the effect of optimistic bias in analysts' forecasts, the equally weighted estimate of the equity risk premium appears to be close to zero [at 1.60%]. We show, however, when estimates are based on value-weighted analyses, the bias in the estimate of the expected rate of return is lower [at 9.67%] and the estimate of the expected equity premium is more reasonable, 4.43%."

Q. Are the forecasts of Value Line superior to those from I/B/E/S?

A. Ramnath *et al.* compare Value Line and I/B/E/S quarterly earnings forecasts in terms of their "accuracy, rationality and the degree to which they proxy for market expectations". They conclude as follows:[327]

> "Overall, our results suggest that, relative to I/B/E/S earnings forecasts, Value Line forecasts are less accurate and poorer proxies for market expectations. Our results suggest that any advantage Value Line's forecasts have due to Value Line's independence as a research company (without investment banking business) is outweighed by an I/B/E/S consensus that includes more timely

[326] Peter D. Easton and Gregory A. Sommers, 2007, Effect of analyst's optimism on estimates of the expected rate of return implied by earnings forecasts, *Journal of Accounting Research* 45: 5 (December), pages 983-1015.
[327] Sundaresh Ramnath, Steve Rock and Philip Shane, 2005, Value line and I/B/E/S forecasts, *International Journal of Forecasting* 21, pages 185-198.

> forecasts and effectively purges idiosyncratic error in analysts' individual earnings forecasts." (page 187)

They go on to state:

> "Our evidence regarding analysts' forecasting rationality suggests that Value Line forecasts are relatively more optimistic than timelier I/B/E/S consensus forecasts. Our evidence that Value Line and I/B/E/S forecasts reflect similar amounts of underreaction to earnings information is somewhat surprising, considering prior research documenting the fact that Value Line's success in recommending stocks is due to its ability to detect earnings momentum." (page 197)

5.4.2.1.3 Industry criticisms about analysts' forecast bias

Q. Are there any examples of criticisms from those in the industry?

A. Yes, there is much criticism from those in the industry.

A very pertinent one is contained in an article by Mr. Montier (2005) that is in the third and final year curriculum for those working towards a Chartered Financial Analyst (CFA) designation.[328] The article classifies analysts as "truly inept seers" who "are terribly good at telling us what has just happened but of little use in telling us what is going to happen in the future" (page 3). He attributes this to the following (page 4): "Experts do know more than lay people, but sadly this extra knowledge seems to trigger even higher levels of overconfidence."

[328] James Montier, 2005, The folly of forecasting: Ignore all economists, strategists, & analysts, *Global Equity Strategy*, DrKW Macro research, August 24, 2005. Available at: http://www.arthurdevany.com/webstuff/montier-follyofforecasting.pdf.

Analysts also have been criticized for the aggressive "hyping" of stocks. The research director of the world's largest securities firm told its analysts to be more critical.[329] Charles Hill, director of research at Thomson Financial/First Call noted that only 1.8% of all current stock recommendations are "sells", even in a bear market. He went on to complain that the compensation packages of many analysts are tied too closely to the performance of the lucrative investment banking operations of the major brokers. The aversion of analysts to making sell recommendations is not confined to one sector or time period, and is ongoing. A recent article published on Bloomberg.com notes that even with a 10% decline in the S&P500, "analysts' recommendations to "buy" or "hold" U.S. shares climbed to 94.5 percent, the highest rate in more than five years".[330]

5.4.2.1.4 Decisions by Canadian regulators dealing with the forecast biases of analysts

Q. How have Canadian regulators dealt with the issue of analyst forecast bias?

A. In Decision EUB Decision 2004-052 (July 2, 2004), the predecessor to this Commission stated on page 23 that:

> "The Board notes ATCO's argument that any upward bias in analyst growth estimates may be less prevalent for stable industries including utilities. Nevertheless, the Board considers that there is merit in the intervener arguments [For example, Cargill Argument, page 23, and CG Argument, page 13] that the analysts' earnings forecasts used in the development of the DCF estimates have been biased high, resulting in DCF estimates that overstate the required return. The record of the Proceeding reveals no evidence on an appropriate discount to apply to the DCF test results to appropriately adjust for an overstatement in the

[329] Dave Ebner, 2002, Merrill Lynch tells analysts to be more critical, *Globe and Mail*, March 7, page B18.
[330] M. Tsang and E. Martin, 2008, Schwab asks who needs analysts after biggest flub (Update4), Bloomberg.com, April 7. Available at: http://www.bloomberg.com/apps/news?pid=20670001&refer=home&sid=aafbjqdWG7pQ.

> required returns. Accordingly, the Board finds reliance on the Applicant's DCF estimates problematic."

The EUB went on to conclude (page 23) that: "As a result of the above noted concerns, the Board concludes that no weight should be placed on the results of the DCF tests presented in this Proceeding".

In a recent decision dealing with Ontario Power Generation, Inc., the Ontario Energy Board concluded (page 157):[331]

> "For example, there is evidence of analyst bias, which although not conclusive with respect to utilities, suggests that the DCF cannot be relied upon wholly. These weaknesses were highlighted during the testimony of the experts and in references to other studies in the financial literature."

The BCUC concluded that the forecasts by Value Line have no bias since Value Line is an independent research firm that neither buys nor sell securities, and that I/B/E/S forecasts have no bias because their forecasts are similar to those of Value Line.[332] This conclusion suffers from two errors in logic. First, analyst bias depends primarily upon the need for the analyst to maintain access to the management of the firms being covered, and this depends to a greater degree upon being firm-friendly and not upon whether or not the analyst's employer buys or sells securities. Second, as we documented earlier, the conclusion does not follow from the empirical evidence on analyst bias that has been published in peer-reviewed journals that includes forecasts made by analysts at Value Line.

Q. What conclusion do you draw from this?

[331] The Ontario Energy Board, Decision with Reasons, EB-2007-0905, In the Matter of an Application by Ontario Power Generation Inc., November 3, 2008.
[332] Mr. McShane's Response to Pollution Probe Interrogatory #21, EB-2007-0905, Exhibit L, Tab 12, Schedule 21, page 1 of 1.

A. We conclude that the "bottom-up forecasts" for individual firms should not be used in the determination of ROE recommendations unless appropriately adjusted because such forecasts tend to be optimistic, sometimes excessively optimistic, and the amount of the bias varies in an unknown fashion over time.

Since Drs. Kolbe and Vilbert do not adjust for optimism in the forecasts of analysts, we conclude that the estimates obtained using the DCF-based risk premium test conducted by them result in ERP estimates for individual utilities that are too unreliable to be used as a proxy for the fair required return on equity capital. If the optimism bias is removed, such ERP estimates provide some very noisy indicative (or secondary) information about the fair required return on equity capital.

5.4.2.2 Problems with the Use of DCF Estimates of Fair Return from a Sample of Utilities

Q. Do any of the experts for the applicant utilities apply the DCF Method to samples of utilities?

A. Yes, Drs. Kolbe and Vilbert generate DCF estimates of a fair return on equity for three samples of utilities.

Q. Are there any problems associated with using the DCF Method to generate fair return on equity estimates?

A. Discounted cash flow (DCF) tests have a number of disadvantages that make them unreliable when applied to specific firms in the same industry. First, the DCF test depends critically on estimating the expected growth rate. Error in capturing the growth rate impacts directly on DCF estimates. Because estimates of the growth rate depend on past growth and/or analyst opinion, it is difficult to achieve any measure of precision. Furthermore, if firms are drawn from the same or similar industries, the growth rate errors will tend to be correlated, and the benefits in terms of forecast precision from an increasing sample size will be greatly reduced. Highly correlated forecast errors across individual firms in the same or similar industries arise due to the fact that analysts specializing in the same industry will make the forecasts for most of the firms in that industry.

Second, circularity also causes a problem in applying the DCF Method to individual firms in regulated industries. Analysts base their analysis of the future growth in earnings and dividends before reflecting their optimism and overconfidence biases on the rate of return allowed by regulatory bodies, which translates into the market price for the shares. If we, in turn, rely solely on the market price and dividend growth rate for our required return on equity, then we are being influenced by the market, which, in turn, is being influenced by its prediction of the regulator's decision. Thus, by employing the DCF method, we would, in effect, be anticipating what the market is expecting the regulators to do thus introducing circularity. In his reply to Information Request AUC-ATCO UTL-8, Mr. Coyne recognizes that circularity is a problem when applying methods such as the DCF Method to individual firms in regulated industries:

> "Regulators frequently rely on proxy groups comprised of utility sector companies because those entities have been determined to be the most similar in terms of financial, business and regulatory risk. Naturally, this can lead to concerns regarding circularity."

Third, two-directional causality causes a problem in applying the DCF Method to individual firms in regulated industries. Causality refers to the relationship between one variable (the cause or independent variable) and another variable (called the effect or dependent variable). Dr. Clive Granger won the Nobel Prize in Economics for developing a statistical technique for determining whether one time series is useful in forecasting another. A classic example of two-directional causality is the answer to the question of whether 'chickens Granger-cause eggs' or do 'eggs Granger-cause chickens'. The analogous question for the use of the DCF approach to individual firms in regulated industries is 'do the earnings forecasts of analysts

Granger-cause allowed ROEs' and/or 'do allowed ROEs Granger-cause the earnings forecasts of analysts'. Especially in regulatory jurisdictions such as the U.S. where the "DCF method is the most widely-used method for estimating the cost of equity",[333] 'the earnings forecasts of analysts must Granger-cause allowed ROEs'.

Even in Canadian regulatory jurisdictions where the DCF method is not widely used, we find evidence that expected 'allowed ROEs Granger-cause the earnings forecasts of analysts'. For example, in Attachment 2 to the response of Information Request UCA-ATCO-53, Mr. Kwan, a financial analyst for RBC Capital Markets, examines the impact of lower expected allowed ROEs on earnings per share and valuations for a number of Canadian utilities. A second, topical example comes from Maquarie Research commenting on the present hearing:[334]

> "We recommend owning Canadian energy infrastructure stocks in 2009. Dividend paying stocks generally outperform over the long term and should serve investors well, especially in today's market conditions. An increase in the allowed ROE would enable the companies to continue growing earnings and dividends while other sectors shrink during the recession. Stocks that could benefit most from an increase in the allowed return are Fortis, TransCanada, Canadian Utilities, ATCO and Enbridge."

Fourth, the DCF model assumes that returns are set competitively, and that no excess returns or "free lunches" are possible. If investors are on average overcompensated for the investment risk they bear for investing in regulated utility stocks, then the DCF model will generate implied returns that are too high. As we subsequently discuss, Drs. Kolbe and Vilbert and Dr. Vander Weide provide evidence of such

[333] Response to Information Request UCA-VanderWeide-018, EPCOR Evidence, Appendix A - Written Evidence of Dr. James H. Vander Weide, page 35, lines 1-5. In his response to Information Request IPCAA-ATCO-7, Mr. Coyne "agrees that FERC relies almost exclusively on the DCF method in establishing the authorized return on equity".
[334] Macquarie Research, Canada, 2009, Canadian energy infrastructure, ROE formula may finally bite the dust, February 23, page 1.

excess returns for their samples of utility investors.[335] We provide further evidence in a subsequent portion of section five of our evidence.

5.4.2.3 <u>The Implied ROE from the DCF Method is a Multiperiod Non-arithmetic Mean</u>

Q. Would you please discuss the output of the DCF Method?

A. Implementations of the DCF Method solve for the rate of discount that equates the present value of a stream of future benefits (typically dividends per share) to the current price of a share. Thus, the DCF Method solves for an implied rate of return on equity that is assumed to be constant over a multi-period horizon. Since it is assumed to be constant, it must be a weighted average of the rates of return for each going forward year used in the calculation. This is the case even if one uses the simple Gordon valuation model.

Furthermore, while experts for applicant utilities typically use or argue for the use of the arithmetic or equal-weighted average when implementing the Equity Risk Premium Estimation Method, they rely on a non-equal-weighted average when implementing the DCF Method. This was aptly stated by Drs. Fama and French as follows:[336]

> "Under certain conditions, the appropriate return concept for the cost of capital is an expected one-period simple return (e.g., see Fama (1996)). This issue is complicated, however, by the fact that expected returns must be estimated and the estimates enter present value expressions in a nonlinear way. As a consequence, estimates of the cost of capital that produce unbiased estimates of present values are weighted averages of average simple and compound returns, with weights that

[335] Dr. Vander Weide confirms that utilities earn risk-adjusted excess returns. Response to Information Request UCA-VanderWeide-019, EPCOR Evidence, Appendix A - Written Evidence of Dr. James H. Vander Weide, page 35, lines 21-27.
[336] Eugene F. Fama and Kenneth R. French, 1999, The corporate cost of capital and the return on corporate investment, *The Journal of Finance* 54: 6 (December) page 1962.

> depend on the maturity of the cash flow to be valued (Blume (1974), Cooper (1994))."

For an infinite horizon, the weighted average of the expected ROE that produces an unbiased estimate of the present value or price of a share is geometric and not arithmetic.

Q. Is this known in the literature?

A. Yes, it is but it has not been dealt with by experts for the applicant utilities. To illustrate, Fama and French estimate a historical expected geometric equity risk premium of 2.55 percentage points when they used dividend growth rates and a premium of 4.32 percentage points when they used earnings growth rates. Drs. Ibbotson and Chen use DCF-based models that produce geometric mean estimates of the long-term supply of equity returns.[337] Specifically on page 89:

> "Because our methods used geometric averages, we focus on the components of the 10.70 percent geometric return. When we present our forecasts, we convert the geometric average returns to arithmetic average returns."

When using the converted discount rate from their DCF-based model to arrive at an equity risk premium over T-bonds instead of T-Bills, Drs. Ibbotson and Chen would also have had to make a similar average-return conversion for the risk-free proxy.

Q. Why is this important?

A. It highlights a major inconsistency in the implementation of the various approaches when the DCF Method is implemented. Specifically, experts for applicant utilities use arithmetic means in the implementation of the Equity Risk Premium Estimation

[337] Roger G. Ibbotson and Peng Chen, 2003, Long-run stock returns: Participating in the real economy, *Financial Analysts Journal* 59: 1 (January/February), pages 88-98.

Method and geometric means in the implementation of the DCF Method. Given that we know little about the time-series properties of the streams discounted to obtain the implied ROEs using the DCF Method, converting from an unequally weighted average to an equally weighted average would be fraught with estimation error. More importantly, as discussed earlier in this section, experts for applicant utilities do not remove the impact of optimism and overconfidence on the part of analysts when calculating the implied ROE from the DCF Method.

5.4.3 Implementation of Survey Methods to Generate an Ex Ante MERP Estimate

Q. Do any of the experts for the applicant utilities rely on survey methods to generate an ex ante MERP estimate?

A. No. Dr. Vilbert discusses the findings of a few surveys dealing with MERPs in Appendix C of his evidence. He dismisses the use of these surveys as follows (lines 9-12, page C-5):[338]

> "The above quotation from Prof. Welch emphasizes the caution that must attend survey data even from knowledgeable survey participants: the outcome is likely to change quickly with changing market circumstances. Regulators should not, in my opinion, attempt to keep pace with such rapidly changing opinions."

However, Dr. Vilbert obtains "the forecast of the long-term risk-free rates on government bonds from the survey information available from Consensus Economics, Inc." (lines 6-7, page 48) although they change quickly with changing market circumstances. Similarly, he uses the forecasts of analysts for individual firms that not only change slowly to changing market circumstances but are known to be seriously biased due to the overconfidence and optimism of analysts, as documented earlier in this section of our evidence.

[338] Nova Gas Transmission Ltd. Evidence Section 2.9, Direct Testimony of Dr. Michael J. Vilbert.

As we discussed in section 3.3.1.4 of our evidence, U.K. regulatory estimates of the MERP have generally relied heavily on survey evidence of investor expectations with some limited consideration usually given to evidence on historic average returns due to their belief that the historic MERP provides an overstatement of the current risk premium.[339] Furthermore, unlike the forecasts of financial analysts, there is no compelling reason to conclude that the expectations of CFOs, investment professionals for longer-term market-level forecasts and professors are biased in one direction or the other.

5.4.4 Adjusting for Flotation Costs

Q. Do any of the experts for the applicant utilities deal with adjusting ROEs for flotation costs?

A. In an attachment filed with the responses to information requests from IPCAA ,[340] Dr. Vander Weide discusses various issues dealing with adjusting ROEs for flotation costs. Not only is his review of the primarily U.S. literature old but he completely ignores the Canadian literature that finds that the costs and impact of secondary offerings are different in Canada compared to the United States. To illustrate, Drs. Kryzanowski and Rubalcava examine the domestic and international secondary equity offerings (SEOs) of Canadian firms cross-listed in the United States and find that there is a significant pre-announcement run up in returns only for domestic issues; and only international SEOs exhibit significant price pressure on the announcement day and post-announcement.[341] Similarly, Drs. Kryzanowski, Lazrak and Rakita find that any price pressure effects on the announcement and closing days for Canadian SEOs is only significant based on the median and not mean, and that while the mean and median price pressure effects for non-resource SEOs are

[339] NERA, UK water cost of capital, *A Final Report for Water UK*, Prepared by NERA, London, July 2003, page 76.
[340] IPCAA-VANDER WEIDE-012 Attachment 012 (b).
[341] Lawrence Kryzanowski and Arturo Rubalcava, 2004, Valuation effects of domestic and international seasoned Canadian offerings by firms cross-listed on the NYSE/Amex or Nasdaq, *Journal of Multinational Financial Management* 14:2 (April), pages 171-186.

significant, their values are small at -29 and -45 basis points, respectively. They also find that there are no significant price pressure effects for the closings.[342]

Q. Would you comment on Dr. Vander Weide's discussion of the Patterson approach to flotation cost recovery?

A. Dr. Vander Weide fails to provide the natural extension to Dr. Patterson's approach to flotation cost recovery. While it is not necessary to adjust the cost of retained earnings for underwriting and issue costs since the firm bypasses these costs when it finances using retained earnings, the actual cost of retained earnings (k_{re}) from an opportunity cost perspective is less than the shareholder's required ROE because investors do not have to pay taxes on dividends and then incur trade costs in order to reinvest the after-tax dividend income to earn their require ROE, k_e. Specifically:

$$k_{re} = k_e(1-t)(1-b)$$

where t is the marginal tax rate net of the dividend tax credit, b is trade costs (brokerage fees, liquidity costs and so forth), and $k_{re} < k_e$ whenever t and/or b are greater than zero.

Thus, it is inconsistent to adjust the allowed ROE for the higher costs of new issues due to issue-related costs (market frictions) but not similarly adjust the allowed ROE for the lower costs of retained earnings due to market frictions.

Q. Does Dr. Kolbe have an opinion on this topic?

A. Yes, Dr. Kolbe provides the following response to Information Request UCA-NGTL 169 (b) that deals with lowering the cost of equity for retained earnings and when funds are raised through a dividend reinvestment program (the latter in part (c) of this IR):

[342] Lawrence Kryzanowski, Skander Lazrak and Ian Rakita, 2008, Behavior of liquidity, spreads and returns around Canadian seasoned equity offerings, Paper presented at the 2008 Meetings of the Eastern Finance Association, April 9-12, 2008, St. Pete Beach, Florida.

> "Dr. Kolbe would also note that after all this research, it is still standard practice to estimate a single cost of equity for a company, not one that is dependent in any way on how that particular company happens to identify the funds used to finance the equity portion of any particular investment. Dr. Kolbe would strongly recommend that the Commission follow standard practice in this regard."

5.4.5 **Adjusting for Financing Costs and Financing Flexibility**

Q. Are there any differences in the adjustments that experts have made for financing costs and financial flexibility?

A. Like us, Dr. Vander Weide and Mr. Coyne have included a 50 basis point adjustment for financing costs and flexibility.[343]

In his reply to Information Request UCA-VanderWeide-014 a-b, Dr. Vander Weide states that he "added a 50-basis point allowance for flotation costs and financial flexibility to experienced risk premiums that did not include an allowance for flotation costs or financial flexibility". However, the experienced risk premiums obtained for a sample of Canadian regulated utilities using the DCF Method already reflect such a premium given that their market returns already reflect the impact of the inclusion of a 50-basis point allowance in their allowed ROEs.

5.4.6 Adjusting for Firm Size

Q. Do investment returns include a premium for small size?

[343] Response to Information Request UCA-VanderWeide-001, EPCOR Evidence, Appendix A - Written Evidence of Dr. James H. Vander Weide, page 7, lines 8-10. Exhibit 975977_1632472, Written evidence of Mr. James M. Coyne for Atco Utilities (Atco Electric Ltd. and Atco Gas and Pipelines Ltd.), page 26.

A. Dr. Neri argues that AUI "faces economic size risk, where "size" is considered from a financial or investment perspective" (lines 12-13, page 6).[344] He goes on to state that "academic research finds that size is an important risk factor affecting the cost of capital" (lines 2-3, page 12). Before dealing with the literature, we point out that Berk demonstrates that size-related regularities in asset prices should not be regarded as anomalies because "size will in general explain the part of the cross-section of expected returns left unexplained by an incorrectly specified asset pricing model".[345] Thus, size is a measure of whether or not the asset pricing model is correctly specified.

Nevertheless, we note that Dr. Neri reviews a number of older papers that find that size is priced in the U.S. market. Current research reaches the opposite conclusion. Drs. Ang, Hodrick, Xing and Zhang strongly demonstrate that for 23 developed markets (including the U.S.) over a sample period that spans January 1980 to December 2003 that only the market factor is consistently priced.[346] Furthermore, the small-minus-big capitalization factor and the high-minus-low book-to-market factor are often insignificant and frequently have the wrong sign (i.e., their impact is opposite to the predicted direction) according to Drs. Fama and French (1993).[347]

Studies dealing with the Canadian market produce inconclusive results. Drs. Liew and Vassalou find a significant small-minus-big capitalization factor in Canada for a smaller subset of stocks listed on the Toronto Stock Exchange (TSX). [348] Using most of the stocks on the TSX, Drs. He and Kryzanowski find no significant size effect in Canadian returns using a conditional CAPM that includes liquidity factors.[349] Drs. Ang *et al.* find that the small-minus-big capitalization factor and the high-minus-low

[344] Exhibit 976562_1633677, Written Evidence of Dr. Michael J. Vilbert for AltaGas Utilities Inc.
[345] J. B. Berk, 1995, A critique of size-related anomalies, *Review Financial Studies* 8, pages 275-286.
[346] A. Ang, R.J. Hodrick, Y. Xing and X. Zhang, 2009, High idiosyncratic volatility and low returns: International and further U.S. evidence., *Journal of Financial Economics* 91: 1 (January), pages 1-23.
[347] E. F. Fama and K.R. French, 1993, Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics* 33, pages 3-56.
[348] J. Liew and M. Vassalou, 2000, Can book-to-market, size, and momentum be risk factors that predict economic growth?, *Journal of Financial Economics*.
[349]Z. He and L. Kryzanowski, 2006, The cross section of expected returns and amortized spreads, *Review of Pacific Basin Financial Markets and Policies (RPBFMP)* 9: 4 (December), pages 597-638.

book-to-market factor are insignificant for Canada but that a separate size factor is significant. However, none of these studies examine if any size effect exists for regulated utilities.

In brief, current research for the U.S.and Canada does not support a significant role for size in asset pricing.

Q. If a utility of small size, such as AUI, is not earning a fair return on rate base, how would that affect institutional ownership?

A. Institutions are believed to be informed investors. As such, they would avoid unattractive investments caused, by example, by utilities earning unfair rates of return.

Q. How has the institutional ownership of AUI equity changed over time?

A. According to AUI's response to Information Request UCA-AUI-13(b),[350] the institutional ownership of AUI has increased from 37.5% at year-end 2006 to 57.1% at month-end June 2007 to 59.4% at year-end 2007. This is not the ownership behavior that one would expect over time if AUI was not earning a fair rate of return.

5.5 COMPARISONS WITH ALLOWED ROEs FOR U.S. UTILITIES

5.5.1 Statements Made by Sell-side or Otherwise Connected Professionals

Q. Would you provide your opinion on the value of comments made by sell-side or otherwise connected professionals that are quoted in the submitted evidence of the applicant utilities and their experts?

[350] Exhibit 104144_1.

A. All of these quoted sell-side or otherwise connected professionals are of the opinion that the allowed ROE for Canadian utilities is low compared to the allowed ROE for comparable U.S. utilities.[351] For example, Mr. Kwan, an equity analyst for RBC Capital Markets, states ". . . it **appears** [our emphasis] that the formula is producing a result that is directionally incorrect (i.e., ROEs declining yet corporate bond yields and equity risk premiums are rising)."[352] Despite this belief, his recommendation for 7 energy infrastructure companies is: outperform for ATCO and TransCanada; sector perform for Canadian Utilities, Fortis and TransAlta Corp.; and underperform for only Emera, a utility whose allowed ROE is not set by a GCOC Formula.

Q. Please comment on Dr. Carpenter's reference to sell-side research in his reply to CAPP-NGTL 59 part (c), where he states:

> "Please refer to Attachment CAPP-NGTL 59(d) – as an example, the reports prepared by Karen Taylor of BMO Capital Markets (Attachment 1) and S&P (Attachment 2) show the Canada-U.S. market analysis done by both."

A. Contrary to Dr. Carpenter's claim, the referenced report prepared by Ms. Taylor *et al.* of BMO Capital markets provides no such analysis. It merely summarizes, without providing any opinion or analysis, the contents on pages 4 and 5 of a report released by the Canadian Gas Association, which was prepared on its behalf by National Economic Research Associates, that "argues the automatic adjustment formulas used to set allowed rates of return on equity (ROE) for gas distribution utilities in Canada has led to an unjustified divergence between allowed ROEs in Canada and the U.S."[353] Furthermore, of the nine utilities listed under "Canadian Gas Utilities", four carried a outperform rating (only one was a fund) and the other five carried a market perform rating (four of which were funds). Furthermore, as required disclosure, BMO

[351] Mr. Coyne's response to Information Request AUC-ATCO UTL-16.
[352] Robert Kwan, 2009, The formula is broken, but will regulators fix it?, RBC Capital Markets, January 16, page 1.
[353] Ms. Karen J. Taylor *et al.*, 2008, Wires, Pipes & Btus, Pipelines and Utilities, BMO Capital Markets, February 28. Available as Attachment 1 to NGTL's response to Information Request CAPP-NGTL 59(d).

Capital markets listed its ongoing investment banking and other relationships with various utilities included in the "Canadian Gas Utilities" group.

Q. Have you be able to find any independent analysis by these commentators?

A. No, we have been unable to find a commentator who does not make the implicit but untested assumption that, since U.S. regulators are better at determining the correct ROE than Canadian regulators, the awarded rates in the U.S. should be used as the benchmark for comparison purposes. Furthermore, when rates of return are declining, we would expect the Canadian rate of return formulas, since they are implemented annually, to produce a quicker decline in the average rates of return than the case-by-case method used in the U.S., whose implementation timing is generally not annual and is determined by utility applicants and not intervenors. In other words, U.S. utilities have a valuable timing option because they can choose when to apply for a rate resetting. In turn, the differences in rate setting would cause any disparity between Canadian and U. S. rates of returns to widen. Also, as we noted in section 3.5.1 of our Evidence:

> "Thus, there appears to be a paradox. On the one hand, some financial analysts argue that the allowed ROEs generated from the generic formula are too low. On the other hand, other financial analysts actually use a cost of equity discount rate that is lower than that generated by the generic formula when valuing Canadian utilities. Is this a case of providing different messages to different audiences?"

Furthermore, the predecessor to this Commission took the position in its Decision 2004-052 on page 26 that this was an "oranges to apples" comparison:

> "In the Board's view, the Applicants did not demonstrate that the regulatory regimes in the two countries are sufficiently comparable that the Board should place significant weight on the return awards for U.S. utilities. For example, the Board notes differences in legislation, public and regulatory policies, the higher

> prevalence of longer-term settlement arrangements, the federal/state jurisdictional divisions, the development of RTOs and other differences in the structure of regulated industrial sectors, and differences in national fiscal, tax and monetary policies…"

In its recent decision for OPG, the Ontario Energy Board also addressed the comparability of U.S. data as follows:[354]

> "In addition, the data may not be sufficiently comparable; if, for example, it is U.S. data, or there may be varying time periods under consideration."

> "The Board concludes that the ERP test is the most reliable test upon which to base its determination."

Our finding of positive abnormal returns or free-lunches for Canadian utilities, which was reported in section three of our evidence, shows that opinions about the unfairness of Canadian allowed ROEs are ill informed since the average Canadian utility significantly outperformed the benchmark on a market- and risk-adjusted basis, which is a difficult task that the average Canadian mutual fund manager can only dream about.

5.5.2 Equity Market Performance of U.S. Utilities

5.5.2.1 Studies in the Popular Literature

Q. Are there any examinations of the market performance of U.S. utilities that have been publicly reported?

A. Yes, there are. In a study that received much media coverage, Mr. Richard Bernstein and Ms. Lisa Kirschner, two prominent strategists at Merrill Lynch in New York

[354] The Ontario Energy Board, Decision With Reasons, EB-2007-0905, In the Matter of an Application by Ontario Power Generation Inc., November 3, 2008, both on page 157.

conduct tests similar to ours using less rigorous methodology and find that the S&P Utility Index outperformed the NASDAQ Index since NASDAQ's inception in 1971.[355] The Utilities outperformed NASDAQ over the 30-year period while incurring less risk. From NASDAQ's inception through the end of September 2001, NASDAQ returned a compound annualized rate of return of 11.2% per year, whereas the S&P Utility Index returned a compound annualized rate of return of 12.0% per year. The authors of this report measure risk using both the standard deviation of rolling 12-month returns (about 26% for NASDAQ versus about 16% for the S&P Utility Index), and alternatively as the percent of the returns that were negative over a 12-month time horizon (over 23% for NASDAQ versus over 15% for the S&P Utility Index).[356]

5.5.2.2 <u>Performance Based on Utility Indexes</u>

Q. Would you please report the results of any tests that you conducted on utility indexes in the United States and Canada?

A. We examined the performance of two S&P500 sub-indexes (electric utilities and gas utilities) over the ten-year period of 1989-2008 and over the five-year period of 2004-2008. These results are reported in Schedule 5.3. Over both periods, both sub-indexes outperformed the S&P500 benchmark on a mean monthly return basis and on an excess return over total risk basis. Since U.S. utilities had superior performance relative to their U.S. benchmark over both periods of time, this alone makes them unsuitable for benchmarking the returns of Canadian utilities.

Q. Subject to this caveat, what conclusions can you draw when you do compare the performance of the two U.S. utility indexes with one for Canada?

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[355] Richard Bernstein and Lisa Kirschner, 2001, Believe it or not: Utilities have outperformed NASDAQ since '71, *Quantitative Strategy Update*, October 25.
[356] This is based on a visual estimation of the values depicted on page 2 of Richard Bernstein and Lisa Kirschner, 2001, Believe it or not: Utilities have outperformed NASDAQ since '71, *Quantitative Strategy Update*, October 25.

A. Subject to the caveat that the U.S. utility indexes are not a good standard of comparison because of their superior performance versus their benchmark, we compared the performance of the two U.S. indexes for utilities against the Canadian utility index. For both time periods, the Canadian utility index had a substantially higher mean monthly return with less risk as measured by the standard deviation of return than the U.S. utility indexes. Thus, not surprisingly, the Canadian utility index has the highest Sharpe ratio for both time periods. Furthermore, the total risk of the Canadian utility index was lower than that for both the S&P500 and S&P/TSX Composite indexes over both periods of time. Thus, the evidence indicates that investors in Canadian utilities earned more than a fair rate of return when benchmarked against either the market index in the U.S. or Canada or when benchmarked against either of two S&P500 sub-indexes for utilities in the U.S.

5.5.3 <u>Performance Based on the Samples of U.S. Utilities Examined by the Experts for the Applicant Utilities</u>

Q. But, is it not possible that the experts for the applicant utilities selected their samples of U.S. utilities so that they did not exhibit superior performance?

A. Yes, it is possible so we tested the performance of four of these samples. These results are summarized in Schedule 5.4.

The KR (Kryzanowski/Roberts) equal-weighted sample of Canadian utilities has a higher mean excess return than one of the four U.S. samples for 1998-2008 and two of the four U.S. samples for 2004-2008. In contrast, the KR equal-weighted sample of Canadian utilities has a lower standard deviation of return than three of the four U.S. samples for both periods. The KR equal-weighted sample of Canadian utilities has a lower Sharpe ratio than two of the four U.S. samples for both periods. The two U.S. samples with higher Sharpe ratios in both periods also have statistically significant abnormal performance as measured by their alphas in both of the periods. While all the estimated alphas are positive, they are statistically significant at conventional levels of significance for three of the four U.S. samples and not the KR equal-weighted sample of Canadian utilities.

Q. Have any of the experts for the applicant utilities provided supporting evidence?

A. Yes, Mr. Coyne is his response to Information Request CAPP-COYNE-5 provides supporting evidence. If we examine the figure on page 1 of Attachment 1 to this reply, we observe that the actual ROEs for his U.S. Natural Gas sample have exceeded or been approximately equal to his prospective returns for the S&P500 since 2003. The actual ROEs for his U.S. Natural Gas sample have increased over time while his prospective returns on the S&P500 have decreased so that the former is now higher than the latter. If we examine the figure on page 2 of Attachment 1 to this reply, we observe that the actual ROEs for his U.S. Electrical Distribution sample have been nearly the same as his prospective returns for the S&P500 since 2003. The two series have converged over time as the actual ROEs for his Electrical Distribution sample have oscillated around a relatively constant value while his prospective returns on the S&P500 have decreased. If we examine the figure on page 3 of Attachment 1 to this reply, we observe that the actual ROEs for his Pipelines Proxy sample have exceeded his prospective returns on the S&P500 since 2000, and that the differential now exceeds 4%. The actual ROEs for his Pipelines Proxy sample have increased over time while his prospective returns on the S&P500 have decreased so that the former is now higher than the latter.

Q. What do you conclude from your analysis of these three graphs that Mr. Coyne provides in his response to Information Request CAPP-COYNE-5?

A. An explanation based on rational behavior is that U.S. regulators have moved the ROEs of the utilities in the three samples in the opposite direction to that of the market because the risks of the utilities in the three samples have increased relative to the risk of the market and are now higher than the risk of the market. If such is the case, then recommendations based on these three samples have no value for a determination of the appropriate allowed ROE for Canadian utilities. If such is not the case, then U.S. regulators have allowed ROEs to move in the wrong direction for these three samples of utilities.

Q. What do you conclude from all of the above tests in this section?

A. Based on formal tests of whether Canadian utilities satisfied the comparable return standard based on realized returns, we conclude that the returns equity investors obtained from their investments in Canadian utilities exceeded the minimum requirements for the comparable return standard.

5.5.4 Tests of Market Performance of Canadian Utilities Conducted by the Experts for the Applicant Utilities

Q. Would you confirm that you conducted tests of the market performance of Canadian utilities?

A. Yes, we did and we found no evidence to support the unsubstantiated conjecture that Canadian utilities did not earn a fair rate of return. Please see section 4.7 of our evidence.

Q. What tests, if any, did Dr. Vander Weide conduct?

A. Our understanding is that Dr. Vander Weide believes that U.S. regulators using detailed cost of equity evidence are more likely to make more correct adjustments than Canadian regulators using formulas.[357] He appears to ignore the reviews and

[357] Response to Information Request UCA-VanderWeide-002, EPCOR Evidence, Appendix A - Written Evidence of Dr. James H. Vander Weide, page 8, lines 16-28.

retention of their annual ROE adjustment formulas by three Canadian boards during the past three years, and he dismisses tests of his belief as follows:[358]

> "To state that the utility portfolios outperformed the market is merely another way of stating that the utility portfolios had higher experienced risk premiums than the market. The statement in the question does not *explain* why the utility portfolios had higher experienced risk premiums than the S&P/TSX Composite portfolio."

It would be extremely unlikely for these utilities to earn higher risk premiums over a long period of time if their allowed ROEs were unfair. Nevertheless, Dr. Vander Weide confirms that the stock returns in column 3 of his table 1 "indicates investors in the BMO CM basket of utilities earned higher returns on the market value of their investments over the period of my study than investors in the S&P/TSX Composite." Thus, earning more than the market over a period as long as 1983-2007 for some unknown reason is consistent with utilities not earning a fair return.[359]

Q. What tests of the performance of investments in Canadian utilities using common performance metrics such as Jensen's alpha and the Sharpe ratio did the other experts for the Applicant utilities conduct?

A. The response to Information Request UCA-ATCO-14 states: **"**Dr. Gaske has not performed any studies that test the performance of investments in Canadian utilities using Jensen's alpha or the Sharpe ratio."

Dr. Carpenter replied that he "has not performed such tests" when asked in Information Request UCA-NGTL 53: "Would Dr. Carpenter please provide the results of any statistical tests that he has conducted of the risk-adjusted historical

[358] Response to Information Request UCA-VanderWeide-001, EPCOR Evidence, Appendix A - Written Evidence of Dr. James H. Vander Weide, page 7, lines 8-10.
[359] Response to Information Request UCA-VanderWeide-006, EPCOR Evidence, Appendix A - Written Evidence of Dr. James H. Vander Weide, page 12, Table 1.

performance of equity investments in U.S. and Canadian utilities for each of the samples that he refers to in his evidence?"[360]

Although Mr. Engen commented on the returns that equity investors earned from their investment in the Canadian utilities subject to GCOC formulas since 2004, he stated that "risk-adjusted returns are not relevant to his evidence and he declines to undertake the extensive work required to provide the sought after information" in his reply to Information Request UCA-NGTL 81. Similarly, in his reply to Information Request UCA-NGTL 82, he confirms that he has not conducted any studies that support his assumptions that:

- The equity risk premium has been escalating;
- The "collapses over the recent past" have "increased the cost of capital"; and
- It is unlikely that stock prices will decline if the stream of anticipated earnings decreases when the rate of discount (i.e., desired rate of return) remains constant.

In his reply to Information Request UCA-NGTL 140, Mr. Murphy confirmed that he did not conduct any studies that show that: (1) the cost of equity has permanently increased since EUB Decision 2004-052; and (3) investors in the equities of publicly traded Canadian equities have underperformed investors in the Canadian non-utility sector over the 2004-8 period using risk-adjusted measures of performance such as the Jensen alpha.

In his reply to Information Request UCA-NGTL 177 (a), Dr. Kolbe stated that he "is not sure what is meant by the question": "Would Dr. Kolbe please provide the results of all the tests that he has conducted on market- and risk-adjusted relative performance of regulated utilities (particularly, for the three samples relied on in his evidence)?"

[360] Also, see his response to Information Request UCA-NGTL 55.

Similarly, the response to Information Request UCA-ATCO-18 and UCA-ATCO-51 states: "Mr. Coyne has not performed any tests regarding the "risk adjusted" historical performance of equity investments in U.S. and Canadian utilities." Mr. Coyne in his evidence does provide considerable non-risk-adjusted evidence that there was (1) an average annual return differential of 8.47% of U.S. utilities over the S&P 500 (i.e., 20.68% minus 12.21%); (2) an average annual return differential of -0.22% of Canadian utilities over the S&P/TSX (i.e., 17.52% minus 17.74%); and (3) Canadian utilities outperformed their U.S. counterparts over the past 6 years by 3.6% if we use all six years of returns that Mr. Coyne reports in table 14.[361] If we take each point in turn, item (1) does not support his conjecture that the allowed returns in the U.S. are appropriate, item (2) does not support his conjecture that the allowed returns in Canada are too low; and item (3) does not support his conjecture that the allowed returns in Canada are too low compared to those in the United States. In his response to Information Request UCA-ATCO-47, Mr. Coyne provides no evidence to explain these return differentials.

Mr. Coyne attributes the 3.6% outperformance of Canadian utilities over their U.S. counterparts primarily to the better performance of the unregulated assets of Canadian utilities over their U.S. counterparts, which would have to be much greater than 3.6% annually to offset the differential in their ROEs on regulated assets.[362] Furthermore, Mr. Coyne in his response to Information Request UCA-ATCO-55 states: "Mr. Coyne does not believe that regulated companies and unregulated affiliates are of equal risk, and he agrees that the greater risk of unregulated affiliates is a valid reason for the disparity in returns."

Q. Does Mr. Coyne provide any other evidence that allowed ROEs for Canadian utilities are fair or more than fair?

[361] ATCO Utilities Evidence, section 3.0, Written evidence of Mr. James M. Coyne, page 62, table 14 through page 63, line 9.
[362] Response to Information Requests UCA-ATCO-50.

A. Yes, Mr. Coyne is his response to Information Request CAPP-COYNE-5 provides supporting evidence. If we examine the figure on page 4 of Attachment 1 to this reply, we observe that the actual ROEs for his Canadian Utility Holding Companies Proxy Group have substantially exceeded his prospective returns for the S&P/TSX index since 2000 with some minor tightening of this spread since 2004. The actual ROEs for his Canadian Utility Holding Companies Proxy Group have decreased along with his prospective returns on the market proxy until 1999. Thereafter, the actual ROEs for his Canadian Utility Holding Companies Proxy Group increased above the prospective returns on the Canadian market proxy and remained relatively constant while the prospective returns on the Canadian market proxy have varied around 10% since 2001.

Q. What do you conclude from your analysis of this Canadian graph that Mr. Coyne provides in his response to Information Request CAPP-COYNE-5?

A. First, Mr. Coyne has provided evidence that the prospective returns on the Canadian market proxy have varied around 10% since 2001. Second, given that he estimates the average beta to be less than one for his Canadian Utility Holding Companies Proxy Group, the market-adjusted outperformance of his Canadian Utility Holding Companies Proxy Group represents an abnormal return. Third, this evidence provides collaborating evidence that the allowed returns for Canadian utilities have been fair or more than fair.

Q. Would you please comment on the graphs provided by Mr. Coyne in his response to Information Request CAPP-COYNE-5 that plot the standard and non-standard betas for the U.S. and Canada?

A. If we examine the figures on pages 5 and 6 of Attachment 1 to this reply, we observe that both the standard and non-standard betas have been substantially higher in the

U.S. than in Canada since about 2001 but in both countries they have always been below 0.8. The differentials between the standard betas have averaged about 0.3 since 2002. Using Mr. Coyne's estimate of the MERP of 6.25% and ignoring any other considerations, the allowed ROE for Canadian utilities should be about 1.875% lower (i.e., 0.3 times 6.25%), all else held constant. By itself, this could explain a major conclusion of the report prepared by Concentric Energy Advisors ("CEA") for the Ontario Energy Board ("OEB"):[363]

> "The current ROE differential between Canada and the U.S. is in the range of 1.50 percent to 2.00 percent (i.e., 150 to 200 basis points)." (page 2)

5.6 REGRESSIONS OF AUTHORIZED RETURNS AGAINST BOND YIELDS FOR U.S. UTILITIES

Q. Would you please comment on the results presented by Mr. Coyne from regressions that he ran between authorized returns and bond yields for U.S. utilities?

A. Abstracting from any potential econometric problems, Mr. Coyne presents strong evidence that U.S. regulators act as if they believe that bond yields are an important driver of the allowed or authorized returns for U.S. utilities.[364] While Mr. Coyne examined if U.S. regulators seem to make authorized return decisions based on hindsight, he did not test if they were forward looking. His evidence strongly suggests that U.S. regulators view utility equities as being quite like floating-rate bonds. His evidence also indicates that U.S. regulators would set the authorized rate at 8% if the Treasury bond yield was 0%, which is considerable higher than would be the case in Canada. Part of this difference across national regulators would be attributable to the primarily reliance on the inflated estimates that are generated by the DCF Method for

[363] Concentric Energy Advisors, 2007, *A comparative analysis of return on equity of natural gas utilities*, prepared for The Ontario Energy Board, June 14.
[364] Exhibit 975977_1632472, Written evidence of Mr. James M. Coyne for Atco Utilities (Atco Electric Ltd. and Atco Gas and Pipelines Ltd.), line 18, page 32 through line 6, page 34. Response to Information Request IPCAA-ATCO-15.

U.S. regulators, and the primarily reliance on the more reasonable estimates that are generated by the ERP Method by Canadian regulators.

Q. Is there any evidence that financial analysts also perceive the equity of utilities as being bond like?

A. Yes, there is. Mr. Kwan, a financial analyst at RBC Capital Markets quoted earlier, described his target price justifications as follows:[365]

> "For the majority of the companies we follow, our valuation is weighted toward a yield approach. We believe that when the 10-year Government of Canada bond yield is below 6.0%, income is the primary driver of the valuation for these interest-sensitive stocks. While the fundamentals underlying the companies are important in determining the dividend yield required by investors, the price/earnings multiples must be interpreted cautiously and are not the main factors underlying the companies' valuations."

Q. Please comment on Dr. Vander Weide's test of the validity of the AUC's GCOC Formula based on regressions of the required returns for U.S. gas and electric utilities against interest rates on long-term U.S. government bonds.

A. In his response to Information Request CAL-VanderWeide-002 a, Dr. Vander Weide states that he believes that "… the sensitivity of the required return on utility equity investments to interest rates [interest-rate beta, our insertion] should be similar in Canada and the U.S." Given that he provides evidence that the sensitivity (market beta) of the required return on utility equity investments to market risk is not similar in Canada and the U.S., it would be unlikely than the cross-border interest-rate betas would be similar for utilities.

[365] Robert Kwan, 2009, The formula is broken, but will regulators fix it?, RBC Capital Markets, January 16, page 12.

APPENDICES - APPENDIX 1.A

BRIEF CURRICULUM VITAE FOR LAWRENCE KRYZANOWSKI

Dr. Lawrence Kryzanowski is currently a Full Professor of Finance and Concordia University Research Chair in Finance (previously Ned Goodman Chair in Investment Finance) at Concordia University. He was until June 2002 the Co-Director of the Concordia-McGill-Xiamen (CMX) Project of the Canada-China University-Industry Partnership Program in Financial Services. He is currently a member of CIRPÉE, a scientific committee member of Institut de Finance Mathématique de Montréal (IFM2), and a member of the scientific advisory board of CEFUP at the University of Porto in Portugal. He is a member (but currently on sabbatical leave) of the Board of Governors and its Executive Committee, and the Pension Committee at Concordia University. He has been a visiting scholar at the University of British Columbia, a research associate at the University of Rochester, a resident consultant at the Federal Department of Finance, and until recently the representative of retail investors on the Regulation Advisory Committee (RAC) of Market Regulation Services Inc.

Dr. Kryzanowski has extensive experience teaching undergraduates, MBA, MSC and Ph.D. students, and executives for the Institute of Canadian Bankers, Shanghai Banking Institute, CMX, Concordia University, Dalhousie University, McGill University and York University. He has taught “asset allocation and performance measurement” in Concordia’s Goodman Institute Program (a private program at the MBA level). This third year course deals with a major component of the level III curriculum of the CFA program. Dr. Kryzanowski has extensive experience in developing or managing the development of instructional textbooks for the Institute of Canadian Bankers (ICB) and the Canadian Securities Institute (CSI), which includes the *Business Solvency Analysis* and *Investment and Portfolio Management* texts for the ICB, and the *Canadian Securities Course* text for the CSI.

Dr. Kryzanowski is an active educator, mentor, consultant and expert witness in financial economics, including investment management, risk pricing and management, and regulation and operations of global financial markets, institutions and participants. He is author or co-author of over 105 refereed journal articles, seven books or monographs, over 180 papers presented at academic conferences and a number of chapter contributions to books of readings/annuals. Dr. Kryzanowski is the first recipient of Prix ACFAS/Caisse de dépôt et placement du Québec, which recognizes an exceptional contribution to research in finance. Dr. Kryzanowski was the inaugural recipient, with co-authors, of the BGI Canada Award and OSFI Award (latter with Dr. Roberts) for excellence in research on capital markets and on regulation of financial institutions, respectively. His 13 other paper awards for co-authored work are from the *Multinational Finance Journal* and various North American academic conferences including the Financial Management Association in 2008. Dr. Kryzanowski is a former Editor of the *Multinational Finance Journal*, co-editor of finance with Dr. Roberts at the *Canadian Journal of Administrative Studies*, and founding chairperson of the Northern Finance Association. Dr. Kryzanowski is currently an Advisory Editor of the *European Journal of Finance*, an Associate Editor of the *International Review of Financial Analysis* and of *Frontier of Finance and Economics*, is member of the Editorial Advisory Boards of *Managerial Finance* and *Studies in Economics and Finance*; and is on the editorial boards of the *Canadian Investment Review* and *Finance India*.

Dr. Kryzanowski has experience in preparing evidence as an expert witness in utility rate of return applications, court proceedings for alleged stock market insider trading and price distortion due to alleged misrepresentation, and confidential final offer arbitration hearings for the setting of fair rates for the movement of various products by rail. Together with Dr. Roberts, he prepared a report and briefed counsel on rate of return considerations in the pipeline application in 1997 of Maritimes and Northeast, and prepared evidence on the fair return on equity and the recommended capital structure for the 2001/2002 Distribution Tariff Application (DTA) of Atco Electric and the 2001/2002 DTA and the 2002 DTA (No. 1250392) of Utilicorp Networks Canada (Alberta) Ltd. before the Alberta Energy and Utilities Board. Together with Dr. Roberts, and on behalf of the Province of Nova Scotia, he provided evidence and testified before the Nova Scotia Utility and Review Board in the matter of Nova Scotia Power Inc. in 2002. Together with Dr. Roberts, and on behalf of the Fédération canadienne de l'entreprise indépendante ("FCEI") / Union des municipalities du Québec ("UMQ") & Option consommateurs ("OC"), he prepared testimony and testified on capital structure and fair return on equity in the matter of Hydro Québec Distribution before the Régie de l'Energie du Québec in 2003. Together with Dr. Roberts, and on behalf of Consumers Group, he prepared testimony and testified in Generic Hearing No. 1271597 before the Alberta Energy and Utilities Board in 2003-2004. Together with Dr. Roberts, and on behalf of the Hydro Communities (Hay River, Yellowknife and Fort Smith), he prepared testimony and testified in NTPC GRA 2006/07 and 2007/08 before the Public Utilities Board of the Northwest Territories in 2007. Together with Dr. Roberts, and on behalf of Pollution Probe, he prepared testimony and testified in EB-2007-0905-OPG-2008-09 Payments before the Ontario Energy Board in 2008.

Dr. Kryzanowski is often sought for his technical ability and advice on various matters in financial economics. He has consulted for the Superintendent of Financial Institutions, Federal Department of Finance, CMHC, CDIC, External Affairs Canada, Canada Investment and Savings, Hydro Quebec, the National Bank, Bombardier, and others.

Dr. Kryzanowski received a B.A. in Economics and Mathematics from the University of Calgary and earned his Ph.D. in Finance at the University of British Columbia.

BRIEF CURRICULUM VITAE FOR GORDON S. ROBERTS

Dr. Gordon S. Roberts is currently CIBC Professor of Financial Services at York University's Schulich School of Business. Prior to joining York University, he was Bank of Montreal Professor of Finance at the School of Business, Dalhousie University. Dr. Roberts has held positions as Visiting Professor and Visiting Scholar at the National Institute for Development Analysis (Bangkok, Thailand), the University of Chile, Tilburg University (the Netherlands), Deakin University (Melbourne, Australia), University of Toronto, University of Arizona, Xiamen University (China) and the University of Zimbabwe.

In addition to teaching undergraduates, MBA and Ph.D. students at these universities, Dr. Roberts has extensive experience in executive teaching for the Kellogg–Schulich Executive MBA Program, the Institute of Canadian Bankers and in the Pension Investment Management School sponsored by the Schulich School jointly with pension consulting firms William Mercer Inc. and Frank Russell.

An active researcher in the areas of corporate finance, bond investments and financial institutions, Dr. Roberts is author or co-author of over forty journal articles and three corporate finance textbooks. In 2000, he shared with Dr. Kryzanowski the OSFI award for excellence in research on the regulation of financial institutions. Dr. Roberts is a former co-editor of finance with Dr. Kryzanowski of the *Canadian Journal of Administrative Studies*. He is a former Associate Editor of the *Journal of Banking and Finance*, and currently serves on the editorial boards of *FINECO* and the *Banking and Finance Law Review*.

Dr. Roberts is experienced in preparing evidence for utility rate of return hearings. From 1995–1997 he submitted prefiled testimony as a Board witness in rate hearings for Consumers' Gas. In 1996, he served as an expert advisor to the Ontario Energy Board in its Diversification Workshop. In 1997, he co-prepared (with Dr. Kryzanowski) a report for the Calgary law firm, MacLeod Dixon, on rate of return considerations in the pipeline application by Maritimes and Northeast. With Dr. Kryzanowski, he filed evidence on three electricity regulatory matters in Alberta in 2001, evidence on regulatory matters before the Alberta Energy and Utilities Board and the Nova Scotia Utility and Review Board in 2002, evidence on regulatory matters dealing with Hydro Quebec Distribution in 2003, evidence in Generic Hearing No. 1271597 before the Alberta Energy and Utilities Board in 2003-2004, evidence in NTPC GRA 2006/07 and 2007/08 before the Public Utilities Board of the Northwest Territories in 2007, and evidence in EB-2007-0905-OPG- 2008-09 Payments before the Ontario Energy Board in 2008.

Often sought for his advice on financial policy, Dr. Roberts has consulted for the Superintendent of Financial Institutions, the federal Department of Finance, Canada Investment and Savings, Canada Mortgage and Housing Corporation, and Canada Deposit Insurance Corporation, among others.

Dr. Roberts received a B.A. in Economics from Oberlin College and earned his Ph.D. at Boston College. He has been listed in the Canadian Who’s Who since 1990.

APPENDIX 2.A

RECENT THINKING AND PRACTICE ON CAPITAL STRUCTURE

In formal academic research, the approach to determining capital structure taken in this evidence is called the trade-off theory. The name describes the central idea of this theory: firms determine a target optimal capital structure by balancing the tax-reduction benefits of debt against the expected costs of financial distress and loss of financial flexibility. This appendix reviews the standing of this theory in the academic literature and its following among financial executives.

The main conclusions are three-fold: first, among academic researchers, the trade-off theory enjoys reasonable support but faces serious challenges from a number of competing theories. Second, while it has moderate support among financial executives, a survey in the U.S. shows that executives look outside the implications of this theory when setting capital structures for their firms. Third, while the trade-off theory can offer useful qualitative guidance, it is a mistake to treat capital structure as if it were amenable to precise analysis by a formula.

To establish these conclusions, we draw importantly on survey papers by Barclay and Smith (2001) and by Graham and Harvey (2001).[1] Further, in addition to the papers they review, we add a discussion of selected research released after these papers were published. We follow their lead in organizing the discussion around theories or concepts argued to influence capital structure. Our review focuses on the findings for large, investment grade firms, as these are most relevant for the utilities industry.

2A.1 TRADE-OFF THEORY

[1] References cited are listed at the end of this appendix.

2A.1.1 Supporting Evidence

As stated earlier, the trade-off theory holds that firms determine their capital structures through a trade-off of the principal benefit of debt, tax deductibility (Modigliani and Miller, 1963) against the main cost: increased expected cost of financial distress (Scott, 1976, inter alia).

A strand of research originated by Miller (1977) modifies the tradeoff theory to incorporate a further cost to debt use: the personal tax disadvantage of interest income for investors as compared with dividends or capital gains. While the impact of personal taxes can theoretically negate the corporate tax advantage of debt, personal taxes have been found to be far less important empirically. Kim, Lewellen, and McConnell (1979) test for the impact of personal taxes and capital structure but fail to obtain conclusive results. Using firm-specific data, Graham (1999) finds that the firms for which the tax advantage of debt, net of the personal tax penalty, is largest use the most debt in virtually every year. He also separately identifies a significant relation between the corporate tax rate (personal tax penalty) and debt usage. Graham and Harvey's (2001) survey of 392 CFO in the U.S. and Canada finds very little evidence that firms directly consider personal taxes when deciding on debt policy. The survey of 313 CFOs in four European countries conducted by Brounen, Jong and Koedijk (2008) reports that European firms do not put much weight on the personal tax considerations of their investors.

A number of researchers find support for the trade-off theory by testing its empirical implications with the focus on corporate taxes and financial distress costs. Bradley, Jarrell and Kim (1984), MacKie-Mason (1990) and Wald (1999), among others, find that riskier firms use less debt as suggested by the theory. Long and Malitz (1985) examine the most and least highly leveraged industries in the U.S. and find that industries with high leverage use fixed assets intensively and are mature and less risky. Barclay, Smith and Watts (1995) and Frank and Goyal (2003) report that higher-growth, riskier firms use less debt. Using a new empirical methodology to control for interactions among the variables, Frank and Goyal (2008) find that highly profitable firms do actually tend to issue debt and repurchase equity, Flannery and Rangan (2006) introduce a more general, partial-adjustment model of firm leverage and report that firms do have target capital structures. This conclusion is supported by Byoun (2009) addressing the dynamics of adjusting leverage over time.

There is consensus in the finance literature that leverage exhibits mean reversion a result consistent with the trade-off theory. Hovakimian *et al.* (2001) show that firms issue debt when actual debt ratios are below target debt ratios, and firms reduce debt when actual debt ratios are above target. Kayhan and Titman (2006) find that, although firms' histories strongly influence their capital structures, they tend to move towards target debt ratios over time, consistent with the tradeoff theory of capital structure. Jalilvand and Harris (1984), Roberts (2001), Frank and Goyal (2003), Leary and Roberts (2005a), Flannery and Rangan (2006) and Alti (2006) all report evidence that firm leverage reverts to its target level, even in the presence of adjustment costs. Lemmon, Roberts and Zender (2008) also show that leverage ratios exhibit a significant amount of convergence over time. Xu and Baranchuk (2008) document that, though there is a large heterogeneity in target levels, the leverage ratios are persist across firms. Charalambakis, Espenlaub and Garrett (2008) confirm that capital structure dynamics are important and that firms trade-off the tax benefit that arises from increasing debt against the increase in possible financial distress that arises from increasing debt.

2A.1.2 Evidence Challenging the Trade-Off Theory

On the other side of the ledger, two studies document firm behavior inconsistent with the theory. Graham (2000) finds that firms use considerably less debt than implied by the trade-off theory given observed expected financial distress costs. Opler and Titman (1998) report that when share prices increase, firms tend to issue more equity. In contrast, the theory implies that, with higher prices, smaller or less frequent equity issues are appropriate to maintain a target debt-equity ratio.

The survey by Graham and Harvey (2001) reports similarly mixed results. Four factors central to the trade-off hypothesis received only moderate emphasis as very important by financial executives: volatility of earnings and cash flows (rated as "important" or "very important" by 48.08% of executives), tax deductibility of interest (44.85%), industry average debt ratio (23.40%) and financial distress costs (21.35%). Balancing these responses, credit ratings, which attempt to incorporate all four factors, are the second most important debt factor and are rated as important or very important by 57.10% of executives. When asked whether they have "somewhat strict" target debt-equity ratios, 55% of large firms answer positively. This percentage increases to 64% for investment grade firms and 67% for regulated firms. This is more supportive of the trade-off theory particularly for regulated firms

A further strand of the literature examines the impact of firm growth and of covenant protection to mitigate agency costs for high growth firms. Billet, King and Mauer (2007) conduct tests excluding financial issuers but including regulated firms. They document a negative relation between leverage and growth opportunities that is significantly attenuated by covenant protection, which suggests that covenants can mitigate the agency costs of debt for high growth firms. They also find that convertible debt issues and issues by regulated firms tend to have less covenant protection. Related research by Aggarwal and Kyaw (2006) finds that for high-growth (low-growth) firms, debt is value reducing (enhancing) and that this effect is stronger in countries with poor institutional structures and related high agency costs. Although their study excludes financial firms and utilities; this is no reason to expect that their results would not apply to low-growth firms such as regulated utilities.

Other studies examine the relation between returns to equity and leverage. In other words, have equity investors in firms with more leverage earned higher risk-adjusted returns, which would occur if leverage is value-enhancing. Although, their results are preliminary, Sivaprasad and Muradoglu (2007) find that **realized** risk-adjusted returns on equity generally decrease as leverage increases, and such returns either increase or remain constant for utilities. They note that utilities are a risk class that is highly regulated and has high concentration of leverage ratios. This suggests that leverage is value enhancing for this industry grouping. However, further research is needed to test the robustness of their results.

2A1.3 Adjusted Present Value

Myers (1974) and Brealey, Myers and Allen (2008) suggest adjusted present value (APV) as an application of the trade-off theory in valuation of a project or a company. APV begins with all-equity value based on a capital structure of 100% equity and adjusts it for the two effects of debt financing identified by the trade-off theory: an upward adjustment for the value of tax shields and a downward shift for the cost of financial distress. In addition, APV also includes associated financing side effects such as growth options, government subsidies and any perceived market mispricing. This would also include the various other real options that are common in the regulated utility sector that are discussed further in section five of our evidence.

2A.1.4 Access to Capital Markets

A study by Faulkender and Petersen (2006) shows that, in addition to the firm characteristics which determine a firm's target debt-equity ratio under the trade-off theory, access to capital markets also encourages companies to borrow more. Kisgen (2006) and Kisgen (2007) show that the discrete costs (benefits) associated with credit downgrades (upgrades) directly affect firms' capital structure as firms reduce borrowing to avoid a downgrade. Mittoo and Zhang (2008) demonstrate that this effect is important for Canadian firms. Rauh and Sufi (2008) demonstrate that the types of debt firms issue varies with credit quality as investment grade issuers concentrate on senior unsecured debt while speculative-grade firms issue a wider variety of secured and convertible debt. They support this finding by examining a sample of fallen angels that experienced a downgrade from investment grade to a speculative (junk) rating. They find that fallen angels reduce their use of unsecured debt and discretionary sources of debt which include revolving bank credit facilities, commercial paper and medium-term notes. However, they report that such firms increase financing from secured debt and subordinated private placements and convertibles. Their results suggest that prior research underestimates the ability of firms to access debt after a downgrade.

Because the evidence backing the trade-off theory is balanced by another body of research challenging the theory, academics have developed a number of competing theories and we review these next.

2A.2 COMPETING THEORIES

2A.2.1 Pecking Order Theory

According to the pecking order theory, firms prefer internal financing and external funding as a last resort when internal funds are exhausted (Myers and Majluf, 1984; Myers, 1984). Managers have private information about the future prospects of their firms. Assuming that this private information is positive, the firm's securities are undervalued and equity is more undervalued than debt. As a result, firms first draw on internal funds, followed by debt and finally equity as the last choice. Since firms wish to avoid external financing according to this theory, they value financial flexibility. Shyam-Sunder and Myers (1999) find support for the pecking order model. Rajan and Zingales (1995), Titman and Wessels (1998) and Fama and French (2002) show that firms that have been more profitable in the past use less debt. Hennessy and Whited (2005) find that leverage is path dependent and that profitable firms tend to be less highly levered. Frank and Goyal (2007) also find a negative relation between leverage and profits. This is consistent with the pecking order theory but not with the trade-off approach. This theory also finds support in Cole (2008) drawing on the Federal Reserve Board's Survey of Small Business Finance.

However, other empirical studies show mixed results or fail to support the pecking order theory. Frank and Goyal (2003) find that large firms use more debt, while small high-growth firms are more likely to use equity financing. Fama and French (2005) show that most firms issue or retire equity each year, and the issues are on average large and not typically done by firms under distress. Leary and Roberts (2005b) find that when firms use external finance, less than 40% of the issues match the pecking order's prediction. Korajczyk *et al.* (1990), Eckbo and Masulis (1995) and Alti (2006) all find that debt issue does not come before equity issuance.

In their survey of executives, Graham and Harvey (2001) discover that financial flexibility and avoiding the sale of undervalued equity are important to financial executives. These factors are central to the pecking order theory. However, the pecking order theory holds that these factors are of greatest importance to firms most likely to have private information, small firms with significant growth opportunities, and this implication is not supported in the survey. Rather the survey reports that firms paying dividends (generally large, well established firms with less private information) are the ones that value the two factors most highly.

In addition, new studies challenge the argument that when researchers find that more profitable firms use less debt this constitutes evidence against the trade-off theory. Sarkar and Zapatero (2003) point out that high earnings today can be coupled with expected low earnings in the future, assuming that earnings follow mean reversion. In this case, we would expect profitable firms to use less debt and the trade-off theory could still hold. Their research supports the conclusions of Hovakimian, Opler and Titman (2001) that pecking order considerations influence firms' short-term adjustments toward target capital structures as envisaged under the trade-off theory.

2A.2.2 Market Timing or "Window of Opportunity"

Managers attempt to issue common shares when the market is high and repurchase their shares in poor markets according to Loughran and Ritter (1995). Rajan and Servaes (1997) also show that firms are more like to issue equity when financial analysts are overoptimistic about the market. Denis and Sarin (2001) provide evidence that firms issue equity when the market overestimates the firm's future earnings performance. Valuation is measured relative to book values or to past levels of the firm's share price. Firms that succeed in timing the market issue equity at high prices and consequently have low leverage ratios. To the extent that it is based on rational factors, such success could arise from waiting until yesterday's private information is reflected in today's stock price (Lucas and McDonald, 1990). Unsuccessful market timers have higher leverage ratios. Baker and Wurgler (2002) measure the relationship between leverage and shifts in market-to-book ratios over time arguing that their results are most consistent with the market timing explanation. Huang and Ritter (2005) show that firms fund a large proportion of their financing deficit with external equity (debt) when the cost of equity is low (high), and past securities issues have strong and long lasting effects on capital structure. On the other hand, Alti (2006) finds that although hot IPO markets induce firms to issue more equity and reduce leverage, the impact of market timing vanishes in two years through debt issue.

Further support for this view is in Graham and Harvey (2001) which identifies recent stock price performance as number three in the list of factors explaining when firms issue equity. Similar evidence is also found in the survey of European firms conducted by Brounen, Jong and Koedijk (2008): stock price performance is particularly highly ranked for less established firms that do not pay dividends.

2A.2.3 Signaling

In a variation on the theme of private information, signaling theory argues that firms with good prospects that are not widely recognized issue debt to create a credible signal to the market that they will enjoy strong cash flows sufficient to meet their increased debt servicing obligations (Ross, 1977; and Leland and Pyle, 1977). The survey by Graham and Harvey (2001) finds little support for this theory, and this conclusion is confirmed by Brounen, Jong and Koedijk (2008) based on their survey of 313 CFOs of 4 European countries.

2A.2.4 Free Cash Flow

Jensen's (1986) free cash flow theory of leverage is rooted in agency conflicts between managers and shareholders. Managers of a firm with plentiful free cash flow enjoy an opportunity to waste cash in excessive consumption of managerial perquisites, through empire building or other unproductive investments. Under the free cash flow theory, increased usage of debt allows managers to bond their promise to pay out free cash flow. Therefore, debt reduces the agency cost of free cash flow by decreasing the free cash flow available for spending at the discretion of managers. This argument is widely advanced in support of leveraged buyouts.

A number of researchers have found support for the free cash flow theory. Studying firms' operating performance after stock repurchase, Nohel and Tarhan (1998) find support for the free cash flow argument, while rejecting the signaling hypothesis. Nikolov and Schuerhoff (2008) demonstrate that entrenched managers issue less debt and rebalance capital structure less often than optimal for shareholders, which is also supposed by Childs and Mauer (2008). Similarly, Farre-Mensa (2008) finds that an increase in managerial entrenchment is associated with a significant decrease in firm leverage only when one controls for free cash flow, and that the effects can be very large for firms with a high level of free cash flow. This problem can arise if regulated utilities, for example, earn excess returns.

In the survey of financial executives, however, free cash flow received a low rating.

2A.2.5 Product Market and Industry Factors

As stated earlier, the use of leverage varies systematically across industries. While this has been viewed as evidence for the trade-off theory as discussed earlier, researchers have developed alternative theories as well. For example, Titman (1984) argues that prospective product purchasers are concerned with the firm's ability to stay in business and make good on product guarantees. As a result, he holds that firms producing unique products should use less debt. Using the seemingly unrelated regression method, Smith, Chen and Anderson (2008) indicate that long-term leverage both influences and is influenced by product-market competition using data from New Zealand. Graham and Harvey (2001) report mixed results on this theory. Although high tech firms produce unique products, they do not address such customer concerns in setting debt levels. However, growth firms do report considering such concerns in their debt policies.

2A.3 SYNTHESIS

A number of capital structure theories are supported in academic research and while the trade-off theory enjoys the greatest popularity as reflected in coverage in textbooks, there are a number of competing theories challenging its conclusions. This disparity is reflected in practice by financial executives. Further, perhaps due to the lack of consensus among researchers, "best practices" managers focus on practical factors only loosely related to theory, such as financial flexibility and credit ratings, when they set capital structures for their firms. Barclay and Smith (2001) provide a clear statement on this point:

> "Empirical methods in corporate finance have lagged behind those in capital markets for several reasons. First, our models of capital structure decisions are less precise than asset pricing models. The major theories focus on the ways that capital structure choices are likely to affect firm value. Rather than being reducible, like the option pricing model to a precise mathematical formula, the existing theories of capital structure provide at best qualitative or directional predictions (p.198)."

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Schedule 2A.1 Samples in Research on Capital Structure

This schedule records the practice of empirical research on capital structure regarding excluding two classes of regulated firms: financials and utilities.

	Excluding Financial firms	**Excluding Utility firms**
Alti, A., 2006	Yes	No
Baker, Malcolm and Jeffrey Wurgler, 2002	yes	No
Charalambakis, Evangelos, Espenlaub, Susanne and Garrett, Ian, 2008	yes	yes
Billett, Matthew T., Tao-Hsien Dolly King and David C. Mauer, 2007	yes	No
Bradley, Michael, Greg Jarrell and Han Kim, 1984	yes	No
Charalambakis, Evangelos, Espenlaub, Susanne and Garrett, Ian, 2008	yes	yes
Cole, Rebel A., 2008,	yes	No
Darren J Kisgen, 2006,	yes	yes
Denis, David J., and Atulya Sarin, 2001	No	No
Fama, Eugene F. and Kenneth R. French, 1998	No	No
Faulkender, Michael and Mitchell A. Petersen, 2006	Yes	No
Fama, Eugene F. and Kenneth R. French, 2002	yes	yes
Flannery, Mark J. and Kasturi P. Rangan, 2006	yes	No
Frank, M.Z., and V.K. Goyal, 2003	yes	yes
Frank, M.Z., and V.K. Goyal, 2007	yes	No
Frank, Murray Z. and Goyal, Vidhan K. 2008	yes	No
Graham, J. R., 1999	No	No
Graham, John R., 2000	No	No
Graham, John R. and Campbell R. Harvey, 2001	No	No
Hovakimian, Armen, Tim Opler and Sheridan Titman, March 2001	yes	No
Huang, Rongbing and Ritter, Jay R., 2007	yes	yes
Jalilvand, A. and R. S. Harris, 1984,	No	No
Joan, Farre-Mensa, 2008	No	No
Kayhan, Ayla and Sheridan Titman, 2007	yes	yes
Kim, E., W. Lewellen, and J. McConnell, 1979	No	No
Kisgen, Darren. J., 2006,	yes	yes
Leary, M.T., and M.R. Roberts, 2005a	yes	yes
Leary, M.T, and M.R. Roberts, 2005b	yes	yes

Schedule 2A.1 Continued.

	Excluding Financial firms	Excluding Utility firms
Long, Michael and Ilene Malitz, 1985	yes	No
Loughran, Tim, and Jay Ritter, 1995	No	yes
MacKie-Mason, Jeffrey, 1990	No	No
Mittoo, Usha R and Zhou Zhang, 2006	yes	yes
Morellec, Erwan, Nikolov, Boris and Schuerhoff, Norman,	yes	yes
Nohel, Tom and Tarhan, Vefa, August 2001	No	No
Rajan, Raghuram and Luigi Zingales, 1995	yes	No
Rajan, Raghuram G., and Henri Servaes, 1997	No	No
Rauh, Joshua D. and Sufi, Amir, 2008	yes	No
Roberts, M. R., 2001	yes	No
Shyam-Sunder, Lakshmi and Stewart C. Myers, 1999	yes	yes
Smith, David J., Chen, Jianguo and Anderson, Hamish D.	yes	yes
Sivaprasad, Sheeja and Gulnur Muradoglu, 2007	yes	No
Titman, S., and R. Wessels, 1988	No	No
Wald, John K., 1999	yes	yes
Xu, Yexiao and Baranchuk, Nina, 2008	No	No

APPENDIX 3A

DEFICIENCIES IN THE COMPARABLE EARNINGS METHODOLOGY THAT MAKE IT UNSUITABLE FOR ROE DETERMINATION

3A.1 INTRODUCTION

The Comparable Earnings Estimation Method arises from the notion that capital should not be committed to a venture unless it can earn a return commensurate with that available prospectively in alternative ventures of comparable risk. While capital needs to be allocated efficiently so that the risk-adjusted returns are equivalent across firms and uses, the Comparable Earnings Test does not measure if this is the case. The Comparable Earnings Test measures rates of return but does not compare them with the opportunity cost of capital as is commonly done with measures such as Economic Value Added or the measures used to measure the allocational efficiency of secondary markets. Thus, we conclude that this Method should not be used as a tool to estimate a fair rate of return on equity for a utility.

Drs. Brigham, Shome and Vinson state that the comparable earnings method "has now been thoroughly discredited (see Robichek [15]), and has been replaced by three market-oriented (as opposed to accounting-oriented) approaches …".[2] Furthermore, there is widespread agreement among utility and intervenor witnesses and Boards that the Comparable Earnings Test is not appropriate for determining a fair rate of return.[3] For example, in 1999, the Alberta Energy and Utilities Board stated:[4]

> "In the Board's view, the comparable earnings test is sensitive to accounting practices of the sample firms, the sample selection, the selected business cycle and discontinuities caused by mergers, divestiture or restructuring. Given the

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[2] E. F. Brigham, D. K. Shome and Steve R. Vinson, 1985, The risk premium approach to measuring a utility's cost of equity, *Financial Management* (Spring), pages 33-45.
[3] The direct testimony of Dr. M. J. Vilbert for TransAlta Utilities Corporation, May 2000, is an example of a utility witness, and the direct testimony of Drs. L. D. Booth and M. K. Berkowitz for TRANSCO, August 2000, is an example of intervenor witnesses.
[4] Alberta Energy Utilities Board Decision U099099, November 25, 1999, page 326.

historical corporate restructuring and economic uncertainty, which may adversely affect the test results, the Board gives little weight to the comparable earnings test in this proceeding for the purposes of determining an appropriate rate of return."

The Alberta Energy Utilities Board has re-iterated its position on the merits of the Comparable Earnings Method in a subsequent decision on the application by AltaLink and TransAlta as follows:[5]

"Accordingly, for all of the above reasons, the Board continues to consider that the comparable earnings method is not appropriate and, hence, gives no weight to the comparable earnings method in this proceeding for the purposes of determining the appropriate equity rate of return."

Despite this widespread agreement against its use, an expert, Ms. McShane, continues to place a significant weight on the results of applying the Comparable Earnings Method when determining her recommended fair rate of return on common equity for an applicant utility in other regulatory proceedings.[6]

3A.2 THE WIDESPREAD AGREEMENT AGAINST THE USE OF THE COMPARABLE EARNINGS ESTIMATION METHOD IS BASED ON A NUMBER OF PROBLEMS WITH ITS USE

The basic problem with the use of the Comparable Earnings Estimation Method is that there is neither a theoretical underpinning nor any empirical support for the comparable earnings approach to estimating a regulated fair rate of return for a utility. As an *ad hoc* approach to estimating a regulated fair rate of return, there are no agreed-upon

[5] Alberta Energy and Utilities Board, August 2003, Decision 2003-061: AltaLink Management Ltd. and TransAlta Utilities Corporation Transmission Tariff for May 1, 2002 – April 30, 2004, TransAlta Utilities Corporation Transmission Tariff for January 1, 2002 – April 30, 2002, page 115.
[6] For example, EB-2007-0905 - OPG - 2008-09 Payments.

rules for deciding upon how the Comparable Earnings Estimation Method should be implemented.

Furthermore, the Comparable Earnings Estimation Method does not satisfy any of the four Daubert criteria for evaluating the admissibility (scientific merit) of expert testimony that have been adopted by federal and many state courts in the U.S. They are: (1) whether the methods upon which the testimony is based are centered upon a testable hypothesis; (2) the known or potential rate of error associated with the method; (3) whether the method has been subject to peer review and publication; and (4) whether the method is generally accepted in the relevant scientific community, particularly in terms of the non-judicial uses to which the scientific techniques are put.[7] This is confirmed more recently by Ms. McShane in her response to Pollution Probe Interrogatory #40 as follows:[8]

> "(a) - (g) The comparable earnings test is specifically applicable to utilities that are regulated on an original cost book value basis, for the specific purpose of adherence to the fairness standard. The limited purpose of the test is in stark contrast to the CAPM or DCF tests, which are more generally applicable across industries, used to estimate the required or expected rate of return on market values. Thus, it would be unlikely that the comparable earnings test has been subject to the types of peer review suggested in the question. Nevertheless, the importance of adherence to the fairness standard in setting the ROE (return on equity) and capital structure for regulated utilities regulated on the basis of original cost warrants giving weight to the comparable earnings test to properly take account of the unique construct."

We will now review some of the problems encountered in implementing a Comparable Earnings Estimation Method.

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[7] For a more extensive discussion of this U.S. Supreme court decision, see, for example: Stephen Mahle, The impact of *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, on expert testimony: With applications to securities litigation, April 1999. Available at: http://www.daubertexpert.com/basics_daubert-v-merrell-dow.html.

[8] Ms. McShane's Response to Pollution Probe Interrogatory #40, EB-2007-0905, Exhibit L, Tab 12, Schedule 40, page 1 of 1.

First, there is no agreement on how long and what time period should be used in the test. Some analysts use a full business cycle while others use a fixed time period of five or ten years. The results tend to be very sensitive to the choice of the time period.

Second, samples drawn from the same population vary considerably for the same expert even when they are drawn in close time proximity. To illustrate this bias, four of the 20 firms (i.e., 20%) used by Ms. McShane in her 11/07 sample for the OPG regulatory proceeding were not in her 11/06 sample for the Northwest Territories Power Corporation regulatory proceeding although none were delisted over the period. This 20% change in the sample over a one-year period highlights the *ex post* selection bias associated with the Comparable Earnings Estimation Method.[9]

Third, there is no agreement on how structural changes in the economy or a number of economic sectors should be dealt with. Furthermore, structural changes may invalidate the usefulness of past rates of return series for predicting future expected rates of return.

Fourth, the predictive usefulness of historical time series of accounting rates of return on equity appears to remain untested. Unlike equity returns that are forward looking in that they incorporate expectations, (accounting) rates of return on equity are backward looking.

Fifth, as an accounting-based measure, comparable earnings will only coincide with the investor’s opportunity cost (desired rate of return) by accident. There is no conceptual reason to expect that comparable earnings represent a rational expectation of an investor’s desired rate of return from investing in the firm.

Sixth, as an accounting-based measure, comparable earnings are subject to variations in the quality of earnings caused by accounting reinstatements, business combinations and divestitures, accounting choice of what is extraordinary, accounting choices of what

[9] Ms. McShane’s Response to Pollution Probe Interrogatory #39, EB-2007-0905, Exhibit L, Tab 12, Schedule 39, page 2 of 2.

is expensed and what is capitalized, and managerial choices about accounting practice. The time-varying use of "aggressive accounting" by firms makes earnings numbers not very reliable for determining ERP.

Seventh, Comparable Earnings Tests suffer from survivorship and selection biases since they tend to be retrospective. This tends to inflate the average rates of return found for the comparable sample. For example, none of the firms in the samples commonly used by experts that use the Comparable Earnings Tests fail to reach the end of the time period that are examined. In reality, even low-risk firms have a material probability of failure over long time periods if they are not subject to regulation, as has occurred during the current credit and economic crises.

Eighth, the Comparable Earnings Test is very dependent upon the criteria or screens used to select the sample members. Most analysts use accounting-based risk proxies to screen possible candidate firms. These screens are an attempt to identify a sample that is similar in risk to the low risk utilities. These accounting-based risk proxies measure total risk and not the systematic risk which is important to diversified investors. Thus, some firms with a high systematic risk survive the screening process. Some of the screens, such as ones that screen out firms with a high coefficient of variation for book returns, bias performance upwards. The coefficient of variation of book (or accounting) returns measures the uncertainty of returns divided by the mean return. Its inverse is a Sharpe-like measure of performance that provides the mean return per unit of standard deviation. High Sharpe-like ratios indicate better performance. For example, the unconditional CAPM (Capital Asset Pricing Model) assumes that the MERP per unit of standard deviation of return (essentially the Sharpe ratio) is positive and constant.[10] Thus, screening out firms with high coefficients of variation tends to screen out firms with low

[10] The literature using the Sharpe ratio to measure portfolio performance using market (not accounting) data is extensive. This literature includes S. Lalancette, L. Kryzanowski and M.C. To, Performance attribution using an APT with pre-specified macrofactors and time-varying risk premia, *Journal of Financial and Quantitative Analysis* 32:2 (June 1997), pages 205-224; S. Lalancette, L. Kryzanowski and M.C. To, Performance attribution using a multivariate intertemporal asset pricing model with one state variable, *Canadian Journal of Administrative Sciences* 11:1 (March 1994), pages 75-85; and L. Kryzanowski and A. B. Sim, Hypothesis testing with the Sharpe and Treynor portfolio performance measures given non-synchronous trading, *Economic Letters* 32 (1990), pages 345-352.

performance based on the Sharpe-like measure. Stated differently, the coefficient of variation of book returns screen retains firms that are most desired from an investor's viewpoint given their high return-to-variability ratios. Such firms include those with the market power to earn sustainable economic rents. Furthermore, some samples of Canadian comparables fail to screen out dual-class shares. The result is that almost one-half of such samples consist of dual-class shares where the subordinated shareholders' claims to earnings may have been enhanced to compensate for their subordinated voting power.

Ninth, the screens used by some experts produce comparable samples with an average price-to-book ratio and an average price-to-earnings ratio that exceeds that of a typical utility. We know from basic valuation theory that the price-to-earnings ratio increases with increasing return-on-equity, and that the price-to-book ratio also increases with increasing return-on-equity. Thus, given this positive relationship between return-on-equity and both the price-to-earnings ratio and the price-to-book ratio, it should not be surprising that the average return-on-equity for the comparable sample exceeds that of the sample of utilities. A higher price-to-book ratio is an indication that investors think a firm has opportunities to earn a rate of return on their investment that exceeds the market capitalization rate. While Canadian Boards appear to err on the side of caution when viewed in hindsight, there is still an upper cap on how much the risk-adjusted rate of return for a utility should exceed its true cost of capital. A higher price-to-earnings ratio is an indication that investors think that a firm has considerable and profitable future growth opportunities.

Tenth, while the current cost of new capital is based on current market values and inflation causes deviations between book and market values on the asset side, inflation also decreases the real value of long-term liabilities and part of the interest payment that represents a payment to debt holders for the depreciation of the real value of their holdings (i.e., a return of capital) is tax deductible. Thus, if the Comparable Earnings Test were to be used, one would have to remove the benefit that utilities receive from the decrease in the real value of their liabilities resulting from inflation, and the tax benefits the utilities receive from the "interest" payments which represent a return of capital and not a return on capital. As firms with relatively higher debt ratios, the sum of both of these items is likely to be material. Furthermore, much of the deviation between book and market values of assets for firms, including utilities, is caused by rates of return exceeding the cost of capital. The abnormal returns identified for Canadian utilities support this statement.

Eleventh, unlike the sample of non-utility comparables, regulated utilities are fully compensated for the actual cost of debt through the regulatory process even when they have a high embedded cost of debt.

Twelfth, and as explained in Section 2 of our evidence, the use of regulatory deferral accounts reduces the business risk of utilities below that of comparable non-utilities.

Thirteenth, and finally, all samples of low risk comparables that we have examined to date do not satisfy the comparable return standard based on realized returns. Based on *ex post* tests of risk-adjusted returns or of market- and risk-adjusted returns, we find that these control samples exceed the minimum requirements for the comparable return standard in that they have earned an abnormal or "free lunch". Typically, we find that these control samples of so-called comparable non-regulated firms exhibit significantly higher Sharpe ratios than the market index and significantly positive Jensen alphas. Sharpe ratios measure the return on the sample of comparables (or market proxy) less the risk-free rate, all divided by the standard deviation of returns of the sample of comparables (or market proxy). As such, Sharpe ratios measure the excess return to total risk for the sample of "comparables" (or market proxy). The Jensen alpha measures the abnormal return on the sample of comparables, where an abnormal return is defined as a risk-and market-adjusted excess return that is not equal to zero.

APPENDIX 3B
SOME MORE RECENT THINKING AND ESTIMATES OF U.S. AND OTHER COUNTRY EQUITY RISK PREMIA

3B.1 ESTIMATES ON A POINT-FORWARD BASIS

There are three approaches to estimating the market equity risk premium (MERP) on a point-forward basis. The first approach extrapolates historical returns based on the premise that realized and expected returns are equivalent, and that the future will be like the past. The second approach uses a theoretical model to determine what the MERP should be based on plausible assumptions about investor risk tolerance. The third approach uses forward-looking information on current dividend yields and interest rates to forecast expected MERP.

Dr. Reichenstein (2001) summarizes the predictions of several academic and professional scholars that long-run real stock returns will be below historical standards and that the MERP will be well below historical standards, and even negative according to some scholars.[11] The academic studies are by Drs. Jagannathan, McGrattan and Scherbina (2000), Dr. Siegel (1999) and Drs. Fama and French (2001). The practitioner studies are by Mr. Brown (2000) and by Mr. Arnott and Mr. Ryan (2001). The real stock return estimates are 2.9% to 4.4% for Drs. Fama and French, 3.2% for Mr. Arnott and Mr. Ryan, 3.3% for Dr. Siegel, 4.8% for Drs. Jagannathan *et al.*, and 5.2% for Mr. Brown.

Drs. Fama and French (2001) obtain estimates of the U.S. equity MERP of 2.55% and 4.32% for 1951-2000 when they use rates of dividend and earnings growth to measure the expected rate of capital gain. These MERP estimates are much lower than the 7.43% estimate produced by using the average stock return over this period of time. They conclude that their evidence shows that the high average realized return for 1951-2000 is

[11] Cited articles in this appendix are listed in the references found between the text and the tables to this appendix.

due to a decline in discount rates that produces large unexpected capital gains. Their main conclusion is that the stock returns (and realized MERPs) of the last half-century are a lot higher than what was expected by investors *ex ante*. According to Drs. Fama and French (2001), "many papers suggest that the decline in the expected stock return is in part permanent, the result of (i) wider equity market participation by individuals and institutions and (ii) lower costs of obtaining diversified equity portfolios from mutual funds (Diamond, 1999; Heaton and Lucas, 1999; Siegel, 1999)".

Drs. Jagannathan *et al.* (2000) demonstrate that the U.S. MERP has declined significantly during the last three decades. They calculate the MERP using a variation of a formula in the classic Gordon stock valuation model. While the premium averaged about 7 percentage points during 1926-70, it only averaged about 0.7 of a percentage point after that. They support this result by demonstrating that investments in stocks and consol bonds of the same duration would have earned about the same return between 1982 and 1999, a period over which the MERP estimate is about zero.

There are a number of studies not reviewed by Dr. Reichenstein (2001). These are reviewed next.

In a conference presentation on October 15, 2001, Mr. Robert A. Arnott of First Quadrant (and a former editor of the *Financial Analysts Journal*) estimates the U.S. MERP for the 75 years from December 1925 to be 4.7%, and to have oscillated around zero beginning in the early 1980s.[12] He estimates the forward-looking U.S. MERP from October 2001 to be 0.3%±.

In a study (undated) by Deutsche Asset Management, the expected long-run MERPs are 2.5% over government bonds or 3.0% over cash for the U.S., Euroland, Japan and the U.K. (see Schedule 3B1). These MERPs are based on two approaches, where the first estimates what equities can return based on free cash flows that they generate, and the

[12] Specifically, Exhibit 4a on page 21 of Arnott (2001).

second estimates what equities need to return to get investors to hold them instead of less risky assets.

Drs. McGrattan and Prescott (2000) conclude that the case for a positive MERP appears weak based on a model that measures the value of corporate capital. They show that including intangibles reduces corporate profits. Since the values of overall productive assets and equity are nearly equal in the United States, they conclude that the MERP is close to zero percent.

Drs. Claus and Thomas (2001) use the implied risk premium methodology to derive an upper bound for the MERP for Canada, France, Germany, Japan, U.K., and the U.S. over the period from 1985-1998. Drs. Claus and Thomas find that MERP estimates are close to three percent rather than the eight percent MERP that has been reported based on the data from Ibbotson & Associates. They consider their estimates as being an upper bound because they use the earnings forecasts of analysts, which are typically optimistic, to forecast the MERP.

Based on reasonable priors and allowing for structural breaks, Drs. Pastor and Stambaugh (2002) obtain estimates of the U.S. MERP of between 3.9 and 6.0 percent over the period from January 1834 through June 1999. The estimated premium rises through much of the nineteenth century and the first few decades of the twentieth century. It declines fairly steadily after the 1930's except for a brief period in the mid 1970s. The estimated MERP exhibits its sharpest decline to 4.8% during the decade of the 1990s.

Drs. Ibbotson and Chen (2001) forecast the MERP through supply side models using historical information. They conclude that “contrary to several recent studies on equity risk premium that declare the forward looking equity risk premium to be close to zero or negative, we find the long-term supply of equity risk premium is only slightly lower than the straight historical estimate". Based on his co-authored paper with Dr. Chen, Dr. Ibbotson concluded that:[13]

> "My estimate of the average geometric equity risk premium is about 4 percent relative to the long-term bond yield. It is, however, 1.25 percent lower than the pure sample geometric mean from the risk premium of the Ibbotson and Sinquefield study (Ibbotson Associates 2001)."

Dr. Ibbotson goes on to state:[14]

> "The 4 percent (400 bps) equity risk premium forecast that I have presented here today is a geometric return in excess of the long-term government bond yield. It is a long-term forecast, under the assumption that today's market is fairly valued."

Hunt and Hoisington (2003, p. 28) conclude that their study "sheds new light on the risk premium of stocks over U.S. Treasury bonds, which indicates most research overstates the advantages of stocks over bonds". They go on to note that:

> "While results may be overstated due to the beginning-period bias, studies based upon past data have conclusively shown that stock returns are superior to bonds over very long time periods. On average, during these time periods, the better performance of stocks is due to inflationary situations, spreads between dividend and bond yields, and P/E ratios that currently do not exist."

Drs. Jacquier, Kane and Marcus (2003) show that, while a weighted-average of the arithmetic and geometric average returns provides an unbiased estimate of expected long-term returns, the best estimate of cumulative returns is even lower. They conclude that:

[13] Roger Ibbotson, Moderator, Implications for asset allocation, portfolio management, and future research: Discussion, *Equity Risk Premium Forum*, November 8, 2001, page 103.
[14] Roger Ibbotson, Summary comments, *Equity Risk Premium Forum*, November 8, 2001, page 108.

"Strong cases are made in recent studies that the estimate of the market risk premium should be revised downward. Our result compounds this argument by stating that even these lower estimates of mean return should be adjusted further downward when predicting long-term cumulative returns."

Using the third approach to estimating MERPs, Dr. Ritter (2002) estimates that the MERP is only about 0.7% or 1 percent rounded up. He points out that lower future real stock returns have squeezed the MERP from the top and a higher real return on bonds has squeezed the MERP from the bottom.[15]

Drs. Buranavityawut *et al.* (2006) provide evidence that supports "an increasingly prevalent view among financial economists that the ex-ante equity premium has declined over the last 50 years". In complete, segmented and incomplete market settings, the authors identify a structural break downwards in the equity premium in both the U.S. and Europe in the immediate post-WWII period driven by a decline in consumption risk.

Drs. Lettau, Ludwigson and Wachter (2007) attribute the lower equity risk premiums in the U.S. of the 1990s to reduced volatility in real economic variables including employment, consumption and GDP growth.

Drs. Dimson *et al.* (2008) conclude on page 500:

> "However, after adjusting for non-repeatable factors that favored equities in the past, we infer that investors expect an equity premium (relative to bills) of around 3—3½ percent on a geometric mean basis and, by implication, an arithmetic mean premium for the world index of approximately 4½—5 percent."

Drs. Madsen and Dzhumashev (2008) argue that "high historical excess returns to equity were the result of a severe *ex post* bias in the period from 1915 to ca 1960 because inflation surprises during this period drove a wedge between *ex ante* and *ex post* returns

[15] Jay R. Ritter, The biggest mistakes we teach, *The Journal of Financial Research* 25: 2, Summer 2002, page 163.

to bonds". After adjusting the *ex post* equity premium by the *ex post* bias, they obtain an arithmetic mean MERP of 3.3-4.4% over the past 132 years for the OECD countries.

3B.2 ACTUAL VERSUS EXPECTED EQUITY RISK PREMIUMS

A few studies examine whether or not actual or realized MERPs are a good proxy for expected or required MERPs. The findings of two of these studies are summarized in Schedule 3B2. The study (undated) by Deutsche Asset Management aptly summarizes these findings as follows:

> "In sum, a wealth of theoretical and empirical evidence suggests that the historical, realized equity premium (5% - 7%) exceeded what equities were expected to deliver in the past, and very likely exaggerates what they should be expected to deliver in the future. An equity premium of 3% - 4% may have been closer to the true, ex-ante premium in the past, and the lower end of that range seems the most that we should anticipate (and that investors will require) now that economic/political conditions are more stable and people are more 'plugged in' to the benefits of equity investing. So we take 3% as an upper bound for the equity premium going forward."

It should also be kept in mind that these equity risk premia are calculated in reference to short-term government bonds (such as T-Bills) and **not long-term government bonds**.

Mr. Arnott and Mr. Bernstein (2002) show that the realized MERP over the last 75 years in the U.S. is overstated due to various accidents. Equity and bond investors obtained returns higher and lower than what they expected, respectively, due to a series of favourable accidents for equity holders and one major unfavourable accident for bondholders.

Mr. Oliver and Mr. Doyle of AMP Henderson Global Investors Limited note:

> "A strong case can be made that favourable forces now justify a lower share-risk premium than the 5% or 6% that prevailed over the past 100 years … The favourable forces include low inflation and a more stable business cycle that are expected to result in higher-quality and steadier earnings and share prices. As well, baby boomers saving for their post-work lives are buying shares. They are arguably less fearful of shares than previous generations and have (hopefully) longer-investment horizons….
>
> Our assessment is that the appropriate risk premium for U.S. shares is about 3% [relative to bonds]. For the Australian shares, fewer opportunities for diversification justify a slightly higher premium of about 4%." [our insertion]

This was re-enforced by Mr. Dyer (2003) of the same firm more recently as follows:

> "For these reasons, **the historically realised ERP of the last 50 years or so is probably an exaggeration of what investors actually require and is absolutely no guide to what the likely ERP will be going forward."** [his emphasis]

Drs. Clarke and de Silva (2003) note that all of the expected MERPs by practitioners from such firms as Frank Russell (3%), Goldman Sachs (3%), Ibbotson (4%) and Alliance Bernstein (4.5%) are lower than the historical experience in the U.S. Drs. Clarke and de Silva conclude their study by noting: "What seems clear from the historical evidence is that a reasonable expectation for the long-run equity risk premium is probably in the 3-6% range." Interestingly, the **expected MERP estimates** of Drs. Clarke and de Silva and the others are based on **geometric means**.

Using a model that extracts the required return on equity from a valuation model based on dividends and repurchases of shares, Dr. Lamdin (2002) obtains MERP estimates of 3% to 6%.

Drs. Donaldson *et al.* (2008) claim that estimating the *ex ante* MERP solely using historical data on *ex post* returns is simplistic. They compute an ex ante risk premium that lies within 50 basis points of 3.5 % when other information (such as dividend yields, Sharpe ratios and return volatility) are reflected in their simulations of the performance of the U.S. markets over the past 50 years.

In a special report (page 3), TD Economics (2009) provides recent MERP estimates for the U.S. based on a review of the literature of between 2.40% (Arnott & Bernstein) and 4.50% (Alliance Bernstein) with a central tendency estimate of 3.3%.[16] TD's long-term MERP estimate over a 4.75% long-run equilibrium yield on GoC (Government of Canada) 10-year bonds is 3.65% (i.e., 8.40 % return on equities minus the 4.75% long-run GoC yield) using the relative financial returns approach (i.e., our first estimation method) and 2.75% (i.e., 7.50% return on equities minus the 4.75% long-run GoC yield) based on economic fundamentals (i.e., our third estimation method).

3B.3 SYNTHESIS

All of the studies conclude that the U.S. MERP has narrowed (most conclude substantially), and is expected to be lower in the future. The U.S. MERP estimates vary from zero or slightly negative (Jagannathan *et al.*, 2000) to about 6% (Ibbotson and Chen, 2001). These studies strongly suggest that any forecast **for the U.S.** over 5% based on T-Bills is in the optimistic tail of the distribution of possible MERP estimates. The results are similar for other markets.

3B.4 RELATIVE RISK OF EQUITIES VERSUS BONDS

It would appear on the surface that a low required MERP going forward is questionable because it is inconsistent with the belief that equities are more risky than bonds. However, some market professionals believe that equities may not be more risky than bonds in terms of investment risk. Studies find that the ratio of the standard deviations of returns on equities to bonds is above one, approaches one, and goes below one as the measurement period over which returns are measured gets longer. The ratio

[16] TD Economics, Evaluating long-run returns in uncertain times, Special Report, February 12, 2009.
Available at:
Available at: http://www.td.com/economics/special/ca0209_returns_eng.pdf.

would remain constant, as the measurement period over which returns are measured gets longer, if stock and bond returns did not exhibit mean reversion/aversion.

In a 2001 study, W.M. Mercer evaluated the investment riskiness of Canadian stocks, bonds and cash over varying time horizons.[17] These results confirm existing U.S. results that:[18]

- Stocks are riskier than both bonds and cash over shorter time horizons, such as one year;
- Stock returns exhibit decreasing variability (measured by the standard deviation of returns) over time;[19]
- For 20-year rolling time periods, stocks outperform bonds in terms of returns, and both asset classes have about the same risk;
- For 30-year rolling time periods, stocks outperform both bonds and cash, and stocks are less risky than both bonds and cash.

In their book, Drs. Campbell and Viceira (2002, pp. 108 and 109) provide evidence that the annualized standard deviation of K-period returns is lower for equities than T-Bills (rolled) or long bonds (rolled) for long holding periods in the United States. Drs. Campbell and Viceira (2002, p. 108) state that: “We see that stocks are mean-reverting – their long-horizon returns are less volatile than their short-horizon returns – while bills are mean-averting – their long-horizon returns are actually more volatile than their short-horizon returns.” Drs. Campbell and Viceira (2002, p. 108) draw the following inference from their analysis: “These effects are strong enough to make bills actually riskier than stocks at sufficiently long investment horizons, a point emphasized by Siegel (1994)”.

[17] William M. Mercer Limited, Are stocks riskier than bonds? New Mercer research indicates that stocks become less risky in the long run, news release, February 15, 2001. Available at www.wmmercer.com/Canada/english/resource/resource_news02152001.html.
[18] The historical results reported by the CIA suggest that the standard deviation results are obtainable for periods as short as 5 years. Over 5-year periods, they report standard deviations of returns of 6.75%, 5.69% and 3.53% for stocks, long Canada’s and 91-day T-Bills, respectively. Over 10-year periods, the corresponding standard deviations are 2.98%, 4.59% and 3.26%. Canadian Institute of Actuaries, *Report on Canadian Economic Statistics*, 1924-2000, September 2001, Table 2A, page 8.
[19] This is consistent with mean reversion in stock returns.

Thus, based on the long-run perspective underlying rate-of-return rate-setting, equities may in fact not be that much more risky than traditional debt instruments from an investment risk perspective. Since the MERP is based on the notion that stocks are riskier than bonds, these results attack the validity of a fundamental notion behind the magnitude of the MERP.

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Schedule 3B1. Expected long-run returns in local currency terms (annualized, percent)

	Cash		Gov't Bonds		Equities	
	Nominal	Real	Nominal	Real	Nominal	Real
U.S.	4.50	2.00	5.00	2.50	7.50	5.00
Euroland	3.75	2.00	4.25	2.50	6.75	5.00
Japan	3.00	2.00	3.50	2.50	6.00	5.00
U.K.	4.50	2.00	5.00	2.50	7.50	5.00

Source: Deutsche Asset Management, undated, 2.

Schedule 3B2. Actual versus 'expected' equity risk premium in %[a]

Study	Country	Dates	Actual	Expected
Fama & French (2001)	U.S.	1872-2000	5.6	3.5
Fama & French (2001)	U.S.	1872-1950	4.4	4.2
Fama & French (2001)	U.S.	1951-2000	7.4	3.4
Dimson *et al.* (2000)	U.S.	1900-2000	5.6	4.0
Dimson *et al.* (2000)	15 countries[b]	1900-2000	5.1	3.5

[a]The actual premium is the compound, annualized rate of return less the compound, annualized return on short-term government debt. The expected premium uses dividend growth and earnings growth models to estimate equity returns.
[b]Australia, Belgium, Canada, Denmark (from 1915), France, Germany (ex. 1922/23), Ireland, Italy, Japan, Netherlands, Spain, Sweden, Switzerland (from 1911), U.K. and U.S.

Source: Deutsche Asset Management, undated.

APPENDIX 3C

INDIRECT DECOMPOSITION METHOD TO ESTIMATE INDUSTRY-LEVEL MONTHLY VARIANCES

An interesting feature of the indirect volatility decomposition method proposed by Drs. Campbell *et al.* (2001) for those that are opposed to using an asset pricing model (APM) is that neither covariances nor betas need to be estimated.[20] In the decomposition, the value-weighted variance for a representative industry *i* for month *t* (i.e., $\sigma_{I,t}^2$) is given by $\sigma_{I,t}^2 = \sum_i w_{i,t} \cdot \sigma_{\varepsilon_{i,t}}^2$, where $\sigma_{\varepsilon_{i,t}}^2 = \sum_{d \in t} \varepsilon_{i,d,t}^2$ is the aggregation of the daily squared excess returns for industry *i* over those of the market over the days *d* in month *t*; $\varepsilon_{i,d,t} = R_{i,d,t} - R_{m,d,t}$ is the excess return for industry *i* over that of the market for day *d* in month *t*; and $R_{m,d,t}$ is the value-weighted excess return for all stocks for day *d* in month *t*. An interesting feature of this decomposition method is that it minimizes selection and survivorship biases by using all stocks that have at least one month of publicly available trade data.

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[20] As in Campbell et al. (2001), the closing numbers of outstanding shares for the previous month are used to compute all market capitalization weights. John Y. Campbell, Martin Lettau, Burton Malkiel and Yexiao Xu, 2001. Have individual stocks become more volatile? An empirical exploration of idiosyncratic risk, *Journal of Finance* 56:1, pages 1-43.

APPENDIX 3D
CRITIQUE OF THE TWO RATIONALES GIVEN FOR USING NON-STANDARD (ADJUSTED OR INFLATED) BETAS

3D.1 INTRODUCTION

In this appendix, we assess the merits of the two primary arguments that have been advanced for using non-standard (adjusted or inflated) betas when calculating the required rate of return on equity for Canadian regulated utilities. As we show in this appendix, both rationales are not appropriate for Canadian utilities as implemented by experts for the applicant utilities.

3D.2 MEAN REVERSION TENDENCY OF BETAS

The first rationale is based on the empirical finding by Dr. Blume (1975) that the betas of individual **U.S.** equities, for a large peer group sample that is representative of the overall market (i.e., a peer group whose weighted average beta is one by construction), tend to regress over the long-run towards the mean beta of one for the sample.[21] In other words, if one wants to examine the contribution of the firms in the market with individual standard betas centered around one to the risk of the market, then the standard betas can be adjusted for their tendency to revert to the mean beta of the market of one.

Dr. Blume obtained his results by running a regression of the beta estimates obtained over the period 1955-1961 against the beta estimates obtained over the period 1948-1954 for common shares traded on the NYSE. Dr. Blume finds that the betas of firms with values less than one subsequently, on average, tend to increase towards the sample beta of one, and firms with betas of more than one tend to subsequently decrease, on average, towards the sample beta of one. The relationship estimated by Dr. Blume suggests that

[21] M.E. Blume, 1975, Betas and their regression tendencies, *Journal of Finance* 30 (June), pages 785-796.

the quality of beta forecasts can be improved, and that a higher quality predictor of the beta of an individual firm in the peer group may be a weighted average of the peer group's beta and the individual firm's current beta where the weights are approximately one-third and two-thirds, respectively.

It is easy to demonstrate that it is nonsensical to assume that a utility's beta will revert to the market beta if the normal or mean tendency of a utility's beta is to take values less than one. For example, if the average beta for a sample of utilities is consistently lower than the market beta of one, as is the case for the samples of utilities studied herein, the use of the market beta of one will result in an over-prediction of the mean beta in the next period for the sample. This is easily shown by taking a portfolio that is invested 40% in risk-free assets and 60% in the market, and thus, has a constant beta of 0.60 by construction. Its adjusted beta would consistently be 0.73 (i.e., two-thirds of 0.6 + one-third of 1), although its actual or true beta is substantially lower at 0.6.

Dr. Vasicek suggests that the amount of movement (shrinkage) in the standard beta of a member of the peer group should decline with an increase in the statistical confidence of the regression beta estimate.[22] Using the Vasicek shrinkage method, the non-standard beta is given by:

Non-standard beta for a member of the peer group = [(1 – weight) x (Peer group beta)] + [(weight) x (Beta of individual member of the peer group)], where:

weight = (cross sectional standard error)^2 / [(cross sectional standard error)^2 + (time-series beta error)^2]

Of course, if one is estimating the beta of the peer group as happens when one is estimating the beta of an average-risk utility, then there is no shrinkage.[23] In other words, if one is estimating the beta for the peer group, there is no effect if one adjusts this peer-group beta towards the beta of the peer group.

[22] O. A. Vasicek, 1973, A note on using cross-sectional information vs. Bayesian estimation of security betas, *Journal of Finance* 28 (September), pages 1233-1239.

[23] Otherwise, some studies have found that in in-sample tests that the standard beta estimates for individual firms can be improved by using the Vasicek shrinkage method. Examples include: E. J. Elton, M. J. Gruber and T. Urich, 1978, Are betas best, *Journal of Finance* 33 (December), pages 1375-1384; and A. A. Eubank and J. K. Zumwalt, 1979, An analysis of the forecast error impact of alternative beta adjustment techniques and risk classes, *Journal of Finance* 34 (June), pages 761-776.

Experts to this proceeding have provided no evidence or referred to any published evidence that the relationship estimated by Dr. Blume for the U.S. market that is over 40 years old still applies to the U.S. market nor that it has ever applied to other markets, such as the Canadian market, or that it has ever applied to utilities. In other words, no empirical evidence has been provided by the experts in this proceeding on whether and how the betas of Canadian stocks revert to the sample mean. Neither have experts in this proceeding provided any evidence that utility betas revert to the market beta of one at a one-third speed.

The published literature on the use of non-standard or adjusted betas for utilities deals with the benchmark to which the betas should be adjusted and whether commercially available non-standard betas have predictive accuracy.

Dr. Harrington (1983) shows that the betas that are supplied by commercial vendors that use various types of adjustments have little predictive accuracy.[24] Her conclusion is based on a comparison of the actual beta forecasts supplied by a number of commercial investment vendors (such as Value Line) with their corresponding benchmark estimates for four forecast horizons.

Drs. Chambers and Wood state on page 23 of their paper that "the measurement of risk to equity holders is an important concept in public utility rate of return regulation" and that the purpose behind adjusting the standard beta estimate is "to reflect the tendency of betas to drift towards some "normal" level".[25] Based on their figure 1 (reproduced in our Schedule 3D.1), they report that the standard beta estimates for the electric utility industry in the United States fall into "two distinct periods divided at approximately 1950" with mean betas usually greater than 1.0 prior to and during World War II and mean betas tending to range between 0.5 and 0.8 subsequent to World War II. Based on various statistical tests, they conclude that:

[24] D.R. Harrington, 1983, Whose beta is best?, *Financial Analysts Journal* (July-August), pages 67-73.
[25] Donald R. Chambers and Robert A. Wood, 1985, The use of adjusted betas in public utility regulation, *Review of Business and Economic Research* 20: 2 (Spring), pages 23-33.

- "The empirical results reject the hypothesis that electric utility betas have the same beta distributions as other firms" (page 29);
- "… an adjustment procedure based on the behavior of a market sample is inappropriate for application in the case of electric utility betas" (page 29); and finally,
- "The following example will be used for the concluding discussion. Consider an electric utility with an *unadjusted* beta of 0.5. The risk-free rate is 10%, the risk premium on the market is 10%, and the *adjusted* beta is 0.7. As discussed above, the beta is adjusted from 0.5 to 0.7 based upon the expectation that betas tend toward 1.0 through time. The primary conclusion of this study is that the beta should *not* be adjusted upwards, since electric utilities do not tend towards 1.0 but rather towards an industry average well below 1.0.

  In the above example, the adjustment procedure inappropriately adds 0.2 to the unadjusted beta of 0.5."

Drs. Kryzanowski and Jalilvand (1986) test the relative accuracy of six beta predictors for a sample of fifty U.S. utilities from 1969-1979.[26] They find that the best predictors differ only in that they use different weighted combinations of the average beta of their sample of utilities, and that, not unexpectedly, the worst predictor is to use a beta of one or the so-called "long-term tendency of betas towards 1.00".

Drs. Gombola and Kahl examine the time-series processes of U.S. utility betas and conclude the following on pages 91-92 for the required adjustment for a single utility:[27]

> "The results of this study, however, indicate that 1.0 is too high an underlying mean for most utilities. Instead, they should be adjusted toward a value that is less than one."

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[26] L. Kryzanowski and A. Jalilvand, 1986, Statistical tests of the accuracy of alternative forecasts: Some results for U.S. utility betas, *The Financial Review*, pages 319-335.
[27] Michael J. Gombola and Douglas R. Kahl, 1990, Time-series processes of utility betas: Implications for forecasting systematic risk, *Financial Management*, pages 84-93. Available at: http://www.oeb.gov.on.ca/documents/cases/EB-2006-0088/gambola-kahlf_131006.pdf.

They advocate no adjustment for an average-risk utility.

Based on an examination of dynamic betas estimated using the Kalman filter approach, Drs. He and Kryzanowski find that the trend beta (i.e., the stable part of the beta) has been 0.5 or less since the late 1990s, that dynamic betas significantly increase the explanatory power of the market model (particularly for the utilities sector), and that time-variation (temporary deviations) in the betas is the most important source of variation in the market model for the Canadian utilities sector.[28] They also find that the U.S. market does not make a statistically significant contribution to explaining the portion of the return of Canadian utilities that is not explained by the Canadian market.

3D.3 BETA ADJUSTMENT TO REFLECT SENSITIVITY TO INTEREST RATE CHANGES

The second rationale for using a variant of the non-standard or adjusted- or inflated-beta method for utilities is that raw utility betas need to be adjusted upward due to their sensitivity to interest rate changes, and that the appropriate adjustment is one that is intermediate between the raw and adjusted betas.

As is the case for the S&P/TSX Composite index, the returns of utilities are sensitive to changes in both market and bond returns. This suggests that utility returns may be better modeled using these two potential return determinants or factors. However, one should not confuse the sensitivity of utility returns with the premium required by investors to bear market and interest rate risk when investing in utility equities.

When there is only one determinant of utility returns (namely, the market), the Market Risk Premium Estimation Method is implemented by first estimating the utility's beta by running a regression of the returns on the utility against the returns on the market

[28] Zhongzhi He and Lawrence Kryzanowski, Dynamic betas for Canadian sector portfolios, *International Review of Financial Analysis*, in press.

proxy (S&P/TSX Composite index). The utility's required equity risk premium is obtained by multiplying the equity risk premium estimate for the market by the utility's beta estimate. The cost of equity for the utility is obtained by adding the equity risk premium estimate for the utility to the estimate of the risk-free rate (as proxied by the yield on 30-year Canada's).

When there are two possible determinants of utility returns (in this case, equity market risk and interest rate risk), the Equity Risk Premium Method now is implemented by first estimating the utility's two betas by running a regression of the returns on the utility against the returns on the equity market proxy (S&P/TSX Composite index) and on the bond market proxy (long Canada's; i.e., Government of Canada bonds with a long term to maturity).[29] The first component of the utility's required equity risk premium is obtained by multiplying the equity risk premium estimate for the market by the utility's market beta estimate, and the second component of the utility's required equity risk premium is obtained by multiplying the bond risk premium estimate by the utility's bond beta estimate. The utility's required equity risk premium is the sum of these two components. The cost of equity for the utility then is obtained by adding the equity risk premium estimate appropriate for the level of relative risk for the utility to the estimate of the risk-free rate (as proxied by the yield on long Canada's).

While one would expect the estimates of the return on the S&P/TSX Composite index, of the return on long Canada's, and of the return on the S&P/TSX Composite index over the yield on long Canada's to be positive and significant, such is not the case for the return on long Canada's over the yield on long Canada's. Over the long run, we would expect the average return on long Canada's to be equal to the yield on long Canada's (the proxy for the risk-free rate in rate of return settings). This is because our expectation is that rates would fluctuate randomly so that returns would be above yields to maturity in some periods and below them in others. Thus, while it is true that utility

[29] This two-step procedure for testing asset pricing models, such as the CAPM, originates with Eugene Fama and James MacBeth, 1973, Risk, return, and equilibrium: Empirical tests, *Journal of Political Economy* 71, pages 607-636.

returns are sensitive to interest rates, it is not true that interest rate risk will have a positive risk premium in an asset pricing implementation over the long run.

We now illustrate the above by first calculating the betas for the two-factor CAPM for a sample of seven utilities over the 1990-2002 period that have full data. In doing so, we use correct econometric procedures by using the orthogonalized long Canada bond returns. When this correct econometric procedure is used, **the market betas are the same as those obtained using the single-factor CAPM for each utility**, and the interest rate betas are the same as those obtained using the two-factor CAPM (without orthogonalization) for each utility. These results are reported in Schedule 3D.2. As expected, the beta estimates for each factor are positive (and generally) statistically significant at conventional levels.

To examine the nature of bond market risk premiums, we calculate them over various time periods that correspond to some of those used previously to calculate the MERP. These results are reported in Schedule 3D.3. As expected, over long periods, such as 1965-2002, the mean bond market risk premium is only 30 basis points, and it becomes negative over the three progressively longer time periods of 1957-2002, 1951-2002 and 1936-2002. While it is positive and quite material over the 1977-2002 period at 1.745%, this is offset by the relatively low MERP of 2.797%. Furthermore, according to our expectations, all of the mean bond risk premiums are not significantly different from zero at conventional levels. In contrast, the mean equity risk premiums are significantly different from zero for the two longest time periods of 1936-2002 (at 5% level) and 1951-2002 (at 12% level). The two series of risk premiums (i.e., equities and bonds) are essentially uncorrelated at 0.02 over the full time period of 1936-2002. The highest correlation between these two series of risk premiums is 0.04 for the 1965-2002 time period.

Looking forward we expect MERPs to be low, and we do not expect the bond market risk premium to be material (on the positive side) since interest rates are now at or near historic lows.

Schedule 3D.1

This figure is drawn from: Donald R. Chambers and Robert A. Wood, The use of adjusted betas in public utility regulation, *Review of Business and Economic Research* 20: 2 (Spring 1985), page 28.

FIGURE 1: MEAN ELECTRIC UTILITY BETAS: 1930–1981

Schedule 3D.2

This table provides the market and bond return betas for a sample of seven utilities based on the estimation of a two-factor CAPM over the period, 1990-2002. The three utilities that do not have data for the full time period are eliminated from the sample. They are Emera (Nova Scotia Power), Pacific Northern Gas and Enbridge. All betas are calculated using monthly total returns for the utility and the S&P/TSX Composite index.

Variable	BC Gas	Cdn Util.	Trans Alta Corp.	Trans Canada	Westcoast Energy	Atco Ltd.	Fortis Inc.	Mean, with Atco: In	Mean, with Atco: Out	Highest, with Atco in
Market beta	0.260	0.345	0.242	0.112	0.197	0.397	0.220	0.253	0.229	0.397
Orthogonalized bond return beta	0.364	0.443	0.568	0.756	0.409	0.494	0.415	0.493	0.493	0.756

Schedule 3D.3

This table provides the equity and bond market premiums over yields on 30-year Canada's (or their proxy) for various time periods. Since the data are drawn from the Canadian Institute of Actuaries, the longest time series with Canada bond data is for the time period, 1936-2002

Time Period	Equity market risk premia	Bond market risk premia	Total risk premia[a]: Atco In	Total risk premia[a]: Atco Out	Total risk premia[a]: Atco In; Highest Individual Beta
1936-2002	4.659	-0.069	1.147	1.035	1.798
1951-2002	3.653	-0.240	0.807	0.719	1.269
1957-2002	2.273	-0.013	0.569	0.515	0.893
1965-2002	1.574	0.301	0.547	0.509	0.852
1977-2002	2.797	1.745	1.568	1.501	2.430

[a]This is calculated using the mean betas for the utility sample given in Schedule 3D2. For example, 1.147 = (.253 *x* 4.659) + (0.493 *x* -0.069).

APPENDIX 5.A
EMPIRICAL TESTS OF THE CAPM AND THEIR IMPLICATIONS FOR THE POSTITIONING OF THE SML

5.A1 INTRODUCTION

In this appendix, we first review the empirical evidence based on empirical tests of the (un)conditional CAPM with particular emphasis on the Canadian evidence. We then discuss the type of adjustment that should be made if, for the sake of argument, one accepted the argument that there should be an adjustment for the early empirical evidence of a flatter-than-expected Security Market Line or SML.

Before proceeding, we want to define a few terms. The intercept and the slope (or beta) are assumed to be constant or found to be constant over time in an unconditional CAPM, and to vary over time in a conditional CAPM. The SML is the graph that depicts the return versus risk relationship for the whole market, and it is unconditional if it is assumed to remain constant or found to be constant over time and to be conditional otherwise.

5.A2 Brief Review of the Empirical Evidence for Tests of the CAPM

Earlier studies that found biases in the CAPM typically used U.S. 90-day Treasury bills as a proxy for the risk-free rate. These studies found that the estimated intercept of the Security Market Line or SML was above this choice of risk-free rate, and that the estimated slope of the SML was smaller than the difference between the mean return on the market proxy and the mean return on T-Bills (i.e., the MERP measured relative to the T-Bill rate). More recent studies find strong support for the zero-beta version of the CAPM where the estimated intercept is the return on the zero-beta portfolio and for conditional forms of the CAPM. The expectation of the CAPM is that the return on the zero-beta portfolio should exceed the return on T-Bills.[30] The use of the higher long Canada rate as the proxy for the risk-free rate instead of the 30- or 90-day Treasury Bill rate is consistent with these empirical findings.

Although a number of older studies do not support the unconditional (or single period) version of the traditional CAPM, the empirical evidence for zero-beta, multifactor or conditional CAPMs is much stronger.

The U.S. literature includes the study by Drs. Pettengill, Sundaram and Mathur (1995) that explains the not significant beta-return relation that is observed when the unconditional beta is used. [31] When they use a constant beta model that is conditioned on up and down markets, they find significant risk premiums for both types of betas. Drs. Pettengill, Sundaram and Mathur (2002) find significant risk premiums for both types of betas for constant risk and dual beta models that are conditioned on the market return.[32] For up markets, they find an insignificant premium for the Fama and French book-to-market equity factor for both models and a marginally significant premium for the Fama and French size factor for only the constant risk beta model. For down markets, they find significant premiums for both Fama and French factors for both models.

Very recent studies by Drs. Ang, Hodrick, Xing and Zhang (2006 forthcoming) strongly demonstrate that for 23 developed markets (including the U.S.) over a sample period that spans January 1980 to December 2003 that only the market factor is consistently priced.[33] Furthermore, the small-minus-big capitalization factor and the high-

[30] Robert F. Stambaugh, 1982, On the exclusion of assets from tests of the two-parameter model: A sensitivity analysis, *Journal of Financial Economics*, November, pages 237-268.
[31] G.N. Pettengill, S. Sundaram and I. Mathur, The conditional relation between beta and returns. *Journal of Financial and Quantitative Analysis*, 30 (1995), pages 101–115.
[32] G. Pettengill, S. Sundaram and I. Mathu, Payment for risk: Constant beta vs. dual-beta models, *The Financial Review* 37:2 (May 2002), pages 123-136.
[33] A. Ang, R.J. Hodrick, Y. Xing and X. Zhang, The cross-section of volatility and expected returns. *Journal of Finance*, 61:1 (2006a), pages 259–299; and A. Ang, R.J. Hodrick, Y. Xing and X. Zhang, High idiosyncratic volatility and low returns: International and further U.S. evidence., forthcoming *Journal of Financial Economics*.

minus-low book-to-market factor are often insignificant and often have the wrong sign predicted by Drs. Fama and French (1993).[34]

Drs. He and Kryzanowski (2006) find that the significant beta-return relation that is observed when the unconditional beta is used for Canada is well explained by the inverse beta-return relation that is expected when the realized market returns are below the zero-beta rate.[35] In particular, while the estimated risk premiums are significant with their expected signs for up- and down-market betas, the estimated risk premium during down-markets dominates the risk premium during up-markets in both magnitude and significance. They also identify significant size and liquidity premiums, although the latter is small in magnitude and the former becomes insignificant when the volatility of liquidity premiums is included in the model. Similarly, the estimate of the intercept in their model captures the risk-free rate, the mean liquidity premium for the market and any mismatch between expected and realized returns for the estimation period(s) examined.

5.A2 ADJUSTMENT FOR THE EARLY EMPIRICAL EVIDENCE OF A FLATTER-THAN-EXPECTED SML

In this section of this appendix, we discuss the type of adjustment that should be made if, for the sake of argument, one accepted the argument that there should be an adjustment for the early empirical evidence of a flatter-than-expected SML.

Suppose that one was to make an adjustment to account for the empirical evidence for the traditional (static or unconditiional) CAPM. Then the slope of the estimated security market line or SML of the traditional CAPM (i.e., MERP) needs to be reduced to account for its "flatter-than-expected" value. In other words, it is the slope of the SML and not the betas of the individual assets or portfolios that need to be adjusted.

[34] E. F. Fama and K.R. French, 1993, Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics* 33, pages 3-56.
[35]Z. He and L. Kryzanowski, 2006, The cross section of expected returns and amortized spreads, *Review of Pacific Basin Financial Markets and Policies (RPBFMP)* 9: 4, pages 597-638.

We arrive at this recommended adjustment by using first principles, and by adding what we learn from an examination of the more recent evidence on the relationship between the MERP that was realized over past periods and what the MERP expectations of investors were estimated to be. We now detail our argument on this point.

First, one of the major assumptions made when testing the CAPM using realized returns is that realized returns are an unbiased estimate of expected returns. In other words, what happened was what investors expected, at least on average. Based on the assumption that realized returns are unbiased estimates of expected returns, the early empirical evidence is interpreted as showing that the estimated CAPM relationship has an estimated intercept that is higher than expected and has an estimated slope that is lower (or flatter) than expected. These tests generally consist of regressions of the realized returns or realized excess returns on portfolios formed to maximize the spread across portfolios in their betas. The interpretation that the estimated intercept is higher than expected is based on a comparison of the estimate against the average T-Bill *yield* over the period. The interpretation that the estimated slope is lower (flatter) than expected is based on a comparison of the estimate against the average realized MERP over the period.

Second, the more recent evidence indicates that realized returns are not unbiased estimates of expected returns, even over very long periods of time. In other words, what happened is not what investors expected, even over very long periods of time. As we discussed in Section 3 of our evidence, the more recent literature concludes that the realized MERP that investors earned exceeded the MERP that investors expected to earn. This is based on the finding that equity investors earned more than what they expected, and bond investors earned less than what they expected.

Third, it then follows that combining the literature referenced in our first and second points leads to the following conclusions:

- The finding that the estimated slope of the CAPM is flatter than expected is what one would expect given that the realized MERP exceeded the expected MERP over the period. This is prior to making any adjustment for the fact that these tests generally use T-Bills and not long Governments as a proxy for the risk-free rate.

- The finding that the estimated intercept of the CAPM is higher than expected is also expected given that using lower MERPs for all the portfolios would shift the SML downwards if we assume that the true expected risk-free rate remains constant, and would result in a lower estimated intercept for the SML. Again, this is prior to making any adjustment for the fact that these tests generally use T-Bills and not long Governments as a proxy for the risk-free rate.

This discussion has a two-fold implication for the determination of the ROE using the MERP method. First, the expected yield on the long Canada should be used since we have no evidence that it is not an unbiased expectation of the future one-period return for the true risk-free rate. Second, the realized mean MERP needs to be revised or adjusted downwards since the upward bias in mean realized equity returns exceeds the downward bias in mean realized bond returns when each is used as a proxy of investor expectations.

Schedule 2.1

Business Risk Rating – Electric Utility Sectors

Risk	Transmission (TFO)	Distribution (DISCO)
Market	**Low**	**Low-moderate**
Competition/ demand	Low	Low-moderate
Credit	Low	Low-moderate
Supply	Low	Low
Operational	**Low-moderate**	**Low-moderate**
Operating Leverage	Low	Moderate
Technology	Low	Low
Asset retirement/construction	Moderate	Low-moderate
Regulatory	**Low**	**Low**
Primary regulation	Low	Low
Deferral accounts	Low	Low
Environmental/safety	Low	Low
Overall	**Low**	**Low-moderate**

Schedule 2.2

Applicant Electric Utilities Business Risk Rating

Applicant	AltaLink	ATCO Electric		ENMAX		EPCOR		FortisAlberta
Sector(s)	TFO	TFO	DISCO	TFO	DISCO	TFO	DISCO	DISCO
Risk								
Market	**L**	**L**	**L-M**	**L**	**L-M**	**L**	**L-M**	**L-M**
Competition/demand	L	L	L-M	L	L-M	L	L-M	L-M
Credit	L	L	L-M	L	L-M	L	L-M	L-M
Supply	L	L	L	L	L	L	L	L
Operational	**L-M**	**L-M**	**L-M**	**L**	**L-M**	**L**	**L**	**L**
Operating Leverage	L	L	M	L	M	L	M	M
Technology	L	L	L	L	L	L	L	L
Asset retirement/construction	M	M	L-M	L-M	L-M	L-M	L-M	L-M
Regulatory	**L**	**L**	**L**	**L**	**L**	**L**	**L**	**L**
Primary regulation	L	L	L	L	L	L	L	L
Deferral accounts	L	L	L	L	L	L	L	L
Environmental/safety	L	L	L	L	L	L	L	L
Overall	**L**	**L**	**L-M**	**L**	**L-M**	**L**	**L-M**	**L-M**

Schedule 2.3

Gas Utilities Sector Business Risk Rating

Risk	Transmission	Distribution
Market	**Moderate**	**Low-moderate**
Competition	Moderate	Low-moderate
Credit	Low	Low-moderate
Supply	Moderate	Low
Operational	**Low-moderate**	**Low-moderate**
Operating Leverage	Low-moderate	Low-moderate
Technology	Low	Low
Asset retirement/construction	Low-moderate	Low-moderate
Regulatory	**Low**	**Low**
Primary regulation	Low	Low
Deferral accounts	Low	Low
Environmental/safety	Low	Low
Overall	**Low-moderate**	**Low-moderate**

Schedule 2.4

Applicant Gas Utilities Sector Business Risk Rating

Applicant	NGTL	ATCO Pipelines	ATCO Gas	AltaGas
Sector	Transmission	Transmission	Distribution	Distribution
Risk		Status Quo		
Market	**M**	**M-H**	**L-M**	**L-M**
Competition	M-H	H	L-M	L
Credit	L	L	L-M	L-M
Supply	M	M	L	L
Operational	**L-M**	**L-M**	**L-M**	**M-H**
Operating Leverage	L-M	L-M	L-M	M-H
Technology	L	L	L	L
Asset retirement/construction	L-M	L-M	L-M	L-M
Regulatory	**L**	**L**	**L**	**L**
Primary regulation	L	L	L	L
Deferral accounts	L	L	L	L
Environmental/safety	L	L	L	L
Overall	**L-M**	**M**	**L-M**	**M**

Drs. Kryzanowski and Roberts, AUC-1578571/Proceeding No. 85.

Schedule 2.5
Senior Unsecured Debt Ratings for the Sample of Canadian Utilities

Corporate Issuer	DBRS		Standard & Poor's	Moody's
	Rating	Debt Rated	Rating	Rating
Atco Ltd.	A (low)	Corporate	A	N/A
Canadian Utilities	A	Corporate	A	N/A
Emera Incorporated Nova Scotia Power	BBB (high) A (low)	MTN MTN & Unsecd. debentures	BBB+ BBB+	Baa2 Baa1
Enbridge Gas Distribution Inc. / Enbridge Inc.	A	MTN and Unsecured Debentures	A-	Baa1
Fortis Inc. Fortis Alberta Fortis BC Newfoundland Power Maritime Electric	BBB (high) BBB(high) A	Unsecured Debentures 1st Mortgage Bonds Corporate	A- BBB+ -- A BBB+	N/A Baa1 Baa3 Baa1 N/A
Pacific Northern Gas	BBB (low)	Secured Debentures	--	--
TransAlta Corp.	BBB	MTN and Unsecured Debentures	BBB	Baa2
TransCanada Pipelines	A	Unsecured Debentures & Notes	A-	A3
Median	**A (low)**		**A-**	**Baa1**

Sources: Dominion Bond Rating Service website: www.dbrs.com, Standard & Poor's website: www.standardandpoors.com, company websites, AltaLink Response to Information Request ASBG-PGA.AML-005.

Schedule 2.6
Capital Structure for Utilities 2005-2007 (percentage of long-term capital).

	Long term debt and debentures			Preferred Shares			Common Equity		
	2005	2006	2007	2005	2006	2007	2005	2006	2007
ATCO LTD.	67.51%	66.97%	65.23%	3.29%	3.13%	3.03%	29.19%	29.90%	31.75%
CANADIAN UTILITIES LTD.	50.20%	50.64%	49.47%	11.04%	10.61%	10.04%	38.57%	38.75%	40.49%
EMERA INC.	50.00%	49.84%	49.70%	8.00%	7.82%	8.07%	42.03%	42.34%	42.23%
ENBRIDGE INC.	58.83%	64.64%	62.98%	1.17%	0.93%	0.85%	40.00%	34.43%	36.17%
FORTIS INC.	58.09%	59.82%	60.31%	8.72%	7.48%	4.17%	33.16%	32.69%	35.52%
PACIFIC NORTHERN GAS LTD.	48.07%	46.16%	45.78%	3.14%	3.18%	3.14%	48.79%	50.67%	51.07%
TRANSALTA CORP.	41.09%	43.09%	42.59%	3.81%	3.83%	0.00%	55.10%	53.08%	57.41%
TRANS CANADA PIPELINES LTD.	55.93%	59.34%	59.25%	2.26%	2.65%	0.00%	41.81%	38.01%	40.75%
Average	**53.72%**	**55.06%**	**54.41%**	**5.18%**	**4.95%**	**3.66%**	**41.08%**	**39.98%**	**41.92%**

Source: Annual reports

Schedule 2.7
Coverage ratios, earned ROEs for selected utilities 2005-2007

Utility	Interest Coverage			Cash Flow to Debt			ROE		
	2005	**2006**	**2007**	**2005**	**2006**	**2007**	**2005**	**2006**	**2007**
ATCO LTD.	3.13	3.36	3.31	24.82	21.33	23.71	11.57	14.98	16.69
CANADIAN UTILITIES LIMITED	3.24	3.32	3.25	25.30	19.95	22.46	12.24	14.24	15.96
EMERA INCORPORATED	2.46	2.85	2.91	8.71	19.28	16.85	9.03	9.07	10.93
ENBRIDGE INC.	2.41	2.35	2.37	9.57	12.87	13.19	13.90	14.26	14.53
FORTIS INC.	2.24	2.04	1.70	11.97	8.60	6.37	12.39	11.83	9.99
PACIFIC NORTHERN GAS LIMITED	2.46	2.06	2.10	12.89	21.53	(3.12)	8.34	5.86	5.00
TRANSALTA CORPORATION	2.24	0.84	3.17	22.18	17.75	33.75	7.45	1.81	13.07
TRANS CANADA CORPORATION	3.03	2.58	2.60	15.21	15.05	18.62	17.56	14.10	13.99
Average	**2.65**	**2.43**	**2.68**	**16.33**	**17.05**	**21.43**	**11.56**	**10.77**	**12.52**

Source: Financial Post Advisor.

Schedule 2.8
Actual and Approved Interest Coverage Ratios for Applicant Utilities, 2001-2007
This schedule calculates interest coverage ratios from data supplied in response to Minimum Filing Requirement 2(a), Summary Historical Financial Information. Approved interest coverage is approved EBIT divided by approved interest. Actual interest coverage is actual EBIT divided by actual interest.

Panel A: Approved Interest Coverage Ratios

Company	2001	2002	2003	2004	2005	2006	2007	Average
Electricity Transmission								
ATCO	---	---	2.23	2.18	2.21	2.16	1.96	**2.15**
EPCOR	1.57	1.58	1.55	1.67	1.69	1.67	1.72	**1.64**
AltaLink	---	---	---	---	---	---	---	---
ENMAX	---	---	---	---	---	---	---	---
Electricity Distribution								
ATCO	---	---	2.35	2.37	2.37	2.33	1.99	**2.28**
EPCOR	---	---	---	1.81	1.85	1.84	1.85	**1.84**
FortisAlberta	---	---	---	---	---	---	---	---
ENMAX	---	---	---	---	---	---	---	---
Gas Transmission								
ATCO	---	---	2.46	2.86	---	---	---	**2.66**
NGTL	---	---	---	---	---	---	---	---
Gas Distribution								
ATCO	---	---	2.62	2.53	2.53	2.45	2.39	**2.51**
ALTAGAS (Dist & Trans)	2.17	2.30	2.39	2.38	2.56	2.57	2.29	**2.38**
Average for all companies for year	**1.87**	**1.94**	**2.27**	**2.26**	**2.20**	**2.17**	**2.03**	**2.16**

Schedule 2.8 Continued

Panel B: Actual Interest Coverage Ratios

Company	2001	2002	2003	2004	2005	2006	2007	Average
Electricity Transmission								
ATCO	2.57	2.64	2.42	2.36	2.24	2.15	1.99	**2.34**
EPCOR	1.53	1.75	1.47	1.58	1.26	2.49	2.09	**1.74**
AltaLink	---	2.48	2.27	2.46	2.45	2.32	2.13	**2.35**
ENMAX	2.20	2.06	1.69	1.71	2.16	2.10	1.69	**1.94**
Electricity Distribution								
ATCO	3.00	3.29	3.18	2.74	2.31	2.27	2.36	**2.74**
EPCOR	---	---	---	2.35	1.98	1.89	1.93	**2.04**
FortisAlberta	2.94	2.86	2.73	2.57	2.46	2.06	1.89	**2.50**
ENMAX	3.79	3.12	3.08	1.78	1.72	1.84	1.63	**2.42**
Gas Transmission								
ATCO	---	---	2.59	3.27	---	---	---	**2.93**
NGTL	2.23	2.34	2.41	2.18	2.28	2.14	2.15	**2.25**
Gas Distribution								
ATCO	---	---	2.74	1.97	1.93	2.10	2.30	**2.21**
ALTAGAS (Dist & Trans)	2.24	2.63	3.19	2.37	2.15	2.05	1.93	**2.37**
Average for year	**2.56**	**2.58**	**2.52**	**2.28**	**2.09**	**2.13**	**2.01**	**2.29**

Schedule 2.9

Allowed vs. Actual Rates of Return on Equity for 2007

Utility	Allowed Return (%)	Actual ROE (%) Consolidated Company	Actual ROE (%) Regulated Entity
ATCO LTD.		16.69	
ATCO ELECTRIC TRANSMISSION	8.51		8.51
ATCO ELECTRIC DISTRIBUTION	8.51		10.27
ATCO GAS	8.51		10.83
ATCO PIPELINES	8.51		8.25
CANADIAN UTILITIES LIMITED			
EMERA (NOVA SCOTIA POWER)	9.55	10.93	
ENBRIDGE GAS DISTRIBUTION	8.39	14.53	
FORTIS INC.		9.99	
ALBERTA	8.51		8.79
BRITISH COLUMBIA	8.77		
MARITIME ELECTRIC	10.25		
NEWFOUNDLAND POWER	8.60		
PACIFIC NORTHERN GAS LIMITED	9.02	5.00	
TRANSALTA CORPORATION	8.51	13.07	
TRANS CANADA PIPELINES LTD.	9.46	13.99	
Average	**8.85**	**12.03**	**9.33**

Sources: Board decisions; Opinion on capital structure and fair return on equity, Prepared for Ontario Power Generation, Kathleen M. McShane, EB-2007-0905, Exhibit C2, Tab 1, Schedule 1, Schedule 30; company evidence in GCOC, Requirement 2a.

Schedule 2.10
Average Actual and Approved Return on Equity for Applicant Utilities, 2001-2007
(in percent)

This table displays average actual and approved returns on equity for applicant utilities. Data are from filed evidence. Binomial counting test supports hypothesis that actual is equal to or above approved ROE at 98% confidence level. I.e., assuming a 50-50 chance of the actual being either above or below approved, observed outcome of 2 of 12 below would occur randomly less than 2 times out of 100.

Company	Actual	Approved	Actual Greater / = Approved
Electricity Transmission			
ATCO	9.36	9.15	Yes
EPCOR	9.07	9.19	Yes
AltaLink	9.47	9.22	Yes
ENMAX	15.08	9.49	Yes
Electricity Distribution			
ATCO	10.77	9.14	Yes
EPCOR	10.25	9.13	Yes
FortisAlberta	9.33	9.61	No
ENMAX	15.89	9.51	Yes
Gas Transmission			
ATCO	9.91	9.50	Yes
NGTL	11.25	9.14	Yes
Gas Distribution			
ATCO	9.19	9.19	Yes
NGTL	9.62	9.35	Yes
Average	**10.77**	**9.30**	**10 Yes, 2 No**

Schedule 2.11
Profitability and Business Risk for Canadian Large Capitalization Companies vs. Utilities

This schedule examines before-tax profitability as measured by EBIT / Assets and its variability for the S&P / TSX-60 with financials excluded (Sample 1 in this table) vs. different utility samples. The ratios are calculated from Financial Post Advisor (www.fpinfomart.com) for the years 2001-7. Utility sample 2A includes the holding companies of the utility companies that submitted evidence Altagas Utility Group, Canadian Utilities, EPCOR Utilities, Fortis Inc. and TransCanada (NGTL). Utility sample 2B includes the 3 utility holding companies that are in the TSX 60 index. This includes only Enbridge, TransAlta and TransCanada. Utility sample 2C includes the 7 publicly traded utility holding companies in Schedule 2.1. One-tailed F-tests reveal that the standard deviation of the S&P/TSX 60 (no financials) is greater than the respective standard deviations of each of the utility samples at the 99% confidence level.

Sample	Mean (%)	Standard Deviation (%)	# Companies	# Observations
1. S&P /TSX-60 (no financials)	8.93	10.31	52	355
Utility Samples				
2A. Holding companies in hearing	8.90	2.99	5	31
2B. Holding companies in S&P/TSX-60	8.11	2.69	3	21
2C. Holding companies in hearing + Enbridge and TransAlta	8.10	2.88	7	45

Schedule 2.12

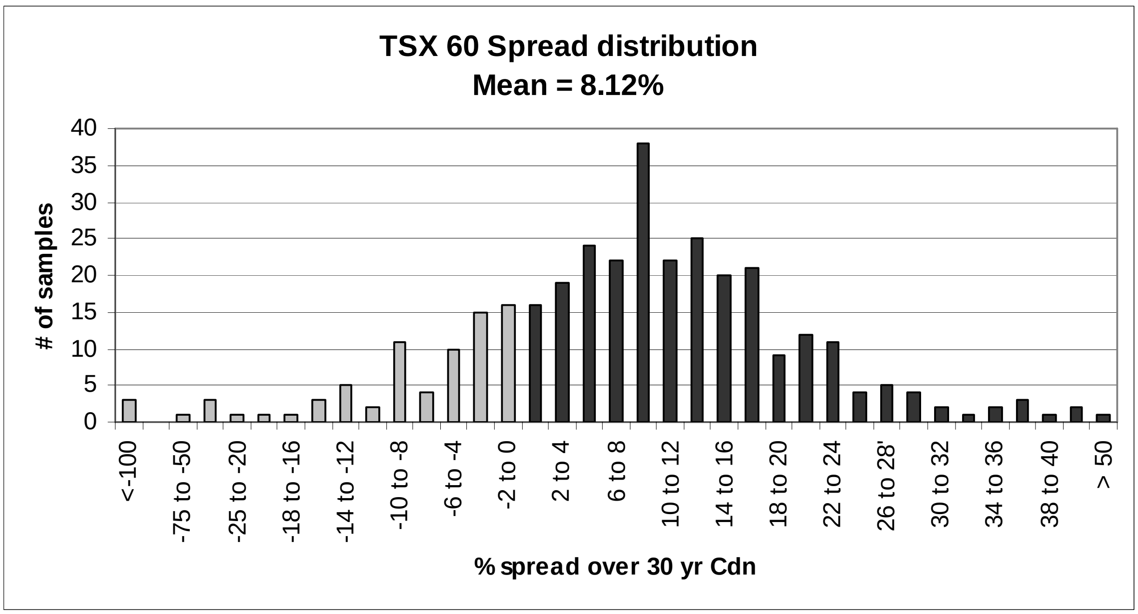
Return on Equity for Canadian Large Capitalization Companies vs. Utilities

This schedule examines return on equity and its variability for the S&P / TSX-60 with financials excluded (Sample 1 in this table) vs. different utility samples. The ratios are calculated from Financial Post Advisor (www.fpinfomart.com) for the years 2001-7. 30-year Canada rates are from the Bank of Canada website. Utility sample 2A includes the holding companies of the utility companies that submitted evidence: Altagas Utility Group, Canadian Utilities, EPCOR Utilities, Fortis Inc. and TransCanada (NGTL). Utility sample 2B includes the 3 utility holding companies that are in the TSX 60 index. This includes only Enbridge, TransAlta and TransCanada. Utility sample 2C includes the 7 publicly traded utility holding companies in Schedule 2.1. One-tailed F-tests reveal that the standard deviation of the S&P/TSX 60 (no financials) is greater than the respective standard deviations of each of the utility samples at the 99% confidence level. Mean ROE on S&P/TSX is not significantly different from riskless 30-year Canada yield. All utility samples' mean ROEs are significantly larger than riskless 30-year Canada mean at 90% confidence level based on student's t-test.

Sample	Mean (%)	Standard Deviation (%)	# Companies	# Observations
1. S&P /TSX-60 (no financials)	12.89	33.05	52	355
Utility Samples				
2A. Holding companies in hearing	10.38	3.19	5	31
2B. Holding companies in S&P/TSX-60	11.90	3.91	3	21
2C. Holding companies in hearing + Enbridge and TransAlta	10.63	3.55	7	45
3. 30-year Government of Canada yield	4.79	N/A	N/A	7

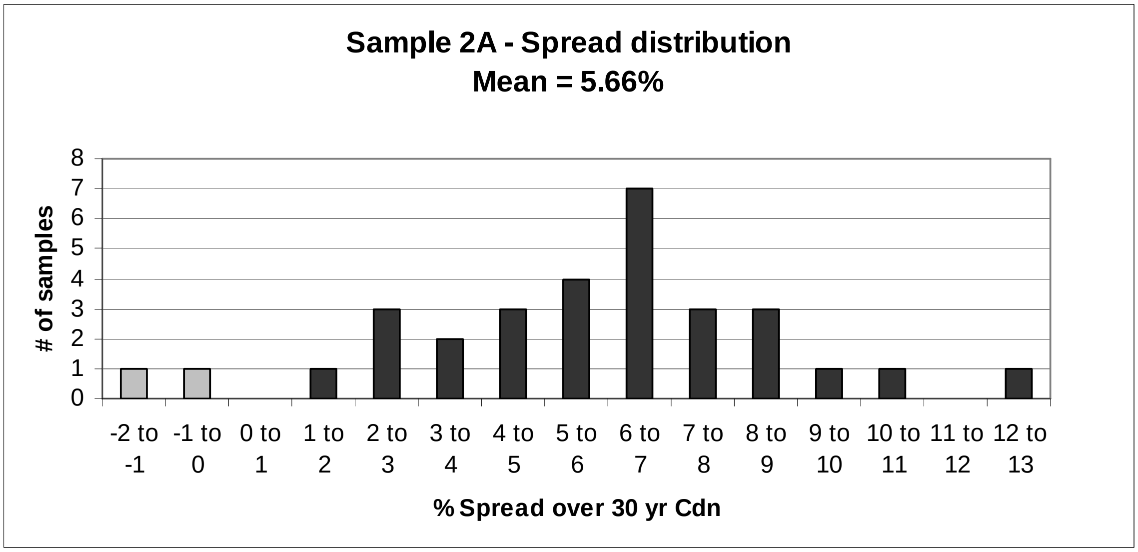
Schedule 2.13
Returns on Equity in Excess of Long-Canada Rates for Canadian Large Capitalization Companies vs. Utilities

This schedule plots returns on equity in excess of the long Canada rate at the end of the year for the S&P / TSX-60 with financials excluded (Sample 1 in this schedule) vs. different utility samples. The ratios are calculated from Financial Post Advisor (www.fpinfomart.com) for the years 2001-7. 30-year Canada rates are from the Bank of Canada website. Utility sample 2A includes the holding companies of the utility companies that submitted evidence: Altagas Utility Group, Canadian Utilities, EPCOR Utilities, Fortis Inc. and TransCanada (NGTL). Utility sample 2B includes the 3 utility holding companies that are in the TSX 60 index. This includes only Enbridge, TransAlta and TransCanada. Utility sample 2C includes the 7 publicly traded utility holding companies in Schedule 2.1.



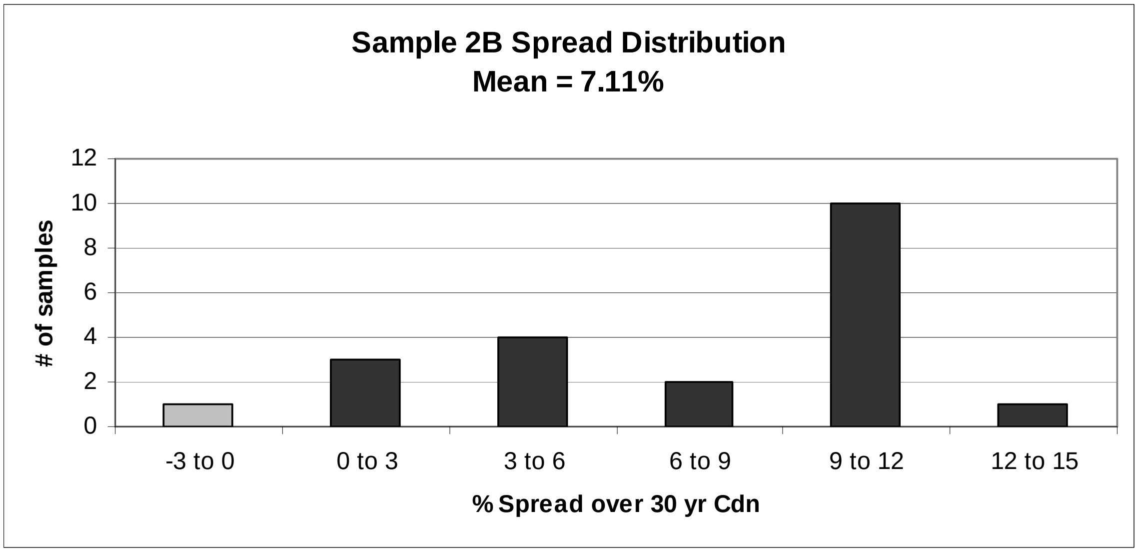
Schedule 2.13 Continued

Returns on equity in excess of long-Canada rates for sample 2A of Canadian utilities



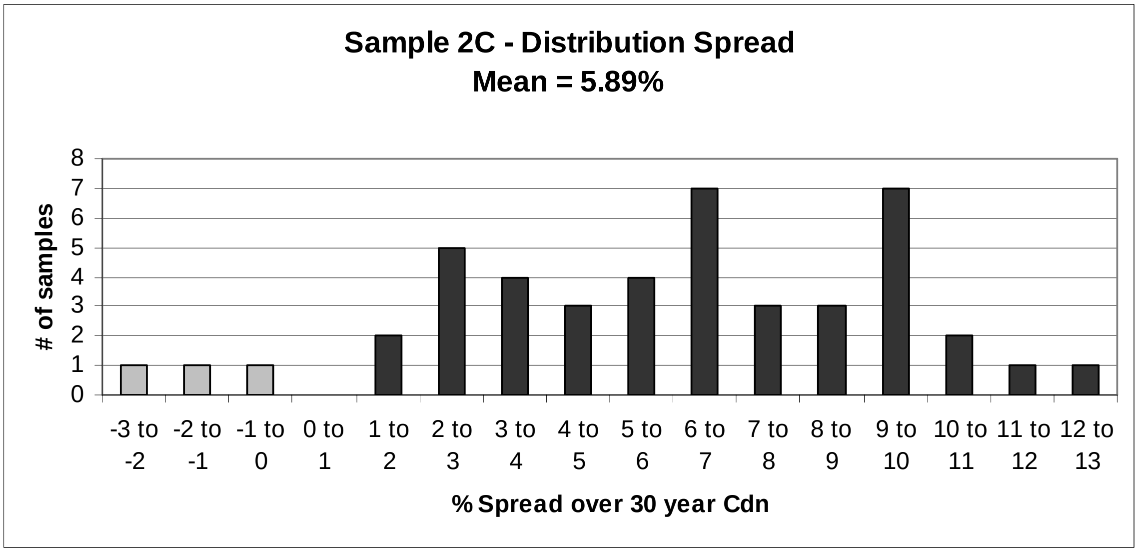
Schedule 2.13 Continued

Returns on equity in excess of long-Canada rates for sample 2B of Canadian utilities



Schedule 2.13 Continued

Returns on equity in excess of long-Canada rates for sample 2C of Canadian utilities



Schedule 2.14

Allowed Common Equity Ratios

Utility	Allowed	Decision
ATCO LTD.		
ATCO ELECTRIC		
TRANSMISSION	33.00	EUB 2004-052,
DISTRIBUTION	37.00	U2005-410
ATCO GAS	38.00	
ATCO PIPELINES	43.00	
CANADIAN UTILITIES LIMITED		
ENBRIDGE GAS DISTRIBUTION	36.00	EB-2006-0034
EMERA (NOVA SCOTIA POWER)	40.00	2007-NSUARB-8
FORTIS INC.		
ALBERTA	37.00	EUB 2004-052
BRITISH COLUMBIA	40.00	G-14-06
MARITIME ELECTRIC	42.70	UE 20934
NEWFOUNDLAND POWER	44.50	PU40 (2006)
PACIFIC NORTHERN GAS LIMITED	40.00	G-14-06
TRANSALTA CORPORATION	45.00	U99099
TRANS CANADA PIPELINES LTD.	36.00	RH-2-2004
Average	**39.40**	
Average without TransAlta	**38.93**	

Source: Board decisions.

Schedule 2.15
Electric Utilities Business Risk Rating and Capital Structures

	AltaLink TFO	ATCO TFO	ATCO DISCO	ENMAX TFO	ENMAX DISCO	EPCOR TFO	EPCOR DISCO	FORTIS ALBERTA
Business Risk	L	L	L-M	L	L-M	L	L-M	L-M
Deemed Equity – Decision 2004-052 (%)	35	33	37	N/A	39	35	39	37
Updated by AUC Since 2004	33							
Drs. Kryzanowski and Roberts:								
2004-052	30	30	35	N/A	35	30	35	35
2009	33	33	35	30	35	30	35	35

Schedule 2.16

Gas Utilities Business Risk Rating and Capital Structures

	NGTL TRANSCO	ATCO PIPELINES Status quo	ATCO PIPELINES Agreement in place	ATCO GAS DISCO	ALTAGAS DISCO Status quo	ALTAGAS DISCO Weather deferral account
Business Risk	L-M	M	L-M	L-M	M	L-M
Deemed Equity – Decision 2004-052 (%)	35	43	43	38	41	41
Drs. Kryzanowski and Roberts:						
2004-052	32	40	40	37	40	40
2009	34	42	34	34	40	37

Schedule 2.17
Projected Pre-Tax Interest Coverage Ratios
This schedule displays calculations for pre-tax interest coverage ratios for 2009 the range of projected capital structures from a low of 30% allowed equity to a high of 40%. Cost of equity is 7.90% as recommended by Drs. Kryzanowski and Roberts. Cost of debt is from AltaLink GTA. Rate base figures are illustrative per $1 million as stated in (000).

Panel A: Allowed equity ratio of 30%

Capital Structure	Principal	Component (%)	Cost (%)	Cost of Capital ($)
Total Debt	700.00	70.0%	5.64%	39.48
Common Equity	300.00	30.0%	7.90%	23.70
Rate Base	1000.00	100.0%	6.318%	63.18

Interest Coverage Ratio 1.6X

Panel B: Allowed equity ratio of 35%

Capital Structure	Principal	Component (%)	Cost (%)	Cost of Capital ($)
Total Debt	650.00	70.0%	5.64%	36.66
Common Equity	350.00	30.0%	7.90%	27.65
Rate Base	1000.00	100.0%	6.318%	64.31

Interest Coverage Ratio 1.75X

Schedule 2.17 Continued

Panel C: Allowed equity ratio of 40%

Capital Structure	Principal	Component (%)	Cost (%)	Cost of Capital ($)
Total Debt	600.00	60.0%	5.64%	33.84
Common Equity	400.00	40.0%	7.90%	31.60
Rate Base	1000.00	100.0%	6.318%	65.24

Interest Coverage Ratio 1.93X

Panel D: Allowed equity ratio of 42%

Capital Structure	Principal	Component (%)	Cost (%)	Cost of Capital ($)
Total Debt	580.00	58.0%	5.64%	32.71
Common Equity	420.00	42.0%	7.90%	33.18
Rate Base	1000.00	100.0%	6.318%	65.89

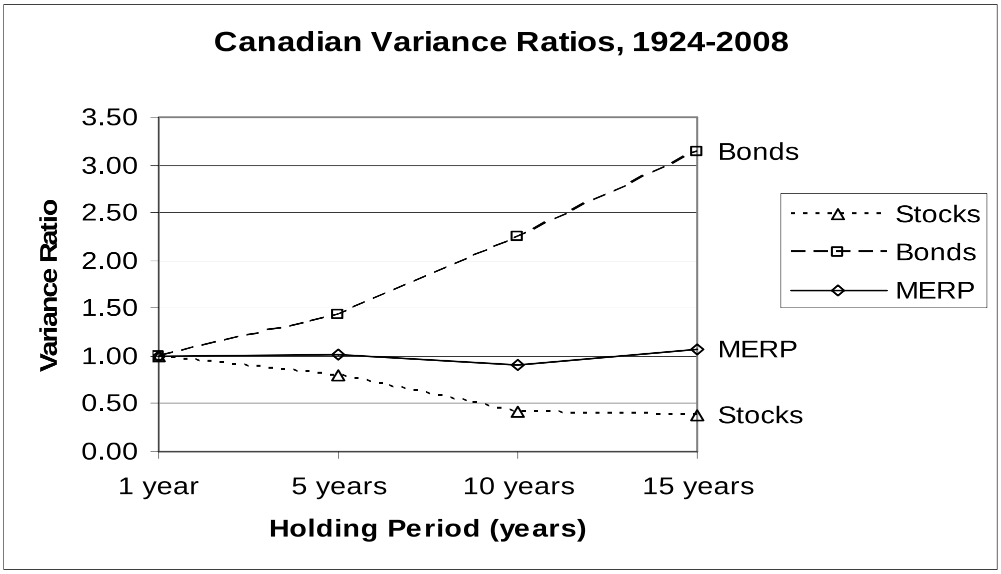
Interest Coverage Ratio 2.01X

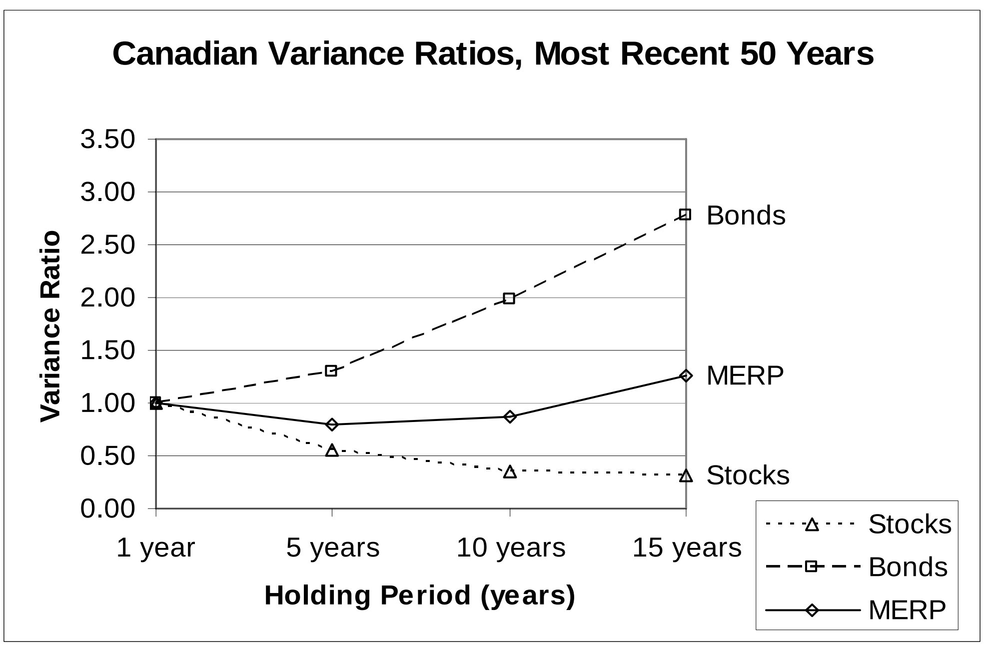
Schedule 3.1

This schedule reports the variance ratios for holding periods of 5, 10 and 15 years relative to a benchmark holding period of 1 year for stocks, long bonds and market equity risk premiums (MERPs) for Canada. The Canada data are annual from the Canadian Institute of Actuaries for the period 1924-2007, and updated using other sources for 2008. A variance ratio of one indicates no aversion or reversion of the mean of the series. Variance ratios less than one indicate mean reversion (i.e., a tendency to revert back to the mean), and variance ratios greater than one indicate mean aversion (i.e., a tendency to continue the movement away from the mean).

	1 year Holding Periods			**5 Year Holding Periods**			**10 Year Holding Periods**			**15 Year Holding Periods**		
	Stocks	**Bonds**	**MERP**	**Stocks**	**Bonds**	**MERP**	**Stocks**	**Bonds**	**MERP**	**Stocks**	**Bonds**	**MERP**
Panel A: CIA data augmented for 2008, 1924-2008 (85 years)												
Var.	0.0352	0.0076	0.0379	0.1412	0.0546	0.1928	0.1468	0.1709	0.3443	0.2008	0.3588	0.6048
Var. Ratio				0.8016	1.4323	1.0161	0.4169	2.2429	0.9074	0.3802	3.1389	1.0626
Panel B: CIA data augmented for 2008, 1959-2008 (Most recent 50 years ending with 2008)												
Var.	0.0268	0.0102	0.0312	0.0753	0.0658	0.1242	0.0935	0.2020	0.2690	0.1262	0.4259	0.5854
Var. Ratio				0.5616	1.2907	0.7959	0.3489	1.9802	0.8619	0.3138	2.7831	1.2503

Schedule 3.2
The following are plots of the variance ratios presented in Schedule 3.1. A variance ratio of one indicates no aversion or reversion to the mean of the series. Variance ratios greater than one indicate mean aversion, and variance ratios less than one indicate mean reversion. MERP is the equity risk premium at the market level.





Schedule 3.3
This table contains various estimates of the historical annual risk premiums of stocks over the risk-free rate for various time periods using nominal total returns. Stocks are proxied by the total returns on the S&P/TSX Composite index or its counterpart for more distant time periods. The risk-free rate is proxied by the total returns on long-term Canada's or its counterpart for more distant time periods. The weighted risk premium is found by taking 75% of the arithmetic mean risk premium plus 25% of the geometric mean risk premium. Primary sources include Canadian Institute of Actuaries (CIA), *Report on Canadian Economic Statistics*, *1924-2007* for data through 2007; and the Dimson database for data through 2002.

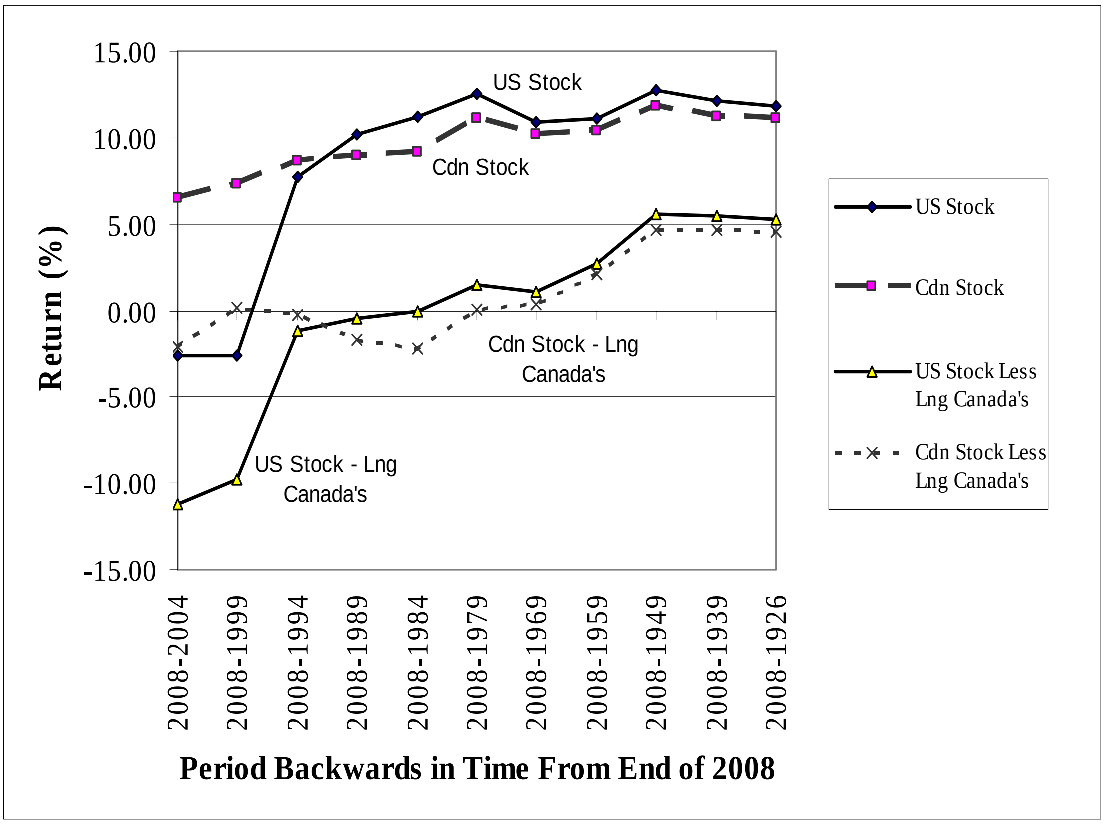
	Arithmetic Mean			**Geometric mean**			
Time Period	**Stock Returns**	**Long Canada Returns**	**Risk Premium**	**Stock Returns**	**Long Canada Returns**	**Risk Premium**	**Weighted Risk Premium**
Panel A: Based on updated Dimson *et al.* nominal return data							
1900-2008 (108 yrs), N			5.33%			3.73%	4.93%
Panel B: Based on updated CIA nominal return data							
1926-2008 (83 yrs)	11.11%	6.55%	4.90%	9.42%	6.20%	3.03%	4.43%
1936-2008 (73 yrs)	11.03%	6.58%	4.88%	9.70%	6.22%	3.28%	4.48%
1951-2008 (58 yrs)	11.01%	7.38%	4.20%	9.69%	6.95%	2.56%	3.79%
1957-2008 (52 yrs)	10.25%	8.06%	2.83%	8.89%	7.62%	1.19%	2.42%
1965-2008 (44 yrs)	10.21%	8.92%	2.03%	8.89%	8.44%	0.41%	1.63%
1977-2008 (32 yrs)	11.69%	10.57%	1.95%	10.29%	10.06%	0.21%	1.52%

Schedule 3.4
This schedule reports historical returns (%) for stock and long governments and equity risk premia for the United States for the period, 1900-2008, and various subsets thereof. The weighted risk premium is found by taking 75% of the arithmetic mean risk premium plus 25% of the geometric mean risk premium.

Time Period	Arithmetic Mean Returns			Geometric Mean Returns			Weighted Risk Premium
	Stock	Long Gov't	Risk Premium	Stock	Long Gov't	Risk Premium	
Panel A: Based on updated Dimson *et al.* nominal return data							
1900-2008 (108 yrs)			5.95%			3.82%	5.41%
Panel B: Based on nominal return data from Ibbotson Associates							
1926-2008 (83 yrs)	11.67%	6.08%	5.95%	9.62%	5.69%	3.71%	5.39%
1936-2008 (73 yrs)	11.78%	6.21%	6.00%	10.14%	5.79%	4.11%	5.53%
1951-2008 (58 yrs)	12.00%	6.91%	5.73%	10.47%	6.41%	3.81%	5.25%
1957-2008 (52 yrs)	10.84%	7.69%	3.88%	9.33%	7.17%	2.02%	3.42%
1965-2008 (44 yrs)	10.48%	8.51%	2.69%	8.95%	7.94%	0.93%	2.25%
1977-2008 (32 yrs)	11.72%	10.13%	2.53%	10.23%	9.49%	0.68%	2.07%

Schedule 3.5

This figure depicts the stock returns for the U.S. market proxy in Canadian dollars and the Canadian market proxy for various periods working backwards in time from the end of 2008. It also depicts the stock market risk premium over long Canada bonds for the U.S. market proxy in Canadian dollars and the Canadian market proxy for various periods working backwards in time from the end of 2008. The stock returns for the U.S. market are based on the Ibbotson series and the returns for the stock market and long Canada's are based on the CIA data set.



Schedule 3.6

This schedule reports historical market equity risk premia or MERPs for Canada, U.K., U.S. and World for the period, 1900-2005, as reported in Elroy Dimson, Paul Marsh and Mike Staunton, Chapter 11: The worldwide equity premium: A smaller puzzle, pages 467-514. In: Rajnish Mehra (editor), *Handbook of the equity risk premium* (Amsterdam: North-Holland, 2008). "Comp." refers to the compound or geometric mean annualized rate of return; "Arith." refers to the arithmetic mean annualized rate of return. The arithmetic mean MERPs decrease to 5.3% and 5.9% for Canada and the U.S. when the three-year period, 2006-2008, is added to these values.

Index	MERP Over Bonds		Standard Deviation
	Comp.	**Arith.**	
Canada	4.15	5.67	17.95
U.K.	4.06	5.29	16.60
U.S.	4.52	6.49	20.16
World	4.04	5.15	14.96

Schedule 3.7

This schedule reports historical real returns and equity risk premia for the United States for the period, 1802-September 2001. "Comp." refers to the compound or geometric mean annual rate of return; "Arith." refers to the arithmetic mean annual rate of return; and "Weighted" refers to our equal-weighted average of the geometric and arithmetic mean annual rates of return. The data are drawn from Table 1 in Jeremy J. Siegel, Historical results I, *Equity Risk Premium Forum*, November 8, 2001, p. 31, available on the AIMR website.

	Real Return				Equity Risk Premium Over Bonds		
	Stocks		Bonds				
Period	**Comp.**	**Arith.**	**Comp.**	**Arith.**	**Comp.**	**Arith.**	**Weighted**
1802-2001	6.8%	8.4%	3.5%	3.9%	3.4%	4.5%	4.0%
1871-2001	6.8%	8.5%	2.8%	3.2%	3.9%	5.3%	4.6%
Major Subperiods							
1802-1870	7.0%	8.3%	4.8%	5.1%	2.2%	3.2%	2.7%
1871-1925	6.6%	7.9%	3.7%	3.9%	2.9%	4.0%	3.5%
1926-2001	6.9%	8.9%	2.2%	2.7%	4.7%	6.2%	5.5%
Post World War II							
1946-2001	7.0%	8.5%	1.3%	1.9%	5.7%	6.6%	6.2%
1946-1965	10.0%	11.4%	-1.2%	-1.0%	11.2%	12.3%	11.8%
1966-1981	-0.4%	1.4%	-4.2%	-3.9%	3.8%	5.2%	4.5%
1982-1999	13.6%	14.3%	8.4%	9.3%	5.2%	5.0%	5.1%
1982-2001	10.2%	11.2%	8.5%	9.4%	1.7%	1.9%	1.8%

Schedule 3.8

This schedule reports the implied market cost of equity for the S&P/TSX Composite and S&P500 index using various forecasts of future growth in dividends based on the one-stage dividend discount model or DDM. The dividend yields (Ylds) for the various indexes are obtained from Bloomberg as of the date of the *Consensus Forecasts* as per the Scenario column. The dividend yields as of November 10, 2008 are used with the predictions from the Watson Wyatt survey (Watson Wyatt, *Economic Expectations 2008*, 28th Annual Canadian Survey, p. 13) to correspond to the mid-November 2008 survey. The Watson Wyatt expectations are based on a survey of the "country's leading business economists and portfolio managers in 47 organizations, such as chartered banks, investment management firms and other corporations" in November 2008. The forecast yield for 30 year Government of Canada bonds for 2009 of 4.36 percent that was used by the NEB in setting its allowed ROE for 2009 is used in calculating the implied MERP (%).

Case	Dividend Yield (%)	Growth rate (%)			Equity Cost (%)	Implied MERP (%)	Scenario
		Real GDP	Inflation	Corporate Earnings			
Panel A: Based on the S&P/TSX Composite (Canada)							
1	3.816			4.04	8.01	3.65	*Consensus Forecasts* (20081110): mean growth rate in corporate profits over the 5-year period of 2009-2013; Dividend Yld from Bloomberg on 20081110.
2	3.816	2.95	2.05		9.01	4.65	Consensus Forecasts (20081110): mean actual GDP and inflation for the 4-year period, 2004-7; Dividend Ylds from Bloomberg on 20081110.
3	3.816	2.20	2.00		8.18	3.82	Watson Wyatt Mid-term 2010-2013 Median Forecasts (200811) for real GDP and inflation rate; Dividend Ylds from Bloomberg on 20081110.
4	3.816	3.00	3.00		10.04	5.68	Watson Wyatt Mid-term 2010-2013 90th Percentile Forecasts (200811) for real GDP and inflation rate; Dividend Ylds from Bloomberg on 20081110.
5	3.816	2.50	2.00		8.49	4.13	Watson Wyatt Long-term 2014-2023 Median Forecasts (200811) for real GDP and inflation rate; Dividend Ylds from Bloomberg on 20081110.
6	3.816	3.00	3.00		10.04	5.68	Watson Wyatt Long-term 2014-2023 90th Percentile Forecasts (200811) for real GDP and inflation rate; Dividend Ylds from Bloomberg on 20081110.

Schedule 3.8 Continued

Case	Dividend Yield (%)	Growth rate (%) Real GDP	Inflation	Corporate Earnings	Equity Cost (%)	Implied MERP (%)	Scenario
Panel B: Based on the S&P500 (U.S.)							
1	3.291			4.92	8.37	4.01	*Consensus Forecasts* (20081110): mean growth rate in corporate profits over the 5-year period of 2009-2013; Dividend Yld from Bloomberg on 20081110.
2	3.291	2.83	3.05		9.36	5.00	Consensus Forecasts (20081110): mean actual GDP and inflation for the 4-year period, 2004-7; Dividend Ylds from Bloomberg on 20081110.
3	3.291	2.00	2.00		7.42	3.06	Watson Wyatt Mid-term 2010-2013 Median Forecasts (200811) for real GDP and inflation rate; Dividend Ylds from Bloomberg on 20081110.
4	3.291	3.00	3.00		9.49	5.13	Watson Wyatt Mid-term 2010-2013 90th Percentile Forecasts (200811) for real GDP and inflation rate; Dividend Ylds from Bloomberg on 20081110.
5	3.291	2.50	2.50		8.46	4.10	Watson Wyatt Long-term 2014-2023 Median Forecasts (200811) for real GDP and inflation rate; Dividend Ylds from Bloomberg on 20081110.
6	3.291	3.00	3.50		10.00	5.64	Watson Wyatt Long-term 2014-2023 90th Percentile Forecasts (200811) for real GDP and inflation rate; Dividend Ylds from Bloomberg on 20081110.

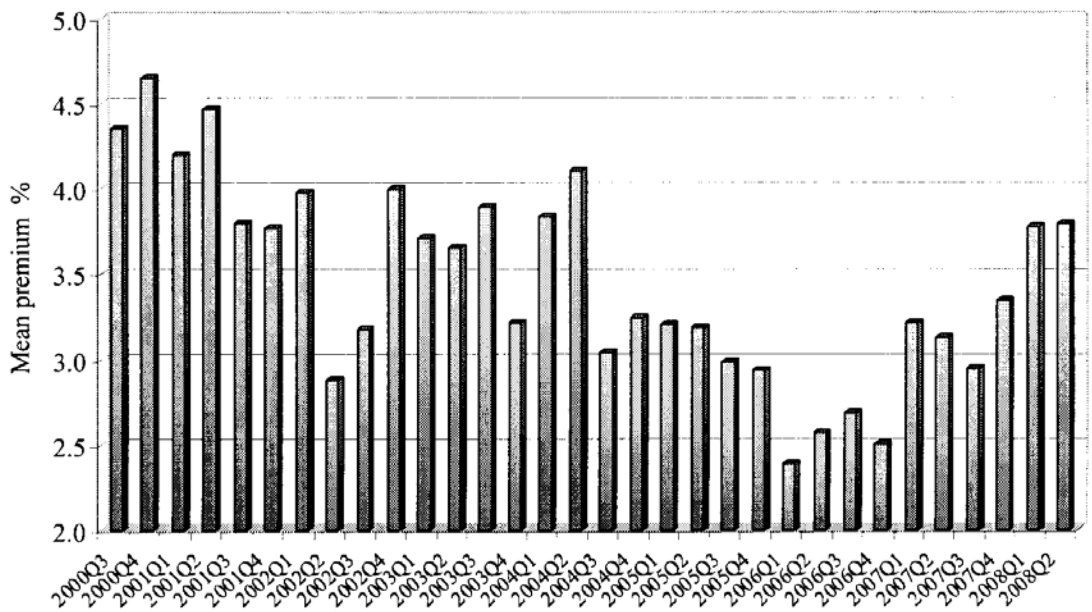
Schedule 3.9
This table summarizes the forecasts of a sample of professionals for the yields and total returns on a number of asset classes, and the MERP implied by the total returns on stock indexes and long bonds. These values are drawn from Watson Wyatt, *Economic Expectations 2009*, 28th Annual Canadian Survey, p. 14. The findings are based on a survey of the "country's leading business economists and portfolio managers in 47 organizations, such as chartered banks, investment management firms and other corporations" in November 2008.

Index	**Sample size**	**Percentiles**				
		10th	**25th**	**50th (median)**	**75th**	**90th**
Panel A: Distribution of mid-term (2010-2013) return expectations from Watson Wyatt						
30-yr Canada Bonds	19	4.00%	4.30%	4.80%	5.00%	7.50%
S&P/TSX Composite Index	29	5.00%	6.00%	7.50%	10.00%	12.00%
S&P 500 Index	27	5.00%	6.00%	7.00%	10.00%	10.00%
Implied MERP S&P/TSX		1.00%	1.70%	2.70%	5.00%	4.50%
Panel B: Distribution of long-term (2014-2023) return expectations from Watson Wyatt						
30-yr Canada Bonds	19	4.30%	4.50%	5.00%	5.30%	7.00%
S&P/TSX Composite Index	29	5.00%	7.00%	7.50%	8.00%	10.00%
S&P 500 Index	27	5.00%	7.00%	8.00%	9.00%	10.00%
Implied MERP S&P/TSX		0.70%	2.50%	2.50%	2.70%	3.00%

Schedule 3.10
The following graph is from a paper by Drs. Graham and Harvey that elicited the expectations of the equity risk premium measured over a multi-year horizon relative to a 10-year U.S. Treasury bond based on a survey of U.S. Chief Financial Officers (CFOs) that was conducted each quarter from June 2000 to March 2008. John R. Graham and Campbell R. Harvey, 2008, The equity risk premium in 2008: Evidence from the global CFO outlook survey (July 22, 2008). Available at SSRN: http://ssrn.com/abstract=1162809. A study for a period ending in 2005 was published in: John R. Graham and Campbell R. Harvey, 2005, The long-run equity risk premium, Finance Research Letters 2, 185–194.

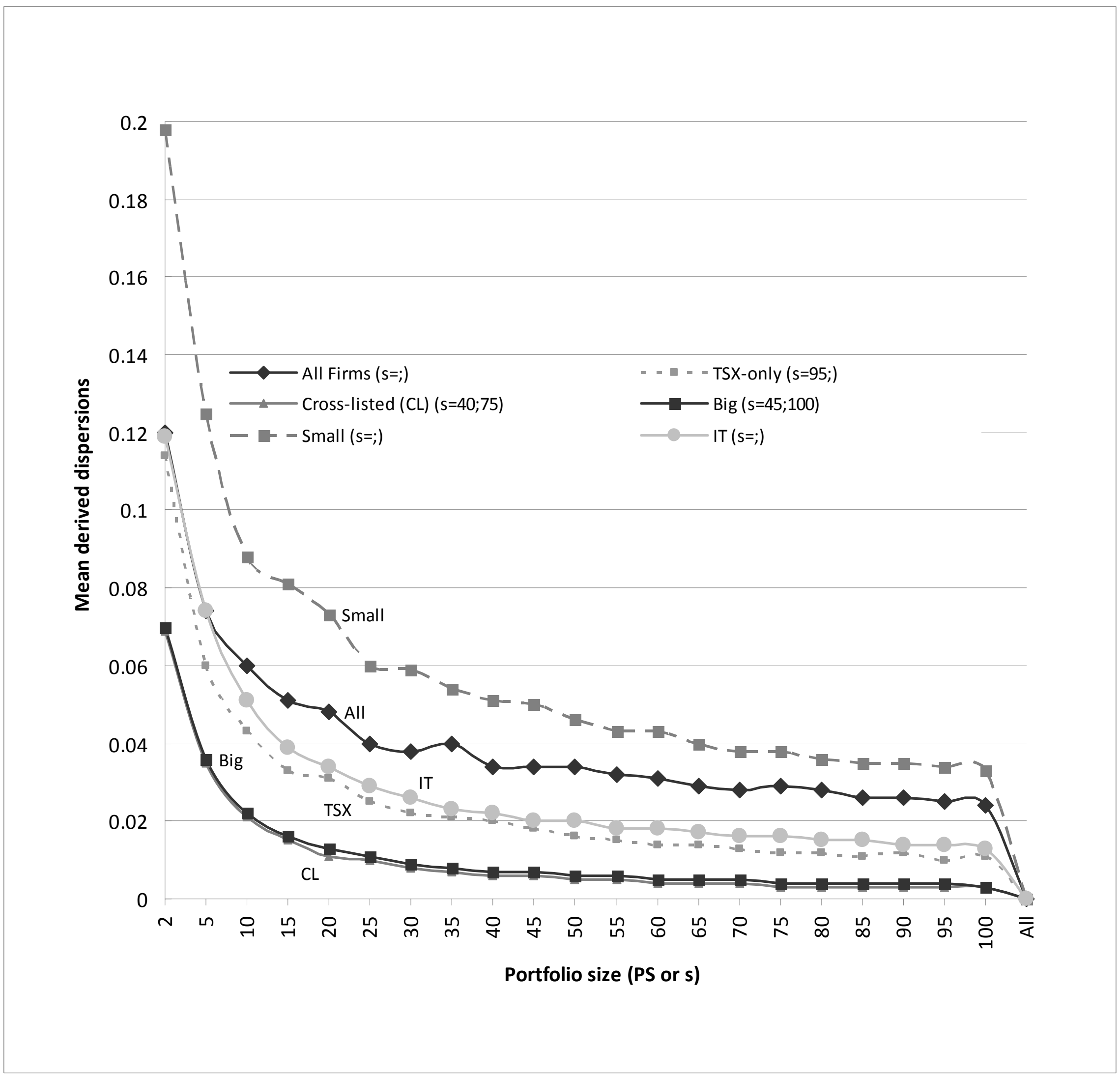
Figure 1

Ten-year forecasted S&P 500 returns over and above the ten-year bond yield



Schedule 3.11

The figure in this schedule depicts the benefits achieved in terms of the reduction of the standard deviation of monthly returns as the number of securities in a portfolio is increased for six investment opportunity sets of Canadian stocks listed on the Toronto Stock Exchange. Specifically, the figure plots the mean derived dispersions (MDDs) or excess standard deviations for 22 portfolio sizes (PSs) for six investment opportunity (IO) sets using returns for the 348 months in the period, 1975-2003. The mean excess standard deviation for a fixed portfolio size *s* and IO set *j* is given by $MDD_{j,s} = \bar{\sigma}_{j,s} - \sigma_J$, where $\bar{\sigma}_{j,s}$ is the mean of the standard deviations for the 5000 randomly selected portfolios with a portfolio size of *s* for IO set *j*, and σ_J is the standard deviation of the equal-weighted portfolio of all the stocks in IO set *j*. In the legend, (s=x,y) refers to the lowest portfolio sizes of x and y that capture at least 90% and 95%, respectively, of the reduction in MDD from moving from a *s* of 2 to a *s* of "All". A blank for either x or y indicates that s > 100. The differences in the means for a *s* of 2 and "All" are significantly different at the 0.05 level for all IO sets. Source: Lawrence Kryzanowski and Shishir Singh, Should minimum portfolio sizes be prescribed for achieving sufficiently well-diversified equity portfolios?, forthcoming *Frontiers in Finance and Economics*.



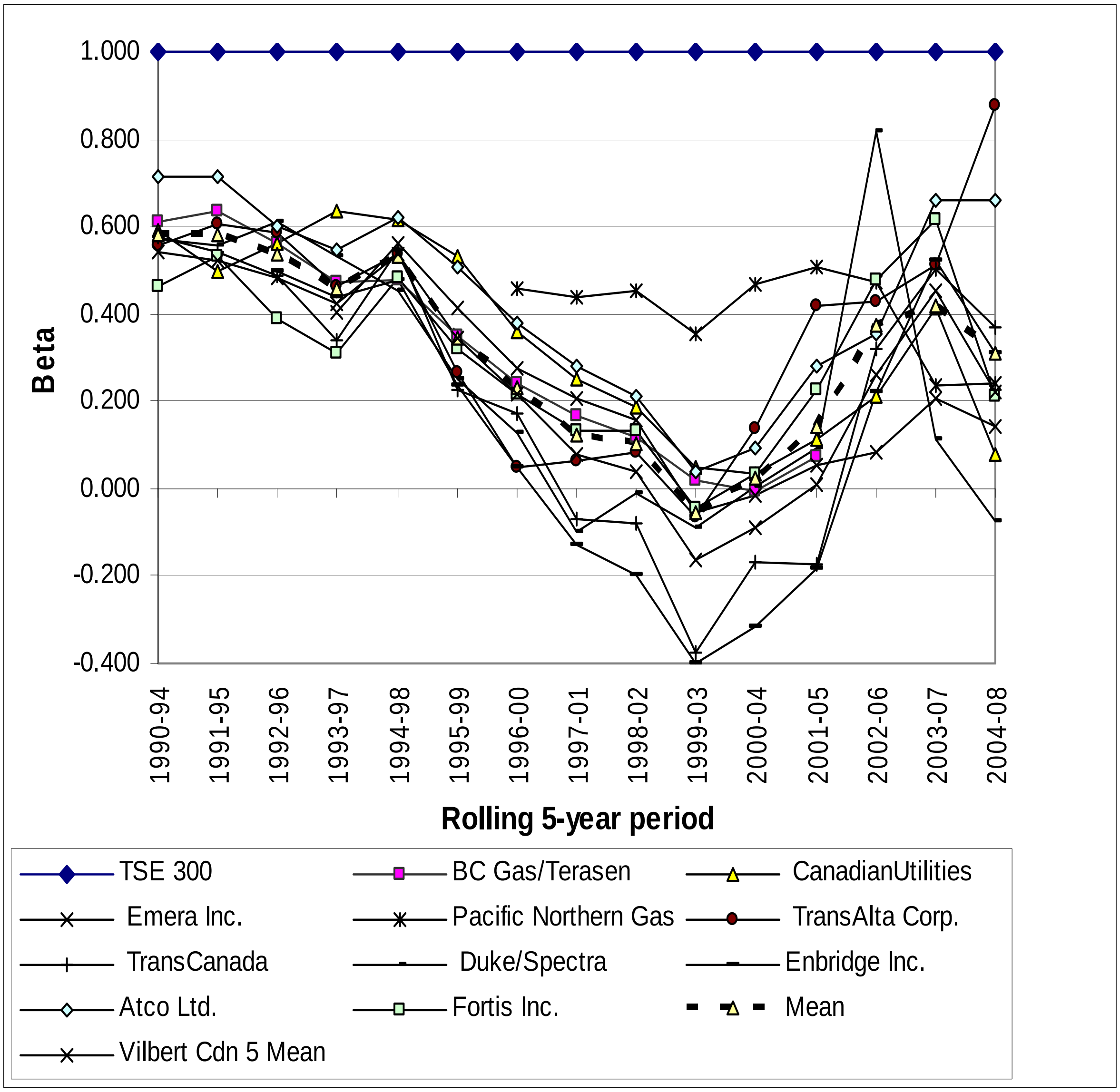
Schedule 3.12
This table provides the rolling five-year betas for our sample of ten utilities. If thin or no trading plagues any five-year period, we do not calculate a beta for that utility. This was the case for Emera, Pacific Northern Gas and Enbridge for the first three, first six and first two rolling five-year time periods, respectively. All betas are calculated using monthly total returns for the utility and the S&P/TSX Composite index. "w/o" refers to without. Although AltaGas Utility Group Inc. became a new, publicly traded corporation on November 17, 2005, it is not included because less than 3 years of market data following a one-year post-IPO period were available for beta estimation. TransAlta Corp is left in to illustrate how beta changes as a utility divests its regulated assets to concentrate on unregulated generation and product marketing.

Five-year period	Terasen[c]	Cdn Utilities	Emera[a]	Pacific Northern Gas	Trans Alta Corp.	Trans Canada Pipe	Duke[b]	En-bridge Inc.	Atco Ltd.	Fortis Inc.	Mean	Mean, w/o Duke	Mean, w/o Atco	Mean, w/o Duke & Atco	Mean, w/o Terasen & Duke	Mean, Vilbert Cdn 5 Sample
1990-94	0.608	0.592			0.558	0.574	0.571		0.715	0.462	0.583	0.585	0.561	0.559	0.580	0.543
1991-95	0.635	0.498			0.606	0.540	0.557		0.712	0.533	0.583	0.587	0.561	0.562	0.578	0.524
1992-96	0.562	0.561			0.585	0.489	0.611	0.498	0.600	0.390	0.537	0.526	0.528	0.514	0.520	0.484
1993-97	0.474	0.634	0.405		0.462	0.338	0.531	0.440	0.546	0.310	0.460	0.451	0.449	0.438	0.448	0.425
1994-98	0.479	0.616	0.564		0.536	0.544	0.453	0.478	0.623	0.484	0.531	0.540	0.519	0.529	0.549	0.537
1995-99	0.352	0.530	0.415		0.265	0.224	0.253	0.237	0.509	0.320	0.345	0.357	0.325	0.335	0.357	0.345
1996-00	0.243	0.361	0.276	0.457	0.048	0.170	0.128	0.046	0.377	0.216	0.232	0.244	0.216	0.227	0.244	0.214
1997-01	0.168	0.249	0.206	0.437	0.061	-0.068	-0.098	-0.128	0.280	0.133	0.124	0.149	0.107	0.132	0.146	0.078
1998-02	0.115	0.184	0.155	0.453	0.082	-0.079	-0.011	-0.199	0.210	0.132	0.104	0.117	0.093	0.106	0.117	0.039
1999-03	0.020	0.050	-0.053	0.354	-0.063	-0.377	-0.087	-0.398	0.039	-0.046	-0.056	-0.053	-0.067	-0.064	-0.062	-0.165
2000-04	-0.007	0.033	-0.015	0.468	0.138	-0.170	0.006	-0.318	0.092	0.031	0.026	0.028	0.018	0.020	0.032	-0.088
2001-05	0.074	0.112	0.054	0.507	0.417	-0.173	0.094	-0.182	0.282	0.227	0.141	0.146	0.126	0.129	0.156	0.007
2002-06		0.210	0.084	0.472	0.427	0.318	0.817	0.221	0.354	0.480	0.376	0.321	0.379	0.316	0.321	0.263
2003-07		0.411	0.209	0.237	0.511	0.502	0.114	0.523	0.657	0.617	0.420	0.458	0.390	0.430	0.458	0.452
2004-08		0.077	0.140	0.239	0.875	0.371	-0.074	0.310	0.659	0.210	0.312	0.360	0.269	0.318	0.360	0.222
Mean	0.310	0.341	0.203	0.403	0.367	0.214	0.258	0.117	0.444	0.300	0.315	0.321	0.298	0.303	0.320	0.259
First five rolling periods											0.539	0.538	0.524	0.520	0.535	0.503
Middle five rolling periods											0.150	0.163	0.135	0.147	0.161	0.102
Last (most recent) five rolling periods											0.255	0.263	0.236	0.243	0.265	0.171

[a]Holding company for Nova Scotia Power. [b]Holding company for Westcoast Energy. [c]Formerly B.C. Gas & bought by Kinder Morgan Inc. in November 30, 2005, and acquired by Fortis as announced on February 26, 2007. The Kinder Morgan family trades as 3 separate firms on the NYSE. Source: Various.

Schedule 3.13

This figure plots the rolling five-year betas for our sample of ten utilities whose values are presented in the preceding schedule. If thin or no trading plagues any five-year period, we do not calculate a beta for that utility. This was the case for Emera, Pacific Northern Gas and Enbridge for the first three, first six and first two rolling five-year time periods, respectively. All betas are calculated using monthly total returns for the utility and the S&P/TSX Composite index. "w/o" refers to without. Although AltaGas Utility Group Inc. became a new, publicly traded corporation on November 17, 2005, it is not included because less than 3 years of market data following a one-year post-IPO period were available for beta estimation. TransAlta Corp is left in to illustrate how beta changes as a utility divests its regulated assets to concentrate on unregulated generation and product marketing.



Schedule 3.14

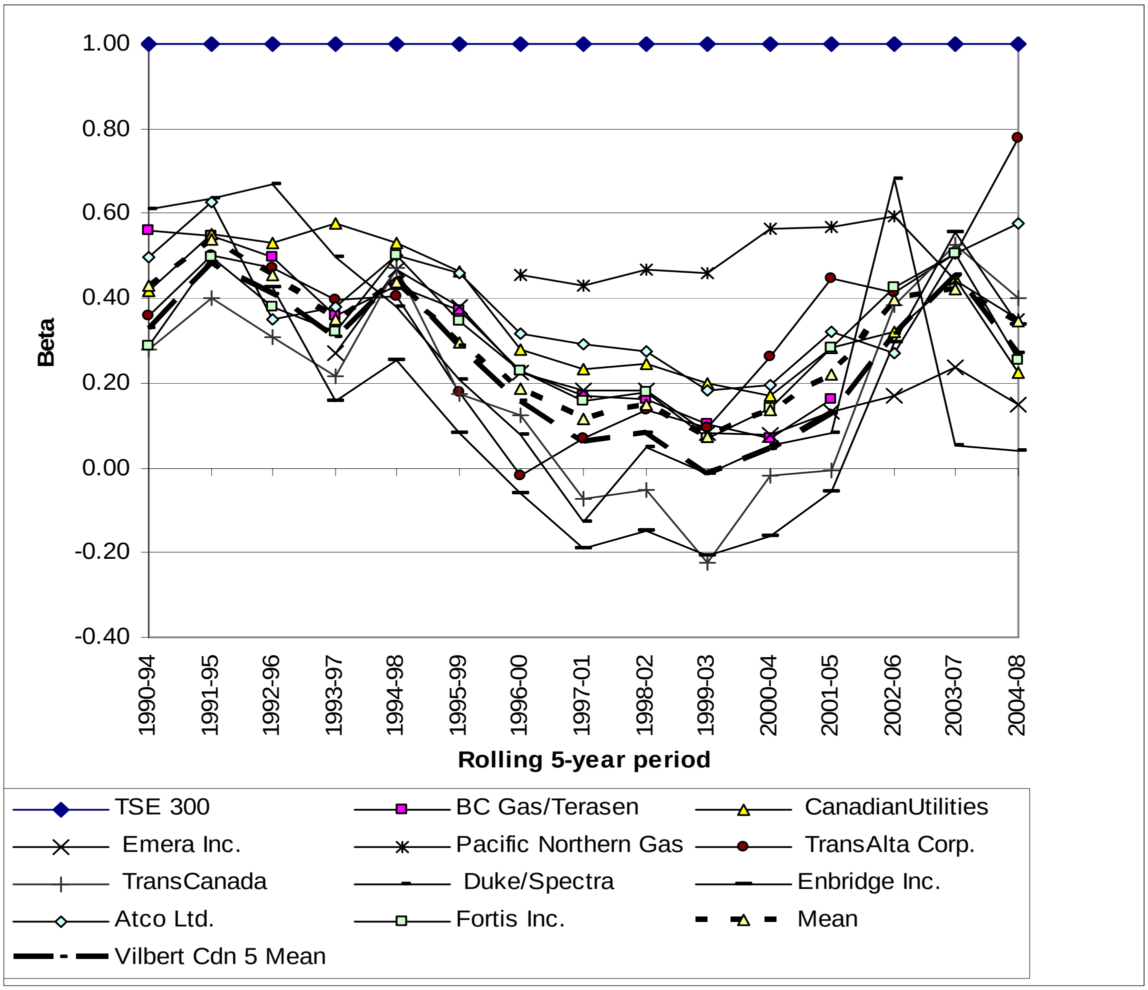
This table provides the rolling five-year betas for our sample of ten utilities. If thin or no trading plagues any five-year period, we do not calculate a beta for that utility. This was the case for Emera, Pacific Northern Gas and Enbridge for the first three, first six and first two rolling five-year time periods, respectively. All betas are calculated using monthly total excess returns (i.e., over the JP Morgan Canada Government 10+ year total return) for the utility and the S&P/TSX Composite index. "w/o" refers to without. Although AltaGas Utility Group Inc. became a new, publicly traded corporation on November 17, 2005, it is not included because less than 3 years of market data following a one-year post-IPO period were available for beta estimation. TransAlta Corp is left in to illustrate how beta changes as a utility divests its regulated assets to concentrate on unregulated generation and product marketing.

Five-year period	Terasen[c]	Cdn Utilities	Emera[a]	Pacific Northern Gas	TransAlta Corp.	Trans Canada Pipe	Duke[b]	En-bridge Inc.	Atco Ltd.	Fortis Inc.	Mean	Mean, w/o Duke	Mean, w/o Atco	Mean, w/o Duke & Atco	Mean, w/o Terasen & Duke	Mean, Vilbert Cdn 5 Sample
1990-94	0.559	0.417			0.360	0.279	0.609		0.496	0.286	0.430	0.400	0.419	0.380	0.368	0.327
1991-95	0.549	0.550			0.500	0.403	0.636		0.628	0.499	0.538	0.521	0.523	0.500	0.516	0.484
1992-96	0.498	0.530			0.472	0.308	0.669	0.425	0.351	0.381	0.454	0.424	0.469	0.436	0.411	0.411
1993-97	0.357	0.576	0.271		0.394	0.216	0.496	0.159	0.380	0.323	0.352	0.334	0.349	0.328	0.331	0.309
1994-98	0.430	0.531	0.466		0.407	0.474	0.378	0.255	0.503	0.500	0.438	0.446	0.430	0.438	0.448	0.445
1995-99	0.372	0.465	0.381		0.178	0.172	0.210	0.084	0.460	0.345	0.296	0.307	0.276	0.285	0.298	0.289
1996-00	0.228	0.280	0.224	0.453	-0.017	0.123	0.079	-0.059	0.317	0.228	0.186	0.198	0.171	0.183	0.194	0.159
1997-01	0.169	0.234	0.183	0.429	0.070	-0.072	-0.127	-0.191	0.293	0.159	0.115	0.142	0.095	0.123	0.138	0.063
1998-02	0.160	0.247	0.181	0.467	0.135	-0.051	0.048	-0.147	0.274	0.180	0.149	0.161	0.136	0.147	0.161	0.082
1999-03	0.105	0.199	0.080	0.457	0.095	-0.225	-0.015	-0.206	0.184	0.070	0.074	0.084	0.062	0.072	0.082	-0.016
2000-04	0.068	0.171	0.078	0.565	0.262	-0.020	0.054	-0.160	0.197	0.142	0.136	0.145	0.129	0.138	0.154	0.042
2001-05	0.160	0.284	0.134	0.568	0.448	-0.004	0.080	-0.058	0.320	0.284	0.222	0.237	0.211	0.227	0.247	0.128
2002-06		0.319	0.170	0.593	0.414	0.382	0.681	0.294	0.270	0.427	0.394	0.359	0.410	0.371	0.359	0.318
2003-07		0.446	0.238	0.443	0.503	0.526	0.052	0.556	0.504	0.507	0.420	0.466	0.409	0.460	0.466	0.455
2004-08		0.224	0.149	0.348	0.776	0.401	0.040	0.336	0.577	0.252	0.345	0.383	0.316	0.355	0.383	0.273
Mean	0.305	0.365	0.213	0.481	0.333	0.194	0.259	0.099	0.384	0.306	0.303	0.307	0.294	0.296	0.304	0.251
First five rolling periods											0.442	0.425	0.438	0.416	0.415	0.395
Middle five rolling periods											0.164	0.178	0.148	0.162	0.174	0.115
Last (most recent) five rolling periods											0.303	0.318	0.295	0.310	0.322	0.243

[a]Holding company for Nova Scotia Power. [b]Holding company for Westcoast Energy. [c]Formerly B.C. Gas & bought by Kinder Morgan Inc. in November 30, 2005, and acquired by Fortis as announced on February 26, 2007. The Kinder Morgan family trades as 3 separate firms on the NYSE. Source: Various.

Schedule 3.15

This figure plots the rolling five-year betas for our sample of ten utilities whose values are presented in the preceding schedule. If thin or no trading plagues any five-year period, we do not calculate a beta for that utility. This was the case for Emera, Pacific Northern Gas and Enbridge for the first three, first six and first two rolling five-year time periods, respectively. All betas are calculated using monthly total excess returns (i.e., over the JP Morgan Canada Government 10+ year total return) for the utility and the S&P/TSX Composite index. "w/o" refers to without. Although AltaGas Utility Group Inc. became a new, publicly traded corporation on November 17, 2005, it is not included because less than 3 years of market data following a one-year post-IPO period were available for beta estimation. TransAlta Corp is left in to illustrate how beta changes as a utility divests its regulated assets to concentrate on unregulated generation and product marketing.



Schedule 3.16

This table provides the rolling five-year correlations (rho) for our sample of ten utilities with the market. If thin or no trading plagues any five-year period, we do not calculate a correlation for that utility. This was the case for Emera, Pacific Northern Gas and Enbridge for the first three, first six and first two rolling five-year time periods, respectively. All correlations (rhos) are calculated using monthly total returns for the utility and the S&P/TSX Composite index. Although AltaGas Utility Group Inc. became a new, publicly traded corporation on November 17, 2005, it is not included because less than 3 years of market data following a one-year post-IPO period were available for rho estimation. TransAlta Corp is left in to illustrate how rho changes as a utility divests its regulated assets to concentrate on unregulated generation and product marketing. Source: *CFMRC* with Bloomberg updates for 2008.

Five-year period	Terasen	Cdn Utilities	Emera	Pacific North. Gas	Trans Alta Corp.	Trans Canada Pipe	Duke	Enbridge Inc.	Atco Ltd.	Fortis Inc.	Mean Rho				
											All In	Atco Out	DukeOut	Atco & Duke Out	Terasen & Duke Out
1990-94	0.571	0.581			0.458	0.492	0.407		0.468	0.485	0.495	0.499	0.509	0.517	0.497
1991-95	0.544	0.485			0.523	0.506	0.362		0.447	0.494	0.480	0.486	0.500	0.510	0.491
1992-96	0.513	0.512			0.579	0.481	0.415	0.440	0.439	0.391	0.471	0.476	0.479	0.486	0.474
1993-97	0.476	0.619	0.445		0.456	0.310	0.414	0.325	0.451	0.361	0.429	0.426	0.430	0.428	0.424
1994-98	0.557	0.655	0.605		0.553	0.464	0.440	0.442	0.571	0.603	0.543	0.540	0.556	0.554	0.556
1995-99	0.363	0.554	0.427		0.229	0.171	0.282	0.221	0.480	0.424	0.350	0.334	0.359	0.341	0.358
1996-00	0.238	0.358	0.300	0.289	0.043	0.117	0.114	0.042	0.291	0.311	0.210	0.201	0.221	0.212	0.219
1997-01	0.167	0.274	0.236	0.233	0.050	-0.049	-0.085	-0.110	0.237	0.188	0.114	0.101	0.136	0.124	0.132
1998-02	0.114	0.204	0.180	0.224	0.068	-0.058	-0.008	-0.201	0.173	0.180	0.087	0.078	0.098	0.089	0.096
1999-03	0.042	0.023	-0.074	0.137	-0.036	-0.216	-0.021	-0.289	0.103	0.039	-0.029	-0.044	-0.030	-0.047	-0.039
2000-04	-0.006	0.032	-0.017	0.185	0.106	-0.136	0.003	-0.260	0.064	0.035	0.001	-0.006	0.000	-0.008	0.001
2001-05	0.065	0.062	0.055	0.211	0.300	-0.188	0.049	-0.162	0.230	0.187	0.081	0.064	0.084	0.066	0.087
2002-06		0.089	0.071	0.223	0.300	0.303	0.367	0.201	0.208	0.291	0.228	0.231	0.211	0.211	0.211
2003-07		0.148	0.148	0.140	0.296	0.378	0.052	0.348	0.331	0.321	0.240	0.229	0.264	0.254	0.264
2004-08		0.040	0.151	0.225	0.594	0.398	-0.072	0.291	0.431	0.163	0.247	0.224	0.287	0.266	0.287
Mean	0.304	0.309	0.211	0.208	0.301	0.198	0.181	0.099	0.328	0.298	0.263	0.256	0.274	0.267	0.271
First five rolling periods											0.484	0.485	0.495	0.499	0.488
Middle five rolling periods											0.147	0.134	0.157	0.144	0.153
Last (most recent) five rolling periods											0.159	0.148	0.169	0.158	0.170

Schedule 3.17
This schedule reports time-series mean monthly variances (in decimal) at the industry-level using the indirect decomposition method of Campbell *et al.* (2001) based on all firms on the TSX for the 1975-2003 and 1994-2003 periods. The 47 industry groups, which are arranged in alphabetical order, are those used by Fama and French (1997). The number of firms is based on the total period. “Utilities as % of 44-industry mean” results from the elimination of the 3 industries with the highest variances. “40-Industry mean” is the cross-sectional mean of the time-series means of all industries with at least 10 firms in them. “Utilities as % of 39-industry mean” results from the elimination of the industry with the highest variance from the 40-Industry mean.

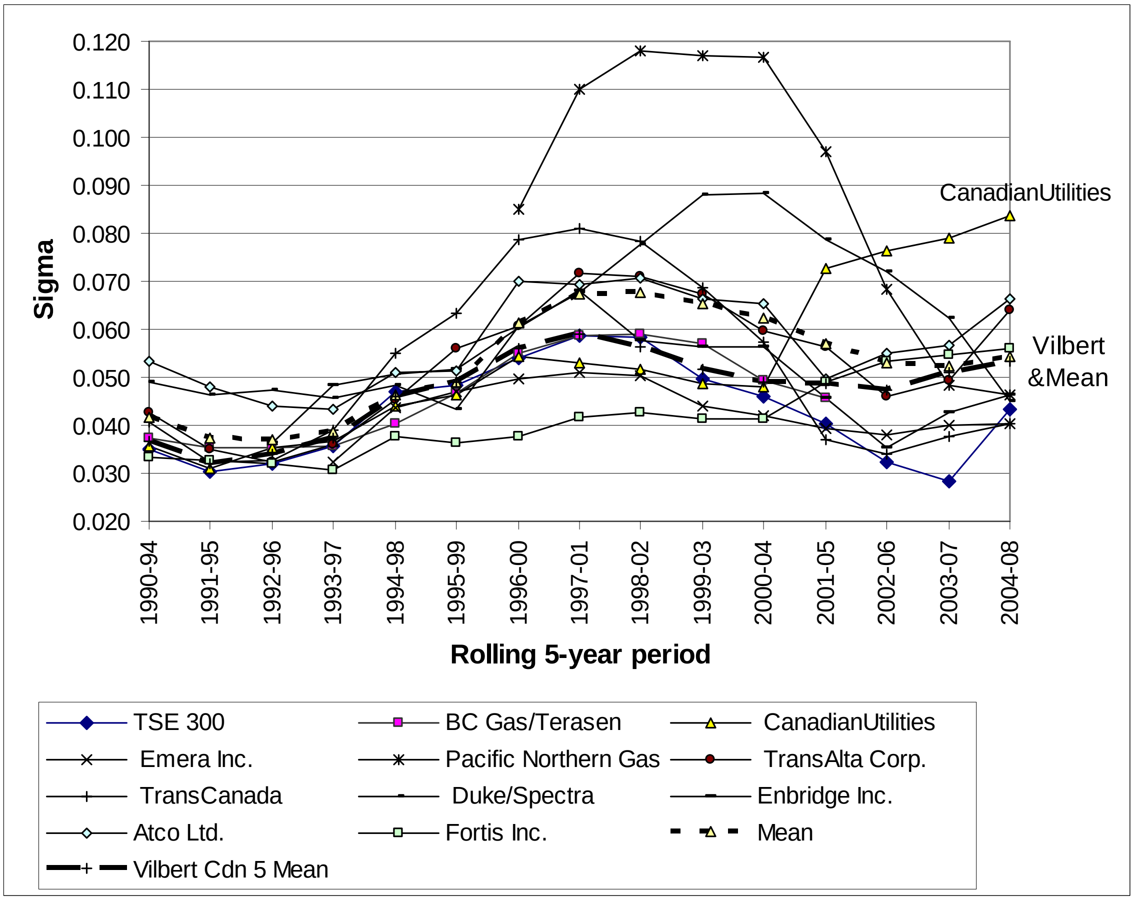
Industry	**# Firms**	**1973-2003**	**1994-2003**	**Industry**	**# Firms**	**1973-2003**	**1994-2003**
Agriculture	3	0.0135	0.0259	Nonmetallic Mining	240	0.0022	0.0019
Aircraft	17	0.0062	0.0083	Personal Services	13	0.0114	0.0090
Alcoholic Beverages	26	0.0028	0.0027	Petrol & Natural Gas	656	0.0017	0.0019
Apparel	22	0.0048	0.0055	Pharmaceutical	59	0.0077	0.0064
Automobiles & Trucks	50	0.0032	0.0030	Precious Metals	366	0.0071	0.0098
Banking	98	0.0019	0.0024	Printing & Publishing	26	0.0761	0.2158
Business Services	218	0.0034	0.0034	Real Estate	90	0.0025	0.0018
Business Supplies	52	0.0019	0.0019	Recreational Products	15	0.0092	0.0129
Candy and Soda	6	0.0083	0.0153	Restaurants, Hotel, Motel	34	0.0034	0.0035
Chemicals	44	0.0029	0.0032	Retail	117	0.0015	0.0015
Coal	9	0.0373	0.0853	Rubber & Plastic	13	0.0040	0.0046
Computers	48	0.0036	0.0056	Shipbuilding, Railroad	3	0.0704	0.0124
Construction	23	0.0050	0.0065	Shipping Containers	4	0.0196	0.0290
Construction Materials	42	0.0029	0.0019	Steel Works, Etc.	43	0.0025	0.0037
Consumer Goods	24	0.0034	0.0031	Telecommunications	93	0.0026	0.0039
Defense	1	0.0137	0.0065	Textiles	15	0.0086	0.0118
Electrical Equipment	21	0.0079	0.0154	Tobacco Products	1	0.0881	0.2452
Electronic Equipment	73	0.0064	0.0119	Trading	331	0.0016	0.0010
Entertainment	45	0.0036	0.0045	Transportation	66	0.0019	0.0018
Food Products	34	0.0030	0.0040	Utilities	52	0.0017	0.0020
Healthcare	16	0.0056	0.0056	Wholesale	120	0.0021	0.0018
Insurance	41	0.0019	0.0018	47-industry mean		0.0109	0.0180
Machinery	91	0.0023	0.0018	Utilities as % of 47-industry mean		15.33%	11.19%
Measure & Control Equip.	11	0.0190	0.0199	Utilities as % of 44-industry mean		26.54%	29.51%
Medical Equipment	13	0.0171	0.0160	40-industry mean		0.0065	0.0107
Miscellaneous	11	0.0036	0.0039	Utilities as % of 40-industry mean		25.64%	18.87%
				Utilities as % of 39-industry mean		35.35%	37.16%

Schedule 3.18

This table provides the rolling five-year standard deviations of returns (sigmas) for our sample of ten utilities. If thin or no trading plagues any five-year period, we do not calculate a sigma for that utility. This was the case for Emera, Pacific Northern Gas and Enbridge for the first three, first six and first two rolling five-year time periods, respectively. All sigmas are calculated using monthly total returns for the utility and the S&P/TSX Composite index. Although AltaGas Utility Group Inc. became a new, publicly traded corporation on November 17, 2005, it is not included because less than 3 years of market data following a one-year post-IPO period were available for sigma estimation. TransAlta Corp is left in to illustrate how sigma changes as a utility divests its regulated assets to concentrate on unregulated generation and product marketing. Source: *CFMRC* with updates from Bloomberg for 2008.

Five-year period	S&P/TSX Composite	Terasen	Cdn Utilities	Emera	Pacific Northern Gas	TransAlta Corp.	Trans Canada Pipe	Duke	Enbridge Inc.	Atco Ltd.	Fortis Inc.	Mean
1990-94	0.035	0.037	0.036			0.043	0.041	0.049		0.053	0.033	0.042
1991-95	0.030	0.035	0.031			0.035	0.032	0.046		0.048	0.033	0.037
1992-96	0.032	0.035	0.035			0.032	0.033	0.047	0.036	0.044	0.032	0.037
1993-97	0.036	0.036	0.037	0.032		0.036	0.039	0.046	0.048	0.043	0.031	0.039
1994-98	0.047	0.040	0.044	0.044		0.045	0.055	0.048	0.051	0.051	0.038	0.046
1995-99	0.048	0.047	0.046	0.047		0.056	0.063	0.043	0.052	0.051	0.036	0.049
1996-00	0.054	0.055	0.054	0.050	0.085	0.061	0.079	0.061	0.060	0.070	0.038	0.061
1997-01	0.059	0.059	0.053	0.051	0.110	0.072	0.081	0.068	0.068	0.069	0.042	0.067
1998-02	0.058	0.059	0.052	0.050	0.118	0.071	0.078	0.078	0.058	0.071	0.043	0.068
1999-03	0.050	0.057	0.049	0.044	0.117	0.067	0.069	0.088	0.056	0.066	0.041	0.065
2000-04	0.046	0.049	0.048	0.042	0.117	0.060	0.057	0.088	0.056	0.065	0.041	0.062
2001-05	0.040	0.046	0.073	0.039	0.097	0.056	0.037	0.079	0.046	0.050	0.049	0.057
2002-06	0.032		0.076	0.038	0.068	0.046	0.034	0.072	0.035	0.055	0.053	0.053
2003-07	0.028		0.079	0.040	0.048	0.049	0.038	0.062	0.043	0.057	0.055	0.052
2004-08	0.043		0.084	0.040	0.046	0.064	0.040	0.045	0.046	0.066	0.056	0.054
Mean	0.043	0.046	0.053	0.043	0.090	0.053	0.052	0.061	0.050	0.057	0.041	0.053
First five rolling periods												0.040
Middle five rolling periods												0.062
Last (most recent) five rolling periods												0.056

Schedule 3.19
This figure plots the rolling five-year standard deviations of returns (sigmas) for our sample of ten utilities whose values are presented in the preceding schedule. If thin or no trading plagues any five-year period, we do not calculate a sigma for that utility. This was the case for Emera, Pacific Northern Gas and Enbridge for the first three, first six and first two rolling five-year time periods, respectively. All sigmas are calculated using monthly total returns for the utility and the S&P/TSX Composite index. Although AltaGas Utility Group Inc. became a new, publicly traded corporation on November 17, 2005, it is not included because less than 3 years of market data following a one-year post-IPO period were available for sigma estimation. TransAlta Corp is left in to illustrate how sigma changes as a utility divests its regulated assets to concentrate on unregulated generation and product marketing.



Schedule 3.20

This table provides the standard deviations of monthly returns (sigmas) for the period 2004-2008 for the members of the S&P/TSX Composite and S&P/TSX 60 indices excluding members that are also in our sample of ten utilities (KR sample). To minimize selection bias, the membership as of December 31, 2003 is used herein. The mean and median sigma and the number of firms are reported for the firms with all 60 months of returns (60 months) and those with at least 36 months of returns but less than 60 months of returns (36 to <60 months). N is the sample size. The mean and median values for our sample of utilities whose standard deviations were reported earlier in schedule 3.18 are reported. They are also reported as a percentage of their corresponding values for an average (as captured by the mean) and typical (as captured by the median) firm in each of the two indices.

Sample	**Mean**	**60 months**	**36 to <60 months**
S&P/TSX Composite Index	Mean	0.111	0.109
	Median	0.101	0.098
	N	152	27
S&P/TSX 60 Index	Mean	0.091	0.099
	Median	0.082	0.095
	N	46	4
KR sample	Mean	0.053	
	As % of Composite	48.99%	49.65%
	As % of 60 Index	59.41%	55.08%
	Median	0.046	
	As % of Composite	45.82%	47.50%
	As % of 60 Index	56.25%	49.01%
	N	9	

Schedule 3.21

This table reports details on Canadian utilities for issues of common equity in panel A, limited partnerships in panel B and trust units in panel C over the five-year period, 2004-2008. Issuers with following SIC codes: 4612 (crude petroleum pipelines), 4613 (refined petroleum pipelines), 4911 (electric services), 4922 (natural gas transmission), 4923 (natural gas transmission and distribution), and 4924 (natural gas distribution). Source: *Financial Post Data Group*. No issues were private placements or special warrants. [a]: Includes 1,338,477 secondary offering. [b]: includes 1,716,000 secondary, AltaGas Holding Limited Partnership No. 1. [c]: Marketed in North America unlike Canada for other issues. [d]: The 752,760 shares purchased by EPCOR Utilities Inc. are excluded. [e]: The 1,228,681 share purchased by EPCOR Utilities Inc. are excluded. [f]: Includes 11,650,000 secondary offering by Enbridge. Mean commissions % (excluding IPOs in parentheses) are: 4.150% (3.944%) for common share issues; 4.470% (4.470%) for limited partnership unit issues; and 5.000% (4.917%) for trust unit issues.

Legal Name	Announce-ment Date	Completion	Amount Offered	Over-Allotment Taken	% Market Cap	Issue Price	Total Proceeds	Commis-sion %
Panel A: Common Shares								
Fortis Inc.	10-Feb-05	1-Mar-05	1,740,000		6.79	74.65	129,891,000	4.000
Pacific Northern Gas Ltd. [a]	11-Mar-05	12-Apr-05	1,338,477		37.24	19.40	25,966,454	5.000
AltaGas Utility Group Inc., IPO [b]	29-Aug-05	17-Nov-05	2,106,000		25.71	7.50	15,795,000	6.000
Fortis Inc.	3-Jan-07	18-Jan-07	5,170,000		4.67	29.00	149,930,000	4.000
Enbridge Inc.	16-Jan-07	2-Feb-07	13,500,000		3.67	38.75	523,125,000	4.000
TransCanada Corporation	6-Feb-07	14-Feb-07	39,470,000	5,920,500	8.39	38.00	1,724,839,000	3.500
Fortis Inc.	26-Feb-07	15-Mar-07	38,500,000	5,775,000	28.48	26.00	1,151,150,000	4.000
TransCanada Corporation [c]	5-May-08	13-May-08	30,200,000	4,530,000	5.93	36.50	1,267,645,000	3.500
TransCanada Corporation [c]	17-Nov-08	25-Nov-08	30,500,000	4,575,000	5.28	33.00	1,157,475,000	3.500
Fortis Inc.	2-Dec-08	19-Dec-08	11,700,000		6.57	25.65	300,105,000	4.000
Panel B: Limited Partnership Units								
EPCOR Power L.P.	29-Mar-04	15-Apr-04	7,570,000		15.60	37.00	280,090,000	4.500
Gaz Métro Limited Partnership	13-Jan-05	28-Jan-05	2,830,000	190,303	2.55	23.00	69,466,969	4.381
EPCOR Power L.P. [d]	7-Apr-06	28-Apr-06	1,707,240		3.43	33.35	56,936,454	4.500
EPCOR Power L.P. [e]	23-May-07	31-May-07	2,786,616		5.07	26.15	72,870,008	4.500
Panel C: Trust Units								
Macquarie Power & Infra. Income Fund, IPO	15-Mar-04	30-Apr-04	21,168,997		100.00	10.00	211,689,970	5.250
AltaGas Income Trust	27-May-04	10-Jun-04	4,300,000	430,000	12.39	18.70	88,451,000	5.000
AltaGas Income Trust [f]	20-Jul-04	10-Aug-04	11,650,000	1,747,500	32.83	19.75	264,600,625	5.000
Macquarie Power & Infra. Income Fund, IPO	12-Sep-05	30-Sep-05	5,630,000		18.26	11.50	64,745,000	5.000
Spectra Energy Income Fund, IPO	3-Nov-05	20-Dec-05	14,000,000	1,400,000	110.00	10.00	154,000,000	5.250
Northland Power Income Fund	7-Mar-06	23-Mar-06	11,560,000	0	18.17	15.15	175,134,000	5.000
Spectra Energy Income Fund	1-Aug-06	22-Aug-06	8,951,000		36.13	12.15	108,754,650	4.500
AltaGas Income Trust	29-May-08	10-Jun-08	3,825,000	573,750	6.31	26.20	115,247,250	5.000

Schedule 3.21 Continued

Legal Name	Terms	Purpose	Ticker & Exchanges	Industry SIC
Panel A: Common Shares				
Fortis Inc.	Bought Deal	Debt Reduction	FTS - TSX	Electric services
Pacific Northern Gas Ltd. [a]	Firm Commitment	Unknown	PNG - TSX	Gas trans. & distr.
AltaGas Utility Group Inc., IPO [b]	Firm Commitment	Debt Reduction	AUI - TSX	Gas trans. & distr.
Fortis Inc.	Overnight	Unknown	FTS - TSX	Electric services
Enbridge Inc.	Bought Deal	General Corporate	ENB - TSX; ENB - NYSE;	Gas trans. & distr.
TransCanada Corporation	Bought Deal	Acquisition/Investment	TRP - TSX; TRP - NYSE;	Natural gas trans.
Fortis Inc.	Bought Deal	Acquisition/Investment	FTS - TSX	Electric services
TransCanada Corporation [c]	Bought Deal	Acquisition/Investment	TRP - TSX; TRP - NYSE;	Natural gas trans.
TransCanada Corporation [c]	Bought Deal	Acquisition/Investment	TRP - TSX; TRP - NYSE;	Natural gas trans.
Fortis Inc.	Bought Deal	Debt Reduction	FTS - TSX	Electric services
Panel B: Limited Partnership Units				
EPCOR Power L.P.	Bought Deal	Acquisition/Investment	TPL.UN - TSX	Electric services
Gaz Métro Limited Partnership	Bought Deal	Unknown	GZM.UN - TSX	Gas trans. & distr.
EPCOR Power L.P. [d]	Bought Deal	Acquisition/Investment	EP.UN - TSX	Electric services
EPCOR Power L.P. [e]	Bought Deal	Debt Reduction	EP.UN - TSX	Electric services
Panel C: Trust Units				
Macquarie Power & Infra. Income Fund, IPO	Firm Commitment	Acquisition/Investment	MPT.UN - TSX	Electric services
AltaGas Income Trust	Firm Commitment	Debt Reduction	ALA.UN - TSX	Gas trans. & distr.
AltaGas Income Trust [f]	Overnight	Unknown	ALA.UN - TSX	Gas trans. & distr.
Macquarie Power & Infra. Income Fund, IPO	Bought Deal	Acquisition/Investment	MPT.UN - TSX	Electric services
Spectra Energy Income Fund, IPO	Firm Commitment	Acquisition/Investment	DET.UN - TSX	Gas trans. & distr.
Northland Power Income Fund	Firm Commitment	Acquisition/Investment	NPI.UN - TSX	Electric services
Spectra Energy Income Fund	Bought Deal	Acquisition/Investment	DET.UN - TSX	Gas trans. & distr.
AltaGas Income Trust	Bought Deal	Debt Reduction	ALA.UN - TSX	Gas trans. & distr.

Schedule 3.21 Continued

Legal Name	**Book Runners; Lead Underwriters; other underwriters not listed but available**
Panel A: Common Shares	
Fortis Inc.	**Book**: Scotia Capital Inc. (50.000%); RBC Capital Markets (50.000%)
Pacific Northern Gas Ltd. [a]	**Book**: Scotia Capital Inc. (50.000%); CIBC World Markets Inc. (50.000%)
AltaGas Utility Group Inc., IPO [b]	**Book**: Clarus Securities Inc. (35.000%). **Lead:** RBC Capital Markets (35.000%)
Fortis Inc.	**Book**: Scotia Capital Inc. (27.500%); CIBC World Markets Inc. (27.500%)
Enbridge Inc.	**Book**: Scotia Capital Inc. (27.320%); CIBC World Markets Inc. (20.620%)
TransCanada Corporation	**Book**: BMO Capital Markets (21.500%); RBC Capital Markets (21.500%); TD Securities Inc. (21.500%)
Fortis Inc.	**Book**: CIBC World Markets Inc. (30.300%); Scotia Capital Inc. (18.180%); TD Securities Inc. (18.180%)
TransCanada Corporation [c]	**Book**: BMO Capital Markets (21.000%); RBC Capital Markets (21.000%); TD Securities Inc. (21.000%)
TransCanada Corporation [c]	**Book**: RBC Capital Markets (21.000%); BMO Capital Markets (21.000%); TD Securities Inc. (21.000%)
Fortis Inc.	Scotia Capital Inc. (20.000%); CIBC World Markets Inc. (20.000%); RBC Capital Markets (20.000%)
Panel B: Limited Partnership Units	
EPCOR Power L.P.	**Book**: BMO Capital Markets (30.000%)
Gaz Métro Limited Partnership	**Book**: BMO Capital Markets (30.000%)
EPCOR Power L.P. [d]	**Book**: BMO Capital Markets (21.000%); TD Securities Inc. (21.000%)
EPCOR Power L.P. [e]	**Book**: TD Securities Inc. (22.000%); CIBC World Markets Inc. (22.000%)
Panel C: Trust Units	
Macquarie Power & Infra. Income Fund, IPO	**Book**: TD Securities Inc. (30.000%). **Lead:** CIBC World Markets Inc. (30.000%)
AltaGas Income Trust	**Book**: RBC Capital Markets (25.000%)
AltaGas Income Trust [f]	**Book**: Scotia Capital Inc. (25.000%); CIBC World Markets Inc. (25.000%); RBC Capital Markets (15.000%)
Macquarie Power & Infra. Income Fund, IPO	**Book**: TD Securities Inc. (36.500%). **Lead:** BMO Capital Markets (26.000%); CIBC World Markets Inc. (26.000%)
Spectra Energy Income Fund, IPO	**Book**: CIBC World Markets Inc. (33.000%); Scotia Capital Inc. (26.000%)
Northland Power Income Fund	**Book**: CIBC World Markets Inc. (35.000%)
Spectra Energy Income Fund	**Book**: CIBC World Markets Inc. (25.000%); BMO Capital Markets (25.000%)
AltaGas Income Trust	**Book**: Clarus Securities Inc. (n/a); Scotia Capital Inc. (n/a)

Schedule 4.1
This schedule contains a list of some of the factors that have been identified in the refereed literature as predictors of security returns and/or market equity risk premiums (MERPs). Some of the literature is also identified, with a slant towards Canadian studies.

Factor	**Used in, for example:**[1]
Dividend yield on market index (e.g., S&P500 or S&P/TSX Composite); negative relationship for realized MERPs	Fama and French (1988), Ferson and Schadt (1996), Kryzanowski *et al.* (1997), Christopherson *et al.* (1998), Farnsworth *et al.* (2002) and Ayadi and Kryzanowski (2005, 2008)
One-month T-bill rate	Ferson and Korajczyk (1995) and Ayadi and Kryzanowski (2005, 2008)
Risk premium as measured by yield spread between long corporates and long governments	Chen *et al.* (1986), Kryzanowski and Zhang (1992), and Koutoulas and Kryzanowski (1996)
Slope of term structure as measured by yield spread between long governments and one-month Treasuries	Ferson and Harvey (1991), Chen and Knez (1996)
Variance of returns on market	Kryzanowski *et al.* (1994)
Growth in % of retirees; negative relationship for realized MERPs	Ang and Maddaloni (2005)
Cyclical component of industrial production	Hodrick and Zhang (2001).
Log consumption-wealth ratio or cay	Lettau and Ludvigson (2001)
Labor income to consumption ratio	Santos and Veronesi (2006)

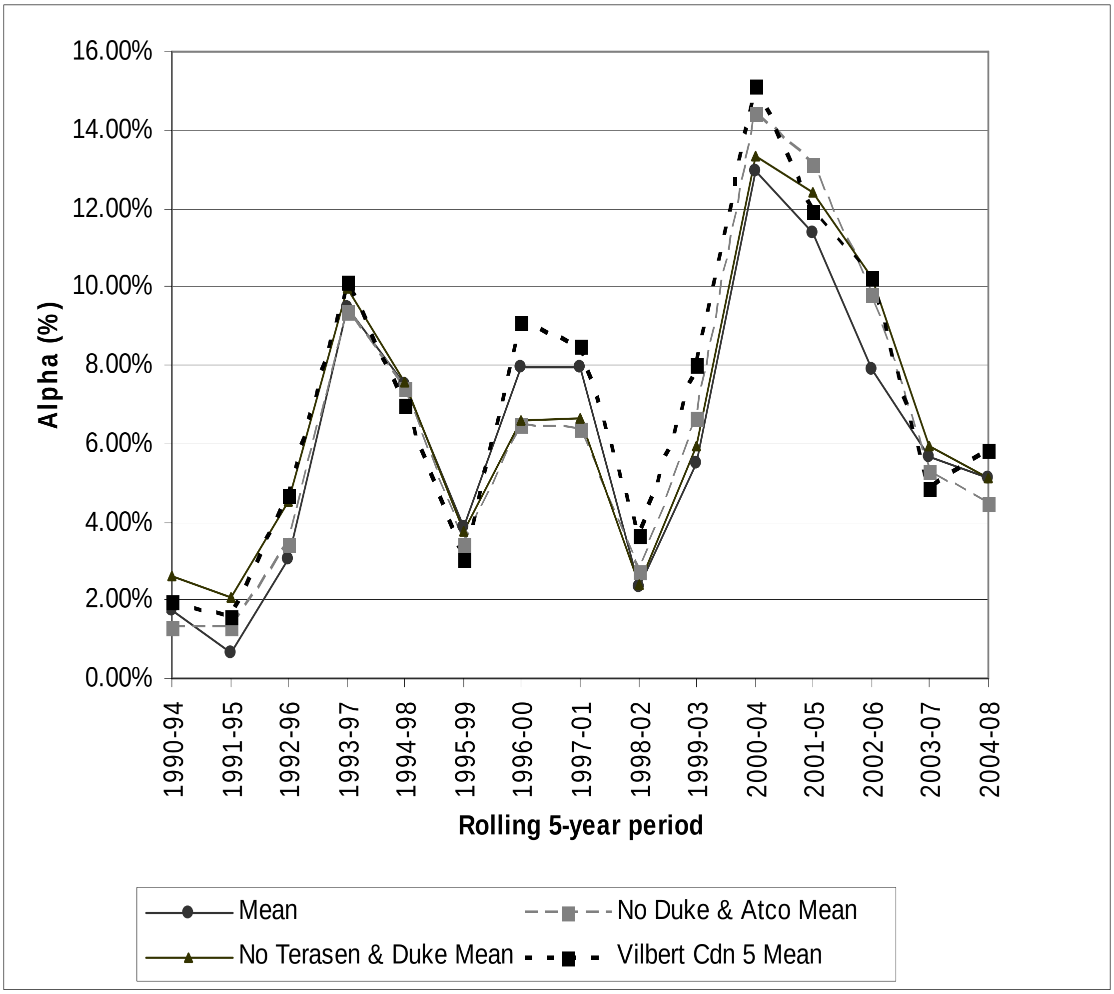
[1]A. Ang and A. Maddaloni, 2005, Do demographic changes affect risk premiums? Evidence from international data, *Journal of* Business 78, pages 341-380; M. Ayadi and L. Kryzanowski, 2005, Portfolio performance measurement using APM-free kernel models, *Journal of Banking & Finance* 29:3 (March), pages 623-659; Ayadi, M. and L. Kryzanowski, 2008, Portfolio performance sensitivity for various asset pricing kernels, *Computers and Operations Research*, Part special issue: Applications of OR in Finance 35:1 (January), pages 171-185; Chen, Z. and P. J. Knez, 1996, Portfolio Measurement: Theory and Applications, *Review of Financial Studies*, 9, pages 511-555; Chen, N. F., R. Roll and S. A. Ross, 1986, Economic Forces and the Stock Market, *Journal of Business*, 59, pages 383-403; Christopherson, J. A., W. E. Ferson, and D. A. Glassman, 1998, Conditioning Manager Alphas on Economic Information: Another Look at the Persistence of Performance, *Review of Financial Studies*, 11, pages 111-142; Fama, E. F., and K. R. French, 1988, Dividend Yields and Expected Stock Returns, *Journal of Financial Economics*, 22, pages 3-25; Farnsworth, H., W. E. Ferson, D. Jackson, and S. Todd, 2002, Performance Evaluation with Stochastic Discount Factors, *Journal of Business*, 75, pages 473-503; Ferson, W. E., and C. R. Harvey, 1999, Conditioning Variables and Cross-Section of Stock Returns, *Journal of Finance*, 54, pages 1325-1360; Ferson, W.E., Korajczyk, R.A., 1995. Do arbitrage pricing models explain the predictability of stock returns, Journal of Business 68, pages 309–350; Ferson, W. E., and R. Schadt, 1996, Measuring Fund Strategy and Performance in Changing Economic Conditions, *Journal of Finance*, 51, pages 425-461; Hodrick, R. J. and Zhang, X., 2001, Evaluating the specification errors of asset pricing models, *Journal of Financial Economics* 62, pages 327-376; Kryzanowski, L., S. Lalancette, and M. C. To, 1997, Performance Attribution using an APT with Prespecified Macrofactors and Time-Varying Risk Premia and Betas, *Journal of Financial and Quantitative Analysis*, 32, pages 205-224; Kryzanowski, L., and H. Zhang, 1992, Economic Forces and Seasonality in Security Returns, *Review of Quantitative Finance and Accounting*, 1, pages 227-244; Koutoulas G., and L. Kryzanowski, 1996, Macrofactor Conditional Volatilities, Time-Varying Risk Premia and Stock Return Behavior, *Financial Review*, 31, pages 169-195; L.. Kryzanowski, S. Lalancette and M.C. To, Performance attribution using a multivariate intertemporal asset pricing model with one state variable, 1994, *Canadian Journal of Administrative Sciences* 11:1, pages 75-85; Martin Lettau and Sydney Ludvigson, 2001, Resurrecting the (C)CAPM: A cross-sectional test when risk premia are time-varying, *Journal of Political Economy* 109: 6, pages 1238-1287; and Tano Santos and Pietro Veronesi, 2006, Labor income and predictable stock returns, *Review of Financial Studies* 19: 1, pages 1–44.

Schedule 4.2
This table provides the rolling five-year alphas in monthly decimal values for our sample of ten utilities. If thin or no trading plagues any five-year period, we do not calculate an alpha for that utility. This was the case for Emera, Pacific Northern Gas and Enbridge for the first three, first six and first two rolling five-year time periods, respectively. All alphas are calculated using monthly total excess returns (i.e., over the TSX DEX Canadian 30 Day Treasury Bill total return) for the utility and the S&P/TSX Composite index. "w/o" refers to without. Although AltaGas Utility Group Inc. became a new, publicly traded corporation on November 17, 2005, it is not included because less than 3 years of market data following a one-year post-IPO period were available for beta estimation. TransAlta Corp is left in to illustrate how alpha changes as a utility divests its regulated assets to concentrate on unregulated generation and product marketing.

Five-year period	Terasen[c]	Cdn Utilities	Emera[a]	Pacific Northern Gas	TransAlta Corp.	Trans Canada Pipe	Duke[b]	En-bridge Inc.	Atco Ltd.	Fortis Inc.	Mean	Mean, w/o Duke	Mean, w/o Atco	Mean, w/o Duke & Atco	Mean, w/o Terasen & Duke	Mean, Vilbert Cdn 5 Sample
1990-94	-0.002	0.003			0.002	0.000	0.001		0.004	0.003	0.001	0.002	0.001	0.001	0.002	0.002
1991-95	-0.001	0.003			0.002	-0.001	-0.004		0.002	0.002	0.001	0.001	0.000	0.001	0.002	0.001
1992-96	0.000	0.004			0.002	0.002	-0.002	0.006	0.005	0.004	0.003	0.003	0.002	0.003	0.004	0.004
1993-97	0.007	0.006	0.006		0.006	0.007	0.006	0.015	0.010	0.007	0.008	0.008	0.008	0.008	0.008	0.008
1994-98	0.009	0.008	0.004		0.006	0.001	0.004	0.012	0.010	0.004	0.006	0.007	0.006	0.006	0.006	0.006
1995-99	0.008	0.004	0.002		-0.001	-0.005	-0.001	0.011	0.010	0.001	0.003	0.004	0.002	0.003	0.003	0.003
1996-00	0.011	0.009	0.005	-0.015	0.009	0.001	0.011	0.018	0.012	0.004	0.007	0.006	0.006	0.005	0.006	0.008
1997-01	0.009	0.008	0.004	-0.009	0.007	0.001	0.013	0.016	0.011	0.006	0.007	0.006	0.006	0.005	0.006	0.007
1998-02	0.007	0.005	0.001	-0.003	-0.001	-0.002	-0.003	0.006	0.005	0.005	0.002	0.003	0.002	0.002	0.002	0.003
1999-03	0.009	0.004	0.002	0.001	0.000	0.008	-0.003	0.010	0.004	0.009	0.005	0.005	0.005	0.006	0.005	0.007
2000-04	0.015	0.009	0.007	0.011	0.007	0.018	0.004	0.014	0.008	0.015	0.011	0.012	0.011	0.012	0.011	0.013
2001-05	0.014	0.001	0.005	0.020	0.004	0.015	-0.002	0.010	0.009	0.018	0.009	0.011	0.010	0.011	0.010	0.010
2002-06		0.002	0.007	0.012	0.003	0.011	-0.009	0.009	0.011	0.013	0.007	0.009	0.006	0.008	0.009	0.009
2003-07		-0.002	0.005	0.003	0.008	0.005	0.003	0.005	0.009	0.007	0.005	0.005	0.004	0.004	0.005	0.004
2004-08		-0.002	0.005	-0.004	0.006	0.004	0.005	0.007	0.008	0.010	0.004	0.004	0.004	0.004	0.004	0.005
Mean	0.007	0.004	0.004	0.002	0.004	0.004	0.001	0.011	0.008	0.007	0.005	0.006	0.005	0.005	0.006	0.006
First five rolling periods											0.004	0.004	0.003	0.004	0.004	0.004
Middle five rolling periods											0.005	0.005	0.004	0.004	0.004	0.005
Last (most recent) five rolling periods											0.007	0.008	0.007	0.008	0.008	0.008

[a]Holding company for Nova Scotia Power. [b]Holding company for Westcoast Energy. [c]Formerly B.C. Gas & bought by Kinder Morgan Inc. in November 30, 2005, and acquired by Fortis as announced on February 26, 2007. The Kinder Morgan family trades as 3 separate firms on the NYSE. Source: Various.

Schedule 4.3
This figures plots the rolling five-year alphas in annualized percentages for the means of our sample of ten utilities based on the values reported in the previous schedule. If thin or no trading plagues any five-year period, we do not calculate an alpha for that utility. This was the case for Emera, Pacific Northern Gas and Enbridge for the first three, first six and first two rolling five-year time periods, respectively. All alphas are calculated using monthly total excess returns (i.e., over the TSX DEX Canadian 30 Day Treasury Bill total return) for the utility and the S&P/TSX Composite index. “w/o” refers to without. Although AltaGas Utility Group Inc. became a new, publicly traded corporation on November 17, 2005, it is not included because less than 3 years of market data following a one-year post-IPO period were available for beta estimation. TransAlta Corp is left in to illustrate how alpha changes as a utility divests its regulated assets to concentrate on unregulated generation and product marketing.



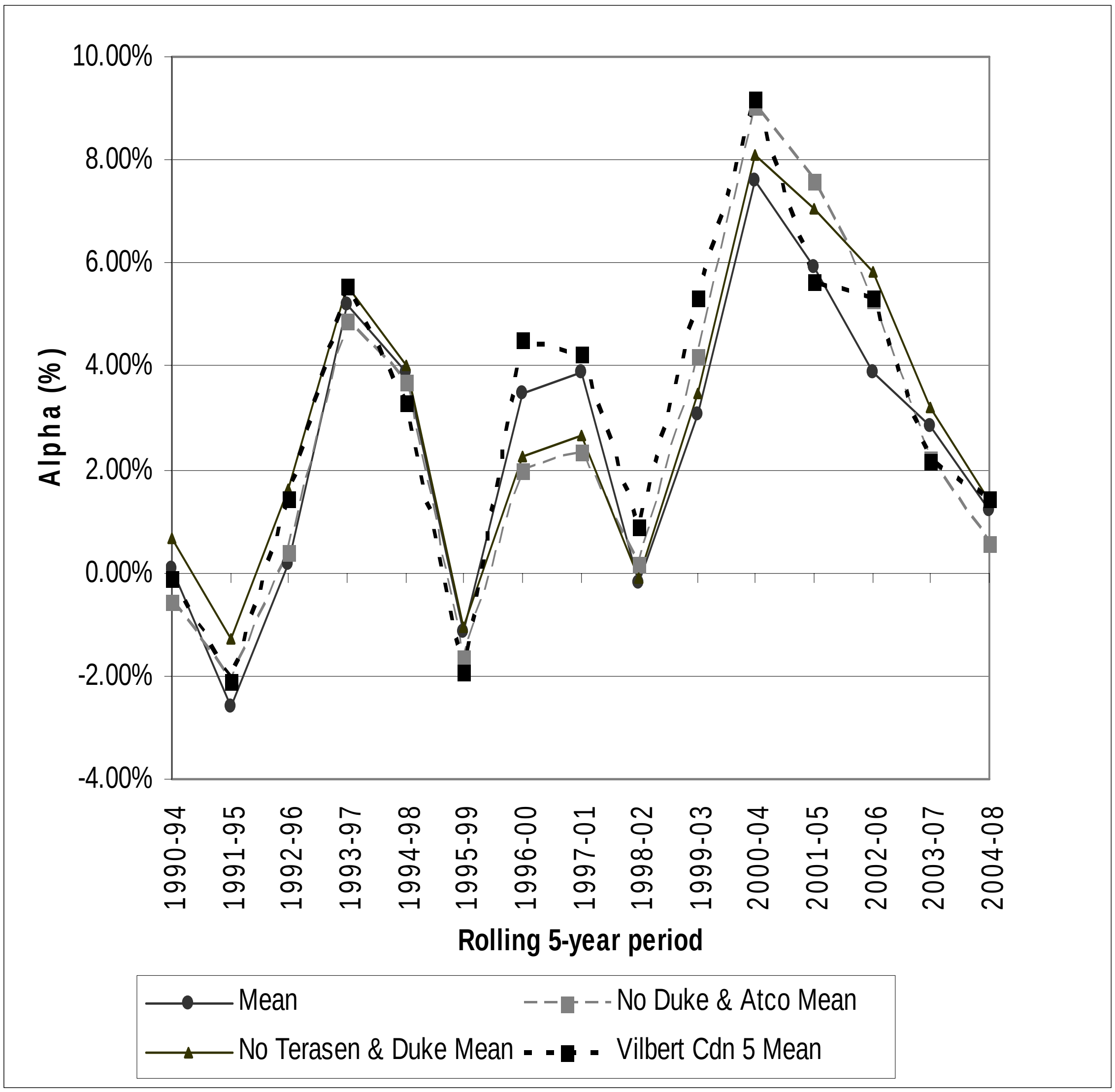
Schedule 4.4

This table provides the rolling five-year alphas in monthly decimal values for our sample of ten utilities. If thin or no trading plagues any five-year period, we do not calculate an alpha for that utility. This was the case for Emera, Pacific Northern Gas and Enbridge for the first three, first six and first two rolling five-year time periods, respectively. All alphas are calculated using monthly total excess returns (i.e., over the JP Morgan Canada Government 10+ year total return) for the utility and the S&P/TSX Composite index. "w/o" refers to without. Although AltaGas Utility Group Inc. became a new, publicly traded corporation on November 17, 2005, it is not included because less than 3 years of market data following a one-year post-IPO period were available for beta estimation. TransAlta Corp is left in to illustrate how alpha changes as a utility divests its regulated assets to concentrate on unregulated generation and product marketing.

Five-year period	Terasen[c]	Cdn Utilities	Emera[a]	Pacific Northern Gas	TransAlta Corp.	Trans Canada Pipe	Duke[b]	En-bridge Inc.	Atco Ltd.	Fortis Inc.	Mean	Mean, w/o Duke	Mean, w/o Atco	Mean, w/o Duke & Atco	Mean, w/o Terasen & Duke	Mean, Vilbert Cdn 5 Sample
1990-94	-0.003	0.001			0.000	-0.002	0.000		0.003	0.001	0.000	0.000	0.000	0.000	0.001	0.000
1991-95	-0.003	0.000			0.000	-0.004	-0.007		0.000	-0.001	-0.002	-0.001	-0.003	-0.002	-0.001	-0.002
1992-96	-0.002	0.001			0.000	0.000	-0.004	0.003	0.004	0.001	0.000	0.001	0.000	0.000	0.001	0.001
1993-97	0.003	0.004	0.002		0.002	0.003	0.003	0.012	0.007	0.002	0.004	0.004	0.004	0.004	0.005	0.005
1994-98	0.005	0.006	0.002		0.003	-0.002	0.000	0.009	0.007	0.000	0.003	0.004	0.003	0.003	0.003	0.003
1995-99	0.004	0.001	-0.002		-0.005	-0.010	-0.006	0.006	0.007	-0.003	-0.001	0.000	-0.002	-0.001	-0.001	-0.002
1996-00	0.008	0.006	0.002	-0.018	0.005	-0.003	0.006	0.014	0.009	0.000	0.003	0.002	0.002	0.002	0.002	0.004
1997-01	0.006	0.006	0.001	-0.011	0.003	-0.003	0.009	0.011	0.008	0.003	0.003	0.003	0.003	0.002	0.002	0.004
1998-02	0.005	0.003	-0.001	-0.004	-0.004	-0.004	-0.006	0.003	0.003	0.003	0.000	0.000	-0.001	0.000	0.000	0.001
1999-03	0.007	0.002	0.000	0.000	-0.002	0.006	-0.005	0.007	0.002	0.007	0.003	0.003	0.003	0.004	0.003	0.004
2000-04	0.010	0.004	0.003	0.009	0.003	0.012	-0.001	0.008	0.004	0.011	0.006	0.007	0.007	0.008	0.007	0.008
2001-05	0.009	-0.003	0.000	0.017	0.001	0.009	-0.007	0.004	0.005	0.014	0.005	0.006	0.005	0.006	0.006	0.005
2002-06		-0.003	0.002	0.009	0.000	0.007	-0.010	0.005	0.008	0.011	0.003	0.005	0.003	0.004	0.005	0.004
2003-07		-0.005	0.001	-0.002	0.006	0.003	0.000	0.003	0.009	0.007	0.002	0.003	0.002	0.002	0.003	0.002
2004-08		-0.006	0.001	-0.008	0.005	0.001	0.000	0.004	0.006	0.006	0.001	0.001	0.000	0.000	0.001	0.001
Mean	0.004	0.001	0.001	-0.001	0.001	0.001	-0.002	0.007	0.005	0.004	0.002	0.003	0.002	0.002	0.002	0.002
First five rolling periods											0.001	0.001	0.001	0.001	0.002	0.001
Middle five rolling periods											0.002	0.002	0.001	0.001	0.001	0.002
Last (most recent) five rolling periods											0.004	0.004	0.003	0.004	0.004	0.004

[a]Holding company for Nova Scotia Power. [b]Holding company for Westcoast Energy. [c]Formerly B.C. Gas & bought by Kinder Morgan Inc. in November 30, 2005, and acquired by Fortis as announced on February 26, 2007. The Kinder Morgan family trades as 3 separate firms on the NYSE. Source: Various.

Schedule 4.5
This figures plots the rolling five-year alphas in annualized percentages for the means of our sample of ten utilities based on the values reported in the previous schedule. If thin or no trading plagues any five-year period, we do not calculate an alpha for that utility. This was the case for Emera, Pacific Northern Gas and Enbridge for the first three, first six and first two rolling five-year time periods, respectively. All alphas are calculated using monthly total excess returns (i.e., over the JP Morgan Canada Government 10+ year total return) for the utility and the S&P/TSX Composite index. "w/o" refers to without. Although AltaGas Utility Group Inc. became a new, publicly traded corporation on November 17, 2005, it is not included because less than 3 years of market data following a one-year post-IPO period were available for beta estimation. TransAlta Corp is left in to illustrate how alpha changes as a utility divests its regulated assets to concentrate on unregulated generation and product marketing.



Schedule 4.6
This table reports the alpha and beta estimates based on regressions of the excess returns for the S&P/TSX Sector 55 Utilities Index against the excess returns for the S&P/TSX Composite Index for three time periods. Excess returns are obtained as the return on the chosen index minus the return on the chosen risk-free proxy for each month. Two risk-free proxies are used; namely, Canadian T-bills and Long Canada bonds (as proxied by the JP Morgan Canada Government 10+ years TR or total return in Canadian dollars). The Alpha estimate (often called the Jensen alpha) provides a measure of the risk premium earned per unit of non-diversifiable risk as measured by beta. All the estimated alphas are statistically significant at the 0.10 level or better with the exception of the full period estimate using long Canadas as the risk-free rate proxy.

Statistic	**T-bills as risk-free rate**			**Long Canadas as risk-free rate**		
	Coefficient	T-statistic	P-value	Coefficient	T-statistic	P-value
Panel A: Full period results, 1988-2008						
Alpha	6.52%	2.4090	0.0167	1.92%	0.7085	0.4793
Beta	0.2074	3.9569	0.0001	0.0739	1.4067	0.1608
Panel B: Most recent ten years, 1999-2008						
Alpha	11.16%	2.6088	0.0103	7.55%	1.7120	0.0895
Beta	-0.1081	-1.4053	0.1626	-0.0934	-1.1775	0.2414
Panel C: Most recent five years, 2004-2008						
Alpha	14.67%	2.9135	0.0051	8.84%	1.7405	0.0871
Beta	0.0889	0.9138	0.3646	0.0598	0.6097	0.5445

Schedule 4.7
This table reports the mean and standard deviation (SD) of the annualized returns for the S&P/TSX Composite Index, the S&P/TSX Sector 55 Utilities Index, Canadian T-bills and Long Canada bonds (as proxied by the JP Morgan Canada Government 10+ years TR or total return in Canadian dollars) for three time periods. The table also reports the Sharpe ratios for these market and utility indexes using both T-bills and Long Canadas as the risk-free rate. The Sharpe ratio is given by: (mean return on the chosen index – the mean return on the chosen risk-free rate) ÷ (the standard deviation of return on the chosen index). The Sharpe ratio provides a measure of the risk premium earned per unit of total risk as measured by the standard deviation.

					T-bills as risk-free rate			Long Canadas as risk-free rate		
	Annualized Returns				Sharpe Ratio		Differential Mean Return	Sharpe Ratio		Differential Mean Return
Statistic	**Market Index**	**Utility Index**	**T-Bills**	**CdnLngBnd**	**Utility Index**	**Market Index**		**Utility Index**	**Market Index**	
Panel A: Full period results, 1988-2008										
Mean	8.52%	12.56%	5.39%	10.41%						
SD	14.89%	12.66%	0.89%	8.46%	0.5664	0.2106	4.04%	0.1700	-0.1265	4.04%
Panel B: Most recent ten years, 1999-2008										
Mean	6.53%	14.36%	3.53%	7.09%						
SD	16.09%	13.55%	0.35%	6.91%	0.7996	0.1869	7.82%	0.5366	-0.0345	7.82%
Panel C: Most recent five years, 2004-2008										
Mean	5.25%	17.98%	3.13%	9.01%						
SD	15.05%	11.22%	0.29%	6.83%	1.3246	0.1415	12.73%	0.7999	-0.2496	12.73%

Schedule 5.1

This schedule provides the relative benefits and costs of being non-taxable when the utility, on average, has an actual ROE that exceeds its allowed ROE. This is implemented by increasing the base year EBIT by 3%. For example, for the taxable utility the base year EBIT becomes $10.37 x 1.03 = $10.68%.

	Taxable Utility				Non-Taxable Utility			
Measure	Good Year	Base Year	Average Excess Over Base Year	Bad Year	Good Year	Base Year	Average Excess Over Base Year	Bad Year
%Variation in EBIT	+ 10%	0%	+3%	-10%	+ 10%	0%	+3%	-10%
EBIT	$11.41	$10.37	$10.68	$9.33	$8.80	$8.00	$8.24	$7.20
Less Interest	$3.60	$3.60	$3.60	$3.60	$3.60	$3.60	$3.60	$3.60
Taxable Income	$7.81	$6.77	$7.08	$5.73	$5.20	$4.40	$4.64	$3.60
Less Income Tax	$2.73	$2.37	$2.48	$2.01	$0.00	$0.00	$0.00	$0.00
Net Income	$5.07	$4.40	$4.60	$3.73	$5.20	$4.40	$4.64	$3.60
ROE	12.70%	11.00%	11.51%	9.30%	13.00%	11.00%	11.60%	9.00%

Incremental mean return: 11.60% - 11.51% = 0.09%.
Incremental risk as measured by the downside risk: (11.00% - 9.00%) – (11.00%- 9.30%) = 0.30%.

Schedule 5.2

This schedule summarizes the rate of return recommendations of the witnesses in this hearing and provides comparisons against the 2009 allowed return placeholder set by the Commission. It also shows the allowed returns produced by regulatory formulas in place in British Columbia, Ontario and at the National Energy Board. In Panel A, the schedule calculates the risk premium over long Canada's for each witness using the recommended returns and long Canada forecast provided by the witness where available. Otherwise, the NEB forecast is used. In Panel B, we report the utility risk premium implied by regulatory formulas based on the NEB long-Canada forecast of 4.36%. Panel C shows the regulatory risk premiums for the Kryzanowski / Roberts long-Canada rate of 4.75%.

	Long-Canada Forecast	**Recommended Return**	**Risk Premium (Basis Points**	**Notes**
Panel A: Witness / Sponsor				
Coyne / ATCO	4.13%	10.2 -11.3	6.07-7.17	Assuming 40% equity
Kolbe / Vilbert / NGTL	4.50%	11.0	6.50	Assuming 40% equity, Long-Canada based on Vilbert
Kryzanowski / Roberts / UCA	4.75	7.90	315	For range of recommended capital structures
McShane / ATCO	4.13	10.5-11.0	6.37-6.87	Positions ATCO companies based on Coyne's results. Long-Canada from Coyne.
VanderWeide / EPCOR, FortisAlberta, AltaLink	4.30	11.0	6.70	Assuming 40% equity. Long-Canada based on NEB forecast of 4.36%
Vilbert / AltaGas	4.50	11.0	6.50	Assuming 46% equity

Panel B: Regulatory Boards				
	Long-Canada Forecast	**Allowed Return for 2009**	**Risk Premium (Basis Points**	**Notes**
AUC	4.36	8.51	415	AUC 2009 placeholder
BCUC	4.36	8.47	411	Terasen Gas
OEB	4.36	8.50	414	
NEB	4.36	8.57	421	
Average	**4.36**	**8.51**	**415**	

Schedule 5.2 Continued

Panel C: Regulatory Boards				
	Long-Canada Forecast	**Recommended Return**	**Risk Premium (Basis Points**	**Notes**
AUC	4.75	8.90	415	
BCUC	4.75	8.76	401	
OEB	4.75	8.79	404	
NEB	4.75	8.86	411	
Average	**4.75**	**8.83**	**408**	

Schedule 5.3

This schedule reports the means, standard deviations and Sharpe ratios based on the monthly returns for two U.S. utility indexes and the S&P500 Index over the ten-year period of 1999-2008 and the five-year period 2004-2008. All indexes are total return. The Sharpe ratio is based on the mean return for the index [i.e., Mean (%) below] minus the mean return for 30-day T-bills, all divided by the standard deviation of return for the index. For comparison purposes, we add the values for the S&P/TSX sector 55 sub-index and the S&P/TSX Composite Index.

Time Period	Measure	S&P 500 Sub-index for: Electric Utilities	S&P 500 Sub-index for: Gas Utilities	S&P500	S&P/TSX Sector 55 Sub-index	S&P/TSX Composite Index
1989-2008	Mean (%)	0.40	0.15	-0.28	1.20	0.54
	St. Dev. (%)	5.06	6.58	4.35	3.91	4.65
	Sharpe	0.03	-0.02	-0.13	0.23	0.05
2004-2008	Mean (%)	0.69	0.21	-0.36	1.50	0.44
	St. Dev. (%)	3.81	5.79	3.68	3.24	4.34
	Sharpe	0.11	-0.01	-0.17	0.38	0.04

Schedule 5.4

This schedule reports the means (%), standard deviations (%) and Sharpe ratios based on the monthly returns for the equal-weighted portfolios of the utilities in four samples of U.S. utilities used as comparables by experts for the applicant utilities to this proceeding and for the S&P500 Index over the ten-year period of 1999-2008 and the five-year period 2004-2008. All indexes are total return. The Sharpe ratio is based on the mean return for the portfolio or index minus the mean return for 30-day T-bills, all divided by the standard deviation of return for the portfolio or index. For comparison purposes, we add the values for the sample of Canadian utilities that we examined in section three of our Evidence. [a, b] and [c] indicate significance at the 0.10, 0.05 and 0.01 levels, respectively, for the alphas based on a two-tailed test of significance. N is the sample size.

	Mean Excess Return (%)	St. Dev. of Return (%)	Sharpe Ratio	Beta	Alpha (%)
Panel A: Dr. Van Weide's sample of electric utilities (N=28)					
1999-2008	0.37	4.42	0.08	0.35	0.47
2004-2008	0.30	3.47	0.09	0.61	0.52
Panel B: Dr. Van Weide's sample of natural gas utilities (N=11)					
1999-2008	0.74	4.21	0.18	0.31	0.83[b]
2004-2008	0.69	3.75	0.18	0.61	0.91[b]
Panel C: Dr. Vilbert's sample of natural gas utilities (N=8)					
1999-2008	0.51	3.45	0.15	0.16	0.56[a]
2004-2008	0.59	3.14	0.19	0.30	0.70[a]
Panel D: Dr. Vilbert's sample of LPs (N=6)					
1999-2008	0.86	4.68	0.18	0.20	0.91[b]
2004-2008	0.18	4.55	0.04	0.20	0.91[b]
Panel E: S&P500 index (benchmark) (N=500)					
1999-2008	-0.28	4.36	-0.07	1.00	
2004-2008	-0.36	3.71	-0.10	1.00	
Panel F: Drs. Kryzanowski & Roberts' (KR's) Cdn utility sample (N=10)					
1999-2008	0.47	3.57	0.13	0.10	0.45
2004-2008	0.51	3.34	0.15	0.31	0.45