RÉGIE DE L'ÉNERGIE

DOSSIER : **R-4156-2021, Phase 2**

EGI – DEMANDE CONJOINTE RELATIVE À LA FIXATION DE TAUX DE RENDEMENT ET DE STRUCTURES DE CAPITAL

DEMANDE DE RENSEIGNEMENTS N^{O} 1
DU DR. BOOTH AU DR. VILLADSEN

Montréal, le 25 février 2022

**INFORMATION REQUESTS N^{O} 1
OF DR. BOOTH TO DR. VILLADSEN ON BEHALF OF THE INDUSTRIAL GAS USERS ASSOCIATION (« IGUA »), THE ASSOCIATION DES HÔTELIERS DU QUÉBEC ET ASSOCIATION RESTAURATION QUÉBEC (« AHQ-ARQ »), THE CANADIAN FEDERATION OF INDEPENDENT BUSINESS (« CFIB ») AND OPTION CONSOMMATEURS (« OC ») ON SETTING RATES OF RETURN AND CAPITAL STRUCTURES**

THEORETICAL APPROACH

1. **References: (i) EGI-1, exhibit B-0015, p. 5.**
(ii) R-3690-2009, Written Evidence of Michael J. Vilbert.
(iii) R-3690-2009, Written Evidence of A. Lawrence Kolbe.

Preamble:

(i) Dr. Villadsen references her text “*Risk and Return for Regulated Industries*” Elsevier, May 2017, which according to her CV was co-authored with Michael Vilbert, Dan Harris, and A. Lawrence Kolbe.

Requests:

1.1 Please confirm that Michael Vilbert and Lawrence Kolbe are the same individuals who filed testimony before the Régie on behalf of Gaz Metro Limited Partnership on May 4, 2009.

1.2 Please confirm that the substance of Dr. Villadsen’s current evidence is very similar to that filed by Dr. Kolbe and Vilbert in two separate pieces of evidence in 2009. More specifically whereas Dr. Vilbert provided the risk positioning and cost of equity estimates and Dr. Kolbe the financial leverage and weighted average cost of capital evidence in 2009, Dr. Villadsen has combined them into one piece of evidence in this hearing. By substantially is meant the theoretical approach of using adjusted betas, an empirical capital asset model (ECAPM) and leverage adjustments based on a constant weighted average cost of capital or what Dr. Kolbe called an ATWACC.

1.3 If Dr. Villadsen disagrees that the theoretical approach is not substantially the same, please provide an explicit discussion of where the approach (not the actual estimates or companies used) differs from that presented by the Brattle group witnesses in 2009.

RATES OF RETURN IN THE CAPITAL MARKET

2. **Reference: (i) EGI-1, exhibit B-0015, p. 10.**

Preamble:

(i) Dr. Villadsen refers to the cost of capital as the rate of return investors require "*based on the risk-return alternatives available in competitive capital markets.*"

Requests:

2.1 Is it Dr. Villadsen's judgment that the massive bond buying in Canada where the Bank of Canada has essentially bought all the debt issued by the Government of Canada over the last two years represents a return based on a competitive capital market?

2.2 Further where a significant proportion of the global bond market trades on negative yields would she confirm that she judges this to be the result of a competitive capital market?

2.3 If Dr. Villadsen agrees that the intervention by central banks has had no impact on rates of return in the capital market, can she provide any support for such a proposition? That is, does she believe that central bank intervention has no impact on prices and rates of return in the capital market?

CREDIT RATING

3. **References: (i) EGI-1, exhibit B-0015, pp. 13-18.**
(ii) R-3690-2009, D-2009-156, par. 173.
(iii) R-3690-2009, D-2009-156, par. 184.

Preamble:

(ii) Dr. Villadsen references the Régie's D-2009-156 (paragraph 173) legal requirement of a fair rate of return and states at p. 18:

> "*Specifically, the Régie aims to set the capital structure and allowed ROE such that utilities can maintain their financial integrity, which in my view is a credit rating in the A-range.*"

(iii) "*<u>The return should be reasonably sufficient to assure confidence in the financial soundness of the utility, and should be adequate, under efficient and economical management, to maintain and support its credit and enable it to raise the money necessary for the proper discharge of its public duties.</u>*"

(Footnote omitted)
(Our emphasis)

Requests:

3.1 With respect to reference (iii), can Dr. Villadsen confirm that the Régie's statement in the above decision further amplifies this by referring to the U.S. Bluefield decision with the words "*support its credit*" which means access to borrowing as the Régie goes on to say, "*enable it to raise the money*"?

3.2 Please indicate any statements that Dr. Villadsen is aware of from previous Régie decisions that the Régie targets a particular bond rating.

3.3 Please provide the S&P bond ratings of all the U.S. public utilities she considered before restricting her samples to the current ones used in this evidence.

3.4 What does Dr. Villadsen judge to be the modal or most common bond rating for a U.S. Public utility?

3.5 Is it Dr. Villadsen's judgment that a utility should be allowed a rate of return on equity (ROE) above a fair return to allow it to get an A-bond rating? If so, please provide any statements in any Canadian board decisions that support such a view.

3.6 Can Dr. Villadsen provide details on when Gazifère and Énergir last had their common equity ratios changed by the Régie and the reference to the Régie's decision allowing for this change.

3.7 Please confirm that all three Quebec gas utilities are requesting such a change in their common equity ratios in this hearing?

CURRENT ALLOWED FINANCIAL PARAMETERS

4. **References: (i) EGI-1, exhibit B-0015, pp. 19-21.**
(ii) Kolbe, Read and Hall, The Cost of Capital, MIT Press, pp. 25 - 32.

Preamble:

(i) Dr. Villadsen refers to current allowed financial parameters on pages 20-21.

"*Therefore, the cost of equity estimates based on the market-derived model inputs (i.e., stock prices, dividends betas) for the proxy companies reflect substantially lower financial risk than the Utilities.*"

Requests:

4.1 In Figure 5, can Dr. Villadsen please provide the risk-free rate, market risk premium and beta coefficient used by the Régie in the decisions that originally led to those financial parameters allowed the Quebec gas distributors

4.2 In Figure 6, can Dr. Villadsen provide the underlying estimates for each company that led to those average allowed ROEs and common equity ratios for each year from 2016 to 2020.

4.2.1. Can Dr. Villadsen provide copies of the decisions that led to the determination of the allowed ROE and common equity ratios.

4.3 In particular, can Dr. Villadsen provide the current allowed ROE and common equity ratio for the following province-wide gas distribution utilities: ATCO Gas, Fortis BC Energy, Enbridge Gas Distribution Inc, Union Gas and Liberty Gas New Brunswick.

4.4 In reference to Figure 7, isn't the most common explanation for higher equity capitalisations (weights) in the capital structure that shareholders are more than happy with the return they are earning and have bid up the share price accordingly? Therefore, isn't the correct implication to lower the allowed ROE not increase it: see Kolbe Read and Hall, the Cost of Capital, MIT Press pp. 25-32.

4.4.1. If Dr. Villadsen disagrees, please explain in detail the fault in their logic.

4.5 In particular, why should the Régie deviate from its accepted regulatory practice to support unrealistic shareholder expectations as reflected in share prices above book value?

4.6 With respect to reference (i), when the stock price exceeds book value, please explain in detail how the cost of equity estimates derived from these higher market values can "*reflect substantially lower financial risk*" when they are at greater risk of having their allowed ROE cut and their stock price dropping to book value? Doesn't the existence of high market to book ratios as reflected in higher equity market capitalization mean by definition a greater risk of capital loss?

4.7 Please provide the complete section as well as the pages from the Brealey et al. textbook referenced at footnote 28. Is 2011 the last edition of the textbook? If not, please explain why you have not used most recent versions. Please provide copies of the pages of the most recent version of this textbook on this topic (standard financial techniques to account for differences in financial leverage)

FINANCIAL LEVERAGE PRINCIPLES

5. **Reference: (i) EGI-1, exhibit B-0015, pp. 21-29.**

Preamble:

(i) Dr. Villadsen generates an example to illustrate financial leverage principles and the weighted after-tax cost of capital (ATWACC).

Requests:

5.1 Can Dr. Villadsen confirm that in the example she is referring to corporate leverage, that is, the use of debt by a corporation and not financial leverage as experienced by investors borrowing on margin to invest in shares? In her judgment, do these two different types of borrowing have the same effect?

5.2 Can Dr. Villadsen confirm that for shareholders using personal borrowing the rate charged is the margin rate on a demand loan, whereas corporations like Énergir borrow long term usually at a fixed rate to match the maturity of their assets? In her judgment, does this differential maturity effect change the financial leverage decision?

5.3 In the example, can Dr. Villadsen confirm that if there is no variation in the cash flows due to the use of deferral accounts by the regulated firm then there is no change in the return on equity?

5.4 Can Dr. Villadsen confirm that she examined the actual ROE relative to the allowed ROE for each of the three utilities to assess the increased variability due to the use of financial leverage and further that the experience of the regulated companies is consistent with her example? If not, can she explain the relevance of her example if all three utilities consistently earn their allowed ROE?

5.5 Can Dr. Villadsen confirm that the credit metrics are all based on book values? If not where does the market value of equity factors into the credit metrics or the variability of the ROE?

5.6 With respect to Figure 10 on page 26, can Dr. Villadsen confirm that the Modigliani and Miller theorem that generates a constant weighted average cost of capital assumes risk-free debt? If not, please explain why not and reference any passages within the original M&M paper where the debt is risky and increases with the use of debt. Further, please produce extracts from the Brealey et al., “seminal” textbook (footnote 28) that explain why the debt cost increases when it is risk-free. For example, does M&M include the illiquidity of corporate debt that causes spreads over default free government debt?

5.7 Please provide the complete section of the textbook dealing with corporate leverage and any other graphs of the change in the weighted average cost of capital as the firm uses debt.

CAPITAL MARKET CONDITIONS AND INTEREST RATES

6. **References: (i) EGI-1, exhibit B-0015, pp. 29-42.**
(ii) R-3752-2011, phase 2, D-2011-182, pp. 25, 26 and 30.

Preamble:

(i) Dr. Villadsen discusses general capital market conditions and interest rates.

"***Q30. How do interest rates affect the cost of equity?***

A30. The current interest rate environment affect the cost of equity estimation in several ways. Most directly, the CAPM takes as one of its inputs a measure of the risk-free rate. The estimated cost of equity using the CAPM decreases (increases) by one percentage point when the risk free rate decreases (increases) by one percentage point. […]

Q.33 How does the current spread between utility and Canadian government bond yields compare to historical spreads?

A33. As interest rates have declined, the spread between A-rated utility bonds and government bond yields has increased in both Canada and the U.S. […]"

Requests:

6.1 Please provide a copy of the Bank of Canada's January 26, 2022, Monetary Policy Report.

6.2 Please explain the statement on page 34 (Q30) that the CAPM equity cost decreases by 1.0% when the risk-free rate decreases by 1.0%. Is Dr. Villadsen assuming that both the market risk premium and the beta coefficient are unaffected by the level of interest rates?

6.3 On page 37 (Q33), Dr. Villadsen claims that spreads between corporate and government bonds may be affected by the level of interest rates. Can she please provide empirical support for this supposition for A rated utility debt in Canada?

6.4 Is Dr. Villadsen aware that when the Régie last set Gaz Metro's (Énergir) fair ROE in D-2011-182 it used an ROE adjustment formula that included the traditional 75% adjustment to changes in the level of the long Canada bond and added a 50% adjustment to changes in the utility credit spread?

6.5 With respect to reference (ii), is Dr. Villadsen aware that the adjustment to GMI's allowed ROE was based on a forecast long Canada bond yield of 4.0% and a credit spread of 1.50%. (paragraphs 295 & 296 of the decision)?

6.6 Based on adjustments since 2011, would Dr. Villadsen accept that her estimate of current utility spreads of 1.33% indicates that the "premium required to hold risky assets: has decreased" from the 2011 ROE decision and not increased as she claims. If not please explain why not.

MARKET RISK PREMIUM

7. **Reference: (i) EGI-1, exhibit B-0015, pp. 42-53.**

Preamble:

(i) Dr. Villadsen discusses the market risk premium.

"***Q38. Please explain the current evidence related to the Market Risk Premium.***

A38. […] Since the beginning of the pandemic, Bloomberg's forward looking estimate of the MRP reached 10.10% in Canada and 9.05% in the U.S. (see Figure 15 below). Currently, the forecasted MRP is 8.45% in Canada and 8.68% in the U.S. […] "

(Footnote omitted)

<u>Requests</u>:

7.1 On page 43, Dr. Villadsen discusses "Bloomberg's" forward-looking estimate of the market risk premium. Please provide a detailed explanation of how this is calculated, what "buttons" or options are available that led to this particular estimate and the time horizon of the estimate, that is, is it based on long-run returns or analyst earnings estimates over a 1 or 3-year horizon?

7.2 Can Dr. Villadsen confirm that the Dr. Morin referred to in footnote 89 appeared as a witness on behalf of Gaz Metro in 2011.

7.3 On page 45, Dr. Villadsen references the Duff and Phelps market risk premium estimate (footnote 91), please provide a screen shot of the estimate and explain how they estimated it. Did Duff and Phelps use the interest component of the bond return and ignore capital gains and losses as an "income return"? If so, can she calculate the income return on equity (dividends) minus the income (interest) return on bonds over the same period thereby using equivalent series or alternatively use total returns?

7.4 Can Dr. Villadsen confirm that the Duarte and Rosa study referenced on pages 46-47 (Figure 16) estimates a one-year ahead market risk premium which is why it is so volatile? Please explain what weight the Régie should place on a one-year ahead market risk premium estimate from seven years ago?

7.5 Please confirm that Dr. Villadsen when referring to the "integrated" market between the U.S. and Canada is assuming that the markets are *perfectly* integrated and that the law of one price applies, such that securities are priced identically in both markets. If she is not so assuming what weight should U.S. evidence from a segmented market play?

7.6 If Dr. Villadsen confirms that she judges the U.S. and Canadian markets to be perfectly integrated does she ignore the impact of the dividend tax credit that provides a tax benefit for Canadians to own higher paying Canadian shares like utilities? Is Dr. Villadsen saying that a Canadian investor is indifferent between a U.S. and a Canadian utility even if the risk is identical given the Canadian Income Tax Act?

7.7 Would Dr. Villadsen agree that if the U.S. and Canadian stock markets are perfectly integrated as she assumes that Canadians would own a balanced portfolio and put 90% of their investments into U.S. stock and only 10% into Canadian stocks given the relative size of the two economies? If so, please provide any data that she is aware of that this is a reality.

EQUITY COST

8. **References: (i) EGI-1, exhibit B-0015, pp. 53-66.**
(ii) R-3690-2009, exhibit B-28, p. 327.

Preamble:

(i) Dr. Villadsen estimates the equity cost from three samples.

Requests:

8.1 In her Canadian sample, Dr. Villadsen includes AltaGas, please indicate what Canadian assets AltaGas now owns and whether any of them are regulated distribution assets. If she determines that AltaGas still owns distribution assets, what percentage of the company's total assets do they represent?

8.2 Please confirm that a Canadian buying U.S. asset through a Utility holding company like Fortis gets the benefit of the dividend tax credit whereas in a direct investment in a U.S. utility it does not.

8.3 Please provide the DBRS bond rating for each of the Canadian companies in Figure 18 on page 56.

8.4 Please confirm that as a general rule S&P will not rate its operating subsidiaries higher than the holding company unless the utility is "ring-fenced."

8.5 Please confirm that all the U.S. gas companies are relatively small compared to the Canadian ones and that none are in the S&P500 index.

8.6 Please indicate for how long each water company in Figure 21 has had a stock exchange listing and whether any of them meet the requirements to be included in the S&P500 index.

8.7 With reference to footnote 132, Dr. Villadsen refers to "*elevated*" spreads. Is she referring to spreads compared to pre-financial crisis spreads, if so please indicate the average annual spread since 2009 and the period of the pre-financial crisis average spread she has estimated.

8.8 With reference to the Duff and Phelps market risk premium estimated as an average equity return minus the average expected yield or income return, please indicate when Duff and Phelps changed their methodology to calculate the market risk premium in this way rather than in a consistent manner as the difference between two rates of return.

8.9 Please confirm that in previous testimony and in answer to Dr. Booth's information request 5.1 (reference (ii)), Dr. Vilbert of Brattle and Dr. Villadsen's co-author had used the market risk premium estimates derived from the annual return on equities minus the annual return on government bonds from the Canadian Institute of Actuaries publication "Report on Canadian Economic Statistics".

ADJUSTED BETAS

9. **References: (i) EGI-1, exhibit B-0015, pp. 66-69.**
(ii) R-3752-2011, phase 2, D-2011-182, p. 11, par. 224.
(iii) R-3690-2009, Written Evidence of Michael J. Vilbert, pp. 56 and 160.

Preamble:

(i) Dr. Villadsen uses adjusted betas in her CAPM estimates.

(ii) "*With respect to the use of adjusted betas. the Regie maintains the position it has taken in previous decisions. The explanation commonly used in financial research to support an adjustment to raw beta, namely the empirically observed tendency of betas in general to converge in the long term towards the market mean of 1, does not apply in the case of regulated companies.*"

(Footnote omitted)

(iii) "***Q86. How is beta obtained****?*

A86. There are many ways to estimate betas. However, standard approaches calculate beta by statistical regression of the excess (positive or negative) of the return on the stock over the risk-free rate against the excess return over *the risk-free rate on the relevant index (e.g., the S&P/TSX index for the Canadian companies or the NYSE index for the U.S. 3 companies). It is common to use monthly return data for the most recent 60-month period for which data exist or weekly data for the most recent 260 weeks."*

Requests:

9.1 With reference to what Dr. Villadsen refers to as "Bloomberg betas". Please confirm that Bloomberg is a data provider and as such provides a range of options in estimating betas. Please indicate why she chose to use "Blume Adjusted" betas and over what period and frequency did she chose to estimate them? Please also indicate whether they are estimated from price series or from actual rates of return including dividends?

9.2 With respect to reference (iii) of Dr. Vilbert's (from Brattle) response to his own question in his previous evidence, can Dr. Villadsen explain why she does not follow standard procedures in estimating betas as laid out by her colleague?

9.3 If Dr. Villadsen judges it is best to use a variety of estimation methods for the equity cost, why has she only relied on her own beta values estimated in a un-common way (according to her colleague)?

9.4 With respect to reference (ii), is Dr. Villadsen aware of any new research that would justify the use of adjusted betas? If so adjustment toward what value?

9.5 With respect to reference (iii), Dr. Vilbert provided both adjusted and unadjusted betas for his samples in his 2009 evidence. Given the judgment of Dr. Vilbert and the decision of the Régie, can Dr. Villadsen please provide revised estimate for the betas for the firms in her three samples using what her colleague Dr. Vilbert described as commonly estimated betas, that is estimated using monthly returns of the stock against the market index over a five-year period. Alternatively, can Dr. Vilbert unadjust her betas reversing the Blume methodology

9.6 Has Dr. Villadsen considered using other ways of adjusting betas such as the model developed by Beaver, Kettler and Scholes, "The Association between Market Determined and Accounting Determined Risk Measures", Accounting Review 1970, or Rosenberg and McKibben, "The Prediction of Systematic and Specific Risk in Common Stocks", JFQA, March 1973 rather than relying on Blume adjusted betas that have been rejected by the Régie? If not, why not?

EMPIRICAL CAPITAL ASSET PRICING MODEL (ECAPM)

10. **References: (i) EGI-1, exhibit B-0015, pp. 70-73.**
(ii) R-3752-2011, phase 2, D-2011-182, p. 7, par. 200.
(iii) R-3690-2009, exhibit B-28, p. 332.
(iv) R-3690-2009, exhibit B-28, p. 333.

Preamble:

(i) Dr. Villadsen refers to the Empirical Capital Asset Pricing model (ECAPM).

(ii) "*The Regie has already ruled on the ECAPM. In the Regie's view, there is no new information that would warrant a reconsideration of this model.*"

(iii) *"6.1 Please confirm that the empirical tests on which the ECAPM is based used the short term treasury bill yield as the risk free rate and actual beta estimates unadjusted either mechanically or by the use of judgment. If not why not.*

Réponse *: Confirmed. All of the academic articles listed in Appendix C to Dr. Vilbert's written evidence are based upon use of 30-day Treasury bills except Pettergill, Sundaram and Mathur 1995 which used 90-day Treasury bills. Confirmed. Beta estimates were not adjusted."*

(iv) *"6.3 Please re-estimate Dr. Vilbert's ECAPM estimates using the current Treasury Bill yield consistent with the empirical tests on which it is based.*

Réponse *: The results of the requested estimates would all be economic nonsense because the estimated cost of equity would be less than the 6.61 percent yield on A-rated utility debt prevailing at the time of the preparation of Dr. Vilbert's written evidence. […]"*

(Footnote omitted)

<u>Requests</u>:

10.1 With respect to reference (iii), can Dr. Villadsen confirm the same is true of her own referenced tests of the CAPM, since the cited references appear to be identical or explain where there are differences?

10.2 With respect to reference (iv), can Dr. Villadsen similarly re-estimate her CAPM estimates in a manner consistent with the empirical evidence that she uses to justify the ECAPM? In other words, use the 30-day Treasury bill yield, her market risk premium estimates and unadjusted betas or would she similarly agree that the results are nonsense?

10.3 With respect to reference (ii), does Dr. Villadsen's use of the ECAPM provide any new information as to its usefulness given the above comments of Dr. Vilbert in 2009 that as applied consistently with the empirical evidence the results are nonsense? If so, please justify why the Régie should reconsider its 2011 dismissal of ECAPM evidence.

DISCOUNTED CASH FLOW (DCF) EQUITY COST MODEL

11. **Reference: (i) EGI-1, exhibit B-0015, pp. 73-76, 110, 139-202.**

Preamble:

(i) Dr. Villadsen estimates a discounted cash flow (DCF) equity cost.

Requests:

11.1 Dr. Villadsen uses a constant growth and two stage DCF models. For the latter, she assumes that utility dividends will grow at the long-run rate of GDP. Please provide all evidence that she is aware of that long-run utility and in particular gas company dividends can be expected to grow at the long-run GDP growth rate.

11.2 Would Dr. Villadsen agree that utility dividend yields are generally higher than that for the S&P500 index, if not please provide quantitative evidence to the contrary.

11.3 Given her answer to 11.2 above if the utility dividend yield is higher than that for the market as a whole and she expects their dividends to grow at the same rate as GDP, doesn't that imply that the DCF equity cost for utilities is higher than that for the overall market and that utilities as a result are riskier than the overall stock market? If not please explain why not.

11.4 In the DCF estimates, can Dr. Villadsen confirm that the growth estimates are based on analyst forecasts and in that exhibit BV-1 (exhibit B-0015, p. 110) she references one paper by Hovakimina and Saenyasiri (2010) immediately after the financial crisis that claim that the analyst optimism bias has disappeared. Given that a quick Google search on analyst forecast optimism on February 8, 2020, came up with 2,010,000 results, how can Dr. Villadsen assure the Régie that the one-12-year-old paper she cites reflects current analyst forecast accuracy?

11.5 In exhibit BV-3 (exhibit B-0015, pp. 139-202), Dr. Villadsen reports just 2-4 security analyst growth forecasts for her Canadian sample. Has Dr. Villadsen checked on whom these analysts are and whether the same two or three analysts are providing forecasts for all these Canadian firms?

11.6 What other basic checks has Dr. Villadsen performed to ensure that the analyst forecasts are accurate, that is, consistent with their ability to retain and earn a reasonable return on their investments given that they come from an extremely limited number of analysts?

11.7 Does Dr. Villadsen think it reasonable that the Régie accept forecasts from in some cases just two sell-side analysts?

11.8 Is it Dr. Villadsen's judgment that dividends on utility shares increase on a quarterly basis so that her DCF estimates are based on quarterly compounding? If so, please provide the dividend history of each utility in her three samples since 2010 to justify the assumption that dividends are increased on a quarterly basis.

EQUITY COSTS ESTIMATES

12. **Reference: (i) EGI-1, exhibit B-0015, pp. 71, 72 and 77-79.**

Preamble:

(i) Dr. Villadsen's final estimates of the equity costs.

Requests:

12.1 On pages 71-72 and page 77, Dr. Villadsen presents her sample equity cost at different equity percentages and different market risk premium estimates for her CAPM and DCF based models. Is it correct to subtract the scenario 3 (4) results from that of scenario 1 (2) to obtain what she judges to be a *leverage* adjustment due to the fact that book capital structure entails more debt than the market valued capital structure she estimates in the appendices? So, for example, in the first set of CAPM estimates for her Canadian sample what she refers to as the "unlevered" method the leverage adjustment is 0.8% and 1.1% depending on the market risk premium and for the Hamada adjustments slightly less?

12.2 Can Dr. Villadsen confirm that similar leverage adjustments increase her estimates for the U.S. gas sample and water sample by 1.1% and 1.4% and by 1.1% and 1.5% respectively?

12.3 Can Dr. Villadsen confirm that for the Canadian sample at the historic market risk premium she uses of 5.68%, the range runs from 7.6% to 7.7% using Énergir's current 46% deemed equity ratio (38.5% common and 7.5% preferred) with her CAPM estimates and that these estimates include adjusted betas which the Régie has consistently rejected? If not, why not?

12.4 Can Dr. Villadsen confirm that her summary CAPM/ECAPM estimates on page 75 are consistently lower for the Canadian sample than for either the U.S. gas sample or water sample? If not, why not?

12.5 Dr. Villadsen's equity cost ranges in Figure 32 on page 78 do not seem to match the data in previous tables, for example the "low" CAPM estimate in Figure 25 on page 71 is 7.6% with the Hamada adjustment at Énergir's 46% equity ratio, whereas the low point in Figure 32 is 7.75%. Can Dr. Villadsen verify how the ranges in Figure 32 were calculated and present new tables if the differences are typos?

LEVERAGE ADJUSTMENT

13. **References:**
- **(i) EGI-1, exhibit B-0015, pp. 22-29, 78 and 139-202.**
- **(ii) R-3690-2009, D-2009-156, pp. 12-15 and 27. (*English version)***
- **(iii) R-3690-2009, D-2009-156, par. 228-229. (*English version)***
- **(iv) R-3690-2009, D-2009-156, pp. 54-58.**
- **(v) R-3724-2010, D-2010-147, p. 94.**
- **(vi) R-3690-2009, Written Evidence of Michael J. Vilbert, pp. 94 - 95.**
- **(vii) R-3690-2009, Written Evidence of A. Lawrence Kolbe, pp. 57 – 58.**
- **(viii) R-3690-2009, D-2009-156, par. 200. (*English version)***
- **(ix) R-3752-2011, phase 2, D-2011-182, p. 30.**

Preamble:

(i) Dr. Villadsen's leverage adjustment discussion pages 22-29 and adjustments on page 78.

(ii) "*This hearing examined a new approach to establishing the return on the Distributor's rate base, namely the ATWACC based on market values. The Régie has decided not to adopt this approach.*"

(viii) "*IGUA recommended continued application of the AAF, which would produce an 8.64 % return on equity (ROE) for 2010. Dr Booth stated that the AAF yields results that he described as generous but reasonable, adding that 75% adjustment factor applied to interest rate variations has been remarkably precise in the past in following downward movements in the Government of Canada bond rate, while allowing an increase in the risk premium*."

(Footnote omitted)

Requests:

13.1 At exhibit BV-3 (exhibit B-0015, pp. 139-202), Dr. Villadsen estimates the CAPM cost of equity for her Canadian sample using adjusted betas, please confirm that the average estimate is 7.6% and would be lower if she had used unadjusted betas.

13.2 Can Dr. Villadsen confirm that in exhibit BV-3 Dr. Villadsen estimates the overall after-tax cost of capital or what Dr. Kolbe in 2009 called the ATWACC for her Canadian sample as 4.8%?

13.3 With respect to reference (vi), can Dr. Villadsen confirm that in the 2009 GMI hearing Dr. Vilbert estimated the Canadian sample's ATWACC at 7.1% using a multistage DCF equity cost estimate of 9.6% (MJV-7) and 8.0% using the simple DCF Model with an equity cost of 11.2% (MJV-7)?

13.4 Can Dr. Villadsen confirm that both the ATWACC and the directly estimated equity cost have declined from Dr. Vilbert's evidence in 2009 to her current evidence by well over 2.0% in both the ATWACC and the equity cost? If not, please provide her own estimates of how much the ATWACC and equity cost have changed since the 2009 Brattle evidence.

13.5 With respect to reference (vii), can Dr. Villadsen confirm that Dr. Kolbe then used an average sample ATWACC of 7.25% that he adjusted upwards for issue costs and embedded debt costs to 7.75%?

13.6 With respect to reference (vii), can Dr. Villadsen confirm that the calculation made by Dr. Kolbe on page 58 is correct that given his 7.75% ATWACC he derived the "leverage adjusted" equity cost of 12.39% by inserting the book value capital structure deemed by the Régie for GMI (Énergir) of 38.5% common and 7.5% preferred shares at 5.22%?

13.7 Can Dr. Villadsen please confirm that in her Figure 25 on page 71 the unlevered equity cost of 7.6% is her direct estimate from her sample of Canadian Utilities and explains why it differs across the three adjustment methods given it is at Énergir's existing equity ratio and not adjusted for a financial leverage difference?

13.8 Can Dr. Villadsen show how the 8.5% equity cost is calculated from the 4.8% ATWACC and provides the calculation equivalent to that of Dr. Kolbe in 2009 page 58?

13.9 In terms of the Hamada adjustments, can Dr. Villadsen confirm that they are derived from a model that assumes there is a tax advantage to issuing debt that flows to shareholders, but that for a regulated firm that advantage flows to ratepayers. If not, please explain why not and where Professor Gordon's critique of the M&M tax corrected empirical tests were incorrect.

13.10 Can Dr. Villadsen confirm that regardless of the ATWACC versus adjusted beta estimates versus the ECAPM estimates her values are consistently much lower than those of Dr. Kolbe and Vilbert in 2009 when the Régie awarded GMI an allowed ROE of 9.20% and not the ATWACC generated estimate of 12.39%; a difference of 3.19%. If not, why not.

13.11 With respect to reference (viii), can Dr. Villadsen confirm that in 2009 IGUA recommended that GMI be allowed the 8.64% ROE that resulted from the application of the ROE adjustment formula at the time which was below the Régie's allowed ROE partly due to a 0.25%-0.55% allowance the Régie made for the effects of the financial crisis?

13.12 With respect to references (v) and (ix), can Dr. Villadsen confirm that the Régie then adjusted its automatic ROE formula to include a 0.50 adjustment to changes in utility borrowing spreads in the 2010 Gazifère decision that it was then adopted for GMI in 2011?

13.13 With respect to reference (ii), can Dr. Villadsen confirm that in its 2009 Decision D-2009-156 paragraph 299 the Régie rejected the ROE recommandation based on the ATWACC market value approach and had explained why the approach was not acceptable on pages 12-15 of its decision.

13.14 Can Dr. Villadsen explain why she is presenting results from a model that the Régie has specifically rejected after considerable hearing time was devoted to it when her current application looks almost identical to the evidence of Drs. Vilbert and Kolbe in that hearing?

RETURN ON EQUITY AND BOOK VALUE

14. **References: (i) EGI-1, exhibit B-0015, p. 8, fig. 1 and 2.**
(ii) Enbridge to sell stake in Noverco for $1.14 billion
(iii) R-3690-2009, Written Evidence of Michael J. Vilbert.
(iv) R-3690-2009, Written Evidence of A. Lawrence Kolbe, p. 57.
(v) Kolbe, Read and Hall, The Cost of Capital, MIT Press, pp. 25 - 32.
(vi) R-3690-2009, D-2009-156, par. 301.

Preamble:

(i) The model assumptions underlying Dr. Villadsen's estimates.

Requests:

14.1 Would Dr. Villadsen accept that her estimates like those of Dr. Vilbert and Kolbe in 2009 are based on methodologies that the Régie has specifically rejected, namely betas adjusted toward 1.0, the ECAPM and an ATWACC leverage adjustment? If not please explain where her evidence substantially deviates from theirs?

14.2 With respect to reference (iv) and (vi), given that Dr. Kolbe recommended an ROE of 12.39% in 2009 and the Régie awarded 9.20%, would Dr. Villadsen accept that in her judgment the Régie allowed an unfair and unreasonable ROE for GMI? If not please explain why not given the Brattle estimates at that time?

14.3 Would Dr. Villadsen accept that allowing an unreasonably low allowed ROE by 3.19% (12.39% - 9.20%) should have caused GMI's utility assets to sell below book value as explained by Kolbe, Read and Hall in their 1986 monograph, The Cost of Capital, MIT Press, pages 25-32?

14.4 Did Dr. Villadsen check the trading values of the then GMI limited partnership units traded on the Toronto Stock Exchange to see whether they did indeed trade below book value after the Régie's decision?

14.5 Is Dr. Villadsen aware that Enbridge Inc., sold a subsidiary's 38.9% interest in Noverco to Trencap limited partners for $1.14 billion in 2021 and that price valued Noverco at 29 times GAAP earnings? Can Dr. Villadsen please provide the 2021 year end PE ratio for each of the utilities in her samples and indicate whether the sale price was at a distressed price due to the unreasonable and unfair allowed ROE for Énergir based on these PE ratios.

14.6 Can Dr. Villadsen please provide the book value of Énergir and indicate what the price to book ratio of Trencap's purchase for Enbridge's share of Noverco was in 2021.

SAMPLES

15. **Reference: (i) EGI-1, exhibit B-0015, p. 78, fig. 31 and 32.**

Preamble:

(i) Dr. Villadsen's estimates relies on three samples of companies and in part on the dividend growth (DCF) model.

Requests:

15.1 Please provide the dividend per share, earnings per share, and book value per share for Énergir (GMI), Gazifère and Intragaz and all companies in Dr. Villadsen's three samples for each year since 2000.

15.2 Please provide the average stock price for each company in her sample back to 2000 (and explain how it is calculated), the price to book ratio and the earned ROE.

15.3 Where possible please provide the allowed ROE of each operating company in her three samples of utility holding companies going back to 2000.

15.4 Can Dr. Villadsen please indicate when she or other Brattle witnesses started using each company in her existing sample to verify that data back to 2020 is available in prior Brattle testimony?

ATWACC APPLICATION

16. **References: (i) EGI-1, exhibit B-0015, pp. 154-155 and 160-161.**
(ii) Alberta EUB, Decision U-99099, p. 303.

Preamble:

(i) Dr. Villadsen's appendices, for example BV 4.7 and BV 4.11, calculate the ATWACC for the firms in her samples.

Requests:

16.1 Please calculate the ATWACC consistent with the decision of the Alberta EUB (Decision U-99099, page 303) that indicated that for regulatory purposes the ATWACC needs to be calculated with book value weights. For this purpose, please use the latest quarterly (interim) financial statements at the time that Dr. Villadsen prepared her appendices.

16.2 Can Dr. Villadsen please estimate the fair ROE for each of the three samples of firms at the current regulated book weights and the ATWACC calculated in 16.1 above consistent with the Alberta EUB decision referenced above.

WRITTEN EVIDENCE OF
MICHAEL J. VILBERT

RÉGIE DE L'ÉNERGIE

WRITTEN EVIDENCE OF MICHAEL J. VILBERT

FOR

GAZ MÉTRO LIMITED PARTNERSHIP

The Brattle Group
44 Brattle Street
Cambridge, Massachusetts 02138
617.864.7900

May 4, 2009

WRITTEN EVIDENCE OF
MICHAEL J. VILBERT

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WRITTEN EVIDENCE OF
MICHAEL J. VILBERT

I. INTRODUCTION AND SUMMARY

Q1. Please state your name and address for the record.

A1. My name is Michael J. Vilbert. My business address is The Brattle Group, 44 Brattle Street, Cambridge, MA 02138, USA.

Q2. Please summarize your background and experience.

A2. I am a Principal of The Brattle Group, ("Brattle"), an economic, environmental and management consulting firm with offices in Cambridge, Washington, London, San Francisco and Brussels.

My work concentrates on financial and regulatory economics. I hold a B.S. from the U.S. Air Force Academy and a Ph.D. in finance from the Wharton School of Business at the University of Pennsylvania. Appendix A to this written evidence is a more complete description of my professional qualifications.

Q3. What is the purpose of your written evidence in this proceeding?

A3. Gaz Métro has asked Brattle (Dr. A. Lawrence Kolbe and me) to estimate the required rate of return for Gaz Métro as the after-tax weighted-average cost of capital ("ATWACC") necessary to provide a fair return on its gas distribution assets.

I derive a range based upon the market-determined overall cost of capital estimates from a selection of companies with business risk comparable to that of Gaz Métro's assets. Since companies with comparable business risk will have approximately the same overall cost of capital, these results provide an estimate of Gaz Métro's overall cost of capital.

My specific role is to estimate the overall cost of capital for the sample companies. I provide a range of estimates using both the risk positioning (also called "equity risk premium") method and the discounted cash flow ("DCF") method. Dr. Kolbe then uses these sample estimates, in conjunction with evidence on the relative business risk of Gaz Métro, to provide a recommended ATWACC.

Q4. Please summarize any parts of your background and experience that are particularly relevant to your written evidence on these matters.

A4. Brattle's specialties include financial economics, regulatory economics, and the gas and electric industries. I have worked in the areas of cost of capital, investment risk and related matters for many industries, regulated and unregulated alike, in many forums. I have testified on the cost of capital before the National Energy Board ("NEB") on behalf of TransCanada PipeLines Limited ("TransCanada") for the Mainline System in 2002 and 2005, and for the Trans Québec & Maritimes Pipeline Inc. ("TQM") in 2008 and before the Alberta Energy and Utilities Board ("EUB") on behalf of TransAlta Utilities in 1999 and on behalf of NOVA Transmission Ltd. in 2003. I have also testified before the Newfoundland & Labrador Board of Commissioners of Public Utilities on behalf of Industrial Customers of Newfoundland and Labrador Hydro in 2001. I filed written evidence before the EUB in 2000, before the Ontario Energy Board in 2005, and before the Alberta Utilities Commission in 2008. I have also testified before the U.S. Federal Energy Regulatory Commission ("FERC") and before many state regulatory commissions. I have not previously testified before the Régie de l'énergie.

Q5. Please outline the steps in your analysis.

A5. To estimate Gaz Métro's cost of capital, I analyze two samples: Canadian regulated utilities and U.S. gas local distribution companies ("gas LDCs"). For each of the benchmark samples, I estimate the market-value capital structures and market costs of debt and preferred stock for the sample companies. These are then combined with cost of equity estimates for the companies using the equity risk positioning approach to compute each firm's overall cost of capital, i.e., its ATWACC. As a check on these results, I use two versions of the DCF method to estimate cost of equity for the samples.

The result of this process is a sample average ATWACC for each benchmark group and for each cost of equity estimation method. I then report the ATWACC that is consistent with the sample evidence. The sample ATWACC estimates does not take Gaz Métro's costs of issuing equity capital or the embedded cost of Gaz Métro's debt into consideration.

Q6. Are the ATWACC estimates from each of the samples the end of the analysis?

A6. No. The ATWACC estimates for the two samples are evaluated by Dr. Kolbe, who first considers Gaz Métro's business risk compared to the sample companies and then determines the recommended ATWACC for Gaz Métro. Because the current turmoil in the financial markets affects the cost of capital for a regulated utility such as Gaz Métro, Dr. Kolbe also considers the effect of the current crisis on the cost of capital in determining the recommended ATWACC.

Q7. How does the current turmoil in the financial markets affect the cost of capital for a regulated utility?

A7. I discuss the effect of the credit crisis on the cost of capital in more detail in *Section III* below, but in general, the cost of capital is higher today than it was before the crisis. Unfortunately, the turmoil in the financial markets also affects the results of the estimation models so that estimating the cost of capital under current conditions is more difficult than it would normally be. Because of the unusual conditions prevailing today, I make several modifications to my standard procedures that I believe provide a more accurate estimate of the cost of capital in the financial markets today. These modifications are discussed below.

Q8. Please summarize your findings about the benchmark samples' costs of capital.

A8. Using benchmark parameters as inputs, the best point estimate of the ATWACC is 7¼ percent for the Canadian utilities sample and 7¼ percent for the gas LDC sample. However the analyses result in a range of estimates for each sample, so I report a range for each sample of plus ½ but minus ¼ percent. The result is a range of 7 to 7¾ percent for the Canadian utilities sample and the gas LDC sample and subsample.[1] Dr. Kolbe

[1] I specify the cost of capital estimate to the nearest ¼ percent because I do not believe that it is possible to estimate the cost of capital more precisely than that. All calculations supporting my analyses are presented in the attached tables labeled Table No. MJV-1 to Table No. MJV-22.

considers these sample estimates along with Gaz Métro's business risk to recommend an allowed ATWACC. Normally, I would report a symmetrical range of plus or minus ¼ percent around my point estimate, but at this time, the uncertainty on the upper end of the range is far greater than on the lower end of the range. In my procedures, I have generally been conservative so that the cost of capital could easily be higher than the highest estimates from my analysis, but it is highly unlikely to be lower.

For both the Canadian utilities and the gas LDC samples, I believe that the results of the DCF model are less reliable than those based upon the risk positioning model; however, the DCF model results serve as a check on the results from the equity risk positioning approach. A check is especially important at this time when the risk-free interest rate is low, the corporate bond yield and the market volatility high, so the numbers from the risk positioning model are harder to interpret.

Q9. How is your written evidence organized?

A9. *Section II* formally defines the cost of capital and touches on the principles relating to the estimating the cost of capital and the effect of capital structure on the cost of equity. Dr. Kolbe's written evidence provides additional detail on these points. *Section III* discusses the impact of the ongoing financial turmoil on the cost of capital. *Section IV* presents the methods used to estimate the cost of capital for the benchmark samples. *Section V* provides the associated numerical analyses and explains the basis of my conclusions for the benchmark samples' overall costs of capital (ATWACC). Appendices B through D support *Section IV* and *Section V* with additional details on the sample selection procedures, estimating the market value capital structures and cost of debt, the risk positioning method and the DCF approach including the details of the numerical analyses. *Section VI* concludes.

II. COST OF CAPITAL THEORY

A. COST OF CAPITAL AND RISK

Q10. Please formally define the "cost of capital."

A10. The cost of capital can be defined as the expected rate of return in capital markets on alternative investments of equivalent risk. In other words, it is the rate of return investors require based on the risk-return alternatives available in competitive capital markets. The cost of capital is a type of opportunity cost: it represents the rate of return that investors could expect to earn elsewhere without bearing more risk. "Expected" is used in the statistical sense: the mean of the distribution of possible outcomes. The terms "expect" and "expected" in this written evidence, as in the definition of the cost of capital itself, refer to the probability-weighted average over all possible outcomes.

The definition of the cost of capital recognizes a tradeoff between risk and return that is known as the "security market risk-return line," or "security market line" for short.

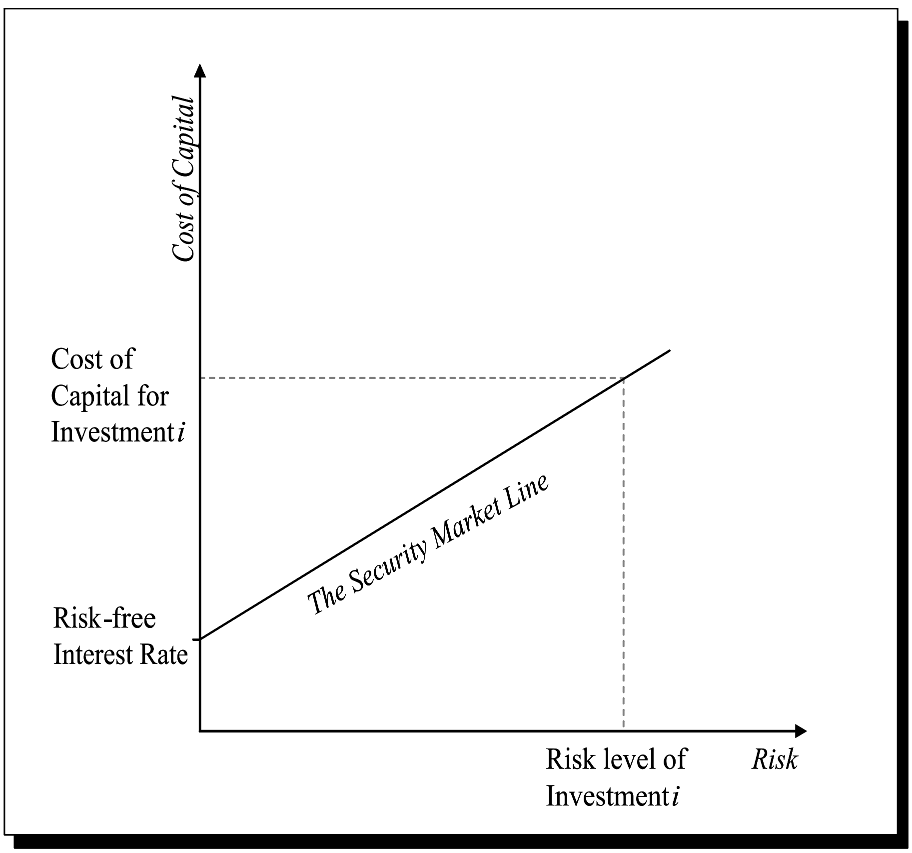


Figure 1: The Security Market Line

This line is depicted in Figure 1. The higher the risk, the higher the cost of capital required. A version of Figure 1 applies for all investments. However, for different types of securities, the location of the line may depend on corporate and personal tax rates.

Q11. Why is the cost of capital relevant in rate regulation?

A11. It has become routine in rate regulation to accept the "cost of capital" as the right expected rate of return on utility investment. That practice normally is viewed as consistent with the Supreme Court of Canada's decision in *Northwestern Utilities v. City of Edmonton* [1929] S.C.R. 186. In the U.S. the comparable decision is the U.S. Supreme Court's opinions in *Bluefield Waterworks & Improvement Co. v. Public Service Commission*, 262 U.S. 678 (1923), and *Federal Power Commission v. Hope Natural Gas*, 320 U.S. 591 (1944).

From an economic perspective, rate levels that give investors a fair opportunity to earn the cost of capital are the lowest levels that compensate investors for the risks they bear. Over the long run, an expected return above the cost of capital makes customers overpay for service. Regulators normally try to prevent such outcomes, unless there are offsetting benefits to customers (e.g., from incentive regulation that reduces future costs). At the same time, an expected return below the cost of capital shortchanges investors. In the long run, such a return denies the company the ability to attract capital, to maintain its financial integrity, and to expect a return commensurate with that on other enterprises attended by corresponding risks and uncertainties.

More important for customers, however, are the economic issues an inadequate return raises for them. In the short run, deviations of the expected rate of return on the rate base from the cost of capital create a "zero-sum game"-- investors gain if customers are overcharged, and customers gain if investors are shortchanged. In the long run, however, inadequate returns are likely to cost customers -- and society generally -- far more than is gained in the short run. Inadequate returns lead to inadequate investment, whether for maintenance or for new plant and equipment. The costs of an undercapitalized industry can be far greater than the gains from short-run shortfalls from the cost of capital. Moreover, in capital-intensive industries, (such as gas transmission, storage and distribution), systems that take a long time to decay cannot be fixed overnight, either. Thus, it is in the customers' interest not only to make sure the return investors expect does not exceed the cost of capital, but also to make sure that it does not fall short of the cost of capital, either.

Of course, the cost of capital cannot be estimated with perfect certainty, and other aspects of the way the revenue requirement is set may mean investors expect to earn more or less than the cost of capital even if the allowed rate of return equals the cost of capital exactly. However, a regulator that on average sets rates so investors expect to earn the cost of capital treats both customers and investors fairly, and acts in the long-run interests of both groups.

B. RELATIONSHIP BETWEEN AFTER-TAX WEIGHTED-AVERAGE COST OF CAPITAL, CAPITAL STRUCTURE, AND THE COST OF EQUITY

Q12. Please explain the numerical calculation of the ATWACC.

A12. The After-Tax Weighted-Average Cost of Capital is calculated as the weighted average of the after tax cost of debt capital and the cost of equity. Specifically, the following equation pertains:[2]

$$ATWACC = r_D \times (1 - T_C) \times \%\,D + r_P \times \%\,P + r_E \times \%\,E \qquad (1)$$

where r_D = market cost of debt,
r_E = market cost of equity,
r_P = market cost of preferred,
T_C = corporate income tax rate,
$\%D$ = percent debt in the capital structure,
$\%E$ = percent equity in the capital structure, and
$\%P$ = percent preferred in the capital structure.

[2] The equation is shown with debt, preferred, and equity. If the capital structure has no preferred, the middle term ($r_P \times \%\,P$) disappears.

The return on equity consistent with the sample's cost of capital estimate (the ATWACC), the market cost of debt, the corporate income tax rate, the market cost of preferred, and the amount of debt, preferred equity and common equity in the capital structure can be determined by solving equation (1) for r_E. Alternatively, if r_E is given and the capital structure is not, one can solve for %E instead. Having determined the ATWACC for the sample companies, I can apply that same ATWACC or an ATWACC adjusted for risk differences to the regulated entity.

Q13. Why it is necessary to consider the sample companies' capital structures as well as that of Gaz Métro in your analysis?

A13. Dr. Kolbe's written evidence covers this topic in detail. Briefly, the cost of equity and the capital structure are inextricably entwined in that the use of debt increases the financial risk of the company and therefore increases the cost of equity. The more debt, the higher is the cost of equity for a given level of business risk. Rate regulation has in the past often focused on the components of the cost of capital, and in particular, on what the "right" cost of equity capital and capital structure should be. The cost of capital depends primarily on the business the firm is in, while the costs of the debt and equity components depend not only on the business risk but also on the distribution of revenues between debt and equity. The cost of capital is thus the more basic concept. Although the overall cost of capital is constant (ignoring taxes and costs of excessive debt), the distribution of the costs among debt and equity is not. Reporting the average cost of equity estimates from the samples without consideration of the differences in financial risk may result in material errors in the allowed return for Gaz Métro. *Section IV* and Appendix B of Dr. Kolbe's evidence set out the principles and procedures on which I rely.

Q14. Please explain how the ATWACC approach differs from that of more traditional procedures where the cost of equity and the deemed capital structure is determined separately.

A14. Traditional approaches often involve estimating the cost of equity for each of the sample firms without explicit consideration of the market-value capital structure underlying those costs. Then, relying on the sample's average cost of equity, one estimates the cost of equity for the company in question. Note that the traditional method often makes no direct connection between differences in the capital structures of the sample firms used to estimate the cost of equity and the regulatory capital structure used to set rates. Consequently, the sample's estimated return on equity does not necessarily correspond to the financial risk faced by investors in the regulated assets. If the sample's estimated cost of equity were adopted without consideration of differences in financial risk, it could lead to an unfair rate of return.

I avoid this problem by calculating each sample company's overall ATWACC using its market value capital structure. The range of ATWACCs that I obtain from the samples then provides a benchmark for determining Gaz Métro's ATWACC. Alternatively, it is possible to determine the cost of equity that is consistent with the samples' ATWACC estimates and with the target utility's regulatory capital structure. In his written evidence, Dr. Kolbe reports the return on equity consistent with his recommended ATWACC for Gaz Métro and different capital structures.

Q15. Does your ATWACC approach parallel the ATWACC approached that the NEB adopted to set rates for TransQuebec & Maritimes Pipeline ("TQM")?

A15. Yes. The NEB decided to set rates for TQM based entirely upon the market determined ATWACC which envisions the recovery of the market cost of debt as opposed to the embedded cost of debt. My procedures essentially duplicate those that the NEB used although the parameters underlying the NEB's ATWACC estimate vary somewhat from the parameters that I use. In addition, in the TQM proceeding, embedded cost of debt was not an issue because (i) the embedded and market costs of debt were comparable and (ii) TQM chose not to focus on the recovery of embedded cost of debt. However, Gaz Métro's embedded cost of debt differs somewhat from the market cost of debt, so the issue of whether to recover the embedded or market cost of debt is more important in this proceeding. This issue is discussed in the written evidence of Dr. Kolbe.

III. IMPACT OF CURRENT ECONOMIC TURMOIL ON THE COST OF CAPITAL

Q16. What is the topic of this section of your testimony?

A16. This section addresses the effect of the current economic situation on the cost of capital and the modifications that I have made to my standard procedures to attempt to estimate the cost of capital more accurately.

Q17. Please summarize the effect of current economic conditions on the cost of capital.

A17. The current economic situation in Canada, the U.S. as well as most of the rest of the world is very uncertain for investors. Economic growth has slowed, and it is now negative in many countries. Stock markets worldwide have lost substantial value. In Canada, the S&P/TSX, for example, has fallen 45 percent from its peak in June 2008 and the volatility of the index has increased substantially. Similarly, in the U.S., the S&P 500 has fallen more than 50 percent from its peak in October 2007**,** and the volatility of the index has increased dramatically. (See Figure 2 and Figure 3 below.) The likely result of the increased uncertainty is that investors' risk aversion has increased, which, in turn, means that the cost of capital is higher today than in the recent past.

Q18. What do you mean by the term investor "risk aversion"?

A18. Risk aversion is simply the recognition that risk-averse investors dislike risk.[3] A fundamental tenet of investing is that investors face a risk-return tradeoff in selecting from among the various investment options. Risk-averse investors can only be induced to accept more risk if the expected return is higher. When investors' risk aversion increases, the expected return (sometimes called the required return) increases for any

[3] The term "coefficient of risk aversion" is frequently used in academic articles in conjunction with an assumption regarding investors' utility functions. In this testimony, I am using the term in a more generic sense.

level of risk. In other words, the market risk premium ("MRP"), the premium required for an average risk stock, is higher today than it was in the recent past.

Q19. What evidence do you have that investors' risk aversion has increased?

A19. A number of readily observable factors indicate an increase in investors' risk aversion. Unprecedented defaults in debt instruments that had previously been highly rated (AA or A), such as collateralized debt obligations and mortgage-backed securities, and the fall in value of most securities caused investors to seek investments that would preserve the value of their investments.[4] As a result, there has been a "flight to safety" by investors seeking to maintain the value of their investments. In general, investors perceive bonds as less risky (safer) than equity so the demand for bonds, particularly government debt, has increased substantially. As a consequence, yields on Canadian government bonds are at a 20 year low. The flight to safety had two other results. First, the yield spread between corporate bonds and government bonds has increased dramatically in Canada as well as elsewhere. Although yield spreads have declined somewhat from their highest levels, they remain high by historical standards. (See Table 1 below.) Second, the stock market has plummeted in value as investors attempted to move out of investments considered risky to those of lower risk. Increased risk aversion translates into a requirement for an investment to provide a higher expected return for a given level of risk. Under such circumstances, prices of investments fall until investors can again expect to earn their (now higher) required rate of return.

[4] To my knowledge, there has been little to no increase in default of investment grade utility debt.

Table 1

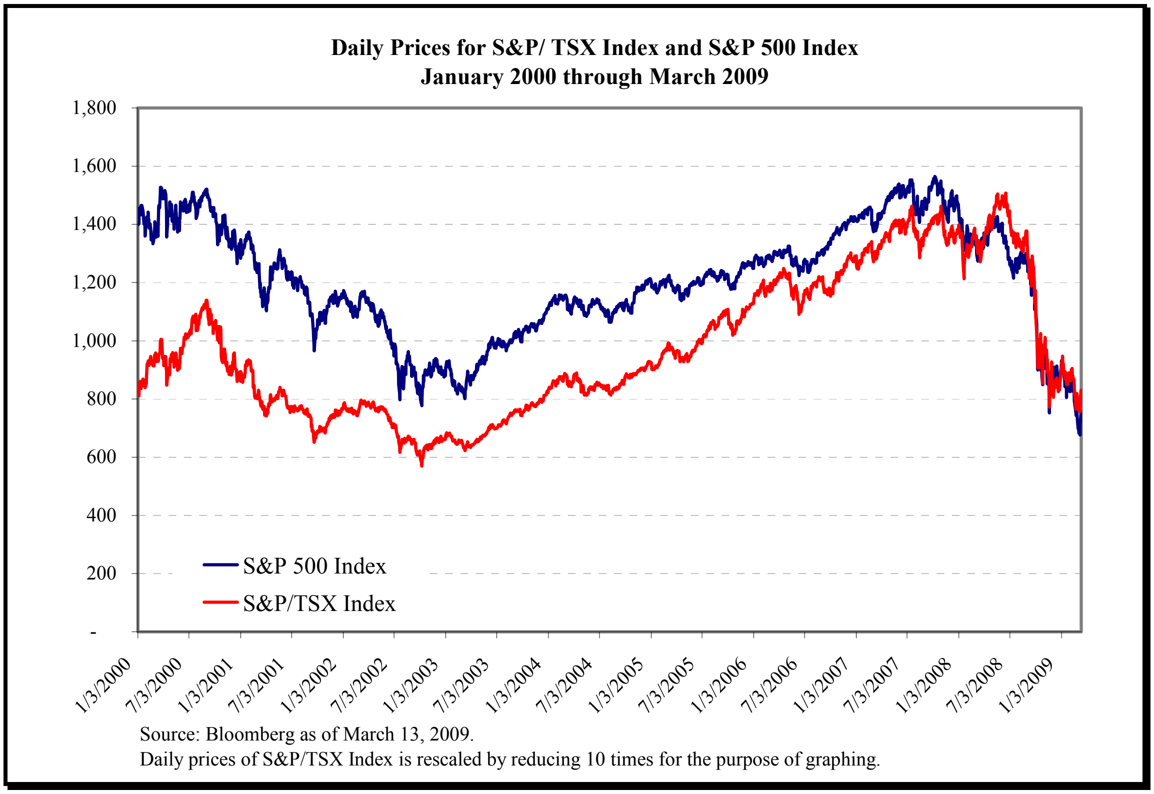
Spreads between Canadian Utility Bonds (10 year maturity) and Canadian Government Bonds (10 year maturity) (in percentage)			
Periods	A-Rated Utility and Government Bonds	BBB-Rated Utility and Government Bonds	Notes
Period 1 - Average Mar-2002 - Dec-2007	0.83	1.08	[1]
Period 2 - Average Aug-2008 - Mar-2009	2.33	3.13	[2]
Period 3 - Average Mar-2009	2.67	3.45	[3]
Period 4 - Average 15-Day (Feb 18, 2009 to Mar 10, 2009)	2.68	3.59	[4]
Spread Increase between Period 2 and Period 1	1.50	2.05	[5] = [2] - [1].
Spread Increase between Period 3 and Period 1	1.84	2.37	[6] = [3] - [1].
Spread Increase between Period 4 and Period 1	1.85	2.50	[7] = [4] - [1].
Spreads between Canadian Utility Bonds (30 year maturity) and Canadian Government Bonds (30 year maturity) (in percentage)			
Periods	A-Rated Utility and Government Bonds	BBB-Rated Utility and Government Bonds	Notes
Period 1 - Average Mar-2002 - Dec-2007	0.99	1.52	[1]
Period 2 - Average Aug-2008 - Mar-2009	2.59	2.85	[2]
Period 3 - Average Mar-2009	2.87	3.11	[3]
Period 4 - Average 15-Day (Feb 18, 2009 to Mar 10, 2009)	2.98	3.20	[4]
Spread Increase between Period 2 and Period 1	1.60	1.33	[5] = [2] - [1].
Spread Increase between Period 3 and Period 1	1.87	1.60	[6] = [3] - [1].
Spread Increase between Period 4 and Period 1	1.98	1.68	[7] = [4] - [1].

Source:
Spreads for the periods are calculated from Bloomberg's yield data.
Average monthly yields for the indices were retrieved from Bloomberg as of April 2, 2009.

Q20. How different is the overall economic environment now compared to other time periods in which you have testified?

A20. We now live in a very different economic environment compared to one or two years ago. The Canadian, the U.S., and the world economies are in the state of economic recession triggered by deep financial crisis that emerged from the housing bubble and from financial institutions' use of complicated structures that concealed the true risk faced by the investors. Stock markets are down, market volatility and the spreads on corporate debt are high, and for most firms it has become extremely hard to gain access to external financing on reasonable terms.

More specifically, as Figure 2 below indicates, both the S&P/TSX index and the S&P 500 index are down by more than 40 percent compared to mid-2008.[5]



Source: Bloomberg as of March 13, 2009.
Daily prices of S&P/TSX Index is rescaled by reducing 10 times for the purpose of graphing.

Figure 2

Figure 3 displays the market volatility, measured by the 10-day rolling volatility on the S&P/TSX index as well as for the S&P 500 index, over the period beginning in 2000 through the second week of March 2009.

[5] As of March 13, 2009, the S&P/TSX is down by 45 percent from its highest level on June 18, 2008 and the S&P 500 is down by 52 percent from its highest level on October 9, 2007.

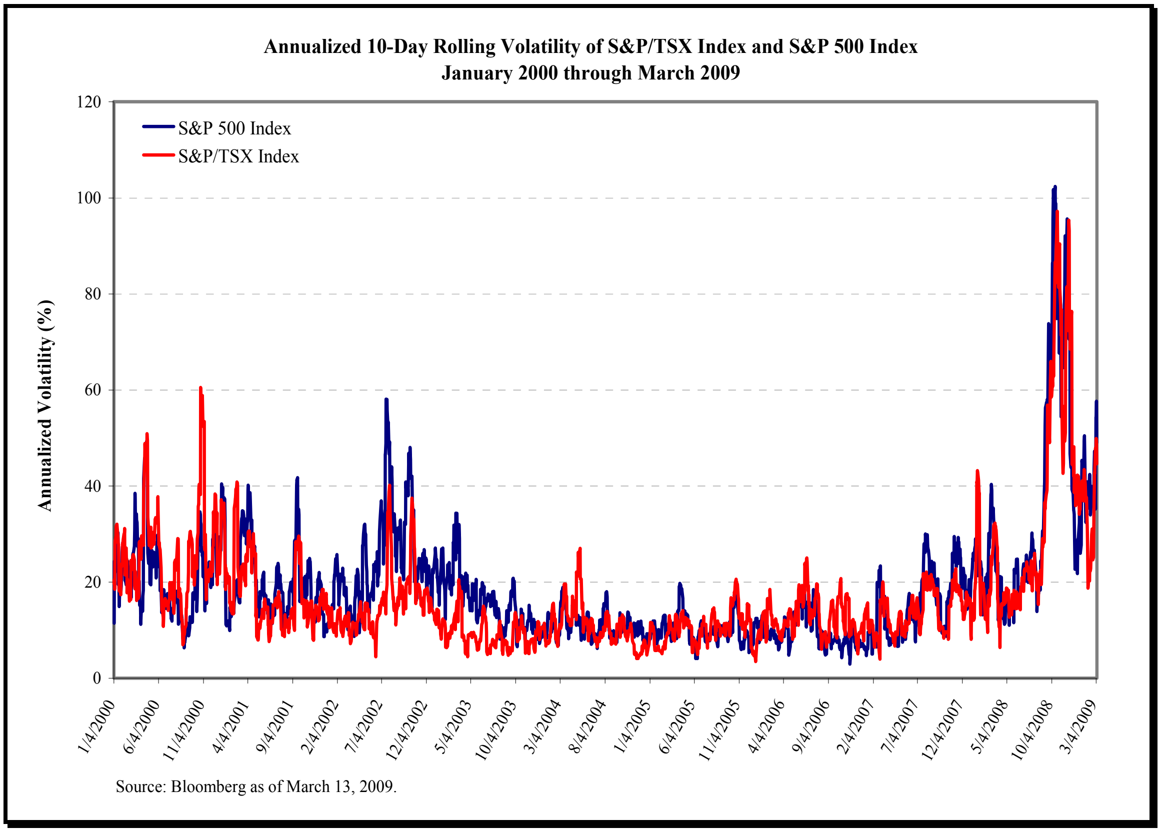


Figure 3

Prior to the current financial crisis, average volatility was a bit below 20 percent in Canada and about 20 percent in the U.S., but it spiked to over 90 percent (100 percent in the U.S.) in late 2008. Although volatility has decreased somewhat over the last several weeks, it is still more than two times higher than the average value for the first half of 2008 and very high by historical standards. One implication of this is that even if investors' risk aversion had not changed, the market risk premium would increase simply because market volatility is up.

Q21. Please explain the link between financial downturn and the MRP.

A21. The academic literature that has studied the impact of recessions on investors' attitude towards risk find that risk aversion and hence the risk premium required to hold equity rather than debt increases in economic downturns. Several articles suggest that the market risk premium is higher during times of recession. Constantinides (2008) studies a classical utility model where consumers are risk averse and also summarizes some of the empirical literature. Empirical evidence shows that consumers become more risk averse in times of economic recession or downturn, and equity investments accentuate this risk[6] (increased risk aversion leads to a higher expected return for investors before they will invest). Specifically, equities are pro-cyclical and their performance is positively correlated with the economy's performance. Thus, unlike government bonds, equities fail to hedge against income shocks that are more likely to occur during recessions.[7] Consequently, investors require an added risk premium to hold equities during economic downturns:

> The risk premium is highest in a recession because the stock is a poor hedge against the uninsurable income shocks, such as job loss, that are more likely to arrive during a recession.[8]

Empirically, several authors have found that market volatility and the market risk premium are positively related. For example, Kim, Morley and Nelson (2004)[9] find that:

> When the effects of volatility feedback are fully taken into account, the empirical evidence supports a significant positive relationship between stock market volatility and the equity premium.[10]

There are also a number of papers that argue that the MRP is variable and depends on a broad set of economic circumstances. For example, Mayfield (2004)[11] estimates the MRP in a model that explicitly accounts for investment opportunities. He models the

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[6] Constantinides, G.M. (2008), "Understanding the equity risk premium puzzle." In R. Mehra, ed., *Handbook of the Equity Risk Premium*. Elsevier, Amsterdam.

[7] Constantinides, G.M., and D. Duffie (1996), "Asset Pricing with Heterogeneous Consumers." *Journal of Political Economy*, pp. 219-240.

[8] Constantinides, G. M. 2008, *Op Cit.,* p. 353.

[9] C-J. Kim, J.C. Morley and C.R. Nelson (2004), "Is There a Positive Relationship Between Stock Market Volatility and the Equity Premium," *Journal of Money, Credit and Banking*, Vol. 36, pp. 339-363.

[10] *Ibid*. p. 357. The authors rely on a statistical (Markov-switching) model of the ARCH type and data for the period 1926 to 2000 for their analysis.

[11] E.S. Mayfield (2004), "Estimating the market risk premium," *Journal of Financial Economics*, vol. 73, pp. 465-496.

process that governs market volatility and finds that the MRP varies with investment opportunities which are linked to market volatility. Thus, the MRP varies with investment opportunities and about half of the measured MRP is related to the risk of future changes in investment opportunities. Thus, the more volatile the market is, the higher the MRP. Additional details on the MRP are included in Appendix C.

Q22. Do you have any evidence on how much the MRP has increased?

A22. Yes. I estimate that the MRP has increased by at least 1 percent over its level prior to the crisis due to a change in financial risk resulting from the unexpected change in the average market value capital structure of the companies in the market.

Q23. How did you estimate the increase in MRP due to the increased financial risk?

A23. The method I used to estimate the increased MRP is based upon the recognition that the sharp decrease in the average market price of equity has unexpectedly increased the level of financial risk in the stock market. Higher financial risk leads to a higher required rate of return on equity, so I compute the average capital structure of the stock market as measured by the S&P/TSX before the crisis and after the crisis to measure the change in financial risk.

Q24. Once you estimate the capital structure of the market at two different times, please outline the steps you used to estimate the change in MRP.

A24. Once I estimated the average capital structure of the market, I estimated the average cost of equity for the market in August 2008 and calculated an ATWACC for the market using the cost of debt for an A-rated company and a 35 percent marginal tax rate. The cost of equity for the market is simply the sum of the long-term risk-free rate and my 5.75 percent estimate of the MRP. I then calculated the ATWACC for the market using Equation 1 above. The next step was to determine how much the market ROE would change solely as a result of the change in financial risk stemming from the drop in market values assuming that the pre-crisis market ATWACC did not change. In the tables included in Workpaper #2, Panels C to E to Table No. MJV-9, I calculated the ROE corresponding to the actual market value equity ratios before and after the decline in the market.[12] I also provide two sensitivity tests calculating the change in ROE starting from 85 percent and 80 percent equity ratio and falling to a 70 percent equity thickness. These values are roughly comparable to the capital structure of the companies in the S&P/TSX index before the crisis and as of today. From this analysis, I concluded that the MRP increased by at least 1 percent, but this is likely to be a floor for the actual increase.

Q25. Why do you believe that the 1 percent estimated increase in the MRP is a floor?

A25. The calculation of the increase in the MRP assumes that the market required ATWACC has not increased, but the evidence indicates that the price of risk has increased substantially. Research indicates, for example, that the MRP is related to volatility in the stock market, which as shown in Figure 3 above has increased dramatically and remains currently at almost twice its normal level. A higher ATWACC would indicate an even greater increase in the estimated MRP than estimated in the Workpaper #2, Panels C to E to Table No. MJV-9.

Q26. Would you please elaborate on the effect of the increasing spread between government bond yields and utility bond yields?

A26. Yes. Gaz Métro obtains equity and debt financing from the capital markets, and the rates available to Gaz Métro are not comparable to those of government bonds. As the spreads between government bond yields and utility bond yields have increased, the risk-free rate, which is the measure used in the Régie's formula, has become less reliable as an indicator of the cost of capital for Gaz Métro (or other utilities). As demonstrated in Table 1 above, the spreads between Canadian long-term government bond yields and utility bond yields have increased markedly. Specifically, the average spreads between utility bond yields and government bond yields with 10-year maturities have increased by more than

[12] For example, in August of 2008, just around the time the stock market began to decline, the average capital structure for the companies in the S&P TSX was about 80.0 percent equity compared to about 69 percent in March 2009. In principle, the appropriate metric would be the average market value capital structure of the S&P TSX over the period used to estimate the MRP, i.e., 1926 to the present, but this is prohibitively time consuming to calculate.

1.85 percent for A-rated utilities and by more than 2.50 percent for BBB-rated utility in the period February/March 2009 compared to the period 2002-2007. For debt with 30-year maturities, the corresponding increases in yields are 1.98 percent for A-rated utility debt and 1.68 percent for BBB-rated utility debt. (See Table 1 above.) The increase in yield spreads indicates that the cost of capital has increased for Canadian utilities.

Q27. Is the increase in investors' risk aversion from current economic conditions likely to be a temporary or a permanent change?

A27. It is likely that some of the increase in risk aversion stems from the chaotic market conditions and will, therefore, be transitory in nature, but there is a strong possibility that there will also be a longer-term (more permanent) effect as market participants draw conclusions from the crisis on the risk-return characteristics of investment alternatives.

Q28. If the increase in the cost of capital is likely to be temporary, should the Régie take the current increase in the cost of capital into consideration when setting the allowed return for Gaz Métro?

A28. Yes. I recommend that the Régie recognize the increased cost of capital. Mechanical application of the formula would indicate a decrease in the allowed rate of return at this time, but all other evidence points to an increase in the cost of capital generally in the market. Although I believe that some of the increase in the MRP is likely to be temporary, it is very difficult to predict when the capital markets will return to more normal conditions so it is difficult to predict when the market cost of risk will return to more normal levels. Even when market conditions are more normal, investors' risk aversion may remain higher well into the recovery period until their confidence fully returns. Although the financial crisis to date has affected the Canadian economy less than the U.S. economy, the impact is still substantial with declining commodity prices and increasing unemployment.[13] The Bank of Canada as well as the Canadian Government has taken actions to increase liquidity in the market, reform financial

[13] See, Speech by Bank of Canada Governor, Mark Carney, *Rebuilding Confidence in the Global Economy*, April 1, 2009.

markets, and stimulate the economy.[14] Although the success or failure of those actions are unlikely to be apparent in the short- to medium-term, in the long run these measures may help alleviate investors' concerns. However, it could easily be years before investors regain the confidence prevailing prior to the current crisis. In fact, there may be a "permanent" adjustment in risk tolerance now that investors realize that severe economic conditions are still possible even with the increased tools to manage the economy available to government.

Q29. Aren't the low realized returns on the market recently a clear indication that market participants are willing to accept a lower expected return on their investments?

A29. Absolutely not. To the contrary – market values have been falling in order to allow an increased in the expected returns on investment. As risk aversion increases, expected returns must increase in order to induce investors to buy, so prices must fall. In other words, realized returns over the last few months are not indicative of investors' required rate of return. Investors have undoubtedly been disappointed recently. This adjustment process is well known to bond investors. As the general level of interest rates in the economy increases, the market price of a bond will decrease so that the yield-to-maturity will increase to the level required by the market. The same phenomenon occurs with equities as well.

Q30. Are the conditions in the financial markets and the economy currently limiting utilities access to financial markets?

A30. Yes. The increased yield on utility debt compared to government debt impedes access because the cost of new utility debt is relatively very high. Also as discussed in Mr. Aaron Engen's written evidence, utilities appear to be replacing equity issuances and

[14] See, for example, Speech by Bank of Canada Deputy Governor, David Longworth, *Financial Systems Policy Responses to the Crisis*, March 12, 2009 and *Canada's Economic Action Plan: A First Report to Canadians*, Department of Finance, March 2009.

bank debt with long-term debt. These factors impact regulated utilities' access to capital and the cost hereof.

Q31. What do you conclude about the cost of capital from the evidence on current economic conditions?

A31. The evidence above and that of Mr. Engen show that the cost of capital is much higher today than in the relatively recent past. Although some of the increase in the MRP is likely to reverse when stable economic conditions return, it may be many years before investors regain the full level of confidence that will result in an MRP as low as before the crisis. Until economic conditions stabilize, it is critical that the major infrastructure investment necessary for regulated utilities not be hampered by inadequate allowed rates of return.

Q32. How do you adjust your cost of capital estimation methods to correct for current economic conditions?

A32. I make no adjustment to the DCF method. For the risk positioning method, I recognize the unusually large yield spread on utility debt by adding a "yield spread adjustment" to the current long-term risk-free rate. This has the effect of increasing the intercept of the Security Market Line displayed in Figure 1 above. I also present results from the risk positioning model by increasing the MRP slightly over the 5.75 percent that I use as the benchmark for Canada. I present sensitivity tests of the effect of an increase in the MRP of 1, 2 and 3 percent and yield spread adjustments of ¾, 1, and 1¼ percent. The spreadsheets attached to my written evidence are based upon a yield spread adjustment of 1 percent and a MRP adjustment of 2 percent.

Q33. How do you estimate the additional increase in MRP over the one percentage point floor derived from the unexpected change in the market's average capital structure?

A33. Estimating the MRP is always imprecise and controversial. Measuring the change in MRP due to the current economic situation is likely to be no different, but it is still necessary to estimate the MRP as carefully as possible given the change in economic conditions. Happily, in addition to the information given by the change in market leverage, an additional way to provide a quantitative benchmark for the increase comes from a paper by Edwin J. Elton, et al., which documents that the yield spread on corporate bonds is normally a combination of a default premium, a tax premium, and a systematic risk premium.[15] As displayed in Table 1 above, the yield spreads for A-rated utility debt have currently increased dramatically compared to the average for the period 2002-2007.

Q34. How do you use the information in Table 1 on the increase in yield spreads to estimate the increase in the MRP?

A34. Table 1 shows that yield spreads for A-rated utility debt have increased by about 1.8 percentage points for 10-year maturities and 2.0 percentage points for 30-year maturities. Some of the increase in yield spread may be due to an increase in default risk,[16] but some of the increase is due to a combination of an increase in the systematic risk premium on A-rated debt and some is the result of downward pressure on the yield of risk-free debt due to the flight to safety. The increase in the default risk premium for A-rated debt is undoubtedly very small because A-rated utility debt has not been among the debt at the center of the wave of defaults based upon collateralized mortgage debt. This means that the vast majority of the increase in yield spreads is due to the increased risk premium and increased downward pressure on the yields of government debt.

Q35. How do you allocate the increased in the yield spread not due to the estimated increase in default risk to the increase in systematic risk or the increase in downward pressure on government bonds?

A35. There is no precise way to allocate the increase in yield to the two components; however, I have estimated that the minimum that the MRP has increased is one percentage point.

[15] "Explaining the Rate Spread on Corporate Bonds," Edwin J. Elton, Martin J. Gruber, Deepak Agrawal, and Christopher Mann, *The Journal of Finance*, February 2001, pp. 247-277.

[16] Although there is no increase in tax premium due to coupon payments, there may some increase due to a small tax effect resulting from the probability of increased capital gains when the debt matures.

Assuming a beta of 0.25 for A-rated debt[17] means that an increase in MRP of one percentage point translates into a ¼ percentage point increase in the risk premium on A-rated debt, i.e. 0.25 (beta) times 1 percentage point (increase in MRP) = ¼ percentage point. A two percentage point increase in the MRP would, therefore, translate into a ½ percentage point increase in the yield spread for the increase in the risk premium for systematic risk, leaving the rest of the increase in yield spread as downward pressure on the risk-free interest rate.

The average increase in yield spread is approximately 1.9 percentage points (average of 1.9 percent and 2.0 percent rounded down). If 0.4 percentage points of this is assumed to be the sum of the increased default risk, increased tax premium and the difference in timing between current Government of Canada bond yields and those forecast for March 2010 in *Consensus Forecasts*, that leaves 1.5 percentage points that result jointly from the increase in systematic risk and the downward pressure on the risk-free rate.

For every 1 percentage point increase in the MRP, the increase in yield spread due to increase in systematic risk is 0.25 percentage point, so a 2 percentage point increase in MRP means that 0.5 percentage point of the 1.5 percentage point increase is for systematic risk, leaving 1 percentage point for the downward pressure on the risk-free rate. The more of the increase in yield spread assumed to result from an increase in systematic risk, the larger must be the corresponding increase in the MRP and the smaller the effect of the downward pressure on the risk-free rate. If all of the non-default increase in the yield spread were due to the increase in systematic risk, the MRP would have to increase by 6 percentage points i.e., 1.5 percentage point = 0.25 (beta) times 6 percentage points (increase in MRP).

Q36. Wouldn't the estimate of the effect of an increase in the MRP be different if the estimate of the beta of an A-rated bond were different?

[17] Elton, et al estimate the average beta on BBB-rated corporate debt as 0.26 over the period of their study, and A-rated debt will have a lower beta than BBB-rated debt.

A36. Yes. If the beta of an A-rated bond were higher (lower), the increase in the systematic risk premium in the yield spread for each one percentage point increase in the MRP would be greater (smaller). However, I believe that a beta estimate of 0.25 for an A-rated utility debt is reasonable, and is likely to be conservative, especially when compared to an average estimated beta of 0.65 for the equity of Canadian utilities. (See Workpaper #1 to Table No. MJV-10 for the estimated betas of the Canadian utilities sample.) As noted in footnote 17, the average estimated beta for BBB-rated was 0.26 and A-rated debt will have a lower estimated beta. Even if the average beta for BBB-rated debt is higher today than at the time of the Elton et al study, it is likely that an estimate of 0.25 for A-rated debt is reasonable.

Q37. So is this calculation the basis of your base-case 2 percentage point increase in the MRP due to the financial crisis?

A37. In part. However, my conclusion is also based on a broader consideration of the present circumstances. As discussed in Mr. Engen's evidence, various authorities, including the Bank of Canada and the International Monetary Fund, keep issuing ever-gloomier economic forecasts. We have seen serious talk of an outright depression for the first time in decades. Banks are failing or stressed in countries around the world, in an increasingly global economy. It simply begs logic to believe that the MRP has not increased markedly from its level in more normal times, whether there is an agreed model for how to calculate the increase or not.

In light of these circumstances and the calculations described above, I submit that a 2 percentage point increase in the MRP is on the low side of the adjustments that might reasonably be made. The one percentage point increase due to the leverage adjustment is the absolute floor on the possible increases, but the actual increase might be far more than 2 percentage points. In my present evidence, I simply show the implications of a 3 percentage point increase as illustrative of the potential greater increases, but in the present circumstances, I might reasonably have chosen an even higher value for this purpose.

IV. COST OF CAPITAL METHODOLOGY

Q38. How is this section of your testimony organized?

A38. As noted in *Section II*, I estimate the cost of capital using samples of Canadian regulated utilities and gas local distribution companies in the U.S. This section first outlines the steps involved in selecting these benchmark samples, in determining the market-value capital structure, and in estimating the sample companies' costs of debt. It then turns to the procedures for estimating the costs of equity and describes the two cost of equity estimation methodologies used in this testimony, the risk positioning method and DCF approach. These are the foundations of my cost of capital calculations, which I present in the following section.

A. SAMPLE SELECTION

Q39. What is the goal of your sample selection procedures?

A39. The goal of the sample selection process is to select a sample of companies of comparable business risk as Gaz Métro. The cost of capital for a part of a company engaged in different lines of business depends on the risk of the business in which the part is engaged, not on the overall risk of the parent company. According to financial theory, the overall risk of a diversified company equals the market-value-weighted average of the risks of its components.

Estimating the fair total return for Gaz Métro's regulated gas distribution assets is the subject of this proceeding. The ideal sample for Gaz Métro is a number of publicly traded pure plays in the regulated natural gas distribution business.[18] Publicly traded firms, firms whose shares are freely traded on stock exchanges, are ideal because the best way to infer the cost of capital is to examine evidence from capital markets on companies in the given line of business.

[18] "Pure-play" is an investment term referring to companies with operations only in one line of business.

The available sample of publicly traded, regulated pure play natural gas distribution companies in Canada is too small to form an ideal sample. However, there is a sample of relatively pure play natural gas distribution companies in the U.S. that can serve as a benchmark. A recent National Energy Board ("NEB") decision found that "[c]omparisons to returns in other countries would be useful."[19] Dr. Carpenter's written evidence finds that the risks of my sample of U.S. gas LDC companies are comparable to those of Gaz Métro.[20]

Q40. How did you select your samples?

A40. I form benchmark samples to estimate the cost of capital for Gaz Métro's assets from the universe of all Canadian utilities with regulated assets and the universe of U.S. gas LDCs in the industry as classified by the *Value Line Investment Survey Plus Edition*.[21] I then apply my standard selection procedures to ensure that reliable estimates and a sufficiently large sample are obtained. I require data from S&P or Moody's, *Value Line*, and Bloomberg be available for all sample companies. Moreover, the companies must own regulated assets, must not exhibit any signs of financial distress, and must not be involved in any substantial merger and acquisition activities that could bias the estimation process. In general, this requires that companies have an investment grade credit rating, a high percentage of regulated assets, no significant merger activity in recent years, and no recent dividend cuts or other activity that could cause the growth rates or beta estimates to be biased. I also report the results from a subsample of the gas LDC sample consisting of companies that have fewer data issues and/or a higher concentration of activities in the regulated gas distribution industry. Additional details of the sample selection process can be found in *Section V.B* below and in Appendix B.

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[19] National Energy Board, Reasons for Decision, TransQuébec & Maritimes Pipelines Inc, RH-1-2008, p. 67.

[20] Written Evidence of Dr. Carpenter, Section V.

[21] An exception is Vectren, a highly regulated company that has more regulated gas assets than electric assets, but which is classified by *Value Line* as an electric company. I include it in the gas LDC sample, a practice also followed by Bloomberg.

B. Capital Structure & the Cost of Debt

1. Market-Value Capital Structures

Q41. What capital structure information do you require?

A41. For reasons discussed in Dr. Kolbe's written evidence and explained in detail in his Appendix B, explicit evaluation of the market-value capital structures of the sample companies is vital for a correct interpretation of the market evidence on the after-tax weighted-average cost of capital and return on equity. This requires estimates of the market values of common equity, preferred equity and debt, and the current market costs of preferred equity and debt.

Q42. Briefly describe how you calculate the market values of common equity, preferred equity and debt for the Canadian utilities and the gas LDC samples.

A42. I determine the capital structure for each company by estimating the market values of common equity, preferred equity and debt from the most recent publicly available data. Briefly, the market value of common equity is calculated as the price per share times the number of shares outstanding. For the risk positioning estimates, I estimate each company's average market value of equity over the most recent five year period. The idea is to match the estimated "betas", which are computed over this five year period, to the level of financial risk present during their estimation. I compute year-end capital structures for each year between 2004 and 2008, using company reported shares outstanding at year end and an average price over the last fifteen trading days of each year.[22] The year-end capital structures are then weighted as detailed in Appendix B to arrive at an estimate of the five year average capital structure for each company.

Because the DCF estimates utilize current prices and forward-looking growth rates, I estimate only the current market value of equity, again using current price data and the most recent quarterly information for company-reported financial information; currently

[22] The data on shares outstanding for each company is obtained from Bloomberg.

year-end 2008.[23] Specifically, I use the average stock price over 15 trading days ending on the day I obtain the Bloomberg BEst[24] growth rates used in the DCF analysis.[25]

The market value of long-term debt for the companies in the samples is based upon the "Estimated Fair (market) Value" of long-term debt as reported in the companies' 10-Ks (U.S. sample) or annual reports (Canadian utilities sample). The book value of long-term debt from Bloomberg[26] is "adjusted" by adding the difference between the estimated fair value and the carrying value of long-term debt from the company's 10-K or annual report. The market value of preferred stock for the samples is set equal to its book value because the market values and book values do not vary much and because the percent of preferred stock in the capital structures is relatively small compared to the debt and common equity components.

Q43. Please explain the capital structures relied upon for Gaz Métro.

A43. As discussed in *Section II* above, altering Gaz Métro's capital structure does not change the ATWACC that it should be allowed an opportunity to earn on its rate base. In recent proceedings before the Régie, Gaz Métro's deemed capital structure included 7.5 percent preferred. However, like many other utility companies, Gaz Métro no longer has any

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[23] I combine the most recent information on outstanding shares from each company with the average stock price over the 15 trading days ending on the day that the earnings growth rate forecasts are obtained from Bloomberg. In this instance, forecasts were obtained on March 10, 2009 for companies in the Canadian utilities and gas LDC samples.

[24] Bloomberg's BEst is a system that gathers and compiles estimates made by stock analysts on the future earnings for the majority of U.S. publicly traded companies. Growth forecasts for the Canadian utilities companies are also from Bloomberg which sources Thompson Research.

[25] March 10, 2009 for both samples. The gas LDC sample DCF estimates also make use of the most recent *Value Line* sheets, dated December 12, 2008 or December 26, 2008, to derive implied growth estimates for each company. As a minor simplification, I assume that *Value Line's* earnings forecasts overlap the BEst March 10, 2009 forecasts exactly so that the DCF capital structure is based upon one common date.

[26] The book value of debt from Bloomberg includes all interest-bearing financial obligations that are not current and includes capitalized leases and mandatory redeemable preferred and trust preferred securities in accordance with FASB 150 effective June 2003. See Bloomberg definition of long-term debt for additional detail.

actual preferred shares outstanding.[27] Therefore, I report the return on equity results for two different capital structures.

2. Market Costs of Debt and Preferred Equity

Q44. How do you estimate the current market cost of debt?

A44. For both samples, the market cost of debt for each company used in the analysis is the current yield on an index of utility bonds corresponding to the company's current debt rating for the DCF models or the average debt rating over the five-year beta estimation period for the risk positioning models. The sample companies' bond ratings are reported by Bloomberg.

Note that for the firms in the gas LDC sample, the bond rating reported by Bloomberg for each company is used with the estimated current yield data on Canadian bonds of an equivalent rating. Calculation of the after-tax cost of debt uses Gaz Métro's estimated marginal income tax rate of 30.15 percent.

Q45. How do you estimate the market cost of preferred equity?

A45. The cost of preferred equity is set equal to the cost of debt on Canadian utility bonds of a comparable rating. There is to my knowledge no public source for yields on preferred equity delineated by credit rating in Canada. The cost of preferred equity is likely to be somewhat higher than the after-tax cost of debt but lower than the pre-tax cost of debt, but because the amount of preferred equity in the capital structures of the Canadian utilities sample companies average two to three percent and less than one percent for the gas LDC companies, this approximation will have a minimal impact on the overall results.

Q46. How do you estimate the cost of preferred for Gaz Métro?

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[27] See Gaz Métro 2008 Annual Report p. 53 for details on Gaz Métro's current capital structure. Table No. MJV-4 provides details on the Canadian utilities sample, and Table No. MJV-15 provides details on the gas LDC sample.

A46. For the calculation of the overall cost of capital and for the ATWACC recommendation, the cost of Gaz Métro's *deemed* (hypothetical) preferred shares is irrelevant as only the sample companies preferred enters the calculation. It is worth noting the utilities in the Canadian utilities and gas LDC samples have small amounts of preferred and only Canadian Utilities Limited has more than 3 percent preferred equity.

C. COST OF EQUITY ESTIMATION

Q47. How do you estimate the cost of equity for your sample companies?

A47. Recall the definition of the cost of capital from the outset of my testimony: *the expected rate of return in capital markets on alternative investments of equivalent risk*. My cost of capital estimation procedures address three key points implied by the definition:

1. Since the cost of capital is an expected rate of return, it cannot be directly observed; it must be inferred from available evidence.
2. Since the cost of capital is determined in capital markets (e.g., the Toronto Stock Exchange), data from capital markets provide the best evidence from which to infer it.
3. Since the cost of capital depends on the return offered by alternative investments of equivalent risk, measures of the risks that matter in capital markets are part of the evidence that needs to be examined.

Q48. How does the above definition help in cost of capital estimation?

A48. The definition of the cost of capital recognizes a tradeoff between risk and expected return – the security market line – plotted earlier in Figure 1. Cost of capital estimation methods take one of two approaches: (1) they try to identify a comparable-risk sample of companies and to estimate the cost of capital directly; or (2) they establish the location of the security market line and estimate the relative risk of the security, which jointly determine the cost of capital. In terms of Figure 1, the first approach focuses directly on the vertical axis, while the second focuses both on the security's position on the horizontal axis and on the position of the security market line.

The first type of approach is more direct, but ignores the wealth of information available on securities not thought to be of precisely comparable risk. The "discounted cash flow" or "DCF" model is an example. The second type of approach requires an extra step, but as a result can make use of information on all securities, not just a very limited subset. The Capital Asset Pricing Model ("CAPM") is an example, and the CAPM is the method used by the Régie. While both approaches can work equally well if conditions are right, one may be preferable to the other under other circumstances. In particular, approaches that rely on the entire security market line are less sensitive to deviations from the assumptions that underlie the model, all else equal. I examine both DCF and risk positioning approach evidence for the samples.

1. The Risk Positioning Approach

Q49. Please explain the risk positioning method.

A49. The risk positioning method estimates the cost of equity as the sum of a current interest rate and a company specific risk premium. It is therefore sometimes also known as the equity "risk premium" approach. This approach may sometimes be applied informally. For example, an analyst or regulator may check the spread between interest rates and what is believed to be a reasonable estimate of the cost of capital at one time, and then apply that spread to changed interest rates to get a new estimate of the cost of capital at another time.

More formal applications of the risk positioning approach take full advantage of the security market line depicted in Figure 1 – they use information on all securities to identify the security market line and derive the cost of capital for the individual security based on that security's relative risk. This reliance on the entire security market line makes the method less vulnerable to the kinds of problems that arise for the DCF method, which relies on one stock at a time. The risk positioning approach is widely used and underlies most of the current research published in academic journals on the nature, determinants and magnitude of the cost of capital.

Q50. How are the "more formal" applications of risk positioning approach implemented?

A50. The first step is to specify the current values of the benchmarks that determine the security market line. The second is to determine the security's or investment's relative risk. The third is to specify exactly how the benchmarks combine to produce the security market line, so the company's cost of capital can be calculated based on its relative risk. All of these elements and how they relate are usefully formulated in the framework of the CAPM.

a) The Capital Asset Pricing Model

Q51. Please start with the CAPM, by describing the model.

A51. As noted above, modern models of capital market equilibrium express the cost of equity as the sum of a risk-free rate and a market risk premium. The CAPM is the longest-standing and most widely used of these theories. The CAPM states that the cost of capital for an investment, *s*, (e.g., a particular common stock) is given by the following equation:

$$r_S = r_f + \beta_S \times MRP \tag{2}$$

where r_s is the cost of capital for investment *S*; r_f is the risk-free rate, β_S is the beta risk measure for the investment *S*; and *MRP* is the market risk premium.

The CAPM relies on the empirical fact that investors price risky securities to offer a higher expected rate of return than safe securities do. It says that the security market line starts at the risk-free interest rate (that is the return on a zero-risk security, the y-axis intercept in Figure 1, equals the risk-free interest rate). Further, it says that the risk premium of a security over the risk-free rate equals the product of the beta of that security and the risk premium on a value-weighted portfolio of all investments, which by definition has average risk.

The Risk-free Interest Rate

Q52. What interest rates do your procedures require?

A52. Modern capital market theories of risk and return use the short-term risk-free rate of return as the starting benchmark, but regulatory bodies frequently use a version of the risk positioning model that is based upon the long-term risk-free rate. In this proceeding, I rely upon the long-term version of the risk positioning model. Accordingly, the implementation of my procedures requires use of a forecast of the long-term Canadian Government bond rate. I obtain this information from *Consensus Forecasts*.[28]

The Market Risk Premium

Q53. Why is a risk premium necessary?

A53. Experience (e.g., the ongoing turmoil in stock markets worldwide and the U.S. market's October Crash of 1987) demonstrates that shareholders, even well diversified shareholders, are exposed to enormous risks. By investing in stocks instead of risk-free government Treasury bills, investors subject themselves not only to the risk of earning a return well below those they expected in any year but also to the risk that they might lose much of their initial capital. This is why investors demand a risk premium.

In regulatory proceedings, two versions of the CAPM are often reported. The first version measures the market risk premium as the risk premium of average risk common stocks over short-term Treasury bills, which is the usual measure of the "market risk premium" used in capital market theories. The second version measures the risk premium relative to a long-term risk-free rate. To determine the cost of capital in a regulatory proceeding, the MRP should be used with a forecast of the same interest rate used to calculate the MRP (i.e., the short-term Government bill rate or the long-term Government rate). In this proceeding, I report results only for the version of the risk

[28] Every month, *Consensus Forecasts* surveys over 240 financial and economic analysts for their forecasts of a range of variables including inflation, economic growth, interest rates and exchange rates for more than 20 countries.

positioning model that relies upon the long-term risk-free rate as is standard in Canadian regulatory proceedings.

Q54. Hasn't the estimate of the MRP been controversial over the recent past?

A54. Yes. Historically, it was generally accepted that the appropriate method to estimate the MRP was to consider the historical average realized return on the market minus the return on a risk-free asset over as long a series of time as possible; however, this procedure came under attack during the period of time generally referred to as the "tech bubble" when the stock markets in the U.S. and Canada reached very high valuation levels relative to traditional metrics of value. The period of the tech bubble also resulted in the average realized return on the market increasing to a very high level. Attempts to explain the high stock market valuation levels centered on the hypothesis that the MRP must be dramatically lower than previously believed, but this hypothesis conflicted with the fact that realized returns over the period were very high. The result was an academic debate on the level of the forward-looking MRP and how best to estimate it, a debate that has still not been fully resolved. As discussed in *Section III*, more recently, stock markets have dropped substantially as a result of the so-called credit-crisis and stock prices have been extremely volatile. As shown in Figure 3 above, volatility in both the Canadian and the U.S. stock markets have increased dramatically in recent months, so that the risk premium investors require has increased.

Q55. How do these factors affect the cost of capital for Gaz Métro?

A55. Access to capital is currently more restricted than before the crisis, and Gaz Métro has to invest in long-lived assets which cannot be easily liquidated (they are hard physical assets that once put in place cannot be moved). Investment is a voluntary activity, and investors generally require a return that is consistent with the risk they take on; therefore, it could be damaging to Gaz Métro's access to capital if investors view the allowed rate of return as lower than the required rate of return.

Q56. What is your conclusion regarding the MRP?

A56. Much of the controversy over market risk premium has centered on various reasons that the market risk premium may not be as high as frequently estimated in the past. Although none of the arguments are completely persuasive in and of themselves, I generally give some weight to these issues, and did so more conservatively in my evidence in the 2004 GCOC proceeding before the Alberta Energy Utilities Board. Specifically, I reduced my 1999 estimate of the Canadian market risk premium from 6.0 percent to 5.5 percent for that proceeding. I further reduced my estimate by 25 basis points for my evidence before the Ontario Energy Board in 2006. However, considering all the evidence including a working paper on the worldwide equity premium[29] and current information on the historical MRP, I concluded that S&P/TSX stocks of average risk required a premium of at least 5.75 percent over the long-term government bond yield prior to the current financial turmoil. This is the same figure as I used in my recent testimony before the NEB in RH-1-2008 and before the Alberta Utilities Commission in its 2009 Generic Cost of Capital Hearing. This figure is also consistent with the MRP estimates that the Régie has relied upon in the past.[30] However, this figure underestimates the current MRP although it is difficult to determine by how much. Therefore, I continue to use 5.75 percent as an initial benchmark but add 2 percent to the MRP for use in the Tables and Workpapers attached to my evidence. I also report the results from sensitivity analyses that increase the MRP by 2 and 3 percent which I believe are likely to still be lower than the current increase in the MRP. For an illustration and further discussion of the MRP, please see Appendix C.

Q57. Is your estimate of the MRP consistent with the Régie's estimate of the MRP?

A57. Yes. In Decision D-2007-116 for Gaz Métro, the Regie determined that the MRP is in the range of 5.40 to 5.90 percent.[31]

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[29] Dimson, E., P. Marsh, and M. Staunton, *Global Investment Returns Yearbook* ABN-AMRO, RBS 2008.

[30] Decision D-2007-116, R-3630-2007, October 15, 2007, p. 23.

[31] Decision D-2007-116, R-3630-2007, October 15, 2007, p. 23.

Beta

Q58. Please explain beta in more detail.

A58. The basic idea behind beta is that risks that cannot be diversified away in large portfolios matter more than those that can be eliminated by diversification. Beta is a measure of the risks that cannot be eliminated by diversification. That is, it measures the "systematic" risk of a stock — the extent to which a stock's value fluctuates more or less than average when the market fluctuates.

Diversification is a vital concept in the study of risk and return. (Harry Markowitz won a Nobel Prize for work showing just how important it was.) Over the long run, the rate of return on the stock market has a very high standard deviation, on the order of 15-20 percent per year.[32] But many individual stocks have much higher standard deviations than this. The stock market's standard deviation is "only" about 15-20 percent because when stocks are combined into portfolios, some of the risk of individual stocks is eliminated by diversification. Some stocks go up when others go down, and the average portfolio return — positive or negative — is usually less extreme than that of individual stocks within it.

In the limiting case, if the returns on individual stocks were completely uncorrelated with one another, the formation of a large portfolio of such stocks would eliminate risk entirely. That is, the market's long-run standard deviation would be not 15-20 percent per year, but virtually zero.

The fact that the market's actual annual standard deviation is so large means that, in practice, the returns on stocks are correlated with one another, and to a material degree. The reason is that many factors that make a particular stock go up or down also affect other stocks. Examples include the state of the economy, the balance of trade, and inflation. Thus some risk is "non-diversifiable". Single-factor equity risk premium

[32] See Brealey, Myers and Allen, *Principles of Corporate Finance, 9th Edition*, McGraw-Hill Irwin, New York, p. 184.

models are based upon the assumption that all of the factors that affect stock returns can be considered simultaneously, through their impact on one factor, the market portfolio. Other models derive somewhat less restrictive conditions under which several factors might be individually relevant.

Again, the basic idea behind all of these models is that risks that cannot be diversified away in large portfolios matter more than those that can be eliminated by diversification, because there are a large number of large portfolios whose managers actively seek the best risk-reward tradeoffs available. Of course, undiversified investors would like to get a premium for bearing diversifiable risk, but they cannot.

Q59. Why not?

A59. Well-diversified investors compete away any premium rates of return for diversifiable risk. Suppose a stock were priced especially low because it had especially high diversifiable risk. Then it would seem to be a bargain to well diversified investors. For example, suppose an industry is subject to active competition, so there is a large risk of loss of market share. Investors who held a portfolio of all companies in the industry would be immune to this risk, because the loss on one company's stock would be offset by a gain on another's stock. (Of course, the competition might make the whole industry more vulnerable to the business cycle, but the issue here is the diversifiable risk of shifts in market share among firms.)

If the shares were priced especially low because of the risk of a shift in market shares, investors who could hold shares of the whole industry would snap them up. Their buying would drive up the stocks' prices until the premium rates of return for diversifiable risk were eliminated. Since all investors pay the same price, even those who are not diversified can expect no premium for bearing diversifiable risk.

Of course, substantial non-diversifiable risk remains, as the ongoing market volatility or the October Crash of 1987 demonstrate. Even an investor who held a portfolio of all traded stocks could not diversify against that type of risk. Sensitivity to such market-wide movements is what beta measures. That type of sensitivity, whether considered in a single- or multi-factor model, determines the risk premium in the cost of equity.

Q60. What does a particular value of beta signify?

A60. By definition, a stock with a beta equal to 1.0 has average non-diversifiable risk: it goes up or down by 10 percent on average when the market goes up or down by 10 percent. Stocks with betas above 1.0 exaggerate the swings in the market: stocks with betas of 2.0 tend to fall 20 percent when the market falls 10 percent, for example. Stocks with betas below 1.0 are less volatile than the market. A stock with a beta of 0.5 will tend to rise 5 percent when the market rises 10 percent.

Q61. How is beta measured?

A61. The usual approach to calculating beta is a statistical comparison of the sensitivity of a stock's (or a portfolio's) return to the market's return. Many investment services report betas, including FPinfomart,[33] Bloomberg and the *Value Line Investment Survey*. Betas are not always calculated the same way, and therefore must be used with a degree of caution, but the basic point that a high beta indicates a risky stock has long been widely accepted by both financial theorists and investment professionals.

Q62. Are there circumstances when the "usual approach" should not be used?

A62. There are at least two cases where the standard estimate of beta should be viewed skeptically. First, companies in serious financial distress seem to "decouple" from their normal sensitivity to the stock market. The stock prices of financially distressed companies tend to change based more on individual news about their particular circumstances than upon overall market movements. Thus, a risky stock could have a low estimated beta if the company was in financial distress. Other circumstances that may cause a company's stock to decouple include an industry restructuring or major changes in a company's supply or output markets.

[33] Beta estimates from *FPinfomart* are not publicly available. FPinfomart.ca is an online media monitoring service that offers timely, reliable and in-depth access to Canada's news and business sources.

Second, similar circumstances seem to arise for companies "in play" during a merger or acquisition. Once again, the information about the progress of the proposed takeover is so much more important for that individual stock than day-to-day market fluctuations that, in practice, beta estimates for such companies seem to be too low.

Q63. How reliable is beta as a risk measure?

A63. Scholarly studies have long confirmed the importance of beta for a stock's required rate of return. It is widely regarded as the best single risk measure available. The merits of beta seemed to be challenged in widely publicized work by Professors Eugene F. Fama and Kenneth R. French.[34] However, despite the early press reports of their work as signifying that "beta is dead," it turns out that beta was still a potentially important explanatory factor (albeit one of several) in their work. Thus, beta remains alive and well as the best single measure of relative risk.

b) The Empirical Capital Asset Pricing Model

Q64. What other equity risk premium model do you use?

A64. Empirical research has long shown that the CAPM tends to overstate the actual sensitivity of the cost of capital to beta: low-beta stocks tend to have higher risk premiums than predicted by the CAPM and high-beta stocks tend to have lower risk premiums than predicted. A number of variations on the original CAPM theory have been proposed to explain this finding, but this finding can also be used to estimate the cost of capital directly, using beta to measure relative risk without simultaneously relying on the CAPM.

The second model makes use of these empirical findings. It estimates the cost of capital with the equation,

[34] See for example, "The Capital Asset Pricing Model: Theory and Evidence", Eugene F. Fama and Kenneth R. French, *Journal of Economic Perspectives*, Volume 18, Summer 2004, pp. 25-46.

$$r_S = r_f + \alpha + \beta_S \times (MRP - \alpha) \quad (3)$$

where α is the "alpha" adjustment of the risk-return line, a constant, and the other symbols are defined as above. I label this model the Empirical Capital Asset Pricing Model, or "ECAPM." The alpha adjustment has the effect of increasing the intercept but reducing the slope of the security market line in Figure 1 which results in a security market line that more closely matches the results of empirical tests.

Q65. Why is it appropriate to use the empirical CAPM?

A65. The CAPM has not generally performed well as an empirical model, but its short-comings are directly addressed by the ECAPM. Specifically, the ECAPM recognizes the consistent empirical observation that the CAPM underestimates (overestimates) the cost of capital for low (high) beta stocks. In other words, the ECAPM is based on recognizing that the actual slope of the risk-return tradeoff is flatter than predicted and the intercept higher based upon repeated empirical tests of the CAPM. The alpha parameter (α) in the ECAPM adjusts for this fact. The difference between the CAPM and the type of relationship identified in the empirical studies is depicted in Figure 4.

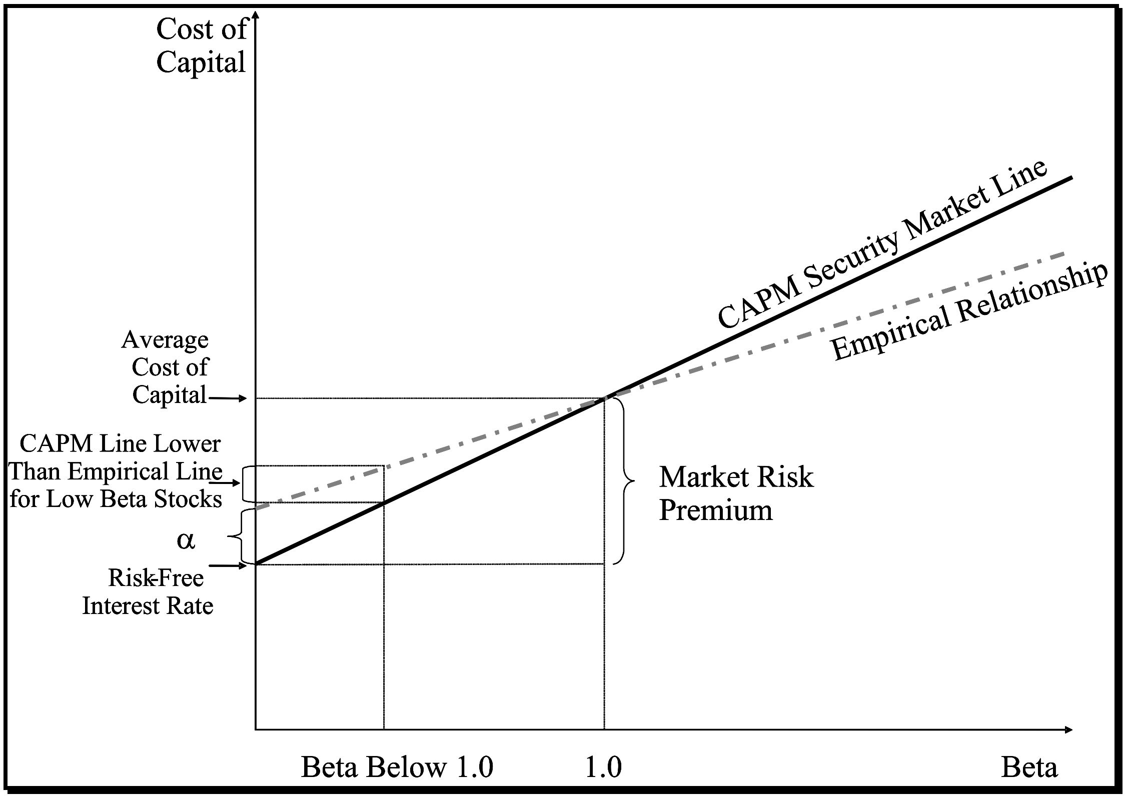

Figure 4: The Empirical Security Market Line

Research supports values for α of one to seven percent when using a short-term interest rate. I use baseline values of α of one percent for the long-term risk-free rate. I also conduct sensitivity tests for different values of α. For the long-term risk-free rate, the corresponding α value sensitivities are computed at zero (the CAPM), one, and two percent. These values are lower than would be justified by the magnitude of the misestimation in the tests of the CAPM, however, I use lower values of α when using a long-term horizon because use of a long-term risk-free rate incorporates some of the desired effect of using the ECAPM. That is, the long-term risk-free rate version of the security market line has a higher intercept and a flatter slope than the short-term risk-free version which is the version that has been extensively tested. Thus, it is likely that I do not need to make the same degree of adjustment when I use the long-term risk-free rate.

Q66. Are there risk positioning models other than the CAPM and ECAPM?

A66. Yes. There are many varieties of multi-factor models such as the Fama-French model as well as varieties of Arbitrage Pricing Theory ("APT") models.[35] Although results from these models are promising, none of them has garnered support in the financial community as the "answer". Probably the best-known alternative is Fama-French three-factor model for stocks, but the added risk factors[36] in multi-factor models are often quite volatile over time, and thus the estimated cost of equity may vary substantially if estimated at two different points in time. I do not present estimates from these models in this proceeding because a consensus has yet to emerge about which multi-factor model is the most reliable for regulated utilities.

2. The Discounted Cash Flow Model

Q67. Please describe the discounted cash flow approach.

A67. The DCF model takes the first approach to cost of capital estimation, i.e., to attempt to estimate the cost of capital in one step. The method assumes that the market price of a stock is equal to the present value of the dividends that its owners expect to receive. The method also assumes that this present value can be calculated by the standard formula for the present value of a cash flow stream:

$$P = \frac{D_1}{(1+r)} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \cdots + \frac{D_T}{(1+r)^T} \qquad (4)$$

where "P" is the market price of the stock; "D_i" is the dividend cash flow expected at the end of period i; "r" is the cost of capital; and "T" is the last period in which a dividend cash flow is to be received. The formula just says that the stock price is equal to the sum

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[35] For a discussion of the Fame-French models see, for example, "The Capital Asset Pricing Model: Theory and Evidence", Eugene F. Fama and Kenneth R. French, *Journal of Economic Perspectives*, Volume 18, Summer 2004, pp. 25-46. For a discussion of the APT model see, for example, Stephen A. Ross, Randolph W. Westerfield, Jeffrey F. Jaffe, and Gordon S. Roberts, *Corporate Finance*, 5th Canadian Edition, 2008 Chapter 12.

[36] For example, the three-factor Fama-French model relies on two risk factors in addition to the market: Small market capitalization Minus Big market capitalization ("SMB") and High book/price ratio Minus Low book/price ratio ("HML").

of the expected future dividends, each discounted for the time and risk between now and the time the dividend is expected to be received.

Most DCF applications go even further, and make very strong (i.e., unrealistic) assumptions that yield a simplification of the standard formula, which then can be rearranged to estimate the cost of capital. Specifically, if investors expect a dividend stream that will grow *forever* at a steady rate, the market price of the stock will be given by a very simple formula,

$$P = \frac{D_1}{(r - g)} \qquad (5)$$

where "D_1" is the dividend expected at the end of the first period, "g" is the perpetual growth rate, and "P" and "r" are the market price and the cost of capital, as before. Equation (5) is a simplified version of equation (4) that can be solved to yield the well known "DCF formula" for the cost of capital:

$$\begin{aligned} r &= \frac{D_1}{P} + g \\ &= \frac{D_0 \times (1+g)}{P} + g \end{aligned} \qquad (6)$$

where "D_0" is the current dividend, which investors expect to increase at rate g by the end of the next period, and the other symbols are defined as before. Equation (6) says that if equation (5) holds, the cost of capital equals the expected dividend yield plus the (perpetual) expected future growth rate of dividends. I refer to this as the simple DCF model. Of course, the "simple" model is simple because it relies on very strong assumptions.[37]

Q68. Are there other versions of the DCF models besides the "simple" one?

[37] In this context "strong" means assumptions that are unlikely to reflect reality but that also are expected to have a large effect on the estimate.

A68. Yes. The constant growth rate DCF model requires that dividends and earnings grow at the same rate for companies that earn their cost of capital on average.[38] It is inconsistent with the theory on which the model is based to have different growth rates in earnings and dividends over the period when growth is assumed to be constant. If the growth in dividends and earnings were expected to vary over some number of years before settling down into a constant growth period, then it would be appropriate to estimate a multistage DCF model. In the multistage model, earnings and dividends can grow at different rates, but must grow at the same rate in the final, constant growth rate period. A difference between forecasted dividend and earnings rates therefore is a signal that the facts do not fit the assumptions of the simple DCF model.

I consider a variant of the DCF model that relies on slightly less strong assumptions in that it allows for varying dividend growth rates in the near term before assuming a perpetual growth rate beginning in year eleven. I use the forecast growth of GDP as the forecast of the long-term growth rate, i.e. year eleven on. This is a variant of the "multistage" DCF method.

Q69. What are the merits of the DCF approach?

A69. The DCF approach is conceptually sound if its assumptions are met, but can run into difficulty in practice because those assumptions are so strong, and hence so unlikely to correspond to reality. Two conditions are well known to be necessary for the DCF approach to yield a reliable estimate of the cost of capital: the variant of the present value formula that is used must actually match the variations in investor expectations for the growth of dividends, and the growth rate(s) used in that formula must match current

[38] Why must the two growth rates be equal in a steady-growth DCF model? Think of earnings as divided between reinvestment, which funds future growth, and dividends. If dividends grow faster than earnings, there is less investment and slower growth each year. Sooner or later dividends will equal earnings. At that point, growth is zero because nothing is being reinvested (dividends are constant). If dividends grow slower than earnings, each year a bigger fraction of earnings are reinvested. That makes for ever faster growth. Both scenarios contradict the steady-growth assumption. So if you observe a company with different expectations for dividend and earnings growth, you know the company's stock price and its dividend growth forecast are inconsistent with the assumptions of the steady-growth DCF model.

investor expectations. Less frequently noted conditions may also create problems (see Appendix D for details). Nevertheless, I believe that the DCF model serves as a useful check on the results of the risk positioning model.

Q70. Do you agree that estimating the "right" dividend growth rate is usually the most difficult part for the implementation of the DCF approach?

A70. Yes, usually finding the right growth rate(s) is the "hard part" of a DCF application. The original approach to estimation of *g* relied on average historical growth rates in observable variables, such as dividends or earnings, or on the "sustainable growth" approach, which estimates *g* as the average book rate of return times the fraction of earnings retained within the firm. But it is highly unlikely that these historical averages over periods with widely varying rates of inflation and costs of capital will equal current growth rate expectations.

Q71. Are the DCF model's assumptions met at this time?

A71. No, not entirely for these industries. The DCF model is sensitive to small deviations from its required assumptions and market conditions are far from meeting the "stability" conditions necessary for reliable implementation of the models. In addition, the industries in the two samples have not been completely stable, either. For example, Fortis acquired Terasen in 2007 and there have been a number of mergers and acquisitions in the U.S. gas LDC industry. Part of the observed market price for these companies almost certainly reflects the expected cash flow impacts for investors that would arise from more such mergers, but this potential source of investor cash flow is not generated within the company and so does not show up in the data used to forecast expected growth rates in the DCF model. That is, at present, gas LDC stock prices will be above the levels justified by those companies' own dividends and growth paths. Instead of Equation (4), their price at the current time is given by

$$P = PV(ExpectedDividends) + PV(ExpectedBuyoutIncrement) \tag{7}$$

where "PV" indicates "the present value of" the quantity in parentheses. In these circumstances, since the DCF model attributes the entire price to the present value of future dividends, it will underestimate the cost of capital used to value those dividends and produce a downward-biased estimate of the cost of capital.

Q72. Does your multistage DCF estimate overcome these problems?

A72. No, not in these circumstances. The multistage method assumes a particular smoothing pattern and a long-term growth rate afterwards. That can be a useful approach in cases where the basic DCF assumptions are approximately met, but here they are not met even approximately. The smoother growth pattern, for example, might be quite wrong, given the initial uncertainty. And even a perfect forecast of growth that ignored the component of the market price represented by a potential acquisition, as shown in Equation (7), would still produce a materially downward biased DCF estimate of the cost of capital. Until the stability conditions the DCF model requires are restored, the DCF method cannot provide completely reliable estimates of the cost of capital.

Q73. Why do you report the results from the DCF model if the conditions required for a reliable implementation of the model are not met?

A73. Current market conditions affect all cost of capital estimation models to some degree, but the DCF model has one advantage over the risk positioning models. Specifically, the DCF model reflects current market conditions more quickly because the market price of a company's stock changes daily. Under current conditions, the dividend yields have increased substantially compared to their pre-crisis values because the market prices have fallen, and current forecasts of earnings growth are available for most companies in the samples. For the risk positioning models, it is true that the risk-free rate changes quickly, but the other parameters in the model do not. Therefore, the DCF model provides a useful check on the result of the risk positioning model.

V. GAS MÉTRO AND THE SAMPLES' COST OF CAPITAL ESTIMATES

A. THE BENCHMARK SAMPLES AND THEIR CHARACTERISTICS

Q74. Why is it necessary to use two samples?

A74. The cost of capital for a part of a company depends on the risk of the lines of business in which the *part* is engaged, *not* on the overall risk of the parent company on a consolidated basis. According to financial theory, the overall risk of a diversified company equals the market-value weighted average of the risks of its components. There is no ideal sample of publicly traded pure play Canadian natural gas distribution companies currently available. However, there is a solid sample of U.S. gas distribution companies which according to Dr. Carpenter's written evidence have comparable business risk characteristics.[39] Therefore, Dr. Kolbe and I select two samples as benchmarks: Canadian regulated utilities and U.S. gas LDC companies.

The sample of Canadian utilities is used to assess the risks for Canadian utilities in general. Unlike the Canadian utilities sample, all companies in the gas LDC sample have operations concentrated in the natural gas industry and primarily operate in the gas distribution segment as does Gaz Métro. To the degree that there are differences in risk among the benchmark samples and Gaz Métro, Dr. Kolbe will take that into consideration as he considers the sample evidence and the business risks of Gaz Métro. Additional details of the sample selection process for each sample are described below as well as in Appendix B.

1. The Canadian Utilities Sample

Q75. How did you select the sample of Canadian regulated utilities?

A75. To construct this sample, I started with the universe of Canadian companies classified as being in the utility industry or in the oil and gas storage and transportation industry in the

[39] See Written Evidence of Dr. Carpenter, Section V and Attachment B.

FPinfomart database.[40] I eliminated companies that were not listed in the FP500 Sales category on FPinfomart which eliminated a number of smaller companies and companies that do not trade on the Toronto Stock Exchange. I then applied additional selection criteria designed to narrow the sample to companies with characteristics similar to that of Gaz Métro. I also eliminated companies with unique circumstances which may bias the cost of capital estimates. The final sample consists of the five companies listed in Table 2 below.[41]

Table 2

Company [1]	Business Activities [2]	Revenue (2008) ($MM) [3]	Regulated Assets [4]	Market Cap. (2008) ($MM) [5]	S&P Credit Rating (2009) [6]	Beta [7]	Long-Term Growth Estimate [8]
Canadian Utilities (AB)	DI (NG-LDC, E, PL, W)	2,779	MR	4,911	A	0.63	3.9%
Emera Inc. (NS, ME)	E (G, T, D)	1,332	R	2,469	BBB	0.57	6.2%
Enbridge Inc. (AB, NB, ON, QC, IL, NY, OK, OR, WA)	NG-LDC, L-PL, NG-PL	16,131	MR	14,661	A	0.72	10.5%
Fortis Inc. (AB, BC, NF, PEI, ON, Belize, Grand Cayman, Turks and Caicos Islands)	E (D, G) NG-LDC, NG-T	3,903	R	4,176	A	0.67	4.6%
TransCanada Corp. (AB, BC, ON, QC, CA, ME, OR, WA)	NG-T, E G	8,619	MR	20,237	A	0.65	7.0%

Sources and Notes:
[1] Operating region as reported in company annual reports for significant operations.
[2] 2008 Company Annual Reports.
Key: DI – Diversified; NG – Natural Gas, E – Electricity; PL – Pipelines;W – Water; L – Liquids
LDC – Local Distribution Company; D – Distribution; T – Transmission; G – Generation
[3] Bloomberg, March 10, 2009.
[4] Key: R – Regulated (More than 80 % of assets regulated).
MR – Mostly Regulated (50 % to 80 % of assets regulated).
Source: 2008 Company Annual Reports. See Table No. MJV-2.
[5] See Table MJV-3 Panels A through E.
[6] Bloomberg, March 10, 2009.
[7] Bloomberg, March 10, 2009. See Workpaper # 1 to Table MJV-10.
[8] Bloomberg as of March 10, 2009. See Table MJV-5.

2. The Gas LDC Sample

Q76. How do you select your sample of U.S. gas local distribution companies?

A76. The gas LDC sample is comprised of regulated companies whose primary source of revenues and majority of assets are in the regulated portion of the natural gas distribution industry. Therefore, I started with the universe of publicly traded natural gas distribution

[40] The information was extracted in March 2009 from www.fpinfomart.com.

[41] Table 2 reports the credit rating without the plus or minus notations.

utilities covered by *Value Line Investment Survey Plus Edition*. [42] This resulted in an initial group of 24 companies, to which I added Vectren Corporation[43] because it is often viewed as a natural gas LDC. Vectren is involved in both gas and electric distribution activities, but more of its regulated assets are invested in gas distribution operations.[44] I then eliminated companies by applying additional selection criteria designed to remove companies with unique circumstances which may bias the cost of capital estimates. The final sample consists of the twelve gas LDCs listed in Table 3 below, from which I also consider a sub-sample of eight companies with the fewest reliability concerns. Appendix B discusses the selection process for the gas LDC sample in more detail. Please refer to Dr. Paul Carpenter's evidence for additional information on the risk characteristics of the gas LDC sample.[45]

Q77. Please compare the characteristics of the Canadian utilities sample and the gas LDC sample.

A77. The percentage of regulated assets for the Canadian utilities sample is somewhat lower to substantially lower than for the gas LDC sample depending upon classification of assets for the companies in the Canadian utilities sample.[46]

The samples differ primarily in the fact that the gas LDC sample is concentrated in one segment of the regulated natural gas industry while the Canadian utilities sample consists of companies in the electric, natural gas pipeline, natural gas distribution and petroleum

[42] The 24 companies are from *Value Line Investment Survey Plus*, dated December, 2008 for all companies except Vectren which is dated December 26, 2008.

[43] This company is also covered by *Value Line*, but is classified as an Electric Utility due to its regulated electric operations.

[44] Vectren Utility Holdings, Inc.'s 2008 10-K reveals that the majority of its assets are subject to regulation and that approximately 57 percent are gas distribution assets. Because it has a substantial amount of regulated electric activity, I exclude it from the sub-sample of companies I consider to be the most representative of the natural gas distribution line of business and to be most free of characteristics that may bias cost of equity estimates.

[45] Note that regulated assets are displayed in Table 2, whereas Dr. Carpenter's written evidence presents data primarily on regulated Property, Plant, and Equipment. As such, the classification may differ.

[46] See Table No. MJV-2 (Canadian utilities sample) and Table No. MJV-13 (gas LDC sample).

industries. Therefore, it is more difficult to determine the risk of any single regulated industry using the Canadian utilities sample because differences in estimated cost of capital among the sample companies could be due to differences in industry risk as well as other factors. In addition, the Canadian utilities sample's results are potentially affected by the amount of merger activities involving companies in the sample, as well as by the difficulty in estimating beta for the sample companies.[47]

Due to various issues with some of the gas LDC sample companies with regard to mergers and acquisition and gas marketing activities, the companies in the sample are not as close to pure plays as they were previously. Therefore, I form a gas LDC sub-sample that is free of any substantial data issues. Please refer to Appendix B for additional details comparing the two samples.

[47] For example, Fortis remains in the Canadian utilities sample for purposes of estimating the average capital structure of the sample even though it recently acquired Terasen, because removing it would leave only four companies in the sample. The recent acquisition of ANR Pipeline by TransCanada may also have affected the company's returns.

Table 3[48]

Company [1]		Revenue (2008) ($MM) [2]	Regulated Assets [3]	Market Cap. (2008) ($MM) [4]	S&P Credit Rating (2009) [5]	Beta Estimate [6]	Long-Term Growth Estimate [7]
AGL Resources Inc (FL, GA, MD, NJ, TN, VA)	•	2,800	MR	2,282	A	0.60	5.2%
Atmos Energy Corp (CO, GA, IA, IL, KS, KY, LA, MO, MS, TN, TX, VA)		7,221	R	2,134	BBB	0.45	4.3%
The Laclede Group (IL, IN, MO)	•	2,209	R	1,007	A	0.45	n/a
New Jersey Resources (NJ)		3,816	MR	1,572	A	0.52	7.1%
Nicor Inc (IL)	•	3,777	R	1,574	AA	0.52	3.4%
NiSource Inc (IN, MD, KY, OH, PA, VA)		8,874	MR	3,042	BBB	0.60	2.7%
Northwest Natural Gas (CA, OR,WA)	•	1,038	R	1,169	AA	0.37	6.2%
Piedmont Natural Gas (NC, SC, TN)	•	2,089	R	2,278	A	0.52	8.4%
South Jersey Industries (NJ)	•	962	MR	1,098	BBB	0.60	7.7%
Southwest Gas Corp (AZ, CA, NV)	•	2,145	R	1,075	BBB	0.60	5.0%
WGL Holdings Inc (DC, MD, VA)	•	2,628	R	1,585	AA	0.60	4.5%
Vectren Corp (IN, OH)		2,485	MR	2,032	A	0.75	8.8%

Sources and Notes:
[1] Operating region as reported in company annual reports for significant operations.
[2] Bloomberg, March 10, 2009.
[3] Key: R – Regulated (More than 80 % of assets regulated).
MR – Mostly Regulated (50 % to 80 % of assets regulated).
Source: 2008 Company 10-K's. See Table MJV-13.
[4] See Table MJV-14, Panels A through K.
[5] Bloomberg, March 10, 2009.
[6] Value Line Investment Survey - See Workpaper # 1 to Table MJV-20.
[7] See Table MJV-16.
• Company included in gas LDC sub-sample (see text for discussion).

B. Cost of Equity Estimation

Q78. How do you ensure that the evidence from U.S. sample companies is consistent with Canadian capital markets?

[48] Table 3 reports the credit rating without the +/- designation that S&P assign to some companies.

A78. I ensure consistency with the Canadian capital markets by combining the risk measures (beta) of the U.S. sample companies with Canadian capital market parameters to estimate the sample's average overall after-tax weighted-average cost of capital. Beta is a measure of the relative risk of a company compared to the risk of an average stock in the market as discussed above in *Section III-C.1*. In other words, I use the Canadian risk-free interest rate, tax rates, interest rates on utility bonds and market risk premium to estimate the cost of equity for the gas LDC sample companies. The result is cost of capital estimates for the sample companies as if their stocks were trading in Canadian capital markets with a relative risk as measured by the companies' betas.

Note that the unadjusted DCF estimates for the gas LDC sample are estimates of the cost of equity in the U.S. capital markets. Therefore, I subtract the difference in long-term government bond yields in the U.S. and Canada from the DCF estimates for the gas LDC sample in order to compare the results on a more consistent basis with the Canadian capital market conditions.

1. Equity Risk Premium Estimates

Q79. How is this section of your evidence on the risk positioning approach to cost of capital estimates organized?

A79. This section first describes the input data used in the CAPM and ECAPM models, and then reports the resulting cost of equity estimates for the samples. Appendix C provides additional details on the empirical analysis.

a) Interest Rate Forecasts

Q80. How do you determine the expected risk-free interest rate?

A80. I obtain the forecast of the long-term risk-free rates on government bonds from the survey information available from Consensus Economics, Inc., a London based forecasting survey firm. Their publication, *Consensus Forecasts*, provides forecasts of both the U.S. 10-year Treasury bond rate and the 10-year Government of Canada bond rate. The Consensus Economics forecast for the year ending March 2010 shows that Canadian long-term interest rates are expected to increase over the coming year compared to current rates. [49] In addition, I add a maturity premium of 20 basis points to the forecast 10-year government bond yield to reflect the additional yield required for bonds of longer maturity.[50] Because the spread between long-term utility bond yields and long-term government bond yields, as illustrated in Table 1 above, currently is very high, I add a 1 percent yield spread adjustment to the long-term risk-free rate to set the risk-free rate for the Tables and Workpapers attached to my evidence in this proceeding.

Q81. Why are you adding a yield spread adjustment to the forecasted risk-free rate?

A81. As discussed in *Section III*, the spread between the yield on utility bonds and government bonds has increased dramatically in recent months. As can be seen from Workpapers #1 and #2 to Table No. MJV-9 the spread between 10-year A-rated utility bond yields and the 10-year government bond yield averaged 0.83 percent from 2002 to 2007 but reached a high of 2.68 percent in February – March, 2009. Thus, the spread has increased by 1.85 percent. Looking at the 30-year A-rate utility bond and the 30-year government bond, the spread averaged 0.99 percent from 2002 to 2007 and reached 2.98 percent in February – March 2009 for an increase in spread of 1.98 percent. Thus, it is clear that the spread has increased dramatically. It is likely that the so-called "flight to quality" has led to a downward pressure on government bond yields while the yield on utility bonds has increased. For a company such as Gaz Métro, it is the cost of utility debt that is relevant. The addition of one percent to the *Consensus Forecasts'* estimated risk-free rate is a modest attempt to capture the increase in spread.

Q82. Why is it necessary to add a maturity premium to the forecast of the 10-year bond yield?

[49] *Consensus Forecasts* as of March 2009.

[50] The 0.20 percent is a conservative estimate of the difference between the yield on 30-year and 10-year government bonds as it is consistent with the spread between 10 and 20 year government bonds and spread increased with the term to maturity. See Workpaper #2 to Table No. MJV-9

A82. The addition of the maturity premium is necessary for consistency so that the average bond maturities in the data used to estimate the long-term market risk premium correspond to the maturity of the benchmark for the long-term risk-free rate.

The maturity premium represents the extra return investors demand for tying up their money for longer periods. CANSIM reports data on three-month, one-to-three-year, three-to-five-year, five-to-ten year, and long-term Government yields from 1951 through 2007. I use these data to infer a set of maturity premiums for intermediate maturities. See Workpaper #3 to Table No. MJV-9 for details.

Q83. What values do you use for the risk-free interest rate in your risk-positioning models?

A83. I use a value of 3.30 percent including the maturity premium and then add a yield spread adjustment for the long-term risk-free interest rate in the risk positioning analyses. I report the results from sensitivity tests where I vary the yield spread adjustment. Specifically, I provide results for yield spread adjustments of ¾, 1, and 1¼, percent. I do not rely on the short-term version of the risk-positioning model in this proceeding.

b) The Estimated Market Risk Premium

Q84. Please remind us of your estimate of the market risk premium.

A84. As I stated earlier, my previous benchmark estimate for the market risk premium is 5.75 percent in Canada; however, in this proceeding I report results for three sensitivity tests using MRP estimates of plus 1, 2 and 3 percent to my previous pre-crisis benchmark of 5.75 percent.

Q85. Would you please illustrate the effect on the security market line ("SML") of the two adjustments that you propose to use?

A85. Yes. The total effect is best illustrated in two steps. The first step is to consider how the SML changes as an adjustment the yield spread is added to the risk-free interest rate. This is shown in Figure 5 below.

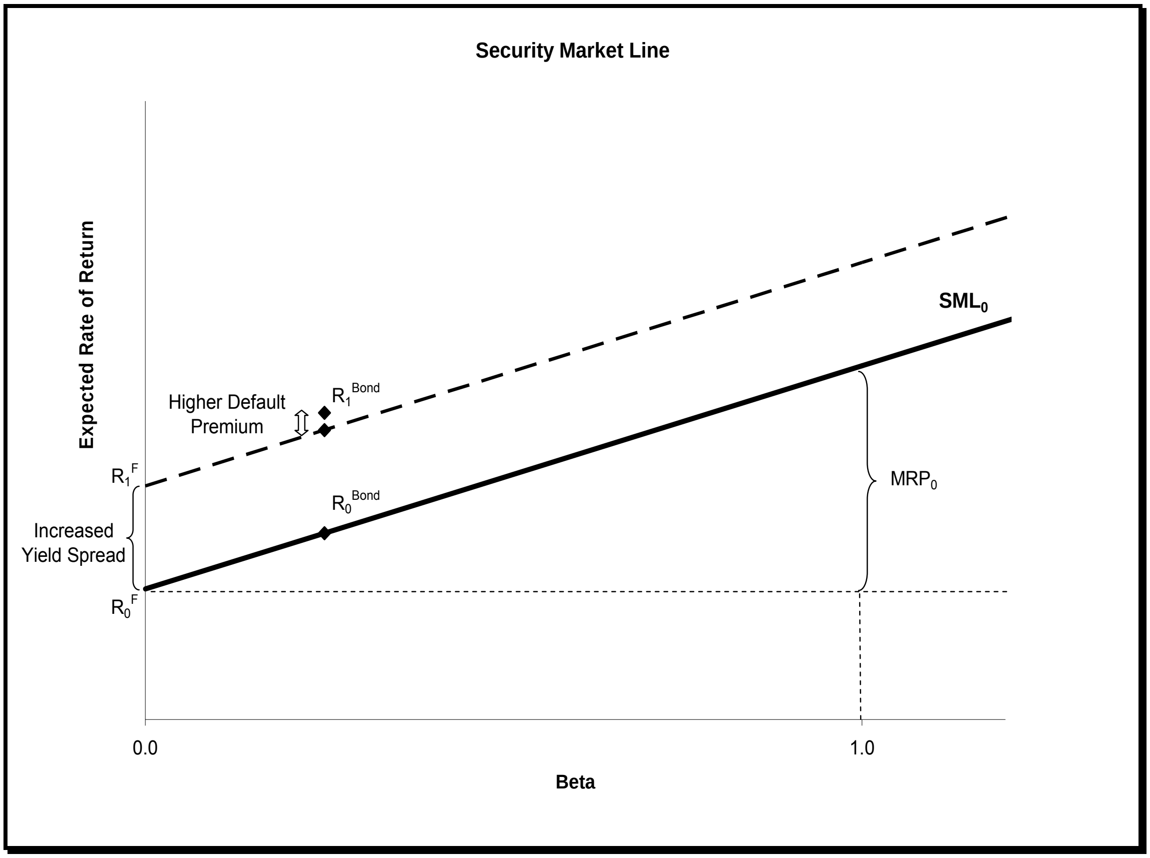

Figure 5

Recognizing the increased yield spread has the effect of moving the SML up without affecting the MRP. Note that I explicitly consider the possibility that some of the increase in the observed yield spread for utility bonds could be an increase in the default and tax premium on utility bonds by not adding the full amount of the increase in the yield spread to the risk-free interest rate. The effect of combining a yield spread adjustment and an increase in the MRP is illustrated in Figure 6 below.

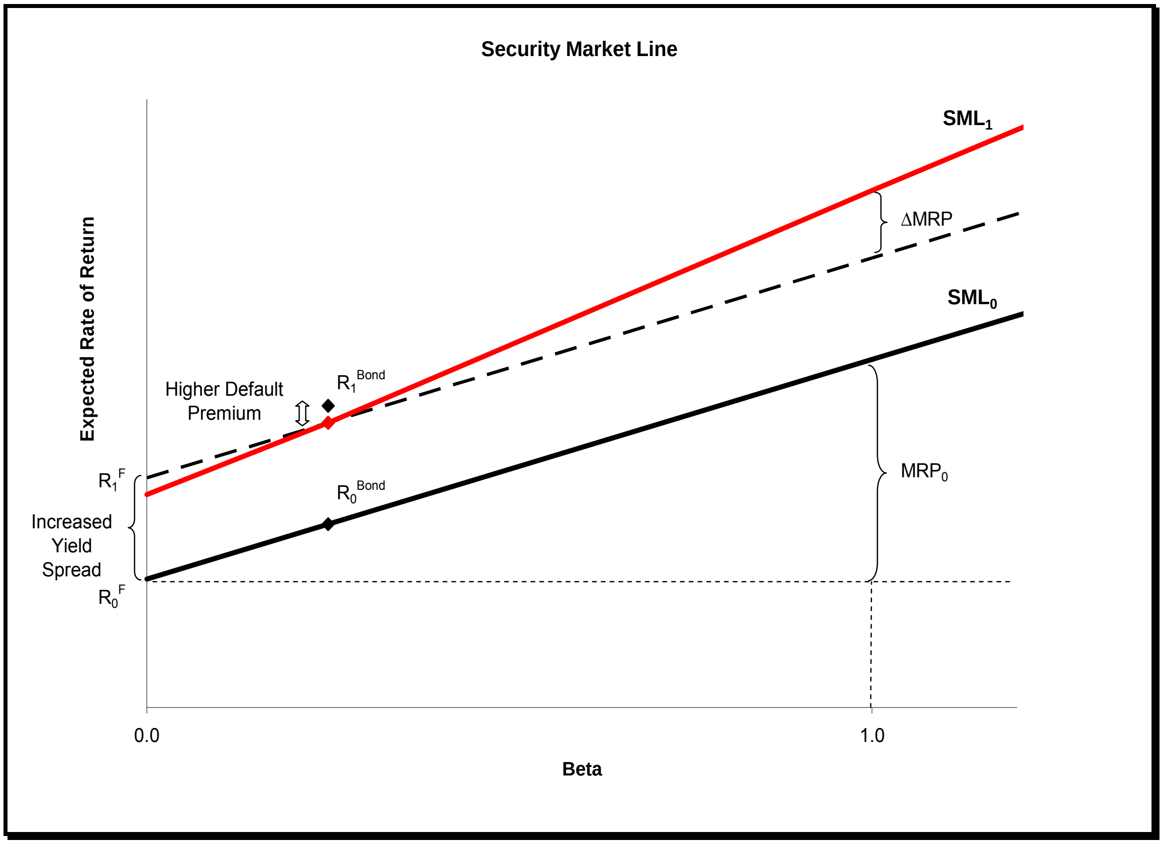

Figure 6

The effect of the MRP adder is to increase the slope of the SML. Note that the SML is rotating through the estimated yield of the utility bond minus the estimate of the increase default and income tax premium. Effectively, this step recognizes that there are three possible components to the increased yield spread: an increased default and income tax risk premium, an increased systematic risk premium and an increased premium over the risk-free rate not related to the other two categories. The result is that the intercept of the SML is lower than it would be if there were no increases in the systematic risk premium in the increase in the yield spread.

c) Beta Estimates

Q86. How is beta obtained?

A86. There are many ways to estimate betas. However, standard approaches calculate beta by statistical regression of the excess (positive or negative) of the return on the stock over the risk-free rate against the excess return over the risk-free rate on the relevant index (e.g., the S&P/TSX index for the Canadian companies or the NYSE index for the U.S. companies). It is common to use monthly return data for the most recent 60-month period for which data exist or weekly data for the most recent 260 weeks.

Q87. Are there any issues affecting beta estimates?

A87. Yes, the unique factors affecting the stock market and the utility industry may make the most recent 60 month period un-representative for the sample companies' betas. The dramatic change in market values may have caused the returns of the companies in the samples to "decouple" from their normal relationship to the returns on the market indices. I believe that the risk of the sample companies has increased given the changes in the financial markets, but betas estimated over 60 month periods have fluctuated dramatically for both the Canadian utilities and the gas LDC samples. These results cause me to question the validity of the estimates.

Q88. What evidence do you have that the betas estimated over the most recent 60 months are unusual?

A88. Figures 7 and 8 below display the average rolling betas estimated for the Canadian utilities sample and the gas LDC sample, respectively, for the period June 1995 to March 2009.[51] For each graph, each point on the line represents a beta estimated using monthly excess returns over the previous 60 months. Market returns are represented by either the S&P/TSX or the S&P 500 indices, as appropriate, and risk-free rates are each country's 91-day T-bill returns. Rolling betas allow an analyst to track the changes in the estimated betas over time.

[51] The graph includes several months of data from the financial crisis period starting in September 2008.

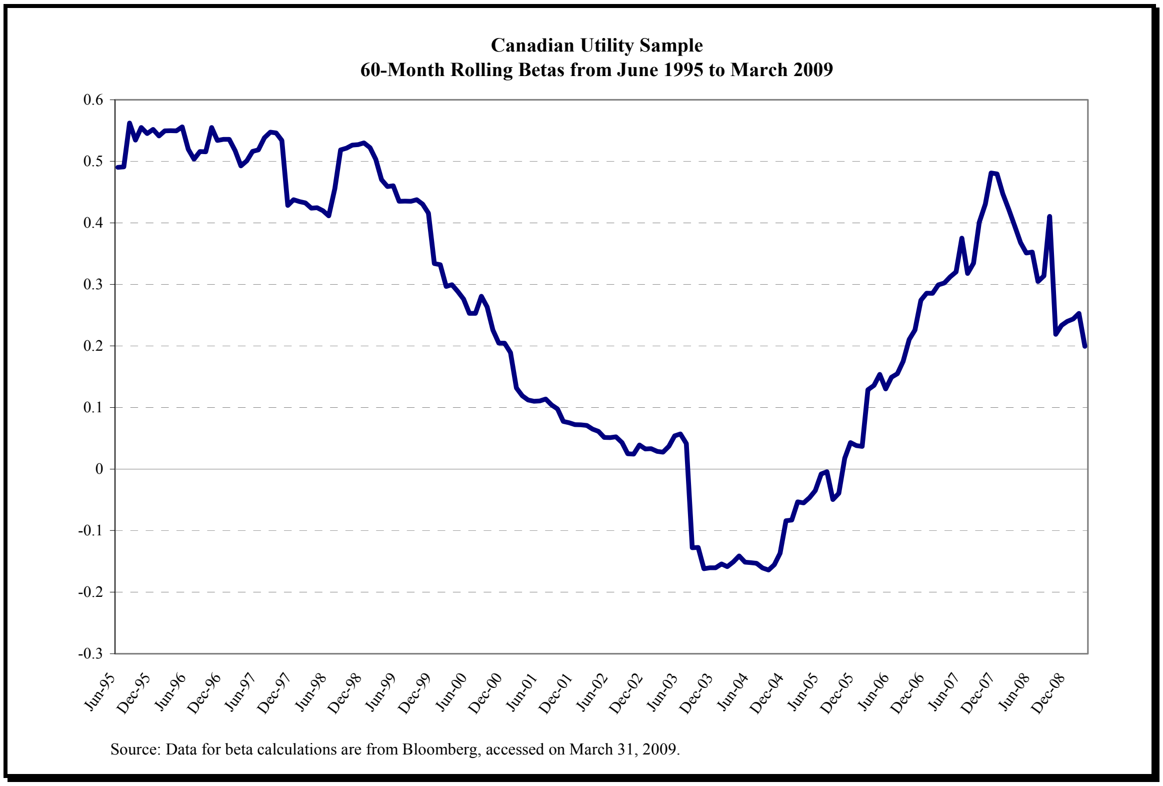

Figure 7: Trends in Canadian utility betas between June 1995 and March 2009

Q89. Do you believe that this is evidence of the "decoupling" that you mentioned earlier?

A89. Yes, because I do not believe that these beta estimates can be an accurate measure of the relative risk of the sample companies in many of the periods. Specifically, the most recent six to seven months have seen enormous turmoil in financial markets that may have caused utility betas to decouple from the market.

Q90. In light of decoupling illustrated in Figures 7 and 8 of your evidence, how do you estimate the betas for the samples?

A90. For the gas LDC sample, I rely on forecasts of beta from *Value Line*, but *Value Line* does not provide betas for all of the companies in the Canadian utilities sample. Consequently, I have chosen to instead rely upon betas provided by Bloomberg based upon 260 weeks (five years) of weekly return data.[52]

[52] Five years of weekly observations was chosen to be consistent with the estimation method relied upon by *Value Line*.

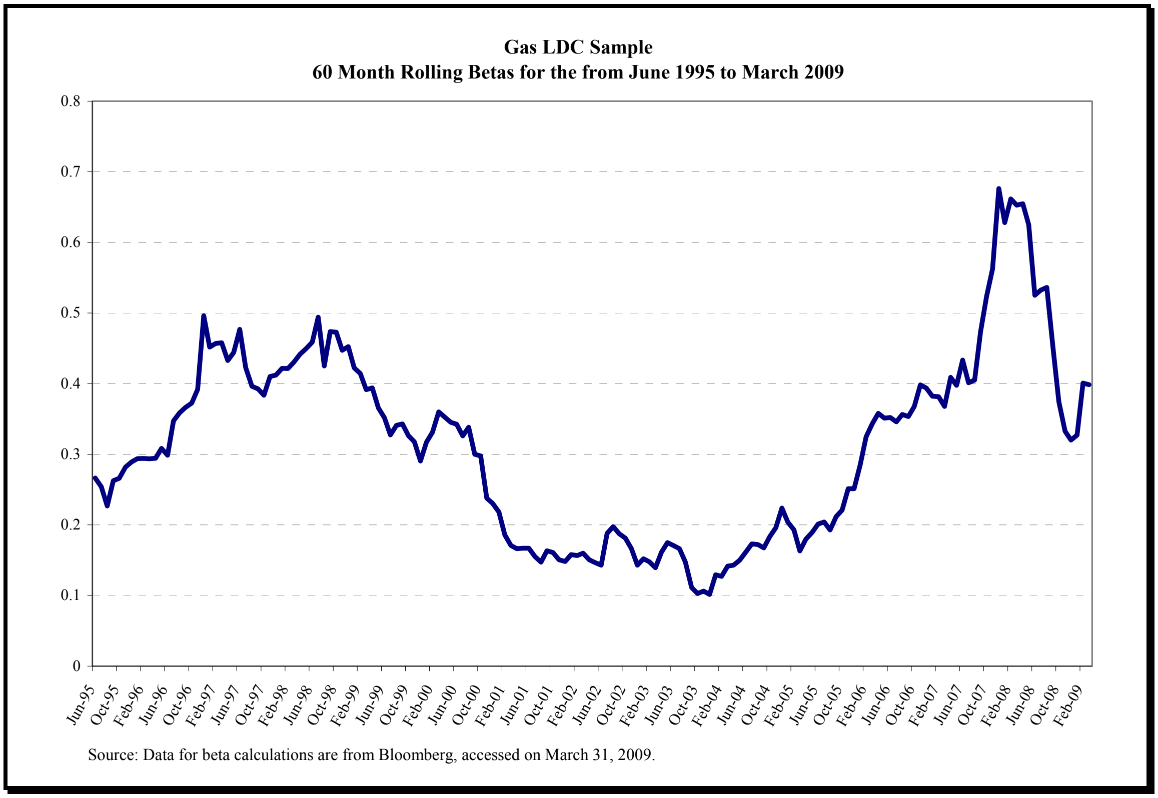

Figure 8: Trends in U.S. Gas LDC Betas between June 1995 and March 2009

Q91. Please discuss the Canadian 260-week beta estimates.

A91. The Bloomberg 260-week betas for the period ending March 10, 2009 are displayed in Workpaper #1 to Table No. MJV-10. Bloomberg adjusts the estimated raw betas towards 1.0 as is standard practice in the industry. This is typically meant to compensate for the observed tendency of betas to regress towards 1.0 in repeated sampling, but is also relevant if one believes that the stock returns being evaluated display interest rate sensitivity. The figure shows that prior to the recent financial turmoil, both the Canadian utilities' betas and the U.S. gas LDC's betas had been recovering from their plunge at the end of 1999 and were approaching their historical levels. The average estimated gas LDC beta in particular has decreased again, but I do not believe this drop in beta values is representative for the industry's systematic risk.

Q92. Are you satisfied that the 260-week estimated betas for the Canadian sample are completely reliable?

A92. Not entirely. As Figure 7 illustrates, the beta relationship has not been anywhere near stable in the last ten years, and the estimated betas were on an increasing trend until very recently. The volatility of the beta estimates indicates that these estimates must be interpreted with caution, which is partly why additional samples are needed to provide a more complete and reliable picture. The credit crises in Canada as well as in the U.S. have affected the relationship between utility returns and market returns. However, the betas for the companies in the Canadian utilities sample for the period ending March 10, 2009 are very similar to those I obtained in August 2008.[53] At this point, the ongoing financial crisis has not caused a decrease in the beta estimates for the Canadian utilities sample although the steady increase in the estimates has ceased.

Q93. With respect to the gas LDC sample, do you have any concerns with the betas obtained from *Value Line*?

A93. Yes. I have reviewed the betas estimated by *Value Line*. While the estimated values declined slightly and then recovered, the beta estimates for some companies in the gas LDC sample has dropped quite materially during the ongoing financial crisis which started earlier in the U.S. than in Canada. While it is unclear why a specific gas LDC's estimated beta fell while other companies' betas did not, I follow my practice from recent proceedings in Canada and rely on unadjusted *Value Line* betas for the gas LDC sample companies. *Value Line* uses five years of weekly return data computed as the difference in the logarithms of prices (i.e., they use continuously compounded returns), and computes betas by regressing company returns against the NYSE index returns, again computed on a continuously compounded basis. It is important to note, however, that the betas reported by *Value Line* are also adjusted towards one. For reasons explained below, I reverse the process to get "unadjusted" values for use in the models for the companies in the gas LDC sample.

[53] In my written evidence for NGTL for the AUC Generic Cost of Capital Proceeding, I relied on betas as of August 2008.

Q94. How do the unadjusted and adjusted betas for the gas LDC sample companies compare?

A94. *Value Line's* adjusted betas for the gas LDC sample range from 0.60 to 0.85, with an average of 0.72. The resulting unadjusted betas range from 0.37 to 0.75 (See Workpaper #1 to Table No. MJV-20) with an average of 0.55.[54]

Q95. Why do you "unadjust" the *Value Line* betas?

A95. The use of unadjusted betas for the gas LDC is consistent with my recent evidence in Canada, although I use adjusted betas when testifying in the U.S. because I believe that adjusted betas give a more accurate estimate of the cost of equity for companies regulated on the basis of original cost rate base.[55] I use unadjusted betas in order to be conservative when using data from companies in this sample.

Adjustment moves the estimated betas one-third of the way toward a value of one, the average stock beta. 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; however, that is not the reason that I normally use adjusted betas.

Companies regulated on the basis of original cost rate base frequently display unusual sensitivity to interest rate changes in a manner similar to bonds. I use adjusted betas when the sample companies display such unusual interest rate sensitivity. The sample companies do not currently display interest rate sensitivity, but I believe that this is because the "decoupling" of the sample companies' returns from the market return, which is resulting in very low or negative beta estimates for the sample companies, is also making it impossible to detect interest rate sensitivity that companies regulated on the basis of an original cost rate base normally display. Nonetheless, even though I

[54] As noted earlier, results from a sub-sample of companies with a high degree of regulation are also considered for the gas LDC sample. The average adjusted and unadjusted betas for the subsample are 0.71 and 0.53 respectively.

[55] Appendix D of Dr. Kolbe's evidence discusses this point in more detail.

believe that adjusted betas would be a better estimate of the relative risk of the gas LDC sample companies, I use unadjusted betas for these companies because I want to ensure that I address the concerns regarding the use of U.S. data.

Q96. Why do you use adjusted betas in your analysis of the Canadian utilities sample?

A96. I use adjusted betas for the Canadian utilities sample for two reasons. First, in the past when betas were estimated reliably, the companies in the sample exhibited the sensitivity to interest rate changes as predicted by theory for companies regulated on the basis of original cost rate base. I believe that this sensitivity is still present, but the difficulty with estimating the sample companies' betas is making it impossible to detect. Second, as I noted earlier, Workpaper #1 to Table No. MJV-10 shows that the 260-week betas for the Canadian utilities sample are similar to slightly higher than those before the financial crisis. Note that using adjusted betas corrects only for the interest rate sensitivity of the companies and not for the expected increase in the risk of the sample companies. I note the expected increase in risk only because I believe that not using adjusted betas would risk underestimating the cost of equity for the sample companies for both reasons. I have adjusted for only one of the two reasons. Although I use these adjusted betas in my analysis, I believe that these estimates of the relative risk of the Canadian utilities sample are likely to be downward biased estimates of the risk of the sample companies because (1) a portion of the period of turmoil in the market that previously resulted in low or negative beta estimates is still included in the estimation period and (2) the ongoing financial crisis is likely to cause estimated utility betas to decouple from the market. In other words, the unadjusted betas are likely to under-estimate the systematic risk of the sample.

d) Equity Risk Premium Results

Q97. What are the cost of equity and overall cost of capital estimates for the samples using the risk positioning approach?

A97. As noted earlier, I use the long-term risk-free rate in the two risk positioning models (CAPM and ECAPM) with two different values for the ECAPM parameter, α, (one and two percent) to produce three estimators for the cost of equity. Then I take the average across companies of these ATWACCs to produce the cost of capital estimates for the sample. The sample average ATWACC estimates for each estimation method serve as a benchmark against which to evaluate Gaz Métro's ATWACC.

Q98. Do you have any preliminary comments regarding the results of the risk positioning models?

A98. Yes. As shown above in Figures 7 and 8, betas measured in the standard way using 60 months of historical data declined to values very near to zero before recently beginning to recover toward more normal values. They have again declined in recent months probably due to the high volatility in financial markets. Ordinarily, using historical data to estimate beta is not a serious problem because the overall business risk of an industry generally does not change rapidly. For an industry undergoing major changes, however, the beta estimates based upon the historical data may not capture the full changes in risk in the industry. This is true even though information on the probability of change and the likely provisions of the industry changes has been available some months ago. The fall in the estimated betas for both the gas LDC and Canadian utilities samples estimated in the standard way might seem to be an unexpected result because the introduction of more competition in the natural gas and electric industries increases risk. However, such "decoupling" of beta from the normal relationship to the market appears to be a common feature of industries undergoing structural changes. This factor also suggests that the risk positioning estimates may be downward biased and is consistent with the information from the DCF model for the samples (see next section). While it is too early to determine the long-term impact of the financial crisis on utilities' systematic risk as measured by beta, the volatility of the market is up, so clearly beta estimates are currently more volatile than in the recent past. It is also clear that utilities cannot raise capital at the same cost as the government, so that the current yield on government bonds downward biases cost of capital estimates using the standard CAPM. In addition, during times of financial crisis, investors' risk aversion increases so that the MRP is up in recent months.

Q99. Please illustrate the values that are used in the tables and workpapers accompanying your written evidence.

A99. My benchmark adjustments are illustrated in Figure 9 below. The adjustments, I incorporated in my risk positioning models are modest attempts to take the downward bias in the risk-free rate and the increase in the MRP into account. However, I rely on my standard beta estimates for both samples. As noted earlier, the tables and spreadsheets accompanying my written evidence rely on a yield spread adjustment of one percent and a MRP adjustment of two percent. Note that for each one percent increase in the market risk premium, I reduce the yield spread added by ¼ percent. The choice of ¼ percent is based on evidence that the estimated beta of corporate bonds against the market are about 0.25.[56]

[56] For example, Edwin J. Elton, Martin J. Gruber, Deepak Agrawal and Christopher Mann, Explaining the Rate Spread on Corporate Bonds, The Journal of Finance LVI, 2001 footnote 32 report bond betas range from 0.12 to 0.76 with the average BBB-rated bond having a beta of 0.26.

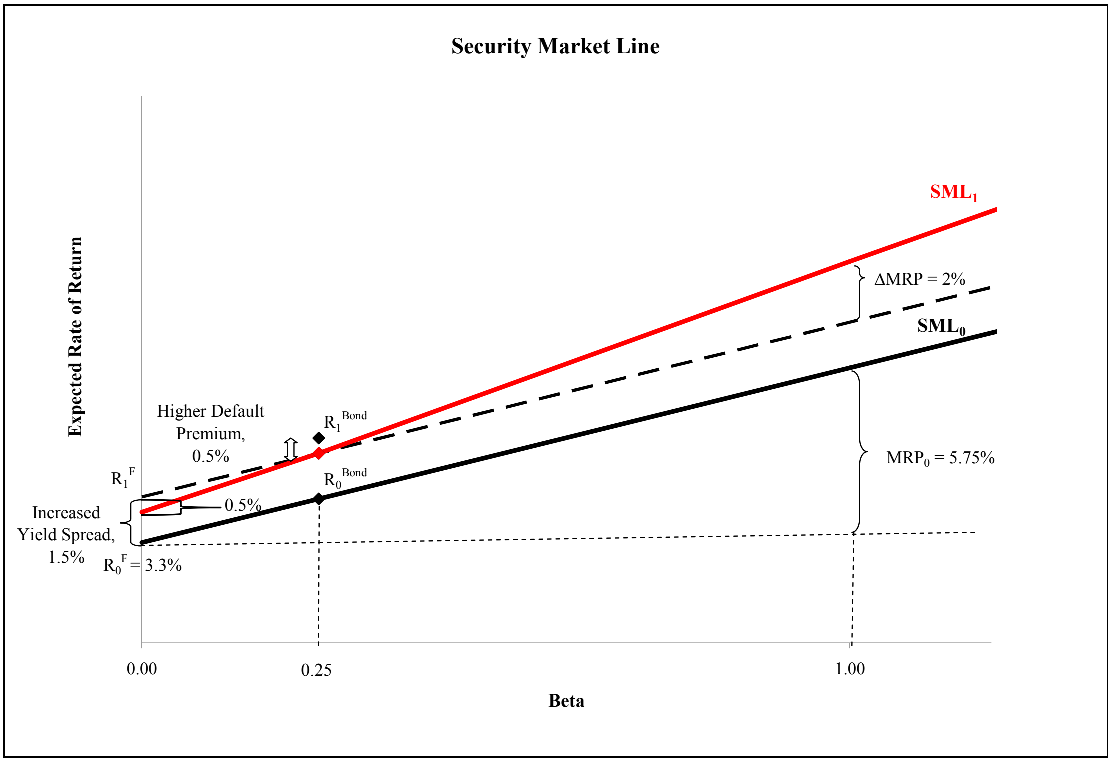

Figure 9

Q100. What are the samples' results from the application of the risk positioning model?

A100. Table 4 below displays the results for both samples, including the sub-sample for the gas LDC sample, based upon the parameters displayed in Figure 9. As seen in Table 4, the results are not substantially different for the gas sub-sample compared to the full sample

Table 4: Risk Positioning Results

2009 Tax Rate: 30.15%	CAPM	ECAPM (α = 1%)	ECAPM (α = 2%)
[1] **Canadian Utilities Sample**			
Average ATWACC	7.2%	7.4%	7.5%
[2] **Gas LDC Sample**			
Full Sample			
Average ATWACC	7.1%	7.4%	7.7%
Sub-Sample			
Average ATWACC	7.1%	7.4%	7.7%
[3] Risk Positioning Parameters			
Risk-Free Rate Estimate:			4.30%
Estimated MRP:			7.75%

Sources and Notes:
[1] See Table 1 for details on the Canadian utilities sample composition. Risk positioning results are from Table No. MJV-12.
[2] See Table 2 for details on the gas LDC sample composition. Risk positioning results are from Table No. MJV-22.
[3] See Appendix C for details on the risk positioning parameters used in the estimates.

Q101. What conclusions do you draw from the equity risk premium results?

A101. Of the equity risk premium results, the CAPM values deserve the least weight, because this method does not adjust for the empirical finding that the cost of capital is less sensitive to beta than predicted by the CAPM (which my written evidence considers by using the ECAPM). Conversely, the ECAPM numbers deserve the most weight, because this method adjusts for the empirical findings. For the Canadian utilities sample, the ATWACC estimates range from 7.2 to 7.5 percent compared to a range of 7.1 to 7.7 percent for both the full gas LDC sample and the gas LDC subsample.

2. DCF Estimates

Q102. What steps do you take in your DCF analyses?

A102. The steps are to collect the data on current market value capital structures, prices, dividends, and growth forecasts. From these estimates, the sample companies' costs of equity are computed and used to determine the return on equity.

a) Growth Rates

Q103. What growth rate information do you use?

A103. For reasons discussed above and in Appendix D, historical growth rates today are not relevant as forecasts of current investor expectations for these samples. I therefore use forecasted rates.[57]

The ideal in a DCF application would be a detailed forecast of future dividends, year by year well into the future until a true steady state (constant) dividend growth rate was reached, based on a large sample of investment analysts' expectations. I know of no source of such data. Dividends are ultimately paid from earnings, however, and earnings forecasts from a number of analysts are available for a few years. Investors do not expect dividends to grow in lockstep with earnings, but for companies for which the DCF approach can be used reliably (*i.e.*, for relatively stable companies whose prices do not include the option-like values described in Appendix D), they do expect dividends to track earnings over the long-run. Thus, use of earnings growth rates as a proxy for expectations of dividend growth rates is a common practice.

Accordingly, the first step in my DCF analysis is to examine a sample of investment analysts' forecasted earnings growth rates from Bloomberg and from *Value Line* for companies in the gas LDC sample. The details are in Appendix D. At present, the data run through the 2011-2013 horizon, which represents on average about a 4 year forecast (from the 4th quarter of 2008 to the end of 2012). The longest-horizon forecast growth rates from these sources underlie my simple DCF model (*i.e.*, the standard perpetual-growth model associated with the "DCF formula," dividend yield plus growth). Unfortunately, the longest growth forecast data only go out for a period of about five years, which is too short a period to make the DCF model completely reliable. I also use the five-year forecasts in conjunction with a forecast of the long-run GDP growth rate in

[57] I obtain growth rate forecasts from Bloomberg for the samples as well as from *Value Line* for the gas LDC sample.

a modest attempt at obtaining a multistage DCF estimate using company-specific growth rates.

Q104. Do these growth rates correspond to the ideal you mentioned above?

A104. No. While forecasted growth rates are the quantity required in principle, the forecasts need to go far enough out into the future so that it is reasonable to believe that investors expect a stable growth path afterwards. As can be seen in Table No. MJV-5 for the Canadian utilities sample and in Table No. MJV-16 for the gas LDC sample, the growth rates estimates do not support the view that investors are expecting growth rates equal to the single perpetual growth rate assumed in the simple DCF model. The five-year growth rate forecasts vary from company to company, but the range for the gas LDC sample is relatively narrow. The Canadian utilities sample earnings growth forecasts range from a low of 3.9 percent forecast for Canadian Utilities Limited to a high of 10.5 percent forecast for Enbridge Inc. The range of estimates for the gas LDC sample is similar. They vary from 1.9 percent to 8.5 percent. However, in my opinion, a much longer detailed growth rate forecasts than currently available from Bloomberg and *Value Line* would be needed to implement the DCF model in a completely reliable way for these two samples at this time.

b) Dividend and Price Input

Q105. What values do you use for dividends and stock prices?

A105. Dividends are for the 4th quarter of 2008, the last recorded dividend payment reported by Bloomberg at the time of the preparation of this evidence. This dividend is grown at the estimated growth rate and divided by the price described below to estimate the dividend yield for the simple DCF model.

Stock prices are an average of closing stock prices for the 15-day trading period ending March 10, 2009 for both the Canadian utilities sample and for the gas LDC sample. This date coincides with the date that the growth forecasts for the samples was extracted from

Bloomberg. A 15-day stock price average is used to guard against anomalous price changes in any single day.

c) DCF Results

Q106. What are the DCF estimates for the samples?

A106. Following the procedures outlined earlier, simple and multistage DCF estimates of the cost of equity are obtained for the Canadian utilities and the gas LDC sample companies, and are presented in Table 5 below.[58] Because the analysts' 5-year growth rate forecasts are in general higher than the forecast growth rate for GDP, the simple DCF estimates are higher than the multistage DCF estimates for both samples. For the Canadian utilities sample, the simple DCF ATWACC estimate is 8.0 percent which is above the range of the risk positioning estimates for the sample. For the gas LDC sample, the simple DCF cost estimate at 8.5 percent (and 8.4 percent for the subsample) is 1 to 1½ percent higher than the risk positioning estimates. The multistage DCF estimates are lower at 7.1 percent for the Canadian utilities sample and 8.0 percent for the full gas LDC sample (7.9 percent for the subsample). These estimates are slightly higher than the risk positioning estimates for the gas LDC sample, but the multistage DCF estimates for the Canadian utilities sample is very similar to the estimates from the risk positioning model.

Q107. What conclusions do you draw from the DCF analysis?

A107. For both samples, the DCF model estimates are suggesting that the risk positioning estimates may be downward biased which is consistent with the difficulty in estimating the betas for the companies at this point in time. In addition, it is highly likely that the MRP is higher under current economic conditions.

[58] See *Section III.B* of above and Appendix D for details of DCF estimation.

Table 5: DCF Results

2009 Tax Rate: 30.15%	Simple	Multi Stage
[1] **Canadian Utilities Sample**		
Average ATWACC	8.0%	7.1%
[2] **Gas LDC Sample**		
Full Sample		
Average ATWACC	8.5%	8.0%
Sub-Sample		
Average ATWACC	8.4%	7.9%
[3] Canadian GDP Growth Estimate:		4.24%
US GDP Growth Estimate:		4.90%

Sources and Notes:
[1] See Table 1 for details on the Canadian utilities sample composition. Results are from Table No. MJV-8.
[2] See Table 2 for details on the gas LDC sample composition. Results are from Table No. MJV-19.
[3] See Appendix D for details on the growth and other DCF parameters used in the estimates.

Although I do not believe one can rely heavily on the DCF estimates, I do believe they provide a useful check on the risk positioning results for both samples. In addition, because the forecast growth rates for the sample companies are relatively stable, I believe that the DCF results for the gas LDC sample provide support for the risk positioning model estimates.

VI. CONCLUSIONS

Q108. Before summarizing the evidence from the samples, do you have any general comments about the data?

A108. Yes. The estimates for the samples were obtained in March 2009, about half a year after the turmoil in the financial markets became prominent. Therefore, the estimates reflect these events to a degree but may not fully incorporate the increased in investors' risk aversion. Hence, the estimates are more likely to be downward biased than upward biased.

Q109. Please provide the results of the sensitivity tests for the Canadian utilities sample by changing the market risk premium.

A109. The sensitivity tests for the Canadian utilities sample and U.S. gas LDC sample are displayed in Table 6 below. Note that in these sensitivity tests, I am not adjusting the intercept, because the estimate of the beta of corporate bonds could be in error.

Table 6

Summary of ATWACC by Adjusting MRPs

	ATWACC		CAPM	ECAPM (α = 1%)	ECAPM (α = 2%)
Canadian Utility Sample					
Adjust MRP by	1%	[1]	6.8%	7.0%	7.2%
	2%	[2]	**7.2%**	**7.4%**	**7.5%**
	3%	[3]	7.5%	7.7%	7.9%
Gas LDC Sub-Sample					
Adjust MRP by	1%	[4]	6.7%	7.0%	7.3%
	2%	[5]	**7.1%**	**7.4%**	**7.7%**
	3%	[6]	7.4%	7.7%	8.0%

Sources and Notes:
[1], [4]: Long-term risk-free rate is 3.30% plus 1.00%
MRP is 5.75% plus 1.00%.
[2], [5]: Long-term risk-free rate is 3.30% plus 1.00%,
MRP is 5.75% plus 2.00%.
[3], [6]: Long-term risk-free rate is 3.30% plus 1.00%,
MRP is 5.75% plus 3.00%.

Q110. Do you have a similar sensitivity table for the Canadian utilities sample and gas LDC sample for the yield spread adjustment to the risk-free rate?

A110. Yes. Please see Table 7 below. Note in that in Table 8, the MRP is held constant while the yield spread adjustment changes.

Table 7

Summary of ATWACC by Adjusting Long-Term Risk-Free Rate					
	ATWACC		CAPM	ECAPM (α = 1%)	ECAPM (α = 2%)
Canadian Utility Sample					
Adjust Risk-Free Rate by	¾ percent	[1]	7.0%	7.2%	7.4%
	1 percent	[2]	**7.2%**	**7.4%**	**7.5%**
	1¼ percent	[3]	7.3%	7.5%	7.7%
Gas LDC Sub-Sample					
Adjust Risk-Free Rate by	¾ percent	[4]	6.9%	7.2%	7.5%
	1 percent	[5]	**7.1%**	**7.4%**	**7.7%**
	1¼ percent	[6]	7.2%	7.5%	7.8%

Sources and Notes:
[1], [4]: Long-term risk-free rate is 3.30% plus ¾ percent, MRP is 5.75% plus 2 percent.
[2], [5]: Long-term risk-free rate is 3.30% plus 1 percent, MRP is 5.75% plus 2 percent.
[3], [6]: Long-term risk-free rate is 3.30% plus 1¼ percent, MRP is 5.75% plus 2 percent.

Q111. In Tables 6 and 7, you have done sensitivity analyses for both the yield spread adjustment and the MRP one parameter at a time, but doesn't that violate the analysis above that allocates the observed increase in the yield spread to either an increase in MRP or an increase in the risk-free rate?

A111. No. The discussion of the allocation of the observed increase in yield spreads for utility bonds is based upon a series of assumptions for illustration purposes and is really quite conservative. For example, the increase in yield spreads based upon data provided by Bloomberg is lower than the evidence on the increase in spreads provided by Mr. Engen. If the yield spread increase were larger, the appropriate adjustment to either the MRP or the risk-free interest rate would be greater. In addition, the increase in MRP and risk-free rate is affected by the assumptions on the beta of A-rated utility bonds and on the magnitude of the increase in the default premium. In general, the assumptions I made were conservative in the sense that the adjustment to the MRP or the risk-free rate were lower than would be the case with less conservative assumptions. The sensitivities displayed in Tables 6 and 7 show the range of estimates from a slight variation in the underlying assumptions.

Q112. Please summarize the evidence from the samples regarding the ATWACC that is consistent with the evidence from the samples.

A112. Based on the cost of equity estimates displayed in Tables 6 and 7 above, the point estimate of the ATWACC is 7¼ percent with a range of 7 percent to 7¾ percent for both the Canadian utilities sample and the gas LDC sample. This estimate is slightly higher than the multistage DCF estimate of 7.1 percent for the Canadian utilities sample but lower than the estimate of 8.0 percent for the gas LDC sample.

Note that in estimating the samples' ATWACC, I round to the nearest ¼ percent because I do not believe that cost of capital estimates can be made more precisely than that.

Q113. Why doesn't your recommended range for the samples cover all of the estimates displayed in Tables 6 and 7?

A113. I have determined a point estimate of the ATWACC for the samples and a range of uncertainty based upon all of the analyses I have done. I provide an estimate of a reasonable range around the point estimate based upon the reliability of the data. I do not try to include all of the resulting estimates in the range because I regard some of the estimates as more reliable than others. For example, the estimates based upon the CAPM are not a reliable as those based upon the ECAPM because the CAPM estimates do not account for the empirical observation that low (high) beta stocks have higher (lower) costs of capital than estimated by the CAPM. Nor is it likely that the lowest and highest estimates in the tables are as reliable as those in the middle of the range because those estimates rely upon all of the parameters being simultaneously low or high.

Q114. Why is your range asymmetric around your point estimate?

A114. Normally, I report a symmetric range, but at this time, I believe that the upper end of the range is much more uncertain than the bottom of the range because the effects of the current economic crisis are difficult to measure. For example, it is more likely that the MRP could have increased by more than 3 percent than it is that it increased by less than 1 percent, but I only provide sensitivity tests for an increase in MRP of 3 percent. For this reason, I believe that the ATWACC for the samples is unlikely to be less than 7 percent (bottom of the range), but it could easily be higher than 7¾ percent (top of the range).

Q115. What is the ATWACC that you estimate for Gaz Métro based upon its relative risk compared to the samples?

A115. I do not estimate the ATWACC for Gaz Métro. Dr. Kolbe interprets the results for the sample in relation to Gaz Métro's risk and provides a recommended ATWACC in his written evidence.

Q116. Does this conclude your written evidence?

A116. Yes, it does.

Table No. MJV-1

Index to Tables for the Written Evidence of Michael J. Vilbert

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Table No. MJV-2	Classification of Companies by Assets of the Canadian Utilities Sample
Table No. MJV-3	Market Value of the Canadian Utilities Sample
Table No. MJV-4	Capital Structure Summary of the Canadian Utilities Sample
Table No. MJV-5	Estimated Growth Rates of the Canadian Utilities Sample
Table No. MJV-6	DCF Cost of Equity of the Canadian Utilities Sample
Table No. MJV-7	Overall After Tax DCF Cost of Capital of the Canadian Utilities Sample
Table No. MJV-8	Summary of Overall After Tax DCF Cost of Capital
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Table No. MJV-10	Risk Positioning Cost of Equity of the Canadian Utilities Sample
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Table No. MJV-2

Canadian Utilities Sample

Classification of Companies by Assets

Company	Company Category
Canadian Utilities	MR
Emera Inc.	R
Enbridge Inc.	MR
Fortis Inc.	R
TransCanada Corp.	MR

Sources and Notes:
R = Regulated (More than 80% of assets are regulated).
MR = Mostly Regulated (50% to 80% of assets are regulated).
Source: 2008 Annual Reports.

Table No. MJV-3

Market Values of the Canadian Utilities Sample

Panel A: Canadian Utilities

($MM)

	DCF Capital Structure	Year End, 2008	Year End, 2007	Year End, 2006	Year End, 2005	Year End, 2004	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$2,752	$2,752	$2,522	$2,325	$2,224	$2,118	[a]
Shares Outstanding (in millions) - Common	126	126	125	125	127	127	[b]
Price per Share - Common	$40	$39	$47	$47	$43	$30	[c]
Market Value of Common Equity	$4,971	$4,911	$5,890	$5,942	$5,497	$3,817	[d] = [b] x [c].
Market to Book Value of Common Equity	1.81	1.78	2.34	2.56	2.47	1.80	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$625	$625	$625	$637	$637	$637	[f]
Market Value of Preferred Equity	$625	$625	$625	$637	$637	$637	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$1,335	$1,335	$1,264	$1,295	$1,303	$1,270	[h]
Current Liabilities	$604	$604	$446	$422	$435	$397	[i]
Current Portion of Long-Term Debt	$63	$63	$65	$59	$57	$56	[j]
Net Working Capital	$794	$794	$883	$932	$925	$929	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$22	$22	$0	$0	$0	$1	[l]
Adjusted Short-Term Debt	$0	$0	$0	$0	$0	$0	[m] = See Sources and Notes.
Long-Term Debt	$3,257	$3,257	$3,081	$3,038	$2,905	$2,932	[n]
Book Value of Long-Term Debt	$3,319	$3,319	$3,147	$3,098	$2,962	$2,988	[o] = [n] + [j] + [m].
Adjustment to Book Value of Long-Term Debt	$17	$17	$304	$369	$0	$0	[p] = See Sources and Notes.
Market Value of Long-Term Debt	$3,336	$3,336	$3,451	$3,466	$2,962	$2,988	[q] = [p] + [o].
Market Value of Debt	$3,336	$3,336	$3,451	$3,466	$2,962	$2,988	[r] = [q].
MARKET VALUE OF FIRM	$8,932	$8,873	$9,966	$10,044	$9,095	$7,442	[s] = [d] + [g] + [r].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	55.65%	55.35%	59.10%	59.15%	60.44%	51.30%	[t] = [d] / [s].
Preferred Equity - Market Value Ratio	7.00%	7.04%	6.27%	6.34%	7.00%	8.55%	[u] = [g] / [s].
Debt - Market Value Ratio	37.35%	37.60%	34.63%	34.51%	32.57%	40.15%	[v] = [r] / [s].

Sources and Notes:
Bloomberg as of March 10, 2009.
Capital structure from Year End, 2008 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 4th Quarter, 2008 balance sheet information and a 15-trading day average closing price ending on March 10, 2009.
Prices are reported in Workpaper #1 to Table No. MJV-6.
[m] =
(1): 0 if [k] > 0.
(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].
(3): [l] if [k] < 0 and |[k]| > [l].
[p]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2006 10-K.

Table No. MJV-3

Market Values of the Canadian Utilities Sample

Panel B: Emera Inc.

($MM)

	DCF Capital Structure	Year End, 2008	Year End, 2007	Year End, 2006	Year End, 2005	Year End, 2004	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$1,546	$1,546	$1,360	$1,408	$1,366	$1,337	[a]
Shares Outstanding (in millions) - Common	112	112	111	111	110	109	[b]
Price per Share - Common	$20	$22	$21	$23	$20	$19	[c]
Market Value of Common Equity	$2,206	$2,469	$2,387	$2,515	$2,257	$2,086	[d] = [b] x [c].
Market to Book Value of Common Equity	1.43	1.60	1.76	1.79	1.65	1.56	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$135	$135	$260	$0	$0	$0	[f]
Market Value of Preferred Equity	$135	$135	$260	$0	$0	$0	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$682	$682	$570	$502	$392	$332	[h]
Current Liabilities	$880	$880	$586	$502	$506	$494	[i]
Current Portion of Long-Term Debt	$131	$131	$121	$3	$153	$101	[j]
Net Working Capital	($67)	($67)	$105	$4	$38	($61)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$158	$158	$105	$133	$88	$145	[l]
Adjusted Short-Term Debt	$67	$67	$0	$0	$0	$61	[m] = See Sources and Notes.
Long-Term Debt	$2,159	$2,159	$1,600	$1,657	$1,632	$1,627	[n]
Book Value of Long-Term Debt	$2,358	$2,358	$1,721	$1,661	$1,785	$1,788	[o] = [n] + [j] + [m].
Adjustment to Book Value of Long-Term Debt	$40	$40	$233	$265	$291	$243	[p] = See Sources and Notes.
Market Value of Long-Term Debt	$2,398	$2,398	$1,954	$1,926	$2,076	$2,031	[q] = [p] + [o].
Market Value of Debt	$2,398	$2,398	$1,954	$1,926	$2,076	$2,031	[r] = [q].
MARKET VALUE OF FIRM	$4,739	$5,002	$4,601	$4,440	$4,333	$4,116	[s] = [d] + [g] + [r].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	46.56%	49.36%	51.87%	56.64%	52.09%	50.67%	[t] = [d] / [s].
Preferred Equity - Market Value Ratio	2.85%	2.70%	5.65%	0.00%	0.00%	0.00%	[u] = [g] / [s].
Debt - Market Value Ratio	50.59%	47.94%	42.47%	43.36%	47.91%	49.33%	[v] = [r] / [s].

Sources and Notes:
Bloomberg as of March 10, 2009.
Capital structure from Year End, 2008 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 4th Quarter, 2008 balance sheet information and a 15-trading day average closing price ending on March 10, 2009.
Prices are reported in Workpaper #1 to Table No. MJV-6.
[m] =
(1): 0 if [k] > 0.
(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].
(3): [l] if [k] < 0 and |[k]| > [l].
[p]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2006 10-K.

Table No. MJV-3

Market Values of the Canadian Utilities Sample

Panel C: Enbridge Inc.

($MM)

	DCF Capital Structure	Year End, 2008	Year End, 2007	Year End, 2006	Year End, 2005	Year End, 2004	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$6,494	$6,494	$5,150	$4,486	$4,145	$3,853	[a]
Shares Outstanding (in millions) - Common	373	373	369	352	349	346	[b]
Price per Share - Common	$38	$39	$39	$40	$36	$29	[c]
Market Value of Common Equity	$14,153	$14,661	$14,381	$14,150	$12,620	$10,116	[d] = [b] x [c].
Market to Book Value of Common Equity	2.18	2.26	2.79	3.15	3.05	2.63	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$125	$125	$125	$125	$125	$125	[f]
Market Value of Preferred Equity	$125	$125	$125	$125	$125	$125	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$3,709	$3,709	$3,265	$3,054	$3,076	$2,349	[h]
Current Liabilities	$4,107	$4,107	$3,515	$3,224	$3,251	$2,744	[i]
Current Portion of Long-Term Debt	$719	$719	$666	$60	$68	$30	[j]
Net Working Capital	$321	$321	$416	($110)	($107)	($365)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$875	$875	$546	$808	$1,075	$651	[l]
Adjusted Short-Term Debt	$0	$0	$0	$110	$107	$365	[m] = See Sources and Notes.
Long-Term Debt	$11,629	$11,629	$9,237	$8,676	$7,899	$6,719	[n]
Book Value of Long-Term Debt	$12,347	$12,347	$9,904	$8,846	$8,074	$7,114	[o] = [n] + [j] + [m].
Adjustment to Book Value of Long-Term Debt	($538)	($538)	($20)	$618	$782	$725	[p] = See Sources and Notes.
Market Value of Long-Term Debt	$11,810	$11,810	$9,884	$9,464	$8,856	$7,839	[q] = [p] + [o].
Market Value of Debt	$11,810	$11,810	$9,884	$9,464	$8,856	$7,839	[r] = [q].
MARKET VALUE OF FIRM	$26,087	$26,595	$24,389	$23,739	$21,601	$18,080	[s] = [d] + [g] + [r].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	54.25%	55.13%	58.96%	59.61%	58.42%	55.95%	[t] = [d] / [s].
Preferred Equity - Market Value Ratio	0.48%	0.47%	0.51%	0.53%	0.58%	0.69%	[u] = [g] / [s].
Debt - Market Value Ratio	45.27%	44.40%	40.52%	39.87%	41.00%	43.36%	[v] = [r] / [s].

Sources and Notes:
Bloomberg as of March 10, 2009.
Capital structure from Year End, 2008 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 4th Quarter, 2008 balance sheet information and a 15-trading day average closing price ending on March 10, 2009.
Prices are reported in Workpaper #1 to Table No. MJV-6.
[m] =
(1): 0 if [k] > 0.
(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].
(3): [l] if [k] < 0 and |[k]| > [l].
[p]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2006 10-K.

Table No. MJV-3

Market Values of the Canadian Utilities Sample

Panel D: Fortis Inc.

($MM)

	DCF Capital Structure	Year End, 2008	Year End, 2007	Year End, 2006	Year End, 2005	Year End, 2004	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$3,037	$3,037	$2,595	$1,268	$1,212	$999	[a]
Shares Outstanding (in millions) - Common	169	169	156	104	103	96	[b]
Price per Share - Common	$23	$25	$28	$29	$24	$17	[c]
Market Value of Common Equity	$3,896	$4,176	$4,408	$3,025	$2,494	$1,649	[d] = [b] x [c].
Market to Book Value of Common Equity	1.28	1.37	1.70	2.39	2.06	1.65	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$347	$347	$122	$122	$0	$0	[f]
Market Value of Preferred Equity	$347	$347	$122	$122	$0	$0	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$1,150	$1,150	$1,038	$409	$299	$293	[h]
Current Liabilities	$1,697	$1,697	$1,804	$565	$412	$538	[i]
Current Portion of Long-Term Debt	$240	$240	$436	$85	$31	$36	[j]
Net Working Capital	($307)	($307)	($330)	($71)	($82)	($209)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$410	$410	$475	$98	$49	$193	[l]
Adjusted Short-Term Debt	$307	$307	$330	$71	$49	$193	[m] = See Sources and Notes.
Long-Term Debt	$5,213	$5,213	$4,949	$2,885	$2,457	$2,226	[n]
Book Value of Long-Term Debt	$5,760	$5,760	$5,715	$3,041	$2,537	$2,455	[o] = [n] + [j] + [m].
Adjustment to Book Value of Long-Term Debt	($161)	($161)	$612	$326	$326	$217	[p] = See Sources and Notes.
Market Value of Long-Term Debt	$5,599	$5,599	$6,327	$3,367	$2,862	$2,672	[q] = [p] + [o].
Market Value of Debt	$5,599	$5,599	$6,327	$3,367	$2,862	$2,672	[r] = [q].
MARKET VALUE OF FIRM	$9,842	$10,122	$10,857	$6,515	$5,356	$4,320	[s] = [d] + [g] + [r].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	39.59%	41.25%	40.60%	46.44%	46.56%	38.16%	[t] = [d] / [s].
Preferred Equity - Market Value Ratio	3.53%	3.43%	1.12%	1.88%	0.00%	0.00%	[u] = [g] / [s].
Debt - Market Value Ratio	56.89%	55.32%	58.28%	51.68%	53.44%	61.84%	[v] = [r] / [s].

Sources and Notes:

Bloomberg as of March 10, 2009.

Capital structure from Year End, 2008 calculated using respective balance sheet information and 15-day average prices ending at period end.

The DCF Capital structure is calculated using 4th Quarter, 2008 balance sheet information and a 15-trading day average closing price ending on March 10, 2009.
Prices are reported in Workpaper #1 to Table No. MJV-6.

[m] =
(1): 0 if [k] > 0.
(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].
(3): [l] if [k] < 0 and |[k]| > [l].

[p]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2006 10-K.

Table No. MJV-3

Market Values of the Canadian Utilities Sample

Panel E: TransCanada Corp.

($MM)

	DCF Capital Structure	Year End, 2008	Year End, 2007	Year End, 2006	Year End, 2005	Year End, 2004	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$12,898	$12,898	$9,785	$7,701	$7,206	$6,565	[a]
Shares Outstanding (in millions) - Common	616	616	540	489	487	485	[b]
Price per Share - Common	$30	$33	$40	$40	$37	$30	[c]
Market Value of Common Equity	$18,698	$20,237	$21,492	$19,668	$17,968	$14,401	[d] = [b] x [c].
Market to Book Value of Common Equity	1.45	1.57	2.20	2.55	2.49	2.19	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	[f]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$3,600	$3,600	$2,305	$2,092	$1,566	$1,101	[h]
Current Liabilities	$4,930	$4,930	$3,035	$2,989	$3,112	$2,754	[i]
Current Portion of Long-Term Debt	$993	$993	$586	$758	$434	$859	[j]
Net Working Capital	($337)	($337)	($144)	($139)	($1,112)	($794)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$1,702	$1,702	$421	$467	$962	$546	[l]
Adjusted Short-Term Debt	$337	$337	$144	$139	$962	$546	[m] = See Sources and Notes.
Long-Term Debt	$17,450	$17,450	$14,225	$12,559	$11,113	$11,111	[n]
Book Value of Long-Term Debt	$18,780	$18,780	$14,955	$13,456	$12,509	$12,516	[o] = [n] + [j] + [m].
Adjustment to Book Value of Long-Term Debt	($817)	($817)	$1,487	$1,646	$2,083	$1,737	[p] = See Sources and Notes.
Market Value of Long-Term Debt	$17,963	$17,963	$16,442	$15,102	$14,592	$14,253	[q] = [p] + [o].
Market Value of Debt	$17,963	$17,963	$16,442	$15,102	$14,592	$14,253	[r] = [q].
MARKET VALUE OF FIRM	$36,661	$38,200	$37,934	$34,770	$32,560	$28,654	[s] = [d] + [g] + [r].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	51.00%	52.98%	56.66%	56.57%	55.18%	50.26%	[t] = [d] / [s].
Preferred Equity - Market Value Ratio	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	[u] = [g] / [s].
Debt - Market Value Ratio	49.00%	47.02%	43.34%	43.43%	44.82%	49.74%	[v] = [r] / [s].

Sources and Notes:
Bloomberg as of March 10, 2009.
Capital structure from Year End, 2008 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 4th Quarter, 2008 balance sheet information and a 15-trading day average closing price ending on March 10, 2009.
Prices are reported in Workpaper #1 to Table No. MJV-6.
[m] =
(1): 0 if [k] > 0.
(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].
(3): [l] if [k] < 0 and |[k]| > [l].
[p]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2006 10-K.

Table No. MJV-4

Canadian Utilities Sample

Capital Structure Summary

Company	DCF Capital Structure			5-Year Average Capital Structure		
	Common Equity - Value Ratio [1]	Preferred Equity - Value Ratio [2]	Debt - Value Ratio [3]	Common Equity - Value Ratio [4]	Preferred Equity - Value Ratio [5]	Debt - Value Ratio [6]
Canadian Utilities	56%	7%	37%	57%	7%	36%
Emera Inc.	47%	3%	51%	52%	2%	46%
Enbridge Inc.	54%	0%	45%	58%	1%	42%
Fortis Inc.	40%	4%	57%	43%	1%	56%
TransCanada Corp.	51%	0%	49%	54%	0%	46%
Average	49%	3%	48%	53%	2%	45%

Sources and Notes:
[1], [4]:Workpaper #1 to Table No. MJV-4.
[2], [5]:Workpaper #2 to Table No. MJV-4.
[3], [6]:Workpaper #3 to Table No. MJV-4.
Values in this table may not add up exactly to 1.0 because of rounding.

Workpaper #1 to Table No. MJV-4

Canadian Utilities Sample

Calculation of the Average Common Equity - Market Value Ratio

Company	DCF Capital Structure [1]	2008 [2]	2007 [3]	2006 [4]	2005 [5]	2004 [6]	5-Year Average [7]
Canadian Utilities	56%	55%	59%	59%	60%	51%	57%
Emera Inc.	47%	49%	52%	57%	52%	51%	52%
Enbridge Inc.	54%	55%	59%	60%	58%	56%	58%
Fortis Inc.	40%	41%	41%	46%	47%	38%	43%
TransCanada Corp.	51%	53%	57%	57%	55%	50%	54%

Sources and Notes:
[1] - [6]: Table No. MJV-3; Panels A - E, [t].
[7]: Average of [2] through [6].

Workpaper #2 to Table No. MJV-4

Canadian Utilities Sample

Calculation of the Average Preferred Equity - Market Value Ratio

Company	DCF Capital Structure [1]	2008 [2]	2007 [3]	2006 [4]	2005 [5]	2004 [6]	5-Year Average [7]
Canadian Utilities	7%	7%	6%	6%	7%	9%	7%
Emera Inc.	3%	3%	6%	0%	0%	0%	2%
Enbridge Inc.	0%	0%	1%	1%	1%	1%	1%
Fortis Inc.	4%	3%	1%	2%	0%	0%	1%
TransCanada Corp.	0%	0%	0%	0%	0%	0%	0%

Sources and Notes:
[1] - [6]: Table No. MJV-3; Panels A - E, [u].
[7]: Average of [2] through [6].

Workpaper #3 to Table No. MJV-4

Canadian Utilities Sample

Calculation of the Average Debt - Market Value Ratio

Company	DCF Capital Structure [1]	2008 [2]	2007 [3]	2006 [4]	2005 [5]	2004 [6]	5-Year Average [7]
Canadian Utilities	37%	38%	35%	35%	33%	40%	36%
Emera Inc.	51%	48%	42%	43%	48%	49%	46%
Enbridge Inc.	45%	44%	41%	40%	41%	43%	42%
Fortis Inc.	57%	55%	58%	52%	53%	62%	56%
TransCanada Corp.	49%	47%	43%	43%	45%	50%	46%

Sources and Notes:
[1] - []: Table No. MJV-3; Panels A - E, [v].
[7]: Average of [2] through [6].

Table No. MJV-5

Canadian Utilities Sample

Bloomberg Estimated Growth Rates

Company	BEst Long-Term Growth Rate [1]	Number of Estimates [2]
Canadian Utilities	3.9%	2
Emera Inc.	6.2%	2
Enbridge Inc.	10.5%	5
Fortis Inc.	4.6%	2
TransCanada Corp.	7.0%	6

Sources and Notes:
[1] - [2]: Bloomberg as of March 10, 2009.

Table No. MJV-6

DCF Cost of Equity of the Canadian Utilities Sample

Panel A: Simple DCF Method (Quarterly)

Company	Stock Price [1]	Most Recent Dividend [2]	BEst Long-Term Growth Rate [3]	Quarterly Growth Rate [4]	DCF Cost of Equity [5]
Canadian Utilities	$39.60	$0.35	3.9%	0.9%	7.6%
Emera Inc.	$19.66	$0.25	6.2%	1.5%	11.8%
Enbridge Inc.	$37.94	$0.37	10.5%	2.5%	14.9%
Fortis Inc.	$23.03	$0.26	4.6%	1.1%	9.4%
TransCanada Corp.	$30.33	$0.38	7.0%	1.7%	12.5%

Sources and Notes:
[1]: Workpaper #1 to Table No. MJV-6.
[2]: Workpaper #2 to Table No. MJV-6.
[3]: Bloomberg as of March 10, 2009.
[4]: {(1 + [3]) ^ (1/4)} - 1.
[5]: {(([2] / [1]) x (1 + [4]) + [4] + 1) ^ 4} - 1.

Table No. MJV-6

DCF Cost of Equity of the Canadian Utilities Sample

Panel B: Multi-Stage DCF (Using EIA's 2008 International Energy Outlook GDP Growth Forecast and Canada's Targeted Inflation Rate)

Company	Stock Price [1]	Most Recent Dividend [2]	Best Long-Term Growth Rate [3]	Growth Rate: Year 6 [4]	Growth Rate: Year 7 [5]	Growth Rate: Year 8 [6]	Growth Rate: Year 9 [7]	Growth Rate: Year 10 [8]	GDP Long-Term Growth Rate [9]	DCF Cost of Equity [10]
Canadian Utilities	$39.60	$0.35	3.9%	3.9%	4.0%	4.0%	4.1%	4.2%	4.2%	7.9%
Emera Inc.	$19.66	$0.25	6.2%	5.9%	5.5%	5.2%	4.9%	4.6%	4.2%	10.4%
Enbridge Inc.	$37.94	$0.37	10.5%	9.5%	8.4%	7.4%	6.3%	5.3%	4.2%	10.2%
Fortis Inc.	$23.03	$0.26	4.6%	4.5%	4.4%	4.4%	4.3%	4.3%	4.2%	9.1%
TransCanada Corp.	$30.33	$0.38	7.0%	6.6%	6.1%	5.6%	5.2%	4.7%	4.2%	10.4%

Sources and Notes:
[1]: Workpaper #1 to Table No. MJV-6.
[2]: Workpaper #2 to Table No. MJV-6.
[3]: Bloomberg as of March 10, 2009.
[4]: [3] - {([3] - [9])/ 6}.
[5]: [4] - {([3] - [9])/ 6}.
[6]: [5] - {([3] - [9])/ 6}.
[7]: [6] - {([3] - [9])/ 6}.
[8]: [7] - {([3] - [9])/ 6}.
[9]: EIA International Energy Outlook, September 2008 and Bank of Canada's Targeted Inflation Rate. This number is assumed to be the perpetual growth rate.
[10]: Workpaper #3 to Table No. MJV-6.

Workpaper #1 to Table No. MJV-6

Canadian Utilities Sample

Common Stock Prices from February 18, 2009 to March 10, 2009

Company	3/10/2009	3/9/2009	3/6/2009	3/5/2009	3/4/2009	3/3/2009	3/2/2009	2/27/2009	2/26/2009	2/25/2009	2/24/2009	2/23/2009	2/20/2009	2/19/2009	2/18/2009	Average
Canadian Utilities	$39.12	$39.15	$39.95	$40.50	$40.52	$40.31	$41.00	$41.30	$40.25	$39.40	$39.70	$37.76	$38.03	$38.66	$38.40	$39.60
Emera Inc.	$18.90	$19.05	$18.99	$19.10	$19.30	$19.29	$19.85	$20.38	$20.41	$20.08	$19.76	$19.23	$19.87	$20.35	$20.38	$19.66
Enbridge Inc.	$37.00	$36.48	$36.14	$36.02	$36.95	$36.12	$37.00	$38.10	$38.96	$38.19	$38.28	$38.50	$40.21	$41.10	$40.09	$37.94
Fortis Inc.	$21.75	$22.00	$21.90	$22.17	$22.86	$23.00	$23.50	$24.01	$23.86	$23.47	$23.45	$22.90	$23.51	$23.54	$23.53	$23.03
TransCanada Corp.	$29.50	$29.27	$29.33	$29.14	$29.97	$29.35	$29.97	$30.90	$31.26	$30.50	$30.11	$30.10	$31.97	$32.13	$31.46	$30.33

Sources and Notes:
Bloomberg as of March 10, 2009.
The prices chosen are the daily closing prices from Bloomberg starting from the most recent prices available in Bloomberg as of March 10, 2009 and ending fifteen trading days before.

Workpaper #2 to Table No. MJV-6

Canadian Utilities Sample

Most Recent Dividend Payments

Company	Most Recent Dividend
Canadian Utilities	$0.35
Emera Inc.	$0.25
Enbridge Inc.	$0.37
Fortis Inc.	$0.26
TransCanada Corp.	$0.38

Sources and Notes:
Bloomberg as of March 10, 2009.

Workpaper #3 to Table No. MJV-6

DCF Cost of Equity of the Canadian Utilities Sample

Multi - Stage DCF (using EIA 2008 International Energy Outlook Long-Term GDP as the Perpetual Growth Rate)

Year	Company	Canadian Utilities	Emera Inc.	Enbridge Inc.	Fortis Inc.	TransCanada Corp.
	Current Dividend	$0.35	$0.25	$0.37	$0.26	$0.38
	Current Stock Price	($39.60)	($19.66)	($37.94)	($23.03)	($30.33)
YEAR 2009	Dividend Q2 Estimate	$0.36	$0.26	$0.38	$0.26	$0.38
YEAR 2009	Dividend Q3 Estimate	$0.36	$0.26	$0.39	$0.26	$0.39
YEAR 2009	Dividend Q4 Estimate	$0.36	$0.26	$0.40	$0.27	$0.39
YEAR 2010	Dividend Q1 Estimate	$0.37	$0.27	$0.41	$0.27	$0.40
YEAR 2010	Dividend Q2 Estimate	$0.37	$0.27	$0.42	$0.27	$0.41
YEAR 2010	Dividend Q3 Estimate	$0.37	$0.28	$0.43	$0.27	$0.41
YEAR 2010	Dividend Q4 Estimate	$0.38	$0.28	$0.44	$0.28	$0.42
YEAR 2011	Dividend Q1 Estimate	$0.38	$0.28	$0.45	$0.28	$0.43
YEAR 2011	Dividend Q2 Estimate	$0.38	$0.29	$0.46	$0.28	$0.44
YEAR 2011	Dividend Q3 Estimate	$0.39	$0.29	$0.47	$0.29	$0.44
YEAR 2011	Dividend Q4 Estimate	$0.39	$0.30	$0.49	$0.29	$0.45
YEAR 2012	Dividend Q1 Estimate	$0.39	$0.30	$0.50	$0.29	$0.46
YEAR 2012	Dividend Q2 Estimate	$0.40	$0.31	$0.51	$0.30	$0.47
YEAR 2012	Dividend Q3 Estimate	$0.40	$0.31	$0.52	$0.30	$0.47
YEAR 2012	Dividend Q4 Estimate	$0.41	$0.32	$0.54	$0.30	$0.48
YEAR 2013	Dividend Q1 Estimate	$0.41	$0.32	$0.55	$0.31	$0.49
YEAR 2013	Dividend Q2 Estimate	$0.41	$0.33	$0.57	$0.31	$0.50
YEAR 2013	Dividend Q3 Estimate	$0.42	$0.33	$0.58	$0.31	$0.51
YEAR 2013	Dividend Q4 Estimate	$0.42	$0.34	$0.59	$0.32	$0.52
YEAR 2014	Dividend Q1 Estimate	$0.43	$0.34	$0.61	$0.32	$0.52
YEAR 2014	Dividend Q2 Estimate	$0.43	$0.35	$0.62	$0.32	$0.53
YEAR 2014	Dividend Q3 Estimate	$0.43	$0.35	$0.64	$0.33	$0.54
YEAR 2014	Dividend Q4 Estimate	$0.44	$0.36	$0.65	$0.33	$0.55
YEAR 2015	Dividend Q1 Estimate	$0.44	$0.36	$0.67	$0.34	$0.56
YEAR 2015	Dividend Q2 Estimate	$0.45	$0.37	$0.68	$0.34	$0.57
YEAR 2015	Dividend Q3 Estimate	$0.45	$0.37	$0.69	$0.34	$0.58
YEAR 2015	Dividend Q4 Estimate	$0.46	$0.38	$0.71	$0.35	$0.58
YEAR 2016	Dividend Q1 Estimate	$0.46	$0.38	$0.72	$0.35	$0.59
YEAR 2016	Dividend Q2 Estimate	$0.46	$0.39	$0.74	$0.35	$0.60
YEAR 2016	Dividend Q3 Estimate	$0.47	$0.39	$0.75	$0.36	$0.61
YEAR 2016	Dividend Q4 Estimate	$0.47	$0.40	$0.76	$0.36	$0.62
YEAR 2017	Dividend Q1 Estimate	$0.48	$0.40	$0.78	$0.37	$0.63
YEAR 2017	Dividend Q2 Estimate	$0.48	$0.41	$0.79	$0.37	$0.63
YEAR 2017	Dividend Q3 Estimate	$0.49	$0.41	$0.80	$0.37	$0.64
YEAR 2017	Dividend Q4 Estimate	$0.49	$0.42	$0.81	$0.38	$0.65
YEAR 2018	Dividend Q1 Estimate	$0.50	$0.42	$0.83	$0.38	$0.66
YEAR 2018	Dividend Q2 Estimate	$0.50	$0.43	$0.84	$0.39	$0.67
YEAR 2018	Dividend Q3 Estimate	$0.51	$0.43	$0.85	$0.39	$0.67
YEAR 2018	Dividend Q4 Estimate	$0.51	$0.44	$0.86	$0.39	$0.68
YEAR 2019	Dividend Q1 Estimate	$0.52	$0.44	$0.87	$0.40	$0.69
YEAR 2019 Q2	Year 10 Stock Price	$60.96	$31.33	$63.39	$35.78	$48.84
	Trial COE: Quarterly Rate	1.9%	2.5%	2.5%	2.2%	2.5%
	Trial COE: Annual Rate	7.9%	10.4%	10.2%	9.1%	10.4%
	Cost of Equity	7.9%	10.4%	10.2%	9.1%	10.4%
	(Trial COE - COE) x 100	0.00	0.00	0.00	0.00	0.00

Sources and Notes:

All Growth Rate Estimates: Table No. MJV-6; Panel B.

Stock Prices and Dividends are from Bloomberg as of March 10, 2009.

1. See Workpaper #1 to Table No. MJV-6 for the average closing stock price obtained from Bloomberg.
2. See Workpaper #2 to Table No. MJV-6 for the for the quarterly dividend obtained from Bloomberg.
3. The EIA 2007 International Energy Outlook Long-Term GDP Growth Rate is used to calculate the Year 10 Stock Price.
   {(the Dividend Year 2019 Q2 Estimate) x ((1 + the Perpetual Growth Rate) ^ (1/4) x (1 + Trial COE - Quarterly Rate))} /
   {(Trial COE - Quarterly Rate) - ((1 + the Perpetual Growth Rate) ^ (1/4) -1)}.

Table No. MJV-7

Overall Cost of Capital of the Canadian Utilities Sample

Panel A: Simple DCF Method (Quarterly)

Company	4th Quarter, 2008 Bond Rating [1]	4th Quarter, 2008 Preferred Equity Rating [2]	DCF Cost of Equity [3]	DCF Common Equity to Market Value Ratio [4]	Cost of Preferred Equity [5]	DCF Preferred Equity to Market Value Ratio [6]	DCF Cost of Debt [7]	DCF Debt to Market Value Ratio [8]	GAZ Metro LP's Income Tax Rate [9]	Overall After- Tax Cost of Capital [10]
Canadian Utilities	A	A	7.6%	0.56	6.6%	0.07	6.6%	0.37	30.2%	6.4%
Emera Inc.	BBB	BBB	11.8%	0.47	6.8%	0.03	6.8%	0.51	30.2%	8.1%
Enbridge Inc.	A	A	14.9%	0.54	6.6%	0.00	6.6%	0.45	30.2%	10.2%
Fortis Inc.	A	A	9.4%	0.40	6.6%	0.04	6.6%	0.57	30.2%	6.6%
TransCanada Corp.	A	A	12.5%	0.51	6.6%	0.00	6.6%	0.49	30.2%	8.6%
Average			11.2%	0.49	6.7%	0.03	6.7%	0.48	30.2%	8.0%

Sources and Notes:

[1]: Bloomberg as of March 10, 2009.

[2]: Preferred ratings were assumed equal to debt ratings.

[3]: Table No. MJV-6; Panel A, [5].

[4]: Table No. MJV-4, [1].

[5]: Workpaper #2 to Table No. MJV-11, Panel B, [6].

[6]: Table No. MJV-4, [2].

[7]: Workpaper #2 toTable No. MJV-11, Panel A, [6].

[8]: Table No. MJV-4, [3].

[9]: Provided by GAZ Metro LP.

[10]: ([3] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}.

Table No. MJV-7

Overall Cost of Capital of the Canadian Utilities Sample

Panel B: Multi-Stage DCF (Using EIA's 2008 International Energy Outlook GDP Growth Forecast and Canada's Targeted Inflation Rate)

Company	4th Quarter, 2008 Bond Rating [1]	4th Quarter, 2008 Preferred Equity Rating [2]	DCF Cost of Equity [3]	DCF Common Equity to Market Value Ratio [4]	Cost of Preferred Equity [5]	DCF Preferred Equity to Market Value Ratio [6]	DCF Cost of Debt [7]	DCF Debt to Market Value Ratio [8]	GAZ Metro LP's Income Tax Rate [9]	Overall After- Tax Cost of Capital [10]
Canadian Utilities	A	A	7.9%	0.56	6.6%	0.07	6.6%	0.37	30.2%	6.6%
Emera Inc.	BBB	BBB	10.4%	0.47	6.8%	0.03	6.8%	0.51	30.2%	7.4%
Enbridge Inc.	A	A	10.2%	0.54	6.6%	0.00	6.6%	0.45	30.2%	7.7%
Fortis Inc.	A	A	9.1%	0.40	6.6%	0.04	6.6%	0.57	30.2%	6.5%
TransCanada Corp.	A	A	10.4%	0.51	6.6%	0.00	6.6%	0.49	30.2%	7.6%
Average			9.6%	0.49	6.7%	0.03	6.7%	0.48	30.2%	7.1%

Sources and Notes:
[1]: Bloomberg as of March 10, 2009.
[2]: Preferred ratings were assumed equal to debt ratings.
[3]: Table No. MJV-6; Panel B, [10].
[4]: Table No. MJV-4, [1].
[5]: Workpaper #2 to Table No. MJV-11, Panel B, [6].
[6]: Table No. MJV-4, [2].
[7]: Workpaper #2 toTable No. MJV-11, Panel A, [6].
[8]: Table No. MJV-4, [3].
[9]: Provided by GAZ Metro LP.
[10]: ([3] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}.

Table No. MJV-8

Summary of DCF ATWACC

Canadian Utilities Sample

Methodology	Overall Cost of Capital [1]
Using All Companies with Bloomberg Forecast	
Simple DCF Quarterly	8.0%
Multi-Stage DCF - Using the EIA 2008 International Energy Outlook Long-Term GDP as the Perpetual Growth Rate	7.1%

Sources and Notes:
[1]: Table No. MJV-7; Panels A-B, [10].

Table No. MJV-9

Canadian Utilities Sample

Computation of Canadian Long-Term Risk-Free Rate

[1]	10-Year Consensus Risk-Free Rate Forecast	3.10%
[2]	Maturity Premium	0.20%
[3]	Spread Adjustment	1.00%
[4]	Long-Term Risk-Free Rate	4.30%

Sources and Notes:
[1]: Consensus Forecast published by Consensus Economics, Inc as of March 2009.
[2]: See Workpaper #3 to Table No. MJV-9, Panel C.
[3]: See Workpaper #4 to Table No. MJV-9.
[4]: [1] + [2] + [3].

Workpaper #1 to Table No. MJV-9

Canadian Utilities Sample

Panel A: Canadian Bond Yield Forecast

	End of March '10 Forecast		Canadian Utility Bond Yield
	[1]		[2]
3-Month T-Bill	0.90%	A-Rated Public Utilities	6.61%
10-Year Govt. Bond	3.10%	BBB-Rated Public Utilities	6.83%

Sources and Notes:

[1]: Consensus Forecast published by Consensus Economics, Inc as of March 2009, page 17.

[2]: Bloomberg as of March 10, 2009.

Bond yields are from 30-year Canadian A-Rated and BBB-Rated Public Utility Bond Indices.

Workpaper #1 to Table No. MJV-9

Canadian Utilities Sample

Panel B: U.S. - Canada Interest Rate Adjustment

		End of March '10 Forecast
U.S. 10-Year Treasury Bond Yield:	[a]	3.4%
Canada 10-Year Treasury Bond Yield:	[b]	3.1%
Difference Factor:	[c]	0.30%

Sources and Notes:
[a] & [b]: Consensus Forecast published by Consensus Economics, Inc as of March 2009, pg. 5 and pg. 17.
[c]: [a] - [b].

Workpaper #2 to Table No. MJV-9

Canadian Utilities Sample

Panel A: Historical Market Risk Premiums

	Long-Term Return on Market [1]	Total Return on 91-Day T-Bills [2]	Total Return on 10-yr+ Gov. Bonds [3]	**Short-Term Risk Premium** [4]	**Long-Term Return on Market - Long-Term Total Return** [5]
1951-2007	11.8%	6.2%	7.4%	5.6%	4.3%
1948-2007	12.6%	5.9%	7.1%	6.6%	5.5%
1936-2007	11.6%	5.0%	6.6%	6.6%	5.0%
1934-2007	12.0%	4.9%	6.7%	7.1%	5.3%
1924-2007	11.8%	n/a	6.6%	n/a	5.3%

Sources and Notes:
[1] - [3]: Computed and updated through 2007 using CANSIM.
[4]: [1] - [2].
[5]: [1] - [3].
[6]: Morningstar, Inc., Canadian Risk Premia Over Time Report, 2009.

Workpaper #2 to Table No. MJV-9

Canadian Utility Sample

Panel B: Ibbotson's Historical Market Risk Premium Comparison

Period	**Ibbotson Long-Term Risk Premium** [1]	Period	**Ibbotson Long-Term Risk Premium** [2]
1951-2007	4.6%	1951-2008	4.6%
1948-2007	5.7%	1948-2008	5.0%
1936-2007	5.4%	1936-2008	4.8%
1934-2007	n/a	1934-2008	n/a
1924-2007	n/a	1924-2008	n/a

Source and Notes:
[1], [2]: Morningstar, Inc., Canadian Risk Premia Over Time Report, 2009.
"The equity risk premium is calculated by subtracting the long-term arithmetic average of the yield on the riskless asset from the long-term arithmetic average stock market total return (measured over the same period as the riskless asset)…" More details are explained in the Methodology part of the report.

Workpaper #2 to Table No. MJV-9

Canadian Utilities Sample

Panel C: Estimating Change in MRP for Canadian Market Based on Data for the Companies in S&P TSX Index

Using Actual S&P/ TSX Data for Pre-Crisis Common Equity Ratio

1. Inputs

Parameters in CAPM:			Source and Notes:
MRP (pre-crisis)	5.75%	[a]	Dr. Vilbert's Tables and Workpapers.
Long-term risk-free rate (pre-crisis)	4.50%	[b]	Dr. Vilbert's Tables and Workpapers.
Parameters for ATWACC:			
Cost of debt for A-Rated Utility (pre-crisis)	5.65%	[c]	15-day average yield ending on 8/8/2008 for A-Rated Utility bond with 20 year maturity
Cost of debt for BBB-Rated Utility (pre-crisis)	5.95%	[d]	15-day average yield ending on 8/8/2008 for BBB-Rated Utility bond with 20 year maturity
Common Equity (pre-crisis)	79.98%	[f]	Actual calculations of S&P/ TSX data from Bloomberg.
Debt (pre-crisis)	20.02%	[g]	= 1 - [f].
Common Equity (post-crisis)	69.31%	[h]	Actual calculations of S&P/ TSX data from Bloomberg.
Debt (post-crisis)	30.69%	[i]	= 1 - [h].
Tax Rate	35%	[j]	Assumption

2. Estimation Results:

Step 1: Estimating Return on Equity using pre-crisis data			
ROE (pre-crisis)	10.3%	[k]	= [a] + [b].
Step 2: Estimating ATWACC using pre-crisis data			
ATWACC (pre-crisis)	8.9%	[l]	= (1 - [j]) x [g] x [c] + [f] x [k].
Step 3: Estimating Return on Equity for with Reduced Equity Share			
Assuming ATWACC constant			
(i) ROE - Using Cost of Debt for A-Rated Utility	11.3%	[m]	= {[l] - (1 - [j]) x [i] x [c])} / [h].
(ii) ROE - Using Cost of Debt for BBB-Rated Utility	11.2%	[n]	= {[l] - (1 - [j]) x [i] x [d])} / [h].
Step 4: Estimating MRP with Reduced Equity Share			
(i) MRP (post-crisis) - Based on Using Cost of Debt for A-Rated Utility	6.8%	[o]	= [m] - [b].
(ii) MRP (post-crisis) - Based on Using Cost of Debt for BBB-Rated Utility	6.7%	[p]	= [n] - [b].
Step 5: Estimating change in MRP due to Reduction in Equity Share			
(i) Change in MRP - Based on Using Cost of Debt for A-Rated Utility	1.0%	[q]	= [o] - [a].
(ii) Change in MRP - Based on Using Cost of Debt for BBB-Rated Utility	0.9%	[r]	= [p] - [a].

Workpaper #2 to Table No. MJV-9

Canadian Utilities Sample

Panel D: Estimating Change in MRP for Canadian Market Based on Data for the Companies in S&P TSX Index

Using An Assumption of 80% for Pre-Crisis Common Equity Ratio

1. Inputs			
Parameters in CAPM:			Source and Notes:
MRP (pre-crisis)	5.75%	[a]	Dr. Vilbert's Tables and Workpapers.
Long-term risk-free rate (pre-crisis)	4.50%	[b]	Dr. Vilbert's Tables and Workpapers.
Parameters for ATWACC:			
Cost of debt for A-Rated Utility (pre-crisis)	5.65%	[c]	15-day average yield ending on 8/8/2008 for A-Rated Utility bond with 20 year maturity
Cost of debt for BBB-Rated Utility (pre-crisis)	5.95%	[d]	15-day average yield ending on 8/8/2008 for BBB-Rated Utility bond with 20 year maturity
Common Equity (pre-crisis)	80.0%	[f]	Assumption based on actual calculations of S&P/ TSX data from Bloomberg. See Workpaper #2 to Table No. MJV-9, Panel C.
Debt (pre-crisis)	20.0%	[g]	= 1 - [f].
Common Equity (post-crisis)	70.0%	[h]	Assumption based on actual calculations of S&P/ TSX data from Bloomberg. See Workpaper #2 to Table No. MJV-9, Panel C.
Debt (post-crisis)	30.0%	[i]	= 1 - [h].
Tax Rate	35%	[j]	Assumption
2. Estimation Results:			
Step 1: Estimating Return on Equity using pre-crisis data			
ROE (pre-crisis)	10.3%	[k]	= [a] + [b].
Step 2: Estimating ATWACC using pre-crisis data			
ATWACC (pre-crisis)	8.9%	[l]	= (1 - [j]) x [g] x [c] + [f] x [k].
Step 3: Estimating Return on Equity for with Reduced Equity Share			
Assuming ATWACC constant			
(i) ROE - Using Cost of Debt for A-Rated Utility	11.2%	[m]	= {[l] - (1 - [j]) x [i] x [c])} / [h].
(ii) ROE - Using Cost of Debt for BBB-Rated Utility	11.1%	[n]	= {[l] - (1 - [j]) x [i] x [d])} / [h].
Step 4: Estimating MRP with Reduced Equity Share			
(i) MRP (post-crisis) - Based on Using Cost of Debt for A-Rated Utility	6.7%	[o]	= [m] - [b].
(ii) MRP (post-crisis) - Based on Using Cost of Debt for BBB-Rated Utility	6.6%	[p]	= [n] - [b].
Step 5: Estimating change in MRP due to Reduction in Equity Share			
(i) Change in MRP - Based on Using Cost of Debt for A-Rated Utility	0.9%	[q]	= [o] - [a].
(ii) Change in MRP - Based on Using Cost of Debt for BBB-Rated Utility	0.9%	[r]	= [p] - [a].

Workpaper #2 to Table No. MJV-9

Canadian Utilities Sample

Panel E: Estimating Change in MRP for Canadian Market Based on Data for the Companies in S&P TSX Index

Using An Assumption of 85% for Pre-Crisis Common Equity Ratio

1. Inputs			
Parameters in CAPM:			Source and Notes:
MRP (pre-crisis)	5.75%	[a]	Dr. Vilbert's Tables and Workpapers.
Long-term risk-free rate (pre-crisis)	4.50%	[b]	Dr. Vilbert's Tables and Workpapers.
Parameters for ATWACC:			
Cost of debt for A-Rated Utility (pre-crisis)	5.65%	[c]	15-day average yield ending on 8/8/2008 for A-Rated Utility bond with 20 year maturity
Cost of debt for BBB-Rated Utility (pre-crisis)	5.95%	[d]	15-day average yield ending on 8/8/2008 for BBB-Rated Utility bond with 20 year maturity
Common Equity (pre-crisis)	85.0%	[f]	Assumption based on actual calculations of S&P/ TSX data from Bloomberg. See Workpaper #2 to Table No. MJV-9, Panel C.
Debt (pre-crisis)	15.0%	[g]	= 1 - [f].
Common Equity (post-crisis)	70.0%	[h]	Assumption based on actual calculations of S&P/ TSX data from Bloomberg. See Workpaper #2 to Table No. MJV-9, Panel C.
Debt (post-crisis)	30.0%	[i]	= 1 - [h].
Tax Rate	35%	[j]	Assumption
2. Estimation Results:			
Step 1: Estimating Return on Equity using pre-crisis data			
ROE (pre-crisis)	10.3%	[k]	= [a] + [b].
Step 2: Estimating ATWACC using pre-crisis data			
ATWACC (pre-crisis)	9.3%	[l]	= (1 - [j]) x [g] x [c] + [f] x [k].
Step 3: Estimating Return on Equity for with Reduced Equity Share			
Assuming ATWACC constant			
(i) ROE - Using Cost of Debt for A-Rated Utility	11.7%	[m]	= {[l] - (1 - [j]) x [i] x [c])} / [h].
(ii) ROE - Using Cost of Debt for BBB-Rated Utility	11.6%	[n]	= {[l] - (1 - [j]) x [i] x [d])} / [h].
Step 4: Estimating MRP with Reduced Equity Share			
(i) MRP (post-crisis) - Based on Using Cost of Debt for A-Rated Utility	7.2%	[o]	= [m] - [b].
(ii) MRP (post-crisis) - Based on Using Cost of Debt for BBB-Rated Utility	7.1%	[p]	= [n] - [b].
Step 5: Estimating change in MRP due to Reduction in Equity Share			
(i) Change in MRP - Based on Using Cost of Debt for A-Rated Utility	1.4%	[q]	= [o] - [a].
(ii) Change in MRP - Based on Using Cost of Debt for BBB-Rated Utility	1.3%	[r]	= [p] - [a].

Workpaper #3 to Table No. MJV-9

Canadian Utilities Sample

Panel A: Canadian Bond Historical Averages (Annual Series Data)

	91-Day T-Bill Yield [1]	1-3 Year Bond Yields [2]	3-5 Year Bond Yields [3]	5-10 Year Bond Yields [4]	Long-Term Government Bond Yield [5]
1936	0.85%	-	-	-	2.97%
1937	0.72%	-	-	-	3.17%
1938	0.60%	-	-	-	3.09%
1939	0.71%	-	-	-	3.16%
1940	0.71%	-	-	-	3.28%
1941	0.58%	-	-	-	3.10%
1942	0.54%	-	-	-	3.06%
1943	0.48%	-	-	-	3.01%
1944	0.39%	-	-	-	3.00%
1945	0.36%	-	-	-	2.93%
1946	0.39%	-	-	-	2.61%
1947	0.41%	-	-	-	2.57%
1948	0.41%	-	-	-	2.93%
1949	0.49%	1.65%	-	-	2.87%
1950	0.55%	1.80%	-	-	2.86%
1951	0.79%	2.42%	2.61%	3.08%	3.23%
1952	1.07%	2.81%	3.24%	3.56%	3.56%
1953	1.72%	3.21%	3.45%	3.63%	3.71%
1954	1.43%	2.18%	2.67%	2.90%	3.18%
1955	1.63%	2.19%	2.79%	2.87%	3.14%
1956	2.96%	3.60%	3.76%	3.75%	3.63%
1957	3.81%	4.46%	4.57%	4.39%	4.11%
1958	2.28%	3.28%	3.47%	3.69%	4.15%
1959	4.90%	5.03%	4.94%	5.10%	5.08%
1960	3.24%	3.96%	4.52%	4.85%	5.19%
1961	2.84%	3.59%	4.38%	4.61%	5.05%
1962	4.12%	4.28%	4.60%	4.76%	5.11%
1963	3.61%	4.21%	4.48%	4.77%	5.09%
1964	3.80%	4.41%	4.72%	4.92%	5.18%
1965	4.04%	4.52%	4.90%	5.09%	5.21%
1966	5.09%	5.38%	5.55%	5.74%	5.69%
1967	4.72%	5.29%	5.64%	5.94%	5.94%
1968	6.42%	6.37%	6.68%	6.85%	6.75%
1969	7.39%	7.49%	7.66%	7.76%	7.58%
1970	6.13%	6.57%	7.11%	7.58%	7.91%
1971	3.61%	4.93%	5.56%	6.15%	6.95%
1972	3.61%	5.54%	6.26%	6.74%	7.23%
1973	5.59%	6.54%	6.98%	7.17%	7.56%
1974	8.06%	8.03%	8.12%	8.27%	8.90%
1975	7.61%	7.56%	7.72%	8.06%	9.04%
1976	9.17%	8.27%	8.35%	8.73%	9.18%
1977	7.54%	7.46%	7.90%	8.14%	8.70%
1978	8.97%	8.77%	9.00%	9.08%	9.27%
1979	12.23%	10.77%	10.42%	10.16%	10.21%
1980	13.45%	12.44%	12.37%	12.30%	12.48%
1981	18.99%	15.97%	15.68%	15.29%	15.22%
1982	14.41%	13.95%	14.00%	14.03%	14.26%
1983	9.65%	10.18%	10.61%	11.11%	11.79%
1984	11.54%	11.67%	11.91%	12.42%	12.75%
1985	9.78%	10.12%	10.39%	10.78%	11.04%
1986	9.29%	9.09%	9.21%	9.37%	9.52%
1987	8.40%	9.19%	9.42%	9.55%	9.95%
1988	9.83%	9.67%	9.77%	9.76%	10.22%
1989	12.62%	10.71%	10.20%	9.83%	9.92%
1990	13.45%	11.65%	11.19%	10.82%	10.85%
1991	9.02%	8.99%	9.16%	9.36%	9.76%
1992	6.76%	7.03%	7.43%	8.16%	8.77%
1993	4.94%	5.89%	6.46%	7.24%	7.85%
1994	5.66%	7.14%	7.79%	8.26%	8.63%
1995	7.08%	7.26%	7.64%	7.93%	8.28%
1996	4.28%	5.35%	6.21%	6.86%	7.50%
1997	3.30%	4.68%	5.33%	5.87%	6.42%
1998	4.82%	5.09%	5.16%	5.26%	5.47%
1999	4.80%	5.36%	5.50%	5.56%	5.69%
2000	5.61%	5.91%	5.99%	5.96%	5.89%
2001	3.83%	4.25%	4.88%	5.32%	5.78%
2002	2.61%	3.55%	4.44%	5.08%	5.66%
2003	2.90%	3.24%	3.88%	4.54%	5.28%
2004	2.24%	2.92%	3.67%	4.34%	5.08%
2005	2.75%	3.18%	3.50%	3.89%	4.39%
2006	4.10%	4.07%	4.10%	4.18%	4.30%
2007	4.15%	4.22%	4.21%	4.25%	4.34%
2008	2.39%	2.66%	2.96%	3.36%	4.04%

Sources and Notes:
[1] - [5]: Report on Canadian Economic Statistics 1924-2006, April 2007; Table 4 - A.

Workpaper #3 to Table No. MJV-9

Canadian Utilities Sample

Panel B: Calculation of Maturity Premia for Different Bond Series

	Annual Historical Average					Maturity Premium Calculation				
	91-Day T-Bill Total Return [1]	1-3 Year Bond Yields [2]	3-5 Year Bond Yields [3]	5-10 Year Bond Yields [4]	Long-Term Government Bond Yield [5]	91-Day T-Bill Total Return [6]	1-3 Year Bond Yields [7]	3-5 Year Bond Yields [8]	5-10 Year Bond Yields [9]	Long-Term Government Bond Yield [10]
1936 - 2008	4.92%	n/a	n/a	n/a	6.32%	0.00%	n/a	n/a	n/a	1.40%
1951 - 2008	6.05%	6.35%	6.64%	6.88%	7.18%	0.00%	0.30%	0.59%	0.83%	1.13%
1959 - 2008	6.71%	6.89%	7.17%	7.42%	7.76%	0.00%	0.18%	0.46%	0.72%	1.05%
1969 - 2008	7.31%	7.43%	7.70%	7.96%	8.34%	0.00%	0.12%	0.39%	0.65%	1.03%
1979 - 2008	7.50%	7.54%	7.78%	8.03%	8.38%	0.00%	0.04%	0.29%	0.53%	0.88%
1989 - 2008	5.36%	5.66%	5.99%	6.30%	6.69%	0.00%	0.29%	0.62%	0.94%	1.33%

Sources and Notes:

[1] - [5] : Workpaper #3 to Table No. MJV-9, Panel A.

The Average Historical Yields from 1936 - 2006 were not calculated for [2], [3] and [4] because a complete set of yields is not available.

The Maturity Premium is estimated as the Average Bond Yield (for different series) - 91-day T-Bill total return.

[6]: [1] - [1].

[7]: [2] - [1].

[8]: [3] - [1].

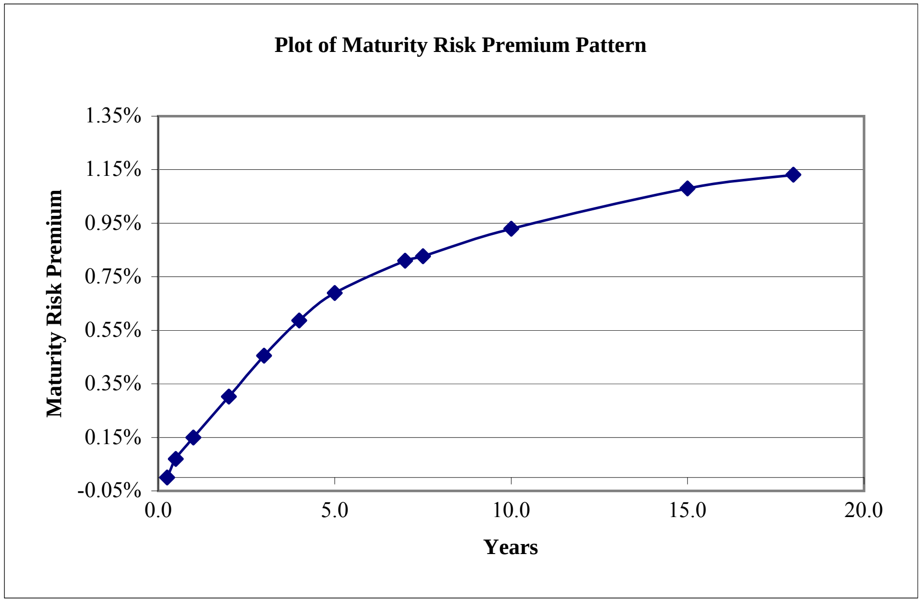
[9]: [4] - [1].

[10]: [5] - [1].

Workpaper #3 to Table No. MJV-9

Canadian Utilities Sample

Panel C: Maturity Premium Graph and Calculations (Using Annual Series Data)



Maturity of Bond (Years) [1]	Maturity Risk Premium [2]	Annualized Difference [3]
0.083		
0.25	0.00%	0.0000
0.5	0.07%	0.0028
1	0.15%	0.0016
2	0.30%	0.0015
3	0.46%	0.0015
4	0.59%	0.0013
5	0.69%	0.0010
7	0.81%	0.0006
7.5	0.83%	0.0003
10	0.93%	0.0004
15	1.08%	0.0003
18	1.13%	0.0003

Sources and Notes:

[1]: The maturity of a bond in years.

[2]: Workpaper #3 to Table No. MJV-9; Panel B; [6] - [10]. This is the Maturity Risk Premium in the graph.

[3]: The difference between the Maturity Risk Premium / The difference in the Maturity of the Bond.

Workpaper #4 to Table No. MJV-9

Canadian Utilities Sample

Spreads between Canadian Utility Bond (10 year maturity) and Canadian Government Bond (10 year maturity)
(in percentage)

Periods	A-Rated Utility and Government Bond	BBB-Rated Utility and Government Bond	Notes
Period 1 - Average Mar-2002 - Dec-2007	0.83	1.08	[1]
Period 2 - Average Aug-2008 - Mar-2009	2.33	3.13	[2]
Period 3 - Average Mar-2009	2.67	3.45	[3]
Period 4 - Average 15-Day (Feb 18, 2009 to Mar 10, 2009)	2.68	3.59	[4]
Spread Increase between Period 2 and Period 1	1.50	2.05	[5] = [2] - [1].
Spread Increase between Period 3 and Period 1	1.84	2.37	[6] = [3] - [1].
Spread Increase between Period 4 and Period 1	1.85	2.50	[7] = [4] - [1].

Spreads between Canadian Utility Bond (20 year maturity) and Canadian Government Bond (20 year maturity)
(in percentage)

Periods	A-Rated Utility and Government Bond	BBB-Rated Utility and Government Bond	Notes
Period 1 - Average Mar-2002 - Dec-2007	0.98	1.48	[1]
Period 2 - Average Aug-2008 - Mar-2009	2.44	2.86	[2]
Period 3 - Average Mar-2009	2.78	3.07	[3]
Period 4 - Average 15-Day (Feb 18, 2009 to Mar 10, 2009)	2.79	3.17	[4]
Spread Increase between Period 2 and Period 1	1.46	1.38	[5] = [2] - [1].
Spread Increase between Period 3 and Period 1	1.80	1.59	[6] = [3] - [1].
Spread Increase between Period 4 and Period 1	1.81	1.69	[7] = [4] - [1].

Spreads between Canadian Utility Bond (30 year maturity) and Canadian Government Bond (30 year maturity)
(in percentage)

Periods	A-Rated Utility and Government Bond	BBB-Rated Utility and Government Bond	Notes
Period 1 - Average Mar-2002 - Dec-2007	0.99	1.52	[1]
Period 2 - Average Aug-2008 - Mar-2009	2.59	2.85	[2]
Period 3 - Average Mar-2009	2.87	3.11	[3]
Period 4 - Average 15-Day (Feb 18, 2009 to Mar 10, 2009)	2.98	3.20	[4]
Spread Increase between Period 2 and Period 1	1.60	1.33	[5] = [2] - [1].
Spread Increase between Period 3 and Period 1	1.87	1.60	[6] = [3] - [1].
Spread Increase between Period 4 and Period 1	1.98	1.68	[7] = [4] - [1].

Source:
Spreads for the periods are calculated from Bloomberg's yield data.
Average monthly yields for the indices were retrieved from Bloomberg as of April 2, 2009.

Table No. MJV-10

Risk Positioning Cost of Equity of the Canadian Utilities Sample

Using the Long-Term Risk-Free Rate

Company	Canadian Long-Term Risk-Free Rate [1]	Bloomberg Betas [2]	Long-Term Market Risk Premium [3]	CAPM Cost of Equity [4]	ECAPM (1.0%) Cost of Equity [5]	ECAPM (2.0%) Cost of Equity [6]
Canadian Utilities	4.3%	0.63	7.75%	9.2%	9.6%	9.9%
Emera Inc.	4.3%	0.57	7.75%	8.7%	9.1%	9.6%
Enbridge Inc.	4.3%	0.72	7.75%	9.9%	10.2%	10.5%
Fortis Inc.	4.3%	0.67	7.75%	9.5%	9.8%	10.2%
TransCanada Corp.	4.3%	0.65	7.75%	9.3%	9.7%	10.0%

Sources and Notes:
[1]: Table No. MJV-9, Computation of Canadian Long-Term Risk-Free Rate, Row [3].
[2]: Workpaper # 1 to Table No. MJV-10, column [1].
[3]: Vilbert Written Evidence, Appendix B.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.0%) + [2] x ([3] - 1.0%).
[6]: ([1] + 2.0%) + [2] x ([3] - 2.0%).

Workpaper # 1 to Table No. MJV-10

Canadian Utilities Sample

Bloomberg Betas

Company	Bloomberg Betas [1]
Canadian Utilities	0.63
Emera Inc.	0.57
Enbridge Inc.	0.72
Fortis Inc.	0.67
TransCanada Corp.	0.65
Average:	0.65

Sources and Notes:
[1]: Bloomberg as of March 10, 2009. Using 260-week adjusted betas.
Adjusted betas were calculated as: Raw Beta x (2/3) + (1/3).

Table No. MJV-11

Overall Cost of Capital of the Canadian Utilities Sample

Panel A: CAPM Cost of Equity

Company	CAPM Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	Weighted - Average Cost of Preferred Equity [3]	5-Year Average Preferred Equity to Market Value Ratio [4]	Weighted-Average Cost of Debt [5]	5-Year Average Debt to Market Value Ratio [6]	GAZ Metro LP's Income Tax Rate [7]	Overall After-Tax Cost of Capital [8]
Canadian Utilities	9.2%	0.57	6.6%	0.07	6.61%	0.36	30.2%	7.4%
Emera Inc.	8.7%	0.52	6.8%	0.02	6.83%	0.46	30.2%	6.8%
Enbridge Inc.	9.9%	0.58	6.6%	0.01	6.61%	0.42	30.2%	7.7%
Fortis Inc.	9.5%	0.43	6.7%	0.01	6.74%	0.56	30.2%	6.8%
TransCanada Corp.	9.3%	0.54	6.6%	0.00	6.61%	0.46	30.2%	7.2%
Average	9.3%	52.7%	6.7%	2.1%	6.7%	45.1%	30.2%	7.2%

Sources and Notes:
[1]: Table No. MJV-10, [4].
[2]: Table No. MJV-4, [4].
[3]: Workpaper #2 to Table No. MJV-11 ; Panel B, [1].
[4]: Table No. MJV-4, [5].
[5]: Workpaper #2 to Table No. MJV-11 ; Panel A, [1].
[6]: Table No. MJV-4, [6].
[7]: Provided by GAZ Metro LP.
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

Table No. MJV-11

Overall Cost of Capital of the Canadian Utilities Sample

Panel B: ECAPM (1.0%) Cost of Equity

Company	ECAPM (1.0%) Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	Weighted - Average Cost of Preferred Equity [3]	5-Year Average Preferred Equity to Market Value Ratio [4]	Weighted-Average Cost of Debt [5]	5-Year Average Debt to Market Value Ratio [6]	GAZ Metro LP's Income Tax Rate [7]	Overall After-Tax Cost of Capital [8]
Canadian Utilities	9.6%	0.57	6.6%	0.07	6.61%	0.36	30.2%	7.6%
Emera Inc.	9.1%	0.52	6.8%	0.02	6.83%	0.46	30.2%	7.1%
Enbridge Inc.	10.2%	0.58	6.6%	0.01	6.61%	0.42	30.2%	7.8%
Fortis Inc.	9.8%	0.43	6.7%	0.01	6.74%	0.56	30.2%	6.9%
TransCanada Corp.	9.7%	0.54	6.6%	0.00	6.61%	0.46	30.2%	7.4%
Average	9.7%	52.7%	6.7%	2.1%	6.7%	45.1%	30.2%	7.4%

Sources and Notes:
[1]: Table No. MJV-10, [5].
[2]: Table No. MJV-4, [4].
[3]: Workpaper #2 to Table No. MJV-11 ; Panel B, [1].
[4]: Table No. MJV-4, [5].
[5]: Workpaper #2 to Table No. MJV-11 ; Panel A, [1].
[6]: Table No. MJV-4, [6].
[7]: Provided by GAZ Metro LP.
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

Table No. MJV-11

Overall Cost of Capital of the Canadian Utilities Sample

Panel C: ECAPM (2.0%) Cost of Equity

Company	ECAPM (2.0%) Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	Weighted - Average Cost of Preferred Equity [3]	5-Year Average Preferred Equity to Market Value Ratio [4]	Weighted-Average Cost of Debt [5]	5-Year Average Debt to Market Value Ratio [6]	GAZ Metro LP's Income Tax Rate [7]	Overall After-Tax Cost of Capital [8]
Canadian Utilities	9.9%	0.57	6.6%	0.07	6.61%	0.36	30.2%	7.8%
Emera Inc.	9.6%	0.52	6.8%	0.02	6.83%	0.46	30.2%	7.3%
Enbridge Inc.	10.5%	0.58	6.6%	0.01	6.61%	0.42	30.2%	8.0%
Fortis Inc.	10.2%	0.43	6.7%	0.01	6.74%	0.56	30.2%	7.1%
TransCanada Corp.	10.0%	0.54	6.6%	0.00	6.61%	0.46	30.2%	7.6%
Average	10.0%	52.7%	6.7%	2.1%	6.7%	45.1%	30.2%	7.5%

Sources and Notes:
[1]: Table No. MJV-10, [6].
[2]: Table No. MJV-4, [4].
[3]: Workpaper #2 to Table No. MJV-11 ; Panel B, [1].
[4]: Table No. MJV-4, [5].
[5]: Workpaper #2 to Table No. MJV-11 ; Panel A, [1].
[6]: Table No. MJV-4, [6].
[7]: Provided by GAZ Metro LP.
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.

Workpaper #1 to Table No. MJV-11

Canadian Utilities Sample

Panel A: Rating to Yield Conversion

Rating	Canadian Bond Yield	Canadian Preferred Yield
A	6.61%	6.61%
BBB	6.83%	6.83%

Sources and Notes:
Bond Yields from Bloomberg as of March 10, 2009.
Preferred Yields are assumed equal to debt yields.

Workpaper #1 to Table No. MJV-11

Canadian Utilities Sample

Panel B: Bond Rating Summary

Company	Year End, 2008 [1]	2007 [2]	2006 [3]	2005 [4]	2004 [5]
Canadian Utilities	A	A	A	A	A
Emera Inc.	BBB	BBB	BBB	BBB	BBB
Enbridge Inc.	A	A	A	A	A
Fortis Inc.	A	A	BBB	BBB	BBB
TransCanada Corp.	A	A	A	A	A

Sources and Notes:
[1] - [5]: Bloomberg as of March 10, 2009.

Workpaper #1 to Table No. MJV-11

Canadian Utilities Sample

Panel C: Preferred Equity Rating Summary

Company	Year End, 2008 [1]	2007 [2]	2006 [3]	2005 [4]	2004 [5]
Canadian Utilities	A	A	A	A	A
Emera Inc.	BBB	BBB	BBB	BBB	BBB
Enbridge Inc.	A	A	A	A	A
Fortis Inc.	A	A	BBB	BBB	BBB
TransCanada Corp.	A	A	A	A	A

Sources and Notes:
[1] - [5]: Preferred equity ratings are assumed equal to the company's bond ratings reported in Workpaper #1 to Table No. MJV-11, Panels A and B.

Workpaper #2 to Table No. MJV-11

Canadian Utilities Sample

Panel A: 15 Day Average Canadian Utility Yield

Date	A Rated Utility [1]	BBB Rated Utility [2]	A Preferred [3]	BBB Preferred [4]
3/10/2009	6.68	6.93	-	-
3/9/2009	6.61	6.85	-	-
3/6/2009	6.58	6.81	-	-
3/5/2009	6.52	6.76	-	-
3/4/2009	6.64	6.86	-	-
3/3/2009	6.60	6.82	-	-
3/2/2009	6.57	6.78	-	-
2/27/2009	6.67	6.88	-	-
2/26/2009	6.68	6.91	-	-
2/25/2009	6.66	6.88	-	-
2/24/2009	6.58	6.78	-	-
2/23/2009	6.56	6.77	-	-
2/20/2009	6.57	6.78	-	-
2/19/2009	6.65	6.84	-	-
2/18/2009	6.57	6.79	-	-
Average	6.61	6.83	6.61	6.83

Sources and Notes:
[1] - [2]: Bloomberg as of March 10, 2009.
[3] - [4]: Preferred yield is assumed equal to debt yield.

Workpaper #2 to Table No. MJV-11

Canadian Utilities Sample

Panel B: Bond Yield Summary

Company	Year End, 2008 [1]	2007 [2]	2006 [3]	2005 [4]	2004 [5]	5-Year Average [6]
Canadian Utilities	6.61%	6.61%	6.61%	6.61%	6.61%	6.61%
Emera Inc.	6.83%	6.83%	6.83%	6.83%	6.83%	6.83%
Enbridge Inc.	6.61%	6.61%	6.61%	6.61%	6.61%	6.61%
Fortis Inc.	6.61%	6.61%	6.83%	6.83%	6.83%	6.74%
TransCanada Corp.	6.61%	6.61%	6.61%	6.61%	6.61%	6.61%

Sources and Notes:
[1] - [5]: Ratings based on Workpaper #1 to Table No. MJV-11, Panel A and bond yields from Bloomberg as of March 10, 2009.
[6]: Average of [1] through [5].

Workpaper #2 to Table No. MJV-11

Canadian Utilities Sample

Panel C: Preferred Equity Yield Summary

Company	Year End, 2008 [1]	2007 [2]	2006 [3]	2005 [4]	2004 [5]	5-Year Average [6]
Canadian Utilities	6.61%	6.61%	6.61%	6.61%	6.61%	6.61%
Emera Inc.	6.83%	6.83%	6.83%	6.83%	6.83%	6.83%
Enbridge Inc.	6.61%	6.61%	6.61%	6.61%	6.61%	6.61%
Fortis Inc.	6.61%	6.61%	6.83%	6.83%	6.83%	6.74%
TransCanada Corp.	6.61%	6.61%	6.61%	6.61%	6.61%	6.61%

Sources and Notes:
[1] - : Ratings based on Workpaper #1 to Table No. MJV-11, Panel A. Preferred equity yields are assumed equal to debt yields.
[6]: Average of [1] through [5].

Table No. MJV-12

Summary of Risk-Positioning ATWACC

Canadian Utilities Sample

Methodology	Overall Cost of Capital [1]
Using Long-Term Risk-Free Rates:	
CAPM using Bloomberg Betas	7.2%
ECAPM (1.0%) using Bloomberg Betas	7.4%
ECAPM (2.0%) using Bloomberg Betas	7.5%

Sources and Notes:
[1]: Table No. MJV-11; Panels A - C, [8].

Table No. MJV-13

Gas LDC Sample

Classification of Companies by Assets

Company	Company Category
AGL Resources Inc	MR
Atmos Energy Corp	R
Laclede Group Inc/The	R
New Jersey Resources Corp	MR
Nicor Inc	R
NiSource Inc	MR
Northwest Natural Gas Co	R
Piedmont Natural Gas Co	R
South Jersey Industries Inc	MR
Southwest Gas Corp	R
WGL Holdings Inc	R
Vectren Corp	MR

Sources and Notes:
Workpaper #1 to Table No. MJV-13, Panels A-L.
R = Regulated (greater than 80 percent of total assets are regulated).
MR = Mostly Regulated (50 to 80 percent of total assets are regulated).

Workpaper #1 to Table No. MJV-13

Gas LDC Sample: Percentage of Regulated Assets

Panel A: AGL Resources Inc (thousands)

		2008	% of Total Assets
Assets Attributed to Utility	[1]	5,138,000	76.6%
Total	[2]	6,710,000	

Sources and Notes:
[1]-[2]: AGL Resources Inc's 2008 Form 10-K.

Workpaper #1 to Table No. MJV-13

Gas LDC Sample: Percentage of Regulated Assets

Panel B: Atmos Energy Corp (thousands)

		2008	% of Total Assets
Assets Attributed to Utility	[1]	6,097,263	95.5%
Total	[2]	6,386,699	

Sources and Notes:
[1]-[2]: Atmos Energy Corp's 2008 Form 10-K.

Workpaper #1 to Table No. MJV-13

Gas LDC Sample: Percentage of Regulated Assets

Panel C: Laclede Group Inc/The (thousands)

		2008	% of Total Assets
Assets Attributed to Utility	[1]	1,624,041	91.6%
Total	[2]	1,772,655	

Sources and Notes:
[1]-[2]: Laclede Group Inc/The's 2008 Form 10-K.

Workpaper #1 to Table No. MJV-13

Gas LDC Sample: Percentage of Regulated Assets

Panel D: New Jersey Resources Corp (thousands)

		2008	% of Total Assets
Assets Attributed to Utility	[1]	1,761,964	67.1%
Total	[2]	2,625,392	

Sources and Notes:
[1]-[2]: New Jersey Resources Corp's 2008 Form 10-K.

Workpaper #1 to Table No. MJV-13

Gas LDC Sample: Percentage of Regulated Assets

Panel E: Nicor Inc (thousands)

		2008	% of Total Assets
Assets Attributed to Utility	[1]	2,723,500	95.3%
Total	[2]	2,858,600	

Sources and Notes:
[1]-[2]: Nicor Inc's 2008 Form 10-K.

Workpaper #1 to Table No. MJV-13

Gas LDC Sample: Percentage of Regulated Assets

Panel F: NiSource Inc (thousands)

		2008	% of Total Assets
Assets Attributed to Utility	[1]	11,467,800	57.2%
Total	[2]	20,032,200	

Sources and Notes:

[1]-[2]: NiSource Inc's 2008 Form 10-K.

Workpaper #1 to Table No. MJV-13

Gas LDC Sample: Percentage of Regulated Assets

Panel G: Northwest Natural Gas Co (thousands)

		2008	% of Total Assets
Assets Attributed to Utility	[1]	n/a	96.0%
Total	[2]	n/a	

Sources and Notes:
[1]-[2]: Northwest Natural Gas Co's 2008 Form 10-K, p. 4 explicitly states the percentage of regulated assets.

Workpaper #1 to Table No. MJV-13

Gas LDC Sample: Percentage of Regulated Assets

Panel H: Piedmont Natural Gas Co (thousands)

		2008	% of Total Assets
Assets Attributed to Utility	[1]	2,908,690	96.7%
Total	[2]	3,008,389	

Sources and Notes:
[1]-[2]: Piedmont Natural Gas Co's 2008 Form 10-K.

Workpaper #1 to Table No. MJV-13

Gas LDC Sample: Percentage of Regulated Assets

Panel I: South Jersey Industries Inc (thousands)

		2008	% of Total Assets
Assets Attributed to Utility	[1]	1,354,015	75.5%
Total	[2]	1,793,427	

Sources and Notes:
[1]-[2]: South Jersey Industries Inc's 2008 Form 10-K.

Workpaper #1 to Table No. MJV-13

Gas LDC Sample: Percentage of Regulated Assets

Panel J: Southwest Gas Corp (thousands)

		2008	% of Total Assets
Assets Attributed to Utility	[1]	3,680,327	96.3%
Total	[2]	3,820,384	

Sources and Notes:
[1]-[2]: Southwest Gas Corp's 2008 Form 10-K.

Workpaper #1 to Table No. MJV-13

Gas LDC Sample: Percentage of Regulated Assets

Panel J: WGL Holdings Inc (thousands)

		2008	% of Total Assets
Assets Attributed to Utility	[1]	3,020,471	93.1%
Total	[2]	3,243,543	

Sources and Notes:
[1]-[2]: WGL Holdings Inc's 2007 Form 10-K.

Workpaper #1 to Table No. MJV-13

Gas LDC Sample: Percentage of Regulated Assets

Panel J: Vectren Corp (thousands)

		2008	% of Total Assets
Assets Attributed to Utility	[1]	2,204,700	57.4%
Total	[2]	3,838,100	

Sources and Notes:
[1]-[2]: Vectren Corp's 2007 Form 10-K.

Table No. MJV-14

Market Values of the Gas LDC Sample

Panel A: AGL Resources Inc

($MM)

	DCF Capital Structure	Year End, 2008	Year End, 2007	Year End, 2006	Year End, 2005	Year End, 2004	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$1,652	$1,652	$1,661	$1,609	$1,499	$1,385	[a]
Shares Outstanding (in millions) - Common	77	77	76	78	78	77	[b]
Price per Share - Common	$27	$30	$37	$39	$35	$33	[c]
Market Value of Common Equity	$2,075	$2,282	$2,828	$3,049	$2,703	$2,549	[d] = [b] x [c].
Market to Book Value of Common Equity	1.26	1.38	1.70	1.89	1.80	1.84	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	[f]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$2,042	$2,042	$1,797	$1,822	$2,041	$1,457	[h]
Current Liabilities	$1,983	$1,983	$1,634	$1,627	$1,968	$1,477	[i]
Current Portion of Long-Term Debt	$0	$0	$0	$0	$0	$0	[j]
Net Working Capital	$59	$59	$163	$195	$73	($20)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$866	$866	$580	$539	$522	$334	[l]
Adjusted Short-Term Debt	$0	$0	$0	$0	$0	$20	[m] = See Sources and Notes.
Long-Term Debt	$1,675	$1,675	$1,675	$1,622	$1,615	$1,623	[n]
Book Value of Long-Term Debt	$1,675	$1,675	$1,675	$1,622	$1,615	$1,643	[o] = [n] + [j] + [m].
Adjustment to Book Value of Long-Term Debt	($28)	($28)	$35	$83	$169	$193	[p] = See Sources and Notes.
Market Value of Long-Term Debt	$1,647	$1,647	$1,710	$1,705	$1,784	$1,836	[q] = [p] + [o].
Market Value of Debt	$1,647	$1,647	$1,710	$1,705	$1,784	$1,836	[r] = [q].
MARKET VALUE OF FIRM	$3,722	$3,929	$4,538	$4,754	$4,487	$4,385	[s] = [d] + [g] + [r].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	55.75%	58.09%	62.32%	64.13%	60.24%	58.13%	[t] = [d] / [s].
Preferred Equity - Market Value Ratio	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	[u] = [g] / [s].
Debt - Market Value Ratio	44.25%	41.91%	37.68%	35.87%	39.76%	41.87%	[v] = [r] / [s].

Sources and Notes:
Bloomberg as of March 10, 2009
Capital structure from Year End, 2008 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 4th Quarter, 2008 balance sheet information and a 15-trading day average closing price ending on March 10, 2009.
Prices are reported in Workpaper #1 to Table No. MJV-17.
[m] =
(1): 0 if [k] > 0.
(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].
(3): [l] if [k] < 0 and |[k]| > [l].
[p]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2006 10-K.

Table No. MJV-14

Market Values of the Gas LDC Sample

Panel B: Atmos Energy Corp

($MM)

	DCF Capital Structure	Year End, 2008	Year End, 2007	Year End, 2006	Year End, 2005	Year End, 2004	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$2,078	$2,078	$1,966	$1,648	$1,602	$1,133	[a]
Shares Outstanding (in millions) - Common	92	92	89	82	81	63	[b]
Price per Share - Common	$22	$23	$28	$32	$26	$27	[c]
Market Value of Common Equity	$2,000	$2,134	$2,470	$2,619	$2,122	$1,704	[d] = [b] x [c].
Market to Book Value of Common Equity	0.96	1.03	1.26	1.59	1.32	1.50	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	[f]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$1,683	$1,683	$1,069	$1,118	$1,264	$677	[h]
Current Liabilities	$2,018	$2,018	$920	$1,119	$1,113	$414	[i]
Current Portion of Long-Term Debt	$401	$401	$4	$3	$3	$6	[j]
Net Working Capital	$66	$66	$153	$2	$155	$269	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$361	$361	$151	$382	$145	$0	[l]
Adjusted Short-Term Debt	$0	$0	$0	$0	$0	$0	[m] = See Sources and Notes.
Long-Term Debt	$1,720	$1,720	$2,126	$2,180	$2,183	$861	[n]
Book Value of Long-Term Debt	$2,120	$2,120	$2,130	$2,184	$2,186	$867	[o] = [n] + [j] + [m].
Adjustment to Book Value of Long-Term Debt	($168)	($168)	($100)	($126)	($105)	$75	[p] = See Sources and Notes.
Market Value of Long-Term Debt	$1,952	$1,952	$2,030	$2,057	$2,082	$943	[q] = [p] + [o].
Market Value of Debt	$1,952	$1,952	$2,030	$2,057	$2,082	$943	[r] = [q].
MARKET VALUE OF FIRM							
	$3,952	$4,086	$4,501	$4,676	$4,204	$2,646	[s] = [d] + [g] + [r].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	50.60%	52.22%	54.88%	56.01%	50.48%	64.39%	[t] = [d] / [s].
Preferred Equity - Market Value Ratio	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	[u] = [g] / [s].
Debt - Market Value Ratio	49.40%	47.78%	45.12%	43.99%	49.52%	35.61%	[v] = [r] / [s].

Sources and Notes:
Bloomberg as of March 10, 2009
Capital structure from Year End, 2008 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 4th Quarter, 2008 balance sheet information and a 15-trading day average closing price ending on March 10, 2009.
Prices are reported in Workpaper #1 to Table No. MJV-17.
[m] =
(1): 0 if [k] > 0.
(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].
(3): [l] if [k] < 0 and |[k]| > [l].
[p]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2006 10-K.

Table No. MJV-14

Market Values of the Gas LDC Sample

Panel C: Laclede Group Inc/The

($MM)

	DCF Capital Structure	Year End, 2008	Year End, 2007	Year End, 2006	Year End, 2005	Year End, 2004	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$509	$509	$428	$403	$367	$356	[a]
Shares Outstanding (in millions) - Common	22	22	22	21	21	21	[b]
Price per Share - Common	$40	$46	$34	$36	$29	$31	[c]
Market Value of Common Equity	$878	$1,007	$745	$759	$624	$657	[d] = [b] x [c].
Market to Book Value of Common Equity	1.73	1.98	1.74	1.89	1.70	1.85	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$0	$0	$1	$1	$1	$1	[f]
Market Value of Preferred Equity	$0	$0	$1	$1	$1	$1	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$640	$640	$467	$460	$424	$338	[h]
Current Liabilities	$561	$561	$474	$431	$366	$263	[i]
Current Portion of Long-Term Debt	$0	$0	$40	$0	$40	$25	[j]
Net Working Capital	$79	$79	$34	$29	$99	$100	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$264	$264	$211	$207	$71	$71	[l]
Adjusted Short-Term Debt	$0	$0	$0	$0	$0	$0	[m] = See Sources and Notes.
Long-Term Debt	$389	$389	$356	$395	$340	$380	[n]
Book Value of Long-Term Debt	$389	$389	$396	$396	$380	$405	[o] = [n] + [j] + [m].
Adjustment to Book Value of Long-Term Debt	($33)	($33)	$8	$18	$31	$35	[p] = See Sources and Notes.
Market Value of Long-Term Debt	$357	$357	$404	$414	$412	$440	[q] = [p] + [o].
Market Value of Debt	$357	$357	$404	$414	$412	$440	[r] = [q].
MARKET VALUE OF FIRM	$1,235	$1,365	$1,149	$1,174	$1,036	$1,098	[s] = [d] + [g] + [r].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	71.09%	73.83%	64.84%	64.66%	60.18%	59.81%	[t] = [d] / [s].
Preferred Equity - Market Value Ratio	0.04%	0.03%	0.05%	0.07%	0.09%	0.10%	[u] = [g] / [s].
Debt - Market Value Ratio	28.87%	26.13%	35.11%	35.27%	39.73%	40.09%	[v] = [r] / [s].

Sources and Notes:
Bloomberg as of March 10, 2009
Capital structure from Year End, 2008 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 4th Quarter, 2008 balance sheet information and a 15-trading day average closing price ending on March 10, 2009.
Prices are reported in Workpaper #1 to Table No. MJV-17.
[m] =
(1): 0 if [k] > 0.
(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].
(3): [l] if [k] < 0 and |[k]| > [l].
[p]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2006 10-K.

Table No. MJV-14

Market Values of the Gas LDC Sample

Panel D: New Jersey Resources Corp

($MM)

	DCF Capital Structure	Year End, 2008	Year End, 2007	Year End, 2006	Year End, 2005	Year End, 2004	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$736	$736	$645	$622	$438	$468	[a]
Shares Outstanding (in millions) - Common	42	42	42	41	42	42	[b]
Price per Share - Common	$34	$37	$33	$33	$29	$29	[c]
Market Value of Common Equity	$1,448	$1,572	$1,392	$1,380	$1,214	$1,204	[d] = [b] x [c].
Market to Book Value of Common Equity	1.97	2.14	2.16	2.22	2.77	2.57	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	[f]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$1,073	$1,073	$800	$966	$1,073	$686	[h]
Current Liabilities	$918	$918	$703	$897	$1,097	$688	[i]
Current Portion of Long-Term Debt	$31	$31	$4	$4	$3	$28	[j]
Net Working Capital	$185	$185	$101	$72	($20)	$26	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$266	$266	$256	$281	$174	$260	[l]
Adjusted Short-Term Debt	$0	$0	$0	$0	$20	$0	[m] = See Sources and Notes.
Long-Term Debt	$461	$461	$383	$332	$317	$316	[n]
Book Value of Long-Term Debt	$492	$492	$388	$336	$341	$344	[o] = [n] + [j] + [m].
Adjustment to Book Value of Long-Term Debt	($48)	($48)	$6	$2	$2	$6	[p] = See Sources and Notes.
Market Value of Long-Term Debt	$443	$443	$394	$338	$343	$349	[q] = [p] + [o].
Market Value of Debt	$443	$443	$394	$338	$343	$349	[r] = [q].
MARKET VALUE OF FIRM	$1,891	$2,016	$1,786	$1,718	$1,557	$1,554	[s] = [d] + [g] + [r].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	76.56%	78.01%	77.95%	80.32%	77.99%	77.52%	[t] = [d] / [s].
Preferred Equity - Market Value Ratio	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	[u] = [g] / [s].
Debt - Market Value Ratio	23.44%	21.99%	22.05%	19.68%	22.01%	22.48%	[v] = [r] / [s].

Sources and Notes:

Bloomberg as of March 10, 2009

Capital structure from Year End, 2008 calculated using respective balance sheet information and 15-day average prices ending at period end.

The DCF Capital structure is calculated using 4th Quarter, 2008 balance sheet information and a 15-trading day average closing price ending on March 10, 2009.
Prices are reported in Workpaper #1 to Table No. MJV-17.

[m] =

(1): 0 if [k] > 0.

(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].

(3): [l] if [k] < 0 and |[k]| > [l].

[p]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2006 10-K.

Table No. MJV-14

Market Values of the Gas LDC Sample

Panel E: Nicor Inc

($MM)

	DCF Capital Structure	Year End, 2008	Year End, 2007	Year End, 2006	Year End, 2005	Year End, 2004	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$973	$973	$945	$873	$811	$749	[a]
Shares Outstanding (in millions) - Common	45	45	45	45	44	44	[b]
Price per Share - Common	$30	$35	$43	$48	$41	$37	[c]
Market Value of Common Equity	$1,347	$1,574	$1,962	$2,163	$1,795	$1,650	[d] = [b] x [c].
Market to Book Value of Common Equity	1.38	1.62	2.08	2.48	2.21	2.20	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	[f]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$1,339	$1,339	$1,043	$911	$1,346	$1,021	[h]
Current Liabilities	$1,668	$1,668	$1,296	$1,142	$1,623	$1,171	[i]
Current Portion of Long-Term Debt	$50	$50	$75	$0	$50	$0	[j]
Net Working Capital	($279)	($279)	($178)	($232)	($227)	($150)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$740	$740	$369	$350	$586	$490	[l]
Adjusted Short-Term Debt	$279	$279	$178	$232	$227	$150	[m] = See Sources and Notes.
Long-Term Debt	$449	$449	$423	$498	$486	$497	[n]
Book Value of Long-Term Debt	$778	$778	$676	$730	$764	$647	[o] = [n] + [j] + [m].
Adjustment to Book Value of Long-Term Debt	$20	$20	$13	$18	$25	$30	[p] = See Sources and Notes.
Market Value of Long-Term Debt	$798	$798	$689	$748	$789	$677	[q] = [p] + [o].
Market Value of Debt	$798	$798	$689	$748	$789	$677	[r] = [q].
MARKET VALUE OF FIRM	$2,145	$2,372	$2,651	$2,911	$2,584	$2,328	[s] = [d] + [g] + [r].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	62.81%	66.37%	74.01%	74.31%	69.48%	70.90%	[t] = [d] / [s].
Preferred Equity - Market Value Ratio	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	[u] = [g] / [s].
Debt - Market Value Ratio	37.19%	33.63%	25.99%	25.69%	30.52%	29.10%	[v] = [r] / [s].

Sources and Notes:

Bloomberg as of March 10, 2009

Capital structure from Year End, 2008 calculated using respective balance sheet information and 15-day average prices ending at period end.

The DCF Capital structure is calculated using 4th Quarter, 2008 balance sheet information and a 15-trading day average closing price ending on March 10, 2009.
Prices are reported in Workpaper #1 to Table No. MJV-17.

[m] =
(1): 0 if [k] > 0.
(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].
(3): [l] if [k] < 0 and |[k]| > [l].

[p]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2006 10-K.

Table No. MJV-14

Market Values of the Gas LDC Sample

Panel F: NiSource Inc

($MM)

	DCF Capital Structure	Year End, 2008	Year End, 2007	Year End, 2006	Year End, 2005	Year End, 2004	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$4,729	$4,729	$5,077	$5,014	$4,933	$4,787	[a]
Shares Outstanding (in millions) - Common	274	274	274	275	271	264	[b]
Price per Share - Common	$9	$11	$19	$24	$21	$22	[c]
Market Value of Common Equity	$2,352	$3,042	$5,158	$6,660	$5,786	$5,819	[d] = [b] x [c].
Market to Book Value of Common Equity	0.50	0.64	1.02	1.33	1.17	1.22	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$0	$0	$0	$0	$81	$81	[f]
Market Value of Preferred Equity	$0	$0	$0	$0	$81	$81	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$3,411	$3,411	$2,460	$2,783	$3,061	$2,284	[h]
Current Liabilities	$4,583	$4,583	$3,398	$3,821	$3,843	$3,579	[i]
Current Portion of Long-Term Debt	$469	$469	$34	$93	$441	$1,300	[j]
Net Working Capital	($703)	($703)	($904)	($945)	($342)	$5	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$1,164	$1,164	$1,061	$1,193	$898	$308	[l]
Adjusted Short-Term Debt	$703	$703	$904	$945	$342	$0	[m] = See Sources and Notes.
Long-Term Debt	$5,944	$5,944	$5,594	$5,146	$5,271	$4,837	[n]
Book Value of Long-Term Debt	$7,117	$7,117	$6,532	$6,185	$6,054	$6,136	[o] = [n] + [j] + [m].
Adjustment to Book Value of Long-Term Debt	($1,484)	($1,484)	($119)	$52	$174	$396	[p] = See Sources and Notes.
Market Value of Long-Term Debt	$5,632	$5,632	$6,414	$6,237	$6,228	$6,533	[q] = [p] + [o].
Market Value of Debt	$5,632	$5,632	$6,414	$6,237	$6,228	$6,533	[r] = [q].
MARKET VALUE OF FIRM	$7,985	$8,675	$11,571	$12,896	$12,095	$12,433	[s] = [d] + [g] + [r].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	29.46%	35.07%	44.58%	51.64%	47.84%	46.80%	[t] = [d] / [s].
Preferred Equity - Market Value Ratio	0.00%	0.00%	0.00%	0.00%	0.67%	0.65%	[u] = [g] / [s].
Debt - Market Value Ratio	70.54%	64.93%	55.42%	48.36%	51.49%	52.54%	[v] = [r] / [s].

Sources and Notes:
Bloomberg as of March 10, 2009
Capital structure from Year End, 2008 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 4th Quarter, 2008 balance sheet information and a 15-trading day average closing price ending on March 10, 2009.
Prices are reported in Workpaper #1 to Table No. MJV-17.
[m] =
(1): 0 if [k] > 0.
(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].
(3): [l] if [k] < 0 and |[k]| > [l].
[p]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2006 10-K.

Table No. MJV-14

Market Values of the Gas LDC Sample

Panel G: Northwest Natural Gas Co

($MM)

	DCF Capital Structure	Year End, 2008	Year End, 2007	Year End, 2006	Year End, 2005	Year End, 2004	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$628	$628	$595	$600	$587	$569	[a]
Shares Outstanding (in millions) - Common	27	27	26	27	28	27	[b]
Price per Share - Common	$41	$44	$49	$42	$35	$33	[c]
Market Value of Common Equity	$1,074	$1,169	$1,286	$1,151	$962	$901	[d] = [b] x [c].
Market to Book Value of Common Equity	1.71	1.86	2.16	1.92	1.64	1.59	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	[f]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$481	$481	$277	$309	$324	$237	[h]
Current Liabilities	$551	$551	$390	$339	$327	$267	[i]
Current Portion of Long-Term Debt	$0	$0	$5	$30	$8	$15	[j]
Net Working Capital	($70)	($70)	($108)	($1)	$5	($15)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$248	$248	$143	$100	$127	$103	[l]
Adjusted Short-Term Debt	$70	$70	$108	$1	$0	$15	[m] = See Sources and Notes.
Long-Term Debt	$512	$512	$512	$517	$522	$484	[n]
Book Value of Long-Term Debt	$582	$582	$625	$548	$530	$514	[o] = [n] + [j] + [m].
Adjustment to Book Value of Long-Term Debt	($6)	($6)	$41	$49	$50	$69	[p] = See Sources and Notes.
Market Value of Long-Term Debt	$576	$576	$666	$597	$579	$583	[q] = [p] + [o].
Market Value of Debt	$576	$576	$666	$597	$579	$583	[r] = [q].
MARKET VALUE OF FIRM	$1,650	$1,745	$1,952	$1,748	$1,542	$1,484	[s] = [d] + [g] + [r].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	65.09%	66.99%	65.88%	65.86%	62.42%	60.72%	[t] = [d] / [s].
Preferred Equity - Market Value Ratio	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	[u] = [g] / [s].
Debt - Market Value Ratio	34.91%	33.01%	34.12%	34.14%	37.58%	39.28%	[v] = [r] / [s].

Sources and Notes:
Bloomberg as of March 10, 2009
Capital structure from Year End, 2008 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 4th Quarter, 2008 balance sheet information and a 15-trading day average closing price ending on March 10, 2009.
Prices are reported in Workpaper #1 to Table No. MJV-17.
[m] =
(1): 0 if [k] > 0.
(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].
(3): [l] if [k] < 0 and |[k]| > [l].
[p]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2006 10-K.

Table No. MJV-14

Market Values of the Gas LDC Sample

Panel H: Piedmont Natural Gas Co

($MM)

	DCF Capital Structure	Year End, 2008	Year End, 2007	Year End, 2006	Year End, 2005	Year End, 2004	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$952	$952	$878	$883	$884	$855	[a]
Shares Outstanding (in millions) - Common	73	73	74	75	77	77	[b]
Price per Share - Common	$24	$31	$27	$27	$24	$23	[c]
Market Value of Common Equity	$1,737	$2,278	$1,983	$2,049	$1,838	$1,797	[d] = [b] x [c].
Market to Book Value of Common Equity	1.82	2.39	2.26	2.32	2.08	2.10	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	[f]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$829	$829	$435	$476	$505	$391	[h]
Current Liabilities	$837	$837	$425	$400	$529	$336	[i]
Current Portion of Long-Term Debt	$30	$30	$0	$0	$35	$0	[j]
Net Working Capital	$22	$22	$11	$76	$11	$55	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$448	$448	$196	$170	$159	$110	[l]
Adjusted Short-Term Debt	$0	$0	$0	$0	$0	$0	[m] = See Sources and Notes.
Long-Term Debt	$794	$794	$825	$825	$625	$660	[n]
Book Value of Long-Term Debt	$824	$824	$825	$825	$660	$660	[o] = [n] + [j] + [m].
Adjustment to Book Value of Long-Term Debt	($26)	($26)	$68	$89	$93	$115	[p] = See Sources and Notes.
Market Value of Long-Term Debt	$798	$798	$893	$914	$753	$775	[q] = [p] + [o].
Market Value of Debt	$798	$798	$893	$914	$753	$775	[r] = [q].
MARKET VALUE OF FIRM	$2,535	$3,075	$2,876	$2,963	$2,592	$2,572	[s] = [d] + [g] + [r].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	68.53%	74.06%	68.97%	69.16%	70.93%	69.86%	[t] = [d] / [s].
Preferred Equity - Market Value Ratio	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	[u] = [g] / [s].
Debt - Market Value Ratio	31.47%	25.94%	31.03%	30.84%	29.07%	30.14%	[v] = [r] / [s].

Sources and Notes:

Bloomberg as of March 10, 2009

Capital structure from Year End, 2008 calculated using respective balance sheet information and 15-day average prices ending at period end.

The DCF Capital structure is calculated using 4th Quarter, 2008 balance sheet information and a 15-trading day average closing price ending on 3/10/2009.
Prices are reported in Workpaper #1 to Table No. MJV-17.

[m] =
(1): 0 if [k] > 0.
(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].
(3): [l] if [k] < 0 and |[k]| > [l].

[p]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2006 10-K.

Table No. MJV-14

Market Values of the Gas LDC Sample

Panel I: South Jersey Industries Inc

($MM)

	DCF Capital Structure	Year End, 2008	Year End, 2007	Year End, 2006	Year End, 2005	Year End, 2004	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$515	$515	$481	$443	$394	$343	[a]
Shares Outstanding (in millions) - Common	30	30	30	29	29	28	[b]
Price per Share - Common	$35	$37	$36	$33	$30	$26	[c]
Market Value of Common Equity	$1,033	$1,098	$1,075	$974	$865	$716	[d] = [b] x [c].
Market to Book Value of Common Equity	2.00	2.13	2.23	2.20	2.20	2.09	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$2	[f]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$2	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$435	$435	$328	$372	$362	$284	[h]
Current Liabilities	$500	$500	$328	$423	$406	$285	[i]
Current Portion of Long-Term Debt	$25	$25	$0	$2	$2	$5	[j]
Net Working Capital	($40)	($40)	$0	($49)	($42)	$4	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$213	$213	$118	$195	$147	$92	[l]
Adjusted Short-Term Debt	$40	$40	$0	$49	$42	$0	[m] = See Sources and Notes.
Long-Term Debt	$333	$333	$358	$358	$319	$329	[n]
Book Value of Long-Term Debt	$398	$398	$358	$409	$363	$334	[o] = [n] + [j] + [m].
Adjustment to Book Value of Long-Term Debt	$79	$79	$33	$21	$13	$16	[p] = See Sources and Notes.
Market Value of Long-Term Debt	$476	$476	$391	$430	$376	$350	[q] = [p] + [o].
Market Value of Debt	$476	$476	$391	$430	$376	$350	[r] = [q].
MARKET VALUE OF FIRM	$1,509	$1,575	$1,466	$1,404	$1,241	$1,068	[s] = [d] + [g] + [r].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	68.44%	69.75%	73.32%	69.38%	69.69%	67.05%	[t] = [d] / [s].
Preferred Equity - Market Value Ratio	0.00%	0.00%	0.00%	0.00%	0.00%	0.16%	[u] = [g] / [s].
Debt - Market Value Ratio	31.56%	30.25%	26.68%	30.62%	30.31%	32.79%	[v] = [r] / [s].

Sources and Notes:
Bloomberg as of March 10, 2009
Capital structure from Year End, 2008 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 4th Quarter, 2008 balance sheet information and a 15-trading day average closing price ending on March 10, 2009.
Prices are reported in Workpaper #1 to Table No. MJV-17.
[m] =
(1): 0 if [k] > 0.
(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].
(3): [l] if [k] < 0 and |[k]| > [l].
[p]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2006 10-K.

Table No. MJV-14

Market Values of the Gas LDC Sample

Panel J: Southwest Gas Corp

($MM)

	DCF Capital Structure	Year End, 2008	Year End, 2007	Year End, 2006	Year End, 2005	Year End, 2004	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$1,038	$1,038	$984	$901	$751	$706	[a]
Shares Outstanding (in millions) - Common	44	44	43	42	39	37	[b]
Price per Share - Common	$20	$24	$30	$38	$27	$25	[c]
Market Value of Common Equity	$873	$1,075	$1,280	$1,601	$1,052	$938	[d] = [b] x [c].
Market to Book Value of Common Equity	0.84	1.04	1.30	1.78	1.40	1.33	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	[f]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$438	$438	$502	$502	$543	$432	[h]
Current Liabilities	$510	$510	$528	$496	$621	$483	[i]
Current Portion of Long-Term Debt	$8	$8	$38	$28	$83	$30	[j]
Net Working Capital	($64)	($64)	$13	$33	$5	($21)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$55	$55	$9	$0	$24	$100	[l]
Adjusted Short-Term Debt	$55	$55	$0	$0	$0	$21	[m] = See Sources and Notes.
Long-Term Debt	$1,285	$1,285	$1,366	$1,386	$1,325	$1,263	[n]
Book Value of Long-Term Debt	$1,348	$1,348	$1,404	$1,414	$1,408	$1,314	[o] = [n] + [j] + [m].
Adjustment to Book Value of Long-Term Debt	($52)	($52)	($89)	$80	$145	$154	[p] = See Sources and Notes.
Market Value of Long-Term Debt	$1,297	$1,297	$1,316	$1,494	$1,553	$1,468	[q] = [p] + [o].
Market Value of Debt	$1,297	$1,297	$1,316	$1,494	$1,553	$1,468	[r] = [q].
MARKET VALUE OF FIRM	$2,170	$2,372	$2,595	$3,096	$2,605	$2,406	[s] = [d] + [g] + [r].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	40.25%	45.33%	49.31%	51.73%	40.37%	38.98%	[t] = [d] / [s].
Preferred Equity - Market Value Ratio	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	[u] = [g] / [s].
Debt - Market Value Ratio	59.75%	54.67%	50.69%	48.27%	59.63%	61.02%	[v] = [r] / [s].

Sources and Notes:
Bloomberg as of March 10, 2009
Capital structure from Year End, 2008 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 4th Quarter, 2008 balance sheet information and a 15-trading day average closing price ending on March 10, 2009.
Prices are reported in Workpaper #1 to Table No. MJV-17.
[m] =
(1): 0 if [k] > 0.
(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].
(3): [l] if [k] < 0 and |[k]| > [l].
[p]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2006 10-K.

Table No. MJV-14

Market Values of the Gas LDC Sample

Panel K: WGL Holdings Inc

($MM)

	DCF Capital Structure	Year End, 2008	Year End, 2007	Year End, 2006	Year End, 2005	Year End, 2004	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$1,089	$1,089	$981	$922	$894	$853	[a]
Shares Outstanding (in millions) - Common	50	50	49	49	49	49	[b]
Price per Share - Common	$30	$32	$33	$33	$30	$31	[c]
Market Value of Common Equity	$1,528	$1,585	$1,631	$1,607	$1,481	$1,506	[d] = [b] x [c].
Market to Book Value of Common Equity	1.40	1.46	1.66	1.74	1.66	1.76	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$28	$28	$28	$28	$28	$28	[f]
Market Value of Preferred Equity	$28	$28	$28	$28	$28	$28	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$1,075	$1,075	$574	$562	$481	$433	[h]
Current Liabilities	$1,014	$1,014	$557	$561	$412	$413	[i]
Current Portion of Long-Term Debt	$50	$50	$21	$61	$50	$61	[j]
Net Working Capital	$111	$111	$38	$62	$120	$81	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$365	$365	$184	$177	$41	$96	[l]
Adjusted Short-Term Debt	$0	$0	$0	$0	$0	$0	[m] = See Sources and Notes.
Long-Term Debt	$658	$658	$616	$576	$584	$590	[n]
Book Value of Long-Term Debt	$708	$708	$638	$637	$634	$651	[o] = [n] + [j] + [m].
Adjustment to Book Value of Long-Term Debt	($39)	($39)	$7	$17	$43	$56	[p] = See Sources and Notes.
Market Value of Long-Term Debt	$669	$669	$645	$654	$677	$707	[q] = [p] + [o].
Market Value of Debt	$669	$669	$645	$654	$677	$707	[r] = [q].
MARKET VALUE OF FIRM	$2,225	$2,282	$2,304	$2,289	$2,186	$2,241	[s] = [d] + [g] + [r].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	68.69%	69.47%	70.79%	70.19%	67.75%	67.19%	[t] = [d] / [s].
Preferred Equity - Market Value Ratio	1.27%	1.23%	1.22%	1.23%	1.29%	1.26%	[u] = [g] / [s].
Debt - Market Value Ratio	30.05%	29.29%	27.98%	28.58%	30.96%	31.55%	[v] = [r] / [s].

Sources and Notes:
Bloomberg as of March 10, 2009
Capital structure from Year End, 2008 calculated using respective balance sheet information and 15-day average prices ending at period end.
The DCF Capital structure is calculated using 4th Quarter, 2008 balance sheet information and a 15-trading day average closing price ending on March 10, 2009.
Prices are reported in Workpaper #1 to Table No. MJV-17.
[m] =
(1): 0 if [k] > 0.
(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].
(3): [l] if [k] < 0 and |[k]| > [l].
[p]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2006 10-K.

Table No. MJV-14

Market Values of the Gas LDC Sample

Panel L: Vectren Corp

($MM)

	DCF Capital Structure	Year End, 2008	Year End, 2007	Year End, 2006	Year End, 2005	Year End, 2004	Notes
MARKET VALUE OF COMMON EQUITY							
Book Value, Common Shareholder's Equity	$1,352	$1,352	$1,234	$1,174	$1,143	$1,095	[a]
Shares Outstanding (in millions) - Common	81	81	76	76	76	76	[b]
Price per Share - Common	$20	$25	$29	$29	$27	$27	[c]
Market Value of Common Equity	$1,639	$2,032	$2,250	$2,170	$2,077	$2,024	[d] = [b] x [c].
Market to Book Value of Common Equity	1.21	1.50	1.82	1.85	1.82	1.85	[e] = [d] / [a].
MARKET VALUE OF PREFERRED EQUITY							
Book Value of Preferred Equity	$0	$0	$0	$0	$0	$0	[f]
Market Value of Preferred Equity	$0	$0	$0	$0	$0	$0	[g] = [f].
MARKET VALUE OF DEBT							
Current Assets	$776	$776	$700	$716	$725	$586	[h]
Current Liabilities	$1,120	$1,120	$1,027	$961	$840	$826	[i]
Current Portion of Long-Term Debt	$80	$80	$0	$44	$54	$49	[j]
Net Working Capital	($264)	($264)	($328)	($201)	($60)	($191)	[k] = [h] - ([i] - [j]).
Notes Payable (Short-Term Debt)	$520	$520	$557	$465	$300	$412	[l]
Adjusted Short-Term Debt	$264	$264	$328	$201	$60	$191	[m] = See Sources and Notes.
Long-Term Debt	$1,248	$1,248	$1,245	$1,208	$1,198	$1,017	[n]
Book Value of Long-Term Debt	$1,593	$1,593	$1,573	$1,454	$1,312	$1,256	[o] = [n] + [j] + [m].
Adjustment to Book Value of Long-Term Debt	($121)	($121)	($17)	$20	$56	$76	[p] = See Sources and Notes.
Market Value of Long-Term Debt	$1,471	$1,471	$1,556	$1,473	$1,368	$1,332	[q] = [p] + [o].
Market Value of Debt	$1,471	$1,471	$1,556	$1,473	$1,368	$1,332	[r] = [q].
MARKET VALUE OF FIRM							
	$3,111	$3,503	$3,806	$3,644	$3,445	$3,356	[s] = [d] + [g] + [r].
DEBT AND EQUITY TO MARKET VALUE RATIOS							
Common Equity - Market Value Ratio	52.70%	58.00%	59.12%	59.56%	60.29%	60.30%	[t] = [d] / [s].
Preferred Equity - Market Value Ratio	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	[u] = [g] / [s].
Debt - Market Value Ratio	47.30%	42.00%	40.88%	40.44%	39.71%	39.70%	[v] = [r] / [s].

Sources and Notes:

Bloomberg as of March 10, 2009

Capital structure from Year End, 2008 calculated using respective balance sheet information and 15-day average prices ending at period end.

The DCF Capital structure is calculated using 4th Quarter, 2008 balance sheet information and a 15-trading day average closing price ending on March 10, 2009.
Prices are reported in Workpaper #1 to Table No. MJV-17.

[m] =
(1): 0 if [k] > 0.
(2): The absolute value of [k] if [k] < 0 and |[k]| < [l].
(3): [l] if [k] < 0 and |[k]| > [l].

[p]: Difference between fair value of Long-Term debt and carrying amount of Long-Term debt per company 10-K. Data for adjustment is from 2006 10-K.

Table No. MJV-15

Gas LDC Sample

Capital Structure Summary

Company		DCF Capital Structure			5-Year Average Capital Structure		
		Common Equity - Value Ratio [1]	Preferred Equity - Value Ratio [2]	Debt - Value Ratio [3]	Common Equity - Value Ratio [4]	Preferred Equity - Value Ratio [5]	Debt - Value Ratio [6]
AGL Resources Inc	*	56%	0%	44%	61%	0%	39%
Atmos Energy Corp		51%	0%	49%	56%	0%	44%
Laclede Group Inc/The	*	71%	0%	29%	65%	0%	35%
New Jersey Resources Corp		77%	0%	23%	78%	0%	22%
Nicor Inc	*	63%	0%	37%	71%	0%	29%
NiSource Inc		29%	0%	71%	45%	0%	55%
Northwest Natural Gas Co	*	65%	0%	35%	64%	0%	36%
Piedmont Natural Gas Co	*	69%	0%	31%	71%	0%	29%
South Jersey Industries Inc	*	68%	0%	32%	70%	0%	30%
Southwest Gas Corp	*	40%	0%	60%	45%	0%	55%
WGL Holdings Inc	*	69%	1%	30%	69%	1%	30%
Vectren Corp		53%	0%	47%	59%	0%	41%
Average		59%	0%	41%	63%	0%	37%
Subsample Average		63%	0%	37%	64%	0%	35%

Sources and Notes:
[1], [4]:Workpaper #1 to Table No. MJV-15.
[2], [5]:Workpaper #2 to Table No. MJV-15.
[3], [6]:Workpaper #3 to Table No. MJV-15.
Values in this table may not add up exactly to 1.0 because of rounding.
*Subsample

Workpaper #1 to Table No. MJV-15

Gas LDC Sample

Calculation of the Average Common Equity - Market Value Ratio

Company	DCF Capital Structure [1]	Year End, 2008 [2]	2007 [3]	2006 [4]	2005 [5]	2004 [6]	5-Year Average [7]
AGL Resources Inc	56%	58%	62%	64%	60%	58%	61%
Atmos Energy Corp	51%	52%	55%	56%	50%	64%	56%
Laclede Group Inc/The	71%	74%	65%	65%	60%	60%	65%
New Jersey Resources Corp	77%	78%	78%	80%	78%	78%	78%
Nicor Inc	63%	66%	74%	74%	69%	71%	71%
NiSource Inc	29%	35%	45%	52%	48%	47%	45%
Northwest Natural Gas Co	65%	67%	66%	66%	62%	61%	64%
Piedmont Natural Gas Co	69%	74%	69%	69%	71%	70%	71%
South Jersey Industries Inc	68%	70%	73%	69%	70%	67%	70%
Southwest Gas Corp	40%	45%	49%	52%	40%	39%	45%
WGL Holdings Inc	69%	69%	71%	70%	68%	67%	69%
Vectren Corp	53%	58%	59%	60%	60%	60%	59%

Sources and Notes:
[1] - [7]: Table No. MJV-14; Panels A - L, [t].
[7]: ([2] + [3] + [4] + [5] + [6]) / 5.

Workpaper #2 to Table No. MJV-15

Gas LDC Sample

Calculation of the Average Preferred Equity - Market Value Ratio

Company	DCF Capital Structure [1]	Year End, 2008 [2]	2007 [3]	2006 [4]	2005 [5]	2004 [6]	5-Year Average [8]
AGL Resources Inc	0%	0%	0%	0%	0%	0%	0%
Atmos Energy Corp	0%	0%	0%	0%	0%	0%	0%
Laclede Group Inc/The	0%	0%	0%	0%	0%	0%	0%
New Jersey Resources Corp	0%	0%	0%	0%	0%	0%	0%
Nicor Inc	0%	0%	0%	0%	0%	0%	0%
NiSource Inc	0%	0%	0%	0%	1%	1%	0%
Northwest Natural Gas Co	0%	0%	0%	0%	0%	0%	0%
Piedmont Natural Gas Co	0%	0%	0%	0%	0%	0%	0%
South Jersey Industries Inc	0%	0%	0%	0%	0%	0%	0%
Southwest Gas Corp	0%	0%	0%	0%	0%	0%	0%
WGL Holdings Inc	1%	1%	1%	1%	1%	1%	1%
Vectren Corp	0%	0%	0%	0%	0%	0%	0%

Sources and Notes:
[1] - [7]: Table No. MJV-14; Panels A - L, [u].
[7]: ([2] + [3] + [4] + [5] + [6]) / 5.

Workpaper #3 to Table No. MJV-15

Gas LDC Sample

Calculation of the Average Debt - Market Value Ratio

Company	DCF Capital Structure [1]	Year End, 2008 [2]	2007 [3]	2006 [4]	2005 [5]	2004 [6]	5-Year Average [8]
AGL Resources Inc	44%	42%	38%	36%	40%	42%	39%
Atmos Energy Corp	49%	48%	45%	44%	50%	36%	44%
Laclede Group Inc/The	29%	26%	35%	35%	40%	40%	35%
New Jersey Resources Corp	23%	22%	22%	20%	22%	22%	22%
Nicor Inc	37%	34%	26%	26%	31%	29%	29%
NiSource Inc	71%	65%	55%	48%	51%	53%	55%
Northwest Natural Gas Co	35%	33%	34%	34%	38%	39%	36%
Piedmont Natural Gas Co	31%	26%	31%	31%	29%	30%	29%
South Jersey Industries Inc	32%	30%	27%	31%	30%	33%	30%
Southwest Gas Corp	60%	55%	51%	48%	60%	61%	55%
WGL Holdings Inc	30%	29%	28%	29%	31%	32%	30%
Vectren Corp	47%	42%	41%	40%	40%	40%	41%

Sources and Notes:
[1] - [7]: Table No. MJV-14; Panels A - L, [v].
[7]: ([2] + [3] + [4] + [5] + [6]) / 5.

Table No. MJV-16

Gas LDC Sample

Combined Bloomberg Estimated and Value Line Estimated Growth Rates

	Bloomberg Estimate		Value Line			
Company	BEst Long-Term Growth Rate	Number of Estimates	EPS Year 2008 Estimate	EPS Year 2011 - 2013 Estimate	Annualized Growth Rate	Combined BEst and Value Line Growth Rate
	[1]	[2]	[3]	[4]	[5]	[6]
AGL Resources Inc	5.2%	3	$2.70	$3.15	3.9%	4.9%
Atmos Energy Corp	4.3%	4	$2.00	$2.45	5.2%	4.4%
Laclede Group Inc/The	n/a	n/a	$2.64	$2.85	1.9%	1.9%
New Jersey Resources Corp	7.1%	3	$2.70	$3.00	2.7%	6.0%
Nicor Inc	3.4%	4	$2.25	$3.45	11.3%	5.0%
NiSource Inc	2.7%	3	$1.25	$1.50	4.7%	3.2%
Northwest Natural Gas Co	6.2%	4	$2.55	$3.35	7.1%	6.4%
Piedmont Natural Gas Co	8.4%	5	$1.55	$2.05	7.2%	8.2%
South Jersey Industries Inc	7.7%	4	$2.30	$3.00	6.9%	7.6%
Southwest Gas Corp	5.0%	3	$1.75	$2.50	9.3%	6.1%
WGL Holdings Inc	4.5%	2	$2.33	$2.55	2.3%	3.8%
Vectren Corp	8.8%	4	$1.70	$2.25	7.3%	8.5%

Sources and Notes:

[1] - [2]: Bloomberg as of March 10, 2009.

[3] - [4]: Most recent Value Line Standard Edition dated as of December 12, 2008 and December 26, 2008.

[5]: ([4] / [3]) ^ (1/4) - 1.

[6]: ([1] x [2] + [5]) / ([2] + 1).

Table No. MJV-17

DCF Cost of Equity of the Gas LDC Sample

Panel A: Simple DCF Method (Quarterly)

Company	Stock Price [1]	Most Recent Dividend [2]	Combined BEst and Value Line Long-Term Growth Rate [3]	Quarterly Growth Rate [4]	DCF Cost of Equity [5]	Interest Rate Adjustment Factor [6]	Adjusted DCF Cost of Equity [7]
AGL Resources Inc	$26.98	$0.43	4.9%	1.2%	11.7%	0.30%	11.4%
Atmos Energy Corp	$21.83	$0.33	4.4%	1.1%	10.9%	0.30%	10.6%
Laclede Group Inc/The	$39.68	$0.39	1.9%	0.5%	5.9%	0.30%	5.6%
New Jersey Resources Corp	$34.26	$0.31	6.0%	1.5%	9.9%	0.30%	9.6%
Nicor Inc	$29.80	$0.47	5.0%	1.2%	11.7%	0.30%	11.4%
NiSource Inc	$8.58	$0.23	3.2%	0.8%	14.7%	0.30%	14.4%
Northwest Natural Gas Co	$40.54	$0.40	6.4%	1.6%	10.6%	0.30%	10.3%
Piedmont Natural Gas Co	$23.64	$0.26	8.2%	2.0%	13.0%	0.30%	12.7%
South Jersey Industries Inc	$34.75	$0.30	7.6%	1.8%	11.3%	0.30%	11.0%
Southwest Gas Corp	$19.76	$0.23	6.1%	1.5%	11.0%	0.30%	10.7%
WGL Holdings Inc	$30.50	$0.36	3.8%	0.9%	8.7%	0.30%	8.4%
Vectren Corp	$20.24	$0.34	8.5%	2.1%	15.8%	0.30%	15.5%

Sources and Notes:
[1]: Workpaper #1 to Table No. MJV-17.
[2]: Workpaper #2 to Table No. MJV-17.
[3]: Table No. MJV-16, [6].
[4]: {(1 + [3]) ^ (1/4)} - 1.
[5]: {(([2] / [1]) x (1 + [4]) + [4] + 1) ^ 4} - 1.
[6]: Workpaper #1 to Table No. MJV-9 Panel B.
[7]: [5] - [6].

Table No. MJV-17

DCF Cost of Equity of the Gas LDC Sample

Panel B: Multi-Stage DCF (Using Blue Chip Economic Indicators Long-Term GDP Growth Forecast As the Perpetual Rate)

Company	Stock Price [1]	Most Recent Dividend [2]	Combined BEst and *Value Line* Long-Term Growth Rate [3]	Growth Rate: Year 6 [4]	Growth Rate: Year 7 [5]	Growth Rate: Year 8 [6]	Growth Rate: Year 9 [7]	Growth Rate: Year 10 [8]	GDP Long-Term Growth Rate [9]	DCF Cost of Equity [10]	Interest Rate Adjustment Factor [11]	Adjusted DCF Cost of Equity [12]
AGL Resources Inc	$26.98	$0.43	4.9%	4.9%	4.9%	4.9%	4.9%	4.9%	4.9%	11.7%	0.30%	11.4%
Atmos Energy Corp	$21.83	$0.33	4.4%	4.5%	4.6%	4.7%	4.7%	4.8%	4.9%	11.2%	0.30%	10.9%
Laclede Group Inc/The	$39.68	$0.39	1.9%	2.4%	2.9%	3.4%	3.9%	4.4%	4.9%	8.3%	0.30%	8.0%
New Jersey Resources Corp	$34.26	$0.31	6.0%	5.8%	5.6%	5.5%	5.3%	5.1%	4.9%	9.0%	0.30%	8.7%
Nicor Inc	$29.80	$0.47	5.0%	5.0%	5.0%	4.9%	4.9%	4.9%	4.9%	11.6%	0.30%	11.3%
NiSource Inc	$8.58	$0.23	3.2%	3.5%	3.7%	4.0%	4.3%	4.6%	4.9%	15.6%	0.30%	15.3%
Northwest Natural Gas Co	$40.54	$0.40	6.4%	6.1%	5.9%	5.6%	5.4%	5.1%	4.9%	9.4%	0.30%	9.1%
Piedmont Natural Gas Co	$23.64	$0.26	8.2%	7.6%	7.1%	6.5%	6.0%	5.4%	4.9%	10.5%	0.30%	10.2%
South Jersey Industries Inc	$34.75	$0.30	7.6%	7.1%	6.7%	6.2%	5.8%	5.3%	4.9%	9.1%	0.30%	8.8%
Southwest Gas Corp	$19.76	$0.23	6.1%	5.9%	5.7%	5.5%	5.3%	5.1%	4.9%	10.0%	0.30%	9.7%
WGL Holdings Inc	$30.50	$0.36	3.8%	4.0%	4.1%	4.3%	4.5%	4.7%	4.9%	9.5%	0.30%	9.2%
Vectren Corp	$20.24	$0.34	8.5%	7.9%	7.3%	6.7%	6.1%	5.5%	4.9%	13.6%	0.30%	13.3%

Sources and Notes:
[1]: Workpaper #1 to Table No. MJV-17.
[2]: Workpaper #2 to Table No. MJV-17.
[3]: Table No. MJV-16, [6].
[4]: [3] - {([3] - [9])/ 6}.
[5]: [4] - {([3] - [9])/ 6}.
[6]: [5] - {([3] - [9])/ 6}.
[7]: [6] - {([3] - [9])/ 6}.
[8]: [7] - {([3] - [9])/ 6}.
[9]: Blue Chip Economic Indicators published on March 10, 2009.
[10]: Workpaper #3 to Table No. MJV-17.
[11]: Workpaper #1 to Table No. MJV-9 Panel B.
[12]: [10] - [11].

Workpaper #1 to Table No. MJV-17

Gas LDC Sample

Common Stock Prices from February 18, 2009 to March 10, 2009

Company	3/10/2009	3/9/2009	3/6/2009	3/5/2009	3/4/2009	3/3/2009	3/2/2009	2/27/2009	2/26/2009	2/25/2009	2/24/2009	2/23/2009	2/20/2009	2/19/2009	2/18/2009	Average
AGL Resources Inc	$24.94	$24.18	$24.70	$24.95	$26.30	$25.92	$26.61	$27.74	$27.89	$28.10	$28.04	$27.80	$28.48	$29.41	$29.65	$26.98
Atmos Energy Corp	$21.16	$20.24	$20.73	$20.20	$20.99	$20.24	$21.10	$21.83	$22.19	$22.52	$22.51	$22.62	$23.31	$23.96	$23.92	$21.83
Laclede Group Inc/The	$36.44	$36.22	$37.26	$37.39	$39.13	$38.10	$40.06	$39.58	$40.43	$40.44	$41.08	$41.25	$42.28	$42.79	$42.68	$39.68
New Jersey Resources Corp	$31.17	$30.94	$31.50	$31.33	$32.78	$32.25	$33.69	$35.07	$35.52	$36.18	$36.22	$36.03	$36.67	$37.25	$37.31	$34.26
Nicor Inc	$28.69	$27.65	$28.24	$28.28	$29.94	$29.17	$30.21	$31.38	$31.67	$32.53	$29.45	$28.99	$29.64	$30.36	$30.85	$29.80
NiSource Inc	$8.72	$8.33	$8.17	$7.86	$8.42	$7.99	$8.31	$8.75	$8.92	$9.10	$9.16	$8.50	$8.70	$8.80	$8.92	$8.58
Northwest Natural Gas Co	$39.19	$39.07	$39.11	$38.87	$39.84	$38.95	$40.29	$40.95	$41.22	$41.15	$41.34	$41.41	$41.87	$42.25	$42.53	$40.54
Piedmont Natural Gas Co	$21.63	$21.25	$22.68	$22.26	$22.98	$22.46	$23.44	$24.14	$24.33	$24.68	$24.75	$24.45	$24.81	$25.52	$25.28	$23.64
South Jersey Industries Inc	$32.98	$32.66	$33.31	$33.10	$34.38	$33.42	$34.82	$36.06	$35.37	$35.15	$35.42	$35.01	$35.97	$36.79	$36.75	$34.75
Southwest Gas Corp	$17.96	$17.58	$17.53	$17.28	$18.10	$18.15	$18.47	$19.49	$20.91	$21.34	$21.59	$21.17	$21.58	$22.57	$22.75	$19.76
WGL Holdings Inc	$29.92	$29.47	$29.84	$29.27	$30.34	$28.99	$29.31	$30.36	$30.43	$30.84	$31.30	$31.26	$31.89	$32.15	$32.12	$30.50
Vectren Corp	$18.59	$18.31	$18.63	$18.59	$19.59	$19.16	$19.98	$20.86	$20.47	$21.11	$20.95	$20.86	$21.52	$21.99	$22.97	$20.24

Sources and Notes:
Bloomberg as of March 10, 2009.
The prices chosen are the daily closing prices from Bloomberg starting from the most recent prices available in Bloomberg as of March 10, 2009 and ending fifteen trading days before.

Workpaper #2 to Table No. MJV-17

Gas LDC Sample

Most Recent Paid Dividend

Company	Most Recent Dividend
AGL Resources Inc	$0.43
Atmos Energy Corp	$0.33
Laclede Group Inc/The	$0.39
New Jersey Resources Corp	$0.31
Nicor Inc	$0.47
NiSource Inc	$0.23
Northwest Natural Gas Co	$0.40
Piedmont Natural Gas Co	$0.26
South Jersey Industries Inc	$0.30
Southwest Gas Corp	$0.23
WGL Holdings Inc	$0.36
Vectren Corp	$0.34

Sources and Notes:
Bloomberg as of March 10, 2009.

Workpaper #3 to Table No. MJV-17

DCF Cost of Equity of the Gas LDC Sample

Multi - Stage DCF (Using Blue Chip Economic Indicators Long-Term GDP Forecast As the Perpetual Growth Rate)

Company	AGL Resources Inc	Atmos Energy Corp	Laclede Group Inc/The	New Jersey Resources Corp	Nicor Inc	NiSource Inc	Northwest Natural Gas Co	Piedmont Natural Gas Co	South Jersey Industries Inc	Southwest Gas Corp	WGL Holdings Inc	Vectren Corp
Current Dividend	$0.43	$0.33	$0.39	$0.31	$0.47	$0.23	$0.40	$0.26	$0.30	$0.23	$0.36	$0.34
Current Stock Price	($26.98)	($21.83)	($39.68)	($34.26)	($29.80)	($8.58)	($40.54)	($23.64)	($34.75)	($19.76)	($30.50)	($20.24)
Dividend Q2 Estimate	$0.44	$0.33	$0.39	$0.31	$0.47	$0.23	$0.40	$0.26	$0.30	$0.23	$0.36	$0.34
Dividend Q3 Estimate	$0.44	$0.34	$0.39	$0.31	$0.47	$0.23	$0.41	$0.27	$0.30	$0.23	$0.36	$0.35
Dividend Q4 Estimate	$0.45	$0.34	$0.39	$0.32	$0.48	$0.24	$0.41	$0.27	$0.31	$0.23	$0.36	$0.36
Dividend Q1 Estimate	$0.45	$0.34	$0.39	$0.32	$0.48	$0.24	$0.42	$0.28	$0.31	$0.24	$0.36	$0.36
Dividend Q2 Estimate	$0.46	$0.35	$0.39	$0.33	$0.49	$0.24	$0.43	$0.28	$0.32	$0.24	$0.37	$0.37
Dividend Q3 Estimate	$0.46	$0.35	$0.39	$0.33	$0.49	$0.24	$0.43	$0.29	$0.33	$0.24	$0.37	$0.38
Dividend Q4 Estimate	$0.47	$0.36	$0.40	$0.34	$0.50	$0.24	$0.44	$0.29	$0.33	$0.25	$0.38	$0.39
Dividend Q1 Estimate	$0.47	$0.36	$0.40	$0.34	$0.51	$0.24	$0.45	$0.30	$0.34	$0.25	$0.38	$0.39
Dividend Q2 Estimate	$0.48	$0.36	$0.40	$0.35	$0.51	$0.25	$0.45	$0.30	$0.34	$0.25	$0.38	$0.40
Dividend Q3 Estimate	$0.48	$0.37	$0.40	$0.35	$0.52	$0.25	$0.46	$0.31	$0.35	$0.26	$0.39	$0.41
Dividend Q4 Estimate	$0.49	$0.37	$0.40	$0.36	$0.53	$0.25	$0.47	$0.32	$0.36	$0.26	$0.39	$0.42
Dividend Q1 Estimate	$0.50	$0.38	$0.41	$0.36	$0.53	$0.25	$0.48	$0.32	$0.36	$0.26	$0.39	$0.43
Dividend Q2 Estimate	$0.50	$0.38	$0.41	$0.37	$0.54	$0.25	$0.48	$0.33	$0.37	$0.27	$0.40	$0.44
Dividend Q3 Estimate	$0.51	$0.38	$0.41	$0.37	$0.54	$0.26	$0.49	$0.34	$0.38	$0.27	$0.40	$0.45
Dividend Q4 Estimate	$0.51	$0.39	$0.41	$0.38	$0.55	$0.26	$0.50	$0.34	$0.38	$0.28	$0.40	$0.45
Dividend Q1 Estimate	$0.52	$0.39	$0.41	$0.39	$0.56	$0.26	$0.51	$0.35	$0.39	$0.28	$0.41	$0.46
Dividend Q2 Estimate	$0.53	$0.40	$0.42	$0.39	$0.57	$0.26	$0.51	$0.36	$0.40	$0.28	$0.41	$0.47
Dividend Q3 Estimate	$0.53	$0.40	$0.42	$0.40	$0.57	$0.26	$0.52	$0.36	$0.41	$0.29	$0.42	$0.48
Dividend Q4 Estimate	$0.54	$0.41	$0.42	$0.40	$0.58	$0.27	$0.53	$0.37	$0.41	$0.29	$0.42	$0.49
Dividend Q1 Estimate	$0.55	$0.41	$0.42	$0.41	$0.59	$0.27	$0.54	$0.38	$0.42	$0.30	$0.42	$0.50
Dividend Q2 Estimate	$0.55	$0.41	$0.42	$0.42	$0.59	$0.27	$0.55	$0.38	$0.43	$0.30	$0.43	$0.51
Dividend Q3 Estimate	$0.56	$0.42	$0.43	$0.42	$0.60	$0.27	$0.55	$0.39	$0.44	$0.31	$0.43	$0.52
Dividend Q4 Estimate	$0.56	$0.42	$0.43	$0.43	$0.61	$0.28	$0.56	$0.40	$0.44	$0.31	$0.44	$0.53
Dividend Q1 Estimate	$0.57	$0.43	$0.43	$0.43	$0.62	$0.28	$0.57	$0.41	$0.45	$0.32	$0.44	$0.54
Dividend Q2 Estimate	$0.58	$0.43	$0.43	$0.44	$0.62	$0.28	$0.58	$0.41	$0.46	$0.32	$0.44	$0.55
Dividend Q3 Estimate	$0.59	$0.44	$0.44	$0.45	$0.63	$0.28	$0.59	$0.42	$0.47	$0.32	$0.45	$0.56
Dividend Q4 Estimate	$0.59	$0.44	$0.44	$0.45	$0.64	$0.29	$0.60	$0.43	$0.47	$0.33	$0.45	$0.57
Dividend Q1 Estimate	$0.60	$0.45	$0.44	$0.46	$0.65	$0.29	$0.60	$0.44	$0.48	$0.33	$0.46	$0.58
Dividend Q2 Estimate	$0.61	$0.45	$0.45	$0.46	$0.65	$0.29	$0.61	$0.44	$0.49	$0.34	$0.46	$0.59
Dividend Q3 Estimate	$0.61	$0.46	$0.45	$0.47	$0.66	$0.29	$0.62	$0.45	$0.50	$0.34	$0.47	$0.60
Dividend Q4 Estimate	$0.62	$0.46	$0.46	$0.48	$0.67	$0.30	$0.63	$0.46	$0.50	$0.35	$0.47	$0.61
Dividend Q1 Estimate	$0.63	$0.47	$0.46	$0.48	$0.68	$0.30	$0.64	$0.46	$0.51	$0.35	$0.48	$0.62
Dividend Q2 Estimate	$0.64	$0.47	$0.46	$0.49	$0.69	$0.30	$0.65	$0.47	$0.52	$0.36	$0.48	$0.63
Dividend Q3 Estimate	$0.64	$0.48	$0.47	$0.49	$0.69	$0.31	$0.65	$0.48	$0.52	$0.36	$0.49	$0.64
Dividend Q4 Estimate	$0.65	$0.49	$0.47	$0.50	$0.70	$0.31	$0.66	$0.48	$0.53	$0.37	$0.49	$0.65
Dividend Q1 Estimate	$0.66	$0.49	$0.48	$0.51	$0.71	$0.31	$0.67	$0.49	$0.54	$0.37	$0.50	$0.66
Dividend Q2 Estimate	$0.67	$0.50	$0.48	$0.51	$0.72	$0.32	$0.68	$0.50	$0.55	$0.37	$0.51	$0.67
Dividend Q3 Estimate	$0.68	$0.50	$0.49	$0.52	$0.73	$0.32	$0.69	$0.51	$0.55	$0.38	$0.51	$0.68
Dividend Q4 Estimate	$0.68	$0.51	$0.49	$0.53	$0.74	$0.32	$0.70	$0.51	$0.56	$0.38	$0.52	$0.69
Dividend Q1 Estimate	$0.69	$0.52	$0.50	$0.53	$0.75	$0.33	$0.71	$0.52	$0.57	$0.39	$0.52	$0.70
Year 10 Stock Price	$44.73	$35.95	$63.67	$57.06	$49.49	$13.83	$67.88	$40.63	$58.71	$33.10	$49.73	$35.77
Trial COE: Quarterly Rate	2.8%	2.7%	2.0%	2.2%	2.8%	3.7%	2.3%	2.5%	2.2%	2.4%	2.3%	3.2%
Trial COE: Annual Rate	11.7%	11.2%	8.3%	9.0%	11.6%	15.6%	9.4%	10.5%	9.1%	10.0%	9.5%	13.6%
Cost of Equity	11.7%	11.2%	8.3%	9.0%	11.6%	15.6%	9.4%	10.5%	9.1%	10.0%	9.5%	13.6%
(Trial COE - COE) x 100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Sources and Notes:
All Growth Rate Estimates: Table No. MJV-17; Panel B.
Stock Prices and Dividends are from Bloomberg as of March 10, 2009.
1. See Workpaper #1 to Table No. MJV-17 for the average closing stock price obtained from Bloomberg.
2. See Workpaper #2 to Table No. MJV-17 for the for the quarterly dividend obtained from Bloomberg.
3. The Blue Chip Economic Indicators Long-Term GDP Growth Forecast is used to calculate the Year 10 Stock Price.
{(the Dividend Year 2019 Q2 Estimate) x ((1 + the Perpetual Growth Rate) ^ (1/4) x (1 + Trial COE - Quarterly Rate))} /
{(Trial COE - Quarterly Rate) - ((1 + the Perpetual Growth Rate) ^ (1/4) -1)}.

Table No. MJV-18

Overall Cost of Capital of the Gas LDC Sample

Panel A: Simple DCF Method (Quarterly)

Company		4th Quarter, 2008 Bond Rating [1]	4th Quarter, 2008 Preferred Equity Rating [2]	DCF Cost of Equity [3]	DCF Common Equity to Market Value Ratio [4]	Cost of Preferred Equity [5]	DCF Preferred Equity to Market Value Ratio [6]	DCF Cost of Debt [7]	DCF Debt to Market Value Ratio [8]	GAZ Metro LP's Income Tax Rate [9]	Overall After- Tax Cost of Capital [10]
AGL Resources Inc	*	A	A	11.4%	0.56	6.6%	0.00	6.6%	0.44	30.2%	8.4%
Atmos Energy Corp		BBB	BBB	10.6%	0.51	6.8%	0.00	6.8%	0.49	30.2%	7.7%
Laclede Group Inc/The	*	A	A	5.6%	0.71	6.6%	0.00	6.6%	0.29	30.2%	5.3%
New Jersey Resources Corp		A	A	9.6%	0.77	6.6%	0.00	6.6%	0.23	30.2%	8.4%
Nicor Inc	*	AA	AA	11.4%	0.63	6.5%	0.00	6.5%	0.37	30.2%	8.9%
NiSource Inc		BBB	BBB	14.4%	0.29	6.8%	0.00	6.8%	0.71	30.2%	7.6%
Northwest Natural Gas Co	*	AA	AA	10.3%	0.65	6.5%	0.00	6.5%	0.35	30.2%	8.3%
Piedmont Natural Gas Co	*	A	A	12.7%	0.69	6.6%	0.00	6.6%	0.31	30.2%	10.2%
South Jersey Industries Inc	*	BBB	BBB	11.0%	0.68	6.8%	0.00	6.8%	0.32	30.2%	9.0%
Southwest Gas Corp	*	BBB	BBB	10.7%	0.40	6.8%	0.00	6.8%	0.60	30.2%	7.2%
WGL Holdings Inc	*	AA	AA	8.4%	0.69	6.5%	0.01	6.5%	0.30	30.2%	7.2%
Vectren Corp		A	A	15.5%	0.53	6.6%	0.00	6.6%	0.47	30.2%	10.4%
Average				11.5%	0.58	6.7%	0.00	6.7%	0.42	30.2%	8.5%
Subsample Average				10.8%	0.61	6.6%	0.00	6.6%	0.38	30.2%	8.4%

Sources and Notes:
[1]: Bloomberg as of March 10, 2009.
[2]: Preferred ratings were assumed equal to debt ratings.
[3]: Table No. MJV-17; Panel A, [5].
[4]: Table No. MJV-15, [1].
[5]: Workpaper #2 to Table No. MJV-21, Panel C, [1].
[6]: Table No. MJV-15, [2].
[7]: Workpaper #2 toTable No. MJV-21, Panel B, [1].
[8]: Table No. MJV-15, [3].
[9]: Provided by GAZ Metro LP.
[10]: ([3] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}.

*Subsample

Table No. MJV-18

Overall Cost of Capital of the Gas LDC Sample

Panel B: Multi-Stage DCF (Using the Blue Chip Economic Indicators Long-Term GDP Growth Forecast)

Company		4th Quarter, 2008 Bond Rating [1]	4th Quarter, 2008 Preferred Equity Rating [2]	DCF Cost of Equity [3]	DCF Common Equity to Market Value Ratio [4]	Cost of Preferred Equity [5]	DCF Preferred Equity to Market Value Ratio [6]	DCF Cost of Debt [7]	DCF Debt to Market Value Ratio [8]	GAZ Metro LP's Income Tax Rate [9]	Overall After- Tax Cost of Capital [10]
AGL Resources Inc	*	A	A	11.4%	0.56	6.6%	0.00	6.6%	0.44	30.2%	8.4%
Atmos Energy Corp		BBB	BBB	10.9%	0.51	6.8%	0.00	6.8%	0.49	30.2%	7.9%
Laclede Group Inc/The	*	A	A	8.0%	0.71	6.6%	0.00	6.6%	0.29	30.2%	7.0%
New Jersey Resources Corp		A	A	8.7%	0.77	6.6%	0.00	6.6%	0.23	30.2%	7.7%
Nicor Inc	*	AA	AA	11.3%	0.63	6.5%	0.00	6.5%	0.37	30.2%	8.8%
NiSource Inc		BBB	BBB	15.3%	0.29	6.8%	0.00	6.8%	0.71	30.2%	7.9%
Northwest Natural Gas Co	*	AA	AA	9.1%	0.65	6.5%	0.00	6.5%	0.35	30.2%	7.5%
Piedmont Natural Gas Co	*	A	A	10.2%	0.69	6.6%	0.00	6.6%	0.31	30.2%	8.4%
South Jersey Industries Inc	*	BBB	BBB	8.8%	0.68	6.8%	0.00	6.8%	0.32	30.2%	7.5%
Southwest Gas Corp	*	BBB	BBB	9.7%	0.40	6.8%	0.00	6.8%	0.60	30.2%	6.8%
WGL Holdings Inc	*	AA	AA	9.2%	0.69	6.5%	0.01	6.5%	0.30	30.2%	7.8%
Vectren Corp		A	A	13.3%	0.53	6.6%	0.00	6.6%	0.47	30.2%	9.2%
Average				10.7%	0.58	6.7%	0.00	6.7%	0.42	30.2%	8.0%
Subsample Average				10.0%	0.61	6.6%	0.00	6.6%	0.38	30.2%	7.9%

Sources and Notes:
[1]: Bloomberg as of March 10, 2009.
[2]: Preferred ratings were assumed equal to debt ratings.
[3]: Table No. MJV-17; Panel B, [10].
[4]: Table No. MJV-15, [1].
[5]: Workpaper #2 to Table No. MJV-21, Panel C, [1].
[6]: Table No. MJV-15, [2].
[7]: Workpaper #2 toTable No. MJV-21, Panel B, [1].
[8]: Table No. MJV-15, [3].
[9]: Provided by GAZ Metro LP.
[10]: ([3] x [4]) + ([5] x [6]) + {[7] x [8] x (1 - [9])}.

*Subsample

Table No. MJV-19

Summary of DCF ATWACC

Gas LDC Sample

Methodology	Overall Cost of Capital [1]
Using All Companies with Bloomberg Forecast	
Simple DCF Quarterly	8.5%
Multi-Stage DCF (Using Blue Chip Economic Indicators Long-Term GDP Growth Forecast)	8.0%
Using Subsample with Bloomberg Forecast	
Simple DCF Quarterly	8.4%
Multi-Stage DCF (Using Blue Chip Economic Indicators Long-Term GDP Growth Forecast)	7.9%

Sources and Notes:
[1]: Table No. MJV-18; Panels A-B, [10].

Table No. MJV-20

Risk Positioning Cost of Equity of the Gas LDC Sample

Using Unadjusted Value Line Betas

Company	Canadian Long-Term Risk-Free Rate [1]	Unadjusted Beta [2]	Long-Term Market Risk Premium [3]	CAPM Cost of Equity [4]	ECAPM (1.0%) Cost of Equity [5]	ECAPM (2.0%) Cost of Equity [6]
AGL Resources Inc	4.3%	0.60	7.75%	8.9%	9.3%	9.7%
Atmos Energy Corp	4.3%	0.45	7.75%	7.8%	8.3%	8.9%
Laclede Group Inc/The	4.3%	0.45	7.75%	7.8%	8.3%	8.9%
New Jersey Resources Corp	4.3%	0.52	7.75%	8.3%	8.8%	9.3%
Nicor Inc	4.3%	0.52	7.75%	8.3%	8.8%	9.3%
NiSource Inc	4.3%	0.60	7.75%	8.9%	9.3%	9.7%
Northwest Natural Gas Co	4.3%	0.37	7.75%	7.2%	7.8%	8.4%
Piedmont Natural Gas Co	4.3%	0.52	7.75%	8.3%	8.8%	9.3%
South Jersey Industries Inc	4.3%	0.60	7.75%	8.9%	9.3%	9.7%
Southwest Gas Corp	4.3%	0.60	7.75%	8.9%	9.3%	9.7%
WGL Holdings Inc	4.3%	0.60	7.75%	8.9%	9.3%	9.7%
Vectren Corp	4.3%	0.75	7.75%	10.1%	10.3%	10.6%

Sources and Notes:
[1]: Table No. MJV-9 - Interest Rate Forecasts, Panel A, Row [A].
[2]: Workpaper # 1 to Table No. MJV-20, Panel A, column [1].
[3]: Vilbert Written Evidence, Appendix C.
[4]: [1] + ([2] x [3]).
[5]: ([1] + 1.0%) + [2] x ([3] - 1.0%).
[6]: ([1] + 2.0%) + [2] x ([3] - 2.0%).

Workpaper # 1 to Table No. MJV-20

Gas LDC Sample

Beta Summary

Company		Value Line Beta [1]	Unadjusted Beta [2]
AGL Resources Inc	*	0.75	0.60
Atmos Energy Corp		0.65	0.45
Laclede Group Inc/The	*	0.65	0.45
New Jersey Resources Corp		0.70	0.52
Nicor Inc	*	0.70	0.52
NiSource Inc		0.75	0.60
Northwest Natural Gas Co	*	0.60	0.37
Piedmont Natural Gas Co	*	0.70	0.52
South Jersey Industries Inc	*	0.75	0.60
Southwest Gas Corp	*	0.75	0.60
WGL Holdings Inc	*	0.75	0.60
Vectren Corp		0.85	0.75
Average:		0.72	0.55
Subsample Average:		0.71	0.53

Sources and Notes:
[1]: Most recent Value Line Standard Edition dated as of December 12, 2008 and December 26, 2008.
[2]: Value Line beta unadjusted using the formula: ([1] - 0.35) / 0.67.
*Subsample

Table No. MJV-21

Overall Cost of Capital of the Gas LDC Sample

Panel A: CAPM Cost of Equity using Value Line Unadjusted Betas

Company		CAPM Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	Weighted - Average Cost of Preferred Equity [3]	5-Year Average Preferred Equity to Market Value Ratio [4]	Weighted-Average Cost of Debt [5]	5-Year Average Debt to Market Value Ratio [6]	GAZ Metro LP's Income Tax Rate [7]	Overall After-Tax Cost of Capital [8]
AGL Resources Inc	*	8.9%	0.61	6.6%	0.00	6.6%	0.39	30.2%	7.2%
Atmos Energy Corp		7.8%	0.56	6.8%	0.00	6.8%	0.44	30.2%	6.4%
Laclede Group Inc/The	*	7.8%	0.65	6.6%	0.00	6.6%	0.35	30.2%	6.7%
New Jersey Resources Corp		8.3%	0.78	6.6%	0.00	6.6%	0.22	30.2%	7.5%
Nicor Inc	*	8.3%	0.71	6.5%	0.00	6.5%	0.29	30.2%	7.2%
NiSource Inc		8.9%	0.45	6.8%	0.00	6.8%	0.55	30.2%	6.7%
Northwest Natural Gas Co	*	7.2%	0.64	6.5%	0.00	6.5%	0.36	30.2%	6.3%
Piedmont Natural Gas Co	*	8.3%	0.71	6.6%	0.00	6.6%	0.29	30.2%	7.3%
South Jersey Industries Inc	*	8.9%	0.70	6.8%	0.00	6.8%	0.30	30.2%	7.7%
Southwest Gas Corp	*	8.9%	0.45	6.8%	0.00	6.8%	0.55	30.2%	6.6%
WGL Holdings Inc	*	8.9%	0.69	6.5%	0.01	6.5%	0.30	30.2%	7.6%
Vectren Corp		10.1%	0.59	6.6%	0.00	6.6%	0.41	30.2%	7.9%
Average		8.5%	62.8%	6.7%	0.1%	6.7%	37.0%	30.2%	7.1%
Subsample Average		8.4%	64.4%	6.6%	0.2%	6.6%	35.4%	30.2%	7.1%

Sources and Notes:
[1]: Table No. MJV-20; Panel A, [4].
[2]: Table No. MJV-15, [4].
[3]: Workpaper #2 to Table No. MJV-21 ; Panel C, [7].
[4]: Table No. MJV-15, [5].
[5]: Workpaper #2 to Table No. MJV-21 ; Panel B, [7].
[6]: Table No. MJV-15, [6].
[7]: Provided by GAZ Metro LP.
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.
*Subsample

Table No. MJV-21

Overall Cost of Capital of the Gas LDC Sample

Panel B: ECAPM (1.0%) Cost of Equity using Value Line Unadjusted Betas

Company		ECAPM (1.0%) Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	Weighted - Average Cost of Preferred Equity [3]	5-Year Average Preferred Equity to Market Value Ratio [4]	Weighted-Average Cost of Debt [5]	5-Year Average Debt to Market Value Ratio [6]	GAZ Metro LP's Income Tax Rate [7]	Overall After-Tax Cost of Capital [8]
AGL Resources Inc	*	9.3%	0.61	6.6%	0.00	6.6%	0.39	30.2%	7.5%
Atmos Energy Corp		8.3%	0.56	6.8%	0.00	6.8%	0.44	30.2%	6.7%
Laclede Group Inc/The	*	8.3%	0.65	6.6%	0.00	6.6%	0.35	30.2%	7.0%
New Jersey Resources Corp		8.8%	0.78	6.6%	0.00	6.6%	0.22	30.2%	7.9%
Nicor Inc	*	8.8%	0.71	6.5%	0.00	6.5%	0.29	30.2%	7.6%
NiSource Inc		9.3%	0.45	6.8%	0.00	6.8%	0.55	30.2%	6.8%
Northwest Natural Gas Co	*	7.8%	0.64	6.5%	0.00	6.5%	0.36	30.2%	6.7%
Piedmont Natural Gas Co	*	8.8%	0.71	6.6%	0.00	6.6%	0.29	30.2%	7.6%
South Jersey Industries Inc	*	9.3%	0.70	6.8%	0.00	6.8%	0.30	30.2%	8.0%
Southwest Gas Corp	*	9.3%	0.45	6.8%	0.00	6.8%	0.55	30.2%	6.8%
WGL Holdings Inc	*	9.3%	0.69	6.5%	0.01	6.5%	0.30	30.2%	7.9%
Vectren Corp		10.3%	0.59	6.6%	0.00	6.6%	0.41	30.2%	8.0%
Average		9.0%	62.8%	6.7%	0.1%	6.7%	37.0%	30.2%	7.4%
Subsample Average		8.9%	64.4%	6.6%	0.2%	6.6%	35.4%	30.2%	7.4%

Sources and Notes:
[1]: Table No. MJV-20; Panel A, [5].
[2]: Table No. MJV-15, [4].
[3]: Workpaper #2 to Table No. MJV-21 ; Panel C, [7].
[4]: Table No. MJV-15, [5].
[5]: Workpaper #2 to Table No. MJV-21 ; Panel B, [7].
[6]: Table No. MJV-15, [6].
[7]: Provided by GAZ Metro LP.
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.
*Subsample

Table No. MJV-21

Overall Cost of Capital of the Gas LDC Sample

Panel C: ECAPM (2.0%) Cost of Equity using Value Line Unadjusted Betas

Company		ECAPM (2.0%) Cost of Equity [1]	5-Year Average Common Equity to Market Value Ratio [2]	Weighted - Average Cost of Preferred Equity [3]	5-Year Average Preferred Equity to Market Value Ratio [4]	Weighted-Average Cost of Debt [5]	5-Year Average Debt to Market Value Ratio [6]	GAZ Metro LP's Income Tax Rate [7]	Overall After-Tax Cost of Capital [8]
AGL Resources Inc	*	9.7%	0.61	6.6%	0.00	6.6%	0.39	30.2%	7.7%
Atmos Energy Corp		8.9%	0.56	6.8%	0.00	6.8%	0.44	30.2%	7.1%
Laclede Group Inc/The	*	8.9%	0.65	6.6%	0.00	6.6%	0.35	30.2%	7.4%
New Jersey Resources Corp		9.3%	0.78	6.6%	0.00	6.6%	0.22	30.2%	8.3%
Nicor Inc	*	9.3%	0.71	6.5%	0.00	6.5%	0.29	30.2%	7.9%
NiSource Inc		9.7%	0.45	6.8%	0.00	6.8%	0.55	30.2%	7.0%
Northwest Natural Gas Co	*	8.4%	0.64	6.5%	0.00	6.5%	0.36	30.2%	7.1%
Piedmont Natural Gas Co	*	9.3%	0.71	6.6%	0.00	6.6%	0.29	30.2%	7.9%
South Jersey Industries Inc	*	9.7%	0.70	6.8%	0.00	6.8%	0.30	30.2%	8.2%
Southwest Gas Corp	*	9.7%	0.45	6.8%	0.00	6.8%	0.55	30.2%	7.0%
WGL Holdings Inc	*	9.7%	0.69	6.5%	0.01	6.5%	0.30	30.2%	8.2%
Vectren Corp		10.6%	0.59	6.6%	0.00	6.6%	0.41	30.2%	8.2%
Average		9.4%	62.8%	6.7%	0.1%	6.7%	37.0%	30.2%	7.7%
Subsample Average		9.4%	64.4%	6.6%	0.2%	6.6%	35.4%	30.2%	7.7%

Sources and Notes:
[1]: Table No. MJV-20; Panel A, [6].
[2]: Table No. MJV-15, [4].
[3]: Workpaper #2 to Table No. MJV-21 ; Panel C, [7].
[4]: Table No. MJV-15, [5].
[5]: Workpaper #2 to Table No. MJV-21 ; Panel B, [7].
[6]: Table No. MJV-15, [6].
[7]: Provided by GAZ Metro LP.
[8]: ([1] x [2]) + ([3] x [4]) + {[5] x [6] x (1 - [7])}.
*Subsample

Workpaper #1 to Table No. MJV-21

Gas LDC Sample

Panel A: Rating to Canadian Yield Conversion

Rating	Bond Yield	Preferred Yield
AA	6.50%	6.50%
A	6.61%	6.61%
BBB	6.83%	6.83%

Sources and Notes:
Bond Yields from Bloomberg as of March 10, 2009.
Preferred Yields from Bloomberg as of March 10, 2009. Assumed AA estimated as A - 0.5 * (BBB - A).

Workpaper #1 to Table No. MJV-21

Gas LDC Sample

Panel B: Bond Rating Summary

Company	Year End, 2008 [1]	2007 [2]	2006 [3]	2005 [4]	2004 [5]
AGL Resources Inc	A	A	A	A	A
Atmos Energy Corp	BBB	BBB	BBB	BBB	BBB
Laclede Group Inc/The	A	A	A	A	A
New Jersey Resources Corp	A	A	A	A	A
Nicor Inc	AA	AA	AA	AA	AA
NiSource Inc	BBB	BBB	BBB	BBB	BBB
Northwest Natural Gas Co	AA	AA	AA	A	A
Piedmont Natural Gas Co	A	A	A	A	A
South Jersey Industries Inc	BBB	BBB	BBB	BBB	BBB
Southwest Gas Corp	BBB	BBB	BBB	BBB	BBB
WGL Holdings Inc	AA	AA	AA	AA	AA
Vectren Corp	A	A	A	A	A

Sources and Notes:
[1] - [6]: Bloomberg as of March 10, 2009.

Workpaper #1 to Table No. MJV-21

Gas LDC Sample

Panel C: Preferred Equity Rating Summary

Company	Year End, 2008 [1]	2007 [2]	2006 [3]	2005 [4]	2004 [5]
AGL Resources Inc	A	A	A	A	A
Atmos Energy Corp	BBB	BBB	BBB	BBB	BBB
Laclede Group Inc/The	A	A	A	A	A
New Jersey Resources Corp	A	A	A	A	A
Nicor Inc	AA	AA	AA	AA	AA
NiSource Inc	BBB	BBB	BBB	BBB	BBB
Northwest Natural Gas Co	AA	AA	AA	AA	AA
Piedmont Natural Gas Co	A	A	A	A	A
South Jersey Industries Inc	BBB	BBB	BBB	BBB	BBB
Southwest Gas Corp	BBB	BBB	BBB	BBB	BBB
WGL Holdings Inc	AA	AA	AA	AA	AA
Vectren Corp	A	A	A	A	A

Sources and Notes:

[1] - [6]: Preferred equity ratings are assumed equal to the company's bond ratings reported in Workpaper #1 to Table No. MJV-21, Panels A and B.

Workpaper #2 to Table No. MJV-21

US Gas LDC Sample

Panel A: 15 Day Average Canadian Utility Yield

Date	A Rated Utility [1]	BBB Rated Utility [2]	A Preferred [3]	BBB Preferred [4]
3/10/2009	6.68	6.93	-	-
3/9/2009	6.61	6.85	-	-
3/6/2009	6.58	6.81	-	-
3/5/2009	6.52	6.76	-	-
3/4/2009	6.64	6.86	-	-
3/3/2009	6.60	6.82	-	-
3/2/2009	6.57	6.78	-	-
2/27/2009	6.67	6.88	-	-
2/26/2009	6.68	6.91	-	-
2/25/2009	6.66	6.88	-	-
2/24/2009	6.58	6.78	-	-
2/23/2009	6.56	6.77	-	-
2/20/2009	6.57	6.78	-	-
2/19/2009	6.65	6.84	-	-
2/18/2009	6.57	6.79	-	-
Average	6.61	6.83	6.61	6.83

Sources and Notes:
[1] - [2]: Bloomberg as of March 10, 2009.
[3] - [4]: Preferred yield is assumed equal to debt yield.

Workpaper #2 to Table No. MJV-21

Gas LDC Sample

Panel B: Bond Yield Summary

Company	Year End, 2008 [1]	2007 [2]	2006 [3]	2005 [4]	2004 [5]	5-Year Average [6]
AGL Resources Inc	6.61%	6.61%	6.61%	6.61%	6.61%	6.61%
Atmos Energy Corp	6.83%	6.83%	6.83%	6.83%	6.83%	6.83%
Laclede Group Inc/The	6.61%	6.61%	6.61%	6.61%	6.61%	6.61%
New Jersey Resources Corp	6.61%	6.61%	6.61%	6.61%	6.61%	6.61%
Nicor Inc	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%
NiSource Inc	6.83%	6.83%	6.83%	6.83%	6.83%	6.83%
Northwest Natural Gas Co	6.50%	6.50%	6.50%	6.61%	6.61%	6.55%
Piedmont Natural Gas Co	6.61%	6.61%	6.61%	6.61%	6.61%	6.61%
South Jersey Industries Inc	6.83%	6.83%	6.83%	6.83%	6.83%	6.83%
Southwest Gas Corp	6.83%	6.83%	6.83%	6.83%	6.83%	6.83%
WGL Holdings Inc	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%
Vectren Corp	6.61%	6.61%	6.61%	6.61%	6.61%	6.61%

Sources and Notes:

[1] - [6]: Ratings based on Workpaper #1 to Table No. MJV-21, Panel A and bond yields from Bloomberg as of March 10, 2009.

[6]: ([1]+ [2] + [3] + [4] + [5]) / 5.

Workpaper #2 to Table No. MJV-21

Gas LDC Sample

Panel C: Preferred Equity Yield Summary

Company	Year End, 2008 [1]	2007 [2]	2006 [3]	2005 [4]	2004 [5]	5-Year Weighted Average [6]
AGL Resources Inc	6.61%	6.61%	6.61%	6.61%	6.61%	6.61%
Atmos Energy Corp	6.83%	6.83%	6.83%	6.83%	6.83%	6.83%
Laclede Group Inc/The	6.61%	6.61%	6.61%	6.61%	6.61%	6.61%
New Jersey Resources Corp	6.61%	6.61%	6.61%	6.61%	6.61%	6.61%
Nicor Inc	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%
NiSource Inc	6.83%	6.83%	6.83%	6.83%	6.83%	6.83%
Northwest Natural Gas Co	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%
Piedmont Natural Gas Co	6.61%	6.61%	6.61%	6.61%	6.61%	6.61%
South Jersey Industries Inc	6.83%	6.83%	6.83%	6.83%	6.83%	6.83%
Southwest Gas Corp	6.83%	6.83%	6.83%	6.83%	6.83%	6.83%
WGL Holdings Inc	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%
Vectren Corp	6.61%	6.61%	6.61%	6.61%	6.61%	6.61%

Sources and Notes:

[1] - : Ratings based on Workpaper #1 to Table No. MJV-21, Panel A are assumed to equal preferred ratings. Preferred equity yields are from Bloomberg as of March 10, 2009. Assumed preferred yield is equal to debt yield.
[6]: ([1]+ [2] + [3] + [4] + [5]) / 5.

The report does not publish yield data for AA-rated preferred equity. Therefore, when there is a AA we assumed:
Yield on AA-rated preferred equity = Yield on A-rated bond - {(1/2) x (Yield on BBB-rated bond - Yield on A-rated bond)}.

Table No. MJV-22

Summary of Risk-Positioning ATWACC

Gas LDC Sample

Panel A: Full Sample using Value Line Unadjusted Betas

Methodology	Overall Cost of Capital [1]
Using Long-Term Risk-Free Rates:	
CAPM using Unadjusted Beta	7.1%
ECAPM (1.0%) using Unadjusted Beta	7.4%
ECAPM (2.0%) using Unadjusted Beta	7.7%

Sources and Notes:
[1]: Table No. MJV-21; Panels A - F, [8].

Table No. MJV-22

Summary of Risk-Positioning ATWACC

Gas LDC Sample

Panel B: Subsample using Value Line Unadjusted Betas

Methodology	Overall Cost of Capital [1]
Using Long-Term Risk-Free Rate:	
CAPM using Unadjusted Beta	7.1%
ECAPM (1.0%) using Unadjusted Beta	7.4%
ECAPM (2.0%) using Unadjusted Beta	7.7%

Sources and Notes:
[1]: Table No. MJV-21; Panels A - F, [8].

Appendix A

Michael Vilbert is an expert in cost of capital, financial planning and valuation who has advised clients on these matters in the context of a wide variety of investment and regulatory decisions. He received his Ph.D. in Financial Economics from the Wharton School of the University of Pennsylvania, an MBA from the University of Utah, an M.S. from the Fletcher School of Law and Diplomacy, Tufts University, and a B.S. degree from the United States Air Force Academy. He joined The Brattle Group in 1994 after a career as an Air Force officer, where he served as a fighter pilot, intelligence officer, and professor of finance at the Air Force Academy.

REPRESENTATIVE CONSULTING EXPERIENCE

- In a securities fraud case, Dr. Vilbert designed and created a model to value the private placement stock of a drug store chain as if there had been full disclosure of the actual financial condition of the firm. He analyzed key financial data and security analysts' reports regarding the future of the industry in order to recreate pro forma balance sheet and income statements under a variety of scenarios designed to establish the value of the firm.

- For pharmaceutical companies rebutting price-fixing claims in antitrust litigation, Dr. Vilbert was a member of a team that prepared a comprehensive analysis of industry profitability. The analysis replicated, tested and critiqued the major recent analyses of drug costs, risks and returns. The analyses helped develop expert witness testimony to rebut allegations of excess profits.

- For an independent electric power producer, Dr. Vilbert created a model that analyzed the reasonableness of rates and costs filed by a natural gas pipeline. The model not only duplicated the pipeline's rates, but it also allowed simulation of a variety of "what if" scenarios associated with cost recovery under alternative time patterns and joint cost allocations. Results of the analysis were adopted by the intervenor group for negotiation with the pipeline.

- For the CFO of an electric utility, Dr. Vilbert developed the valuation model used to support a stranded cost estimation filing. The case involved a conflict between two utilities over the responsibility for out-of-market costs associated with a power purchase contract between them. In addition, he advised and analyzed cost recovery mechanisms that would allow full recovery of the stranded costs while providing a rate reduction for the company's rate payers.

- Dr. Vilbert has testified as well as assisted in the preparation of testimony and the development of estimation models in numerous cost of capital cases for natural gas pipeline, water utility and electric utility clients before the Federal Energy Regulatory Commission ("FERC") and state regulatory commissions. These have spanned standard estimation techniques (e.g., Discounted Cash Flow and Risk Positioning models). He has also developed and applied more advanced models specific to the industries or lines of business in question, e.g., based on the structure and risk characteristics of cash flows, or based on multi-factor models that better characterize regulated industries.

- Dr. Vilbert has valued several large, residual oil-fired generating stations to evaluate the possible conversion to natural gas or other fuels. In these analyses, the expected pre- and post-conversion station values were computed using a range of market electricity and fuel cost conditions.

- For a major western electric utility, Dr. Vilbert helped prepare testimony that analyzed the prudence of QF contract enforcement. The testimony demonstrated that the utility had not been compensated in its allowed cost of capital for major disallowances stemming from QF contract management.

- Dr. Vilbert analyzed the economic need for a major natural gas pipeline expansion to the Midwest. This involved evaluating forecasts of natural gas use in various regions of the United States and the effect of additional supplies on the pattern of natural gas pipeline use. The analysis was used to justify the expansion before the FERC and the National Energy Board of Canada.

- For a Public Utility Commission in the Northeast, Dr. Vilbert analyzed the auction of an electric utility's purchase power agreements to determine whether the outcome of the auction was in the ratepayers' interest. The work involved the analysis of the auction procedures as well as the benefits to ratepayers of transferring risk of the PPA payments to the buyer.

- Dr. Vilbert led a team tasked to determine whether bridge tolls were "just and reasonable" for a non-profit port authority. Determination of the cost of service for the authority required estimation of the value of the authority's assets using the trended original cost methodology as well as evaluation of the operations and maintenance budgets. Investment costs, bridge traffic information and inflation indices covering a 75 year period were utilized to estimate the value of four bridges and a passenger transit line valued in excess of $1 billion.

- Dr. Vilbert helped a recently privatized railroad in Brazil develop an estimate of its revenue requirements, including a determination of the railroad's cost of capital. He also helped evaluate alternative rate structures designed to provide economic incentives to shippers as well as to the railroad for improved service. This involved the explanation and analysis of the contribution margin of numerous shipper products, improved cost analysis and evaluation of bottlenecks in the system.

- For a utility in the Southeast, Dr. Vilbert quantified the company's stranded costs under several legislative electric restructuring scenarios. This involved the evaluation of all of the company's fossil and nuclear generating units, its contracts with Qualifying Facilities and the prudence of those QF contracts. He provided analysis concerning the impact of securitizing the company's stranded costs as a means of reducing the cost to the ratepayers and several alternative designs for recovering stranded costs.

- For a recently privatized electric utility in Australia, Dr. Vilbert evaluated the proposed regulatory scheme of the Australian Competition and Consumer Commission for the company's electric transmission system. The evaluation highlighted the elements of the proposed regulation which would impose uncompensated asymmetric risks on the company and the need to either eliminate the asymmetry in risk or provide additional compensation so that the company could expect to earn its cost of capital.

- For an electric utility in the Southwest, Dr. Vilbert helped design and create a model to estimate the stranded costs of the company's portfolio of Qualifying Facilities and Power Purchase contracts. This exercise was complicated by the many variations in the provisions of the contracts that required modeling in order to capture the effect of changes in either the performance of the plants or in the estimated market price of electricity.

- Dr. Vilbert helped prepare the testimony responding to a FERC request for further comments on the appropriate return on equity for electric transmission facilities. In addition, Dr. Vilbert was a member of the team that made a presentation to the FERC staff on the expected risks of the unbundled electric transmission line of business.

- Dr. Vilbert and Mr. Frank C. Graves, also of The Brattle Group, prepared testimony evaluating an innovative Canadian stranded cost recovery procedure involving the auctioning of the output of the province's electric generation plants instead of the plants themselves. The evaluation required the analysis of the terms and conditions of the long-term contracts specifying the revenue requirements of the plants for their entire forecasted remaining economic life and required an estimate of the cost of capital for the plant owners under this new stranded cost recovery concept.

- Dr. Vilbert served as the neutral arbitrator for the valuation of a petroleum products tanker. The valuation required analysis of the Jones Act tanker market and the supply and demand balance of the available U.S. constructed tanker fleet.

- Dr. Vilbert evaluated the appropriate "bareboat" charter rate for an oil drilling platform for the renewal period following the end of a long-term lease. The evaluation required analysis of the market for oil drilling platforms around the world including trends in construction and labor costs and the demand for platforms in varying geographical environments.

PRESENTATIONS

"Utility Distribution Cost of Capital," *EEI Electric Rates Advanced Course*, Bloomington, IN, 2002, 2003.

"Issues for Cost of Capital Estimation," with Bente Villadsen, *Edison Electric Institute Cost of Capital Conference*, Chicago, IL, February 2004.

"Not Your Father's Rate of Return Methodology," *Utility Commissioners/Wall Street Dialogue*, NY, May 2004.

"Utility Distribution Cost of Capital," *EEI Electric Rates Advanced Course*, Madison, WI, July 2004.

"Cost of Capital Estimation: Issues and Answers," *MidAmerican Regulatory Finance Conference*, Des Moines, IA, April 7, 2005.

"Cost of Capital - Explaining to the Commission - Different ROEs for Different Parts of the Business," *EEI Economic Regulation & Competition Analysts Meeting*, May 2, 2005.

"Current Issues in Cost of Capital," with Bente Villadsen, *EEI Electric Rates Advanced Course*, Madison, WI, 2005.

"Current Issues in Estimating the Cost of Capital," *EEI Electric Rates Advanced Course*, Madison, WI, 2006, 2007, 2008.

"Revisiting the Development of Proxy Groups and Relative Risk Analysis," Society of Utility and Regulatory Financial Analysts: 39th Financial Forum, April 2007.

"Current Issues in Explaining the Cost of Capital to Utility Commissions" Cost of Capital Seminar, Philadelphia, PA, 2008.

ARTICLES

"Flaws in the Proposed IRS Rule to Reinstate Amortization of Deferred Tax Balances Associated with Generation Assets Reorganized in Industry Restructuring," by Frank C. Graves and Michael J. Vilbert, white paper for *Edison Electric Institute* (EEI) to the IRS, July 25, 2003.

"The Effect of Debt on the Cost of Equity in a Regulatory Setting," by A. Lawrence Kolbe, Michael J. Vilbert, Bente Villadsen and The Brattle Group, *Edison Electric Institute*, April 2005.

"Measuring Return on Equity Correctly: Why current estimation models set allowed ROE too low," by A. Lawrence Kolbe, Michael J. Vilbert and Bente Villadsen, *Public Utilities Fortnightly*, August 2005.

"Understanding Debt Imputation Issues," by Michael J. Vilbert, Bente Villadsen and Joseph B. Wharton, *Edison Electric Institute*, August 2008.

TESTIMONY

Direct and rebuttal testimony before the Alberta Energy and Utilities Board on behalf of TransAlta Utilities Corporation in the matter of an application for approval of its 1999 and 2000 generation tariff, transmission tariff, and distribution revenue requirement, October 1998.

Direct testimony before the Federal Energy Regulatory Commission on behalf of Central Maine Power in Docket No. ER00-982-000, December 1999.

Direct testimony before the Alberta Energy and Utilities Board on behalf of TransAlta Utilities Corporation for approval of its 2001 transmission tariff, May 2000.

Direct testimony before the Federal Energy Regulatory Commission on behalf of Mississippi River Transmission Corporation in Docket No. RP01-292-000, March 2001.

Written evidence, rebuttal, reply and further reply before the National Energy Board in the matter of an application by TransCanada PipeLines Limited for orders pursuant to Part I and Part IV of the *National Energy Board Act*, Order AO-1-RH-4-2001, May 2001, Nov. 2001, Feb. 2002.

Written evidence before the Public Utility Board on behalf of Newfoundland & Labrador Hydro - Rate Hearings, October 2001.

Direct testimony (with William Lindsay) before the Federal Energy Regulatory Commission on behalf of DTE East China, LLC in Docket No. ER02-1599-000, April 2002.

Direct and rebuttal reports before the Arbitration Panel in the arbitration of stranded costs for the City of Casselberry, FL, Case No. 00-CA-1107-16-L, July 2002.

Direct reports before the Arbitration Board for Petroleum products trade in the Arbitration of the Military Sealift Command vs. Household Commercial Financial Services, fair value of sale of the Darnell, October 2002.

Direct testimony and hearing before the Arbitration Panel in the arbitration of stranded costs for the City of Winter Park, FL, In the Circuit Court of the Ninth Judicial Circuit in and for Orange County, FL, Case No. C1-01-4558-39, December 2002.

Direct testimony before the Federal Energy Regulatory Commission on behalf of Florida Power Corporation, dba Progress Energy Florida, Inc. in Docket No. SC03-1-000, March 2003.

Direct report before the Arbitration Panel in the arbitration of stranded costs for the Town of Belleair, FL, Case No. 000-6487-C1-007, April 2003.

Direct and rebuttal reports before the Alberta Energy and Utilities Board in the matter of the Alberta Energy and Utilities Board Act, R.S.A. 2000, c. A-17, and the Regulations under it; in the matter of the Gas Utilities Act, R.S.A. 2000, c. G-5, and the Regulations under it; in the matter of the Public utilities Board Act, R.S.A. 2000, c. P-45, as amended, and the Regulations under it; and in the matter of Alberta Energy and Utilities Generic Cost of Capital Hearing, Proceeding No. 1271597, July 2003, November 2003.

Written evidence before the National Energy Board in the matter of the National Energy Board Act, R.S.C. 1985, c. N–7, as amended, (Act) and the Regulations made under it; and in the matter of an application by TransCanada PipeLines Limited for orders pursuant to Part IV of the *National Energy Board Act*, for approval of Mainline Tolls for 2004, RH-2-2004, January 2004.

Direct and rebuttal testimony before the Public Service Commission of West Virginia, on Cost of Capital for West Virginia-American Water Company, Case No 04-0373-W-42T, May 2004.

Direct and rebuttal testimony before the Federal Energy Regulatory Commission on Energy Allocation of Debt Cost for Incremental Shipping Rates for Edison Mission Energy, Docket No. RP04-274-000, December 2004 and March 2005.

Direct testimony before the Arizona Corporation Commission, Cost of Capital for Paradise Valley Water Company, a subsidiary of Arizona-American Water Company, Docket No. WS-01303A-05, May 2005.

Written evidence before the Ontario Energy Board, Cost of Capital for Union Gas Limited, Inc., Docket No. EB-2005-0520, January 2006.

Direct and rebuttal testimony before the Pennsylvania Public Utility Commission, Return on Equity for Metropolitan Edison Company, Docket No. R-00061366 and Pennsylvania Electric Company, Docket No. R-00061367, April 2006 and August 2006.

Expert report in the United States Tax Court, Docket No. 21309-05, 34th Street Partners, DH Petersburg Investment, LLC and Mid-Atlantic Finance, Partners Other than the Tax Matters Partner, Petitioner, v. Commissioner of Internal Revenue, Respondent, July 28, 2006.

Direct and supplemental testimony before the Federal Energy Regulatory Commission, Docket No. ER06-427-003, on behalf of Mystic Development, LLC on the Cost of Capital for Mystic 8 and 9 Generating Plants Operating Under Reliability Must Run Contract, August 2006 and September 2006.

Direct testimony before the Federal Energy Regulatory Commission, Docket No. ER07-46-000, on behalf of Northwestern Corporation on the Cost of Capital for Transmission Assets, October 2006.

Direct and rebuttal testimony before the Tennessee Regulatory Authority, Case No. 06-00290, on behalf of Tennessee American Water Company, on the Cost of Capital, November, 2006 and April 2007.

Direct and rebuttal testimony before the Public Service Commission of Wisconsin, Docket No. 5-UR-103, on behalf of Wisconsin Energy Corporation, on the Cost of Capital for Wisconsin Electric Power Company and Wisconsin Gas LLC, May 2007 and October 2007.

Rebuttal testimony before the California Public Utilities Commission, Docket No. A. 07-01-036-39, on behalf of California-American Water Company, on the Cost of Capital, May 2007.

Direct testimony before the Public Utilities Commission of the State of South Dakota, Docket No. NG-07-013, on behalf of NorthWestern Corporation, on the Cost of Capital for NorthWestern Energy Company's natural gas operations in South Dakota, June 2007.

Direct, supplemental and rebuttal testimony before the Public Utilities Commission of Ohio, Case No. 07-551-EL-AIR, Case No. 07-552-EL-ATA, Case No. 07-553-EL-AAM, and Case No. 07-554-EL-UNC, on behalf of Ohio Edison Company, The Toledo Edison Company, and The Cleveland Electric Illuminating Company, on the cost of capital for the FirstEnergy Company's Ohio electric distribution utilities, June 2007, January 2008 and February 2008.

Direct testimony before the Public Service Commission of West Virginia, Case No. 07-0998-W-42T, on behalf of West Virginia American Water Company on cost of capital, July 2007.

Direct and rebuttal testimony before the State Corporation Commission of Virginia, Case No. PUE-2007-00066, on behalf of Virginia Electric and Power Company on the cost of capital for its southwest Virginia coal plant, July 2007 and December 2007.

Direct and Supplemental testimony before the Public Utilities Commission of Ohio, Case No. 07-829-GA-AIR, Case No. 07-830-GA-ALT, and Case No. 07-831-GA-AAM, on behalf of Dominion East Ohio Company, on the rate of return for Dominion East Ohio's natural gas distribution operations, September 2007 and June 2008.

Direct testimony before the Federal Energy Regulatory Commission, Docket No. ER08-92-000 to Docket No. ER08-92-003, on behalf of Virginia Electric and Power Company, on the Cost of Capital for Transmission Assets, October 2007.

Direct and rebuttal testimony before the California Public Utilities Commission, Docket No. A. 07-01-022, on behalf of California-American Water Company, on the Effect of a Water Revenue Adjustment Mechanism on the Cost of Capital, October 2007 and November 2007.

Written direct and reply evidence before the National Energy Board in the matter of the National Energy Board Act, R.S.C. 1985, c. N−7, as amended, and the Regulations made thereunder; and in the matter of an application by Trans Québec & Maritimes PipeLines Inc. for orders pursuant to Part I and Part IV of the *National Energy Board Act*, for determining the overall fair return on capital for tolls charged by TQM, December 2007 and September 2008.

Comments in support of The Interstate Natural Gas Association of America's Additional Initial Comments on the FERC's Proposed Policy Statement with regard to the Composition of Proxy Companies for Determining Gas and Oil Pipeline Return on Equity, Docket No. PL07-2-000, December, 2007.

Direct and rebuttal testimony on the Cost of Capital before the Tennessee Regulatory Authority, Case No. 08-00039, on behalf of Tennessee American Water Company, March and August 2008.

Post-Technical Conference Affidavit on behalf of The Interstate Natural Gas Association of America in response to the Reply Comments of the State of Alaska with regard the FERC's Proposed Policy Statement on to the Composition of Proxy Companies for Determining Gas and Oil Pipeline Return on Equity, Docket No. PL07-2-000, March, 2008

Direct and rebuttal testimony before the California Public Utilities Commission, Docket No. A.08-05-003, on behalf of California-American Water Company, concerning Cost of Capital, May 2008 and August 2008.

Rebuttal testimony on the financial risk of Purchased Power Agreements, before the Public

Utilities Commission of the State of Colorado, Docket No. 07A-447E, in the matter of the application of Public Service Company of Colorado for approval of its 2007 Colorado Resource Plan, June 2008.

Direct testimony before the Federal Energy Regulatory Commission, Docket No. RP08-426-000, on behalf of El Paso Natural Gas Company, on the Cost of Capital for Natural Gas Transmission Assets, June 2008.

Direct testimony before the Federal Energy Regulatory Commission, Docket No. ER08-1207-000, on behalf of Virginia Electric and Power Company, on the incentive Cost of Capital for investment in New Electric Transmission Assets, June 2008

Direct testimony before the Federal Energy Regulatory Commission, Docket No. ER08-1233-000, on behalf of Public Service Electric and Gas Company, on the Cost of Capital for Electric Transmission Assets, July 2008.

Direct and rebuttal testimony before the Public Service Commission of West Virginia, Case No. 08-0900-W-42t, on behalf of West Virginia-American Water Company concerning the Cost of Capital for Water Utility assets, July 2008 and November 2008.

Direct and rebuttal testimony before the Public Utilities Commission of Ohio, Case No. 08-935-EL-SSO, on behalf of Ohio Edison Company, The Toledo Edison Company, and The Cleveland Electric Illuminating Company, with regard to the test to determine Significantly Excessive Earnings within the context of Senate Bill No. 221, September 2008 and October 2008.

Direct testimony before the Federal Energy Regulatory Commission, Docket No. ER09-249-000, on behalf of Public Service Electric and Gas Company, on the incentive Cost of Capital for Mid-Atlantic Power Pathway Electric Transmission Assets, November 2008.

Direct testimony before the Public Service Commission of West Virginia, Case No. 08-1783-G-PC, on behalf of Dominion Hope Gas Company concerning the Cost of Capital for Gas Local Distribution Company assets, November 2008.

Direct Testimony before the Alberta Utilities Commission in the matter of the Alberta Utilities Commission Act, S.A. 2007, c. A-37.2, as amended, and the regulations made thereunder; and IN THE MATTER OF the Gas Utilities Act, R.S.A. 2000, c. G-5, as amended, and the regulations made thereunder; and IN THE MATTER OF the Public Utilities Act, R.S.A. 2000, c. P-45, as amended, and the regulations made thereunder; and IN THE MATTER OF Alberta Utilities Commission 2009 Generic Cost of Capital Hearing, Application No. 1578571/Proceeding No. 85. 2009 Generic Cost of Capital Proceeding for AltaGas Utilities Inc., November 2008.

Direct testimony before the Federal Energy Regulatory Commission, Docket No. ER09-548-000, on behalf of ITC Great Plains, LLC, on the Cost of Capital for Electric Transmission Assets, January 2009.

Direct testimony before the Federal Energy Regulatory Commission, Docket No. ER09-681-000, on behalf of Green Power Express, LLP, on the Cost of Capital for Electric Transmission Assets, February 2009.

Appendix B: SAMPLE SELECTION

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I. THE CANADIAN UTILITIES SAMPLE 1
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Appendix B: SAMPLE SELECTION

Q1. What is the purpose of this appendix?

A1. This appendix describes the sample selection procedure for forming the proxy groups and discusses their inter-relationships and limitations. The ideal sample would be a sample of Canadian regulated natural gas distribution companies, but such a sample does not exist so I must rely upon other samples. Specifically, I examine the cost of capital for two samples: Canadian utilities and U.S. gas local distribution companies ("gas LDCs"). Each sample is discussed below.

I. THE CANADIAN UTILITIES SAMPLE

Q2. How do you select the Canadian utilities sample?

A2. The goal of the selection process for this sample is to create a sample of companies whose primary business is as a regulated utility in Canada with business risk generally similar to that of Gaz Métro.

To construct this sample, I started with the universe of Canadian companies classified as being in the utilities or energy industry group and categorized as either Electric, Gas, or Pipelines by FPInfomart.[1] I further restricted the sample to those companies that were listed in the FP500 Sales category which eliminated a number of smaller companies. As a result, I had an initial sample of 29 companies. From this sample, I also eliminated companies without a Bloomberg ticker. This criterion provided a sample of fifteen companies. I then applied additional selection criteria designed to narrow the sample to companies with characteristics similar to those of Gaz Métro. I also eliminated companies with unique circumstances which may bias the cost of capital estimates.

Q3. What are the additional selection criteria you applied?

[1] The information was extracted in February 2009 from www.fpinformart.ca.

A3. I eliminated all companies not traded on the Toronto Stock Exchange and companies with a high probability of financial distress.[2] Financial distress is measured by a bond rating of less than BBB-, which is the lowest investment grade credit rating.[3]

Finally, I eliminated companies whose total revenues in 2008 were less than $300 million in order to avoid cost of capital estimation problems associated with small companies such as thin trading and size effects. Table No. MJV-2 reports whether a company's assets are primarily regulated, mostly regulated, or not regulated.[4]

Q4. Why would you normally eliminate companies currently involved in a relatively large merger or acquisition from your sample?

A4. The stock prices of companies involved in mergers are often more affected by news relating to the merger than to movements in the stock market. In other words, the stock price begins to "decouple" from its normal relationship to the stock market (the economy) which is the basis upon which a company's cost of capital is calculated. Instead the stock price of a merger candidate is more affected by the latest speculation on the terms and probability of the merger. Merger activity by many of the remaining Canadian companies (though not necessarily large in relative terms) is another reason why I feel other sample groups should be considered as a cross-check on the Canadian sample results.

Q5. What companies were eliminated because they do not trade on the Toronto Stock Exchange or due to lack of data?

A5. I eliminated Petro Canada, TransCanada Pipelines Limited, British Columbia Hydro and Power Authority, Hydro One Inc., Hydro Quebec, New Brunswick Power Holding Corporation, Newfoundland and Labrador Hydro, Northwest Territories Power

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[2] Usually, I would also eliminate companies that had dividend cuts during the relevant period. In this case, there are two companies eliminated for this reason.

[3] Credit ratings and associated yields were obtained from Bloomberg on March 10, 2009.

[4] I estimate the approximate percentage of each company's assets that are devoted to regulated activities and classify companies for which more than 80 percent of assets are regulated to be Regulated while companies with 50 to 79 percent regulated assets are Mostly Regulated, and companies that have less than 50 percent regulated assets are classified as Non-Regulated.

Corporation, Nova Scotia Power Incorporated, Ontario Power Generation Inc., Saskatchewan Power Corporation, The Manitoba Hydro Electric Board, Gaz Métro Inc., and Union Gas Limited for these reasons.

Q6. Were companies eliminated from the Canadian utilities sample due to the magnitude of their annual revenues?

A6. Yes, Boralex Inc. and Pacific Northern Gas LTD both had 2008 revenues significantly below $300 million.

Q7. Were any other companies eliminated from the Canadian utilities sample?

A7. Yes. To avoid double counting ATCO LTD was dropped because it belongs to the same group as Canadian Utilities Limited Company, which is already included in the sample. TransAlta, Husky Energy, Imperial Oil, and Suncor Energy were eliminated because they are non-regulated entities. Lastly, I did not consider income funds for my sample which eliminates Fort Chicago Energy Partners, Gaz Métro and EPCOR Power LP from the sample. Not only is the procedure for reliably estimating their cost of capital complex at best, the tumultuous path they have experienced since the Federal government's announcement to alter their tax status in October 2006 makes them unsuitable candidates.

Q8. What companies constitute the Canadian utilities sample?

A8. The final sample is comprised of the following five companies: Canadian Utilities Ltd., Emera Inc., Enbridge Inc., TransCanada Corp., and Fortis Inc.

Q9. Do you have any remaining concerns with the final sample?

A9. These remaining companies have other issues which raise concerns. For example, several companies have substantial non-regulated activities and assets. In addition, several companies have recently engaged in acquisition activities. For example, Fortis acquired Terasen Gas in May 2007 for $3.1 billion which almost doubled its assets in 2007.[5] Similarly, TransCanada acquired ANR Pipeline in February 2007 and thereby

[5] Fortis Inc. Press Release, May 17, 2007.

added a substantial amount to its pipeline assets.[6] It is my opinion that the Canadian utilities sample is not sufficiently concentrated in natural gas distribution activities to provide a completely reliable estimate of the cost of capital for Gaz Métro, which is a fully regulated gas distribution company. Therefore, I also rely on a sample of U.S. gas LDCs to provide a more reliable estimate of Gaz Métro's cost of capital and its fair return on equity. In its recent RH-1-2008 Decision, the National Energy Board found that U.S. companies "have the potential to act as a useful proxy for the investment opportunities available in the global market place."[7]

II. THE GAS LDC SAMPLE

Q10. How do you select the gas LDC sample?

A10. To select this sample, I started with the universe of publicly traded natural gas distribution utilities covered by *Value Line Investment Survey Plus*. This resulted in an initial group of 24 companies, to which I added Vectren Corporation because it is often viewed as a natural gas LDC. Vectren is involved in both gas and electric distribution activities, but more of its regulated assets are invested in the gas distribution operations.[8] This company is also covered by *Value Line*, but is classified as an Electric Utility due to its regulated electric operations. I then eliminated companies by applying additional selection criteria designed to remove companies with unique circumstances which may bias the cost of capital estimates. The final sample consists of twelve natural gas LDCs, from which I also consider a sub-sample of eight companies with the fewest reliability concerns. Table No. MJV-13 reports the classification of the gas LDCs in my gas LDC sample.

Q11. What are the other selection criteria you applied?

[6] TransCanada Press Release, February 22, 2007.

[7] National Energy Board, Reasons for Decision, Trans Québec & Maritimes Pipelines Inc., RH-1-2008, March 2007, p. 67

[8] Vectren Utility Holdings, Inc.'s 2008 10K reveals that about 57 percent of its assets are regulated natural gas distribution assets. The remaining assets are primarily regulated electric assets. Because it has a substantial amount of regulated electric activity, I exclude it from the sub-sample of companies I consider to be the most representative of the natural gas distribution line of business and to be most free of characteristics that may bias cost of equity estimates.

A11. I applied my standard criteria to narrow the sample to those companies likely to have reliable cost of equity estimates. Specifically, I eliminated all companies whose S&P bond rating as reported by Bloomberg was not investment grade, i.e., less than BBB-. To guard against measurement bias caused by "thin trading," I also restricted the sample to companies with total operating revenues greater than $300 million (USD) in 2008 as reported by Bloomberg.[9] Companies with a large merger during the period January 2005 to March 2009 (i.e. the past four or so years) were also generally removed from the sample. The screen for merger activity was primarily done by scanning each company's news history on Bloomberg.[10]

Q12. Please describe why some companies were eliminated.

A12. Eleven companies were eliminated because of a lack of a bond rating or a below investment-grade bond rating. Many of these companies also had revenue below $300 million or lacked data. Williams Partners LP was excluded because most of its revenue and assets are devoted to natural gas liquids and Canadian Utilities Limited Company was eliminated because it is included in the Canadian utilities sample.

Q13. Are there any issues with the remaining companies in your sample?

A13. There are four companies in the sample that are not "pure play" gas LDC. Those are Atmos, New Jersey Resources Corp, NiSource, and Vectren. For example, Atmos has significant involvement in natural gas intrastate pipelines and intrastate storage segments. Also, large portion of its income comes from the natural gas marketing activities. New Jersey Resources Corp has had significant income from wholesale energy and gas marketing services in some of the recent years. NiSource has a diversified business with large intrastate transportation and storage segments as well as large electric generation segment. Finally, Vectren has non-trivial involvement in electricity distribution business. Due to these concerns, I also report the results for a sub-sample of the gas LDC sample that consists of companies which can be classified as "pure play" gas LDC.

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[9] Data was extracted from Bloomberg as of February 24, 2009

[10] This was done in February 24, 2009

Appendix C: RISK POSITIONING APPROACH METHODOLOGY: DETAILED PRINCIPLES AND RESULTS

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Appendix C: RISK POSITIONING APPROACH METHODOLOGY: DETAILED PRINCIPLES AND RESULTS

Q1. What is the purpose of this appendix?

A1. This appendix describes the estimation of the parameters used in the equity risk premium models and the details of the cost of capital estimates obtained from this methodology.

I. RISK-FREE INTEREST RATE FORECAST

Q2. How do you obtain the forecasts of the risk-free interest rate?

A2. I start with the interest rate forecasts from Consensus Economics Inc., a London-based forecast survey firm which provides forecasts of interest rates, inflation rates and other economic indicators for many countries worldwide. In particular, I use the March 9, 2009 *Consensus Forecasts* which forecasts a 3.1 percent yield for the 10-year Canadian Government bonds for the year ending March 2010.[1]

I add a maturity premium of 0.2 percent to the 10-year bond yield forecast to adjust the forecast to the average maturity of the long-term bond yields used to estimate the long-term MRP. The bond maturity premium represents the extra return investors demand for tying up their money for longer periods. The addition of the maturity premium is necessary for consistency so that the average bond maturities in the data used to estimate the long-term market risk premium correspond to the maturity of the benchmark for the long-term risk free rate.[2] The addition of the maturity premium provides a yield forecast for Canadian bonds with 15 to 18 years of maturity.

The spread between utility bond yields and government bond yields currently is unusually high, and utilities, like other private companies, cannot access capital at the same rate as the

[1] See *Consensus Forecasts*, Survey Date, March 9, 2009 published by Consensus Economics, Inc.

[2] The 0.2 percent addition is a conservative estimate of the premium that investors require to hold bonds with a maturity of 15-18 years instead of bonds with a maturity of 10 years. The estimate is derived from a yield curve constructed from the historical average maturity premiums of Canadian Government bonds from 1951 through 2008 for bonds with five different average maturities (See Workpaper #3 to Table No. MJV-9)

government. I, therefore, adjust the risk-free rate for the increase in the observed spread. As shown in Table 1 in my written evidence, the increase in yield spread is 1.50 to 1.85 percent for 10-year bonds and 1.60 to 1.98 percent for 30-year bonds.[3] The tables and workpapers attached to my written evidence are based upon adding a yield spread adjustment of 1 percent to the 3.1 percent forecasted 10-year government bond yield for a total of 4.30 percent including the maturity premium. However, I also report the results for yield spread adjustments of ¾ percent and 1¼ percent.

II. MARKET RISK PREMIUM ESTIMATION

Q3. How do you estimate the MRP?

A3. There is presently little consensus on "best practice" for estimating the MRP (which is not the same thing as saying that all practices are equally good). For example, the latest edition of the leading U.S. graduate textbook in corporate finance, after recommending use of the arithmetic average realized excess return on the market for many years (which for a while was noticeably over 9 percent in the U.S.), reviews the current state of the research and expresses the view that a range between 5.0 to 8.0 percent (short-term MRP) is reasonable for the U.S.[4,5]

A prominent text in corporate finance in Canada calculates the average arithmetic market risk premium in Canada to be 6.98 percent over the period 1948-2006[6] but only 4.53 percent for the period 1957 to 2006.[7] The authors use a figure of 4.53 percent in their examples.

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[3] Workpaper #2 to Table No. MJV-9, Panel B.

[4] Richard A. Brealey, Stewart C. Myers and Franklin Allen, *Principles of Corporate Finance,* McGraw-Hill, 9th edition, 2008, pp. 173-180.

[5] In past editions, the authors expressed the view that they are "most comfortable" with values toward the upper end of that range, but this language does not appear in the 9th edition.

[6] Stephen A. Ross, Randolph W. Westerfield, Jeffrey F. Jaffe, and Gordon S. Roberts, *Corporate Finance*, 5th Canadian ed, McGraw-Hill Ryerson (2008), p. 280.

[7] *Ibid*, p. 276.

My written evidence considers both the historical evidence and the results of scholarly studies of the factors that affect the risk premium for average-risk stocks in order to estimate the benchmark risk premium investors currently expect. I consider the historical differences between the S&P/TSX Composite Index[8] ("S&P/TSX") and the risk-free rate for the Canadian market risk premium, historical differences between the Standard & Poor's 500 ("S&P 500") and the risk-free rate for the U.S. market risk premium, and the relationship between the market returns in Canada and in the U.S. Finally, I reviewed Ibbotson Associates discussion on the "International Cost of Capital" in the *SBBI: Valuation Edition 2008 Yearbook*.[9] The international cost of equity models reviewed in Ibbotson result in estimates of the Canadian MRP that are greater than the MRP in the U.S. rather than less as is the result based upon historical realized returns.

Q4. Please summarize the literature on the MRP and the conclusions you draw from it?

A4. Research based upon U.S. data challenges the conventional wisdom of using arithmetic average historical excess returns to estimate the MRP. However, after reviewing the issues in the debate, I remain skeptical for several reasons that the market risk premium has declined substantially in the U.S. or in Canada.

First, despite eye-catching claims like "equity risk premium as low as three percent,"[10] and "the death of the risk premium,"[11] not all recent research arrives at the same conclusion. In his presidential address to the American Finance Association in 2001, Professor Constantinides seeks to estimate the unconditional equity premium based on

[8] Prior to May 1, 2002 the key index on the Toronto Stock Exchange was the TSE 300 composite index ("TSE 300") which was always composed of 300 companies. The index was replaced by the S&P/TSX composite index on May 1, 2002. The number of companies in the latter index is not fixed but consists of those companies that meet Standard & Poor's criteria for inclusion.

[9] See Morningstar *Ibbotson SBBI Valuation Edition 2008 Yearbook*, pp. 175-184.

[10] Claus, J. and J. Thomas, (2001), "Equity Risk Premium as Low as Three Percent: Evidence from Analysts' Earnings Forecasts for Domestic and International Stocks," *Journal of Finance* 56:1629-1666.

[11] Arnott, R. and R. Ryan, (2001), "The Death of the Risk Premium," *Journal of Portfolio Management* 27(3):61-74.

average historical stock returns.[12] (Note that this address was based upon evidence just before the major fall in market value in that time period.) He adjusts the average returns downward by the change in price-earnings ratio because he assumes no change in valuations in an unconditional state. His estimates for 1926 to 2000 and 1951 to 2000 are 8.0 percent and 6.0 percent, respectively, over the 3-month T-bill rate. In another published study in 2001, Professors Harris and Marston use the DCF method to estimate the market risk premium for the U.S. stocks.[13] Using analysts' forecasts to proxy for investors' expectation, they conclude that over the period 1982-1998 the MRP over the long-term risk-free rate is 7.14 percent. As yet another example, the paper by Professors Ibbotson and Chen (2003) adopts a supply side approach to estimate the forward looking long-term sustainable equity returns and equity risk premium based upon economic fundamentals. Their equity risk premium over the long-term risk-free rate is estimated to be 3.97% in geometric terms and 5.90% on an arithmetic basis. They conclude their paper by stating that their estimate of the equity risk premium is "far closer to the historical premium than being zero or negative."[14] It is also noteworthy that the most recent edition of Morningstar /Ibbotson's annual yearbook updates this study with more recent data and estimate an MRP of 6.24 percent.[15]

Second, Professor Ivo Welch surveyed a large group of financial economists in 1998 and 1999. The average of the estimated MRP was 7.1 percent in Prof. Welch's first survey[16] and 6.7 percent in his second survey which was based on a smaller number of individuals. However, a more recent survey by Prof. Welch reported only a 5.5 percent

[12] Constantinides, G.M. (2002), "Rational Asset Prices," *Journal of Finance* 57:1567-1591.

[13] Harris, R. and F. Marston (2001), "The Market Risk Premium: Expectational Estimates Using Analysts' Forecasts," *Journal of Applied Finance* 11 (1) 6-16.

[14] Ibbotson, R. and P. Chen (2003), "Stock Market Returns in the Long Run: Participating in the Real Economy," *Financial Analyst Journal*, 59(1):88-98. Cited figures are on p. 97.

[15] Morningstar, *Ibbotson SBBI Valuation Edition, 2008 Yearbook*, p. 97.

[16] I. Welch (2000), "Views of Financial Economists on the Equity Premium and on Professional Controversies," *Journal of Business*, 73(4):501-537. The cited figures are in Table 2 p. 514.

MRP.[17] In characterizing these results Prof. Welch notes that "[T]he equity premium consensus forecast of finance and economics professors seems to have dropped during the last 2 to 3 years, a period with low realized equity premia."[18] More recently, Professor Welch found that a sample of about 400 finance professors estimated the geometric MRP at about 5%[19] for an arithmetic MRP of about 7% (the arithmetic mean is approximated by the geometric mean plus one half of the variance of the returns).[20] In other words, Professor Welch's more recent study shows that finance professors view of the market risk premium as of year-end 2007 is back up to the level it was at in 1998.

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.

Third, some of the evidence for negative or close to zero market risk premium simply does not make sense. Despite relatively high valuation levels at the time of the studies, stock returns remained much more volatile than Treasury bond returns. The volatility of stock market returns has skyrocketed during the financial crisis.[21] I am not aware of any empirical or theoretical evidence showing that investors would rationally hold equities and not expect to earn a positive risk premium for bearing the risk.

Fourth, the recent financial crisis has made it clear that there is no convincing theory that the expected MRP has substantially declined. Many at the height of the stock market

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[17] I. Welch (2001), "The Equity Premium Consensus Forecast Revisited," School of Management at Yale University working paper. The cited figure is in Table 2.

[18] *Ibid*., p. 8.

[19] I. Welch (2008), "The Consensus Estimate For The Equity Premium by Academic Financial Economists in December 2007: An Update to Welch (2000)," Working paper, SSRN.

[20] See, Morningstar, *Ibbotson SBBI Valuation Edition, 2008 Yearbook*, p. 97. The historical variance on the return on the U.S. market has been 19.97%, so that the arithmetic market risk premium equals the geometric market risk premium of 5% plus approximately 1.99% for a premium of approximately 7%.

[21] See, for example, Figure 3 in my written evidence.

bubble in the U.S. and Canada claimed that the only way to justify the high stock prices would be if the MRP had declined dramatically.[22] However, this argument has been heard less frequently in recent years and now that the market has declined substantially and is in turmoil, there should not be any question that the MRP currently is very high.

Another common argument for a lower expected MRP than indicated by the past realized MRP has been that the U.S. (and Canada) experienced very remarkable growth in the 20th century that was not anticipated at the start of the century. As a result, the average realized excess return is greater than expected by investors at the time which means that relying on historical realized market returns, the standard method of estimating the MRP, would be biased upward. However, a study by Professors Jorion and Goetzmann[23] finds, under some simplifying assumptions, that the so-called "survivorship bias" is only 29 basis points[24] and in a more recent working paper, Dimson, Marsh, and Staunton find a survivorship bias of only 0.1 percent.[25] Furthermore, "[I]f investors have overestimated the equity premium over the second half of the last century, Constantinides (2002) argues that 'we now have a bigger puzzle on our hands' Why have investors systematically biased their estimates over such a long horizon?"[26]

There are also a number of papers that argue that the MRP is variable and depends on a broad set of economic circumstances. For example, Mayfield (2004) estimates the MRP in a model that explicitly accounts for investment opportunities. He models the process that governs market volatility and finds that the MRP varies with investment

[22] See Robert D. Arnott and Peter L. Bernstein (2002), "What Risk Premium is 'Normal'?" *Financial Analysts Journal* 58:64-85, for an example.

[23] Jorion, P., and W. Goetzmann (1999), "Global Stock Markets in the Twentieth Century," *Journal of Finance* 54:953-980.

[24] Dimson, Marsh, and Staunton (2003), "Global Evidence on the Equity Risk Premium," Journal of Applied Corporate Finance, 15, pp. 27-38 make a similar point when they comment on the equity risk premia for 16 countries based on returns between 1900 and 2001: "While the United States and the United Kingdom have indeed performed well, compared to other markets there is no indication that they are hugely out of line." p.4.

[25] Dimson, E., P. Marsh, and M. Staunton (2006), "The Worldwide Equity Premium: A Smaller Puzzle," Working Paper, London Business School, April 2006, p. 22.

[26] Mehra, R., and E.C. Prescott (2003), "The Equity Premium in Retrospect," in *Handbook of the Economics of Finance*, Edited by G.M. Constantinides, M. Harris and R. Stulz, Elsevier B.V, p. 926

opportunities which are linked to market volatility. Thus, the MRP varies with investment opportunities and about half of the measured MRP is related to the risk of future changes in investment opportunities. Based on this approach Mayfield estimates the U.S. MRP to be 5.6 percent measured since 1940.[27] However, the problem with such an approach is determining when the MRP has changed and by how much.[28]

To sum up the above, I cite two passages from Profs. Mehra and Prescott's review of the theoretical literature on the equity premium puzzle:[29]

> Even if the conditional equity premium given current market conditions is small, and there appears to be general consensus that it is, this in itself does not imply that it was obvious either that the historical premium was too high or that the equity premium has diminished.
>
> In the absence of this [knowledge of the future], and based on what we currently know, we can make the following claim: over the long horizon the equity premium is likely to be similar to what it has been in the past and the returns to investment in equity will continue to substantially dominate that in T-bills for investors with a long planning horizon.

Q5. Is there other scholarly discussion on the value of the MRP?

A5. Yes. Another line of research was pursued by Steven N. Kaplan and Richard S. Ruback. They estimate the market risk premium in their article, "The Valuation of Cash Flow Forecasts: An Empirical Analysis."[30] Professors Kaplan and Ruback compare published cash flow forecasts for management buyouts and leveraged recapitalization over the 1983 to 1989 period against the actual market values that resulted from these transactions. One of their results is an estimate of the market risk premium over the long-term Treasury bond yield that is based on careful analysis of actual major investment decisions, not realized market returns. Their median estimate is 7.78 percent and their mean estimate is

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[27] E. S. Mayfield (2004), "Estimating the market risk premium," *Journal of Financial Economics* 73, pp. 465-496.

[28] See Figure 3 in my written evidence.

[29] Mehra, R., and E.C. Prescott, *op cit.*, p. 926.

[30] *Journal of Finance*, 50, September 1995, pp. 1059-1093.

7.97 percent.[31] This is considerably higher than my pre-crisis estimate of 6.5 percent for the U.S. Even if the maturity premium of Treasury bonds over Treasury bills were only 1 percent, well below the best estimate of 1.5 percent, the resulting estimate of the market risk premium over Treasury bills is higher than my estimate of 8.0 percent for the U.S. Because the capital markets in the U.S. and Canada are becoming increasingly integrated, the MRP in Canada will be affected by the investment opportunities in the U.S. and the rest of the world. For example, in a recent study of Canadian utilities Standard & Poor's noted that "[b]oth utilities and power income funds are focused on opportunities south of the Canada-U.S. border."[32]

Q6. Please review the evidence on the historical market risk premium in Canada?

A6. I consider evidence on two different measures of the historical MRP. The first is for use with the short-term risk free rate and the other is based on the constant maturity yields of long-term government bonds. The short-term measure is the average return on the market minus the average annual total return on 3-month Treasury bills. The second measure subtracts the average annual total return on long-term government bonds. The short-term data is updated through 2007 using CANSIM and the long-term data is from the Report on Canadian Economic Statistics 1924-2007. (See Workpaper #2 to Table No. MJV-9).

From 1936 to 2007, the full period for which short-term Government bond total returns are reported, the data show that the average premium of stocks over three-month Government bills is 6.6 percent. I also examine the "post-War" period. The risk premium for 1948-2007 is also 6.6 percent. (I exclude 1946 and 1947 because their economic statistics appear to be heavily influenced by the War years. They are not really "post-War" years, from an economic viewpoint.) The average risk premium is even higher at 7.1 percent if the full period of data, 1934-2007, for the short-term rate is

[31] *Ibid*, p. 1082.

[32] Standard & Poor's Ratings Direct, "Industry Report Card: Top Seven Canadian Utilities Reflect Ongoing Sector Stability," October 27, 2006.

used.[33] Subtracting the average maturity premium of about one percent for long-term bond yields over Treasury bill yields gives an estimate of 5.5 to 6.0 percent for the MRP over long-term bonds.[34] The average premium over the total return on long-term Government bonds is 5.3% for the period 1924 to 2007, the longest period for the available data.[35,36] The average premium is 5.0 percent for the 1936 to 2007 period and 5.5 percent for the post-war period, 1948 to 2007.

Q7. Do you have any additional comments on your choice of the MRP?

A7. Yes. All of the debate discussed above has taken place before the current financial turmoil, ensuing economic downturn, and highly uncertain timing of recovery. As discussed at length in my written evidence, the recent events in the financial markets cast serious doubt on the claim that the MRP may have declined. Moreover, as discussed therein, there are strong reasons to expect that the current level of the MRP may in fact be significantly higher than what has been reported traditionally and higher than the base level MRP that I use in my written evidence.

Q8. Have any of the prior academic studies shed any light on why the MRP would be higher under current circumstances?

A8. Yes. First and foremost, the standard consumption-based asset pricing theory suggests that, all else equal, higher risk aversion implies higher MRP.[37] To the extent that there has been an adverse shock to the risk aversion of investors, the MRP is likely to have increased.

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33 Historical data on Government bond yields are not available until 1936 although information on 3-month Treasury bills is available in 1934. Total return on long-term Government bonds extends from 1924.

34 Recall that the maturity premium is the difference in yield for bonds of longer maturity over those with shorter maturity.

35 The Canadian Government bonds used to estimate the long-term market risk premium represents bonds having an average maturity of 18 years.

36 The long-term Government bond data is from the Report on Canadian Economic Statistics 1924-2006. The updated version of the report is not available at the time of filing.

37 Constantinides, G. M., "Understanding the equity risk premium puzzle". In R. Mehra, ed., *Handbook of the Equity Risk Premium*, 2008, Elsevier, Amsterdam.

Second, the academic literature contains studies of the impact of recessions on investors' attitude towards risk. These studies find that the risk aversion and hence the risk premium required to hold equity rather than debt increases in economic downturns. Several articles suggest that the market risk premium is higher during times of recession. Constantinides (2008) studies a classical utility model where consumers are risk averse and also summarizes some of the empirical literature. Constantinides draws from empirical evidence that shows that consumers become risk averse in times of economic recession or downturn, and equity investments accentuate this risk.[38] (Increased risk aversion leads to a higher expected return for investors before they will invest.) Specifically, equities are pro-cyclical and decline in value when the probability of a job loss increases; thus, they fail to hedge against income shocks that are more likely to occur during recessions.[39] Consequently, investors require an added risk premium to hold equities during economic downturns:

> In economic recessions, investors are exposed to the double hazard of stock market losses and job loss. Investment in equities not only fails to hedge the risk of job loss but also accentuates its implications. Investors require a hefty equity premium in order to be induced to hold equities. This is the argument that I formalize below and address the predictability of asset returns and their unconditional moments.[40]

And

> The first implication of the theory is an explanation of the counter-cyclical behavior of the equity risk premium: the risk premium is highest in a recession because the stock is a poor hedge against the uninsurable income shocks, such as job loss, that are more likely to arrive during a recession.
>
> The second implication is an explanation of the unconditional equity premium puzzle: even though per capita consumption growth is poorly correlated with stocks returns, investors require a hefty premium to hold

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[38] Constantinides, G. M., "Understanding the equity risk premium puzzle". In R. Mehra, ed., *Handbook of the Equity Risk Premium*, 2008, Elsevier, Amsterdam.

[39] Constantinides, G.M., and D. Duffie (1996), "Asset Pricing with Heterogeneous Consumers", *Journal of Political Economy*, Vol. 104 (2): 219-240.

[40] G.M. Constantinides (2008), "Understanding the equity risk premium puzzle." In R. Mehra, ed., *Handbook of the Equity Risk Premium*. Elsevier, Amsterdam.

> stocks over short-term bonds because stocks perform poorly in recessions, when the investor is most likely to be laid off.[41]

Empirically, several authors have found that market volatility and the market risk premium are positively related. For example, Kim, Morley and Nelson (2004)[42] find that

> When the effects of volatility feedback are fully taken into account, the empirical evidence supports a significant positive relationship between stock market volatility and the equity premium.[43]

Additionally, in their article that won the annual Smith-Breeden Paper Award given by the American Finance Association and the *Journal of Finance*, Bansal and Yaron (2004) demonstrate that economic uncertainty plays an important role in explaining the MRP.[44] In particular, they show that uncertainty is priced in the market. In their model, higher uncertainty (measured in their paper by volatility of consumption) leads to higher conditional MRP. Another implication of the analysis in Bansal and Yaron (2004) is that even the unconditional MRP can increase if any of the following materialize: (i) investors become more risk-averse; (ii) shocks to economic uncertainty become more pronounced; (iii) periods of high economic uncertainty become longer lasting. To the extent that risk aversion has experienced an adverse shock, the MRP must have increased. Furthermore, perception of more severe shocks to economic uncertainty and slower decay of higher uncertainty periods are likely to cause the MRP to remain higher even in the absence of any shock to the risk aversion parameter.

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[41] *Ibid*, p. 353.

[42] C-J. Kim, J.C. Morley and C.R. Nelson (2004), "Is There a Positive Relationship Between Stock Market Volatility and the Equity Premium," *Journal of Money, Credit and Banking*, Vol. 36.

[43] *Ibid*. p. 357. The authors rely on a statistical (Markov-switching) model of the ARCH type and data for the period 1926 to 2000 for their analysis.

[44] Bansal, R., and A. Yaron (2004), "Risks for the Long Run: A Potential Resolution of Asset Pricing Puzzles", *Journal of Finance*, Vol. 59 (4): 1481-1509.

Gabaix (2009) provides an alternative channel for interrelating time-varying risk premium in his newly circulated working paper.[45] The argument is that the MRP is linked to the fear of rare but large "disasters". The time-varying nature of the severity of those disasters leads to time-varying risk premium. To the extent we are experiencing economic downturn of a magnitude not seen since the times of the Great Depression, I find the argument presented in the above mentioned paper to be supportive of the idea that currently the MRP is higher than its normal level.

Furthermore, the facts that financial markets are in turmoil and stock market volatility has increased dramatically mean that equity investors face increased uncertainty. Increased uncertainty leads them to seek lower risk investments or to demand a higher expected rate of return before they are willing to invest their money. In part, this is an explanation of why market prices have fallen. The financial market distress means that the current MRP is *higher* than it would otherwise be. Dimson, Marsh, and Staunton (2008) appear to agree as they note

> Although credit spreads widened, credit fundamentals as measured by low default rates remained at historically strong levels. This may indicate higher defaults to come, an increase in risk aversion, a bigger premium for liquidity, or all three.[46]

As shown in Figure 3 in my written evidence, the volatility in both the Canadian and U.S. stock markets spiked to 3 to 4 times the normal level of about 18 and 20 percent, respectively in September-October and remains at more than twice its normal level.

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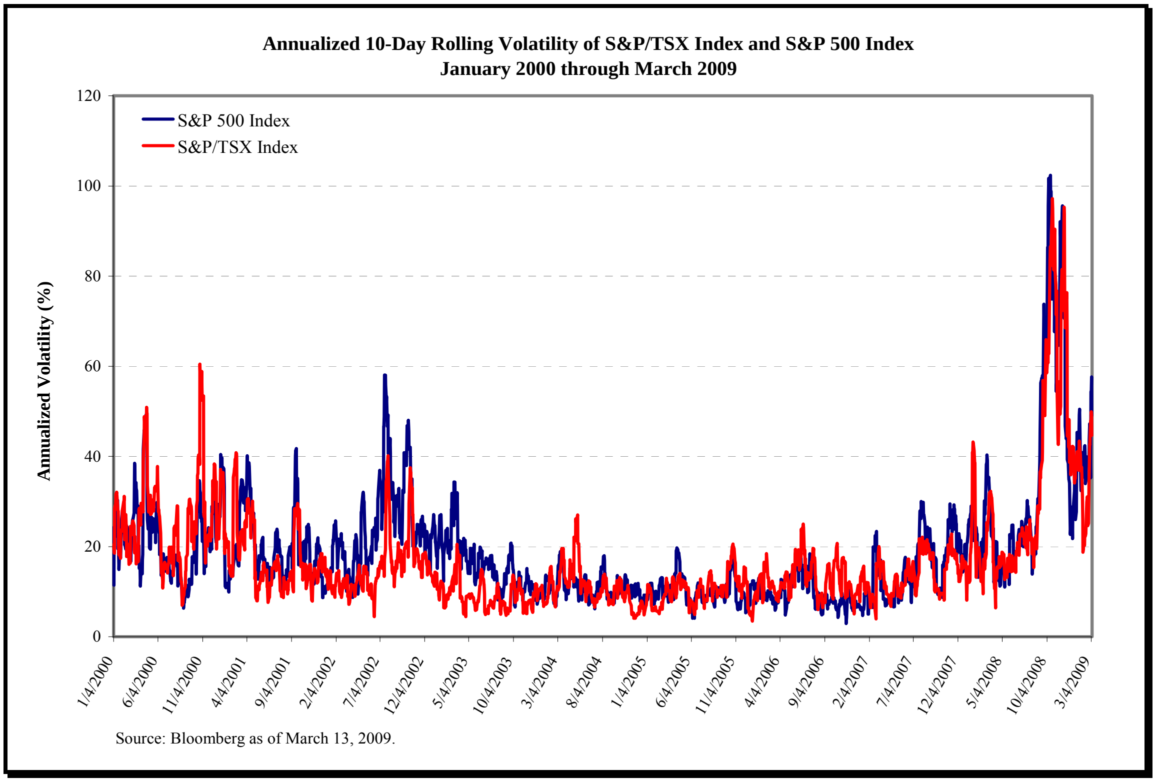
[45] Gabaix, X. (2009), "Variable Rare Disasters: An Exactly Solved Framework for Ten Puzzles in Macro Finance", *Working Paper*, *New York University Stern School of Business* and *NBER*.

[46] Elroy Dimson, Paul Marsh, and Mike Staunton, 2008, *Global Investment Returns Yearbook 2008*, p. 25.



As investors' risk aversion also increases during times of financial distress, there can be little doubt that the MRP is currently higher than in the recent past.

Q9. What is the "long-run realized risk premium" in the U.S.?

A9. From 1926 to 2007, the full period reported, Morningstar / Ibbotson data show that the average premium of stocks over Treasury bills is 8.5 percent[47]. I also examine the "post-War" period. The risk premium for 1947-2007 is 8.3 percent. (I exclude 1946 because its economic statistics are heavily influenced by the War years; *e.g.*, the end of price controls yielded an inflation rate of 18 percent. It is not really a "post-War" year, from an economic viewpoint.) These averages often change slightly when another year of data is added to the Ibbotson series. However, as discussed above, there has been a great deal of academic research on the MRP done recently. This research has put practitioners in a dilemma: there is nothing close to a consensus about how the MRP should be estimated,

[47] Morningstar *Ibbotson SBBI Valuation Edition*, 2008 Yearbook, Appendix A.

but a general agreement in the academic community seems to be emerging that the old approach of using the average realized return over long periods gives too high an answer.

For the MRP over the long-term risk-free rate, the Morningstar / Ibbotson data show that the average maturity premium of government bond yields over one month Treasury bills is about 1.5 percent. This suggests that stocks of average risk have commanded a premium of about 7.0 percent over the long-term risk-free rate and a market risk premium of 8.5 percent over the short-term risk-free rate in the U.S.

Q10. How do you use these estimates of the U.S. MRP to help determine the appropriate Canadian MRP?

A10. The increasing integration of the Canadian capital markets with those in the U.S., which is generally considered to have a higher MRP than Canadian markets, is likely to result in a narrowing of the difference in MRP, resulting in a slight increase in the Canadian MRP. Any estimate of the MRP for Canada must therefore consider the size of the MRP in United States as an important factor affecting the MRP for Canada. Moreover, the widely expected benefits of diversification from investing internationally do not seem to be as great as once thought, certainly at least not during the current economic crisis which seems to be affecting nearly all countries universally.

Q11. Having discussed the choice of the risk-free rate and the MRP in Canada and the adjustments needed, have you considered the interaction of the long-term corporate bond yield and the MRP?

A11. Yes. The academic literature indicates that both the corporate bond yield and the return on equity are affected by the systematic risk in the market.[48] As a result, some of the increase in the spread between corporate and government bond yields increases represents an increase in the systematic risk premium for corporate debt. Please see pp. 21-26 of my written evidence for additional discussion of this issue.

[48] See, for example, Robert C. Merton, On the Pricing of Corporate Debt: The Risk Structure of Interest Rates, *The Journal of Finance*, 1974, pp. 449-470 and Edwin J. Elton, Martin J. Gruber, Deepak Agrawal and Christopher Mann, Explaining the Rate Spread on Corporate Bonds, *The Journal of Finance* LVI, 2001, pp. 247-278.

Q12. What is your conclusion regarding the MRP in Canada?

A12. Estimation of the MRP remains controversial. There is no consensus on its value or even how to estimate it. It is clear that market return information is volatile and difficult to interpret, but my judgment is that the best available evidence on the MRP in Canada prior to the current financial crisis is that it lies in the range of 5¼ to 6 percent relative to the long-term risk free rate. This is consistent with a study of the MRP for 16 countries using data from more than 100 years (1900 to 2001) by Profs. Dimson, Marsh, and Staunton who report a 5.5 percent arithmetic mean excess return for Canada, over both the long-term and short-term risk-free rate.[49] In a more recent paper by the same authors, they find a historical arithmetic equity premium of 5.9 percent over bills (5.7 percent relative to bonds) in Canada for the period 1900-2007.[50]

The realized historical risk premium varies, but the evidence from U.S. market data, scholarly articles and the models referenced in the Morningstar / Ibbotson Yearbook together lead to the conclusion that the MRP is likely to be at the upper end of the range so that 5.75 percent is a reasonable estimate of the risk premium over long-term bonds in Canada prior to the current financial crisis.

Q13. Do you rely on a 5.75 percent MRP in your analyses?

A13. No. At this time, an additional upward adjustment of at least 2 percent is warranted in recognition of the unsettled condition of the capital markets. The increase in the MRP is highly likely to greater than that. Additionally, I provide results using an increase of 1 percent and 3 percent in this proceeding to demonstrate the effect of different values of the MRP. Table 7 in the written evidence shows the sensitivity of the cost of equity implied by my ATWACC approach to additional changes in the level of the (long-term) MRP.

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[49] See Table 1 of Dimson, E., R. Marsh, and M. Staunton (2003), "Global Evidence on the Equity Risk Premium," *Journal of Applied Corporate Finance*, Volume 15, No. 4, pp. 27-38.

[50] E.R. Dimson, R. Marsh and M. Stauton (2008), "Global Investment Returns Yearbook 2008," ABN-AMRO p. 48.

III. COST OF CAPITAL ESTIMATES

Q14. How do you obtain the beta estimate for your sample companies?

A14. I obtain the beta estimates for my Canadian utilities sample from Bloomberg and the estimates for the gas LDC companies from *Value Line Investment Survey*. The details of the beta estimates are discussed in my written evidence *Section IV*.1.[51]

Q15. Now that the basic parameters for the risk positioning model have been collected, how do you estimate the cost of equity values for the sample companies?

A15. The procedures for two samples are the same, and for each sample the calculations are displayed in three tables. The first table, e.g., Table No. MJV-10 for the Canadian utilities sample, presents three cost of equity estimates corresponding to the three versions of the equity risk premium method based upon the long-term risk-free rate. The first estimate is the CAPM estimate and the next two rely upon values of α of one and two percent in the ECAPM. The corresponding table for the gas LDC sample is Table No. MJV-20.

Q16. How do you use the cost of equity results to estimate the companies' overall cost of capital?

A16. For the Canadian utilities sample, the second of the three tables implementing the risk positioning approach combine the cost of equity estimates from the first table with the sample's average market-value capital structure, cost of debt and preferred and Gaz Métro's marginal tax rate to estimate the ATWACC for the sample. These calculations are displayed in Table No. MJV-11 for the Canadian utilities sample.

For the gas LDC sample, the procedures are the same except that the cost of equity estimates for each individual sample company from the first table in the risk positioning calculations are combined with the individual company's market value capital structure information and Gaz Métro's tax rate to estimate the after-tax weighted average cost of

[51] *Value Line Investment Survey*, December 12, 2008 and December 26, 2008 for the gas LDC sample and Bloomberg as of March 10, 2009 for the Canadian utilities sample.

capital for each individual company. These calculations are displayed in Table No. MJV-21, Panels A, B and C. Sample averages are reported in the bottom row of each panel.

Q17. What do these values imply for the ATWACC for Gaz Metro?

A17. I discuss the implications of the equity risk positioning results in the main body of my written evidence.

Q18. Does this complete Appendix C?

A18. Yes, except for the Table MJV-C1 which provides the academic references upon which I rely to estimate the value of the α parameter for use in the Empirical Capital Asset Pricing Model.

Table MJV-C1

EMPIRICAL EVIDENCE ON THE ALPHA FACTOR IN ECAPM*

AUTHOR	RANGE OF ALPHA	PERIOD RELIED UPON
Black (1993)[1]	1% for betas 0 to 0.80	1931-1991
Black, Jensen and Scholes (1972)[2]	4.31%	1931-1965
Fama and McBeth (1972)	5.76%	1935-1968
Fama and French (1992)[3]	7.32%	1941-1990
Fama and French (2004)[4]	N/A	
Litzenberger and Ramaswamy (1979)[5]	5.32%	1936-1977
Litzenberger, Ramaswamy and Sosin (1980)	1.63% to 3.91%	1926-1978
Pettengill, Sundaram and Mathur (1995)[6]	4.6%	1936-1990

*The figures reported in this table are for the longest estimation period available and, when applicable, use the authors' recommended estimation technique. Many of the articles cited also estimate alpha for sub-periods and those alphas may vary.

[1]Black estimates alpha in a one step procedure rather than in an un-biased two-step procedure.
[2]Estimate a negative alpha for the subperiod 1931-39 which contain the depression years 1931-33 and 1937-39.
[3]Calculated using Ibbotson's data for the 30-day treasury yield.
[4]The article does not provide a specific estimate of alpha; however, it supports the general finding that the CAPM underestimates returns for low-beta stocks and overestimates returns for high-beta stocks.
[5]Relies on Lizenberger and Ramaswamy's before-tax estimation results. Comparable after-tax alpha estimate is 4.4%.
[6]Pettengill, Sundaram and Mathur rely on total returns for the period 1936 through 1990 and use 90-day treasuries. The 4.6% figure is calculated using auction averages 90-day treasuries back to 1941 as no other series were found this far back.

Sources:
Black, Fischer. 1993. Beta and Return. *The Journal of Portfolio Management* 20 (Fall): 8-18.
Black, F., Michael C. Jensen, and Myron Scholes. 1972. The Capital Asset Pricing Model: Some Empirical Tests, from Studies in the theory of Capital Markets. In *Studies in the Theory of Capital Markets*, edited by Michael C. Jensen, 79-121. New York: Praeger.
Fama, Eugene F. and James D. MacBeth. 1972. Risk, Returns and Equilibrium: Empirical Tests. *Journal of Political Economy* 81 (3): 607-636.
Fama, Eugene F. and Kenneth R. French. 1992. The Cross-Section of Expected Stock Returns. *Journal of Finance* 47 (June): 427-465.
Fama, Eugene F. and Kenneth R. French. 2004. The Capital Asset Pricing Model: Theory and Evidence. *Journal of Economic Perspectives* 18 (3): 25-46.
Litzenberger, Robert H. and Krishna Ramaswamy. 1979. The Effect of Personal Taxes and Dividends on Capital Asset Prices, Theory and Empirical Evidence. *Journal of Financial Economics* XX (June): 163-195.
Litzenberger, Robert H. and Krishna Ramaswamy and Howard Sosin. 1980. On the CAPM Approach to Estimation of a Public Utility's Cost of Equity Capital. *The Journal of Finance* 35 (2): 369-387.
Pettengill, Glenn N., Sridhar Sundaram and Ike Mathur. 1995. The Conditional Relation between Beta and Returns. *Journal of Financial and Quantitative Analysis* 30 (1): 101-116.

Appendix D: DISCOUNTED CASH FLOW METHODOLOGY: DETAILED PRINCIPLES AND RESULTS

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Appendix D: DISCOUNTED CASH FLOW METHODOLOGY: DETAILED PRINCIPLES AND RESULTS

Q1. What is the purpose of this appendix?

A1. This appendix reviews the principles behind the discounted cash flow or "DCF" methodology and the details of the cost of capital estimates obtained from this methodology.

I. DISCOUNTED CASH FLOW METHODOLOGY PRINCIPLES

Q2. How is this section of the appendix organized?

A2. The first part discusses the general principles that underlie the DCF approach. The second portion describes the strengths and weaknesses of the DCF model and why it is generally less reliable for estimating the cost of capital for the sample companies at the present time than the risk positioning method discussed in Appendix C.

A. SIMPLE AND MULTI-STAGE DISCOUNTED CASH FLOW MODELS

Q3. Please summarize the DCF model.

A3. The DCF model takes the first approach to cost of capital estimation discussed with Figure 1 in *Section II-A* of my written evidence. That is, it attempts to measure the cost of equity in one step. The method assumes that the market price of a stock is equal to the present value of the dividends that its owners expect to receive. The method also assumes that this present value can be calculated by the standard formula for the present value of a cash flow stream:

$$P = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \ldots + \frac{D_T}{(1+k)^T} \qquad \textbf{(D-1)}$$

where "P" is the market price of the stock; "D_i" is the dividend cash flow expected at the end of period i; "k" is the cost of capital; and "T" is the last period in which a dividend cash flow is to be received. The formula just says that the stock price is equal to the sum of the expected future dividends, each discounted for the time and risk between now and the time the dividend is expected to be received.

$$P = \frac{D_1}{(k - g)} \qquad \textbf{(D-2)}$$

Most DCF applications go even further, and make very strong (*i.e.*, unrealistic) assumptions that yield a simplification of the standard formula, which then can be rearranged to estimate the cost of capital. Specifically, if investors expect a dividend stream that will grow forever at a steady rate, the market price of the stock will be given by a very simple formula,

where "D_1" is the dividend expected at the end of the first period, "g" is the perpetual growth rate, and "P" and "k" are the market price and the cost of capital, as before. Equation D-2 is a simplified version of Equation D-1 that can be solved to yield the well known "DCF formula" for the cost of capital:

$$k = \frac{D_1}{P} + g = \frac{D_O \times (1 + g)}{P} + g \qquad \textbf{(D-3)}$$

where "D_0" is the current dividend, which investors expect to increase at rate g by the end of the next period, and the other symbols are defined as before. Equation D-3 says that if Equation D-2 holds, the cost of capital equals the expected dividend yield plus the (perpetual) expected future growth rate of dividends. I refer to this as the simple DCF model. Of course, the "simple" model is simple because it relies on very strong (*i.e.*, very unrealistic) assumptions.

Q4. Are there other versions of the DCF models besides the "simple" one?

A4. Yes. If Equation D-2 does not hold, sometimes other variations of the general present value formula, Equation D-1, can be used to solve for k in ways that differ from Equation D-3. For example, if there is reason to believe that investors do *not* expect a steady growth rate forever, but rather have different growth rate forecasts in the near term (e.g., over the next five or ten years), these forecasts can be used to specify the early dividends in Equation D-1. Once the near-term dividends are specified, Equation D-2 can be used to specify the share price value at the end of the near-term (e.g., at the end of five or ten years), and the resulting cash flow stream can be solved for the cost of capital using Equation D-1.

More formally, the "multi-stage" DCF approach solves the following equation for *k*:

$$P = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \ldots + \frac{D_T + P_{TERM}}{(1+k)^T} \qquad \textbf{(D-4)}$$

The terminal price, P_{TERM} is estimated as

$$P_{TERM} = \frac{D_{T-1}}{(k - g_{LR})} \qquad \textbf{(D-5)}$$

where *T* is the last of the periods in which a near term dividend forecast is made and g_{LR} is the long-run growth rate. Thus, Equation D-4 defers adoption of the very strong perpetual growth assumptions that underlie Equation D-2 — and hence the simple DCF formula, Equation D-3 — for as long as possible, and instead relies on near term knowledge to improve the estimate of *k*. I examine both simple and multistage DCF results below.

Q5. What are the merits of the DCF model?

A5. The DCF approach is conceptually sound if its assumptions are met but can run into difficulty in practice because those assumptions are so strong, and hence so unlikely to correspond to reality. Two conditions are well-known to be necessary for the DCF approach to yield a reliable estimate of the cost of capital: the variant of the present value formula, Equation D-1, that is used must actually match the variations in investor expectations for the dividend growth path; and the growth rate(s) used in that formula must match current investor expectations. Less frequently noted conditions may also create problems.

The DCF model assumes that investors expect the cost of capital to be the same in all future years. Investors may not expect the cost of capital to be the same, which can bias the DCF estimate of the cost of capital in either direction.

The DCF model only works for companies for which the standard present value formula works. The standard formula does *not* work for companies that operate in industries or markets that are unstable or for options (*e.g.*, puts and calls on common stocks), and so it will not work for companies whose stocks behave as options do. Option-pricing effects will be important for companies in financial distress, for example, which implies the DCF model will *understate* their cost of capital, all else equal.

In recent years even the most basic DCF assumption, that the market price of a stock in the absence of growth options is given by the standard present value formula (*i.e.*, by Equation D-1 above), has been called into question by a literature on market volatility.[1] In any case, it is still too early to throw out the standard formula, if for no other reasons than that the evidence is still controversial and no one has offered a good replacement. But the evidence suggests that it must be viewed with more caution than financial analysts have traditionally applied. Simple models of stock prices may not be consistent with the available evidence on stock market volatility.

Q6. Normally DCF debates center on the right growth rate. What principles underlie that choice?

A6. Finding the right growth rate(s) is indeed the usual "hard part" of a DCF application. The original approach to estimation of *g* relied on average historical growth rates in

[1] See for example, Robert J. Shiller (1981), "Do Stock Prices Move Too Much to be Justified by Subsequent Changes in Dividends?," *The American Economic Review*, Vol. 71, No. 3, pp. 421-436. John Y. Campbell and Robert J. Shiller (1988), "The Dividend-Price Ratio and Expectations of Future Dividends and Discount Factors," *The Review of Financial Studies*, Vol. 1, No. 3, pp. 195-228. Lucy F. Ackert and Brian F. Smith (1993), "Stock Price Volatility, Ordinary Dividends, and Other Cash Flows to Shareholders," *Journal of Finance*, Vol. 48, No. 1, pp. 1147-1160. Eugene F. Fama and Kenneth R. French (2001), "Disappearing Dividends: Changing Firm Characteristics or Lower Propensity to Pay?," *Journal of Financial Economics*, Vol. 60, pp. 3-43. Borja Larrain and Motohiro Yogo (2005), "Does Firm Value Move Too Much to be Justified by Subsequent Changes in Cash Flow?," Federal Reserve Bank of Boston, *Working Paper*, No. 05-18.

observable variables, such as dividends or earnings, or on the "sustainable growth" approach, which estimates *g* as the average book rate of return times the fraction of earnings retained within the firm. But it is highly unlikely that historical averages over periods with widely varying rates of inflation, interest rates and costs of capital, such as in the relatively recent past, will equal current growth rate expectations.

A better approach is to use the growth rates currently expected by investment analysts, if an adequate sample of such rates is available. If this approach is feasible and if the person estimating the cost of capital is able to select the appropriate version of the DCF formula, the DCF method should yield a reasonable estimate of the cost of capital for companies not in financial distress and without material option-pricing effects (always subject to recent concerns about the applicability of the basic present value formula to stock prices as well as issues of optimism bias). However, for the DCF approach to work, the basic stable-growth assumption must become reasonable and the underlying stable-growth rate must become determinable *within the period for which forecasts are available*.

Q7. What is the so called "optimism bias" in the earnings growth rate forecasts of security analysts and what is its effect on the DCF analysis?

A7. Optimism bias is related to the observed tendency for analysts to forecast earnings growth rates that are higher than are actually achieved. This tendency to over estimate growth rates is perhaps related to incentives faced by analysts that provide rewards not strictly based upon the accuracy of the forecasts. To the extent optimism bias is present in the analysts' earnings forecasts, the cost of capital estimates from the DCF model would be too high.

Q8. Does optimism bias mean that the DCF estimates are completely unreliable?

A8. No. The effect of optimism bias is least likely to affect DCF estimates for large, rate regulated companies in relatively stable segments of an industry. Furthermore, the magnitude of the optimism bias (if any) for regulated companies is not clear. This issue is addressed in a paper by Chan, Karceski, and Lakonishok (2003) who sort companies on the basis of the size of the I/B/E/S forecasts to test the level of optimism bias. Utilities constitute 25 percent of the companies in lowest quintile, and by one measure the level of optimism bias is 4 percent. However, the 4 percent figure does not represent the complete characterization of the results in the paper. Table IX of the paper shows that the median I/B/E/S forecast for the first (lowest) quintile averages 6.0 percent. The realized "Income before Extraordinary Items" is 2.0 percent (implying a four percent upward bias in I/B/E/S forecasts), but the "Portfolio Income before Extraordinary Items" is 8.0 percent (implying a two percent downward bias in I/B/E/S forecasts).

The difference between the "Income before Extraordinary Items" and "Portfolio Income before Extraordinary Items" is whether individual firms or a portfolio are used in estimating the realized returns. The first is a simple average of all firms in the quintile while the second is a market value weighted-average. Although both measures of bias have their own drawbacks according to the authors,[2] the Portfolio Income measure gives more weight to the larger firms in the quintile such as regulated utilities. In addition, the paper demonstrates that "analysts' forecasts as well as investors' valuations reflect a wide-spread belief in the investment community that many firms can achieve streaks of high growth in earnings."[3] Therefore, it is not clear how severe the problem of optimism bias may be for regulated utilities or even whether there is a problem at all.

Further, the National Association of Security Dealers (NASD) was designed to reduce the conflicts of interest and pressures brought against security analysts and recently a Joint Report by NASD and the New York Stock Exchange ("NYSE") on the reforms stated

> … the SRO Rules have been effective in helping restore integrity to research by minimizing the influences of investment banking and promoting transparency of other potential conflicts of interest. Evidence

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[2] Chan, Karceski, and Lakonishok, *op. cit.*, p. 675.

[3] Chan, Karceski, and Lakonishok, *op. cit*., p. 663.

> also suggests that investors are benefiting from more balanced and accurate research to aid their investment decisions.[4]

The report does note additional reforms are advisable, but the situation is far different today than during the height of the tech bubble when analyst objectivity was clearly suspect.

Finally, the two-stage DCF model also adjusts for any over optimistic (or pessimistic) growth rate forecasts by substituting the long-term GDP growth rate for the 5-year growth rate forecasts of the analysts in the years after year 5.

B. CONCLUSIONS ABOUT THE DCF MODEL

Q9. Please sum up the implications of this part of the appendix.

A9. The unavoidable questions about the DCF model's strong assumptions — whether the basic present value formula works for stocks, whether option pricing effects are important for the company, whether the right variant of the basic formula has been found, and whether the true growth rate expectations have been identified — cause me to view the DCF method as *inherently* less reliable than the equity risk premium approach, the other approach I use. However, because the DCF method has been widely used in the past and in other forums when the industry's economic conditions were different from today's, I submit DCF evidence in this case. DCF estimates also serve as a check on the values provided by the risk positioning approach methods.

II. EMPIRICAL DCF RESULTS

Q10. How is this part of the appendix organized?

A10. This section presents the details of my DCF analyses, which are summarized in my written evidence. The first part describes some preliminary matters, such as data inputs. Then it turns to the details of the DCF estimates themselves.

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4 Joint Report by NASD and NYSE on the Operation and Effectiveness of the Research Analyst Conflict of Interest Rules, December 2005, p. 44.

In particular, implementation of the simple DCF models described above requires an estimate of the current price, the dividend, and near-term and long-run growth rate forecasts. The simple DCF model relies only on a single growth rate forecast, while the multi-stage DCF model employs both near-term individual company forecasts and long-run GDP growth rate forecasts. The remaining parts of this section describe each of these inputs in turn.

A. PRELIMINARY MATTERS

Q11. In Appendix C you discuss estimating cost of capital and implied cost of equity using the risk positioning methodology. What, if anything, is different when you use the DCF method?

A11. The timing of the market value capital structure calculations is different in the DCF method and in the equity risk premium method. The equity risk premium method relies on the average capital structure over the period used to estimate beta while the DCF approach uses only current data, so the relevant market value capital structure measure is the most recent that can be calculated. This capital structure is reported in columns [1]-[3] of Tables No. MJV-4 for the Canadian utilities sample and in Table No. MJV-15 for the gas LDC sample.

B. GROWTH RATES

Q12. What growth rates do you use?

A12. For reasons discussed above, historical growth rates today are generally unreliable as forecasts of current investor expectations for the either the Canadian utilities sample or the natural gas distribution industry. I therefore use rates forecasted by security analysts.

The ideal in a DCF application would be a detailed forecast of future dividends, year by year well into the future, based on a large sample of investment analysts' expectations. I know of no source of such data. Dividends are ultimately paid from earnings, however, and earnings forecasts are available for a few years. Investors do not expect dividends to grow in lockstep with earnings, but for companies for which the DCF approach can be used reliably (*i.e.*, for relatively stable companies whose prices do not include the option-like values described previously), they do expect dividends to track earnings over the long-run. Thus, use of earnings growth rates as a proxy for expectations of dividend growth rates is a common practice.

Accordingly, the first step in my DCF analysis is to examine a sample of investment analysts' forecasted earnings growth rates. For the gas LDC sample, I utilize BEst forecasts as provided by Bloomberg and *Value Line's* forecasted earnings growth while for the Canadian utilities sample I only utilize BEst forecasts.[5] The projected earnings growth rates for the companies in the Canadian utilities sample are in Table No. MJV-5 and for the gas LDC sample in Table No. MJV-16. Column [1] of Table No. MJV-5 reports analysts' forecasts of the long-term earnings growth for the Canadian utilities companies while column [2] reports the number of analysts that provided a forecast. In Table No. MJV-16 columns [1] and [5] report the forecasted long-term growth rate using BEst and *Value Line*, respectively. Column [2] reports the number of analysts providing a BEst forecast, and column [6] reports the average of the BEst and *Value Line* five-year forecasts. (I treat the *Value Line* forecasts as though they overlap exactly with the forecasts from BEst.) These growth rates underlie my simple and multi-stage DCF analyses.

In particular, the five-year average annual growth rate is the perpetual growth rate I employ in the simple DCF model.[6] In the multi-stage model, I rely on the company-specific growth rate until Q1, 2014 and on the long-term GDP forecast for Q2, 2019

[5] The BEst growth rates for both samples were downloaded from Bloomberg.

[6] This growth rate is in Table No. MJV-5 column [1] for the Canadian utilities sample and in Table No. MJV-16 column [6] for the gas LDC sample.

onwards. During the period from Q2, 2014 to Q1, 2019, I assume the growth rate converges linearly towards the long-term GDP forecast, which is reached in 2019.[7]

Q13. Do these growth rates correspond to the ideal you mentioned above?

A13. No, not completely. While forecasted growth rates are the quantity required in principle, the forecasts need to go far enough out into the future so that it is reasonable to believe that investors expect a stable growth path afterwards. As can be seen in Table No. MJV-5 for the Canadian utilities sample and in Table No. MJV-16 for the gas LDC sample, the growth rates estimates do not support the view that investors are expecting growth rates equal to the single perpetual growth rate assumed in the simple DCF model. However, the 5-year growth rate estimates for the Canadian utilities companies are not homogeneous as can be seen by reference to Table No. MJV-5. The forecasts for the companies in the Canadian utilities sample range from 3.9 to 10.5 percent. Moreover, the forecasts for four out of five companies in the same sample are higher than the long-term forecast of 4.2 percent for the Canadian GDP. For the gas LDC sample, all except one of the long-term growth rates is in the range from 3.2 to 8.5 percent. All of the companies in the gas LDC sample have more than one analyst providing an earnings growth rate forecast except for Laclede, which has only one analyst from *Value Line* providing the growth rate estimate. (See Table No. MJV-16). The comparison between the average growth rate forecasts and the growth in GDP indicate that these growth rate forecasts are not overly optimistic for the gas LDC sample.

Q14. How well are the conditions needed for DCF reliability met at present?

A14. The requisite conditions for the sample companies are not fully met at this time. Of particular concern for this proceeding is the uncertainty about what investors truly expect the long-run outlook for the sample companies to be. The longest time period available

[7] For Canada, I use a long-term GDP growth estimate obtained from the Energy Information Administration, *International Energy Outlook*, September 2008. Because this growth estimate is in real terms, I combine the estimate with the publicly announced long-term inflation target of two percent from the Bank of Canada (see www.bankofcanada.ca). For companies in the gas LDC sample, I use the long-term U.S. GDP growth estimate from *Blue Chip Economic Indicators* (March, 2009).

for growth rate forecasts of which I am aware is five years. The long-run growth rate (*i.e.*, the growth rate after the energy industry settles into a steady state, which is certainly *beyond* the next five years for this industry) drives the actual results one gets with the DCF model. Unfortunately, this implies that unless the company or industry in question is stable, so there is little doubt as to the growth rate investors expect, DCF results in practice can end up being driven by the subjective judgment of the analyst who performs the work.

This is a problem at present because it is hard to imagine that today's energy industry would accurately be described as stable. While inflation remains stable, interest rates have recently increased and the spread between corporate and government bond yields has widened dramatically. . The prices of natural gas and petroleum have also exhibited a great deal of volatility recently, and the estimated total amount of recoverable natural gas in the Western Canada Sedimentary Basin is being revised downward, so that Gaz Métro's supply is affected. These factors plus the recent turmoil in financial markets makes Gaz Métro's outlook more uncertain. Additionally, both the Canadian utility and the gas distribution industry have recently going through a series of mergers and acquisitions, which affects the companies' earnings growth rate estimates. This is one reason why companies involved in mergers and acquisitions are normally excluded from the sample. There has also been financial distress among companies specializing in trading natural gas and electricity products which affects both regulated and unregulated companies. Taken together, these factors mean that it may be some time before the energy industry settles into anything investors will see as a stable equilibrium.

Such circumstances imply that a regulator may often be faced with a wide range of DCF numbers, none of which can be well grounded in objective data on true long-run growth expectations, *because no such objective data now exist*. DCF for firms or industries in flux is *inherently* subjective with regard to a parameter (the long-run growth rate) that drives the answer one gets.

It is clear that much longer detailed growth rate forecasts than currently available from BEst and *Value Line* would be needed to implement the DCF model in a completely reliable way for these two samples at this time; however, the general stability of the 5-year growth rate forecasts for both samples indicates a higher degree of reliability than in the relatively recent past.

C. Dividend and Price Inputs

Q15. What values do you use for dividends and stock prices?

A15. Dividends are the last recorded dividend payments as reported by Bloomberg, the 4th-quarter 2008 dividend. This dividend is grown at the estimated growth rate and divided by the price described below to estimate the dividend yield for the simple and multi-stage DCF models.

Stock prices are the average of the closing stock prices for the 15 trading days (approximately three weeks) ending March 10, 2009 for both the Canadian utilities sample and the gas LDC sample. These time periods coincide with the dates I obtained the BEst growth forecasts. I do not use a longer period to measure the price because that would be inconsistent with the principles that underlie the DCF formula. The DCF approach assumes the stock price is the present value of future expected dividends. Stock prices six months or a year ago reflect expectations at that time, which are different from those that underlie the currently available growth forecasts. At the same time, use of an average over a brief period helps guard against a company's price on a particular day price being unduly influenced by mistaken information, differences in trading frequency, and the like.

The closing stock price is used because it is at least as good as any other measure of the day's outcome, and may be better for DCF purposes. In particular, if there were any single price during the day that would affect investors' decisions to buy or sell a stock, I would suspect that it would be each day's closing price, not the high or low during the day. The daily price changes reported in the financial pages, for example, are from close to close, not from high to high or from low to low.

D. COMPANY-SPECIFIC DCF COST OF CAPITAL ESTIMATES

Q16. What DCF estimates do these data yield?

A16. The cost of equity results for the simple and multi-stage DCF models are shown in Table No. MJV-6 for the Canadian utilities sample and in Table No. MJV-17 for the gas LDC sample. Panel A reports the results for the simple DCF method, and Panel B reports the results for the multi-stage DCF method using the long-term GDP growth rate as the perpetual growth rate.

Q17. What overall cost of capital estimates result from the DCF cost of equity estimates?

A17. The capital structure, DCF cost of equity, and cost of debt estimates are combined to obtain the overall after-tax weighted-average cost of capital for each sample company. These results are presented in Table No. MJV-7 for the Canadian utilities sample and Table No. MJV-18 for the gas LDC sample. Panel A relies on the simple DCF cost of equity results, and Panel B relies on the multi-stage DCF cost of equity results.

For the gas LDC sample, I also report the average for the sub-sample of companies with the fewest reliability concerns.[8]

Q18. What information do you report in Tables No. MJV-8 and MJV-19?

A18. These tables report the samples' average (and the sub-sample's) estimated overall after-tax weighted-average cost of capital.

Q19. What are the implications of these results?

A19. The implication of these numbers is discussed in my written evidence, along with the findings of the equity risk premium approach.

[8] See Tables No. MJV-2 and MJV-13 for a summary of the Canadian utilities and gas LDC sample's regulated assets, respectively. See Tables 3 and 4 in my written evidence and Appendix B for a description of the samples.

RÉGIE DE L'ÉNERGIE

WRITTEN EVIDENCE OF A. LAWRENCE KOLBE

FOR

GAZ MÉTRO LIMITED PARTNERSHIP

The Brattle Group
44 Brattle Street
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617.864.7900

May 4, 2009

WRITTEN EVIDENCE OF
A. LAWRENCE KOLBE

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WRITTEN EVIDENCE OF
A. LAWRENCE KOLBE

I. INTRODUCTION AND SUMMARY

Q1. Please state your name and address for the record.

A1. My name is A. Lawrence Kolbe. My business address is The Brattle Group, 44 Brattle Street, Cambridge, Massachusetts, 02138.

Q2. Please summarize your background and experience.

A2. I am a Principal of The Brattle Group ("Brattle"), an economic, environmental and management consulting firm with offices in Cambridge, San Francisco, Washington, Brussels, London and (soon) Madrid. My work concentrates on financial and regulatory economics. I hold a B.S. from the U.S. Air Force Academy and a Ph.D. from the Massachusetts Institute of Technology, both in economics.

Q3. What is the purpose of your evidence in this proceeding?

A3. Gaz Métro Limited Partnership ("Gaz Métro" or the "Company") has asked Brattle (Dr. Michael J. Vilbert and me) to estimate the rate of return necessary to provide it with a fair return on its assets for 2010. The most fundamental measure of the required return on investment is the after-tax weighted-average cost of capital ("ATWACC"), and that is the focus of our analysis and recommendations. The ATWACC as I define it has been widely adopted as the rate of return standard by regulators outside of North America, and it has recently been used by the National Energy Board ("NEB") to set the rate of return for Trans Québec & Maritimes Pipeline Inc. ("TQM").[1] As points of information, Gaz Métro has also requested me to indicate the associated cost of equity at a 38.5 percent deemed common equity ratio and at the Company's actual common equity ratio, 46 percent.

The worldwide financial crisis has profound implications for Gaz Métro's required return. Capital is extraordinarily expensive at present, and current data imply that the market expects it to remain so during the next year. Dr. Vilbert and I have worked out procedures to address this problem, which are explained in his evidence.

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[1] National Energy Board, *Reasons for Decision, Trans Québec & Maritimes Pipeline, Inc.*, RH-1-2008, March 2009 ("TQM Decision").

I base my conclusions for Gaz Métro on cost of capital analyses of various samples performed by Dr. Vilbert and on risk evidence from our Brattle colleague, Dr. Paul R. Carpenter. I also consider aspects of the evidence of Mr. Aaron Engen.

Additionally, I have been asked to:

- Review the nature of the investment process and the reasons that investors should have a fair opportunity to earn the cost of capital, including the implications of a company's ability to raise capital for the adequacy of its equity return;
- Describe the principles that govern interactions among the ATWACC, the cost of equity, and the cost of debt, and
- Address concerns raised in the past regarding the evidence presented to implement the capital structure principles, including how to transition to an ATWACC-based rate of return and how to adjust for the costs of issuing common equity.

Q4. Please review any parts of your background and experience that are particularly relevant to your evidence in this proceeding.

A4. I have been a student of rate regulation for three decades now. Among other publications, I am a co-author of two books[2] and dozens of papers and articles that focus on various aspects of rate regulation, as well as a third book that addresses capital investment and valuation generally.[3] One of my papers appears in a law journal and addresses the economics of the U.S. Supreme Court's risk-return standards for rate-regulated companies,[4] and other papers in various economics journals address aspects of the same set of issues.[5]

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[2] A. Lawrence Kolbe and James A. Read, Jr., with George R. Hall, *The Cost of Capital: Estimating the Rate of Return for Public Utilities*, Cambridge, MA: The MIT Press (1984), and A. Lawrence Kolbe, William B. Tye and Stewart C. Myers, *Regulatory Risk: Economic Principles and Applications to Natural Gas Pipelines and Other Industries*, Boston: Kluwer Academic Publishers (1993).

[3] Richard A. Brealey and Stewart C. Myers, with The Brattle Group, *Capital Investment and Valuation* (Brattle author A. Lawrence Kolbe), New York: McGraw-Hill/Irwin (2003).

[4] A. Lawrence Kolbe and William B. Tye, "The *Duquesne* Opinion: How Much '*Hope*' Is There for Investors in Regulated Firms?" *Yale Journal on Regulation* 8:113-157 (1991).

[5] A. Lawrence Kolbe and William B. Tye, "The Fair Allowed Rate of Return with Regulatory Risk," *Research in Law and Economics* 15:129-169 (1992); A. Lawrence Kolbe and William B. Tye, "Compensation for the Risk of Stranded Costs," *Energy Policy* 24:1025-1050 (1996); and A. Lawrence

I have testified on financial and regulatory issues in many forums. These include international arbitrations in The Hague, London and Melbourne, Australia; lawsuits in U.S. courts; U.S. arbitrations, and Canadian and U.S. regulatory proceedings. In particular, I have provided expert testimony in regulatory proceedings before seven Canadian and U.S. federal regulatory bodies, and one or more regulatory bodies in 19 provinces or states. These proceedings have concerned a wide variety of rate-regulated companies or industries, including local gas distribution companies ("LDCs"). I have not previously appeared in a proceeding before the Régie de l'énergie ("Régie"). Appendix A contains more information on my professional qualifications.

Q5. Please summarize the conclusions in your evidence.

A5. My conclusions in the above-cited areas may be summarized as follows:[6]

1. Nature of the Investment Process: Investment by non-financial corporations turns a fungible and very liquid asset -- money -- into much less flexible assets (e.g., gas). In exchange for the money, investors expect a return on and of the investment. The return required varies with the risk involved, which itself varies from industry to industry *because* some corporate assets are riskier than others. If the risk of a company's long-lived assets changes as time passes, its required rate of return changes, too. Nor does the fact that an existing corporation can raise incremental capital imply that its equity return is adequate, since the pre-existing capital provides a cushion for new investors even if the equity return is too low.

Actions that treat investors unfairly have adverse consequences for customers and the local economy as well as for investors. This is the message of a relatively new economic literature, which documents the impact of international differences in enforceable legal rights

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Kolbe and Lynda S. Borucki, "The Impact of Stranded-Cost Risk on Required Rates of Return for Electric Utilities: Theory and An Example," *Journal of Regulatory Economics* 13:255-275 (1998).

[6] The statements in this section are summaries of detailed discussions in the body of my evidence. It is prepared only for the convenience of the reader, and this section cannot and is not intended to replace the subsequent, more detailed discussions. Additionally, citations to the sources of facts or data discussed in this summary are contained in the main body of my evidence or in my workpapers.

for investors on the health of a nation's financial markets and the level of investment. Another recent line of research asks even more fundamental questions, for example, why has the rate of economic growth in the last 500 years differed so much among countries? Both bodies of research conclude that a nation that fails to protect the rights of investors harms itself materially, since you cannot force investors to supply capital. (In the vernacular, "you can't push a rope.") Inadequate assurance of a fair return on and of investment makes capital scarce and unduly expensive, and it slows economic growth. Moreover, the costs of a reputation for poor investor protection persist long after investors are finally convinced that the unfair treatment is past, because an undercapitalized system of long-lived assets cannot be fixed quickly.

2. Effect of Debt on the Overall Cost of Capital and the Cost of Equity: Companies raise money by selling securities to investors. The securities give investors a claim on part of the cash that flows from the company's operations. Different securities (e.g., common stocks versus corporate bonds) have different claims. Debt has a senior claim on a specified portion of the cash flow, while common equity, the most junior security, gets what's left after everyone else has been paid. Since equity is last in line when the company's cash is allocated, it bears the most risk. Investors accordingly require a higher rate of return on equity than on debt.

The fundamental determinant of a company's required rate of return is the risk of its assets. Debt and equity just divvy that risk up. The mix of financing sources (i.e., debt and equity) a company uses to buy its assets is known as its "capital structure." Debt provides "leverage" (or "gearing") for equity, since equity bears the costs or reaps the benefits of fluctuations in the market value of the company's assets. That is, debt adds "financial" risk to equity and thereby increases equity's required rate of return.

Unfortunately, the cost of equity cannot be looked up in the financial pages. It must be estimated using capital market evidence from one or more samples of companies. The resulting market-based estimates will, of course, reflect the risk the sample companies' owners *actually* bear, which in turn depends both on the sample's business risk and on its financial risk, which is determined by its market-value capital structure.

A half-century of economic research reveals that there is no magic in financial leverage. The market value of a company does not change materially within a broad middle range of capital structures, so the after-tax required rate of return on the company's assets -- its "after-tax weighted-average cost of capital," or "ATWACC" -- does not change materially, either.

A regulated company requires a fair opportunity to earn compensation for the *business* risk of its assets. The best measure of a company's or industry's business risk is its ATWACC. Therefore, to provide adequate compensation, rates must produce an expected rate of return on the company's assets equal to the company's ATWACC. This may be done in three ways: (a) by focusing directly on the ATWACC as the primary rate of return standard; (b) by finding the allowed rate of return on equity that produces the appropriate ATWACC at a given deemed equity ratio, or (c) by finding the deemed equity ratio that produces the appropriate ATWACC at a given allowed rate of return on equity. Dr. Vilbert's and my evidence adopts the first of these approaches, but reports the implications of our findings for the second approach as well.

3. Analysis of Risk-Return Issues Raised Previously: Dr. Vilbert and I have been basing cost of capital evidence on ATWACC and urging its adoption by Canadian regulators for a decade now. Over that period, a number of questions and concerns about the approach have been raised. We have now appeared three times before the NEB, and it appears that the NEB's questions and concerns about the use of ATWACC as a rate of return standard have now been adequately addressed, at least in the case of TQM. My evidence therefore reviews what I believe to be the principal issues that have arisen in prior proceedings as potential barriers to the adoption of ATWACC, so that the Régie has before it both the issues raised and the resolutions of them that we have submitted for regulators' consideration.

Additionally, a new issue arose from the NEB's TQM decision: what to do about the difference between the embedded and market cost of debt in an ATWACC-based rate of return system. Avoidance of windfall gains and loses to customers and investors requires a transition mechanism in the case of Gaz Métro, although the Régie could also decide to implement an ATWACC-based standard but adhere indefinitely to the practice of treating embedded interest expense as a cost-of-service item. My evidence lays out pros and cons for each approach, so the Régie and the parties can evaluate how to proceed.

Finally, in the 2009 rate case, the Régie rejected a Gaz Métro request to increase the allowance for the costs of issuing equity from 30 to 50 basis points in the allowed return on equity.[7] Gaz Métro has asked me to look at this issue afresh. I find that the use of the principles underlying ATWACC sheds additional light on how this adjustment should be made and on its appropriate magnitude. In particular, the rate of return that should be allowed on these issuance costs is the ATWACC, not the cost of equity. I perform the necessary calculations in the final section of my evidence.

4. Gaz Métro's ATWACC: This discussion first assesses whether there is reason to question whether the current formula return, deemed equity ratio approach provides a fair return. It next turns to the risk-return evidence and my conclusions on Gaz Métro's ATWACC. It then calculates the modifications to the ATWACC necessary (1) to cover embedded interest expense and (2) to compensate for equity issuance costs. Lastly, it calculates the overall ATWACC modified for these two factors and reports the associated required rates of return on equity at Gaz Métro's actual 46 percent equity ratio and at its deemed 38.5 percent equity ratio.

4a. The Régie's Formula Return on Equity: The Régie's formula for the return on equity for Gaz Métro was established in 1999,[8] and a Gaz Métro request to suspend it was rejected in the 2009 rate case, in part based on the lack of "expert evidence covering all the relevant parameters."[9]

Even ignoring the current financial crisis, there is direct evidence that the formula return system has been inadequate in recent years. Mr. Engen's evidence reports what

[7] Régie Decision D-2008-140, Case No. R-3662-2008, November 12, 2008 ("Decision D-2008-140"), p. 28.

[8] Régie Decision D-99-011, Case No. R-3397-98, February 10, 1999 ("Decision D-99-011").

[9] Decision D-2008-140, pp. 26-28, quotation at p. 28.

amounts to a "natural experiment"[10] regarding the adequacy of formula rates of return in recent years. Gas distribution company investments tend to be incremental to an already-existing system, but new gas pipelines may be built entirely from scratch. If the formula returns were seen as adequate, new pipelines should adopt the formula returns at least as often as they negotiate alternative rate of return arrangements, since such negotiations consume resources that could be saved if the formula return worked just as well. Instead, Mr. Engen reports that new pipelines in Canada almost never utilize the NEB's formula return. Instead, to the extent information is available, new pipelines routinely negotiate rates of return above the NEB formula value, which last for many years. Mr. Engen also reports that an investment in gas storage facilities in Ontario similarly went forward only because it did not come under regulation at the relevant formula return.

The Régie's formula rate of return does not produce returns on capital that are materially different in magnitude from the NEB's. Therefore, the two-tier rate of return system that has evolved in Canada is a market signal that says that formula return on equity values generally comparable to the Régie's are no longer adequate to induce investment by those who have a choice (i.e., who are not held hostage by large amounts of already-sunk capital or other constraints).

Moreover, the current economic crisis has materially increased the cost of capital for all companies, as discussed also in the evidence of Mr. Engen and Dr. Vilbert.

Therefore, I would respectfully submit that Gaz Métro's rate of return for 2010 should receive a test on the merits, without taking the existing formula value as predetermining the answer. Dr. Vilbert and I provide such a test, by analyzing Gaz Métro's current cost of capital. As explained below, our evidence shows that the traditional approach to setting Gaz Métro's overall return falls far short of the return Gaz Métro requires today.

4b. Conclusions on ATWACC: The ATWACC is the most fundamental measure of the rate of return required for a given level of business risk. Therefore, it is the focus of Dr. Vilbert's and my analyses. Dr. Carpenter provides evidence on Gaz Métro's risk. I

[10] Economics for the most part cannot rely on carefully controlled laboratory experiments, but rather must analyze the data that nature and the actual economy provide.

interpret that risk evidence in cost of capital terms, drawing on Dr. Vilbert's sample evidence to provide cost of capital benchmarks.

Dr. Vilbert has provided sample evidence on a group of Canadian companies that own rate-regulated entities ("Canadian utilities" or "Canadian sample") and a group of U.S. gas local distribution companies ("gas LDCs"). Dr. Vilbert finds the point-estimate ATWACCs of both samples at present to be 7¼ percent at present.[11]

Given the risk evidence and my own experience, I have concluded that the point-estimate ATWACC for Gaz Métro is 7½ percent at present. I believe Dr. Vilbert's estimates are on the low side of those that might be reasonably estimated at present, and I have made only a modest adjustment to Dr. Vilbert's results for Gaz Métro's greater risk. As a result, I find the reasonable range of values for Gaz Métro's ATWACC to be between 7¼ percent and 8 percent.

4c. Calculation of Embedded Interest Expense Adjustment: Gaz Métro's embedded interest rate is 6.87 percent, versus a 6.61 percent market rate in Dr. Vilbert's calculations. This is a 25 basis point difference after rounding, or 18 basis points after tax. Gaz Métro's debt amount is $965.5 million, so there needs to be an extra $1.7 million in after-tax interest expense ($965.5 million × 18 basis points) in the 2010 revenue requirement. Relative to Gaz Métro's total capital ($1,788.0 million), this is 10 basis points, so the point estimate of the ATWACC modified for embedded interest expense is (7.50 + 0.10) = 7.60 percent.[12]

4d. Equity Issuance Cost Adjustment: I requested that Gaz Métro provide all available data on equity issuance costs. In analyzing these costs, I credited the present value of the tax savings they permit. The result is that documented issuance costs amount to 4.5

[11] Dr. Vilbert and I have a longstanding practice of stating cost of capital conclusions only to the nearest one-quarter percentage point, to emphasize the intrinsic limits on the accuracy with which the cost of equity can be estimated with currently available techniques.

[12] Once having estimated the ATWACC to an achievable level of accuracy, neither Dr. Vilbert nor I object to calculating regulatory values to as many decimal places as the applicable regulatory calculations require.

percent of the net equity obtained in the equity offerings. Missing data imply that this is a conservative estimate of the actual percentage. Gaz Métro's actual equity is $822.5 million, and 4.5 percent of this amount is $37.0 million. At an ATWACC of 7.5 percent, this implies annual compensation of $2.8 million, which is 0.16 percent of Gaz Métro's $1788.0 million in total capital, or 16 basis points in the overall return.

4e. Final ATWACC Value and Associated Returns on Equity: The ATWACC as modified to (1) accommodate the difference between embedded and market interest rates and (2) compensate for equity issuance costs is (7.50 + 0.10 + 0.16) = 7.76 percent. I understand that in its cost of service calculations, the Company has rounded this down to the nearest quarter percentage point, 7.75 percent. In my opinion, that is an economically fair and reasonable rate of return on total capital for Gaz Métro's 2010 rates, given current economic conditions. With this as the base value, I would put the reasonable range of values for Gaz Métro's modified ATWACC at 7.50 percent to 8.25 percent.

Finally, as noted earlier, Gaz Métro also requested me to identify the required rates of return on equity for 2010 at its actual 46 percent equity ratio and at a 38.5 percent deemed equity ratio using a hypothetical 7.5 percent of preferred stock. At the 46 percent equity ratio, the return on equity that produces a 7.75 percent modified ATWACC is 11.22 percent. At the deemed 38.5 percent equity ratio and the assumed 5.22 percent return on the hypothetical preferred stock, the return on equity that produces a 7.75 percent modified ATWACC is 12.39 percent.

Should the Régie decide instead to set a return on equity via another means and implement my recommendations by stating a deemed equity ratio, the appropriate deemed equity ratio would be the one that produced a 7.75 percent modified ATWACC at the rate of return on equity used by the Régie.

Q6. How is the remainder of your evidence organized?

A6. *Section II* describes the nature of the investment process and the importance to all parties of fair treatment of investors. *Section III* turns to the effect of debt on the cost of equity and the overall cost of capital. Appendices B and C supplement this discussion, B with an extended, everyday example and C with a more formal review of the literature and principles. *Section IV* addresses previous regulatory concerns, including the treatment of embedded interest expense in an ATWACC-based rate of return system. Lastly, *Section V* discusses the evidence on the cost of capital of available benchmark groups and on the relative risk of Gaz Métro. It explains my conclusions on Gaz Métro's ATWACC, the adjustment for embedded interest expense, and the floatation cost adjustment. Appendix D covers certain difficulties in beta estimation for rate-regulated companies revealed by research I've undertaken in the past, on which Dr. Vilbert relies in parts of his evidence. Finally, Appendix E presents the details of the how Dr. Vilbert and I address and resolve past regulatory concerns with implementation of the capital structure principles.

II. "YOU CAN'T PUSH A ROPE"

Q7. What is the purpose of the evidence in this section?

A7. The section first reviews the corporate investment process in a market economy. It then provides an example to illustrate the consequences of acts that make voluntary investment less likely, based in part on a relatively new body of economic literature. Third, it briefly relates the economic principles to the plain English of various legal opinions on rate-of-return standards for rate-regulated companies. Finally, it draws on the previous parts to focus specifically on rate-regulated investments.

A. THE INVESTMENT PROCESS

Q8. What is the nature of the corporate investment process?

A8. Investment by non-financial corporations turns a fungible and very liquid asset -- money -- into other assets that have at least as much value, but which are much less fungible and liquid. Examples of such other assets include automobile factories, water treatment plants, gas pipelines, and research and development programs that companies hope will produce valuable patents.[13]

[13] The bulk of the assets of "financial" corporations, such as banks and insurance companies, consist of securities, loans they make, or other assets held for investment rather than operational purposes.

Q9. How do corporations get money to invest?

A9. They must induce investors to provide it, by offering the prospect of gains worth the risks involved. The level of return investors require varies from industry to industry, largely *because* some of the assets in which corporations invest are riskier than others (although as discussed in more detail below, the intrinsic risk of the assets can be allocated among parties by contracts or their equivalent).

Q10. Please explain this risk-return tradeoff in more detail.

A10. The expected rate of return on money in the bank or high-quality, short-term debt is predictable and carries little or no risk. It also is low. The expected rate of return on the assets corporations build or buy with investors' money is less predictable and carries more risk, and sometimes much more. It also is higher, because investors require a higher expected rate of return to bear more risk. To attract capital, corporations must identify investments with an expected rate of return at least equal to that investors could expect on alternative investments of equivalent risk.

However, the risk of long-lived assets can change as business conditions in the industry, the state of the economy, or legal or regulatory rules change, which leads to changes in the required rate of return.

B. CONSEQUENCES OF ACTIONS THAT HARM INVESTORS

1. The Example

Q11. Please provide an example of what you meant at the start of this section by "acts that make voluntary investment less likely."

A11. Consider a car leasing company that initially offers two types of lease. In one, the company takes the car back at the end of the lease. In the other, the customer takes the car at the end of the lease for a price agreed on at the start of the lease. Figure 1 depicts the key steps in these two types of lease.

Car Leasing Example: Party Responsible under Two Ownership Options at End of Lease

Steps in Process	**Company Owns at End**	**Customer Owns at End**
1. Buy Car	Company	Company
2. Agree on Lease Terms	Both	Both
3. Make Payments and Bear Risk During Lease	Customer	Customer
4a. Take Car Back	Company	
4b. Buy Car for Originally Agreed Price		Customer
5. *Bear Risk at End*	*Company*	*Customer*

Figure 1

During the lease period, the customer bears the risk of changes in the value of the car. (For example, if a new model comes out that makes the car less desirable, the customer still must make the lease payments.) The longer the lease, the greater the proportion of the car's lifetime risk the customer bears. The risk after the lease arises because the car's end-of-lease value is uncertain (e.g., if the economy is booming, demand for cars will be higher and the value of cars will be, too). The party retaining ownership wins if the car is worth more than expected and loses if it's worth less, but the terms of the lease are set so the owning party breaks even on average.

Now suppose a government decides that it is unfair for the leasing company to enjoy profits from above-anticipated values on cars it owns at the end of the lease, and it passes a windfall profits tax to take those profits. It does not permit end-of-lease shortfalls from anticipated values as an offset, however, nor does it impose the tax on customers.[14]

Q12. What effects does the new tax have?

A12. First, it kills the taxed type of lease. The company must recover, through payments from customers, the expected cost of the windfall profits tax. However, the government, not customers, benefits from this tax. Customers can lease a car without paying the expected cost of the tax by electing to take ownership themselves. After the windfall profits tax passes, only one type of lease is signed, the one giving customers ownership at the end.[15]

Second, the new tax increases the cost of the other type of lease. What a government has done once, it may do again. The company therefore will sign new leases only if customers pay a premium for the risk that the government may suddenly pass another new tax on the business.[16] This will drive up the price for leased cars and lead to a new equilibrium, in which fewer leased cars exist in this government's jurisdiction, and those that do cost customers more than before. To the extent that other businesses take note of and worry about extensions of the car leasing industry's new tax, the level of investment may go down and the cost of goods go up more broadly within the affected jurisdiction.

2. The Economic Evidence

Q13. Your example suggests some potentially costly long-run consequences of acts such as the tax. Is there any evidence that these really are effects worth worrying about?

A13. Yes. A relatively recent body of economic research analyzes the impact of international differences in enforceable legal rights on the health of a nation's financial markets and the level of investment. Two quotations from that literature summarize some of the relevant findings:

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[14] This tax is deliberately different from any actual policy of which I'm aware, to focus on the principles.

[15] This abstracts from the possibility of extremely risk-averse customers.

[16] This premium will be smaller than that required for the lease subject to the actual tax, which is why the second type of lease is the one that will survive.

> Recent research reveals that a number of important differences in financial systems among countries are shaped by the extent of legal protection afforded outside investors from expropriation by the controlling shareholders or managers. The findings show that better legal protection of outside shareholders is associated with: (1) more valuable stock markets ... ; (2) a higher number of listed firms ... ; (3) larger listed firms in terms of their sales or assets ... ; (4) higher valuation of listed firms relative to their assets ... ; (5) greater dividend payouts ... ; (6) lower concentration of ownership and control ... ; (7) lower private benefits of control ... ; and (8) higher correlation between investment opportunities and actual investments ... . [Omitted citations indicated by ellipses.][17]

Also,

> Recent research suggests that the extent of legal protection of investors in a country is an important determinant of the development of its financial markets. Where laws are protective of outside investors and well enforced, investors are willing to finance firms, and financial markets are both broader and more valuable. In contrast, where laws are unprotective of investors, the development of financial markets is stunted. Moreover, systematic differences among countries in the structure of laws and their enforcement, such as the historical origin of their laws, account for the differences in financial development ... . [Omitted citations indicated by ellipses.][18]

Another line of research asks even more fundamental questions, for example, why has the rate of economic growth in the last 500 years differed so much among countries? A survey article of that research finds that:

> Economic institutions encouraging economic growth emerge when political institutions allocate power to groups with interests in broad-based property rights enforcement, when they create effective constraints on power-holders, and when there are relatively few rents to be captured by power-holders.[19]

[17] Andrei Shleifer and Daniel Wolfenzon, "Investor Protection and Equity Markets," *Journal of Financial Economics* 66: 3-27 (October 2002), pp. 3-4.

[18] Rafael La Porta, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert Vishny, “Investor Protection and Corporate Valuation”, *The Journal of Finance* 57: 1147-1170 (June 2002), p. 1147.

[19] Daron Acemoglu, Simon Johnson, and James Robinson, “Institutions as the Fundamental Cause of Long-Run Growth,” *Handbook of Economic Growth*, Philippe Aghion and Steve Durlauf, eds., 2005,

Property rights enforcement and constraints on power-holders let people invest with the expectation that they will keep the fruits of their investment if it turns out well, rather than having those fruits taken by acts of government or by favoured social classes. More investment means more economic growth and a higher standard of living. Thus, such rights turn out to be a key determinant of the success or failure of a nation's long-run economic health.

The financial market literature typically focuses on the possibility of appropriation by a country's citizens of minority investments made by outsiders, typically foreigners, under the law of the country in question. The broader literature addresses the full range of institutions, including acts and policies of government as well. Both conclude that a country's failure to protect the rights of investors harms it materially.

C. RELATIONSHIP TO LEGAL DECISIONS' LANGUAGE

Q14. How does the protection of the rights of investors relate to the legal standards for rates of return for rate-regulated companies?

A14. I am not an attorney, but the plain language of the various legal opinions often cited[20] to answer such questions appears to be in line with these economic principles. For example, a decision of the Supreme Court of Canada has held that:

> The duty of the Board was to fix fair and reasonable rates; rates which, under the circumstances, would be fair to the consumer on the one hand, and which, on the other hand, would secure to the company a fair return for the capital invested. By a fair return is meant that the company will be allowed as large a return on the capital invested in its enterprise (which will be net to the company) as it would receive if it were investing the same amount in other securities possessing an attractiveness, stability and certainty equal to that of the company's enterprise.[21]

385-471, from the Abstract.

[20] For example, the NEB's RH-2-2004, Phase II, Decision, dated April 2005, ("Decision RH-2-2004") cites the three cases mentioned here at p. 8. Also, the Alberta Energy and Utilities Board's Decision 2004-052, dated July 2, 2004, ("Decision 2004-052") cites the three cases mentioned here at pp. 12-13.

[21] *Northwestern Utilities Limited v. City of Edmonton,* [1929] S.C.R. 186 ("*Northwestern*") at pp. 192-193.

Decisions of the U.S. Supreme Court have held that:

> A public utility is entitled to such rates as will permit it to earn a return on the value of the property which it employs for the convenience of the public . . . equal to that generally being made . . . on investments in other business undertakings which are attended by corresponding risks and uncertainties. … The return should be reasonably sufficient to assure confidence in the financial soundness of the utility and should be adequate, under efficient and economical management, to maintain and support its credit and enable it to raise the money necessary for the proper discharge of its public duties.[22]

and

> From the investor or company point of view it is important that there be enough revenue not only for operating expenses but also for the capital costs of the business. These include service on the debt and dividends on the stock. [Citation omitted.] By that standard, the return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks. That return, moreover, should be sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain its credit and to attract capital.[23]

These passages appear to establish a two-part standard. First, the expected rate of return for investors in a rate-regulated company should equal that available in other investments of equivalent risk. Second, the return should be adequate to maintain the financial integrity of the company so it can attract the capital needed to provide service.[24]

I understand that the U.S. Supreme Court's decisions directly relate to investor protection, since they spring from the prohibition in the U.S. Constitution against uncompensated takings of property by governments. Regardless of their legal basis, the

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[22] *Bluefield Waterworks & Improvement Co. v. Public Service Commission,* 262 U.S. 679 (1923) ("*Bluefield*") at 692-693.

[23] *Federal Power Commission v. Hope Natural Gas,* 320 U.S. 591 ("*Hope*") at 603.

[24] Please note that economically, the maintenance of "credit," by itself, is not enough to assure the attraction of capital, since capital includes both debt and equity. Therefore, maintenance of "financial integrity" requires more than simply maintaining a particular bond rating.

decisions make good economic sense. Economically, a "taking" does not require the physical appropriation of the property involved, it can as readily be a taking of the return on the property. Thus, the windfall profits tax in the auto leasing example is a "taking," economically, and a denial of the Courts' conditions for rate-regulated companies would be as well.

D. RELATIONSHIP TO RATE-REGULATED INVESTMENTS

Q15. What implications do the preceding parts of this section have for regulated investments?

A15. They explain why there are severe consequences for customers and for the economy of sustained unfair treatment of investors in rate-regulated enterprises. They also note that the plain language of oft-cited legal standards is consistent with the economically sound goal of avoiding these consequences.

Corporate investment is risky. The ability to count on fair treatment in the long run is vital to voluntary investment. Sinking fungible money into non-fungible assets, particularly those with long lives, creates a great deal of intrinsic risk. Companies sometimes choose to bear all of this risk and sometimes try to lay some or all of it off on other parties (as the car leasing company did in the second form of lease).[25]

Rate-regulated companies typically have long-lived assets with little or no alternative use. Long-lived assets with little or no alternative use have a great deal of intrinsic risk, since if they turn out to be materially less valuable than expected, their costs are already sunk and few "off ramps" are available to avoid the losses. At the same time, if they are materially more valuable than expected, competitive entry will tend to reduce that value going forward. (Cars, in contrast, have relatively short lives and a range of alternative uses, and so have far less intrinsic risk.)

Rate regulation passes much of this high intrinsic risk through to customers, which produces a reduction in the market cost of capital that leads to lower prices than customers

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[25] As another example, leasing cars is less costly than renting them day-to-day because the lessee rather than the lessor bears the risk that the car might not be needed on a given day. I return to this topic near the end of my evidence, when analyzing the risk-return implications of rates of return demanded by other Canadian pipelines.

would otherwise have to pay. The risk transfer associated with rate regulation is intended to provide investors with a fair opportunity to earn the cost of capital and to recover all of the money sunk into the company's assets, through depreciation or amortization charges. Of course, if the risks facing a regulated company go up, regulation should adjust the company's return accordingly.

Q16. But would not regulators' need to balance customer and investor interests mean that the return on equity should be kept low, even if the company's risks have increased?

A16. No, not if the result is an expected rate of return on regulated assets that is below the cost of capital. The cost of capital is as much a real cost as workers' wages. Economically, keeping the allowed rate of return on equity at a level that does not reflect new risk is no different from a regulatory order to freeze wages. Workers who were satisfied with the wage trajectory before the freeze would start to look for better opportunities. The longer the freeze, the larger the proportion of workers who would quit.

Q17. Workers are a lot more mobile than long-lived assets. Would there really be a detectible effect if the return on capital were systematically too low?

A17. Yes, although, the speed of the effect would vary with the industry. It would probably be slowest for rate-regulated companies. Unfortunately, the same forces that would slow the initial response would make its ultimate consequences all the harder to overcome.

Q18. Please explain.

A18. Rate-regulated companies, like the institutions of regulation itself, have a great deal of inertia. They are like oil supertankers, which take a great deal of time to turn if trouble looms, but which then take at least as much time to get back on the original course.

Rate regulated companies' managers tend to see it as their duty to provide service when it is requested, trusting to the regulatory process to perform acceptably for their investors on average. When such performance is not forthcoming, their duties to their shareholders conflict with their duties to their customers. These customer obligations mean rate-regulated companies react less quickly than competitive firms to signals that a previously remunerative market no longer is generating an adequate return.[26] Additionally, such companies (for awhile) can be hostage to the capital already sunk, since it can be cheaper to invest incrementally at a loss than to abandon the system. And even after managers do start to slow or stop new investment, the assets' long lives can mean existing services take a long time to decay.

Q19. Before you go on, are you saying Gaz Métro will stop investing if its return is systematically inadequate?

A19. Only Gaz Métro can answer that question, but I have been told explicitly that Gaz Métro would continue to invest for security reasons and to protect the investments already made, but also that Gaz Métro's Board of Directors recognizes that non-regulated activities earn higher returns and is seriously considering this issue before investing new money.

Q20. Are you aware of instances in which a regulated industry has not invested adequate amounts?

A20. Yes, I am aware of instances in which bodies of rate-regulated assets have in fact become materially inadequate due, at least in part, to low returns. The U.S. rail system, for example, used "deferred maintenance" as a major source of cash flow for a number of years.[27] The result was that by the start of the 1980s, "the state of the [rail] roadbed ... reached crisis proportions."[28] More recently, the U.S. electric transmission grid proved to be so inadequate that the U.S. Federal Energy Regulatory Commission ("FERC") implemented a number of

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[26] This is one reason that regulated firms can have so much trouble adapting to competition if it appears. See A. Lawrence Kolbe and Richard W. Hodges, "EPRI PRISM Interim Report: Parcel/Message Delivery Services," report prepared for the Electric Power Research Institute, RP-2801-2 (June 1989), reprinted in S. Oren and S. Smith, eds., *Service Opportunities for Electric Utilities: Creating Differentiated Products*. Boston: Kluwer Academic Publishers (1993).

[27] See, for example, Ann F. Friedlaender and Richard H. Spady, *Freight Transport Regulation*, Cambridge, MA: The MIT Press (1981), pp. 8-9.

[28] *Ibid.*, p. 9.

special measures, including premium rates of return, to induce rapid new investment.[29] The FERC viewed inadequate rates of return as an important reason for the underinvestment.[30]

The transmission example highlights the fact that once problems develop with a system of rate-regulated assets, they cannot be overcome in a hurry, any more than a supertanker can immediately resume its previous course. Not only do remedial investments take time, but also they take longer to get started and/or are more expensive.

Q21. Why is that?

A21. Investors, once burned, will be loath to trust that the regulatory jurisdiction in question would not repeat the same pattern. If regulators subsequently ask for quick investments to shore up a system that the previous policy let decay, or to extend service to new customers,

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[29] FERC, *Promoting Transmission Investment through Pricing Reform*, Docket No. RM06-4-00; Order No. 679, July 20 2006, and Order No. 679-A, December 22, 2006 (available at: http://www.ferc.gov/industries/electric/indus-act/trans-invest.asp). See also the Testimony of Pat Wood, III, Chairman, Federal Energy Regulatory Commission, Before the Government Reform Subcommittee on Energy and Resources, U.S. House of Representatives, June 8, 2005 (http://www.ferc.gov/eventcalendar/Files/20050608124932-testimony-wood.pdf), and the Testimony of the Honorable Joseph T. Kelliher, Chairman, Federal Energy Regulatory Commission, Before the Government Reform Subcommittee on Energy and Resources, U.S. House of Representatives, July 12, 2006 (http://www.ferc.gov/EventCalendar/Files/20060712145318-kelliher-test-07-12-06.pdf). An update on this process is in the Testimony of the Honorable Joseph T. Kelliher, Chairman, Federal Energy Regulatory Commission, Before the Committee on Energy and Natural Resources, United States Senate, July 31, 2008 (http://www.ferc.gov/EventCalendar/Files/20080731102123-Chairmantestimony.pdf).

[30] The 2006 Kelliher testimony cited in the previous footnote states at p. 6 (mimeo version),

> Let me start with transmission. Our nation's transmission system has suffered from underinvestment for years. ... Transmission underinvestment is a national problem. We need a national solution. Using important provisions of [recent legislation], the Commission is addressing two key impediments to transmission: the failure of transmission rates to give a strong enough incentive for investment and the difficulty in siting new lines.
>
> Transmission investment will not return unless the rates companies are allowed to charge for transmission give them a strong incentive to invest in new transmission.

It is true that the FERC's premium returns are only granted on new investment, but the costs of the previous underinvestment are borne until the problem is corrected, which cannot happen overnight. Those costs are material and sometimes huge (e.g., if a "load pocket" develops). The 2008 Kelliher testimony at pp. 13-16 (mimeo version) reports some success at inducing materially higher rates of transmission investment with these premium returns, but the FERC continues to press for even more transmission investment, so the problems are not yet solved. Thus, it is cheaper on balance to pay an adequate return all along than to bear the costs of an undercapitalized industry.

such experience-based concerns can prove very costly. The safest way for investors to avoid inadequate returns on future major investments in such a jurisdiction is to keep the system capital-starved.

If new capital were to be forthcoming, it therefore would have to be on terms that reduced the risk of similar treatment in the future. For example, the company might not invest unless regulators were willing to negotiate *ex ante* terms that assured a fair return on incremental investment, at least. Such negotiations at the very least take time and cost extra money. They also lead to a higher rate of return and/or to a shift of more risk to customers than could have been achieved by a policy of allowing the company a fair opportunity to earn its cost of capital all along.[31] (In this regard, I would note that Mr. Engen's evidence in this proceeding describes the recent prevalence of negotiated rates of return for new Canadian investments in natural gas infrastructure, which, as discussed below, has economic implications for the adequacy of the formula rates of return now in use.)

Finally, even if the company in question stops short of a *de facto* exit strategy, those most likely to pay attention to inadequate returns for one rate-regulated company are investors in and managers of other rate-regulated industries in the jurisdiction. They may grow cautious about new investment, even if they have not yet been affected directly. Rate-regulated industries tend to provide basic services, so a reluctance to invest in these industries, whether solely in the one directly affected or in all of them, is very likely to spill over to the rest of the jurisdiction's economy.

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[31] This assessment of the high costs of inadequate returns is evidently shared by regulators in New Zealand, which adopted rate regulation much later than Canada or the U.S., with access to decades of additional economic research. The New Zealand Commerce Commission has published its "Draft Guidelines: The Commerce Commission's Approach to Estimating the Cost of Capital" (http://www.comcom.govt.nz//Publications/ContentFiles/Documents/WACC%20Draft%20Guidelines0.pdf). (This link may need to be pasted into a browser.) The Commerce Commission regulates electricity and gas in New Zealand, among other industries. The Commerce Commission calculates the statistical uncertainty associated with its estimate of the overall rate of return the regulated company requires. Given this distribution, as the document summarizes on p. 32,

> the Commission notes that the consequences of finding excess returns when they do not exist, or setting prices too low, are more severe than the contrary error. The Commission therefore generally chooses a[n overall rate of return] equal to or above the mid-point or the 50th percentile to reflect this asymmetry in risk.

Q22. But suppose a company is able to support its current investment needs through a combination of new debt, depreciation, and retained earnings, and that it could easily raise modest amounts of equity if required. Is this not proof that the company's allowed return on equity, however arrived at, is adequate?

A22. No, for several reasons.

First, companies routinely select internal sources of cash and debt over new equity when financing new investments. This phenomenon is so widespread that attempts to explain it have given rise to one of the leading theories of corporate capital structure, the "pecking order" hypothesis.[32] The underlying economics of the mix of securities companies use to finance investment is a complicated topic that is the subject of an enormous economic literature, which still contains major unresolved issues after a half-century of active research.[33] That literature implies that no inferences may legitimately be drawn regarding the adequacy of the rate of return based solely on the mix of securities used to finance new investment.

Second, the fact that debt can be floated successfully says essentially nothing about the adequacy of the return on equity. The failure of a debt issue would signal a major financial problem for a company, but a successful issue says only that any financial problems the company has are not yet devastating. Debt is a senior security, and it can be successfully issued even if the return on equity is inadequate, as long as the new issue does not tip the company's leverage so far that it induces serious financial distress.

Third, the fact that a company may continue to make some investments does not imply that its return is adequate. For example, investments may be required for security reasons or to avoid even greater losses of value on already-sunk capital.

Finally, the overall return must be fair whether there is an immediate need for a large equity infusion or not. It is in no way inappropriate to pay the true cost of equity at all times, even when new equity is not needed. To the contrary, a policy in which the return were allowed to become unfairly low once capital was sunk and raised only when more capital again was needed, would deny a fair return overall, raising the concerns just discussed.

[32] See Appendix C for more discussion of the pecking order hypothesis.

[33] Again, see Appendix C for an overview of the main threads of that literature.

Therefore, the fact that only a modest equity issue that could be readily absorbed might be needed at any particular time says nothing about the adequacy of the then-existing equity rate of return, either.

Q23. Please sum up.

A23. A systematic failure to provide fair returns to today's investors might give service below cost to today's customers, but it would also create material problems for tomorrow's customers and very probably for the jurisdiction's economy. The optimal strategy for investors in such a company is to keep it capital-starved, and possibly even to exit the jurisdiction. As time passes, that will lead to less reliable and/or less extensive service. Unfortunately, while systems consisting of long-lived assets take a long time to "break," once "broken" they also take a long time to fix. Moreover, tomorrow's investors will not put up new money to fix such systems on the old terms. Even after such a system is restored, it will cost tomorrow's customers more than it would have without the initial decision to give today's investors inadequate returns.

III. "THERE IS NO 'MAGIC' IN FINANCIAL LEVERAGE"

Q24. What is the purpose of this section?

A24. It describes how a company's decision to issue debt affects the risk and required return on its assets, and what that in turn implies for its cost of equity.

Q25. As a preface, please briefly review how companies raise money from investors.

A25. Companies raise money by selling securities that give investors a claim on part of the cash that flows from the company's operations. Different securities (e.g., common stocks or corporate bonds) have different claims on the firm's cash flows.[34] Debt has a senior claim on a specified portion of the cash. Common equity, the most junior security, gets what's left

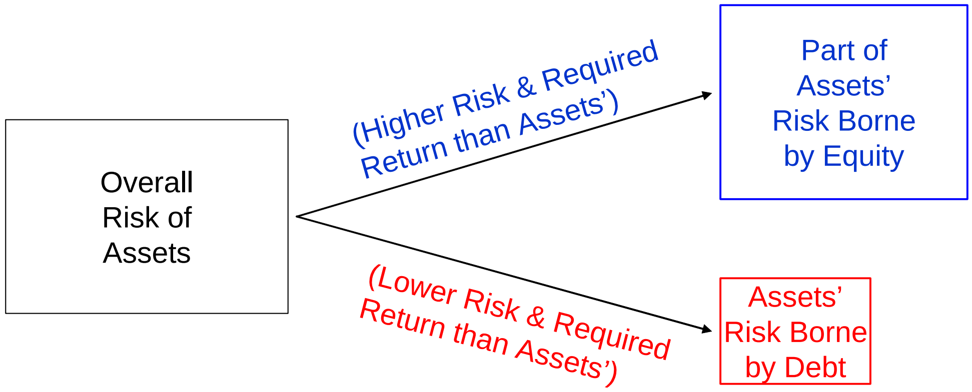
[34] If the company gets into enough trouble that it can't honour the claims on its cash flows, the different securities also have claims of different priority on its assets (e.g., in a bankruptcy proceeding).

after everyone else has been paid.[35] The mix of financing sources (i.e., debt and equity) a company uses to buy its assets is known as its "capital structure," which can be stated in both dollar and percentage terms.

Q26. How do the differences in priority affect the required returns on the different types of security?

A26. Since equity is last in line when the company's money is allocated, it bears the most risk. Investors accordingly require a higher rate of return on equity than on debt. However, except at extreme debt levels, the overall level of risk of the firm does not change materially due to the addition of debt. The various securities just divvy that risk up. Figure 2 illustrates these principles.

The Overall Risk of a Company's Assets is Split between Equity (higher risk) and Debt (lower risk)



Key Points:

1. Overall firm risk does not change materially with modest levels of debt, it merely is divided among the firm's securities.
2. The higher the risk, the higher the rate of return required to induce investors to bear it. Equity bears most of the risk and so requires a higher rate of return.

Figure 2

[35] Financial markets are very inventive in creating new securities. It simplifies the discussion to focus on the two most basic types, ordinary debt and common equity, but the same general principles apply to other securities as well. In the remainder of this evidence, "equity" by itself refers to common equity, and preferred equity is identified as such or simply as "preferred."

Q27. Why do you address this topic?

A27. The cost of equity cannot be looked up in the financial pages. It must be estimated using capital market evidence from one or more samples of companies. The resulting market-based estimates will, of course, reflect the risk the samples' shareholders bear from holding the equity.

A stock's risk depends in part on the amount of debt the company issues, since (as explained below) debt magnifies the risk equityholders bear. The extra risk created by debt's magnification of equity risk (and hence of the cost of equity) is known as "financial" risk.

The cost of equity is measured at the stock's actual level of financial risk, based on its actual capital structure. But the allowed rate of return on equity is applied to a regulated rate base that might have a quite different capital structure. If the sample companies had had that capital structure, then, estimation errors aside, *their estimated costs of equity would have been different*, which would produce a different value for the allowed rate of return on equity. Therefore, differences in the level of financial risk between the sample companies and the regulated company must be considered and controlled for, if market-based evidence is to provide an accurate assessment of the regulated company's cost of equity at its regulatory capital structure.

Q28. How does the remainder of this section provide the information necessary to consider and control for differences in financial risk?

A28. It first explains why debt magnifies the risk of equity.[36] There is an unbreakable link between the cost of equity and capital structure because of this risk magnification. The section then turns to some of the fine points that govern precisely how the cost of equity changes with the amount of debt. These involve the combined effects of corporate and

[36] Preferred equity acts much like debt in magnifying common equity's risk. However, as noted earlier, it simplifies the discussion to focus on debt and common equity alone.

personal taxes and of the non-tax effects of debt (e.g., the costs of financial distress) on the overall risk and value of the firm's assets.[37]

A. THE RISK-MAGNIFYING EFFECTS OF DEBT

Q29. Why do you say there is an "unbreakable" relationship between the cost of equity and capital structure?

A29. The cost of equity depends on the risks investors must bear. More debt means more risk for equityholders. More debt therefore means equityholders will demand a higher expected rate of return on their equity to invest voluntarily (i.e., will have a higher cost of equity). This part of the section briefly explains the risk impacts of debt. Appendix B provides an extended, non-technical illustration of these points.

Q30. Why does more debt mean more risk for equityholders?

A30. When a company uses debt, the overall risk of the company's assets falls on only a part of its capital, the equity (since the bondholders demand to be paid the same amount whether asset values rise or fall).[38] Suppose changes in some market-wide economic factor normally produce fluctuations within a band of plus or minus ("+/−") 2 percent of the market value of a company's assets. At 100 percent equity, these changes produce fluctuations of +/− 2 percent of the market value of the company's equity, too. But at a 50-50 market-value debt-equity ratio, 2 percent of asset value equals 4 percent of equity value. Therefore, the same asset value fluctuations produce equity value fluctuations of +/− 4 percent. At a 75-25 debt-equity ratio, the fluctuations are +/− 8 percent of the market value of the company's equity. Figure 3 illustrates this point for debt-equity ratios of 0-100, 25-75, 50-50, and 75-25.

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[37] The precise way such forces affect the overall cost of capital has been a topic raised in earlier proceedings, but the basic effect of debt on the risk of equity is entirely independent of this issue.

[38] Of course, if a company uses excessive debt, raising the risk of financial distress or bankruptcy, bondholders start to bear part of the overall risk as well. But they still have better protection than equityholders.

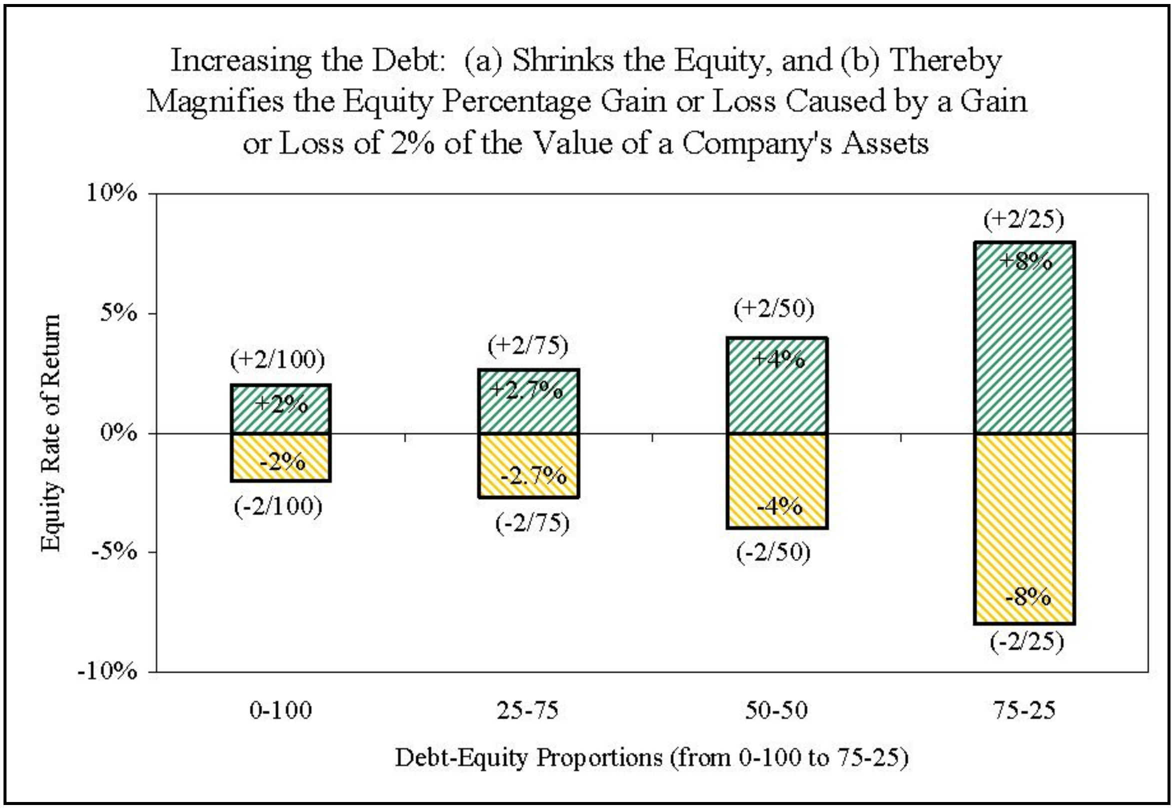

Figure 3

Q31. **Why do you use market-value instead of book-value capital structures in the above example?**

A31. Because market values directly determine the amount of financial risk equity investors actually bear. When the value of a firm's assets fluctuates in response to market-wide, non-diversifiable risk factors, equity fluctuates more, as just illustrated. How much more depends solely on the initial proportions of debt and equity in the market value of assets. The book capital structure literally never enters the picture. (Appendix B illustrates this point as well.)

Q32. **What are the basic points to take away from this discussion?**

A32. There are three:

1. *Debt magnifies equity's risk, and at an ever increasing rate.*

2. *Therefore, the required rate of return on equity goes up at an ever increasing rate as a company adds more debt.*

3. *Market values, not book values, determine the risk impacts of capital structure on the market cost of equity.*

B. IMPLICATIONS OF RESEARCH ON DEBT'S EFFECTS

Q33. What does the economic research show about the effects of debt on a firm?

A33. Considerable research has been done on this topic, reaching back nearly half a century. Much of that research looks at taxes. It also addresses other issues, such as the risk of financial distress or bankruptcy and the signals corporations send investors by the choice of how to finance new investments. The bottom line is that such factors enrich the details but do not change the above three messages.

Q34. Please summarize the salient parts of this literature.

A34. A more technical discussion is in Appendix C. Briefly, firms that use no debt are less valuable because they forego the corporate tax shield that interest expense provides. But personal taxes on debt are higher than on equity, offsetting some of debt's corporate tax advantage. Additionally, too much debt risks financial distress, reducing firm value. And more generally, after 50 years of research, we still do not have a way to determine the optimal capital structure for a firm, which implies debt cannot have a first-order impact on the value of the firm.

Therefore, the maximum value of the firm for most industries lies somewhere between the extremes of its possible capital structures. However, the lack of a first-order impact on value implies that debt cannot have a material effect on the value of the firm within a broad middle range of capital structures.

Q35. Can you depict what you mean?

A35. Yes, Figure 4 illustrates the implications of the research. It shows the present value of an investment in each of four different industries. For simplicity, the investment is expected to yield $1.00 per year forever. For firms in relatively high-risk industries (Industry 1 in the graph, the lowest line), the $1.00 perpetuity is not worth much and any use of debt decreases firm value. High-tech startups, for example, are better financed by equity than by debt. For firms in relatively low-risk industries (Industry 4 in the graph), the perpetuity is worth more and substantial amounts of debt make sense. Industries 2 and 3 are intermediate cases.

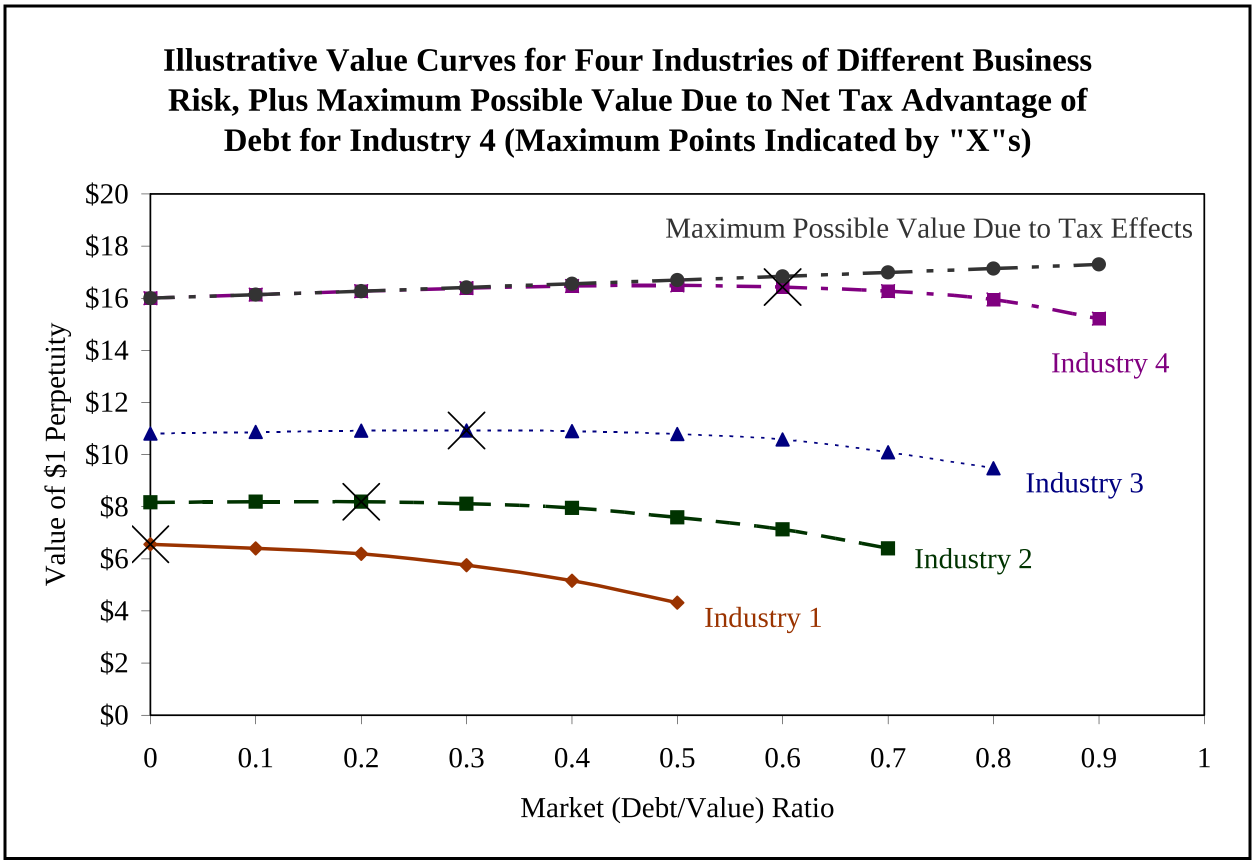

Figure 4

The maximum rate at which taxes can increase firm value in this figure equals the present value of 10 percent of the interest expense. Ten percent is the assumed net (corporate versus personal) tax advantage of debt.[39] The figure plots the maximum possible impact of taxes on the lowest-risk industry (Industry 4) as a separate line.

While Figure 4 identifies one point as the maximum value on each of the four curves, the research shows that it is impossible to identify this maximum point in practice (except

[39] See Appendix C, Table C-3, for calculation of the net corporate-over-personal tax rates. Based on recent changes in dividend taxation, 10 percent actually overstates the maximum possible tax advantage of debt. The current value is at most about 4 percent for the average corporation, and less for Gaz Métro.

in the extreme case where no debt should be used). The research also shows that capital structure has little effect near the top of the value curve. Even low-risk industries (Industry 4) eventually must reach a broad range where changes in the debt ratio make little difference to firm value.

Q36. What do these findings imply for the cost of capital?

A36. Since firm value is independent of capital structure within a broad middle range, the cost of capital used to calculate that value in a standard investment project evaluation must also be independent of capital structure within that range.

Q37. Please explain.

A37. The standard investment valuation approach discounts an investment's expected all-equity after-tax operating cash flows at the risk-appropriate after-tax weighted-average cost of capital.[40] The all-equity operating cash flows by definition do not vary with capital structure. The research shows that the market value of a firm also does not vary with capital structure (within a broad middle range). If the cash flows do not vary with capital structure and the value of the firm does not vary with capital structure, then neither can the discount rate.[41]

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[40] See, for example, Richard A. Brealey, Stewart C. Myers and Franklin Allen, *Principles of Corporate Finance*, 9th ed., New York: McGraw-Hill/Irwin (2008), Chapter 20. (In the eighth edition of this text, Prof. Allen joined Profs. Brealey and Myers as an additional author.) Recall that the ATWACC is the weighted average of the cost of equity and the current, after-tax cost of debt, using market-value weights. This quantity typically is called the "weighted-average cost of capital" or "WACC" in finance textbooks. However, rate regulation in North America often works with another "weighted-average cost of capital," the *book*-value weighted average of the cost of equity and the *before-tax*, *embedded* cost of debt. Accordingly, in regulatory settings it's useful to refer to the textbook WACC as the "ATWACC." I follow that practice here.

[41] For example, in the simplifying case of a constant perpetual cash flow,

Firm Value = (All-Equity Expected Cash Flow) / (Discount Rate).

If Firm Value and All-Equity Expected Cash Flow are constant, then the Discount Rate must be, also. (For completeness, I would note that this finding does not depend on the simplifying assumption of a constant perpetual cash flow.)

Since the discount rate in such calculations is the ATWACC, the ATWACC does not vary within the broad middle range.[42]

Q38. Can you depict this relationship, also?

A38. Yes, Figure 5 plots the after-tax weighted-average costs of capital (ATWACCs) that correspond to the value curves in Figure 4. This picture just turns Figure 4 upside down.[43] All the same conclusions remain, except that they are stated in terms of the overall cost of capital instead of the overall firm value. In particular, except for high-risk industries, the overall cost of capital is essentially flat across a broad middle range of capital structures for each industry, which is the only outcome consistent with the research.

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[42] Brealey, Myers and Allen, *op. cit.*, p. 545.

[43] Note that the actual estimated ATWACC at higher debt ratios will tend to underestimate the ATWACC that corresponds to the value curves in Figure 4, as depicted in Figure 5, and so will tend to overestimate the value of debt to the firm. The reason is that some of the non-tax effects of excessive debt, such as a loss of financial flexibility, may be hard to detect and not show up in cost of capital measurement. Also, the value of the firm will fall at high debt ratios for reasons that can be entirely independent of the cost of capital, strictly defined. Therefore, the true ATWACC for project valuation purposes, at least at high debt ratios, is higher than the simple average of an industry sample of ATWACCs, but this refinement cannot be made with available estimation techniques. This conclusion carries over to rate regulation, too. The actual overall rate of return necessary to cover all costs at higher debt ratios exceeds the estimated ATWACC from a group of comparable-risk sample companies.

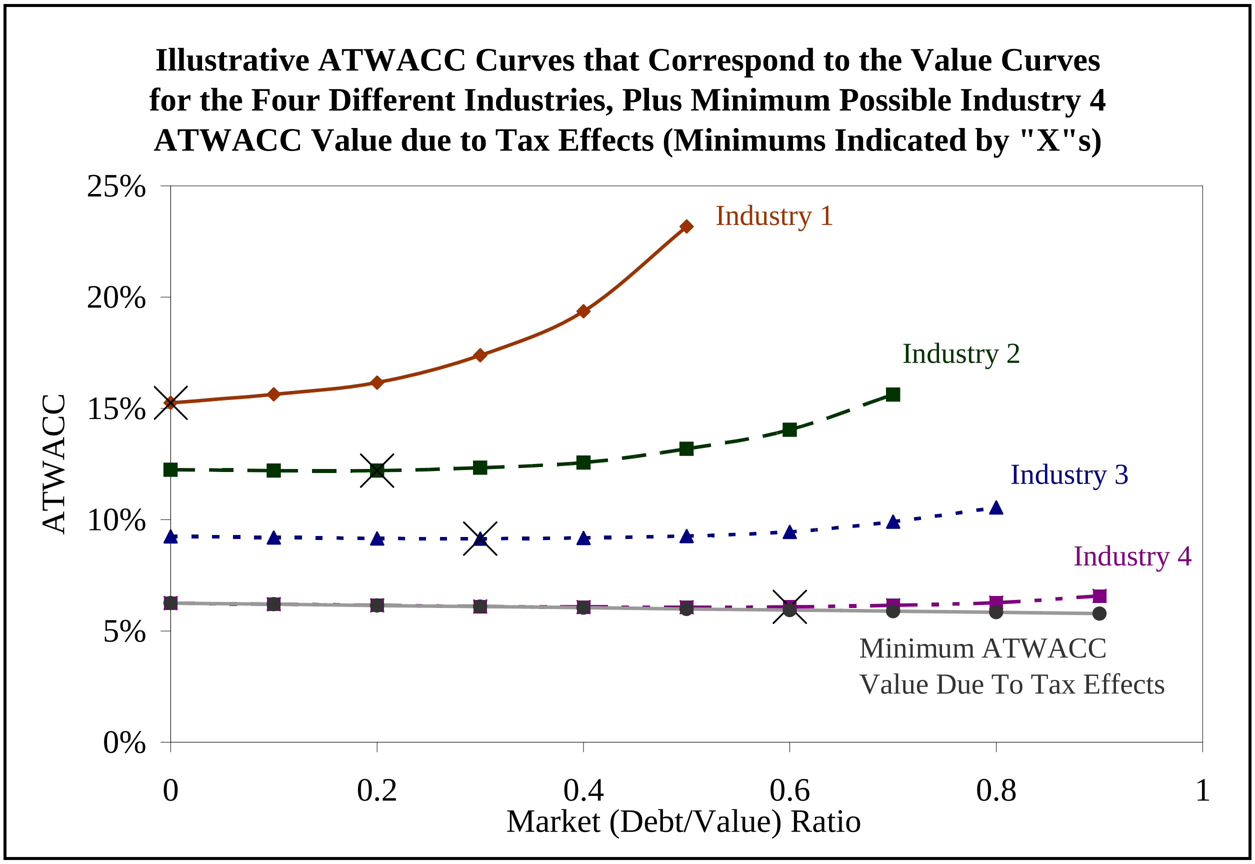

Figure 5

Q39. **How does this discussion relate to estimation of the right cost of equity for ratemaking purposes?**

A39. The estimated cost of equity for a sample of companies reflects the sample's actual market-value capital structure, which already includes debt. The estimated sample ATWACCs therefore are already out somewhere in the middle range. Accordingly, analysts should treat the sample's average ATWACC as a constant that can be compared "apples to apples" across different firms or industries.

The economically appropriate cost of equity at the *regulatory* deemed equity ratio will produce the same, market-determined ATWACC. That is the cost of equity that a comparable-business-risk sample would have had, estimation problems aside, if the sample's market-value equity ratio had equaled the deemed equity ratio.

C. CALCULATION OF COSTS OF EQUITY AT ALTERNATIVE CAPITAL STRUCTURES AND DEEMED EQUITY RATIOS AT ALTERNATIVE COSTS OF EQUITY

Q40. Given the ATWACC of a sample, please illustrate how an analyst can calculate the cost of equity at a capital structure different from the sample's.

A40. Figure 6 shows the starting point. The after-tax weighted-average cost of capital is mildly U-shaped, as in Figure 5. Consistent with the research, the ATWACC curve is essentially flat in a broad middle range, shown here for purely illustrative purposes as lying between market-value capital structures of about 35 and 70 percent debt (i.e., 65 to 30 percent equity). Since the overall cost of capital is essentially constant as the proportion of risk-bearing equity shrinks, the associated risk and cost of equity must rise at an ever-increasing rate.

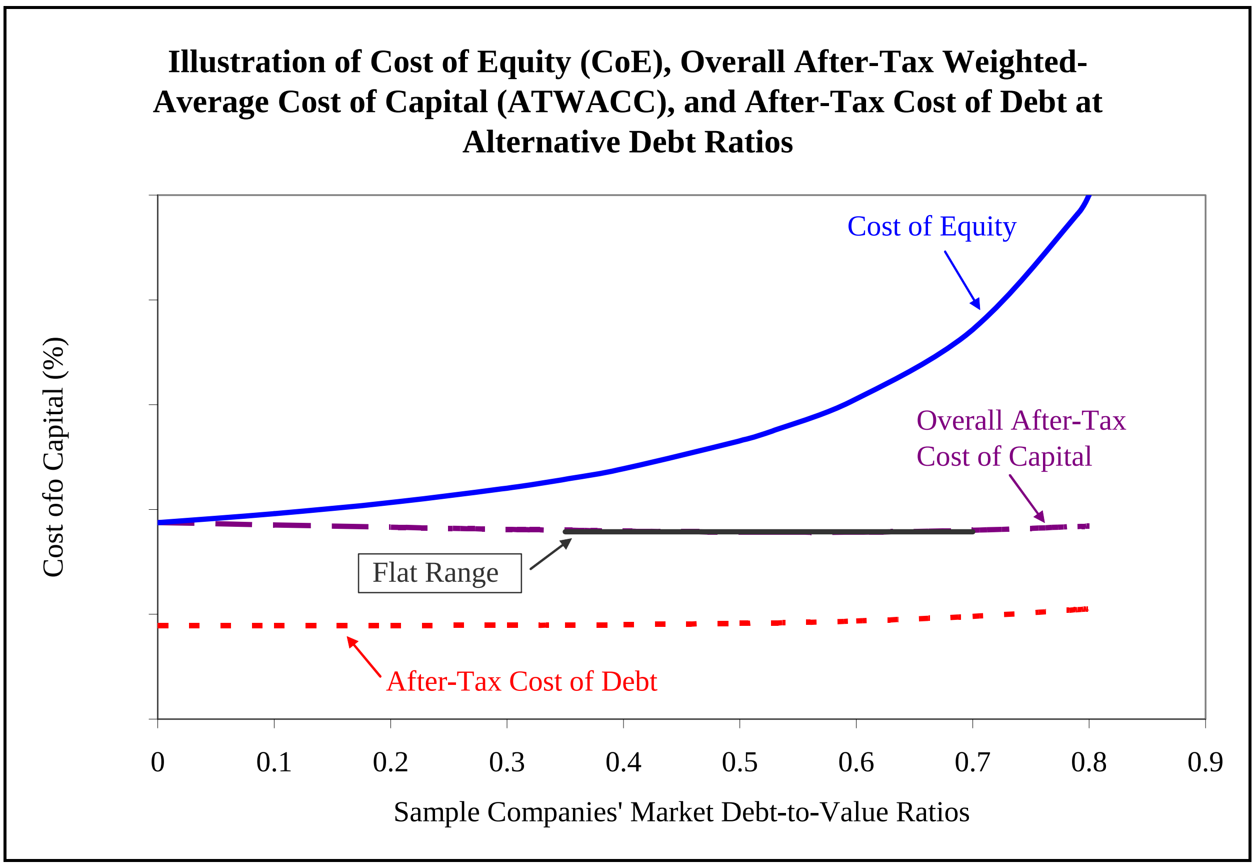

Figure 6

The cost of equity at an alternative capital structure is readily calculated from the sample's ATWACC, as Figure 7 illustrates. First specify the alternative debt ratio on the horizontal axis, and then calculate the associated cost of equity on the vertical axis. This procedure simply recognizes that business risk is measured by the ATWACC, and the correct cost of equity at an alternative debt ratio must be the one that provides compensation for the same level of business risk.

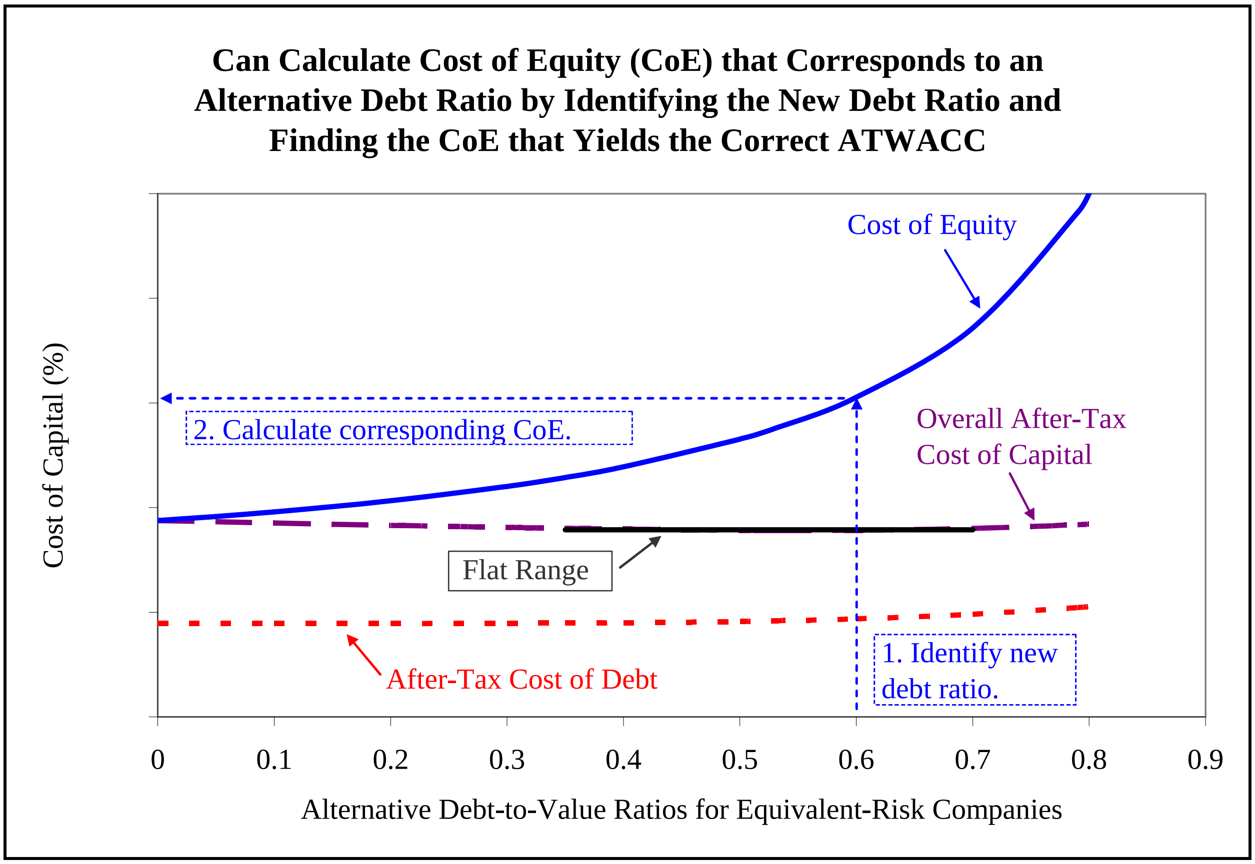

Figure 7

Q41. Does Figure 7 depict the basic process that you later use to calculate the required returns on equity at Gaz Métro's deemed 38.5 percent and actual 46 percent equity ratios?

A41. Yes, it does.

Q42. Suppose the Régie wanted to pick a particular return on equity and calculate the deemed equity ratio that corresponds to the overall ATWACC. How would that be done?

A42. The analysis would simply turn Figure 7 on its side, as in Figure 8. Figure 8 uses the equity ratio as the vertical axis and the rate of return as the horizontal axis. This amounts to rotating Figure 7 by 90 degrees clockwise. Now a new cost of equity is specified on the horizontal axis, and the deemed equity ratio that corresponds to the sample's overall business risk is calculated on the vertical axis.

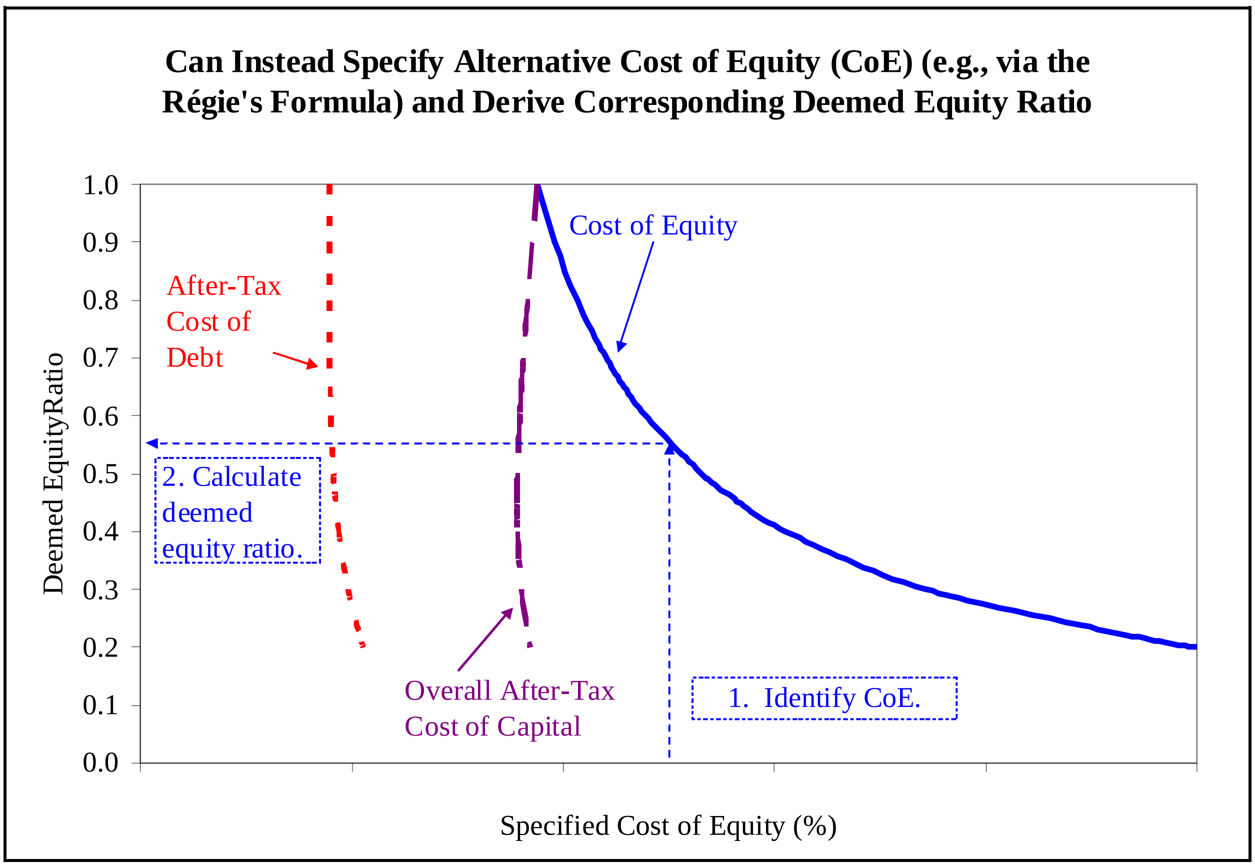

Figure 8

The result will be the deemed equity ratio that yields the ATWACC that the market requires. That deemed equity ratio is also the market-value equity ratio that the analyst would have observed, estimation problems aside, if the sample's market cost of equity had been equal to the some alternative value, such as that under the Régie's formula for Gaz Métro. For these reasons, that value is the appropriate allowed deemed equity ratio at the alternative cost of equity.

D. REGULATORY APPLICATION OF ATWACC ELSEWHERE

Q43. Before you leave this section, please state whether the ATWACC as you define it here has been used as the rate of return standard in other regulatory applications.

A43. Yes. Of course, it has just been adopted by the NEB for TQM. More generally, it is widely used outside North America, in countries that "privatized" state-owned utilities and instituted rate regulation much later than we did here, with the advantage of access to the modern financial literature. To the best of my knowledge, it is used at least in Australia, Austria, Belgium, Finland, France, Ireland, Luxembourg, Italy, the Netherlands, New Zealand, Sweden, and the United Kingdom.[44] Also a variant of the ATWACC is used in the U.S. by the Surface Transportation Board to establish "revenue adequacy" standards for railroads.[45]

Q44. What factors lead to this widespread use outside North America, in your view?

A44. Part of the reason is surely that these jurisdictions adopted rate regulation much more recently than in North America, with the advantage of access to the modern financial literature. The ATWACC is the modern, textbook answer to what rate of return is required to justify an investment, so it is the natural standard to apply in rate regulation if starting from scratch. Businesses around the world evaluate investments by discounting their all-equity after-tax cash flows at the ATWACC.

It also is simpler for regulators to administer, because regulators do not have to worry about a company's individual capital structure as long as it falls within a reasonable middle range. With an ATWACC-based revenue requirement, as in unregulated markets, customers pay the same amount regardless of the company's capital structure decisions. (The price of tomatoes does not depend on the size of the farm's mortgage.) Use of ATWACC also

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[44] My understanding for many of these countries does not come from direct review of regulatory documents, due to language barriers. Additionally, my failure to mention a country is due only to my lack of knowledge; I am aware of no country outside North America that does not rely on ATWACC.

[45] The Surface Transportation Board uses the market-value weighted average of the railroads' cost of equity and pre-tax cost of debt.

automatically guarantees internal consistency between a company's equity ratio and its cost of equity. There is no need to go through the exercise depicted in Figure 7 above to obtain such consistency if you start and finish with the ATWACC itself.[46]

In short, ATWACC is simply the natural choice for regulators outside North America to have made when establishing their procedures.

IV. ANALYSIS OF RISK-RETURN ISSUES RAISED PREVIOUSLY

Q45. What is the purpose of this section?

A45. Dr. Vilbert and I have been basing cost of capital evidence on ATWACC and urging its adoption by Canadian regulators for a decade now, since first submitting evidence to the Alberta Energy and Utilities Board ("AEUB") on behalf of TransAlta Utilities in 1998. Over that period, a number of questions and concerns about the approach have been raised. We have now appeared three times before the NEB, and it appears that the NEB's questions and concerns about the use of ATWACC as a rate of return standard have now been adequately addressed, at least in the case of TQM. The main purpose of this section is to review what I believe to be the principal issues that have arisen in prior proceedings as potential barriers to the adoption of ATWACC, so that the Régie has before it both the issues raised and the resolutions of them that we have submitted for regulators' consideration.

Additionally, I address an issue that the NEB raised specifically during the TQM hearing, which is how to treat the embedded cost of debt under regulation using the ATWACC directly as the method of calculating the revenue requirement. Lastly, I address an issue that arose before the Régie in Gaz Métro's 2009 rate case, how to compensate investors for the costs of issuing equity.

This section analyzes these topics in the above order.

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[46] That said, there is no harm to doing so as long as consistency between the cost of equity and the financial risk implied by a given capital structure is maintained. This is how I determine the illustrative costs of equity associated with the deemed 38.5 percent and actual 46 percent equity ratios for Gaz Métro, for example, and it is how the Régie should obtain the appropriate deemed equity ratio for Gaz Métro if it decides to adopt a cost of equity based on some other calculation (but using Figure 7 turned on its side, as in Figure 8).

A. PREVIOUS REGULATORY COMMENTS ON ATWACC-BASED EVIDENCE

Q46. What have Canadian regulatory bodies said about the general use of ATWACC-based evidence, to your knowledge?

A46. The AEUB discussed aspects of the topic in a 1999 decision, but not in its 2004 Generic Cost of Capital decision.[47] The most recent discussion prior to the TQM decision came in the NEB's RH-2-2004 Decision. In that proceeding, the focus was on the appropriate deemed equity ratio for the TransCanada Mainline. While adhering to this focus, the Mainline based its deemed equity ratio recommendations on the capital structure principles described above, which led to comments by the NEB.

In particular, the NEB in Decision RH-2-2004 at p. 54 accepted "that ATWACC-based methodologies have theoretical merit." Also, at p. 55 the decision says, "The Board accepts that, over a certain range, the ATWACC curve may be flat or virtually flat." However, the NEB also stated at p. 54 that "a number of empirical concerns limit [ATWACC-based methodologies'] usefulness as a tool to assess cost of capital or the Mainline's appropriate deemed equity ratio."

Q47. What did these statements signify for your TQM evidence?

A47. I took these statements to mean that for the NEB, the issue was no longer whether the principles are sound, but whether the evidence is adequate. As a result, Dr. Vilbert and I attempted in our TQM evidence to address explicitly the concerns the NEB enunciated in Decision RH-2-2004. Appendix E to this evidence describes how we addressed both the NEB's concerns in Decision RH-2-2004 and the AEUB's concerns in Decision U99099.[48]

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[47] The ATWACC principles were set out in my evidence in Alberta's generic cost of capital proceeding, Decision 2004-052, but there is no discussion of the AEUB's views about these principles in Decision 2004-052. I am also aware that the AEUB accepted the ATWACC as one standard but implemented it using book-value rather than market-value weights in its Decision U99099, 1999/2000 Electric Tariff Applications, 25 November 1999 ("Decision U99099") based in part on analyses introduced for the first time on argument, without the opportunity for expert evidence in response. Appendix E to this evidence addresses the issues raised in Decision U99099.

[48] Appendix E also considers certain aspects of another issue that has arisen in the past, whether there are material differences in the cost of capital for new, stand-alone pipeline investments and that of already-existing pipelines.

Q48. Please review the major points in that discussion.

A48. While the Appendix E discussion addresses all of the NEB's previous concerns in detail, the three chief points are:

- There were concerns over the lack of sample companies in the gas pipeline business that were substantially mitigated in the TQM proceeding by a new sample of pipeline limited partnerships in Dr. Vilbert's evidence. (Of course, there are gas LDC companies in Dr. Vilbert's present sample, so this issue is also directly addressed for Gaz Métro.)
- The fact that the Canadian sample companies own unregulated businesses does *not* imply its estimated cost of capital is necessarily above the cost of capital of the regulated businesses. Additionally, as Dr. Vilbert's Gaz Métro evidence shows, Canadian utility betas were until recently on a clear upward trend from their unexplained fall to essentially zero in the early years of this decade. The current estimates of that sample's cost of capital thus understate their true cost of capital, even absent the effects of the economic crisis.
- Even if a particular sample of companies were operating with less leverage than necessary to reach the range where the ATWACC is essentially flat (a postulate for which no evidence exists), the impact on Dr. Vilbert's cost of capital estimates would be very small, because the maximum rate at which the ATWACC can decline is so small. (See Figure 5 above and the accompanying discussion, as well as Appendix C, Section II.)

Q49. What about the AEUB's concerns in Decision U99099?

A49. Appendix E shows that:

- A plot of ATWACCs versus capital structures will tend to be downward sloping because of factors that distort the comparison and/or because of factors left out of the measured ATWACC. However, that does not invalidate the conclusion that the true ATWACC is essentially flat across a broad middle range of capital structures. Use of the estimated ATWACC will tend to understate the appropriate rate of return, if anything.

- The ATWACC should be calculated with market-value rather than book-value weights even for companies regulated on a book-value rate base (a point accepted by the NEB in the TQM decision).
- It turns out that stock prices are more complicated than our simple models can encompass. As a result, the market-to-book ratio test lacks a firm conceptual foundation. Moreover, the levels of utility market-to-book ratios observed in recent years are simply too high to be the result of rational pricing based on the present value formula that underlies the market-to-book test. Regulatory bodies therefore can no longer rely on the market-to-book test to test the adequacy of allowed returns on equity.

Q50. Please sum up.

A50. Dr. Vilbert and I believe we have directly addressed and resolved both the NEB's and the AEUB's previously identified concerns about the nature of the ATWACC evidence. It appears that the NEB has accepted as adequate our proposed resolutions of the objections to the use of ATWACC as the rate of return standard in the case of TQM, at least. I would hope that the Régie will feel that it can take advantage of this history to make use of ATWACC-based evidence in this proceeding and to adopt ATWACC as the standard for Gaz Métro's rate of return.

B. TREATMENT OF EMBEDDED INTEREST EXPENSE UNDER AN ATWACC-BASED RATE OF RETURN STANDARD

Q51. How did the issue of treatment of embedded interest expense arise?

A51. Rate regulation in North America typically treats actual interest expense as a cost of service, while the ATWACC is calculated with the current market interest rate. In the cases in which Dr. Vilbert and I have relied on ATWACC itself as a recommended rate of return, the company's cost-of-service filing has included an adjustment to permit the company to recover its actual, embedded interest expense instead of the interest allowance based on the current market interest rate.

However, during the TQM hearing, the NEB raised the question of whether the ATWACC should instead be adopted in full, with no adjustment for the difference between market and embedded interest expense.[49] The NEB decided to adopt the ATWACC with no adjustment for the difference between market and embedded debt costs for TQM because (1) it believed the approach to be superior, economically, and because (2) the difference between the ATWACC with and without such an adjustment was small in the case of TQM, so that the need to consider a grandfathering or transition phase did not arise.[50]

Q52. What are the pros and cons of a regulatory body's ultimately adopting an unmodified ATWACC-based system, without further adjustments for the differences between market and embedded debt costs for new debt?

A52. As an economist, I believe that all else equal, the more nearly regulation can replicate competition, the better. Unregulated firms' shareholders, not their customers, bear the risk and reap the rewards of fluctuations in interest rates, and an unmodified ATWACC-based rate of return standard would make the same true for regulated firms.

However, regulation is not competition, and there are potential costs to such a policy that should be considered in deciding how to proceed:

- First, unlike the case of TQM, a switch to an unmodified ATWACC-based system for Gaz Métro definitely would require a transition mechanism, which would involve some extra cost and complexity.
- Second, and of greater concern, is that the future gains and losses from the use of market interest rates to set the rate of return could cause problems down the road.

Q53. Since you say it is of greater concern, please start by explaining the second of these issues.

A53. Gaz Métro has had an incentive program in recent years that involves sharing the benefits of productivity gains with customers. The gains and losses from interest rate changes have the potential to greatly exceed the gains and losses under the incentive program, yet will be

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[49] See in particular the transcript for Hearing RH-1-2008, Volume 9, October 3, 2008 ("TQM Volume 9"), paragraphs 11763-11820 (questions to the TQM panel by Member George). Earlier passages bearing on this topic appear at paragraphs 11188-11233 and11438-11527 (questions by NEB Counsel Fowke), and paragraphs 11534-11572 (questions by the Chairman).

[50] TQM Decision, p. 81.

less under management control. A sharp fall in interest rates, which would reduce the unmodified ATWACC, could provide Gaz Métro with a material shortfall in its realized rate of return on equity, and a sharp rise an equally material excess. If the former comes first, by the time the latter rolls around it seems likely to be seen by customers as a fair implementation of the new system. But if the latter comes first, customers might be unhappy that they are paying much more in interest expense under an unmodified ATWACC-based system than the company actually sends out to bondholders. The result could be pressure on future regulators to justify maintaining the decision to use market interest rates.

This creates the potential for an asymmetric risk-reward system. Such systems have costs because of the factors discussed in Section II of my evidence.

Q54. Why do you say there could be a "material" excess in the return on equity?

A54. Gaz Métro's actual capital structure happens to be 54 percent debt, 46 percent equity. A one percentage point rise in interest rates, pre-tax, would imply about a 0.7 percentage point rise in after-tax interest rates. The resulting rise in the rate of return on equity would be (0.7 percentage points × 0.54 / 0.46) = 0.8 percentage points. (Of course, a fall in the interest rate would result in an equal shortfall in the rate of return on equity.)

Interest rates have been relatively stable in this decade compared to the past, but have still varied by materially more than one percentage point. Moreover, corporate debt can last a long time, which implies the potential for large movements in interest rates over the decades. Gaz Métro, for example, currently has coupon rates on its debt that range between 5.4 percent and 10.45 percent, which were current at the time of issue. Mr. Engen's evidence reports monthly values for long-term corporate bond yields from November 1977 through June 2007. These values range from 5 percent to 19 percent. Of course, we all hope such high rates are forever behind us, but confidence in our ability to manage the economy without disruptions of the sort seen in the past has necessarily been shaken by the current crisis. A market interest rate several percentage points or more above the then-current embedded rate cannot be ruled out, and it is certainly possible that such a rate would create customer concerns under an unmodified ATWACC approach.

Q55. Please now return to the first issue you mentioned. Why might a grandfathering or transition phase be required under a shift to an ATWACC-based rate of return?

A55. Debt now on the books of rate-regulated companies was issued under the current arrangement and designed to satisfy the standards regulators and regulated companies have worked out for such debt. An immediate switch to a revenue requirement based on the current market cost of debt would create windfall losses for customers on debt issues that had turned out to be relatively cheap at today's interest rates, and windfall gains on debt issues that had turned out to be relatively expensive. The impact on investors would be the reverse of the impact on customers. As time passed, the size of these windfalls relative to the current system would change from year to year, and they would vary from company to company in any given year.

If customers are to pay and investors to receive a fair return, basic changes in regulatory policies should be designed to avoid transition windfall gains and losses to the maximum extent possible. Moreover, if this is not done and the change happens to come at a time when customers benefit on average, investors may worry that the regulatory decision not to adopt a transition mechanism that avoids the windfall gain to customers is opportunistic, which could increase the rate of return investors demand going forward.

Q56. Why was such a mechanism not needed in the case of TQM, from your perspective?

A56. The TQM Decision reflects testimony by TQM that the difference in overall return in that case was within the inevitable band of uncertainty[51] associated with the fair return. However, as important as the size of the adjustment, from an economic perspective, is that TQM's existing debt would come up for renewal in 2009-2010.[52] Thus, the potential for material windfalls over the remaining life of TQM's debt was very limited.

Q57. Would an explicit transition mechanism be necessary for Gaz Métro?

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[51] In the original, bi-lingual transcript, "dans la marge de manoeuvre" (TQM Volume 9, paragraph 11780, M. Cabana in response to a question from Membre George).

[52] TQM Volume 9, paragraph 11812, Mr. Otis in response to a question from Member George.

A57. Absolutely. Some of Gaz Métro's debt runs into the 2030s, and the various issues have embedded interest rates both above and below current market rates. Windfall gains and losses for customers and investors on Gaz Métro's existing debt are inevitable, absent a transition mechanism.

Q58. How do you address this issue in the present proceeding?

A58. I calculate the adjustment necessary to the ATWACC to provide Gaz Métro with its actual interest expense on its existing debt. This is equivalent to maintaining the existing policy of recovering embedded interest expense under an otherwise ATWACC-based system. This policy could be maintained indefinitely if the Régie wished, or there could be a transition to an ATWACC-based system that operates without further modifications for the costs of embedded debt. The simplest transition mechanism would be to continue to make the adjustment for embedded interest expense for all Gaz Métro debt outstanding at the time of the transition ("old debt"), but not for debt issued afterwards ("new debt").

I describe the actual calculations involved below, when I present my findings for Gaz Métro's ATWACC.[53]

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[53] In the TQM hearing, I also raised the possibility of a transition through a one-time calculation, in which the present value of the difference between embedded and market interest expense was calculated and then amortised over a suitable period, with interest on the balance accruing until the amortisation was complete. (TQM Volume 9, paragraphs 11801-11803, in response to a question from Member George.) I do not consider that as an option here, for two reasons. First, it is not yet clear whether the Régie would wish to adopt an ATWACC-based system that ultimately abandons the traditional approach to embedded interest expense, and the grandfathering of Gaz Métro's embedded interest expense works equally well as a transition mechanism (since all Gaz Métro's debt is now "old debt" for this purpose) or as a continuation of the traditional approach. Additionally, on further reflection, I have had some second thoughts about a transition mechanism based on the present value of the difference at the time of the switch, since it would be less effective in preventing windfall gains and losses.

Of course, the most direct windfall gain or loss would occur with no transition, in which case the present value of the difference in interest expense would immediately flow from customers to investors or from investors to customers. Both transition mechanisms avoid this problem. However, market interest rates will continue to change as time passes. The present value of the interest rate difference will change as that happens, which implies that except at the moment of calculation, the second transition method will not be exactly right. Second-order windfall gains and losses on debt issued under the old rules will continue. In fact, by chance there could be *no* difference between current and embedded interest rates at the time of a switch to an unmodified ATWACC standard for some company with long-lived debt, but very material interest rate differences later on. This would impose material gains and losses on debt issued before the switch with no compensation at all. The first method, grandfathering interest expense on old debt, avoids this problem and therefore is more effective.

Q59. Do you have a recommendation regarding the treatment of the embedded cost of debt?

A59. No. I strongly recommend adoption of an ATWACC-based standard, whether it is modified for embedded interest expense or not, because it focuses directly on the most fundamental measure of the market's required return and prevents errors that can easily occur when capital structure and the cost of equity are not jointly and consistently analyzed. I believe it will also save resources in misdirected debates. But I see the question of whether to make an adjustment to the ATWACC for the difference between embedded and current interest expense as a distinct, and less fundamental, issue.

If it were certain that an asymmetric implementation would not arise from the actions of future regulators in the event of a marked increase in interest rates and if there were no other regulatory policy considerations, I would recommend an unmodified ATWACC-based system, after a transition for old debt. However, it seems to me that there is at least some danger that an asymmetry could arise, and there may be other regulatory policy considerations as well (for example, rates might be more stable if the use of embedded debt costs were retained). As a result, I think the decision of whether to maintain the traditional policy with respect to embedded interest expense is something to be left as a matter of agreement among the regulatory body and the affected parties.

Adoption of an ATWACC-based rate of return standard is economically fair and reasonable both with continued use of embedded interest rates and with the use of current market interest rates, as long as an effective transition mechanism for debt issued under the old rules is used and asymmetry is avoided.

C. ADJUSTMENT FOR THE COSTS OF ISSUING EQUITY

Q60. How did the issue of the appropriate adjustment for the costs of issuing equity arise?

A60. Gaz Métro previously requested an increase in the issuance cost adjustment to the return on equity from 30 basis points to 50 basis points, as authorized in some other jurisdictions. The Régie rejected this request in Decision D-2008-140.[54] The Company has asked me to take a fresh look at the appropriate adjustment.

[54] p. 28.

Q61. What principles underlie an adjustment for equity issuance costs?

A61. The costs of issuing equity are an expense that needs to be recovered in the revenue requirement in some systematic way, just as debt issuance costs are. Put differently, issuance costs mean that less money gets invested than equityholders have actually supplied, and equityholders should expect a fair return of and on the entirety of the capital they supply, not just the part left over after issuance costs.

In principle, the simplest way to do this would be to add the equity issuance costs to the rate base as they are incurred, and either leave them there forever or amortize them over some convenient period. However, unless this method is put into effect at the creation of the utility, some alternative is needed. The goal of the alternative should be to provide an incremental return of and on the rate base that recovers the equity issuance costs in present value.

Q62. What is your understanding of the specific approach that underlies Gaz Métro's equity issuance cost adjustment.

A62. I understand that since Gaz Métro does not retain earnings and that since the equity issuance costs are not amortized, the adjustment is based on the formula for the present value of a perpetuity: PV = CF / r, where "PV" is the present value, "CF" the perpetual annual cash flow, and "r" the cost of capital. Under the existing concept, the cash flow is therefore the increment needed to provide a fair return on, without a return of, the actual equity issuance costs. That is, for a perpetuity, CF = r × PV, or in present terms, the required compensation = the cost of capital × the actual dollar amount of equity issuance costs. This annual charge can be expressed as a basis point adjustment to the allowed rate of return on equity, if the fraction of equity that comprises issuance costs is known. This approach apparently has been used in the past to calculate the appropriate increment to the allowed rate of return on equity.

Q63. Do you agree with this approach?

A63. Not entirely. The problem is that its goal is to compensate as though there were more equity in the rate base than there actually is, specifically, as if the issuance costs had been included in the rate base at the time. This is a sound goal, but if there were more equity, the cost of equity would decline slightly because of the capital structure risk-return principles discussed in Section III of my evidence. The existing approach does not take account of this decline in the rest of the return on equity.

Q64. What procedure would you recommend?

A64. I suggest that the adjustment should focus directly on the ATWACC, which does not change as capital structure changes. The ideal would be to measure the dollar sum of the past issuance costs and multiply that sum times the ATWACC, then to add that total to the cost of service just as if these costs had been included in the rate base from the beginning. Then this dollar amount can be divided by the rate base, to get the required increment to the ATWACC with the actual rate base. If the total of past issuance costs is unavailable, the requisite adjustment should be calculated from the data that are available. I perform this calculation in the last section of my evidence.

Note that this procedure can simply ignore the impact of alternative capital structures on the cost of capital (since the overall cost of capital does not change within a broad middle range of capital structures), which a focus on an adjustment to the cost of equity alone cannot, or at least should not, ignore. This provides another illustration of the merits of an ATWACC-based rate of return regime.

Q65. How does your recommendation compare with the principles that govern unregulated investments?

A65. An unregulated investment should consider issuance costs as part of the initial capital outlay for the project(s) funded with the capital raised. To have a positive net present value, the present value of the resulting project cash flows has to exceed this initial outlay, including issuance costs, when discounted at the appropriate ATWACC. This has the same effect as the procedure I recommend.

Q66. Suppose some of the issuance costs are tax-deductible. Should that be taken into account?

A66. Yes. The resulting tax deductions reduce the burden of the issuance costs, which means the rest of the project's cash flows do not need to be as high to achieve a positive net present value. My calculations in the next section take this into account.[55]

V. FINDINGS FOR GAZ MÉTRO'S ATWACC AND ASSOCIATED CALCULATIONS

Q67. How is this section of your evidence organized?

A67. This section first discusses some evidence that indicates the formula return system has produced returns that are too low in recent years, even in the absence of the current worldwide financial crisis. It then reviews the evidence on Gaz Métro's relative risks and on the cost of capital for benchmark sample groups. Third, it reports my conclusions on Gaz Métro's ATWACC. Fourth, it calculates the required adjustment for the difference between the embedded and market cost of debt if the Régie decides to adopt ATWACC as its primary rate of return standard. Fifth, it calculates the adjustment required for equity issuance costs. Finally, it calculates the overall modified ATWACC, which includes both the embedded debt and equity issuance cost adjustments, and provides information on the associated required rate of return on equity at Gaz Métro's actual equity ratio of 46 percent and at a deemed equity ratio of 38.5 percent

A. THE FORMULA RETURN ON EQUITY SYSTEM

Q68. Is there any evidence that the formula return on equity system has actually been wrong in recent years?

A68. Yes, in the discussion in Mr. Engen's evidence of energy infrastructure investments.

Q69. Please explain.

A69. The Régie's formula for the return on equity for Gaz Métro was established in 1999, in Decision D-99-011. It is one of several such systems now in use, and discretionary

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[55] My tax calculations use today's tax rate and today's ATWACC as a discount rate. Tax rates have been coming down over the years, but so too have interest rates. In my judgment, the increment in precision that would result from use of historical tax rates and estimation of historical ATWACCs to use as discount rates would not justify the cost of the calculations, particularly since missing data imply that the equity issuance costs I use are conservative estimates of Gaz Métro's actual equity issuance costs.

investments under other such systems provide a natural experiment that Mr. Engen's evidence analyzes.

Gas distribution company systems are specific to a locality, but other investments are not. As a result, gas distribution investments tend to be incremental to an already-existing system, but some new investments may be built entirely from scratch. New pipelines, for example, typically represent discretionary investment, unencumbered by the need to maintain an existing system or to protect its value. Arrangements negotiated between the owners and shippers for the new line, who have adverse interests with respect to pipeline tariffs, therefore tend to be fair to both sides.

If the formula returns were seen as adequate, one would expect new discretionary investments to tend to rely on the formula, since negotiating alternative arrangements takes time and consumes resources that could be put to alternative uses. Instead, Mr. Engen reports that a discretionary investment in gas storage facilities in Ontario went forward only because it did not come under regulation at the relevant formula return. Mr. Engen also reports that new pipelines in Canada almost never utilize the NEB's formula return. Instead, to the extent information is available, new pipelines routinely negotiate rates of return above the NEB formula value, which last for many years.

Q70. Why does the evidence of new projects convey more information on the adequacy of returns than investments in existing systems do?

A70. Companies with considerable amounts of sunk capital may invest at a perceived inadequate rate of return, since the loss from not investing can exceed the loss from investing. Companies with ongoing operations may have commitments that require investment at a loss, also, at least for awhile. And as noted above, rate-regulated companies tend to exhibit a great deal of inertia in such matters. But companies without sunk capital or other commitments will only invest if the rate of return is adequate. The fact that these companies and their customers opt to incur the costs of negotiation concerning rate of return provisions instead of accepting the formula return implies that it is materially inadequate.

Q71. But might not the difference between the rates of return new pipelines require and the formula return for old pipelines simply reflect differences in risk?

A71. In principle the answer is yes, that might be the explanation, but it is not the explanation in the present case. Dr. Carpenter and Mr. Engen address aspects of that question, as do I in the last section of Appendix E to my evidence.

Q72. How do you interpret the existence of premium rates of return for new gas infrastructure investments?

A72. I interpret it as a clear market signal akin to the discontinuance of one type of auto lease in the example in Section II of my evidence. It says that the formula return on equity system is not adequate to induce investment by those who have a choice (e.g., who are not held hostage by large amounts of already-sunk capital or by other commitments).

Q73. What relevance does this evidence have for this proceeding?

A73. The Régie's formula rate of return does not produce returns on capital that are materially different in magnitude from the NEB's.[56] Dr. Carpenter's evidence indicates that Gaz Métro is not materially less risky than gas pipelines, which implies that a return materially inadequate for gas pipelines would not nonetheless be adequate for Gaz Métro. Therefore, the two-tier rate of return system that has evolved in Canada is a market signal that says that formula return on equity values generally comparable to the Régie's are no longer adequate to induce investment by those who have a choice (i.e., who are not held hostage by large amounts of already-sunk capital or other constraints).

Moreover, the current economic crisis has materially increased the cost of capital for all companies, as discussed in the evidence of Mr. Engen and Dr. Vilbert.

Therefore, I would respectfully submit that Gaz Métro's rate of return for 2010 should receive a test on the merits, without taking the Régie's prior formula value as predetermining the answer. Dr. Vilbert and I provide such a test, by analyzing Gaz Métro's current cost of capital.

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[56] With the same interest rates, the 1999 Régie formula value and the NEB formula value are almost the same. For example, at the 9.25 percent interest rate first used by the NEB, the 1999 Régie formula value would be 12.26 percent, versus the NEB's initial 12.25 percent. As discussed in Mr. Engen's evidence, the new projects had materially higher rates of return on equity than available under the relevant formula, and capital structures sufficiently similar to produce materially higher overall rates of return.

B. CONCLUSIONS ON GAZ MÉTRO'S ATWACC

Q74. What risk-return evidence do you consider?

A74. My analysis considers Dr. Carpenter's risk evidence. His evidence speaks for itself, but it explains in detail why Dr. Vilbert's LDC sample is of lower risk than Gaz Métro. I have reviewed his evidence and discussed it with him, and based on his evidence and my own experience, I agree with that conclusion.

My conclusions also rely on Dr. Vilbert's analyses of the costs of capital of his two sample groups. Dr. Vilbert's evidence contains results for the sample ATWACCs. A major issue at present is how to quantify the effects of the current global financial crisis. Dr. Vilbert and I discussed the procedures he uses to do that, and like him, I believe his conclusions represent values that are on the low side of the cost of capital estimates that might reasonably be made at present for his sample groups. Nonetheless, I accept his conclusions as stated for purposes of this evidence.

Q75. Why do you believe Dr. Vilbert's cost of capital conclusions are on the low side of those that might reasonably be made at present?

A75. As Dr. Vilbert and Mr. Engen explain, the interest rate spread on corporate over government debt is exceptionally high at present. Corporations cannot access "zero-beta" debt[57] at the same low rate as the government enjoys on its debt, so this spread increase represents an increase in the entire security market line. However, Mr. Engen's evidence reports data that imply that the actual increase in the spread may be larger than that used by Dr. Vilbert. Thus, Dr. Vilbert's adjustment for this factor is on the low side of those that might reasonably be made.

At the same time, the equity market risk premium ("MRP") has increased for two reasons: (1) the equity market has had an unanticipated and unwanted increase in leverage due to the sharp fall in equity values, and (2) investors are demanding higher risk premiums due to the high risk created by the crisis. Unfortunately, while Dr. Vilbert's evidence

[57] A "zero-beta" asset is one that has an uncertain outcome, but no systematic, market-correlated risk of the sort that requires a risk premium in the cost of capital.

reviews the research in this area, the profession lacks an accepted way to quantify the second of these, the pure increase in risk aversion associated with the crisis. Nonetheless, like Dr. Vilbert, I believe Dr. Vilbert's adjustment for this factor is also on the low side of those that might reasonably be made.

Q76. What are your views on the relative merits of Dr. Vilbert's samples in analyzing Gaz Métro's ATWACC?

A76. The LDC sample, and particularly the LDC subsample, provide the best available benchmark for Gaz Métro's cost of capital at present. However, as things have turned out, Dr. Vilbert's analyses produce virtually the same results for the full LDC sample and for the Canadian sample. These results have led him to find sample ATWACCs of 7¼ percent in all cases.

Q77. What are your findings for Gaz Métro's ATWACC?

A77. Gaz Métro's ATWACC must exceed that of Dr. Vilbert's LDC sample because Gaz Métro has more risk. Based on Dr. Carpenter's evidence, Dr. Vilbert's evidence, and my own experience in rate regulation and cost of capital estimation, I have concluded that the best point-estimate for Gaz Métro's ATWACC is 7½ percent. Gaz Métro's ATWACC cannot lie below that of Dr. Vilbert's samples, so based on my view that Dr. Vilbert's findings are on the low side of those that would be reasonable during the current crisis, 7¼ percent is the bottom of what I would consider to be a reasonable range of values.

It is much harder to say what the upper bound of a reasonable range of values would be at present. It plainly lies further above the 7½ percent point estimate than the lower bound (7¼ percent) lies below it. Additionally, Gaz Métro's greater risk might require a greater increment to its ATWACC over Dr. Vilbert's samples' values than the ¼ percentage point used above. On balance, I would say 8 percent is the upper bound that is consistent with the values Dr. Vilbert has provided and Dr. Carpenter's evidence.

In summary, I find Gaz Métro's ATWACC to lie in a range of 7¼ to 8 percent, with the best point-estimate to be 7½ percent.

C. ADJUSTMENT FOR EMBEDDED INTEREST EXPENSE

Q78. What adjustment to the ATWACC should be made for the difference between the market and embedded cost of debt?

A78. The calculations are shown in Table 1. It starts by computing the difference between the embedded and market interest rate, which at present is a positive 25 basis points (0.25%). This amount is pre-tax, and at the tax rate of 30.15%, the after-tax amount is 18 basis points. On the $965.5 million in debt in Gaz Métro's capital structure, this produces a dollar amount of $1.7 million ($1,717 thousand).[58] After dividing by Gaz Métro's total capital of $1,788.0 million, the resulting increment to the ATWACC is 10 basis points (0.10%).[59]

Table 1. Calculation of Embedded Debt Adjustment to ATWACC

		Source
Embedded interest rate:	6.87%	*[1] Gaz Métro*
Market interest rate:	6.61%	*[2] Vilbert Evidence*
Difference:	0.25%	*[3] = [1] - [2]*
Tax rate:	30.15%	*[4] Vilbert Evidence*
After-tax difference:	0.18%	*[5] = [3] * (1 - [4])*
Amount of debt:	$965,512	*[6] Gaz Métro (000s)*
Dollar difference in interest expense:	$1,717	*[7] = [5] * [6] (000s)*
Amount of capital:	$1,787,980	*[8] Gaz Métro (000s)*
Adjustment to ATWACC:	**0.10%**	*[9] = [7] / [8]*

Thus, the point estimate of the ATWACC modified for embedded interest expense is (7.50 + 0.10) = 7.60 percent.

Q79. This adjustment, like that in the TQM Decision, is small. Does that mean a transition mechanism is not required?

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58 The calculations underlying the table reflect more decimal places than shown in the table, leading to some rounding differences. In particular, the actual after-tax difference is slightly less than 0.18 percent, so the actual dollar difference is the $1,717 thousand shown, not (0.18% × $965,512 thousand) = $1,738 thousand.

59 The values for Gaz Métro's embedded interest rate and for the amounts of debt and capital discussed in this paragraph are from Gaz Métro's filing in the 2010 rate case.

A79. No. Please recall that the record in TQM identified two key characteristics of TQM's debt: (1) the difference between the current and embedded cost was small, and (2) all of TQM's debt was to expire by 2010. The former is true for Gaz Métro, but the latter is far from true. Some Gaz Métro debt issues do not expire until the 2030s. Over the remaining life of Gaz Métro's debt, material fluctuations in interest rates are effectively certain. The fact that the adjustment is small today will not prevent material windfall gains and losses for customers and investors in later years, if existing debt is not grandfathered in a switch to an ATWACC-based rate of return standard.

D. EQUITY ISSUANCE COST ADJUSTMENT

Q80. How do you calculate the adjustment to the ATWACC for equity issuance costs?

A80. The calculations are shown in Table 2. My Equity Issuance Cost Workpaper, which follows my appendices, uses available data to calculate the equity issuance costs as 4.5 percent of the net equity raised. Since some cost data are missing, this is a conservative estimate of the actual percentage.

Table 2.Calculation of Equity Issuance Cost Adjustment to ATWACC

		Source
Cost as a percent of net equity issued:	4.5%	*[1] Kolbe Workpapers*
Actual equity in capital:	$822,468	*[2] Gaz Métro (000s)*
Dollar amount of equity issue costs:	$37,011	*[3] = [1] * [2] (000s)*
ATWACC:	7.5%	*[4] Kolbe Evidence*
Dollar amount of compensation:	$2,776	*[5] = [3] * [4] (000s)*
Amount of capital:	$1,787,980	*[6] Gaz Métro (000s)*
Adjustment to ATWACC:	**0.16%**	*[7] = [5] / [6]*

This percentage times the $822.5 million in actual equity in Gaz Métro's capital produces a dollar amount of equity issuance costs of $37.0 million.[60]

As discussed in the previous section, fair compensation for this prior outlay, which is not amortized, consists of the ATWACC times the amount itself, or $2.8 million ($2,776

[60] The value for Gaz Métro's actual equity is from Gaz Métro's filing in the 2010 rate case.

thousand). When this is divided by Gaz Métro's $1,788.0 million in capital, the result is a 16 basis point (0.16%) required increase to the ATWACC.

E. FINAL ATWACC VALUE AND ASSOCIATED RETURNS ON EQUITY

Q81. What is the final value of the ATWACC as modified for the difference between the embedded and market cost of debt and the compensation required for equity issuance costs?

A81. The modified ATWACC simply sums the point-estimate for the ATWACC and the adjustments calculated in Tables 1 and 2. That is, the modified ATWACC = (7.5 + 0.10 + 0.16) = 7.76 percent.

Q82. Is this the value the Company uses in its cost of service calculations?

A82. Almost. The Company chose to round it down to the nearest one-quarter of one percent, or 7.75 percent. I find that to be an economically fair and reasonable value for Gaz Métro's 2010 rates.

Q83. What would be a reasonable range of uncertainty around that value?

A83. I would simply adjust the range used for the original ATWACC accordingly, since there is, by comparison, next to no uncertainty to the adjustments for embedded interest expense and compensation for equity issuance costs. This produces a range of 7.50 percent to 8.25 percent.

Q84. What rate of return on equity is implied by a 7.75 percent ATWACC?

A84. The answer depends on the capital structure used. Gaz Métro traditionally has used a 38.5 percent deemed common equity ratio with a hypothetical 7.5 percent of preferred equity at a hypothetical cost of 5.22 percent.[61] With this assumption and 54 percent debt at an embedded cost of 6.87 percent, a 12.39 percent allowed rate of return on equity is required.

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[61] These values are from Gaz Métro's filing in the 2010 rate case.

This calculation essentially follows the process illustrated above, in Figure 7. It can be checked by observing that:[62]

$$\text{Modified ATWACC} = 0.1239\times0.385 + 0.0522\times0.075 + .0687\times(1\text{-}0.3015)\times0.54$$
$$= 0.0775 = 7.75\%.$$

The same process implies an 11.22 percent required rate of return on equity at Gaz Métro's actual 46 percent equity ratio, which can be checked in the same way:

$$\text{Modified ATWACC} = 0.1122\times0.46 + .0687\times(1\text{-}0.3015)\times0.54$$
$$= 0.0775 = 7.75\%.$$

Of course, one of the benefits of ATWACC regulation is that the overall return is the same regardless of the deemed capital structure used. This is why the cost of equity at a 38.5 percent equity ratio is higher than that at a 46 percent equity ratio.

Q85. Put this way, these numbers are much higher than the Régie has traditionally granted. Why is that?

A85. There are two reasons. First, as indicated earlier, the traditional formula returns have simply become too low. Second, the current global financial crisis has materially increased the cost of capital for all securities except the government's. At present, the cost of capital is simply extremely high.

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[62] The formula for calculating the required return on equity is:

$$\text{ROE} = \frac{\text{Modified ATWACC} - (\text{ROP} \times \%\ \text{Preferred}) - [\ \text{ROD} \times (1\text{-Tax Rate}) \times \%\ \text{Debt}]}{\%\ \text{Equity}}$$

where ROE, ROP and ROD are the returns on equity, preferred and debt, respectively, and the leading "%" refers to the share of that security in the overall capital structure.

Q86. **Suppose that despite all you have said, the Régie wished to specify an allowed return on equity in some other fashion and set Gaz Métro's overall return by specifying a deemed equity ratio. How should it compute that deemed equity ratio?**

A86. It should find the deemed equity ratio that produced a 7.75 percent modified ATWACC at whatever cost of equity it chose to use.

Q87. **Does this complete your direct written evidence?**

A87. Yes, it does.

RÉGIE DE L'ÉNERGIE

APPENDICES AND WORKPAPERS TO WRITTEN EVIDENCE OF A. LAWRENCE KOLBE

FOR

GAZ MÉTRO LIMITED PARTNERSHIP

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May 4, 2009

APPENDICES AND WORKPAPERS TO WRITTEN EVIDENCE OF
A. LAWRENCE KOLBE

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WORKPAPERS TO WRITTEN EVIDENCE OF A. LAWRENCE KOLBE

APPENDICES AND WORKPAPERS TO WRITTEN EVIDENCE OF
A. LAWRENCE KOLBE

Appendix A: QUALIFICATIONS OF A. LAWRENCE KOLBE

A. Lawrence Kolbe is a Principal of The Brattle Group ("Brattle"), an economic, environmental and management consulting firm with offices in Cambridge (Massachusetts), San Francisco, Washington, Brussels, London and (soon) Madrid. Before co-founding The Brattle Group, he was a Director of Putnam, Hayes & Bartlett, and before that, he was a Vice President of Charles River Associates ("CRA"). Earlier, he was an Air Force officer assigned to the Office of the Secretary of Defense with the job title "Health Economist," and before that, he was assigned to Headquarters, USAF with the job title "Systems Analyst."

His work has included extensive research in financial economics, especially as it applies to rate regulation, project or asset valuation, and the decisions of private firms. Clients for this work include the California Public Utilities Commission, the Consumer Advocate in a Newfoundland proceeding, the Edison Electric Institute, the Electric Power Research Institute, the Interstate Natural Gas Association of America, the Newfoundland Federation of Municipalities, the Nova Scotia Board of Commissioners of Public Utilities, the Town of Labrador City, the U.S. Department of Energy, the U.S. Department of Justice, the U.S. Department of State, the U.S. Internal Revenue Service, and a number of private firms.

He is the coauthor of three books and he has published a number of articles. He is coauthor of a report filed with the British Office of Fair Trading, in London, and he has been an expert witness in: proceedings before the U.S.-U.K. Arbitration Concerning Heathrow Airport Landing Charges (under the auspices of the International Bureau of the Permanent Court of Arbitration) in The Hague, the Iran-United States Claims Tribunal in The Hague, the U.S. Court of Federal Claims, U.S. District Courts in Arizona, Colorado, Florida, Massachusetts, New Jersey, Oklahoma, Pennsylvania, Texas and Virginia, U.S. Tax Court, the Supreme Court of the State of New Mexico, District Courts in Colorado and Kansas, a commercial arbitration tribunal in Australia, a commercial arbitration tribunal held in London concerning a dispute in Australia, the Minerals Management Service of the U.S. Department of the Interior, the Master Settlement Agreement Tobacco Arbitration Panels for the State of Louisiana and the Commonwealth of Massachusetts (which determined fee awards to private counsel assisting the state), and a commercial arbitration in Arizona; federal regulatory proceedings before the Canadian Radio-television and Telecommunications Commission, the [Canadian] National Energy Board, the [U.S.] Postal Rate Commission, the [U.S.] Surface Transportation Board, the U.S. Federal Communications Commission, the U.S. Federal Energy Regulatory Commission and the U.S. Federal Maritime Commission; and provincial or state regulatory proceedings in Alaska, Alberta, Arizona, Arkansas, California, Connecticut, Illinois, Maine, Massachusetts, Michigan, Montana, Newfoundland, New Mexico, New York, Nova Scotia, Ohio, Ontario, Virginia and West Virginia.

He holds a B.S. in International Affairs (Economics) from the U.S. Air Force Academy and a Ph.D. in Economics from the Massachusetts Institute of Technology. Additional information on his qualifications follows.

HONOURS AND AWARDS

Sears Foundation National Merit Scholarship, 1963 (declined).
Fairchild Award, U.S. Air Force Academy, 1968 (for standing first in his class, academically).
National Science Foundation Graduate Fellowship in economics, MIT, 1968-1971.
Joint Service Commendation Medal, 1975.

PROFESSIONAL AFFILIATIONS

American Economic Association
American Finance Association
The Econometric Society
Served as Referee for *The Rand Journal of Economics*, *Land Economics*, *The Journal of Industrial Economics*

AVAILABLE PAPERS AND PUBLICATIONS

"Chapter 5: How to Value a Lost Opportunity: Defining and Measuring Damages from Market Foreclosure," (with William B. Tye and Stephen H. Kalos), in *The Economics of Antitrust Injury and Firm-Specific Damages*, Kevin S. Marshall, ed., Tucson, AZ: Lawyers & Judges Publishing Company, Inc. (2008).

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"The 'Abandonment Value' of Shorter Leadtimes" (with Applied Decision Analysis, Inc.). June 1985.

"Rate Shock and Power Plant Phase-In: Discussion Paper of Generic Issues." Published by the Edison Electric Institute. December 1984.

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Appendix B: ILLUSTRATION OF EFFECTS OF DEBT ON THE COST OF EQUITY

Q1. What is the purpose of this appendix?

A1. It explains why and how debt magnifies the risk of equity, using an everyday example.[1] As noted in the body of my evidence, there is an unbreakable link between the cost of equity and capital structure because of this risk effect.[2]

I. HOME MORTGAGE EXAMPLE OF DEBT'S RISK-MAGNIFYING EFFECTS

Q2. What example do you use to illustrate the "unbreakable" relationship between the cost of equity and capital structure?

A2. The example examines the effects of home mortgages on the homeowner. In particular, suppose a couple takes money out of their savings and buys a dwelling for $100,000. The dwelling's future value is uncertain. If housing prices go up, they win. If housing prices go down, they lose. Figure B-1 depicts the outcome of a 10 percent fluctuation in the dwelling's price.

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1 Preferred equity acts much like debt in magnifying common equity's risk. However, as noted in the body of my evidence, it simplifies the discussion to focus on debt and common equity alone.

2 The precise way such forces affect the overall cost of capital has been a topic raised in earlier proceedings, but the basic effect of debt on the risk of equity is entirely independent of this issue.

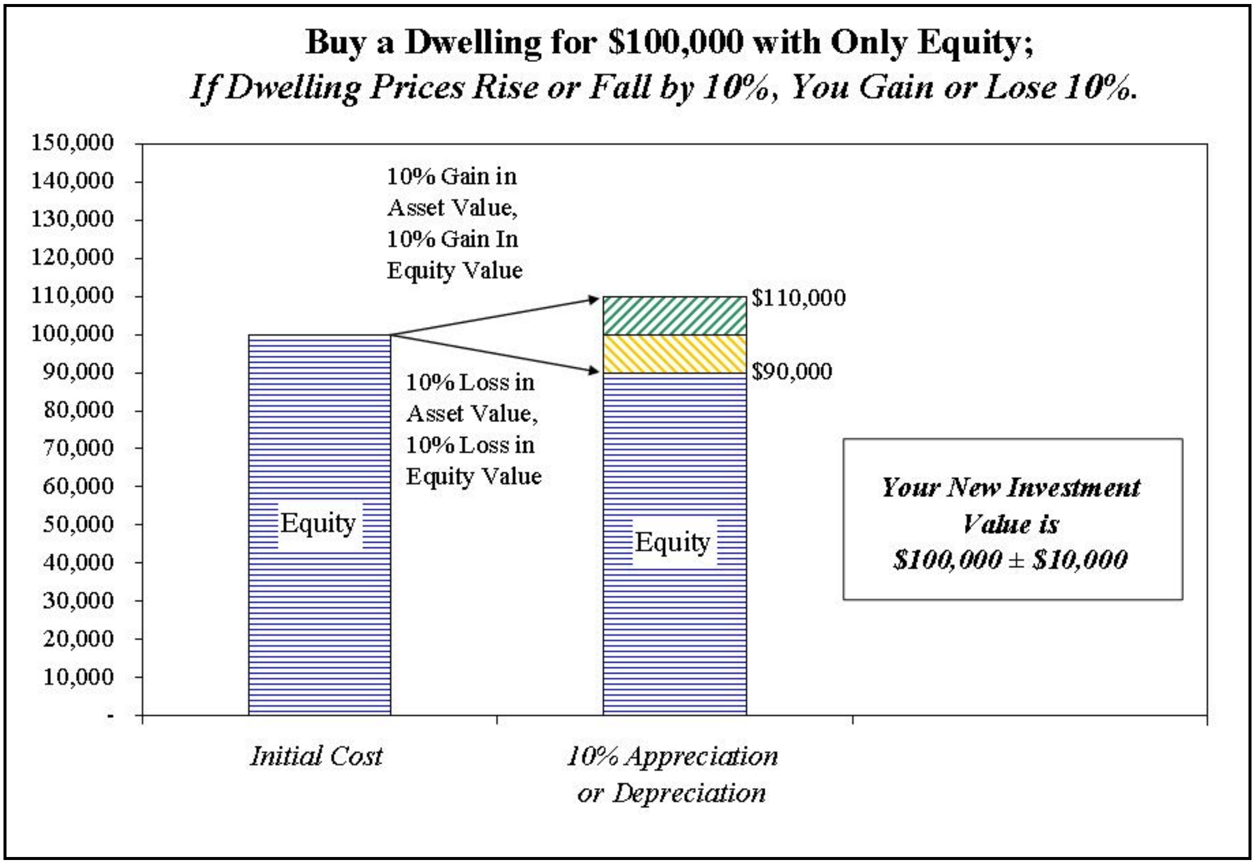

Figure B-1

Now suppose the couple doesn't want to take the full $100,000 out of their savings, or they don't have that much saved, so they take out a mortgage for half the money needed. The mortgage lender does not expect to share in the benefits of rising housing prices, nor to bear the pain of falling ones. The couple owes the lender $50,000 either way. That means their equity investment bears the entire risk of changing dwelling prices. Figure B-2 illustrates this effect.

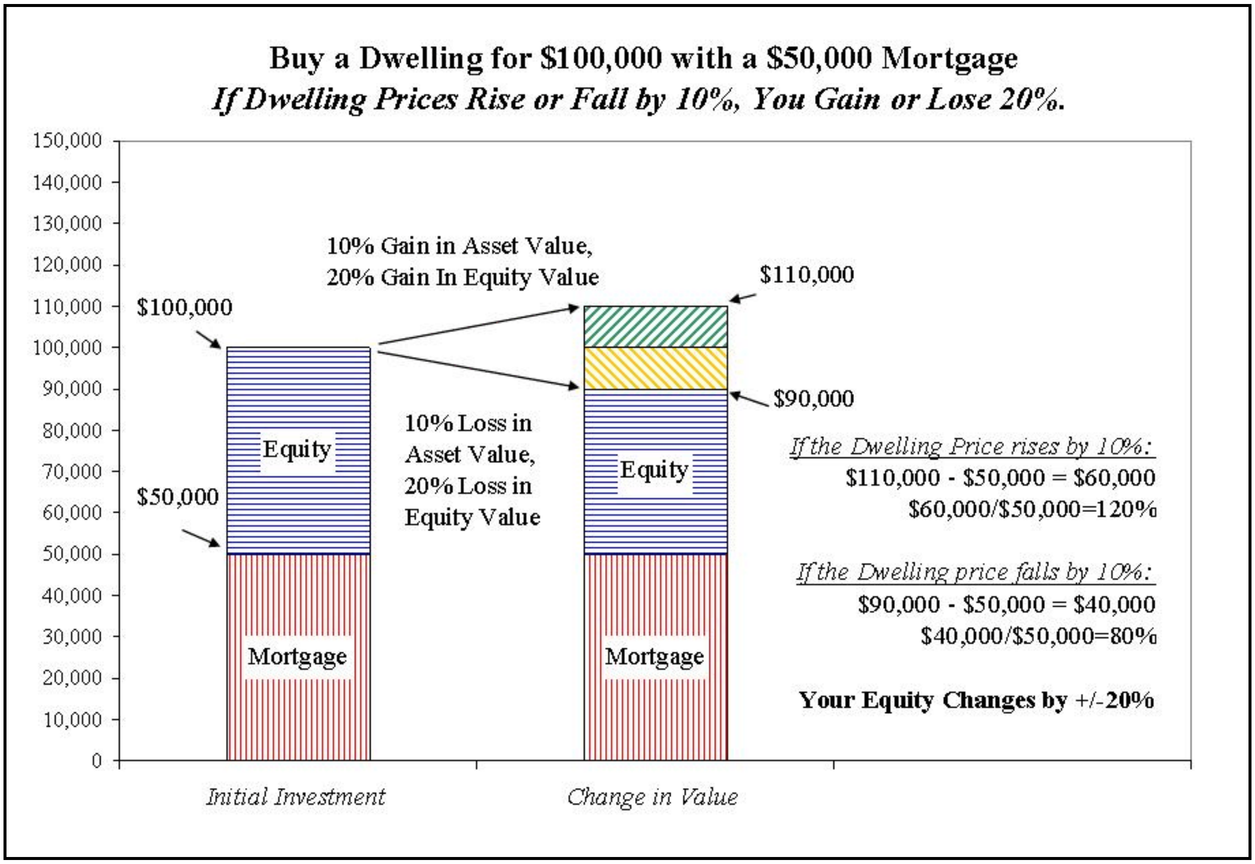

Figure B-2

Now the variability of their equity return due to the dwelling's price fluctuations doubles. The entire variability of a 10 percent increase in housing prices now falls on the $50,000 in original equity.

Q3. What happens if the mortgage is a different proportion of the initial dwelling price?

A3. The equity return gets ever more variable as the mortgage proportion grows. Figure B-3 shows the outcome for mortgages that are 0 percent, 20 percent, 50 percent and 80 percent of the initial dwelling purchase price.

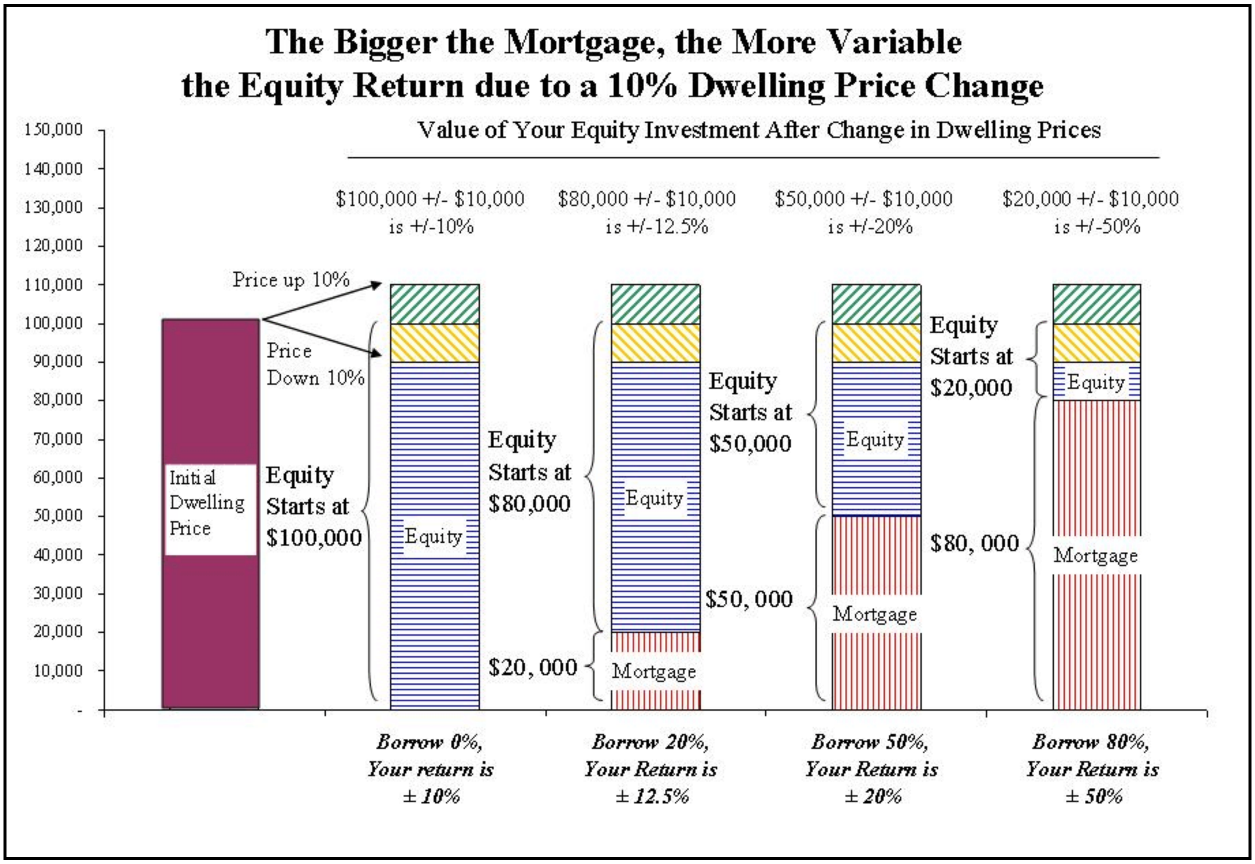

Figure B-3

Figure B-4 depicts the same point in a different way. It shows the growing variability of the equity return as the mortgage proportion increases for a more nearly continuous set of cases. The basic message is the same either way: a higher mortgage (more debt) means ever more risk for equity.

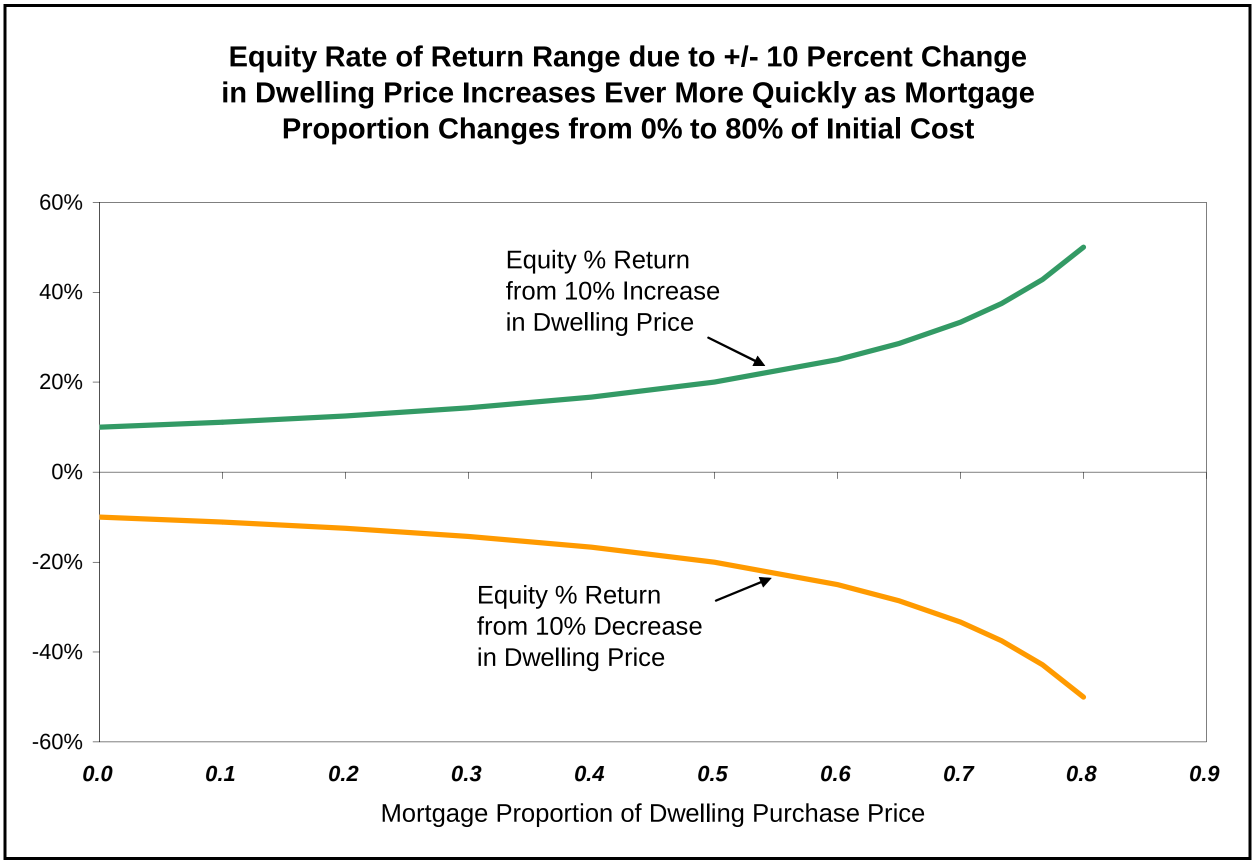

Figure B-4

Q4. **What does all this mean for the cost of equity?**

A4. Investors do not like risk. For the same expected rate of return on equity, rational investors would choose to be on the left edge of Figure B-4, not somewhere to the right. No investor would choose an investment with an expected return of, say, 10 percent plus or minus 50 percent over one with an expected return of 10 percent plus or minus 5 percent. Investors demand a higher rate of return to bear more risk.

The messages of this example are simple:[3]

---

[3] These points hold generally. Below, this appendix shows that the fact that the example omits rent (operating income) and interest on the mortgage (corporate interest expense) has no effect. Appendix C covers taxes, which have been the subject of considerable research; these points hold regardless of the tax model used. Nor is the example contrary to modern models of cost of equity causation, which assume risk consists of a stock's sensitivity to one or more economic factors that affect asset values generally. Broad economic forces that lead to fluctuations in asset values lead to even greater fluctuations in equity values if the assets are partly financed by debt, which directly affects the equity beta (or "betas," in multi-factor models).

1. *Debt magnifies equity's risk, and at an ever increasing rate.*

2. *Therefore, the required rate of return on equity goes up at an ever increasing rate as a company adds more debt.*

This is not only basic finance theory, it is the everyday experience of anyone who buys a home. The bigger the mortgage, the more percentage risk the equity faces from changes in housing prices.

II. WHICH CAPITAL STRUCTURE IN COST OF EQUITY ESTIMATION?

Q5. Should you use market-value or book-value capital structures to assess the degree to which financial risk affects the cost of equity measured in capital markets?

A5. The market-value capital structure is the relevant quantity for analyzing the market cost of equity evidence, not the book-value capital structure.[4] For example, the variability of the equity in the dwelling illustration depends on the market-value shares of the mortgage and the equity, not the book-value shares.

Q6. Please elaborate.

A6. All right. Suppose someone bought a dwelling 10 years ago and has been renting it out. Suppose depreciation has reduced the original book value from \$100,000 to \$75,000. Suppose also that the owner had an original mortgage of \$80,000 and has paid off 20 percent of the original mortgage, leaving \$64,000 still owed. That means that on a book value basis, there is \$75,000 - \$64,000 = \$11,000 in equity.

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[4] The need to use market-value capital structures to analyze the effect of debt on the cost of equity has been recognized from the beginning of the financial literature on the topic. For example, the initial reconciliation of the Modigliani-Miller theories of capital structure with the Capital Asset Pricing Model, in Robert S. Hamada, "Portfolio Analysis, Market Equilibrium and Corporation Finance, *The Journal of Finance* 24:13-31 (March 1969), works with market-value capital structures. For a more recent presentation of the concept, see, for example, Richard A. Brealey, Stewart C. Myers and Franklin Allen, *Principles of Corporate Finance*, 9th ed., New York: McGraw-Hill/Irwin (2008), at 530-31. Book values may be relevant for some issues, e.g., for covenants on individual bond issues, but as explained in the text, market values are the determinant of the impact of debt on the cost of equity.

What happens now if housing prices increase or decrease 10 percent? It is impossible even to start to answer this question unless we first specify how housing prices have changed over the last ten years. If we assume that the market value of the dwelling is now $200,000, we can calculate a 10 percent change as $20,000. A 10 percent decrease in housing prices is therefore almost twice the book equity of $11,000. Does that mean a 10 percent decrease will wipe the owner out?

Of course not. The real equity is the market value equity in the dwelling. Suppose the market value of the mortgage equals its remaining unpaid balance. The relevant measure of equity for risk-reward calculations is

$$\text{True Equity in Dwelling} = \text{Market Value of Dwelling - Market Value of Mortgage}$$

$$= \$200{,}000 - \$64{,}000 = \$136{,}000$$

Therefore, the percentage rate of return on equity due to a 10 percent change in dwelling values is

$$\text{Rate of Return on Equity} = \frac{\text{Change in Dwelling Value}}{\text{Starting Equity Value}}$$

$$= \frac{\pm \$20{,}000}{\$136{,}000}$$

$$= \pm 15\%$$

Figure B-5 depicts the actual risk-return tradeoff after 10 years. A 10 percent decline in dwelling values would be painful, but it wouldn't come close to wiping out the equity in the dwelling, no matter what the books say. Nor would it even show up on the books, despite its still material impact on the value of the equity investment.

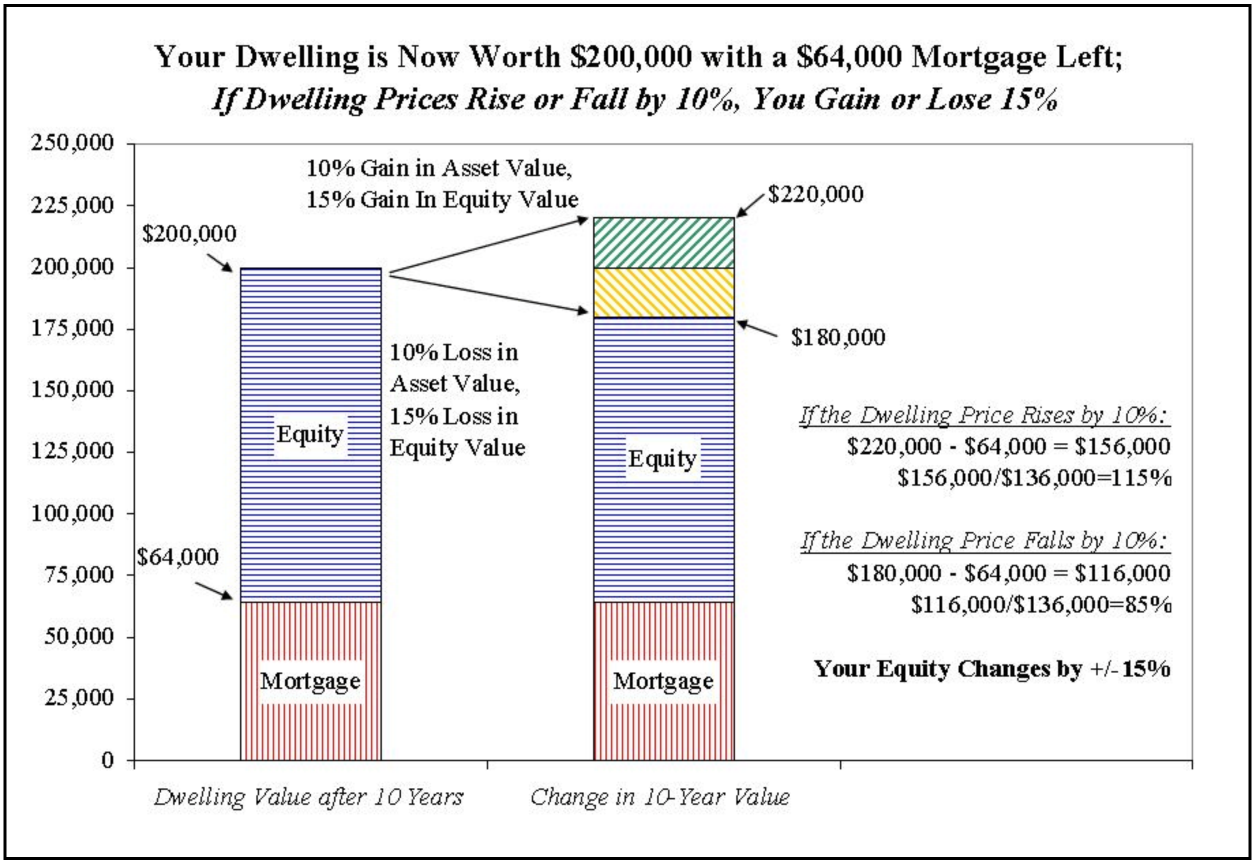

Figure B-5

No landlord would assess his or her risk due to a mortgage by comparing fluctuating property values to the remaining book value of the property. The risk that debt imposes on the cost of equity is a function of relative market values, not relative book values.

Q7. But if the cost of equity estimate is to be applied to a book-value capital structure and a book-value rate base, should not the book-value capital structure be used for the sample companies as well?

A7. No. The issue here is, what level of risk is reflected in that cost of equity estimate? That risk level depends on the sample company's market-value capital structure, not its book-value capital structure. *That risk level would be different if the sample company's market-value capital structure exactly equaled its book-value capital structure, so the estimated cost of equity would be different, too.*

Q8. Please explain this point using the above example.

A8. All right. Suppose that the owner has refinanced the dwelling. While it still is worth $200,000 ten years after the initial purchase, the post-refinancing market-value debt-equity proportions are consistent with the above example's pre-refinancing book capital structure. That is, given an undepreciated book value of $75,000 consisting of $11,000 of equity and $64,000 of debt, the book equity share is 14.67 percent and the book debt share 85.33 percent. If the post-refinancing capital structure is to give the same market-value proportions, the mortgage must be [$200,000 x 0.8533] = $170,667, and the equity must be [$200,000 x 0.1467] = $29,333. Now a plus or minus 10% swing in housing prices gives an equity rate of return of:

$$\text{Rate of Return on Equity} = \frac{\text{Change in Dwelling Value}}{\text{Refinanced Starting Equity Value}}$$

$$= \frac{+/-\ \$20{,}000}{\$29{,}333}$$

$$= +/-\ 68\%$$

Contrast this value with the +/- 15 percent above in Figure B-5, in the case where the dwelling's market value had gone up the same amount but there was no refinancing. A cost of equity analyst who estimated the "beta" risk measure on a stock like this would get a much higher value than in the earlier example, because the stock would be much more volatile.[5] *Exactly* the same thing would happen for a rate-regulated company with a book value rate base. The estimated beta *automatically* reflects the market-value capital structure. A third message therefore is,

3. *Market values, not book values, determine the risk impacts of capital structure on the market cost of equity for all companies, even those regulated on a book-value rate base.*

---

[5] Technical note: debt magnifies the stock's entire variability, diversifiable and undiversifiable alike. Therefore, the stock's beta (or "betas," if more than one risk factor matters to investors) will in fact be affected by the company's market-value capital structure.

Q9. Can you provide the full details of the two numerical examples you just discussed?

A9. Yes, Tables B-1 and B-2 do for, respectively, the original mortgage amount and the mortgage refinanced to make the market-value capital structure equal to the original book-value capital structure. The tables show a 10 percent loss in dwelling value, but only the sign would change if it were instead a 10 percent gain.

Table B-1. Details of Equity Rate of Return Example after 10 Years, Original Mortgage

	Book Value	Market Value	Key
Original Value of Dwelling (Asset)	$ 100,000	$ 100,000	[1] = Assumption
Cumulative Depreciation	$ 25,000	n/a	[2] = Assumption
Net Current Value of Dwelling (Asset)	$ 75,000	$ 200,000	[3] BV = [1] - [2], [3] MV = Assumption
Refinanced Value of Mortgage (Debt)	$ 80,000	$ 80,000	[4] = Assumption
Amount of Principal Paid Off	$ 16,000	$ 16,000	[5] = Assumption
Current Value of Mortgage (Debt)	$ 64,000	$ 64,000	[6] = [4] - [5]
Net Value of Asset	$ 75,000	$ 200,000	[7] = [3]
Current Value of Debt	$ 64,000	$ 64,000	[8] = [6]
Net Value of Equity	**$ 11,000**	**$ 136,000**	[9] = [7] - [8]
%Change in Market Value of Dwelling	n/a	**-10%**	[10] = Assumption
$Change in Market Value of Dwelling	n/a	$ (20,000)	[11] = [10] x [1]
$Change in Market Value of Equity	n/a	$ (20,000)	[12] = [11]
%Change in Market Value of Equity	n/a	**-15%**	[13] = [11] / [9]

Table B-2. Details of Example After Refinancing to 85.33% Market-Value Debt

	Book Value	Market Value	Key
Original Value of Dwelling (Asset)	$ 100,000	$ 100,000	[1] = Assumption
Cumulative Depreciation	$ 25,000	n/a	[2] = Assumption
Net Current Value of Dwelling (Asset)	$ 75,000	$ 200,000	[3] BV = [1] - [2], [3] MV = Assumption
Refinanced Value of Mortgage (Debt)	$ 170,667	**$ 170,667**	[4] = 0.8533 x [7]
Amount of Principal Paid Off	$ -	$ -	[5] = Assumption
Current Value of Mortgage (Debt)	$ 170,667	$ 170,667	[6] = [4] - [5]
Net Value of Asset	$ 75,000	$ 200,000	[7] = [3]
Current Value of Debt	$ 170,667	$ 170,667	[8] = [6]
Net Value of Equity	$ (95,667)	**$ 29,333**	[9] = [7] - [8]
%Change in Market Value of Dwelling	n/a	**-10%**	[10] = Assumption
$Change in Market Value of Dwelling	n/a	$ (20,000)	[11] = [10] x [1]
$Change in Market Value of Equity	n/a	$ (20,000)	[12] = [11]
%Change in Market Value of Equity	n/a	**-68%**	[13] = [11] / [9]

Q10. Are mortgages the only everyday example of the effect of debt on the risk of equity?

A10. No, any time someone uses debt to finance part an investment, the same risk magnification occurs. For example, if someone buys stocks "on margin" -- by borrowing part of the money used to buy them -- there is a higher expected rate of return, but more risk. I could illustrate this by attaching new labels to Figure B-3, so the "dwelling" became a stock portfolio and the "mortgage" became the associated margin debt. Of course, stocks are a lot more volatile than dwellings, in normal circumstances, so it would be economically infeasible to use 80 percent margin to buy stocks unless the investor offered additional security in some form. If someone does buy on margin, there is a higher expected rate of return, but more risk, too.

The point is, exactly the same risk-magnifying effects happen when companies borrow to finance part of their investments.

Q11. Please sum up the implications of this section.

A11. Please refer to Tables B-1 and B-2 above. The asset value change and rate of return is the same in both cases, a $20 thousand drop from the initial $200 thousand, or −10 percent. The equity value change is the same too, −$20 thousand. But there is much less equity to absorb the change in the second case, so the equity rate of return is −68 percent instead of −15 percent. Since the cost of equity depends on how volatile the equity rate of return is, *the cost of equity is much higher in the second case than the first.* That is why the sample companies' estimated costs of equity are simply inapplicable to the regulatory capital structure unless the sample companies' market capital structures happen to equal the capital structure used for ratemaking.

The market risk, and therefore the cost, of equity depends directly on the market-value capital structure of the company or asset in question. It therefore is impossible to compare validly the measured costs of equity of different companies without taking capital structure into account. Capital structure and the cost of equity are unbreakably linked, and any effort to treat the two as separate and distinct questions violates both everyday experience (e.g., with home mortgages) and basic financial principles.

III. THE EXAMPLE WITH RENT AND INTEREST EXPENSE

Q12. To this point, the mortgage example has not addressed rent, interest expense or taxes. How do these factors affect the interaction between debt and the cost of equity?

A12. The net effect of corporate and personal taxes has been a major topic of research. The main text of my evidence summarizes the outcome of this research, and Appendix C reviews the literature on the topic. Accordingly, here I need only address rent and interest expense.

Rent could affect a dwelling buyer in two ways. First, the buyer could buy the dwelling as an investment or as a future retirement home and rent it out. Second, the dwelling buyer could live there and avoid having to pay rent on an apartment instead. The former seems to be the better analogy for present purposes.

Assume rent on the \$100,000 dwelling would net the owner \$500 per month on average after all (non-interest) expenses, or \$6,000 annually. Suppose also that expected appreciation in housing prices were 4 percent, so the dwelling's expected value would be \$104,000 after the first year. Then the expected rate of return from owning the dwelling if there is no mortgage would be:

$$\text{Expected rate of return @ 0\% Mortgage} = \frac{\text{Expected Net Rent + Expected Value Appreciation}}{\text{Initial } \textit{Dwelling} \text{ Value}}$$

$$= \frac{\$6{,}000 + (\$104{,}000 - \$100{,}000)}{\$100{,}000}$$

$$= \frac{\$6{,}000 + \$4{,}000}{\$100{,}000} = \frac{\$10{,}000}{\$100{,}000}$$

$$= 10\%$$

Suppose also that the mortgage interest rate were 6 percent. Then at a mortgage equal to 50 percent of the purchase price, or \$50,000, interest expense would be (\$50,000 x 0.06), or \$3,000. The expected equity rate of return would be

$$\text{Expected rate of return @ 50\% Mortgage} = \frac{\text{Expected (Net Rent + Value Appreciation) - Interest}}{\text{Initial } \textit{Equity} \text{ Value}}$$

$$= \frac{\$6{,}000 + (\$104{,}000 - \$100{,}000) - \$3000}{\$50{,}000}$$

$$= \frac{\$6{,}000 + \$4{,}000 - \$3{,}000}{\$50{,}000} = \frac{\$7{,}000}{\$50{,}000}$$

$$= 14\%$$

The expected return on equity is higher. However, as illustrated above, so is the risk equity bears.

Q13. Can you provide a more general illustration?

A13. Yes. Figure B-6 uses these assumptions at different mortgage levels to plot both (1) the expected rate of return on the equity in the dwelling, and (2) the realized rate of return on that equity in a year if the dwelling value increases by 10 percent more than the expected 4 percent rate (i.e., if the dwelling value increases by 14 percent) or by 10 percent less than expected (i.e., if it decreases by 6 percent).[6]

[6] For simplicity, the figure assumes the mortgage interest rate is independent of the mortgage proportion. This might not always be true, and in general would not be true for a corporation that issued debt. However, the same basic picture would emerge if the interest rate varied in a realistic way as the mortgage proportion increased.

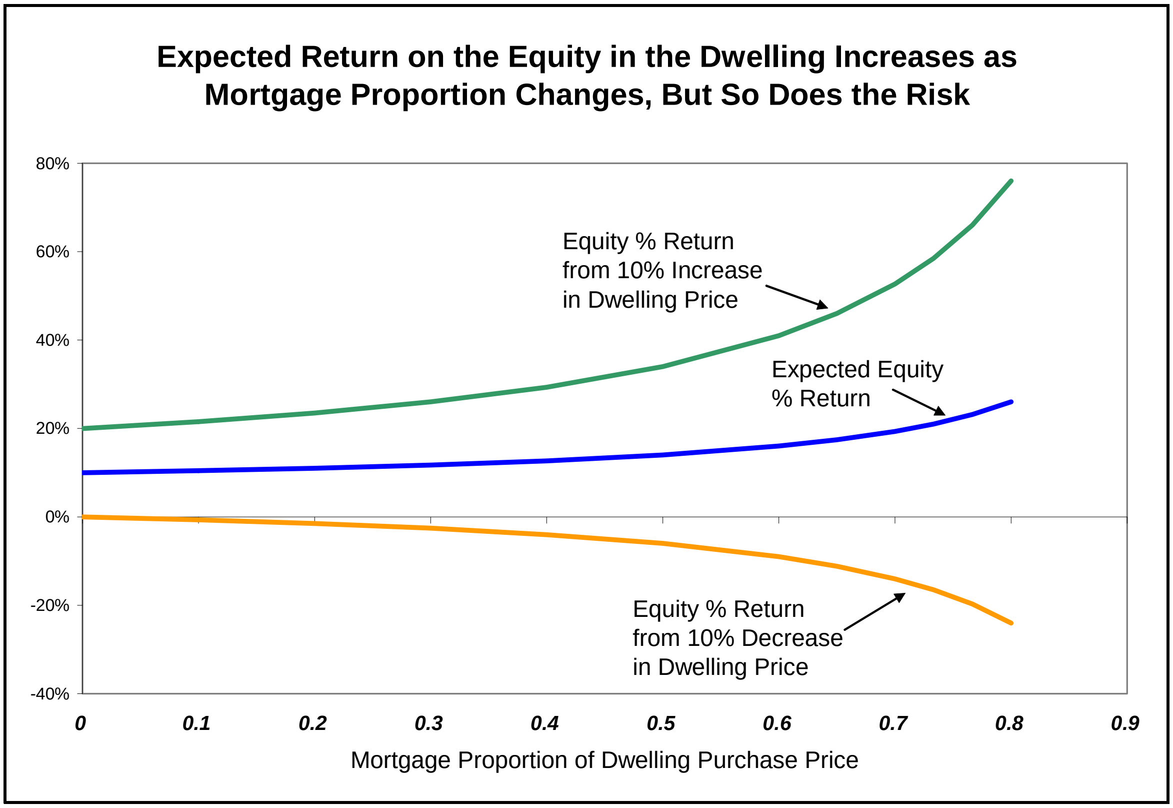

Figure B-6

The expected rate of return on equity increases at an increasing rate as the buyer finances more and more of the dwelling with a mortgage. But since (absent financial distress or bankruptcy) equity bears all of the risk of fluctuations in dwelling values, the amount of risk the buyer bears grows at an ever increasing rate at the mortgage percentage increases, too. (The upper and lower lines in Figure B-6 effectively just add or subtract the lines from Figure B-5, above, to the Figure B-6 expected rate of return on equity.) This means the required rate of return on equity must increase, else the buyer would be bearing risk without reward.

Q14. Can you provide an example of a deal that would involve bearing financial risk with no reward?

A14. Suppose someone were to object that they don't think of the equity in their home as requiring a higher expected rate of return just because they use a mortgage, and that they personally would not demand a higher rate of return for this risk. Suppose also that the numbers in the dwelling example above were in front of this person and a potential co-investor in a dwelling. The co-investor would be happy to propose a deal something like the following.

"Why don't we buy the dwelling 50-50. It costs $100,000. We'll finance it 50 percent with a mortgage, so we each put in $25,000 in equity and are individually responsible for $25,000 of the mortgage. We'll rent the dwelling out, sell it in one year, and pay off the mortgage. I say we have a 14 percent required return on equity, or an expected $3,500 each on our $25,000 individual equity investments. But you only require 10 percent, the overall expected rate of return on the dwelling itself, because you don't think use of a mortgage increases your required return on equity. That means you'll be satisfied with an expected return of $2,500. It's easy for us to achieve that outcome: whatever the result of our investment, I'll just pocket an extra $1,000 from your half of the investment as part of my share. You're happy, because you get the 10 percent expected rate of return you require, and so am I, because I earn a superior risk-adjusted rate of return, 18 percent instead of the market 14 percent. In fact, I'd even be willing to split the difference and take only $500 instead of $1,000 from your half. That would give us both a higher expected return than we require, you 12 percent ($3,000/$25,000) and me 16 percent ($4,000/$25,000). It's win-win, given your return requirements. After we cash out the first year's dwelling, let's do it again, but with more money next time."

Anyone willing to bear financial risk without reward can expect many such offers. Anyone who asks someone else to bear financial risk without reward will find few if any takers. That is why the more debt a company adds, the higher its cost of equity.

Q15. Does this complete Appendix B?

A15. Yes, it does.

Appendix C: RESEARCH ON EFFECTS OF DEBT ON THE COST OF EQUITY

Q1. What is the purpose of this appendix?

A1. The body of my evidence describes, and Appendix B illustrates, the most fundamental point about the effect of debt on the cost of equity capital, that it increases equity's risk at an ever-increasing rate. This appendix provides additional detail on the effect of capital structure on the cost of equity. It first summarizes the relevant economic literature. It then explores the maximum possible net tax advantage to debt when both corporate and personal taxes are considered.

I. AN OVERVIEW OF THE ECONOMIC LITERATURE

Q2. What is the focus of the economic literature on the effects of debt?

A2. The economic literature focuses on the effects of debt on the value of a firm. The standard way to recognize one of these effects, the impact of the fact that interest expense is tax-deductible, is to discount the all-equity after-tax operating cash flows generated by a firm or an investment project at a weighted average cost of capital, typically known in textbooks as the "WACC." The textbook WACC equals the *market*-value weighted average of the cost of equity and the *after-tax*, *current* cost of debt. However, rate regulation in North America has a legacy of working with another weighted-average cost of capital, the *book*-value weighted average of the cost of equity and the *before-tax*, *embedded* cost of debt. Accordingly, in regulatory settings it's useful to refer to the textbook WACC as the "ATWACC," or after-tax weighted-average cost of capital. I follow that practice here.

Q3. What is the implication of the literature's focus for this section?

A3. Since the literature focuses on the overall effect of debt on the value of the firm, a discussion summarizing that literature must do so, also. A principal goal of the appendix is to translate the literature's findings on debt's effects on firm value into a procedure to adjust the cost of equity for capital structure changes. For these reasons, much of the discussion in this first section focuses on the overall cost of capital, i.e., the ATWACC. The next section translates these findings into specific cost of equity terms.

Q4. How is this section of the appendix organized?

A4. It starts with the tax effects of debt. It then turns to other effects of debt.

A. TAX EFFECTS

Q5. What are the main threads of the literature on the tax effects of debt?

A5. Three seminal papers define the main threads of this literature. The first assumes no taxes and risk-free debt. The second adds corporate income taxes. The third adds personal income taxes.

1. Base Case: No Taxes, No Risk to High Debt Ratios

Q6. Please start by explaining the simplest case of the effect of debt on the value of a firm.

A6. The "base case," no taxes and no costs to excessive debt, was worked out in a classic 1958 paper by Franco Modigliani and Merton Miller, two economists who eventually won Nobel Prizes in part for their body of work on the effects of debt.[7] Their 1958 paper made what is in retrospect a very simple point: if there are no taxes and no risk to the use of excessive debt, use of debt will have no effect on a company's operating cash flows (i.e., the cash flows to investors as a group, debt plus equity combined). If the operating cash flows are the same regardless of whether the company finances mostly with debt or mostly with equity, the value of the firm cannot be affected at all by the debt ratio. In cost of capital terms, this means the overall cost of capital is constant regardless of the debt ratio, too.

In this case, issuing debt merely divides the same set of cash flows into two pools, one for bondholders and one for shareholders. If the divided pools have different priorities in claims on the cash flows, the risks and costs of capital will differ for each pool. But the risk and overall cost of capital of the entire firm, the sum of the two pools, is constant regardless of the debt ratio. That means,

$$r^*_1 = r_{A1} \tag{C-1a}$$

where r^*_1 is the overall after-tax cost of capital at any particular capital structure and r_{A1} is the all-equity cost of capital for the firm. (The "1" subscripts distinguish these quantities in

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[7] Franco Modigliani and Merton H. Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment," *American Economic Review*, 48: 261-297 (June 1958).

the case where there are no taxes from subsequent equations that consider first corporate and then both corporate and personal taxes.) With no taxes and no risk to debt, the overall cost of capital does not change with capital structure.

This implies that the right formula to relate the overall cost of capital to the component costs of debt and equity is

$$r_{E1}\times(E/V) + r_D\times(D/V) = r^*_1 \qquad \text{(C-1b)}$$

with the overall cost of capital (r^*) on the *right* side, as the *independent* variable, and the costs of equity (r_E) and debt (r_D) on the left side, as *dependent* variables determined by the overall cost of capital and by the capital structure (i.e., the shares of equity (E) and debt (D) in overall firm value (V=E+D)) that the firm happens to choose. Note that if equation (C-1a) were correct, the equation that solved it for the cost of equity would be,

$$r_{E1} = r^*_1 + (r^*_1 - r_D) \times (D/E) \qquad \text{(C-1c)}$$

Note also that (D/E) gets exponentially higher in this equation as the debt-to-value ratio increases.[8] Therefore Equation (C-1c) has the property emphasized in the body of my evidence, that the cost of equity grows at an ever-increasing rate as you add more and more debt.

[8] For example, at 20-80, 50-50, and 80-20 debt-equity ratios, (D/E) equals, respectively, (20/80) = 0.25, (50/50) = 1.0, and (80/20) = 4.0. The extra 30 percent of debt going from 20-80 to 50-50 has much less impact on (D/E) [i.e., by moving it from 0.25 to 1.0] than the extra 30 percent of debt going from 50-50 to 80-20 [i.e., by moving it from 1.0 to 4.0]. Since the cost of equity equals a constant risk premium times the debt-equity ratio, the cost of equity grows ever more rapidly as you add more and more debt.

2. Corporate Tax Deduction for Interest Expense

Q7. What happens when you add corporate taxes to the discussion?

A7. If corporate taxes exist with risk-free debt (and if only taxes at the corporate level matter, not taxes at the level of the investor's personal tax return), the initial conclusion changes. Debt at the corporate level reduces the company's tax liability by an amount equal to the marginal tax rate times interest expense. All else equal, this will add value to the company because more of the operating cash flows will end up in the hands of investors as a group. To illustrate this point, consider the example in Table C-1.

Table C-1
Effect of Corporate Tax Deduction for Interest Expense

	Without Debt	With Debt
Pre-Tax Operating Income	$1,000	$1,000
− Interest Expense	- 0	- 200
= Pre-Tax Equity Income	$1,000	$800
− Taxes @ 35%	- 350	- 280
= After-Tax Equity Income	$650	$520
+ Interest to Bondholders	+ 0	+ 200
= Income to All Investors	$650	$720

A company without debt starts out with $1,000 in pre-tax operating income and pays taxes at a 35 percent rate. It has ($1,000×0.35) = $350 in taxes and ($1,000−$350) = $650 available for investors. If it now issues debt that has $200 in interest expense, its taxes fall to [($1,000-$200)×0.35] = $280, and it has ($1,000−$280) = $720 available for investors as a group. The tax advantage to the use of debt is ($720−$650) = $70, or 35 percent of the $200 in interest.

Thus, if only corporate taxes mattered, interest would add cash to the firm equal to the corporate tax rate times the interest expense. This increase in cash would increase the value of the firm, all else equal. In cost of capital terms, it would reduce the overall cost of capital.

How much the value of the firm would rise and *how far* the overall cost of capital would fall would depend in part on how often the company adjusts its capital structure, but this is a second-order effect in practice. (The biggest effect would be if companies could issue riskless perpetual debt, an assumption Profs. Modigliani and Miller explored in 1963, in the second seminal paper;[9] this assumption could *not* be true for a real company.) Prof. Robert A. Taggart provides a unified treatment of the main papers in this literature and shows how various cases relate to one another.[10] Perhaps the most useful set of benchmark equations for the case where only corporate taxes matter are:

$$r^*_2 = r_{A2} - r_D \times t_C \times (D/V) \qquad \text{(C-2a)}$$

$$r_{E2} \times (E/V) + r_D \times (D/V) \times (1 - t_C) = r^*_2 \qquad \text{(C-2b)}$$

which imply for the cost of equity,

$$r_{E2} = r_{A2} + (r_{A2} - r_D) \times (D/E) \qquad \text{(C-2c)}$$

where the variables have the same meaning as before but the "2" subscripts indicate the case that considers corporate but not personal taxes.

Note that Equation (C-2a) implies that when only corporate taxes matter, the overall after-tax cost of capital declines steadily as more debt is added, until it reaches a minimum at 100 percent debt (i.e., when D/V = 1.0). Note also that Equation (C-2c) still implies an exponentially increasing cost of equity as more and more debt is added. In fact, except for the subscript, Equation (C-2c) looks just like Equation (C-1c).

However, whether any value is added and whether the cost of capital changes at all also depends on the effect of taxes at the personal level.

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[9] Franco Modigliani and Merton H. Miller, "Corporate Income Taxes and the Cost of Capital: A Correction," *American Economic Review*, 53: 433-443 (June 1963).

[10] Robert A. Taggart, Jr., "Consistent Valuation and Cost of Capital Expressions with Corporate and Personal Taxes," *Financial Management* 20: 8-20 (Autumn 1991).

3. Personal Tax Burden on Interest Expense

Q8. How do personal taxes affect the results?

A8. Ultimately, the purpose of investment is to provide income for consumption, so personal taxes affect investment returns. For example, in the U.S., municipal bonds have lower interest rates than corporate bonds because their income is taxed less heavily at the personal level. In general, capital appreciation on common stocks is taxed less heavily than interest on corporate bonds because (1) taxes on unrealized capital gains are deferred until the gains are realized, and (2) the capital gains tax rate is lower. Dividends are taxed less heavily than interest, also. The effects of personal taxes on the cost of common equity are hard to measure, however, because common equity is so risky.

Professor Miller, in his Presidential Address to the American Finance Association,[11] explored the issue of how personal taxes affect the overall cost of capital. The paper pointed out that personal tax effects could offset the effect of corporate taxes entirely. To see how this might work, consider the after-corporate-tax, after-personal-tax investor returns of the firm in Table C-2, with and without debt.

Table C-2
Combined Effect of Corporate and Personal Taxes

	Without Debt	With Debt
Pre-Tax Operating Income	$1,000	$1,000
− Interest Expense	- 0	- 200
= Pre-Tax Equity Income	$1,000	$800
− Taxes @ 35%	- 350	- 280
= After-Tax Equity Income	$650	$520
− Personal Taxes @ 7.7%	- 50	- 40
= After-All-Tax Equity Income	$600	$480
+ Interest to Bondholders	+ 0	+ 200
− Personal Taxes @ 40%	- 0	- 80
= Total After-All-Tax Income	$600	$600

[11] Merton H. Miller, "Debt and Taxes," *The Journal of Finance*, 32: 261-276 (May 1977), the third of the seminal papers mentioned earlier.

Suppose the corporate tax rate were 35 percent, the effective personal tax rate on the marginal investors holding corporate debt were 40 percent, and the effective personal tax rate on the marginal investors holding common equity were only 7.7 percent, representing a blend of the rates on dividends and on the present value of future capital gains when finally realized. Then corporate taxes for an all-equity firm with pre-tax operating income of \$1,000 would be (\$1,000×0.35) = \$350, as above, leaving (\$1,000−\$350) = \$650 in after-corporate-tax earnings to be distributed as dividends or retained to support future capital gains. Personal taxes on that amount at the effective marginal personal tax rate on equity would be (\$650×0.077) = \$50. The after-all-tax cash flow to the marginal investors in an all-equity firm would be (\$1,000−\$350−\$50) = \$600.

Now suppose the firm issues debt with \$200 in interest expense, as before. Corporate taxes again fall to [(\$1,000-\$200)×0.35] = \$280, and the firm has (\$1,000−\$280) = \$720 to distribute to investors. After all taxes, equityholders keep \$480 of that, and bondholders keep \$120, for the same \$600 total. Or to calculate it another way, the personal tax burden on all investors equals the sum of that on debt and on equity, or {(\$200×0.40) + [(\$720-\$200)×0.077)]} = (\$80 + \$40) = \$120. The after-all-tax cash flow to the investors in the levered-equity firm would be (\$1,000−\$280−\$120) = \$600, again the same as for the all-equity firm. The tax advantage to use of debt at the corporate level would vanish entirely at the personal level under these conditions.

Q9. Is it likely that the effect of personal taxes will completely neutralize the effect of corporate taxes?

A9. No. These conditions seem pretty unlikely, if they require only a 7.7 percent effective personal tax rate on equity. However, personal taxes are important even if they do not make the corporate tax advantage on interest vanish entirely. Capital gains and dividend tax advantages definitely convey some personal tax advantage to equity, and even a partial personal advantage to equity reduces the corporate advantage to debt. (Section III of this appendix explores the degree of offset in more detail using actual tax rates.)

The Taggart paper explores the case of a partial offset, also. With personal taxes, the risk-free rate on the security market line (Figure 1 in Dr. Vilbert’s evidence) is the after-personal-tax rate, which must be equal for risk-free debt and risk-free equity.[12] Therefore, the pre-personal-tax risk-free rate for equity will generally not be equal to the pre-personal-tax risk-free rate for debt. In particular, $r_{fE} = r_{fD}\times[(1-t_D)/(1-t_E)]$, where r_{fE} and r_{fD} are the risk-free costs of equity and debt and t_E and t_D are the personal tax rates for equity and debt, respectively. In terms of the cost of debt, the Taggart paper's results imply that a formal statement of these effects can be written as:[13]

$$r^*_3 = r_{A3} - r_D\times t_N\times(D/V) \quad \text{(C-3a)}$$

$$r_{E3}\times(E/V) + r_D\times(D/V)\times(1-t_C) = r^*_3 \quad \text{(C-3b)}$$

which imply

$$r_{E3} = r_{A3} + \{r_{A3} - r_D\times[(1-t_D)/(1-t_E)]\}\times(D/E) \quad \text{(C-3c)}$$

Note that the first case above, t_E = 7.7 percent and t_D = 40 percent, implies $[(1-t_D)/(1-t_E)] = 0.65 = (1-t_C)$. That corresponds to Miller's 1977 paper, in which the net personal tax advantage of equity fully offsets the net corporate tax advantage of debt. Note also that in that case, $t_N = 0$.[14] Therefore, if the personal tax advantage on equity fully offsets the corporate tax advantage on debt, Equation (C-3a) confirms that the overall after-tax cost of capital is a constant.

However, it is unlikely that the personal tax advantage of equity fully offsets the corporate tax advantage of debt. If not, and if taxes were all that mattered (i.e., if there were no other costs to debt), the overall after-corporate-tax cost of capital would still fall as debt was added, just not as fast. How fast it falls would depend chiefly on the net corporate-over-

[12] As Prof. Taggart notes (his footnote 9), it is not necessary that a specific, risk-free equity security exist as long as one can be created synthetically, through a combination of long and short sales of traded assets. Such constructs are a common analytical tool in financial economics.

[13] The net all-tax effect of debt on the overall cost of capital, t_N, equals $\{[t_C+t_E-t_D-(t_C\times t_E)] / (1-t_E)\}$, where t_D is the personal tax rate on debt, as before. This measure of net tax effect is designed for use with the cost of debt in Equation (C-3a), which seems more useful in the present context. The Taggart paper works with a similar measure, but one which is designed for use with the cost of risk-free equity in the equivalent Taggart equation.

[14] In the above example, $t_N = \{[0.35+0.077-0.4-(0.35\times0.077)] / (1.0-0.077)\} = 0.0/0.923 = 0$.

personal tax advantage of debt (and secondarily on how often the company readjusts its capital structure to the “normal” or “target” level). Even absent a complete offset, personal tax effects still serve to reduce the corporate tax advantage of debt.

Finally, note that the overall after-tax cost of capital, Equation (C-3b), still uses the corporate tax rate even when personal taxes matter. Equations (C-2b) and (C-3b) both correspond to the usual formula for the ATWACC. Personal taxes affect the way the cost of equity changes with capital structure -- Equation (C-3c) -- but not the formula for the overall after-tax cost of capital given that cost of equity.

B. NON-TAX EFFECTS

Q10. Please describe the non-tax effects of debt.

A10. If debt is truly valuable, firms should use as much as possible, and competition should drive firms in a particular industry to the same, optimal capital structure for the industry. If debt is harmful on balance, firms should avoid it. As I discuss below, neither picture corresponds to what we actually see. A large economic literature has evolved to try to explain why.

Part of the answer clearly are the costs of excessive debt. Here the results cannot be reduced to equations, but they are no less real for that fact. As companies add too much debt, the costs come to outweigh the benefits. Too much debt reduces or eliminates financial flexibility, which cuts the firm’s ability to take advantage of unexpected opportunities or weather unexpected difficulty. Use of debt rather than internal financing may be taken as a negative signal by the market.

Also, even if the company is generally healthy, more debt increases the risk that a bad year will imply the company cannot use all of the interest tax shields when anticipated. As debt continues to grow, this problem grows worse and others crop up. Managers begin to worry about meeting debt payments instead of making good operating decisions. Suppliers are less willing to extend trade credit, and a liquidity shortage can translate into lower operating profits. Ultimately, the firm might have to go through the costs of bankruptcy and reorganization. Collectively, such factors are known as the costs of "financial distress."[15]

The net tax advantage to debt, if positive, is affected by costs such as a growing risk that the firm might have to bear the costs of financial distress. First, the expected present value of these costs offsets the value added by the interest tax shield. Second, since the likelihood of financial distress is greater in bad times when other investments also do poorly, the possibility of financial distress will increase the risks investors bear. These effects increase the variability of the value of the firm. Thus, firms that use too much debt can end up with a higher overall cost of capital than those that use none.

Other parts of the answer include the signals companies send to investors by the decision to issue new securities, and by the type of securities they issue. Other threads of the literature explore cases where management acts against shareholder interests, or where management attempts to "time" the market by issuing specific securities under different conditions. For present purposes, the important point is that no theory, whether based on taxes or on some completely different issue, has emerged as "the" explanation for capital structure decisions by firms. Nonetheless, despite the lack of a single "best" theory, there is a great deal of relevant empirical research.

Q11. What does that research show?

A11. The research does not support the view that debt makes a material difference in the value of the firm, at least not once a modest amount of debt is in place. If debt were truly valuable, competitive firms should use as much as possible without producing financial distress, and competitive firms that use less debt ought to be less profitable. The research shows exactly the opposite.

For example, Kestler[16] found that firms in the same industry in both the U.S. and Japan do not band around a single, "optimal" capital structure, and the most profitable firms are the ones that use the *least* debt. This finding comes despite the fact that both countries

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15 See, for example, Brealey, Myers and Allen, *op. cit.*, at 503-17.

16 Carl Kester, "Capital and Ownership Structure: A Comparison of United States and Japanese Manufacturing Concerns," *Financial Management*, 15:5-16, (Spring, 1986).

at the time (unlike Canada) had fully "classical" tax systems, in which dividends are taxed fully at both the corporate and personal level.[17] Wald[18] confirms that high profitability implies low debt ratios in France, Germany, Japan, the U.K., and the U.S. Booth *et al.* find the same result for a sample of developing nations.[19] Fama and French[20] analyze over 2000 firms for 28 years (1965-1992, inclusive) and conclude, "Our tests thus produce no indication that debt has net tax benefits."[21] A recent paper by Graham[22] carefully analyzes the factors that might have led a firm not to take advantage of debt. It confirms that a large proportion of firms that ought to benefit substantially from use of additional debt, including large, profitable, liquid firms, appear not to use it "enough."

This research leaves us with only three options: either (1) apparently good, profit-generating managers are making major mistakes or deliberately acting against shareholder interests, (2) the benefits of the tax deduction are less than they appear, or (3) the non-tax costs to use of debt offset the potential tax benefits. Only the first of these possibilities is consistent with the view that the tax deductibility of debt conveys a material cost advantage. Moreover, if the first explanation were interpreted to mean that good managers are deliberately acting against shareholder interests, it would require the additional assumption that their competitors (and potential acquirers) let them get away with it.

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[17] The U.S. currently has an exception to this long-standing policy, in which dividends bear a lower tax rate than interest. The exception was introduced in 2003 and is currently in place until 2010. However, no such exception was in place when the research described in this appendix was performed.

[18] John K. Wald, "How Firm Characteristics Affect Capital Structure: An International Comparison," *Journal of Financial Research*, 22:161-167 (Summer 1999).

[19] Laurence Booth *et al.*, "Capital Structures in Developing Countries," *The Journal of Finance* Vol. LVI (February 2001), pp. 87-130, finds at p. 105 that "[o]verall, the strongest result is that profitable firms use less total debt. The strength of this result is striking ..."

[20] Eugene F. Fama and Kenneth R. French, "Taxes, Financing Decisions and Firm Value," *The Journal of Finance*, 53:819-843 (June 1998).

[21] *Ibid.*, p. 841.

[22] John R. Graham, "How Big Are the Tax Benefits of Debt," *The Journal of Finance*, 55:1901-1942 (October 2000)

Q12. Are there any explanations in the financial literature for this puzzle other than stupid or self-serving managers at the most profitable firms?

A12. Yes. For example, Stewart C. Myers, a leading expert on capital structure, made it the topic of his Presidential Address to the American Finance Association.[23] The poor performance of tax-based explanations for capital structure led him to propose an entirely different mechanism, the "pecking order" hypothesis. This hypothesis holds that the net tax benefits of debt (i.e., corporate tax advantage over personal tax disadvantage) are at most of a second order of importance relative to other factors that drive actual debt decisions.[24] Similarly, Baker and Wurgler (2002)[25] observe a strong and persistent impact that fluctuations in market value have on capital structure. They argue that this impact is not consistent with other theories. The authors suggest a new capital structure theory based on market timing -- capital structure is the cumulative outcome of attempts to time the equity market.[26] In this theory, there is no optimal capital structure, so market timing financing decisions just accumulate over time into the capital structure outcome. (Of course, this theory only makes sense if investors do not recognize what managers are doing.)

Q13. Do inter-firm differences within an industry explain the wide variations in capital structure across the firms in an industry?

A13. No. Any such view is flatly contradicted by the empirical research. As already noted, it has long been found that the most profitable firms in an industry, i.e., those in the best position

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[23] Stewart C. Myers, "The Capital Structure Puzzle," *The Journal of Finance*, 39: 575-592 (1984). See also S. C. Myers and N. S. Majluf, "Corporate Financing Decisions When Firms Have Information Investors Do Not Have," *Journal of Financial Economics* 13:187-222 (June 1984).

[24] See also Stewart C. Myers, "Still Searching for Optimal Capital Structure," *Are the Distinctions Between Debt and Equity Disappearing?*, R.W. Kopke and E. S. Rosengren, eds., Federal Reserve Bank of Boston. (1989).

[25] Malcolm Baker and Jeffrey Wurgler, "Market Timing and Capital Structure," *The Journal of Finance* 57:1-32 (2002).

[26] *Ibid*., p. 29.

to take advantage of debt, use the least.[27] The recent Graham paper very carefully examines differences in firm characteristics as possible explanations for why firms use "too little" debt and concludes that such differences are *not* the explanation: firms that ought to benefit substantially from more debt by all measurable criteria, if the net tax advantage of debt is truly valuable, voluntarily do not use it.[28]

Nor does the research support the view that firms are constantly trying to adjust their capital structures to optimal levels. Additional research on the pecking order hypothesis demonstrates that firms do not tend towards a target capital structure, or at least do not do so with any regularity, and that past studies that seemed to show the contrary actually lacked the power to distinguish whether the hypothesis was true or not.[29] In the words of the Shyam-Sunder - Myers paper (at p. 242), "If our sample companies did have well-defined optimal debt ratios, it seems that their managers were not much interested in getting there."

C. COMBINED EFFECTS

Q14. Please summarize the implications of this literature for the combined impact of the tax and non-tax effects of debt.

A14. The above results are not *theory,* they are empirical *fact*. The most profitable firms do not behave as if debt makes any material difference to value, and competition does not force them into an alternative decision, as it would if debt were genuinely valuable. As noted in the main body of my evidence, the explanation that fits the facts and the research is that within an industry, there is no well-defined optimal capital structure. Use of some debt does

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[27] For example, Kestler, *op. cit.* and Wald, *op. cit.*

[28] While not contradicting Graham's finding that differences in firm characteristics do not explain capital structure differences, Nengjiu Ju, Robert Parrino, Allen M. Poteshman, and Michael S. Weisbach, "Horses and Rabbits? Optimal Dynamic Capital Structure from Shareholder and Manager Perspectives," Working Paper, February 4, 2003, looks at the issue in another way. This paper uses a dynamic rather than static model to analyze the tradeoff between the tax benefits of debt and the risk of financial distress. It finds that bankruptcy costs by themselves are enough to explain observed capital structures, once dynamic effects are considered. This simply means debt is not as valuable as the traditional static analysis, of the sort used by Graham and many others, implies.

[29] Lakshmi Shyam-Sunder and Stewart C. Myers, "Testing static tradeoff against pecking order models of capital structure," *Journal of Financial Economics* 51:219-244 (February 1999).

convey an advantage in most industries, but that advantage is offset by other costs as firms add more debt. The range of capital structures over which the value of the firm in any industry is maximized is wide and should be treated as flat. The location and level of that range, however, does vary from industry to industry, just as the overall cost of capital varies from industry to industry. To conclude that more debt does add more value, once the firm is somewhere in the normal range for the industry, is to conclude that corporate management in general is either blind to an easy source of value or otherwise incompetent (and that their competitors let them get away with it).

Even more generally, this appendix can discuss only a few of what may well be thousands of papers that have been published on this topic. My conclusions rest on the entire literature, to the extent I can know it, and particularly on the fact that after more than 50 years of research, we still do not have an agreed theory of capital structure. For example, the concluding paragraph of a recent survey article by Frank and Goyal (2008)[30] states:

> Where does this leave Myers's contest [regarding explanations for capital structure]? As one might have hoped, in the two decades since his [1984 Presidential Address to the American Finance Association], there have been significant improvements in our knowledge of the facts. Perhaps the most serious problem at this time is the lack of a satisfactory unifying model. We are not aware of any current model that is capable of simultaneously accounting for [the facts the research has revealed about capital structure] but it will be nice to have one.

If debt had a first-order impact on the value of the firm at the margin within a given industry, by now we would understand what that impact was and could confidently recommend that firms adopt capital structures that maximize that first-order impact. Nothing could be further from the truth.

Therefore, the value of the firm plotted against (market-value) leverage must be quite flat in a range that varies from industry to industry, which as explained in the main body of my evidence in Section III.B, and especially in connection with Figures 4 and 5, implies that

[30] Frank, Murray Z. and Vidhan K. Goyal, "Trade-off and Pecking Order Theories of Debt," in B. Espen Eckbo (ed.) *Handbook of Corporate Finance: Empirical Corporate Finance, Volume 2* (Handbooks in Finance Series, Elsevier/North-Holland), Ch. 12, 2008, p. 195.

the ATWACC must be viewed as essentially flat within a broad middle range of capital structures, in industries in which it is sensible to use some debt.

II. THE MAXIMUM NET TAX ADVANTAGE OF DEBT

Q15. What topic does this section cover?

A15. Equation (C-3a) above shows that the net tax advantage of debt over equity at the corporate level is reduced by debt's higher personal tax burden. 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.

Q16. Why can you not identify the marginal tax advantage precisely?

A16. To calculate the rate at which debt produces a net tax advantage, considering only the tax effects of debt, an analyst needs data on corporate tax rates and on personal tax rates for debt and equity. However, multiple tax rates exist. The personal tax rates for dividends differ from those on capital gains, the tax rates vary among the provinces, and the tax rates vary by income level.

Dr. Vilbert's Canadian sample's returns split between dividends and capital gains, with a higher proportion of dividends than the typical stock. As benchmarks, I consider 100 percent dividends, 50-50, and 100 percent capital gains.

Q17. How do you address these difficulties?

A17. I use KPMG data on the top marginal personal tax rates, by province, for interest, dividends, and capital gains, and also for corporate tax rates by province. Gaz Métro supplied the blended 2009-2010 corporate tax rate relevant for its 2010 rate case. This enabled me to test the range of possible values for the net tax advantage with various combinations of personal and corporate rates. Table C-3 reports the results.[31]

Table C-3
Net Tax Advantage of Debt with Corporate and Personal Taxes ("t_N")

Tax Rate Combinations	Period		**Share of Dividends in Equity Returns**		
			100%	50%	0%
Based on Calendar Year					
Quebec Corporate Rate, Average Personal Rates	2009	[a]	2.6%	2.3%	2.1%
	2010	[b]	2.1%	1.6%	1.1%
Average Corporate Rate, Average Personal Rates	2009	[c]	3.3%	3.0%	2.8%
	2010	[d]	2.8%	2.2%	1.7%
Based on Gaz Metro's Filing Schedule					
Gaz Metro Corporate Rate, Average Personal Rates	2009 - 2010	[e]	2.2%	1.8%	1.3%
Average Corporate Rate, Average Personal Rates	2009 - 2010	[f]	2.9%	2.4%	2.0%

Sources and Notes:
Territories are not included in the calculations. Including them would not materially affect the weighted values due to the relative populations in these regions.
[a], [c]: Workpaper #1 to Table C-3, Panel A.
[b], [d]: Workpaper #1 to Table C-3, Panel B.
In the initial calculations, corporate rates and average personal rates are based on calendar year. For Gaz Metro, the rates are adjusted based on the company's filing schedule. The filing starts in the fourth quarter of 2009 and completes in the third quarter of 2010. Therefore, rates are adjusted as follows:
[e] = 25.2% x [a] + 74.8% x [b].
[f] = 25.2% x [c] + 74.8% x [d].
The weights are provided by Gaz Metro, in which:
25.2% equals to (92 days / 365 days) for 2009.
74.8% equals to (273 days / 365 days) for 2010.

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[31] The calculations underlying Table C-3 are in my Tax Advantage Workpapers.

The top of the table calculates rates for 2009 and 2010 individually, and the bottom of the table calculates the blended rate relevant for Gaz Métro's 2010 rate filing. The calculation is not particularly sensitive to the proportion of dividends and capital gains. The first row of the bottom part of the table is the more relevant for Gaz Métro, but there is not a great deal of difference between rows, either. The illustrations in the body of my evidence use a 10 percent rate as the maximum possible tax advantage of debt, but this rate is clearly too high for an actual analysis.

Of course, the actual advantage of incremental debt will be *lower* than shown in the table at normal capital structures, since adding debt at that point would further increase the non-tax costs of debt.

Q18. Does this complete Appendix C?

A18. Yes, it does.

Appendix D: ESTIMATION OF BETA FOR COMPANIES USING BOOK-VALUE RATE BASES

Q1. What is the purpose of this appendix?

A1. Shareholders of companies regulated on a book-value rate base receive compensation for inflation in a different way from most companies' shareholders, through an inflation premium in the rate of return rather than through appreciation of asset value.[1] Bondholders get inflation compensation in the same way, through an inflation premium in the interest rate. This similarity makes regulated company returns especially sensitive to fluctuations in the bond market. This in turn can affect the estimation of such a company's beta, the stock market measure of risk. This appendix describes the procedures Dr. Vilbert and I use to accommodate this effect.

Q2. Please summarize the meaning of "beta."

A2. Beta is a measure of the "systematic" risk of a stock -- the extent to which a stock's returns tend to respond to the market's returns. As Dr. Vilbert explains, the basic idea behind beta is that risks that cannot be diversified away in large portfolios matter more than those that can be eliminated by diversification. Beta is a measure of the risks that *cannot* be eliminated by diversification. By definition, a stock with a beta equal to 1.0 has average non-diversifiable risk. Stocks with betas above 1.0 have more than average risk, and those with betas below 1.0 have less than average risk.

Q3. Why did you recommend that Dr. Vilbert use a modification to the standard procedure for estimating beta for regulated companies?

A3. Beta is normally calculated by statistically comparing (using "regression analysis") the excess (positive or negative) of the return on the stock over the risk-free rate with the excess of the return on a market index such as the S&P/TSX composite index (or the S&P 500 in the U.S.) over the risk-free rate. However, when that method is used for companies

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[1] See Stewart C. Myers, A. Lawrence Kolbe and William B. Tye, "Inflation and Rate of Return Regulation," *Research in Transportation Economics*, Volume II. Greenwich, CT: JAI Press, Inc. (1985). A number of other papers cited in Appendix A and my book with Professor Myers and Dr. Tye also explore these principles. Additional references are in the bibliographies of those papers.

regulated on a book-value rate base, the extra sensitivity to the bond market is ignored. This can create measurement problems and biases.

Q4. Why is that?

A4. Standard practice is to use the stock market as the definition of "the market" in theories such as the CAPM. However, CAPM theory is based on a market that includes *all* assets: stocks, bonds, real estate, gold, etc. A focus on stocks alone creates no obvious bias for most industries, but does for companies regulated on a book-value rate base. This effect is especially pronounced for electric utilities, but in principle affects all companies subject to book-value regulation. The fact that bonds are "missing" from the standard definition of "the market" is thus responsible for the bias. When interest rates change, regulated companies respond in part the way bonds do, and for exactly the same reason: a nominal rate of return on a book-value rate base offers the same pattern of future cash flows as a nominal interest rate on the fixed face value of a bond. The true risk of rate-regulated companies relative to other companies can be materially understated when this fact is ignored. Betas that are calculated in a way that does capture the interest rate sensitivity and that are then calibrated to be comparable to conventional betas are dramatically higher, indicating a much higher risk relative to other companies than the standard beta calculation reveals.[2]

Q5. How do you adjust for this effect in this proceeding?

A5. The original analysis was done using U.S. data, and the Canadian analysis has adopted the same procedures.

For many years after the U.S. Board of Governors of the Federal Reserve System (the "Fed") began targeting monetary growth rates rather than interest rates in late 1979,

[2] Empirical study of utility returns has long confirmed this effect. Betas that are calculated in a way that does capture the interest rate sensitivity and that then are calibrated to be comparable to conventional stock-only betas are dramatically higher. See Charles River Associates ("CRA"), *Choice of Discount Rates in Utility Planning: A Critique of Conventional Betas as Risk Indicators for Electric Utilities*, prepared for the Electric Power Research Institute ("EPRI"), February 1984. (I was one of the authors of this study.) See also E. J. Elton, M. J. Gruber and J. Mei, "Cost of Capital Using Arbitrage Pricing Theory: A Case Study of Nine New York Utilities," *Financial Markets, Institutions, and Instruments* 3: 46-73 (August 1994), cited in Richard A. Brealey and Stewart C. Myers, *Principles of Corporate Finance*, 7th Ed., New York: Irwin McGraw-Hill (2003) at 206-208.

government bonds had higher betas measured against the stock market. My procedure to estimate accurately the *stock* market beta for companies regulated on a book value rate base despite their bond market sensitivity requires identification of the part of bond market returns that is *not* caused by this sensitivity of bonds to the stock market.[3]

The resulting estimates of beta against the stock market are not subject to bias due to regulated companies' unusual sensitivity to pure bond market forces. That is, these betas measure the pure stock-market effect on regulated companies' returns, undiluted by regulated companies' unusual sensitivity to bond market returns. Thus, these are superior estimates of the true stock market betas of companies regulated on a book-value rate base.

Q6. What use do you or Dr. Vilbert make of the other beta in the regression, against the pure bond market variable?

A6. In the U.S., these second betas have been highly statistically significant in two-variable electric utility industry regressions (at least, until the recent anomalous decline in measured betas to zero, discussed in Dr. Vilbert's evidence). However, this high significance does not show up for the U.S. gas distribution sample. For Canadian utility companies, consistent statistical significance does not arise until recent years, but does exist for the period over which Dr. Vilbert estimates his Canadian sample betas. Overall, such findings reconfirm the extreme sensitivity of rate-regulated companies to bond market forces first documented in the CRA report for EPRI that led me to try this test in the first place. That in turn reconfirms that the unadjusted stock market betas themselves, even when estimated accurately in the two-variable regression, still understate the relative risk of U.S. utilities and Canadian rate-regulated companies against the broader market of CAPM theory.

Q7. Please explain this last statement in more detail. Are you saying that for some rate-regulated companies the stock market betas that come out of your analysis that includes the pure bond market factor are still too low to reflect the companies' true risk?

[3] Recently, this sensitivity of bond returns to stock market returns seems to have vanished.

A7. Absolutely. These betas are constructed so they only measure the regulated companies' sensitivity to stock-market-related factors, not the pure bond market factors. Yet where statistical significance obtains, the stocks unambiguously are exposed to the pure bond market factors also. The failure of the standard beta approach to measure the greater sensitivity of such stocks to the pure bond market risk factors means the conventional calculation understates the risks of these companies relative to other companies. That is, the true beta of such companies against all assets is closer to the average value than the conventional calculation against the stock market shows, even when the regulated company's pure stock market beta is estimated accurately.

Q8. Is this effect material?

A8. It definitely is. The CRA study found that utility betas against an augmented market of stocks and bonds, which then were adjusted to be comparable to ordinary stock betas, were roughly *twice* as large after the Fed policy change began to be felt. As another, rough illustration, the Elton, Gruber and Mei study found a risk factor for sensitivity to the excess return on bonds (their "yield spread" risk factor) of 5.1 percent. The utility sensitivity to the pure bond market factor in the above tests was typically on the order of 0.75. An extra risk premium, over and above the stock market risk factor, of 0.75 x 5.1 percent = 3.8 percent would be material by any reasonable standard.[4]

Q9. How do you recommend that Dr. Vilbert accommodate this effect when estimating the cost of capital for the various samples?

A9. In general, we have not been able to estimate utility betas reliably in the conventional way for several years now, although U.S. betas may be returning to normal. (Of course, no one

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[4] Taking one risk factor from an Arbitrage Pricing Study and applying it to a different model (i.e., one with only a stock and a bond effect, as in my tests), can only serve as a rough illustration of relative importance. The Elton, Gruber and Mei study has several risk factors that are related to bond returns (their "yield spread," "interest rate" and "inflation") factors. The sum of these three risk effects for electric utilities as these authors measure it is a risk premium of 6.8 percent, to which modest positive and negative risk premiums for other factors, including the stock market, are added. Their final risk premium for utilities is about 8.5 percent over Treasury bills, considerably higher than that Dr. Vilbert finds using my beta procedures.

knows what the market turmoil since September 2008 will do to beta estimates in the future.) This means we have not been able to confirm statistically the sensitivity of utility stocks to interest rates for several years, either. Nonetheless, North American utilities still overwhelming use original cost rate bases, and there is no reason to believe their true sensitivity to interest rates has diminished.

Accordingly, I recommend use of adjusted betas for utilities regulated on a book-value rate base. Dr. Vilbert follows that recommendation for his Canadian utility sample, but not for his gas LDC sample, for reasons he explains.

Q10. Does this complete Appendix D?

A10. Yes, it does.

Appendix E: ISSUES RAISED IN PREVIOUS REGULATORY DECISIONS

Q1. What is the purpose of this appendix?

A1. To my knowledge, the NEB's Decision RH-2-2004 is the most recent discussion of the issues by a Canadian regulatory body prior to the TQM Decision. Decision RH-2-2004, while apparently accepting the principles underlying ATWACC, raises certain concerns about the evidence used in that proceeding to implement the principles. Therefore, my TQM evidence addressed in detail the NEB's stated concerns.

The outcome of the TQM proceeding suggests that the NEB, at least, may have found some of that discussion helpful, and my hope is that the Régie might find it helpful, also. The first part of this appendix therefore essentially replicates that discussion.

The AEUB's Decision 2004-052 does not discuss the AEUB's then-current views of the capital structure principles that underlie Dr. Vilbert's and my evidence. Earlier, the AEUB's Decision U99099, 1999/2000 Electric Tariff Applications, November 29, 1999 ("Decision U99099") accepted that the ATWACC principles as stated in my evidence both here and in that proceeding govern the returns of unregulated firms, and it adopted ATWACC as a (still subordinate) tool to arrive at a fair return for TransAlta Utilities. However, based in part on analyses introduced for the first time in post-hearing argument, without the opportunity for a response in expert evidence, the ATWACC the AEUB used was calculated with book-value, not market-value, weights. My TQM evidence addressed three issues that appear to have contributed to the AEUB's use of book-value weights, and the second part of this appendix essentially replicates that discussion, also.

Finally, Mr. Engen's evidence discusses the widespread failure of new, unconstrained energy infrastructure investments (mostly pipelines) to use the formula return system. In past NEB and AEUB decisions, various differences between those pipelines and existing pipeline systems were cited as possible reasons that the adverse parties might agree to much higher returns rather than simple adopting the formula return. The last section of this appendix addresses the subset of these possible reasons that fall within my area.

I. THE NEB'S COMMENTS ON ATWACC-BASED EVIDENCE IN DECISION RH-2-2004

Q2. What did Decision RH-2-2004 say about the general use of ATWACC-based evidence?

A2. In that proceeding, the focus was on the appropriate deemed equity ratio for the TransCanada Mainline. While adhering to this focus, the Mainline based its deemed equity ratio recommendations on the capital structure principles described above, which led to comments by the NEB.

In particular, Decision RH-2-2004 at p. 54 accepted "that ATWACC-based methodologies have theoretical merit." Also, at p. 55 the decision says, "The Board accepts that, over a certain range, the ATWACC curve may be flat or virtually flat." However, the NEB also stated at p. 54 that "a number of empirical concerns limit [ATWACC-based methodologies'] usefulness as a tool to assess cost of capital or the Mainline's appropriate deemed equity ratio."

Q3. What did these statements signify for your evidence in the TQM proceeding?

A3. I took these statements to mean that *the issue was no longer whether the principles are sound, but whether the evidence is adequate.* As a result, Dr. Vilbert and I attempted in TQM evidence to address explicitly the concerns the NEB enunciated in Decision RH-2-2004. We discussed specific comments from the NEB's RH-2-2004, Phase II discussion of this issue and the ways we have addressed them.

The remainder of this section of the appendix addresses these issues. I try to indicate places in which differences between Gaz Métro and TQM are relevant to the discussion, and I correct some cross-references (since the discussion appeared in the body of my TQM evidence instead of in an appendix). Otherwise, the remainder of this section largely simply copies my TQM evidence.

Q4. How do you discuss the NEB's RH-2-2004 comments?

A4. This (long) answer quotes the comments from pp. 54-56 of Decision RH-2-2004 and describes the ways in which we addressed them.

Comment 1: "The Board is cognizant of the fact that there are no companies involved exclusively in long-distance natural gas transmission, and the approach must therefore rely on sample companies that are not directly comparable."

Ways Addressed:

It is true that the ideal sample is not available, but for the first time in many years there is a sample of companies that are as close to being "pure plays" in the gas pipeline business as has been available for many years. Dr. Vilbert's TQM evidence analyzes that sample. (Of course, this issue is not a concern in the case of Gaz Métro, since Dr. Vilbert does analyze a sample of pure-play gas LDCs in his present evidence.) Moreover, we would also note that the absence of a large sample of pure-play gas pipeline corporations is a problem for *all* efforts to estimate the fair rate of return on equity for a gas pipeline.

That is, the absence of a perfect sample is entirely independent of the capital structure principles discussed elsewhere in my evidence. Given the changes in the industry since the NEB's RH-2-94 formula[5] was created, there is no way to escape this problem in *any* review of a pipeline's cost of equity. Nor could this be a valid reason to stick to the existing formula: TQM's and any other pipeline's fair rate of return on equity would be forever beyond reasoned review if the NEB were to rule that it can only be determined by (or the current formula value only challenged by) use of evidence of a type that no longer exists. I am unqualified to say if such a ruling would comply with applicable legal standards, but I can say definitively that it would pave the way for the kind of economic problems discussed in Section II of my evidence.

Comment 2: "The Board accepts that, over a certain range, the ATWACC curve may be flat or virtually flat. However, 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. In this regard, the Board notes that the average estimated level of common equity for the companies in the US gas LDCs sample differs significantly from the currently deemed ratio for the Mainline. Further, it also exceeds that estimated for most companies in the

[5] "Reasons for Decision" in RH-2-94, dated March 1995 ("RH-2-94 Decision").

> Canadian Utilities sample. In the Board's view, these differences in capitalization are likely reflective of material differences in business risk. Consequently, the Board places little reliance on the US gas LDCs sample, or on firms in the Canadian Utilities sample that exhibit significantly different equity ratios."

Ways Addressed:

We address this comment in four ways.

First, we would respectfully note that as written, this comment appears to reason in reverse. The statement, "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" *starts* from the capital structure "which is deemed for the Mainline" as a reason to reject the sample evidence. However, the goal of the analysis of sample data in the RH-2-2004, Phase II proceeding was to *determine* what capital structure *should* be deemed for the Mainline. Thus as stated, this reason for rejecting the evidence would seem to be circular: it assumes an answer to the question under investigation and uses that assumed value as a reason to reject evidence on what the answer to the question should be. We would respectfully submit that the non-circular way to analyze the question would instead be to compare the business risk of the sample and a particular pipeline based on the natures of the businesses, to accept the sample's business risk as accurately reflected in its ATWACC, and then to see what that implies about the pipeline's required ATWACC, and in turn its deemed equity ratio or cost of equity.

Second, our results are not sensitive to the concern about the width of the ATWACC's flat range. As depicted in Figure 5 in the body of my present evidence, the maximum rate at which the ATWACC can decline as debt is added is very modest.[6]

Third, the U.S. gas LDC industry is regulated under the same cost-of-service model used in Canada, is a part of integrated North American gas markets, and has had stable regulatory rules for some time now.[7] Dr. Carpenter similarly finds the LDC industry to be

[6] I calculate this rate in Appendix C.

[7] I should note that recent developments imply DCF-based cost of equity estimates for the LDC sample will tend to understate the true cost of capital at present, but risk-positioning methods are more robust (continued...)

a relevant benchmark. No perfect sample exists, and evidence from an industry with the characteristics of the LDC sample should not be lightly dismissed. (Of course, the LDC sample is directly relevant for Gaz Métro.)

Finally, in his TQM evidence Dr. Vilbert also analyzes a gas pipeline sample, something that has not been possible for many years. Even if the NEB were to conclude afresh that it did not want to rely on the LDC sample, the pipeline sample amply supports our findings and recommendations.

Comment 3: "In addition, the Board notes that during the ATWACC estimation process, numerous adjustments were made, all of which result in an increase to the estimated ATWACC. As can be observed in Table 5-1, the impact of relaxing even a single assumption can be significant."

Ways Addressed:

We address this comment in two ways.

First, we would respectfully suggest the need to re-examine Comment 3. Some of Dr. Vilbert's "adjustments" in RH-2-2004, Phase II led to a decrease in the estimated ATWACC, not an increase. For example, Dr. Vilbert "unadjusted" the Value Line betas for his LDC sample, which has the effect of reducing rather than increasing the estimated ATWACC.[8] He used lower interest rates than many parties in the case, and a lower estimate of the Market Risk Premium than he had in earlier proceedings.

Table 4 below depicts the directional effects of the "adjustments" made by Dr. Vilbert. Note that it indicates two types of directional effect for an "adjustment." First, a plus or minus in parentheses -- (+) or (−) -- indicates the effect relative to taking the data as found or to accepting the theoretical CAPM despite the repeated empirical finding that it

[7] (...continued)
and can still be used. (I leave this comment here for completeness, but it referred to a wave of mergers and acquisitions of LDC companies, and the global financial crisis has changed the set of challenges a cost of capital analyst faces.)

[8] A potential source of confusion: the NEB's statement about "adjustments" uses the word in the ordinary way. Value Line's "adjustment" to its betas refers to the application of a formula that moves its betas towards a value of 1.0, which tends to raise the betas of utilities. Since both sources use the same word, my evidence does, also. But readers should keep the distinction in mind.

underestimates the cost of capital of low-beta stocks. Second, a plus or minus in brackets -- [+] or [−] -- indicates the impact of changes from the previous evidence Dr. Vilbert filed before the NEB. As the table shows, there are three minus signs and four plus signs in the procedures Dr. Vilbert used in RH-2-2004, Phase II. For, the procedures he uses in the TQM proceeding, there are still four plus signs, but there are six minus signs.

Table E-1
"Adjustments" from RH-4-2001 to RH-2-2004, Phase II to TQM Proceeding [1)]

	RH-2-2004	Current
Beta		
Canadian Sample	Adjusted (+)	Adjusted (+)
Gas LDC Sample [2)]	Removed Adjustment (-)	Removed Adjustment (-)
Pipeline Sample	n/a	Unadjusted (-) [4)]
Market Risk Premium		
Long-Term	5.5% [-]	5.75% [+]
Risk-Free Rates		
Long-Term Adjustment for Yield Spread	0.4% (+)	0.2% (+), [-]
Consider Short-Term Rate Evidence [3)]	No [+]	No (-)
ECAPM increment to CAPM intercept		
Long-Term	0%, 1%, 2% (+ for latter two only)	0%, 1%, 2% (+ for latter two only)
DCF Analyses		
Use of Long-Term GDP Growth Rate	(-)	(-)
Canadian vs. U.S. Interest Rates	No Adjustment	Adjustment [-]

1) + or - in parentheses shows direction of change relative to taking data straight from the source or of accepting the CAPM "as is", ignoring the results of empirical research; + or - in brackets shows direction of change from procedures used in previous proceeding.

2) For the U.S. Gas LDC companies, betas were obtained from Value Line, which reports adjusted betas. Dr. Vilbert reversed the adjustments, which reduces beta.

3) Dr. Vilbert considered short-term rate evidence in 2001. In 2004, he reported but did not consider it, because short-term rates were anomalously low. In the current proceeding, he does not report or consider short-term rates, but now short-term rate results would exceed those derived from long-term interest rates.

4) Dr. Vilbert did not have an MPL pipeline sample previously, but ordinarily he would use adjusted betas for companies regulated on an original cost rate base.

In short, while Dr. Vilbert has always used the procedures he believes to be most reliable as of the date the evidence is filed, we hope that all parties will agree that regardless of the NEB's findings in RH-2-2004, Phase II, the procedures he uses in his TQM evidence definitely do not have only one-sided adjustments.

Of course, in the present proceeding, Dr. Vilbert has markedly increased his values for the MRP and the long-term adjustment for the yield spread, because the global financial crisis has materially increased the cost of capital for all companies. Additionally, the pipeline sample simply does not appear, because the LDC sample is the directly relevant benchmark for Gaz Métro. At the same time, my own estimate of the equity issuance cost adjustment is lower than that suggested by Gaz Métro in the 2009 rate case. Thus, the general point remains: Dr. Vilbert's and my procedures do not uniformly produce a higher cost of capital estimate.

Second, we would add that even the lowest of Dr. Vilbert's RH-2-2004, Phase II estimates still indicated the need for a material increase in the TransCanada Mainline's overall return, which was also true of TQM in that proceeding (and is true of Gaz Métro in the present proceeding).

Comment 4: "The Board has particular concerns with the inconsistent time periods over which the Canadian Utilities sample's betas were derived (five-year period ending May 2000) and the corresponding market-value capital structures were estimated (five-year period ending October 2003). The Board notes that Drs. Kolbe and Vilbert emphasized the importance of the fundamental relationship between a firm's true beta and market value capital structure. The Board is of the view that this empirical inconsistency weakens the application of the K&V ATWACC Methodology."

Way Addressed:

The NEB's comment is an accurate reflection of our evidence in the RH-2-2004 proceeding. The source of the difficulty is that no party believed the then-current values of the betas for the Canadian sample. The procedure described is our adaptation to the problem, which the NEB rejected. The appropriate remedy is to find a new procedure, which we have done. In particular, Dr. Vilbert is now able to use more recent information. His findings here are based on current betas and on current capital structure data as well. Therefore, we believe we have directly remedied the NEB's stated concern.

Comment 5: "While the sample of Canadian Utilities is an obvious benchmark, the Board notes that all firms in Dr. Vilbert's Canadian Utilities sample derive a portion of their revenues from unregulated activities. Since these activities are typically riskier than gas pipeline operations, the estimated cost of capital for these firms tends to overstate the cost of capital of their regulated operations, and indirectly that of the Mainline. In the Board's view, the evidence of Drs. Kolbe and Vilbert did not adequately address this concern."

Ways Addressed:

We address this concern in five ways.

First, we would note that the fact that a sample company has unregulated activities does *not* necessarily mean its measured cost of capital overstates the regulated portion's cost of capital. This is particularly true if the unregulated businesses have experienced difficulty, since the measured cost of capital of businesses in trouble tends to *understate* their true cost of capital.

Second, the Canadian sample does not consist of pure plays in any particular rate-regulated business, so even its regulated businesses are hard to benchmark against a particular pipeline. Moreover, it has been getting steadily smaller (and is smaller today than in the RH-2-2004, Phase II proceeding), and small samples have larger measurement errors. Additionally, despite Dr. Vilbert's efforts to estimate a current beta for this sample, the value of the Canadian sample beta remains less certain than those of the U.S. samples. This means the estimated Canadian sample cost of capital is simply much less reliable than those of the U.S. samples. We would submit that even if the NEB ultimately wishes to be able to rely solely on Canadian sample data, it is a simple fact that the quality of the available Canadian sample data *at this time* cannot legitimately support such reliance.

Third, as discussed in Dr. Vilbert's evidence, the Canadian sample betas are still recovering from their plunge in the early 2000s. The values observed today underestimate the true risk of the Canadian sample. (As noted in the body of my present evidence, this recovery has been halted recently.)

Fourth, for the first time in many years we are able to analyze an actual gas pipeline sample, albeit in a way that produces a downward-biased estimate of its actual cost of capital. The results of that sample confirm that the Canadian sample's results are biased downward at this time.

Finally, we would note again that the problems with the available sample data are just as serious for the current value of the formula return on equity, since those problems affect *any* estimate of the cost of equity. Use of the formula value could not be justified on the grounds that sufficient evidence to overturn it is no longer available because of data problems, or companies would have no way *ever* to challenge the value the formula produces at any particular time.

To the above points from my TQM evidence I would just add that Dr. Vilbert's LDC sample is directly applicable for Gaz Métro and avoids the present problems with the Canadian sample.

Q5. Please sum up.

A5. Dr. Vilbert and I believe we have directly addressed and resolved the NEB's previously identified concerns about the nature of the evidence, so that the NEB could make use of ATWACC-based evidence in the TQM proceeding. In the TQM Decision, the NEB did make use of both ATWACC-based evidence and cost of capital information on U.S. companies. I would hope that the Régie finds this background useful for its own deliberations.

II. ISSUES RAISED IN THE AEUB'S DECISION U99099

Q6. What issues does this section discuss?

A6. There are three: (1) if the ATWACC is flat in the middle range, as I say, why might graphs of ATWACC against the debt ratio show a downward slope; (2) should book- or market-value capital structure weights be used to calculate the ATWACC for companies regulated on a book-value rate base, and (3) is the market-to-book ratio a reliable guide to whether a rate-regulated company expects to earn more or less than its cost of capital?

A. MEASURED ATWACC VS. THE DEBT RATIO

Q7. What is the answer to the first of these questions?

A7. There are a number of forces that may be responsible for a downward slope of the measured ATWACC against the debt ratio. They may be broadly grouped into two categories: factors that distort the comparison, and factors that are left out of the measured ATWACC.

1. Factors That Distort the Comparison

Q8. Please describe the first type of force you say is responsible for the downward slope, "factors that distort the comparison."

A8. Estimation of the cost of capital is an inherently imprecise exercise. Part of this imprecision is statistical, which may give rise to anomalous comparisons in any particular case, and part is due to the inevitable shortfall of a real sample from the ideal sample of "pure plays" identical to the company in question. This is particularly true of Dr. Vilbert's Canadian sample, which perforce includes companies in different lines of business entirely, but it is a general feature of cost of capital estimation. Therefore the sample companies in reality will have somewhat different ATWACCs not because of capital structure, but because of differences in *business* risk.

All else equal, less business risk means the broad middle range of capital structures over which the ATWACC is constant will contain more debt on average, as illustrated in Figure 5 in the body of my evidence. This in turn will result in a negative correlation between measured ATWACC and the debt ratio, not because more debt lowers the ATWACC, but because a lower ATWACC tends to lead to more use of debt. That is, the negative correlation may be real, but the cause differences in business risk rather than a material tax advantage to debt. This causality would be the exact opposite of that hypothesized in the information presented in post-hearing written argument in the proceeding that produced Decision U99099.

2. Factors Left out of the Measured ATWACC

Q9. Are such distortions alone enough to explain a negative correlation between measured ATWACC and the debt ratio?

A9. No, in my view they are not. Instead, the ATWACC measured at higher debt ratios understates the ATWACC that would be ideal to use in capital budgeting and in rate regulation. The reason is that some of the non-tax effects of excessive debt may be hard to detect and not show up in cost of capital measurement. Others may be purely cash flow effects, with no impact on the cost of capital strictly defined, but with a definite impact on the value of the firm. This problem is handled in capital budgeting by strict prohibitions against artificially inflating the debt ratio when evaluating a project. For example, Brealey, Myers and Allen, the leading graduate textbook on the subject, cautions against such adjustments under the subtitle, "Mistakes People Make in Using the Weighted-Average Formula."[9] This implies that the non-tax costs of excessive debt are valued by not reducing the ATWACC for tax effects beyond those embodied in the ATWACC value estimated from the market. Rate regulation using ATWACC needs to adopt similar standards.

Q10. Why do you say the ATWACC at high debt ratios understates the ideal number for use in rate regulation?

A10. The same logic used in capital budgeting also applies to rate regulation. For regulatory purposes, the non-tax costs of excessive debt would wrongly be ignored if regulators who rely on ATWACC were to assume the ATWACC would continue to go down as debt was added. Those costs, discussed in Appendix C, consist of such factors as reduced financial flexibility and a higher risk the firm may have to bear the costs of financial distress. Such factors may not show up when the cost of capital is estimated, but they do not show up as line items in a regulated company's revenue requirement, either. There is no place a regulatory board can point to and say, "well, we're adding to the debt ratio without holding the ATWACC constant, but that's okay because we've added X dollars for the costs of excessive debt to the revenue requirement." If anything, this factor implies that the true

9 Brealey, Myers and Allen, *op. cit*, at p. 541.

ATWACC for project valuation or regulatory purposes is somewhat *higher* than the simple average of the industry sample ATWACCs, but this refinement cannot be made with available estimation techniques.

Firms consistently *behave* as if such non-tax costs matter more than the net tax advantage of debt. If anything, the logic of such behaviour is *stronger* in Canada than in countries with classical tax systems, the subject of much of the research, since equity is at a bigger a corporate tax disadvantage in those countries than in Canada. One way to recognize these principles is to adopt the ATWACC as the fair return standard. Other ways are to pick a (1) deemed equity ratio or (2) cost of equity that is consistent with the required ATWACC, given a specified (1) return on equity (e.g., from the Board's formula) or (2) deemed equity ratio.

B. MARKET VS. BOOK CAPITAL STRUCTURE WEIGHTS

Q11. Should book value weights be used in the formula to adjust the cost of equity or to calculate the ATWACC for firms regulated on a book-value rate base?

A11. No, that would be economically incorrect.

Q12. Why?

A12. The cost of capital is determined in the market for regulated and unregulated firms alike. Regulated shareholders will be unhappy if the market value of their shares falls, even if the book value is constant. They will be indifferent to a fall in book value as long as the market value is unaffected. In this they are no different from any other group of shareholders.

Q13. Would use of market-value weights to calculate the cost of equity or the ATWACC for rate-regulated companies be circular or lock in an excessive return?

A13. No. The true beta depends on the market value of the firm's leverage, again for regulated firms just as much as for unregulated firms.[10] That means the measured beta of a regulated company sample will be lower when its market-to-book ratio is above one than when its

[10] Of course, the measured beta may be different.

market-to-book ratio equals one, all else equal. (Of course, in practice all else may not be equal.) The result is that the ATWACC using market-value weights is the best estimate of the true ATWACC of the regulated company, regardless of whether the regulated company's market-to-book ratio is above or below one.[11] Market-value weights must be used to calculate the implications of the sample costs of equity, as well, in Equation (C-4). With a market-to-book ratio over one, use of book-value weights can lead to a potentially serious underestimate of the company's true cost of capital.

Brealey, Myers and Allen, *op. cit.*, makes the same point. For example, at p. 541 the authors caution, "You cannot increase the debt ratio without creating financial risk for stockholders and thereby increasing r_E, the expected rate of return they demand from the firm's common stock." Which debt ratio do they mean? At p. 504 they begin an example to show how to calculate the ATWACC. They provide the book- and market-value balance sheets and do the calculation using the market values. Then they say at pp. 504-05,

> Why did we show the book-value balance sheet? Only so you could draw a big X through it. Do so now.
>
> When estimating the weighted-average cost of capital, you are not interested in past investments but in current values and expectations for the future. [The example company]'s true debt ratio is not 50 percent, the book ratio, but 40 percent, because its assets are worth $1,250 million [versus a book $1,000 million]. The cost of equity ... is the expected rate of return from purchase of stock at $7.50 per share [the market value]. You can't buy shares in [the company] for $5 [the book value] anymore.

Professors Brealey and Myers are very familiar with the institutions of ratemaking.[12] If an exception were needed to a point they make this dramatically, to say that book values should be used instead of market values to calculate ATWACC for companies regulated on book value, it would have been discovered and included by the seventh edition of the

[11] As just discussed, the fact that the ATWACC of any given sample may display a downward slope against the debt ratio does not change this point.

[12] Some of my earliest consulting work led to papers written with Professor Myers on the implications of the differences between capital charges under book-value regulation and those under competition. I subsequently worked on related issues with both Professors Brealey and Myers in the context of Heathrow Airport landing charges.

textbook. No such exception is included because none is warranted. ATWACC and cost of equity adjustments for *all* companies should be calculated with market-value weights.

Appendix B illustrates why market-value weights must be used to measure equity risk. Recall the extension of the dwelling example, in which the value of the dwelling had grown to $200,000 after ten years. The book-value capital structure was irrelevant to the level of financial risk imposed by fluctuations in asset values. It is equally irrelevant to the level of financial risk actually borne by shareholders.

Q14. So why doesn't this effect always show up when someone plots beta against the debt ratio?

A14. The forces outlined above and in Dr. Vilbert's evidence are at work. Part of the problem is in measurement. Part of the problem is the "decoupling" of beta from the market that accompanies regulatory transitions, financial distress and mergers. And part of the problem is that some of the costs of excessive leverage don't show up in measured beta, leading to an underestimate of the appropriate ATWACC for capital budgeting and regulation when sample companies with relatively high debt ratios are used. That is, the ATWACC you estimate at high debt ratios may not be the one that gives the correct value for the firm or investment. The problem is that the estimated ATWACC is too low to calculate the actual value of the company's operating cash flows.

But none of these forces imply it would be circular to use market-value weights to calculate the cost of equity at alternative capital structures or the ATWACC for a company regulated on a book-value rate base. The cost of capital is just as much a market-driven parameter for regulated companies as it is for unregulated firms. Use of book-value weights to calculate a regulated company's alternative cost of equity or ATWACC when the market-to-book ratio is greater than one definitely underestimates the regulated company's true cost of capital.

Q15. Would use of market-value weights to calculate an adjusted cost of equity or ATWACC imply an abandonment of regulation based on book value?

A15. Absolutely not. The cost of equity and the ATWACC are *rates of return*. It is absolutely standard in rate regulation, even in North America, to apply a market-derived rate of return to a book-value *rate base*. The issue that drives the choice of cost of equity adjustment or ATWACC weights is how to understand what the market is telling us about the rate of return investors require. The risk of shares, as with the equity in a home, depends on market values, not book values. Therefore, market values *must* be used to calculate the cost of capital. (If this were not true, book value rather than market value would be the appropriate denominator for the dividend yield in the DCF model!) It would be inconsistent with standard regulatory practice in North America to say that a market-based rate of return cannot be applied to a book-value rate base without abandoning book-value regulation. To the contrary, North American rate regulation routinely looks to market values for every other part of the rate of return calculation, and it should look to market values for the weights to use to adjust cost of equity for capital structure or to calculate the ATWACC. Then, with the cost of capital correctly calculated based on market evidence, it can be applied to the book value rate base in the traditional way.

C. MARKET-TO-BOOK RATIO TEST

Q16. What is the market-to-book ratio test?

A16. The market-to-book ratio is supposed to indicate whether a utility expects to earn more or less than its cost of capital. In particular, for a utility regulated on a book-value rate base, a market-to-book ratio of 1.0 is supposed to indicate an expected rate of return on the book rate base equal to the utility's cost of capital. The test is based on the assumption that the value of a utility's stock equals the present value of the returns on (i.e., earnings) and of (i.e., depreciation) a rate base equal to the net book value of the utility's equity.[13]

Q17. That assumption does not sound very controversial. Is the market-to-book test valid?

[13] See, for example, Kolbe, Read and Hall, *op. cit.*, pp. 25-33, 85-91.

A17. No, it turns out not to be valid, although I believed it was when writing a book published in 1984.[14] And even in 1984 there were a number of caveats concerning use of the market-to-book ratio to test utility rates.[15] Since that time, however, the market has behaved in ways that are plainly inconsistent with the simple pricing model on which the market-to-book ratio test rests. It is now clear that the market-to-book ratio test does not work.

Q18. Before you address the changes since your book was published, please identify the "caveats" concerning use of the market-to-book ratio test that existed even in 1984.

A18. First, even when we were able to believe in the validity of the market-to-book ratio test, we knew that the test could work only for companies that consisted entirely of regulated businesses with a rate base equal to net book value. The test never was believed to work for unregulated businesses. The pattern of cash flows over the life of an unregulated investment is quite different from that of an investment regulated on a net book-value rate base.[16] In a competitive equilibrium with inflation, that means market values will generally exceed book values for unregulated firms. The deviations may be even greater in the actual world.

Second, even for (1) a pure-play utility with a rate base equal to net book value, with (2) a true market asset pricing model that would yield a market-to-book ratio of one for such a utility in equilibrium, the regulatory process may act with a lag that leaves market-to-book ratios substantially different from one for long periods of time.

Third, even for (1) a pure-play utility with a rate base equal to net book value, with (2) a true market asset pricing model that would yield a market-to-book ratio of one for such a utility in equilibrium, regulators could not try consciously to target a market-to-book ratio of one in setting the allowed rate of return. The reason is that once investors discovered this policy (whether through public pronouncements or analysis of the results of confidential deliberations), investors would take it into account in pricing the stock. That would change

[14] *Ibid.*

[15] *Ibid.*

[16] See, for example, Stewart C. Myers, A. Lawrence Kolbe and William B. Tye, "Inflation and Rate of Return Regulation," *Research in Transportation Economics*, Volume II. Greenwich, CT: JAI Press, Inc. (1985).

the market-to-book ratio, thereby contaminating the information regulators would need to implement the policy. Regulation that consciously tries to set an allowed rate of return that makes the market-to-book ratio equal one is circular. This circularity existed even before the market taught us that we could no longer believe in the market-to-book test, and even for companies in circumstances that we would have believed would make market-to-book test valid.

Q19. Please now identify the actions of the market that have led you to conclude that the market-to-book ratio test turns out to be invalid.

A19. The stock market has taught us that the true, unknown, model or models that drive stock prices is (are) more complicated than the simple models that give rise to the market-to-book test. That means we can no longer trust that the market-to-book test would actually work even for a pure-play utility regulated entirely on a rate base equal to net book value, in equilibrium.

Specifically, the stock market forced me to change my view of the value of the market-to-book ratio for a steady-state, pure play utility with a book-value rate base when it crashed in October 1987.[17] The stock market bubble of the late 1990s and 2000 has only reinforced this conclusion.

In an attempt to explain how the market's level could change so much in such a short period, Prof. Stewart C. Myers wrote a paper[18] that argues that the stock market is good at getting relative prices right, because a great deal of money can be made in riskless arbitrage if securities are mispriced relative to one another. However, the stock market is not able to get absolute prices right, except in a “fuzzy” way.[19]

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17 For the record, I am not claiming an epiphany. It took several years for me to understand the implications of the crash in the context of rate regulation.

18 Stewart C. Myers, “Fuzzy Efficiency,” *Institutional Investor*, December 1988.

19 Nobel laureate Paul A. Samuelson expressed a related view in a letter to Profs. Robert Shiller and John Campbell:

> Modern markets show considerable *micro* efficiency (for the reason that the minority who spot

(continued...)

The market-to-book ratio purports to be a test of absolute value for utilities. If the stock market can get relative prices right, and if any stock has a reliable test for its absolute value, then all stocks will be priced right relative to it, and all stocks will be priced right in absolute value, too. If this were true, the stock market wouldn't have crashed in October 1987, nor would the turn-of-the-century “tech bubble” have happened. Since those events did happen, the supposed test of absolute value for utilities, i.e., the market-to-book ratio test, must not be valid. The unknown “true” model(s) of stock market prices in practice must be richer and more complicated than assumed in the simple derivation of the market-to-book test.

Q20. Can the other potential problems you mentioned explain current market-to-book ratios in ways that preserve the market-to-book test?

A20. No. For example, I believe that in recent years there have been companies that are essentially entirely regulated water utilities with market-to-book ratios in the 1.5 to 3.0 range. Those numbers are too high to be the result of regulatory lag in, for example, commissions’ adjusting the allowed rate of return on equity in response to declining interest rates.

Q21. Why do you say that, when interest rates have been coming down for quite awhile now, at least on average? Could not it be that for utilities, at least, the basic model still fully

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[19] (...continued)

aberrations from micro efficiency can make money from those occurrences and, in doing so, they tend to wipe out any persistent inefficiencies). In no contradiction to the previous sentence, I had hypothesized considerable *macro* inefficiencies, in the sense of long waves in the time series of aggregate indexes of security prices below and above various definitions of fundamental values. ... Long swings are long in time but *that* doesn’t get them corrected with increasing confidence on the part of observing scientist.

Quoted from Robert J. Shiller, *Irrational Exuberance*, New York: Broadway Books (2001), p. 243, emphases in the original.

More generally, Prof. Shiller and others have produced a growing literature that questions the notion that stock prices are determined in accord with simple models such as the present value formula. Our basic understanding of stock price formation has proven inadequate to explain the actual data we observe.

explains stock prices and the market-to-book ratios we observe are simply a result of a slow adjustment of allowed rates of return to interest rate declines?

A21. Unfortunately, such a view is not supportable. Suppose you observe a pure-play utility with a book-value rate base and a market-to-book ratio equal to 2.0. Then investors are paying \$2 now for stock value that will be brought down to \$1 as soon as regulators catch up with the interest rate declines. That amounts to a −50 percent return on the initial investment, which under this assumption must be recovered through the excess of the allowed rate of return over the cost of capital during the years before regulators catch up. Put this way, the notion seems implausible on its face. But we can be more quantitative about why the explanation of regulatory lag is unsupportable.

Q22. How?

A22. Assume that the market-to-book test worked, that a cost of capital analyst estimated the cost of equity as 10 percent, and that the relevant regulatory body accepted the estimate and set the allowed rate of return on book equity at 10 percent. However, suppose the utility's market-to-book ratio is 2, which if the market-to-book test were valid would signal that 10 percent is above the cost of equity. Suppose also that the book value of the utility is expected to grow at a long-term annual rate of 4 percent. Lastly, suppose that investors expected an extreme form of regulatory lag: regulators will leave allowed rates of return at the current 10 percent level for X years. On the last day of the Xth year, regulators will readjust the allowed rate of return down to the cost of equity, so the market-to-book ratio goes down to 1.0 on that day. In short, the assumptions are that (1) investors put up \$2 now for every \$1 of book equity rate base, (2) earn an allowed rate of return of 10 percent (which by hypothesis is above the cost of capital) on the equity rate base (which grows at 4 percent per year) for X years, and (3) then end up with a stock value equal to only to the book-value rate base. Thus, they lose 50 percent of their original investment after X years.

If the market-to-book test is assumed valid, the discount rate that makes the present value of these hypothesized returns equal to twice the book value of the stock is the utility's true cost of equity. Figure E-1 plots the implied true cost of equity associated with values of "X" running out to 20 years. As benchmarks, it adds the hypothesized 10 percent allowed rate of return on equity and the hypothesized government bond rate, bond rate, 4.5 percent.

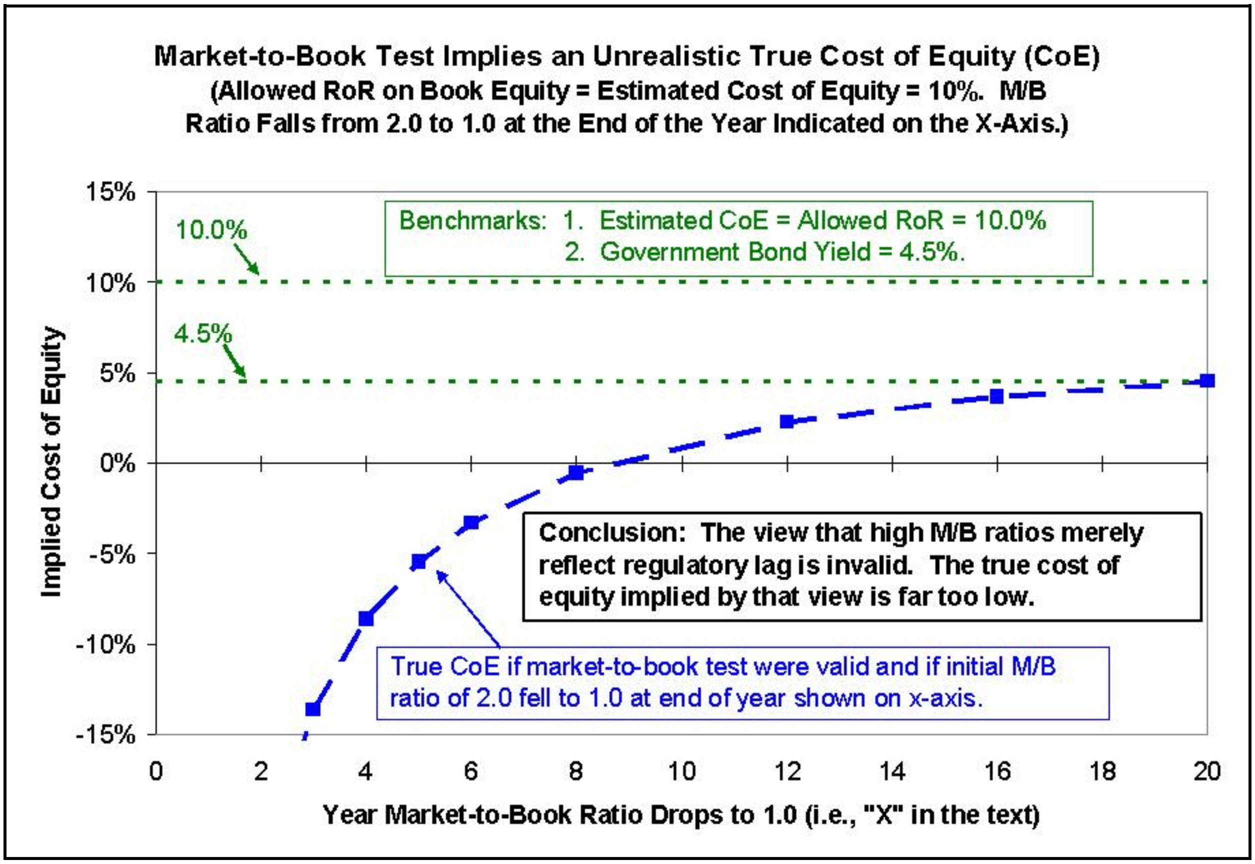

Figure E-1

Q23. Please discuss Figure E-1.

A23. The curving line indicated by long dashes with boxes (which is blue in color copies of this evidence) plots the true cost of capital as the length of regulatory lag (i.e., "X") grows from three years (the first value shown) to 20 years. With a loss of 50 percent of the original investment due to the end of regulatory lag, X must exceed 8 years for the true cost of equity even to be *positive*. It takes the full 20 years plotted in Figure 6 before the true cost of equity even equals the long-term government bond rate, 4.5 percent.[20] Since the actual cost of

[20] The top two lines in the figure, with small dashes (in green in color copies of this testimony), are the (continued...)

equity must be well above the Treasury rate, regulatory lag cannot be the explanation for the market-to-book ratios we actually observe.

Q24. But suppose investors expect that regulators would never adjust allowed rates of return for the fall in interest rates in recent years. That is, suppose they believe the regulatory lag you just discussed is many decades long. Does that save the market-to-book test?

A24. If investors expected regulators to ignore falling interest rates for many decades, the implied true cost of equity would keep climbing as X gets further into the future, although it always would remain materially below the hypothesized 10 percent estimate of the cost of equity. It would be 6.4 percent with an X of 50 years, for example. But "saving" the market-to-book test by assuming that regulators effectively *never* react to the fall in interest rates is a cure that is worse than the disease. Nor is such an assumption supported by experience. Allowed rates of return for rate regulated companies were far higher in the 1980s, when interest rates were so high, than they are today. Yet the 1980s are a "mere" two decades ago. I would submit that it is far more plausible, after the experience of recent years, to believe that we do not understand the way stock prices are set than to believe that (1) we can model the stock price process exactly, but (2) investors today believe that regulators will ignore the implications of falling interest rates forever.[21]

Q25. Please sum up.

A25. It turns out that stock prices are more complicated than our simple models can encompass. As a result, the market-to-book ratio test lacks a firm conceptual foundation. Moreover, the levels of utility market-to-book ratios observed in recent years are simply too high to be the

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[20] (...continued)
allowed rate of return on equity of 10 percent and the government bond rate of 4.5 percent.

[21] Reportedly, even Professor Eugene Fama has reached the conclusion that stocks can sometimes be irrationally priced. See "As Two Economists Debate Markets, The Tide Shifts; Belief in Efficient Valuation Yields Ground to Role Of Irrational Investors" *The Wall Street Journal,* October 18, 2004, p. A-1. Of course, we cannot be sure whether (1) the market is priced irrationally or (2) the market is priced rationally but is in accord with some model or set of models we do not yet understand. Either way, however, we can no longer rely on the market-to-book test.

result of rational pricing based on the present value formula that underlies the market-to-book test.

Q26. What do you believe regulators should do about the market-to-book ratio?

A26. I believe regulators should focus on setting the allowed return according to the best evidence available and leave the market-to-book ratio to whatever (currently incompletely understood) forces drive the stock prices of the individual sample companies and the market as a whole.

III. REGULATORY COMMENTS ON RISK-RETURN COMPARABILITY AMONG PIPELINES

Q27. What is the purpose of this section of your appendix?

A27. Various past filings to the NEB[22] and the AEUB[23] compared a pipeline company's return to that of new investments in gas pipelines that were not part of existing systems. The ultimate purpose of these comparisons was to use the level of the arm's-length negotiated rates of return on these new, stand-alone investments as evidence on the *level* of the fair return for the filing company. Gaz Métro does not offer such a comparison in this proceeding, but it does make use of the widespread *existence* of much higher negotiated rates of return on investments unencumbered by already-sunk capital to call into question the merits of the formula return systems now in use.

In the TQM proceeding and the ongoing Alberta generic cost of capital proceeding (from which NGTL has now withdrawn), my written evidence addressed various objections that had arisen to use of the level of the negotiated returns as evidence on the level of the then-current fair return for the pipeline in question. Some of those (e.g., the effect of changes in the cost of capital and interest rate environment) are not relevant for Gaz Métro's purpose, since it is sufficient to call into question the formula return systems in use to

[22] Specifically, the TransCanada Mainline filing in RH-2-2004, Phase II and the recent TQM filing in RH-1-2008.

[23] Specifically, the NGTL filing in 2004 Generic Cost of Capital proceeding that produced Decision 2004-052. NGTL filed similar evidence in the current Generic Cost of Capital proceeding in Alberta, but NGTL has withdrawn from that proceeding because the company is now under NEB jurisdiction.

observe merely that a return well above the *then-current* formula return was negotiated and agreed to by adverse parties at the time. However, some of the past objections by regulators to use of these returns as evidence on the current fair return for the company in question might, in principle, have relevance. Examples include the fact that the negotiated returns were locked in for periods much longer than a year and the fact that the negotiated returns varied inversely with the cost of construction, to provide an incentive to keep construction costs down.

This section of the appendix reviews the past comments that might, in principle, have relevance, to see whether they challenge the use of these data for Gaz Métro's more limited purpose.

A. Issues Addressed

Q28. What comments in the AEUB's Decision 2004-052 are relevant to this section of your appendix?

A28. The passage is on p. 27:

> NGTL's view was that Alliance and M&NP are particularly relevant comparisons for NGTL. ... In regards to the regulated returns of Alliance and M&NP, the Board agrees with CAPP that these returns are not directly relevant, due to different circumstances (such as the level of ROE being locked in for a long period of time) and because they date back to a period of higher interest rates and returns. In this respect, the Board notes CAPP's argument that Alliance takes risks that NGTL does not, including some volume risk on an exception basis, long-term shipper contract default risk, and long-term interest rate risk, and that the M&NP was built for a new untested basin with few pools having been delineated. In addition, the Board notes that the deemed equity ratios for Alliance and M&NP are lower than any Board-approved equity ratio, which would directionally reduce the impact on customer rates of a higher ROE.
>
> Although, directionally, the absolute level of return for Alliance and M&NP would support a 2004 ROE above the Board's CAPM estimate, the Board concludes, based on the above analysis, that it should place limited weight on the Alliance and M&NP returns.

The parts of this passage that I address include contract default risk, long-term interest rate risk, and differences in deemed equity ratios.

Q29. What NEB comments apply to this part of your appendix?

A29. The NEB's Decision RH-2-2004 comments about comparisons of the TransCanada Mainline and Alliance Pipeline Ltd, at pp. 69-70, best summarize the issues:

> The Board accepts that the level of risk faced by Alliance is sufficiently similar to the Mainline to make comparison relevant. However, when making comparisons, there is validity in adjusting Alliance's return to account for differences in circumstances. In particular, prior to comparing it with the Mainline, the return of Alliance should be adjusted to reflect the different risk-reward relationship of the two pipelines and the cost of capital environment that existed at the time that Alliance's return was set. Unlike the Mainline, Alliance took on construction cost risk, locked in its return over an extended period of time, and took on some capacity risk. On the other hand, Alliance's long-term contracts tend to mitigate, in part, these additional risks. Comparison with Alliance's return ought to account for the different set of circumstances, including construction cost risk, whether such a risk was mitigable or not, and differences in the cost of capital and interest rate environment that prevailed at the time the return was set.

This passage identifies capacity risk, construction cost risk, a locked-in return, the existence of long-term contracts, and differences in the cost of capital and interest rate environment as factors to take into account.

Q30. What comments are relevant from the TQM Decision?

A30. The NEB did not discuss the above issues in its TQM Decision. Instead, it concluded in that negotiated returns did not provide reliable evidence on the level of required returns for TQM because they were only one component of a package, and therefore cannot be presumed to be independently acceptable to the parties.[24]

Q31. How do the NEB's TQM comments affect Gaz Métro's use of the returns?

A31. Gaz Métro's evidence in this proceeding does not rely on the negotiated returns' precise *levels'* being independently acceptable. It only relies on the observation that in the natural

[24] TQM Decision, p. 69.

experiment provided by these new investments, the formula returns were rejected in favor of something materially higher despite the incremental time and cost required to negotiate that alternative. The fact that the negotiated return might have been somewhat higher or lower than the actual value if negotiated entirely by itself does not affect Gaz Métro's use of these data.

Q32. How do you address the comments in the earlier decisions that might, at least in principle, affect Gaz Métro's use?

A32. It turns out that the locked-in return, the existence of long-term contracts, and contract default / capacity risk are all aspects of an important difference between Alliance and pipelines subject to NEB's (Alliance's regulator) formula return provisions, which must be jointly analyzed.[25] I then address Alliance's construction cost risk. Next, I extend these two analyses to other pipeline projects with related provisions.

B. Locked-in Return, Long-term Contracts, and Contract Default / Capacity Risk

Q33. What are Alliance's tolling provisions in these areas?

A33. Alliance started with fifteen-year contracts for essentially all of its capacity.[26] The firm shippers, rather than Alliance, were given the right to unused capacity through the "Authorized Overrun Service", including the profits from the sale of such capacity.[27] In exchange, Alliance was given a fixed rate of return on equity and capital charges in the form of demand charges that were not at risk due to fluctuations in the volumes shipped.[28]

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[25] As explained below, the key issue in this regard is the interest rate used to adjust the NEB formula return. The Régie's formula returns for Gaz Métro use a similar interest rate (albeit one measured at a different point during the year) and adjustment process. Since the NEB's formula was in place when Alliance's return were negotiated, it is the relevant benchmark, and I use it below. But the same relative risk conclusions would result from the Régie's procedures, because of the common method of adjustment.

[26] National Energy Board, "Reasons for Decision, Alliance Pipeline Ltd.", GH-3-97, November 1998 ("GH-3-97 Decision"), pp. 27-28.

[27] GH-3-97 Decision, pp. 81, 83.

[28] GH-3-97 Decision, pp. 13, 30. Transportation Service Agreement for Firm Transportation of Natural Gas Alliance Pipeline Limited Partnership ("Alliance TSA"), p. 6.

Alliance agreed to bear some capacity risk related to possible shipper default.[29] However, it did so at a time when a positive view of available supply was held by most industry participants, including the NEB.[30] Additionally, whatever the level of capacity risk, Alliance had the opportunity to re-market the capacity of a defaulting shipper, and I understand that Alliance has in fact been effective in re-marketing and avoiding risk realization, at least through the period before the current economic crisis (which could hardly have been foreseen when Alliance's risk-return provisions were negotiated).

Q34. What are the risk-return implications of these arrangements?

A34. From a risk-return perspective, these arrangements are equivalent to the shippers' leasing essentially all of the capacity of the pipeline for fifteen years and contracting with Alliance, the "lessor," to operate it. Alliance bears counterparty credit risk, as is common in leases, but otherwise has shifted to the shippers the risk of changes in the value of the pipeline's services over these fifteen years, in exchange for fixed payments to Alliance. Alliance re-assumes the risk of changes in the pipeline's value after fifteen years (although the original shippers have the right to extend their contracts for a minimum of one year at a time with five years' advance notice).[31] Alliance is like the car leasing company in the example in Section II.B of the main body of my evidence, which shifts the asset's risk to the lessee during the lease period but re-assumes the risk of car ownership at the end.

For the first fifteen years, Alliance's shippers effectively are the owners of the pipeline, from a risk-return perspective.[32] As for other lessees, the return to their effective

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[29] Alliance TSA, Section 8.

[30] GH3-97 Decision, Section 2.2.

[31] Alliance TSA, Section 6.2. Section 6.3 provides that Alliance may waive the advance notice provision at its sole discretion.

[32] In the words of the leading graduate textbook on corporate finance (Brealey, Myers and Allen, *op. cit.*, p. 708),

> Who really owns the leased asset? To a lawyer or a tax accountant, that would be a silly question: The lessor is clearly the *legal* owner of the leased asset. ... From an *economic* point of view, you might say that the *user* is the real owner, because ... the user faces the risks and

(continued...)

ownership comes in the form of a rate of return paid to Alliance that is materially *below* the cost of capital of the pipeline absent these contracts. The shippers bear the risk, so they would not voluntarily pay Alliance the return Alliance would require to bear it instead. That would amount to the shippers' bearing the risk without a reward.[33]

Q35. Given this context, what is the implication of the fact that Alliance's return on equity is fixed for the life of the "lease"?

A35. Empirically, locking in a rate of return does increase the required return relative to indexing the rate. The issue, of course, is materiality: *how large* a premium might be required for Alliance's accepting a fixed rate instead of coming under the NEB's formula rate of return?

Q36. How did you answer this question?

A36. The first step was to consider the nature of the locked-in versus the indexed rate. Note in particular that while the NEB's formula return on equity changes annually, it (like the Régie's) is indexed to a forecast of the long-run bond rate, not to a short-term interest rate. Longer-run rates tend to be more stable and therefore more akin to the fixed rate Alliance has used. To demonstrate this, I need to compare the interest rate the NEB uses to shorter-term rates.

Figure E-2 starts that process by comparing the forecast interest rate that underlies the NEB's formula return on equity to two government interest rates, the long-term rate and the two-year rate, both measured as of November the year before (versus the August

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32 (...continued)
receives the rewards of ownership.

33 The NEB has recently reconfirmed its recognition of the fact that the longer the contractual commitment to a pipeline, the lower the appropriate toll. This relationship follows directly from the principle that a contractual commitment transfers a pipeline's risks from its owners to the shipper, and the longer the commitment, the lower the rate of return the shipper should pay. See the NEB's Reasons for Decision, OH-1-2007, September 2007, p. 19.

measurement used for the Régie's formula).[34] The forecast and the actual long-term rate both are materially more stable than the two-year rate.

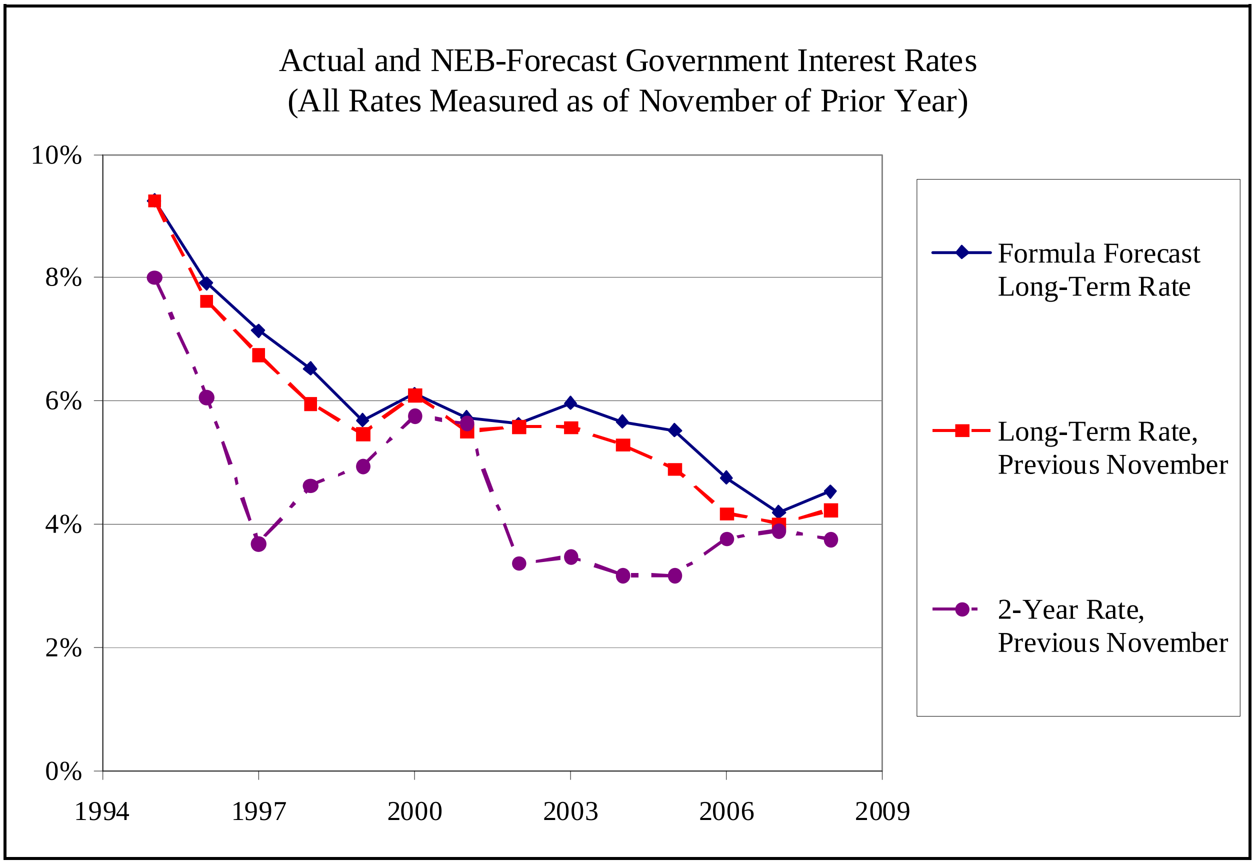

Figure E-2

Figure E-3 continues the process by adding (the "×"s) the rate that tracks the year-to-year changes in the NEB's formula, which equals one-quarter of the initial, 1995 rate and three-quarters of the current formula rate.[35] It also adds (the "+"s) an estimate of the rate that

[34] The NEB's formula is the alternative that Alliance faced. The interest rate the NEB uses to set the formula return on equity is as of November the year before, and this measure of the actual long-term rate tracks the rate the NEB uses closely, as seen in the figure -- more closely than does the actual average long-term rate during the years in question.

[35] To verify that this formulation works, consider the changes from 1995, the first year of formula operation, to 1997. First, ROE_{95} = 3% + Interest $Rate_{95}$. $ROE_{96} = ROE_{95}$ + [0.75 × (Interest $Rate_{96}$ − Interest $Rate_{95}$)] = 3% + Interest $Rate_{95}$ + [0.75 × (Interest $Rate_{96}$ − Interest $Rate_{95}$)] = 3% + [Interest $Rate_{95}$ × (1
(continued...)

tracks formula changes as of the Alliance negotiation, calculated as the average of the 1996 (measured November 1995) and 1997 (measured November 1996) rates.

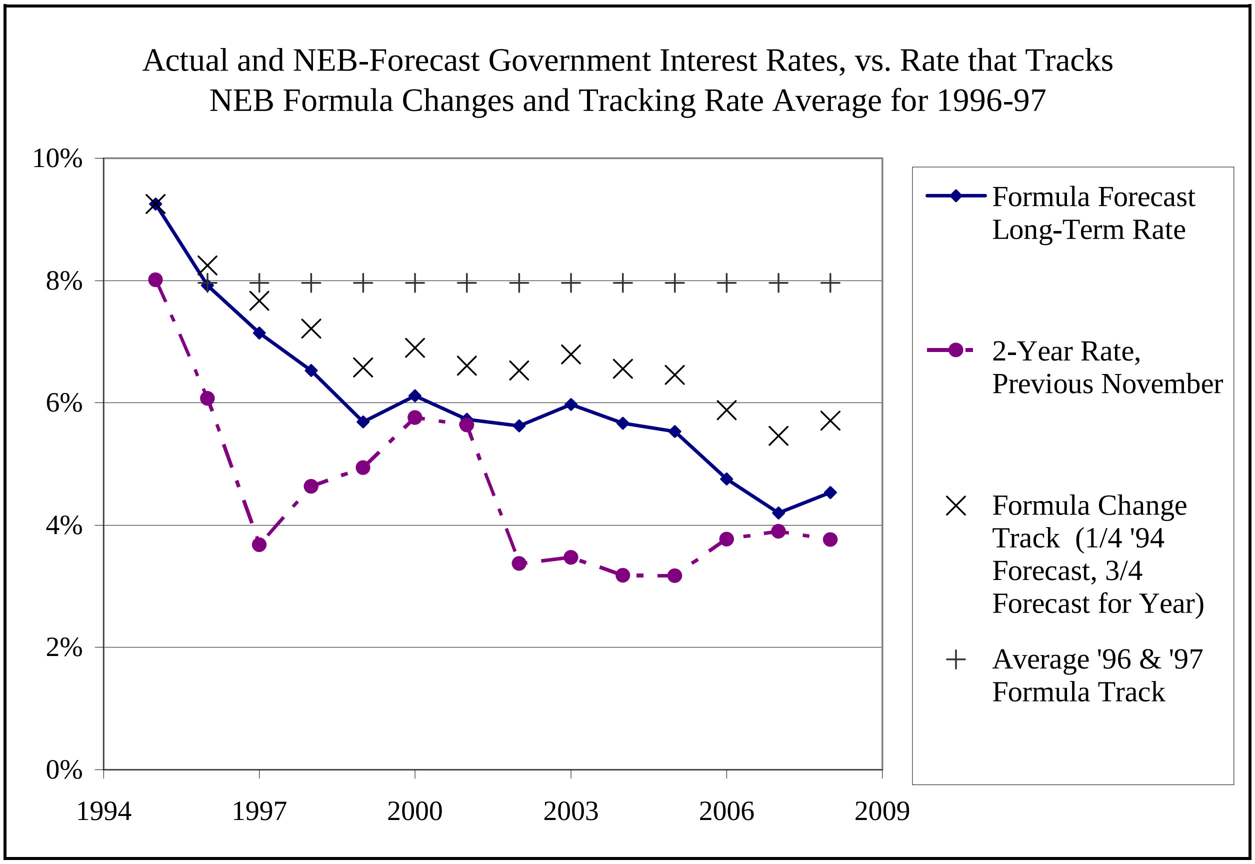

Figure E-3

The year-to-year changes in the rate that tracks the formula are even more stable than the changes in the long-term interest rate, let alone changes in shorter-term rates. Therefore, the historical maturity premium observed in long-term versus short-term interest rates would

[35] (...continued)
− 0.75)] + 0.75 × Interest Rate_{96}. ROE_{97} = ROE_{96} + [0.75 × (Interest Rate_{97} − Interest Rate_{96})] = 3% + (Interest Rate_{95} × 0.25) + 0.75 × Interest Rate_{96} + [0.75 × (Interest Rate_{97} − Interest Rate_{96})] = 3% + (Interest Rate_{95} × 0.25) + [0.75 × (Interest Rate_{96} − Interest Rate_{96} + Interest Rate_{97})] = 3% + (0.25 × Interest Rate_{95}) + (0.75 × Interest Rate_{97}). The same process works going forward from 1997, so that the formula ROE at any time is indexed to a rate equal to ¼ of the 1995 forecast interest rate and ¾ of the current-year (measured as of the previous November) forecast interest rate.

materially overstate the average premium required to lock in a fifteen-year fixed rate instead of indexing it to the NEB's formula return on equity.

Q37. **What lock-in premium would be correct?**

A37. I asked Mr. Engen to help get more information about the issue. His evidence describes work to price the premium required to accept a fifteen-year fixed interest rate instead of a floating rate tied to the ten-year constant-maturity swap rate.[36] That is, what premium would Alliance have had to pay to an investment bank at the time to swap a fixed fifteen-year rate of return for a variable rate of return equal to the future rate of return on a ten-year bond, reset annually? The answer must recognize that while the swap transaction and the analysis would take place in 1996, the actual operation of the pipeline and the interest rate swap would commence about four years later. I note that while swap markets currently are very volatile and information is scarce, the data relied upon dates back to 2006 or earlier.

As Mr. Engen's evidence describes, the answer for Alliance was 28-38 basis points.[37] He also supplies the results of a similar calculation for Southern Lights as of 2006, which yields a range of 9-19 basis points. An important reason for the difference is that the market's forecast of future interest rates of varying starting points and maturity was increasing relatively quickly in 1996, at the time of the Alliance negotiation, and relatively slowly in 2006, at the time of the Southern Lights negotiation. All else held equal, the premium required for such a swap will be higher when future forward rates are increasing more rapidly.

Q38. **Does that mean that Alliance's negotiated rate of return on equity was 28-38 basis points higher than it would have been under the NEB's formula?**

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[36] The NEB's procedure (used also by the Régie) forecasts a thirty-year rate, not a ten-year rate, by adding the spread between thirty-year and ten-year rates to the forecast of ten-year rates. (NEB Decision RH-2-94, p. 31; Decision D-99-011, p. 49.) The thirty-year rate is even more stable than the ten-year rate, all else equal, so the premiums in Mr. Engen's evidence tend to overstate the lock-in premium for use of a fixed rate rather than the NEB's formula.

[37] Mr. Engen's evidence also reports a premium of 17-27 basis points for Alliance's Taylor Expansion.

A38. No. First, as noted earlier, since these rates are indexed to ten-year constant maturity rates instead of thirty-year constant maturity rates, they tend to exceed the rate required for the NEB's index. Second, the NEB's formula, like the Régie's formula, is only three-quarters indexed. Three quarters of 28 to 38 basis points would be 21-29 basis points. Three quarters of Southern Light's 9-19 basis points would be 7-14 basis points.

More generally, however, differences in the shape of the market's then-current forecast of future interest rates of varying starting points and maturity as of any date can obscure the underlying, average premium for a locked-in rate. The average premium will be less than that observed in times when forward interest rates are increasing unusually rapidly, and more than that observed in times when they are increasing unusually slowly. Please note that Mr. Engen's evidence also reports December, 2007 lock-in premiums of under 20 basis points for lock-in periods of varying duration, and an average lock-in premium over the ten years preceding that date of 20-30 basis points, for a fifteen-year lock-in relative to the ten-year constant maturity swap rate (which, again, is less than the NEB's longer, thirty-year partial indexing rate, which was the alternative facing the pipelines being analyzed).[38]

Please recall also the intrinsic uncertainty in estimation of the cost of capital. I think it is plainly a mistake to believe that we could pin down the estimate of the average lock-in premium to an accuracy measured in basis points.

Q39. What do the foregoing considerations imply for the risk premium for Alliance's locked-in rate of return on equity relative to the NEB-formula rate?

A39. They mean that the underlying average lock-in premium for accepting a fifteen-year fixed rate instead of the NEB's formula return for pipelines like Alliance (and Southern lights) would be *at most* ¼ of a percentage point in the return on equity. It could well be less.

Q40. What about default / capacity risk?

[38] Mr. Engen informs me that the current financial crisis implies that attempts to update these results to the present would be unreliable. Fortunately, no such update is required: the agreed pipeline rates of return being analyzed were negotiated in normal times, before the crisis hit.

A40. Given the outlook for the Western Canada Sedimentary Basin ("WCSB") at the time and what it implied for Alliance's ability to re-market any capacity that might become available due to a shipper default, I do not believe there would be any detectible adjustment to Alliance's required return on equity for this risk. Of course, in hindsight, with knowledge of the subsequent adverse changes in the long-run outlook for the WCSB, the capacity risks seem larger. But Alliance's tolling arrangements were not negotiated and approved with the benefit of such hindsight.[39]

Q41. Please sum up.

A41. Alliance transferred the risks of ownership to its shippers for the first fifteen years of its life by effectively leasing the pipeline to them, from an economic perspective. The fixed rate of return is a frequent practice in such long-term risk transfers. Alliance did bear a modicum of capacity risk, but this risk was not judged material at the time. Thus on this set of criteria, Alliance was an extremely low-risk investment. The negotiated and agreed upon rate of return on equity is below the cost of capital of otherwise equivalent pipelines without such risk-reducing, long-term contracts, and at most ¼ of a percentage point higher than that of an otherwise identical pipeline with similar long-term contracts that opted instead for the NEB's formula return on equity.

C. Incentive Return Provisions

Q42. What are Alliance's tolling provisions in the "construction cost" area?

A42. Alliance agreed to an incentive rate of return on equity in its contracts with its shippers. The rate of return would be 12 percent on a 30 percent equity ratio if the pipeline's construction cost was as forecasted. It would increase linearly to 14 percent for construction cost savings up to 40 percent of the forecasted level, and decrease linearly to 10 percent for construction

[39] Also, even with regard to risks as of today, the Alliance TSA relates to the initial contracts of Alliance, which I understand may not necessarily apply beyond the term of such contracts, which is when supply is expected to be more problematic.

cost overruns up to 40 percent of the forecasted level.[40] The actual outcome was an overrun that produced a rate of return on equity of 11.26 percent, applied to the equity portion of a rate base that included the full amount of construction expenditures, including the overrun.[41]

Q43. **What is the effect of this provision on Alliance's cost of capital?**

A43. The natural first reaction is that the incentive rate of return provision increases Alliance's required rate of return. However, a deeper analysis shows that this first reaction is not correct.

Q44. **Please explain.**

A44. The explanation requires consideration of the impact of the risk on Alliance's expected lifetime earnings and of how that impact in turn affects the cost of capital.

First, note that all the uncertainty is resolved at the outset of Alliance's operating life and so does not have a compounding effect over the life of the pipeline.[42]

Second, recall from Dr. Vilbert's evidence (and from the longstanding reliance on the concept of "beta" in cost of capital measurement in Canadian regulatory proceedings) that the risks that affect the cost of capital are those that cannot be eliminated by diversification. This distinction can be illustrated by considering the risks of roulette.

Betting on roulette is risky for an individual. But roulette by itself is not risky for the casino, because the dozens of spins per wheel per night, over many nights and many roulette wheels, are uncorrelated with one another. The random outcomes of individual spins are inconsequential because of the huge number of spins. This makes the casino's roulette rate of return per dollar bet very predictable. The casino's expected roulette rate of return per

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[40] Alliance TSA, Schedule B. Note that the incentive provision affects the rate of return on equity, not the amount of construction expenditure that is put in the rate base. Thus, calling it "construction cost risk" is potentially confusing. Additionally, the above NEB quotation raises the issue of whether the risk was mitigable or not. Mr. Engen's evidence addresses that issue.

[41] Alliance TSA, Schedule B.

[42] That is, if calculating the present value of Alliance's expected earnings at the outset of construction, the adjustment for the incentive return's effects should be made to the pre-operation discount rates only.

dollar bet is positive and the gambler's is negative, which is why gambling is not considered an investment.

Q45. Does this mean casinos have a cost of capital equal to the risk-free rate?

A45. No. The casino's risk depends not on the spins of the wheel, but on how many people come to bet and how much they bet when they arrive. In good economic times, when people are better off, they are likely to be more willing to travel and less concerned about losing. In bad times, they may have to stay at home, or if they travel to a casino, they may be unwilling to bet as much. Thus, the casino's risks depend, in part, on major, non-diversifiable economic factors such as the state of the economy. Casinos have positive risk premiums in their cost of capital because of their exposure to such non-diversifiable risks.

Recall that "beta" is the standard measure of the level to which such non-diversifiable risks affect a particular investment. The average-risk stock has a beta of 1.0, by definition. Stocks that are less sensitive than average to broad market forces have betas below 1.0, and conversely.

Q46. How does the Alliance incentive return provision affect the non-diversifiable risk of its lifetime earnings?

A46. High construction costs reduce its realized rate of return, while low construction costs increase it. So the answer depends on how construction costs are affected by fluctuations in the economy.

Logically, some construction cost uncertainty will be driven by considerations that are completely uncorrelated with the economy. Soil conditions along the pipeline's route may be more or less favourable than anticipated, for example. However, all else equal, some of the uncertainty should derive from how expensive the inputs to the construction process are -- wage rates, the costs and wait-times for pipe, etc. Such costs will be higher in booming times, which makes the construction cost positively correlated with the state of the economy.

It is not necessary to rely on logic alone for this conclusion. A 2007 Enbridge Investor Conference documents the problem.[43]

> Staying on schedule continues to be a challenge and it is coming at a cost. The hard reality is that it's costing us more than we would have liked to meet our expected in service dates. The increased capital costs have stemmed primarily from higher than anticipated contractor and labor costs. Those have been the prime driver. And as you will have noticed ... three of our projects, Southern Access, Southern Lights and Waupisoo, have experienced significant cost increases.

Q47. So does this mean Alliance's incentive rate of return provision increased its initial cost of capital?

A47. No, it means the opposite. Boom times produce higher construction costs. Higher construction costs produce a lower rate of return for Alliance. Conversely, hard times produce lower construction costs, which produce a higher rate of return for Alliance. This induces a *negative* correlation between the state of the economy and Alliance's lifetime returns, which reduces the correlation that would exist without the provision. Therefore, the incentive rate of return provision would, if anything, reduce rather than increase Alliance's initial cost of capital.

This is a specific example of a general phenomenon: the *higher* the correlation of *costs* with the economy, the lower the firm's risk, all else equal. Conversely, the *lower* the correlation of *revenues* with the economy, the lower the firm's risk, all else equal. Another way of saying this is that firms have less risk with variable costs than with fixed costs, all else equal, because variable costs can be cut back in hard times. They also have less risk with fixed revenues than variable revenues, because fixed revenues bring in more money in hard times.

Q48. Can you explain in more detail why a *higher* correlation of costs with the economy *reduces* a firm's beta, all else equal?

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[43] Enbridge Inc. Q2 2007 Investor Call Transcript, p. 3 of 22, available at http://seekingappha.com, reporting remarks by Patrick D. Daniel, President and Chief Executive Officer.

A48. Yes, with Figures E-4 and E-5 on the next page, which are intended simply to illustrate the basic idea of how cost variability affects the variability of investor cash flows. The figures depict fluctuations in the present value ("PV") of a firm's (1) revenues, (2) costs and (3) investor cash flows. (Note that PV(Investor Cash Flows) = PV(Revenues) − PV(Costs).) The figures depict two alternative cases, the first with a relatively low correlation of PV(Costs) with the economy and with PV(Revenues), and the second with a higher correlation of PV(Costs) with the economy and with PV(Revenues). (The PV(Revenues) lines are the same in both figures.)

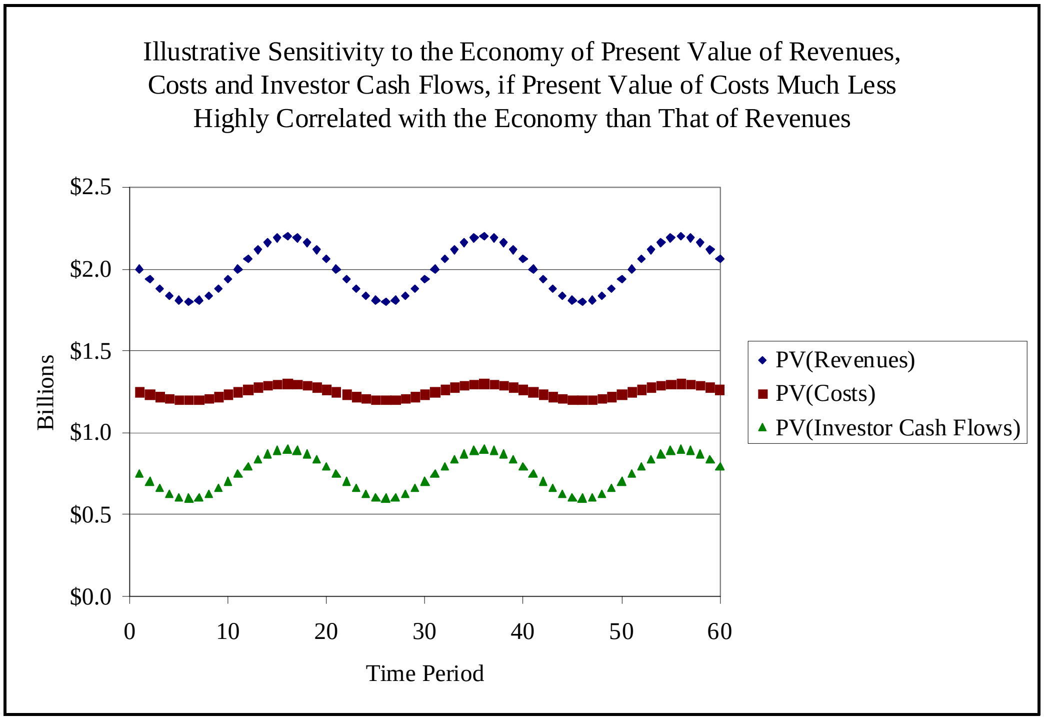

Figure E-4

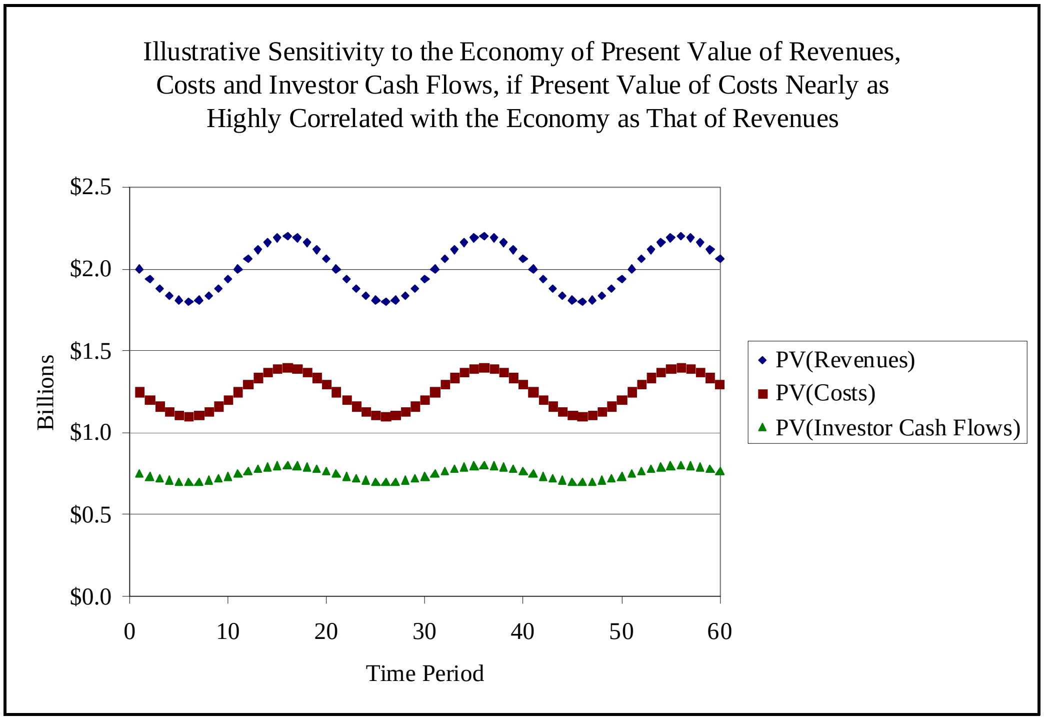

Figure E-5

In the top figure, the weak correlation of the present value of costs with the economy and with the present value of revenues produces a relatively large correlation between the economy and the value of the firm (i.e., of the present value of investor cash flows). In the lower figure, something has increased the correlation with the economy of the present value of costs, so it is much closer to that of the present value of revenues. This reduces the correlation of the firm's value with the economy, which reduces the firm's beta and hence its cost of capital.

Thus, the higher the correlation of costs with the economy, the lower the risk of the firm, all else equal, and conversely.

Q49. But is it ultimately Alliance's revenues, rather than its costs, that are affected by the incentive provision?

A49. Yes, because Alliance is a regulated company and the construction cost incentive provisions reduce the correlation between Alliance's expected future revenue requirements and the economy during the construction period. However, this reduces Alliance's beta, all else equal, because the lower correlation of expected future revenues with the economy is desirable to investors. Thus the construction cost incentive program will tend to reduce rather than increase Alliance's cost of capital, albeit by an unknown amount.

Q50. Are you saying the incentive return mechanism reduced Alliance's cost of capital to something fairly close to the risk-free rate, as seems to be implied by Figure E-5?

A50. No, of course not. First, the above figures are simply intended to illustrate the principles, and the exact import of the correlation between construction costs and the economy on Alliance's cost of capital cannot be quantified. Second, and more fundamental, is that the negotiations among the adverse parties resulted in a higher return than the risk-free rate for Alliance.

Q51. Are you saying that investors do not care that the construction cost overruns give them a lower rate of return over the life of the investment?

A51. Again, no, not at all. The overruns affect the level of investor cash flows over the lifetime of the project, which clearly affects the pipeline's value. This value equals the present value to investors of these lower cash flows. A counter-cyclical impact of construction cost uncertainty on the level of cash flows, however, implies that the effect on value of the lower cash flows is offset to a degree by a lower discount rate, i.e., a lower cost of capital. The pipeline is more valuable with cash flows that are affected by a "negative beta" risk than it would be with the same cash flows affected by a risk that was entirely diversifiable, or even worse, by one that increased the project's beta.

Q52. Then what are you saying?

A52. Decision RH-2-2004 cited "construction cost" risk as a source of difference between Alliance and other pipelines that needs to be taken into account. I have done so here. It turns out that when you analyze the actual nature of that risk, it tends to *reduce* rather than increase Alliance's cost of capital, albeit by an unknown amount. This means that if anything, Alliance's lifetime cost of capital is *lower* than that of an otherwise identical pipeline without such an incentive provision.[44]

D. Implications for Other Pipelines

Q53. Are other pipeline projects affected by the above findings?

A53. A number of new pipelines have provisions with similar risk-reducing effects. For example, Southern Lights Diluent Pipeline ("Southern Lights") has provisions like Alliance's, including the same incentive rate of return structure, based on the same 12 percent rate of return.[45] It also will have "committed shippers" who sign up for fifteen years and must pay

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[44] It may be useful to distinguish between the pipeline provisions at issue here and the general effect of construction cost uncertainty in the economy. Normally, construction cost uncertainty does not affect revenues. A competitive company builds a new factory at high cost in booming times because it expects to sell the resulting output at high prices. The special issue here is the reduction in the rate of return and hence the revenues under the Alliance incentive arrangement, which is the factor responsible for its tendency to reduce Alliance's beta.

[45] Southern Lights Diluent Pipeline Transportation Services Agreement ("Southern Lights TSA"), Schedule "B".

their share of its capital costs regardless of whether they ship their anticipated amounts of diluent.[46]

A number of pipelines in addition to Alliance and Southern Lights have lifetime returns that vary inversely with actual versus target construction costs, with the uncertainty resolved at the outset of the project's life. These include the Alberta Clipper,[47] the Enbridge Line 4 Extension,[48] and planned expansions of Trans Mountain Pipe Line.[49] These mechanisms affect the amount of construction cost put into the rate base, not the rate of return.

Q54. What difference is there in the use of a rate base incentive instead of a rate of return incentive?

A54. The effect is essentially the same, despite the fact that it may sound more serious to those used to the procedures of rate regulation.

Q55. Please explain.

A55. Suppose Bombardier decides to build a new aircraft factory. It might come in under or over budget. If it comes in under, when Bombardier sells a given number of aircraft produced in the factory at a given price, the company makes a higher rate of return on its factory investment. If it costs more than expected, Bombardier makes a lower rate of return. Either way, it records and depreciates the factory's actual costs on its books, and the market takes account of the actual costs when valuing Bombardier's shares. Of course, as noted above, higher construction costs will tend to come when the economy is strong, which means prices and/or projected sales levels are likely to be higher, too. That could be a reason for the company to spend more than originally budgeted to get the factory into production on or

[46] Southern Lights TSA, p. 1 and Section 6.02. Shippers can extend their contracts for a single fifteen-year term, providing certain conditions are met. Southern Lights TSA, Section 5.03.

[47] See the Alberta Clipper Canada Settlement, June 28, 2007, Section 7.

[48] See the Line 4 Extension Settlement, June 28, 2007, Section 7.

[49] See the Incentive Toll Settlement for the Trans Mountain Pipeline System 2006-2010, Section 15.

ahead of schedule, whereas it might accept delays if it would save construction costs when the economy was looking worse than anticipated.

The market will also assess the values of the pipelines in question based on the actual costs expended, not the amount recorded for regulatory purposes. The pipeline's rate of return on those outlays will be affected by the incentive mechanism's impact on the amount put into the rate base.[50] Nonetheless, the reason the rate of return is affected does not matter: if a pipeline's true rate of return is 10 percent on the actual investment outlay, shareholders will not care whether that 10 percent is due to a reduced allowed rate of return or to a reduced rate base.

Q56. Can you think of a reason that the rate base treatment might seem more serious?

A56. Yes. Rate-regulated companies normally can break even or lose with respect to what goes into the rate base, but not win. If the costs are prudently incurred, everything goes into the rate base. If not, less goes in than actually expended. But regulators do not put in more than actually expended if the construction cost comes in under budget.

Bombardier, however, can win, since it makes a higher rate of return if it saves on construction costs, all else equal. The same is true for the incentive mechanisms for the new pipelines. If they save money relative to forecasted construction costs, more than they actually expended will go into the rate base and their rate of return on the actual outlays will be higher. Thus, the ultimate result is the same for the rate base mechanism and the rate of return mechanism: the rate of return on the *actual* expenditures will be lower if the pipeline comes in over budget and higher if it comes in under budget.[51]

Q57. Please sum up.

A57. The same basic economic forces govern regardless of the incentive mechanism chosen:

---

[50] However, as noted earlier, unlike Bombardier, the pipelines' expected rates of return would tend to be lower when the economy is strong and higher when it is weak than they would be without the incentives.

[51] Of course, the magnitude of the effect will vary with the details of the incentive.

- Construction costs will tend to be higher in economic booms than in busts;[52]
- Higher construction costs will have a one-time negative effect on the lifetime earnings expected by the pipeline, and conversely, so
- The construction cost incentive provisions, like the rate of return incentive provisions, will tend to reduce the pipelines' initial cost of capital rather than increase it, albeit by an unknown amount.

The conclusion is the same: the rate of return / construction cost incentives of these pipelines do not increase their cost of capital.

E. Changes in the Level of Interest Rates and Returns

Q58. The final consideration mentioned in the initial quotations from AEUB's Decision 2004-052 and the NEB's Decision RH-2-2004 is differences in the level of interest rates and returns (or as the NEB put it, in the cost of capital and interest rate environment). What effect does this have on the comparisons for Gaz Métro's purposes?

A58. I cannot think of any relevant effect. Gaz Métro's filing is not using these comparisons to decide on the level of the appropriate return, but only to note that returns well above the then-current formula values were negotiated at the time, despite the additional cost of having to undertake such negotiations.

Q59. But would not the parties have to negotiate the rate of return to implement Alliance's construction cost incentive provision, regardless of the existence of the formula?

A59. No. For example, the parties could have adopted an incentive range around the formula value if they all believed that the formula returns were acceptable, without needing to negotiate the overall level of returns. Under such an arrangement, if Alliance had come in as much over budget as it actually did, it could have had (Formula Value − 0.74%) instead of (12% − 0.74% = 11.26%) as its rate of return, if all the parties had believed the formula value represented a fair and reasonable level of compensation.

Q60. Please sum up.

[52] Recall the above quotation from Enbridge's CEO.

A60. The factors mentioned in prior regulatory decisions as creating problems for comparisons of negotiated returns on independent pipeline projects with formula returns do not invalidate the use to which Gaz Métro puts these comparisons. The existence of widespread rejection of formula returns in cases when energy infrastructure investment projects are not linked to already-sunk capital does in fact call into question the level of the formula returns.

Q61. **Does this complete Appendix E?**

A61. Yes, it does.

WORKPAPERS TO WRITTEN EVIDENCE OF A. LAWRENCE KOLBE

This section includes:

Equity Issuance Cost Workpaper

Tax Advantage Workpapers

EQUITY ISSUANCE COST WORKPAPER

GAZ Metro LP's Common Equity Issuance Costs

Inputs	See Notes	
Company Tax Rate (%)	[a]	30.15%
Amortization Period (Years)	[b]	5.00
ATWACC (%)	[c]	7.50%
Annuity Factor	[d]	4.05

(in Dollars, otherwise stated)

Issuance Period		1993	1994	Jan 1995	Feb 1995	May 1995	1999	2003	2005	Total
Amount of Issue	[1]	109,893,000	55,650,000	40,200,000	22,440,000	14,850,000	61,606,380	80,540,250	69,466,969	454,646,599
Price of Units Issued	[2]	10.00	13.25	12.00	12.75	13.50	17.35	20.30	23.00	
Commission	[3]	7,076,000	2,962,000	1,608,000	897,600	594,000	2,730,088	3,591,760	3,096,359	
Direct Costs (Legal Fees, etc.)	[4]	-	-	133,800	133,800	133,800	227,447	293,584	305,502	
Last Trade Price	[5]	10.00	13.25	12.25	12.75	13.50	17.40	20.51	23.19	
Net Proceeds	[6]	102,817,000	52,688,000	38,458,200	21,408,600	14,122,200	58,648,845	76,654,906	66,065,108	430,862,859
Discount Amount	[7]	-	-	837,500	-	-	177,540	833,175	573,858	2,422,073
Total Issue Costs	[8]	7,076,000	2,962,000	2,579,300	1,031,400	727,800	3,135,075	4,718,519	3,975,719	26,205,813
Tax Deductible Costs	[9]	7,076,000	2,962,000	1,741,800	1,031,400	727,800	2,957,535	3,885,344	3,401,861	23,783,740
Annual Tax Savings	[10]	426,683	178,609	105,031	62,193	43,886	178,339	234,286	205,132	1,434,160
Present Value (Annual Tax Savings)	[11]	1,726,309	722,630	424,941	251,627	177,559	721,541	947,895	829,941	5,802,444
Net Issue Costs Including Discount	[12]	5,349,691	2,239,370	2,154,359	779,773	550,241	2,413,534	3,770,624	3,145,777	20,403,368
Net Issue Costs / Proceeds	[13]	4.9%	4.0%	5.4%	3.5%	3.7%	3.9%	4.7%	4.5%	4.5%

Sources and Notes:
[a]: Provided by Gaz Metro, LP.
[b],[c]: See the Kolbe Written Evidence.
[d] = {1- (1 + [c]^(-[b]))} / [c].
[1] - [5]: Provided by Gaz Metro, LP.
[4]: The total direct cost of 1995, $401,400, is allocated equally to three issues.
[5]: Values for Mar 1993 and Mar 1994 issues are assumed to equal the price of units issued as actual data are not available.
[6] = [1] - [3] - [4].
[7] = ([5] - [2]) x ([1] / [2]).
[8] = [3] + [4] + [7].
[9] = [8] - [7].
[10] = ([9] x [a]) / [b].
[11] = [10] x [d].
[12] = [9] + [7] - [11].
[13] = [12] / [1].

TAX ADVANTAGE WORKPAPERS

Workpaper #1 to Table C-3

Panel A

2009 Weighted Average Rate (Kolbe)

	Rate		Quebec Corporate Tax Rate			Avg Corp. Tax Rate		
			Weight	Weight	Weight	Weight	Weight	Weight
Weighted dividend rate	22.93%	[a]	1	0.5	0	1	0.5	0
Weighted capital gains rate	22.38%	[b]	0	0.5	1	0	0.5	1
Average = te:			0.23	0.23	0.22	0.23	0.23	0.22
td	0.45	[c]						
te			0.23	0.23	0.22	0.23	0.23	0.22
tc		[d]	0.31	0.31	0.31	0.32	0.32	0.32
(1-td)	0.55							
(1-te)			0.77	0.77	0.78	0.77	0.77	0.78
(1-tc)			0.69	0.69	0.69	0.68	0.68	0.68
tn			**0.03**	**0.02**	**0.02**	**0.03**	**0.03**	**0.03**

Sources and Notes:

te calculated in each column as the weighted average of the Weighted dividend rate and Weighted capital gains rate, where weights used are as in the above rows.

[a]: For Rate, see Table No. ALK-2 [2][a].

[a]: For Rate, see Table No. ALK-2 [3][a].

[c]: For Rate, see Table No. ALK-2 [1][a].

[d]: See Table No. ALK-1 [3] for Quebec's Corporate Tax Rate and Table No. ALK-1 [3][a] for Avg Corp. Tax Rate.

Formulas:

tn = {[tc + te - td - (tc x te)] / (1 - te)} = net tax advantage of debt

Where:

tc = marginal corporate tax rate (Quebec)

te = marginal personal tax rate on equity

td = marginal personal tax rate on debt

Workpaper #1 to Table C-3

Panel B

2010 Weighted Average Rate (Kolbe)

	Rate		Quebec CorporateTax Rate			Avg Corp. Tax Rate		
			Weight	Weight	Weight	Weight	Weight	Weight
Weighted dividend rate	23.54%	[a]	1	0.5	0	1	0.5	0
Weighted capital gains rate	22.38%	[b]	0	0.5	1	0	0.5	1
Average = te:			0.24	0.23	0.22	0.24	0.23	0.22
td	0.45	[c]						
te			0.24	0.23	0.22	0.24	0.23	0.22
tc		[d]	0.30	0.30	0.30	0.31	0.31	0.31
(1-td)	0.55							
(1-te)			0.76	0.77	0.78	0.76	0.77	0.78
(1-tc)			0.70	0.70	0.70	0.69	0.69	0.69
tn			**0.02**	**0.02**	**0.01**	**0.03**	**0.02**	**0.02**

Sources and Notes:
te calculated in each column as the weighted average of the Weighted dividend rate and Weighted capital gains rate, where weights used are as in the above rows.

[a]: For Rate, see Table No. ALK-2 [2][b].

[b]: For Rate, see Table No. ALK-2 [3][b].

[c]: For Rate, see Table No. ALK-2 [1][b].

[d]: See Table No. ALK-1 [3] for Quebec's Corporate Tax Rate and Table No. ALK-1 [3][b] for Avg Corp. Tax Rate.

Formulas:

tn = {[tc + te - td - (tc x te)] / (1 - te)} = net tax advantage of debt

Where:
- tc = marginal corporate tax rate (Quebec)
- te = marginal personal tax rate on equity
- td = marginal personal tax rate on debt

Table No. ALK-1

2009 & 2010 Combined Federal and Provincial Corporate Rate

	Province	Year	Federal Rate **[1]**	Provincial Rate **[2]**	Total Combined Rates **[3]**	Population Weight **[4]**
	British Columbia	2009	19.00%	11.00%	30.00%	13.2%
		2010	18.00%	10.50%	28.50%	
	Alberta	2009	19.00%	10.00%	29.00%	10.9%
		2010	18.00%	10.00%	28.00%	
	Saskatchewan	2009	19.00%	12.00%	31.00%	3.1%
		2010	18.00%	12.00%	30.00%	
	Manitoba	2009	19.00%	12.50%	31.50%	3.6%
		2010	18.00%	12.00%	30.00%	
	Ontario	2009	19.00%	14.00%	33.00%	38.9%
		2010	18.00%	14.00%	32.00%	
	Quebec	2009	19.00%	11.90%	30.90%	23.3%
		2010	18.00%	11.90%	29.90%	
	New Brunswick	2009	19.00%	13.00%	32.00%	2.2%
		2010	18.00%	13.00%	31.00%	
	Nova Scotia	2009	19.00%	16.00%	35.00%	2.8%
		2010	18.00%	16.00%	34.00%	
	Prince Edward Island	2009	19.00%	16.00%	35.00%	0.4%
		2010	18.00%	16.00%	34.00%	
	Newfoundland and Labrador	2009	19.00%	14.00%	33.00%	1.5%
		2010	18.00%	14.00%	32.00%	
	Simple Average	2009	19.00%	13.04%	32.04%	
		2010	18.00%	12.94%	30.94%	
[a]	Weighted Average	2009	19.00%	12.60%	31.60%	
[b]		2010	18.00%	12.52%	30.52%	

Sources and Notes:

Rates from KPMG Corporate Tax; current as of March 2009. http://www.kpmg.ca/en/services/tax/taxrates.html.

Weights calculated from Statistics Canada data.

[1]: Starting in 2008, the corporate income tax rate will decrease to a target rate of 15% as of January 1, 2012.
The corporate income tax rate will decrease as follows: to 19% on January 1, 2009, to 18% on January 1, 2010, to 16.5% on January 1, 2011 and to 15% on January 1, 2012.

[2]: British Columbia's general corporate income tax rate will decrease to 10.5% as of January 1, 2010 and to 10% as of January 1, 2011.

[3]: [1] + [2].

[4]: Workpaper #2 to Table No. ALK-2.

Table No. ALK-2

2009 & 2010 Canadian Personal Tax Rates Summary

Province	Year	Interest Tax [1]	Dividends Tax [2]	Capital Gains Tax [3]	Population [4]	Population Weight [5]	
British Columbia	2009	43.70%	19.91%	21.85%	4,420	13.2%	
	2010	43.70%	19.77%	21.85%			
Alberta	2009	39.00%	14.55%	19.50%	3,632	10.9%	
	2010	39.00%	14.45%	19.50%			
Saskatchewan	2009	44.00%	20.34%	22.00%	1,024	3.1%	
	2010	44.00%	20.20%	22.00%			
Manitoba	2009	46.40%	23.82%	23.20%	1,214	3.6%	
	2010	46.40%	23.66%	23.20%			
Ontario	2009	44.18%	21.96%	22.09%	12,987	38.9%	
	2010	44.18%	23.77%	22.09%			
Quebec	2009	48.22%	29.69%	24.11%	7,783	23.3%	
	2010	48.22%	29.48%	24.11%			
New Brunswick	2009	46.95%	23.17%	23.48%	748	2.2%	
	2010	46.95%	23.01%	23.48%			
Nova Scotia	2009	48.25%	28.34%	24.13%	940	2.8%	
	2010	48.25%	28.14%	24.13%			
Prince Edward Island	2009	47.37%	24.43%	23.69%	140	0.4%	
	2010	47.37%	24.26%	23.69%			
Newfoundland and Labrador	2009	44.50%	22.88%	22.25%	509	1.5%	
	2010	44.50%	22.72%	22.25%			
Simple Average	2009	45.26%	22.91%	22.63%			
	2010	45.26%	22.95%	22.63%			
Population-weighted Average	2009	44.76%	22.93%	22.38%			[a]
	2010	44.76%	23.54%	22.38%			[b]
Total					33,397	100.0%	

Sources and Notes:

[1] - [3]: Workpaper #1 to Table No. ALK-2.

[4]: Workpaper #2 to Table No. ALK-2.

[5]: ([4] / Total of [4]).

Workpaper #1 to Table No. ALK-2

2009 & 20010 Canadian Marginal Tax Rates

Region	Year		Federal Tax Rate [1]	Provincial Tax Rate [2]	Maximum Provincial Surtax Rates [3]	Combined Interest Tax Rate [4]	Combined Capital Gains Tax Rate [5]	Regional Eligible Dividends Credit [6]	Regional Eligible Dividends Tax Rate [7]	Combined Eligible Tax Rate [8]	Regional Non-Eligible Credit [9]	Regional Non-Eligible Dividends Tax Rate [10]	Combined Non-Eligible Tax Rate [11]
British Columbia	2009		29.00%	14.70%		43.70%	21.85%	11.00%	5.37%	19.91%	4.20%	13.13%	32.71%
	2010		N/A	N/A		43.70%	21.85%	N/A	5.33%	19.77%	3.40%	14.13%	33.71%
Alberta	2009		29.00%	10.00%		39.00%	19.50%	9.99%	0.01%	14.55%	3.48%	8.15%	27.73%
	2010		N/A	N/A		39.00%	19.50%	N/A	0.01%	14.45%	N/A	8.15%	27.73%
Saskatchewan	2009		29.00%	15.00%		44.00%	22.00%	11.00%	5.80%	20.34%	6.00%	11.25%	30.83%
	2010		N/A	N/A		44.00%	22.00%	N/A	5.76%	20.20%	N/A	11.25%	30.83%
Manitoba	2009		29.00%	17.40%		46.40%	23.20%	11.00%	9.28%	23.82%	2.50%	18.63%	38.21%
	2010		N/A	N/A		46.40%	23.20%	N/A	9.22%	23.66%	2.50%	18.63%	38.21%
Ontario	2009	[a]	29.00%	11.16%	36%	44.18%	22.09%	7.40%	7.41%	21.96%	5.13%	7.54%	27.12%
	2010		N/A	N/A	N/A	44.18%	22.09%	6.40%	9.32%	23.77%	4.50%	8.33%	27.91%
Quebec	2009	[b]	24.22%	24.00%		48.22%	24.11%	11.90%	17.55%	29.69%	8.00%	20.00%	36.35%
	2010		N/A	N/A		48.22%	24.11%	N/A	17.42%	29.48%	N/A	20.00%	36.35%
New Brunswick	2009		29.00%	17.95%		46.95%	23.48%	12.00%	8.63%	23.17%	5.30%	15.81%	35.40%
	2010		N/A	N/A		46.95%	23.48%	N/A	8.57%	23.01%	N/A	15.81%	35.40%
Nova Scotia	2009		29.00%	17.50%	10%	48.25%	24.13%	8.85%	13.80%	28.34%	7.70%	12.25%	31.83%
	2010		N/A	N/A	N/A	48.25%	24.13%	N/A	13.70%	28.14%	N/A	12.25%	31.83%
Prince Edward Island	2009		29.00%	16.70%	10%	47.37%	23.69%	10.50%	9.89%	24.43%	3.20%	16.88%	36.46%
	2010		N/A	N/A	N/A	47.37%	23.69%	N/A	9.82%	24.26%	N/A	16.88%	36.46%
Newfoundland and Labrador	2009		29.00%	15.50%		44.50%	22.25%	9.75%	8.34%	22.88%	5.00%	13.13%	32.71%
	2010		N/A	15.50%		44.50%	22.25%	N/A	8.28%	22.72%	N/A	13.13%	32.71%
Federal	2009	[c]	29.00%					18.97%	14.54%		13.33%	19.58%	
	2010	[d]	29.00%					18.97%	14.44%		13.33%	19.58%	

Sources and Notes:

In the event that 2010 Personal Tax Rates are not available (N/A), the 2009 rates are used instead as an estimate.

[1]-[3]: http://www.cra-arc.gc.ca/tax/individuals/faq/taxrates-e.html, http://www.kpmg.ca/en/services/tax/taxratesPersonal.html, and http:/www.taxtips.ca/fedtax.htm.

[1][b]: Values are net of Quebec's 16.5% Federal Tax Rate abatement.

[4]: [1] + [2]* (1+ Provincial Surtax Rate).

[5]: [2] x 50%.

[6]: 2009 rates from:
http://www.taxtips.ca/dtc/enhanceddtc/enhanceddtcrates.htm
2010 rates from:
British Columbia:
2009 British Columbia Budget: Tax Highlights, http://www.pwc.com/ca/eng/about/svcs/tax/tm-bcbudget0209.pdf
Manitoba:
2009 Manitoba Budget: Tax Highlights, http://www.pwc.com/ca/eng/about/svcs/tax/tmman-0309.pdf
Ontario: both 2009 and 2010 rates come from:
2009 Ontario Budget: Tax Highlights, http://www.pwc.com/ca/eng/about/svcs/tax/tm-onbudget-0309.pdf

[6][a]: Ontario's rate will change to 7.4% and 7.7% for 2009 and 2010 respectively.

[7]: For 2009, 1.45 x ([2]-[7]). This calculation reflects the fact that rates are applicable to dividends grossed-up by 45%.
For 2010, 1.44 x ([2]-[7]). This calculation reflects the fact that rates are applicable to dividends grossed-up by 44%.

[7][c]: 1.45 x ([1][c]-[4][c]).

[7][d]: 1.44 x ([1][d]-[4][d]).

[8]: For 2009: [7] + [7][c].
For 2010: [7] + [7][d].

[8][b]: For 2009: [7][b] + (1-16.9%)x[7][c], which recognizes the impact of the Federal Tax abatement for Quebec residents.
For 2010: [7][b] + (1-16.9%)x[7][d], which recognizes the impact of the Federal Tax abatement for Quebec residents.

[9]: http://www.taxtips.ca/dtc/smallbusdtc.htm

[10]: 1.25 x ([2]-[10]). This calculation reflects the fact that rates are applicable to dividends grossed-up by 25%.

[11]: For 2009: [10] + [10][c].
For 2010: [10] + [10][d].

[11][b]: For 2009: [10][b] + (1-16.9%)x[10][c], which recognizes the impact of the Federal Tax abatement for Quebec residents.
For 2010: [10][b] + (1-16.9%)x[10][d], which recognizes the impact of the Federal Tax abatement for Quebec residents.

Workpaper #2 to Table No. ALK-2

2009 Population of Canada by Location

Location	Population
Alberta	3,632.48
British Columbia	4,419.97
Manitoba	1,213.82
New Brunswick	748.32
Newfoundland and Labrador	508.99
Northwest Territories	42.94
Nova Scotia	939.53
Nunavut	31.56
Ontario	12,986.86
Prince Edward Island	140.40
Quebec	7,782.56
Saskatchewan	1,023.81
Yukon	33.44
Canada	33,504.68

Sources and Notes:
http://www.statcan.gc.ca/daily-quotidien/090326/t090326a2-eng.htm

The Cost of Capital
Estimating the Rate of Return for Public Utilities

A. Lawrence Kolbe and
James A. Read, Jr.
with George R. Hall

A Charles River Associates Study

The MIT Press
Cambridge, Massachusetts
London, England

would be honored on the downside as well as the up. There is also a question of which customers benefit and which investors pay. When rates rise, some customers benefit and some investors pay. When rates fall, a quite different group of customers and investors might divide the costs and benefits in the other direction. Even though this bargain may be fair on average, it usually would not be fair to all parties at all times.

On balance we believe that setting the allowed rate of return equal to the cost of capital is the policy that best meets the criterion of "fairness."

3. Use of the Market-to-Book Ratio as a Guide for Regulators

Our second approach to developing the reasons that the cost of capital should serve as the basis of the allowed rate of return is indirect: we examine the proposition that regulators' actions should make the ratio of a regulated stock's market value to its book value (slightly more than[19]) one. This prescription is frequently heard, but not always agreed to. It turns out to be simply another way of saying that the allowed rate of return should equal the cost of capital. It is worth approaching the topic from this direction because understanding this proposition's premises yields additional insights into the nature of the cost of capital and the "fairness" of alternative policies. It also shows that failure to follow the prescription may prove very costly in the long run.

Why Choose a Market-to-Book Ratio of One?

The market-to-book ratio expresses the market value of the firm's outstanding common stock to the book value of its equity. If the two are equal, the expected return on the book will equal the expected return on the market value of the company, which in turn will equal the cost of capital for a company of that degree of risk.

The Basic Argument

To demonstrate the point, we first must define the determinants of the market value of a company. We start by defining the concept of the present value of a stream of future cash flows. A present-value calculation discounts future expected returns back to the present. The basic formula is

$$PV = \sum_{y=1}^{Y}\left[\frac{CF_y}{(1 + r)^y}\right], \qquad (2.1)$$

which translates as

Present value of a stream of future cash flows	=	Sum, over all future years (running from 1 to Y) in which a cash flow is expected, of	$\left(\dfrac{\text{Cash flow expected in year } y}{\text{Sum of one plus the discount rate raised to the } y\text{th power}}\right)$

By definition, the appropriate discount rate in a present-value calculation is the cost of capital. As discussed earlier, the cost of capital depends on business and financial risk and may change over time, depending on such factors as the state of the economy or the rate of inflation.

The market value of a stock, which we shall call MV, equals the present value of the expected cash flows to stockholders, discounted at the current cost of capital appropriate for the stock's risk. These cash flows equal the expected dividends per share, which in turn are determined by the expected earnings of the firm. In principle the cash flows extend into the indefinite future (i.e., Y is replaced by infinity in [2.1]).[20] Changes in the market value of a firm may arise from changes in either its expected cash flows or its cost of capital.

At this point we make two simplifying assumptions: (1) The firm is in a no-growth steady state, so that forecasted earnings and dividends can be treated as perpetual annuities. This assumption is for convenience only; our conclusions would follow for any growth pattern. (2) Rate base equals net book value.

If investors forecast dividends as a perpetual annuity, then equation (2.1) simplifies to $PV = CF/r$, so that $MV = CF/r$.

The expected earnings, E, of a company subject to rate-of-return regulation equal its allowed rate of return, ROR, times its rate base (which we assume equals net book value, BV), assuming other expenses and total sales are correctly forecasted in setting the rates charged to customers. Symbolically, $E = ROR \times BV$.

If the firm does not grow, all earnings can be paid out to investors. (Reinvested depreciation is sufficient to maintain the value of the rate

base.) Then the cash flow received by investors equals earnings, so $CF = ROR \times BV$. The market value of the firm's stock is:

$$MV = \frac{CF}{r} = \frac{(ROR \times BV)}{r}. \qquad (2.2)$$

The market-to-book ratio therefore equals the ratio of the allowed rate of return to the cost of capital:

$$\left(\frac{MV}{BV}\right) = \left(\frac{ROR}{r}\right) \qquad (2.3)$$

Equation (2.3) of course reflects strong simplifying assumptions. But the qualitative conclusions we draw from it hold in most cases. If regulators allow the firm to expect to earn its cost of capital, market value will equal book value ($ROR = r$ implies $ROR/r = MV/BV = 1$, so that $MV = BV$). Conversely, if we observe $MV = BV$, we conclude that investors expect regulators to allow the firm to earn its cost of capital, at least on average. ($MV = BV$ implies $MV/BV = ROR/r = 1$, so that $ROR = r$.)

Possible Complications

These two conclusions hold under a variety of more general assumptions. Thus the assumed constancy of the rate of return, the rate base, and the cost of capital, and the assumed infinite cash flow horizon, are not important. If more general assumptions in these areas were made, the equations would grow more complicated but the same conclusions would be reached. However, some of the assumptions made do lead to important complications.

First, it is important that the *actual* rate of return investors expect the firm to earn on its rate base must equal its cost of capital, not just that the *allowed* rate of return equal the cost of capital. For example, if investors expect a systematic difference between allowed and realized rates of return (the so-called earnings attrition problem), the allowed rate of return would have to be adjusted to offset the expected difference if regulators desire to bring market value into equality with the firm's rate base.

So far we have equated rate base with net book value. This is essentially true with Original Cost regulation, although complications are often encountered.[21] For example, if only part of a firm's business is regulated, book value exceeds rate base. The firm's stock price may differ from book value per share because book value does not measure economic value for unregulated lines of business. The book value and the market value of an unregulated firm's equity may be very different. Thus a market-to-book ratio greater than one does not necessarily indicate superior profitability.

Even if all the firm's *activities* are regulated, there may be some book assets, such as construction work in progress (CWIP), that do not appear in the rate base.[22] This does not necessarily upset our interpretation of the market-to-book ratio, however. Commissions do allow return on CWIP by giving an allowance for funds used during construction (AFUDC). AFUDC is not immediately charged to consumers but reserved for later inclusion in the rate base. The market-to-book ratio will still equal one, however, as long as both the AFUDC rate and the allowed rate of return equal the cost of capital.[23]

Thus a commission might aim at equality of market and book value because they would then know that investors expected the regulated firm's actual average rate of return to equal its cost of capital (assuming Original Cost or equivalent Fair Value regulation). The market-to-book ratio is an indication of how nearly the market expects regulators to achieve this goal.

Does Undervaluation of Unregulated Stocks Imply Regulated Stocks Should Be Undervalued Too?

A number of stocks, particularly those of companies owning large amounts of natural resources such as petroleum, have sometimes been said to be "undervalued." Several explanations for this alleged widespread undervaluation have been offered in the economics literature, but the debate continues.[24] For regulators, the issue is whether such undervaluation implies that market values should be lower than book values for regulated companies as well. Is it "fair" for regulated stocks to be protected against undervaluation when unregulated stocks are not? A closer look at this argument shows that it should not be carried over to regulated firms.

Possible Reasons for Undervaluation

The explanations for undervaluation offered to date include: (1) inflation-induced errors in investors' evaluation of unregulated earnings, because of failure to recognize the increases in asset values due to inflation; (2) an increase in the effective tax rates on *real* corporate income, because taxable book income overstates real income when

inflation "renumbers" the dollars in which earnings are measured; (3) increased riskiness in all stocks relative to other investments, perhaps also because of inflation; and (4) a basic decline in the *average* pre-tax profitability of existing capital in the United States, because of changes such as the run-up of energy prices.

Examples may clarify these explanations. First, inflation makes conventionally reported book earnings very misleading. If the resale or replacement value of an asset increases from $1 million to $1.1 million during a year, the $100,000 difference is not reported as earnings. The first explanation is that investors simply do not recognize how valuable these hidden earnings are and so underprice stocks.

Second, income taxes are applied to book earnings, which rely on historical rather than current costs for capital assets. Straight-line, ten-year book depreciation of a $1-million asset is $100,000. But if the asset would cost $1.5 million new today, "using up" one tenth of its productive life this year represents a cost of $150,000. The extra $50,000 of true cost is not deducted as an expense in computing tax liability, so the company must pay taxes on it. Real tax rates have increased. (Note that the hidden real income from asset appreciation cuts against this argument.)

The third explanation is that stocks, for whatever reason, have proved to be poor inflation hedges, and rational investors consider this in choosing among investments. Money that went into the stock market in the 1960s was invested in houses, gold, stamps, and other nonfinancial assets in the '70s. The result has been a fall in the value of stocks.

The fourth explanation is that the physical assets the stockholders own were designed to use cheaper raw materials, especially energy. When energy prices rose dramatically, net profits using these now-inefficient assets fell, so their value (measured by their stock price) fell also. An example is the 1974 resale value of a 1973 "gas guzzling" car.

Applicability to Public Utilities

The key point for regulatory policy is that none of these explanations implies that undervaluation should be carried over to regulated stocks.

Asset values of regulated companies do not appreciate with inflation, at least under Original Cost or equivalent Fair Value rate bases. All of the inflation compensation investors are to receive comes in the rate of return underlying current earnings. If inflation-induced errors are responsible, such errors would not occur for regulated companies' stocks.

Under cost-based regulation, taxes are treated as an expense to be recovered from ratepayers. Equityholders do not benefit from a reduction in tax rates, because their revenue requirements are lowered by a like amount.[25] Therefore, it would be inconsistent to force them to bear the cost of an increase in effective tax rates, whether caused by inflation or legislation.

Finally, and in a similar vein, rate-of-return regulation is designed to deny utility equityholders the chance for extraordinary capital gains (from factors such as increased productivity or a decrease in the riskiness of all stocks) except during a limited period between regulatory proceedings. Each proceeding resets rates so that the expected rate of return equals the cost of capital. If utility stockholders are denied the chance for extraordinary gains, it would be inconsistent to require them to bear the extraordinary losses that unregulated companies might face from such changes.[26]

Even if one were certain that unregulated stocks were undervalued, there remains one more fundamental objection to allowing regulated stocks to remain undervalued just because unregulated stocks were. Even for unregulated companies, the undervaluation of the *average* assets underlying a stock does not imply an undervaluation of *incremental* assets (new investment). This safeguard does not apply for regulated firms forced to invest when market value is below book value.

Suppose average pre-tax profitability on old assets has declined for an unregulated firm. Managers require (or at least ought to require) that new investments have a positive net present value when the cash flows are discounted at the cost of capital. If this standard is met, the market value of any new assets will equal or exceed their cost. In other words, prudent managers only make a new investment when the implicit market-to-book ratio *for the new investment* is one or higher.

Under conventional regulation, however, the rate of return on both old and new assets is the same. To force the market value of a regulated firm below its book value, regulators must reduce the *average* allowed rate of return below the cost of capital. This in turn would force the firm to make any *new* investments at a substandard rate of return—a burden to which unregulated firms are never subjected. It is this burden that underlies the objection to "dilution" of a regulated firm's stock when new equity is issued when market value is below book value.[27]

Thus although it may seem attractive to force regulated firms' market-to-book ratios to the levels of unregulated firms, this would often require allowed rates of return substantially above or below the cost of capital. If above, regulated firms would receive a windfall on each new investment; if below, they would suffer a capital loss. In either case the basic standard of cost-based regulation would be violated—and for what end? The *reasons* that unregulated firms' market and book values differ do not apply, or should not apply, to regulated firms.

The Implications of a Conscious Decision Not to Equate Market and Book Value

From the preceding discussion, it should be clear that a decision to permit market value to remain lower (or higher) than book value implies that the average expected rate of return will be lower (or higher) than the company's cost of capital.[28] The longer this condition persists, the more serious the consequences.

In recent years market value is most commonly below—often substantially below—book value. Data for three regulated industries are shown in figure 2.4 in ratio form and in figure 2.5 on a logarithmic scale.[29] Several reasons for the persistent shortfalls over the last decade are possible.

Real energy prices increased substantially during the 1970s, creating serious difficulty for people with lower incomes. During the same period inflation and the cost of capital also increased substantially. Holding back the rate of growth of regulated prices would aid those with lower incomes, and one way to do so is to be slow to recognize the full increases in the cost of capital.

Second, compared to unregulated prices, the conventional rate-base approach requires exaggerated changes in regulated prices following a change in the rate of inflation or a large addition to the rate base.[30] Customers naturally object to such dramatic differences from the pattern of other prices.[31]

The cost of capital reached very high levels in recent years; some regulators may not have believed that such high rates of return were truly necessary to bring forth the capital needed for new investments. Alternatively, regulators may have believed that the cost of capital

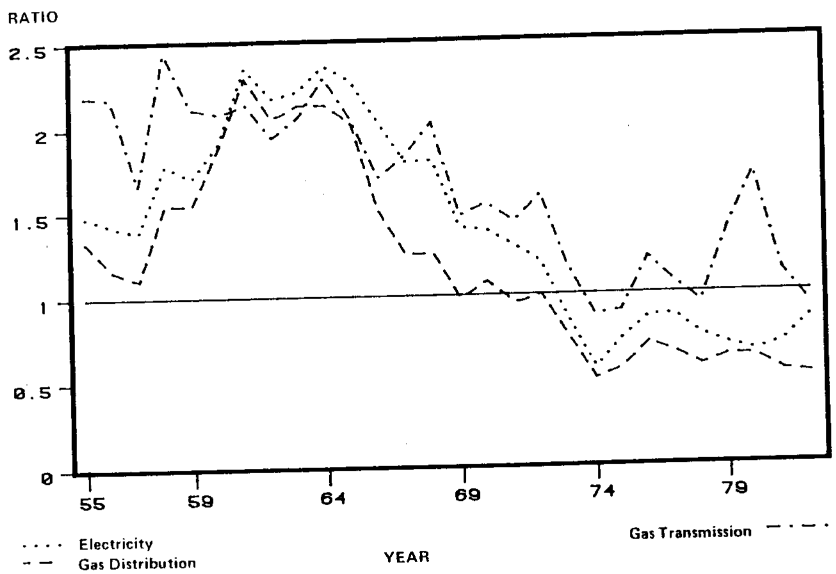

Figure 2.4
Market-to-Book Ratios for Gas and Electric Utilities
Source: Moody's Public Utility Manual.

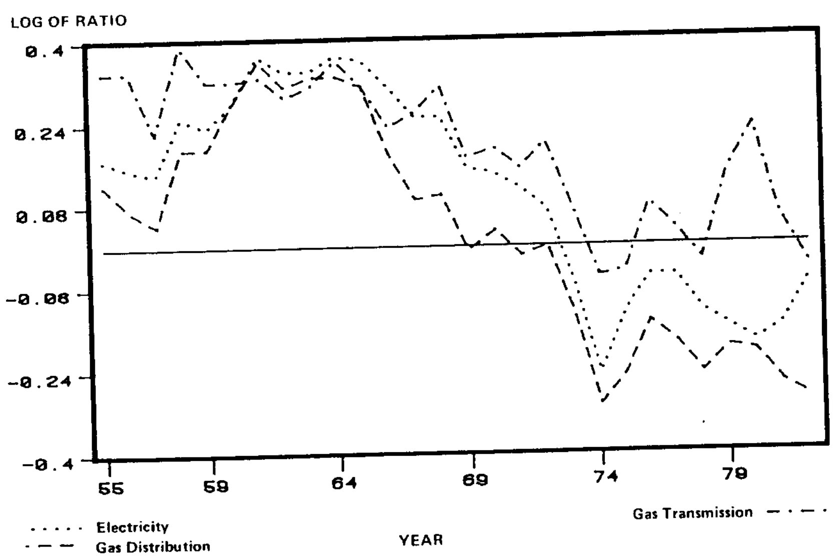

Figure 2.5
Market-to-Book Ratios for Gas and Electric Utilities: Logarithmic Scale

was truly as high as it appeared but may have been responding with a lag in order to smooth the rate of change of regulated prices. (As noted earlier, for this procedure to be "fair" to investors on average, regulators must also respond with a lag when the cost of capital declines; see Kolbe 1983.)

Finally, regulators may have consistently underestimated the cost of capital. In this view, the low market-to-book ratios are a mistake, not the consequence of a deliberate policy.

Regardless of the reasons that regulators might consciously allow market-to-book ratios to remain below one, such a decision implies either that the regulators are substituting their judgment for the market's in deciding how much return is truly required, or that regulators believe the costs of maintaining this policy to be lower than the costs of allowing rates of return high enough to equate market and book values. If the former, regulators must at least recognize that they cannot force the market to share their judgment. If the latter, regulators should recognize that the costs of failing to equate the rate of return with the cost of capital will grow larger the longer the policy persists.[32]

The costs of the policy are the mirror image of the benefits of equating the cost of capital and the rate of return discussed earlier. Given an inadequate rate of return, the value of outstanding stock will fall to where the expected rate return on the lower purchase price equals the cost of capital. Existing shareholders will pay for this fall through a capital loss. If the policy is maintained, new investors are likely to be aware of the chance for such losses to recur, and to require a higher expected rate of return as a result. Also, utility managers can make new investments only by penalizing their existing stockholders, which they will be increasingly unwilling to do as the condition persists. Managers will look for ways to reduce shareholder losses, including deferral of investments and a preference for small investments even if larger investments would be much more efficient.

Utimately, the costs of the policy will be split between the original shareholders and future ratepayers. The short-run benefits will go to current ratepayers.

In our view, the arguments in favor of equating the allowed rate of return with the cost of capital, at least on average, are overwhelming. The remaining chapters assume that this goal is accepted, and turn to the narrower question of how to estimate the cost of capital.