

Régie de l'énergie

Decision D-2007-116 / File R-3630-2007

English Version

« Section 4.1 Rate of return »

Note: This document provides a translation of pages 22 to 32 of Decision D-2007-116 rendered on October 15, 2007. It does not replace in any way the Decision. Only the full French text of the Decision has legal force.

4.1 RATE OF RETURN

4.1.1 MODELS

The experts who testified used different approaches and models to calculate return on equity (ROE).

The IGUA expert, Dr. Booth, used the conventional Capital Asset Pricing Model (CAPM) and a two-factor model based on the market risk premium and the risk premium on Canada long-term bonds¹. Gaz Métro's expert, Dr. Chrétien, applied the Fama-French model to a portfolio containing securities issued by companies with characteristics similar to those of a reference distributor. He also used an adjusted CAPM model².

The CAPM is expressed by the following equation:

$$K = R_f + \beta*(R_m - R_f)$$

This equation represents the rate of return (K) that an investor expects to receive on an investment in a security with a specified level of risk. The expected return on this security equals the return on a risk-free investment (R_f) plus a risk premium. The risk premium is specific to the security under consideration and is proportionate to the market risk ($R_m - R_f$), which is estimated on the basis of the rate of return (R_m) generated by a diversified portfolio. The relationship between market risk and the risk for the security under consideration is expressed by the beta factor (β).

The Fama-French model used by Dr. Chrétien has been under development since 1993 and reportedly is increasingly used in finance. According to the evidence, however, it has not previously been used in Canada in a submission to a regulatory body for the purpose of setting a utility's ROE and has been used in such a context only once in the U.S.³

While the two models differ, the purpose of both is to estimate the rate of return an investor expects to realize on an investment in a security with a specified level of risk. The main difference between the two approaches is the method used to calculate this risk. In the Fama-French model, the risk associated with a security is a function of three explanatory variables — the market risk, value and size premiums — rather than the single variable, market risk premium, used in the CAPM. As well, the model proposed by Dr. Chrétien is based on a different calculation of the risk-free rate (R_f) than the one generally used in the CAPM. Dr. Chrétien proposed the following equation:

¹ Exhibit C-8-10, IGUA, Evidence of Laurence D. Booth, July 2007, pages 54 and 55.

² Exhibit B-4- Gaz Métro -7, document 8, page 44.

³ Exhibit B-11-Gaz Métro-7, document 8.4, page 1.

$$K = R_f^{\text{mod}} + \beta_{(\text{market})} * \lambda_{(\text{market})} + \beta_{(\text{size})} * \lambda_{(\text{size})} + \beta_{(\text{value})} * \lambda_{(\text{value})}$$

Dr. Chrétien argued that this model reflects observed market returns more accurately than the CAPM model. He submitted that this is confirmed in particular by securities with lower than average risk and so-called value stocks in all the markets studied, i.e. North American and international markets alike. For his part, Dr. Booth contended that this model is considered highly controversial in financial circles. In support of this claim, he produced a variety of articles from the specialized literature⁴.

The Régie has decided not to use the Fama-French model to set ROE in this decision.

To date, there has not been sufficient study of the application of this model to regulated companies to use it as a basis for fixing a distributor's ROE. According to the evidence, there have been very few articles in the specialized literature concerning such an application of the model for regulatory purposes.

Nevertheless, the evidence submitted by Dr. Chrétien does show that the model produces convincing and solid statistical results with a capacity to explain previously observed market returns for securities issued by companies engaged primarily in gas distribution. In this connection, Dr. Booth argued that the model's statistical performance is not the prime factor to be considered; rather, the model's consistency with basic principles in finance, notably with respect to analysis of risk factors that are liable to influence rates of return, should be examined. The Régie's view is that more extensive analysis of these issues will be necessary before the Fama-French model can be recognized and applied for the purpose of determining a reasonable rate of return.

Moreover, based on the evidence, the Régie notes, among other things, the difficulty inherent in developing data series over a sufficiently long period of time, and the fact that the reference portfolios include companies whose operations often extend well beyond distribution or regulated activities *per se*. The Régie also notes the inclusion of income trusts in the selected portfolios and the resulting potential impact on assessment of the risk factor associated with the value factor. Finally, the Régie is concerned about the possibly circular logic of using portfolios containing regulated companies to estimate the size and value parameters. While application of the CAPM model may also entail some of these difficulties, they appear to be more acute with the Fama-French model, due to the nature of the explanatory factors considered.

With respect to the adjusted CAPM model used by Dr. Chrétien to complement the Fama-French model and the multi-factor model used by Dr. Booth, the Régie takes note of the results, but for information purposes only, in order to validate its calculation of the ROE.

⁴ Exhibits C-8-30, C-8-31 and C-8-32, IGUA, responses to undertaking #2.

For these reasons, the Régie has decided to rely primarily on the CAPM model in this decision. This is the method the Régie has applied in previous decisions and it is the most widely used approach in Canada. This model is recognized and used both in financial circles and by the majority of the experts who testify before regulatory bodies. However, the use of this model does entail significant difficulties which the Régie addresses in greater detail below.

4.1.2 MARKET RISK PREMIUM

The CAPM model requires the establishment of a market risk premium, based on which a premium is determined for a reference company or distributor.

Dr. Chrétien proposed a market risk premium of 6.43%, based on average returns calculated according to the arithmetic mean return since 1951 in the Canadian market and since 1927 in the U.S. market⁵. For this calculation, he used the weighting adopted by the Régie in Decision D-99-150: 60% for the Canadian data and 40% for the U.S. data⁶. He also argued that the inclusion of the U.S. figures was warranted by the increasing integration of the two economies⁷.

Dr. Booth suggested that integration of the two economies can be expected to lead to lower, not higher, risk premiums. He referred to various Canadian and U.S. figures in his testimony but gave precedence to the Canadian data. He also mentioned the need to look at data for both short and long periods. Dr. Booth submitted estimates for the periods beginning in 1926 and 1957 based on the arithmetic and geometric means and the ordinary least squares method. He proposed a market risk premium of 5.0%.

Based on the evidence in the record, the Régie has decided to base its assessment of the market risk premium on Canadian and U.S. data, weighted in the same proportions as in 1999. The Régie is of the opinion that more open markets are giving investors a variety of investment options, which must be reflected in setting a reasonable ROE.

The Régie has also decided to continue calculating the market risk premium on the basis of the arithmetic mean return observed in the markets. However, the choice of reference period for establishing the risk premium raises certain issues: the mean may vary significantly depending on the beginning date and the choice of data series.

Since 1999, the statistics have shown a significant decrease in average yields. The decline is more pronounced in the means for shorter periods. The drop in stock prices in 2001 and 2002 partly accounts for this phenomenon.

⁵ Exhibit B-11-Gaz Métro-7, document 8.1, page 2.

⁶ Decision D-99-150, File R-3428-99, page 10.

⁷ Exhibit B-11-Gaz Métro-7, documents 8.27 and 8.30.

Therefore, the Régie has chosen to assign greater weight than previously to means for longer periods.

Based on the evidence in the record, the Régie has determined the market risk premium to be in the range of 5.40% to 5.90%.

4.1.3 RISK FOR A REFERENCE DISTRIBUTOR

Dr. Booth and Dr. Chrétien then submitted risk estimates for a reference distributor, i.e. a utility with a low risk profile. This risk is measured by the beta factor, which represents the risk differential between the reference company and the broader market.

Establishing the beta factor is one of the major difficulties in applying the CAPM model. The problems relate both to establishing reference portfolios that are representative of the risk associated with regulated companies and obtaining valid data series that can support a robust estimate.

Dr. Booth noted problems related to the impact of a few large companies on the samples, such as Nortel's weight in the TSX several years ago. He argued that this can result in a significant bias in estimates of the beta values of regulated companies as a whole when the beta values of these large companies depart significantly from the norm. He submitted various estimates based on recent data but submitted that judgement must be applied and suggested that the beta value of a reference company be established on the basis of the historic mean, which he estimated at between 0.45 and 0.55.

Dr. Chrétien submitted a beta of 0.53, calculated on the basis of the various reference portfolios used in applying the Fama-French model.

He also submitted an adjusted beta of 0.58⁸ under the adjusted CAPM model. The purpose of the adjusted beta is to reflect empirical research showing the tendency of beta values to converge towards 1. Dr. Booth argued, on the contrary, that the beta values of regulated companies converge towards the average beta for their group and not towards 1.

Upon review, the Régie maintains the position it adopted in Decision D-2003-93, to the effect that the beta values of regulated companies converge towards their own mean and not the market mean, which by definition is 1⁹.

While beta value is a decisive factor in application of the CAPM, it is difficult to objectively deduce it from observed market data for the companies in the samples. **Based on the**

⁸ Exhibit B-4-Gaz Métro-7, document 8, page 53.

⁹ File R-3492-2002, phase 1, Decision D-2003-93, page 73.

evidence in the record, the Régie determines the beta of a reference company to be in the 0.50 to 0.55 range.

4.1.4 RISK-FREE RATE

The CAPM model requires the establishment of a risk-free rate, to which the company's risk premium is then added. The usual practice is to use the 30-year Government of Canada bond yield, based on a specialized publication from Consensus Economics Inc., as the risk-free rate.

Dr. Chrétien proposed an improvement on the approach used in 1999, called the modified risk-free rate. He argued that using the rate for the projected test year as a basis for establishing the reference rate of return is arbitrary insofar as the rate for the year in question is not representative of the mean rate over the long term. Since the risk premium is established on the basis of long-term means, he recommended using the long-term mean yield on Government of Canada bonds with a term of more than 10 years to establish the reference rate of return, and then to adjust the resulting risk premium for the year 2008 using the 75/25 elasticity factor established in the 1999 decision. If the Régie accepts the 6.41% rate proposed by Dr. Chrétien and the risk-free rate of 4.78% in the record, the resulting adjustment to Gaz Métro's risk premium for 2008 would be approximately 41 basis points.

Dr. Booth argued that it is not appropriate to correct the 1999 risk premium by using the modified risk-free rate approach since the fair and reasonable ROE authorized by the Régie in 1999 was the result of an assessment that took all the information available at the time into account. He was not aware of any other regulatory body that had used the modified risk-free rate approach. He recommended that the Régie continue using the unmodified risk-free rate for the purpose of establishing a reasonable ROE, but that it takes all relevant factors, based on the evidence before it, into account in assessing the risk premium, including the relationship between the risk premium and the long-term bond rate.

The Régie does not consider the two experts' positions to be irreconcilable. In the Régie's view, application of the CAPM raises an additional difficulty when returns are calculated over a period in which government bond rates are significantly different from the mean rates over the longer term. Since the risk premium is calculated over a long period and represents the difference between the arithmetic mean market return and the arithmetic mean return on government bonds, it basically reflects prevailing conditions over that same period. The Régie's calculation must therefore be adjusted when bond market conditions vary from this mean.

In short, Dr. Chrétien proposed an explicit modification of the risk-free rate in such a case while Dr. Booth preferred to rely on the judgement of experts and the regulator. In the Régie's view, the modified risk-free rate is an attractive approach to facilitating application of the CAPM.

The Régie believes this initial discussion of the issue should be followed by further study. However, this question should not have a significant impact on the reasonable rate of return to which a shareholder is entitled. If it is not addressed explicitly, as Dr. Chrétien proposed, it must be taken into account in assessing the facts, as Dr. Booth noted. In the case at hand, the Régie has decided to make an upward adjustment of 40 basis points to the results produced by the CAPM.

4.1.5 OTHER MARKET ACCESS COSTS

Issuance costs and other costs of accessing the market have not been considered in detail in this case. Such costs amount to 0.30% for the company according to Dr. Chrétien's evidence while Dr. Booth estimated them at 0.50%. **The Régie maintains Gaz Métro's issuance costs and other market access costs at 30 basis points, as established in Decision D-99-150.**

4.1.6 GAZ MÉTRO'S LEVEL OF RISK

Gaz Métro's level of risk in relation to that of a reference distributor and the evolution of risk since 1999 were discussed at length in the evidence.

Dr. Carpenter is of the view that this risk has increased since 1999 due to the sharp rise in natural gas prices and price volatility. He also mentioned that the company's level of risk has been increased by the incentive-based regulatory mechanism introduced in 2001. He concluded that Gaz Métro's risk is higher than that of a reference company and that an upward adjustment of 50 basis points is warranted.

Dr. Booth noted that Gaz Métro has a higher level of business risk than its counterparts due to the make-up of its customer base. He argued, however, that its higher capitalization ratio and greater risk coverage through a number of deferred charge accounts counterbalance the business risk and the company's overall risk is therefore average.

Another IGUA witness argued that the risk related to the make-up of the customer base has decreased since 1999. He also contended that the incentive-based mechanism in no way entails increased risk for the company but rather offers it an opportunity to realize higher returns insofar as its performance warrants, while providing protections that make it comparable to a cost-based system.

Based on the evidence in the record, the Régie finds that the company's overall risk has increased since 1999. The Régie bases this conclusion on the much higher average supply price and the impact of the price increase on factors such as the competitive position of natural gas in relation to fuel oil and electricity¹⁰. The Régie considers the loss of industrial volume and the relative stagnation of total sales since 1999 to be cause for concern. The Régie also notes the increased volatility of supply prices, which however is partially offset by the use of by-products under a strategy of which the outlines were previously approved by the regulator.

The Régie does not consider the company's risk to have been significantly increased by the introduction of the incentive-based mechanism. This mechanism has been adjusted twice since 2001. While it is too early to assess the impact of the changes made to the system in 2007, the possibility of considering the company's revenue requirement on a yearly basis for the purpose of rate-setting has been maintained; in this respect, the mechanism is similar to conventional cost-based systems.

The Régie considers the company's overall risk to be higher than average but also takes into account the increased coverage of these same risks provided by deferred charge accounts and the company's slightly higher-than-average capitalization ratio.

The Régie finds the company's risk has increased since 1999 and is higher than that of a reference company. Based on the evidence in the record, the Régie has determined that the higher risk warrants an upward adjustment in comparison with the risk premium of a reference distributor in the amount of 25 to 35 basis points.

4.1.7 RESULTS OF THE CAPM

In view of all the above conclusions concerning the application of the CAPM model, the results of the model for the distributor are in the range of 8.43% to 9.08%.

4.1.8 AUTOMATIC RISK PREMIUM ADJUSTMENT FORMULA

Based on the evidence, simply updating the company's risk premium, without adjustment, by applying the automatic rate of return adjustment formula that has been in effect since 1999 would produce an ROE of 8.91%.

¹⁰ Exhibit B-16-Gaz Métro-2, document 2, page 3.

4.1.9 OTHER MODELS

As noted above, the Régie takes into account the results of the adjusted CAPM model used by Dr. Chrétien on a complementary basis and the multi-factor model used by Dr. Booth, but only for information purposes, in order to validate its calculation of the ROE.

4.1.10 COMPARISON WITH U.S. DISTRIBUTORS

Comparison of the ROEs authorized for regulated Canadian companies and their U.S. counterparts was discussed at length at the hearing. Gaz Métro executives and IGUA officials alike informed the Régie of the related issues for the industry as a whole.

The Régie is making a determination in this case on the reasonable rate of return for shareholders of the distributor Gaz Métro. It is not taking a position on the debate underway in the industry. It will however indicate the factors that influenced its assessment.

The Régie believes that while it is clear that the ROEs authorized in the U.S. are higher, on average, than those granted in Canada, the evidence does not support the conclusion that the distributor is suffering any harm or unfair treatment. The applicant has not demonstrated that the opportunities available on the U.S. market are comparable, particularly in terms of risk. Dr. Chrétien's evidence shows that the risk premium has been higher in the past for U.S. portfolios than for Canadian portfolios¹¹. At the same time, Dr. Carpenter's evidence failed to establish conclusively that the company's specific level of risk was comparable to that of the U.S. firms used for comparative purposes. Finally, the evidence does not allow to compare overall differences between the two countries' institutional, economic and financial environments, and their impact on the resulting investment opportunities.

The results of the Concentric Energy Advisors study commissioned by the Ontario Energy Board in 2006 were also mentioned. It refers to, among other things, the fact that the ROEs granted in Ontario and the U.S. have reversed since 1997, when automatic rate of return adjustment formulae based on variations in long-term bond rates were introduced. The study's findings merit further debate in the future by supporters of both positions.

4.1.11 CONCLUSION

Under its enabling legislation, the Régie must determine a reasonable return on the distributor's rate base.

This hearing reviewed a new approach to establishing ROE, the Fama-French model, which

¹¹ Exhibit B-4-Gaz Métro-7, document 8, page 40.

incorporates additional explanatory factors in order to reflect the effects of size and value in calculating the risk premium. The new approach has not been adopted for this decision due to the lack of work or research supporting its use for the purpose of setting the ROE of a regulated company, in either academic or regulatory circles. Rather, the Régie has decided to use the results produced by the Capital Asset Pricing Model (CAPM) as its reference.

This hearing has however highlighted certain issues related to objective application of the CAPM model for determination of a reasonable ROE in the current situation. The Régie indicates in its opinion the nature of these issues, on which more elaborate evidence will be useful in the future. Finally, it sets out its conclusions on application of the CAPM.

Finally, the Régie takes note of the results of the other risk premium models for information purposes.

In view of the result of the CAPM, of the results that application of the automatic adjustment formula in effect since 1999 would have produced, and of the Régie's conclusions respecting the Distributor's higher risk since 1999, the Régie considers it reasonable to set the company's authorized ROE in the upper part of the range produced by the CAPM.

Given the evidence in the record and all the reasons set out above, the Régie sets Gaz Métro's return on equity (ROE) at 9.05% as of October 1, 2007, based on a risk-free rate of 4.78%, amounting to an implicit risk premium of 4.27%.

Further, based on an equity ratio of 38.5% and the cost of debt in the record, the Régie sets the mean cost of capital to be applied to the rate base at 7.68% and the projected cost of capital at 6.69%.

Finally, the Régie renews the automatic ROE adjustment formula, to be in application as of the year 2009, according to the terms and conditions established in Decision D-99-11.