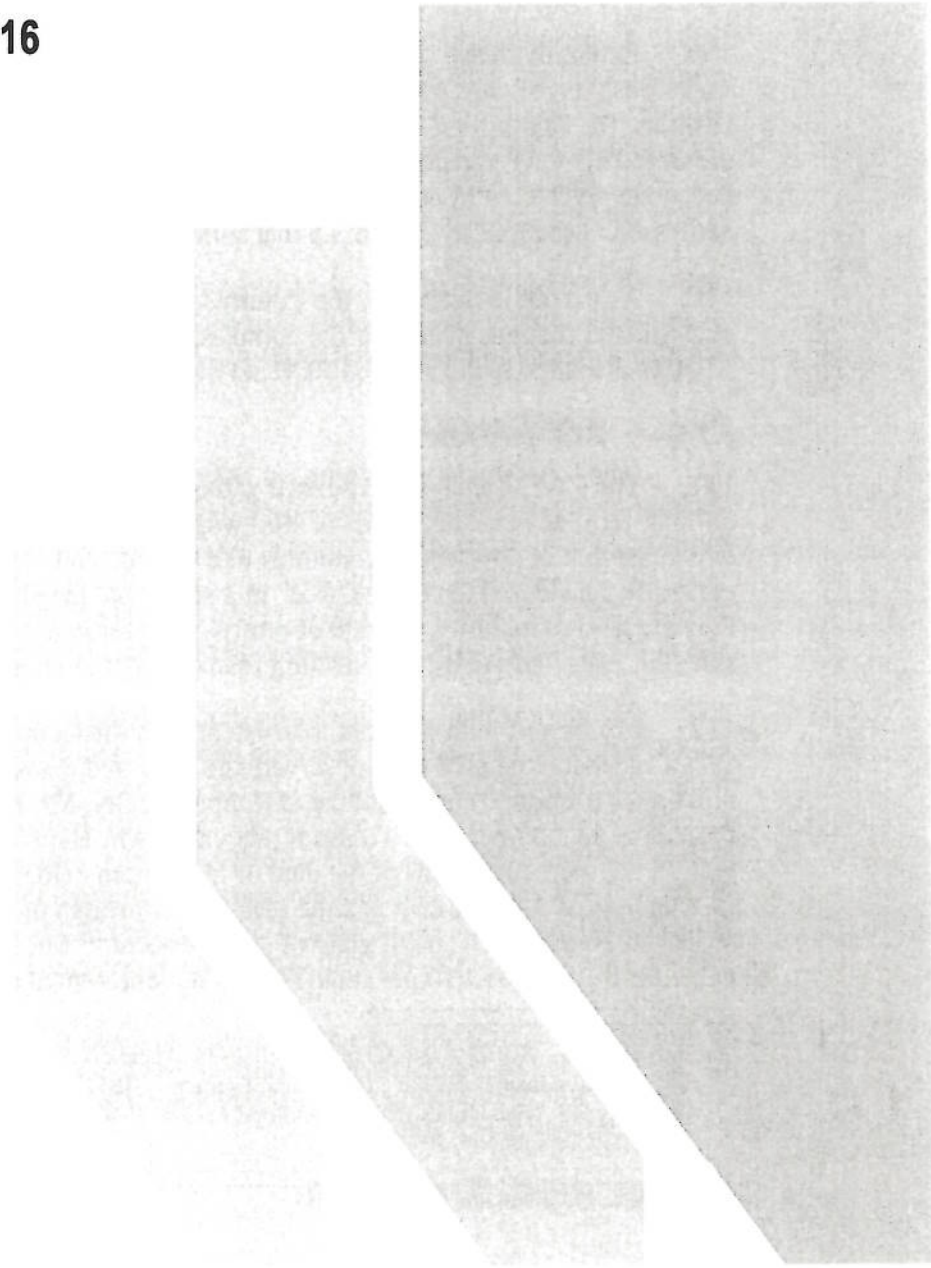




2016 Generic Cost of Capital

October 7, 2016



premium specific to that security or type of security. In other words, the CAPM formally assumes that all securities are priced such that the required return on the security is equal to the risk free rate plus the securities beta risk measure times the difference between the required return on the overall market and the risk-free rate.

108. In general terms, CAPM can be represented by the following formula:

$$R_e = R_f + \beta[E(R_m) - R_f],$$

where:

R_e is the required return on common equity

R_f is the risk-free rate

β, or **beta**, measures the sensitivity of a required return of an individual security to changes in the market return

E(R_m)-R_f is the MERP; i.e., the expected market return E(R_m) minus the risk free rate, R_f

109. Expert evidence supporting various proposed ROEs based on an application of CAPM, or variations thereof, was provided by Mr. Hevert for AltaLink and EPCOR, Dr. Villadsen for the Utilities, Dr. Booth for CAPP, and Dr. Cleary for the UCA. As well, Mr. Thygesen for the CCA presented his CAPM recommendations based on the values approved in previous GCOC decisions. Each CAPM component, and the overall resulting CAPM estimates for ROE, are addressed in sections 6.1.1 to 6.1.5 that follow.

110. As set out in Section 3, the Commission's approach in this area of the decision is to examine the changes in each of the components of the CAPM for purposes of determining whether a change in the allowed ROE set out in the 2013 GCOC decision is required.

6.1.1 Risk-free rate

111. The CAPM analysis requires a value for the risk-free rate. For practical purposes, a yield on long-term government bonds is used widely as a proxy for the risk-free rate. Dr. Villadsen explained that in developed economies like Canada and the U.S., government bonds are generally considered to be "risk-free" in a sense that they have no default risk. However, unless they are held to maturity, the rate of return on government bonds may in fact differ from their stated or expected yields, thus making them subject to interest rate risk.¹²⁷

112. Mr. Hevert indicated that, consistent with the Commission's determinations in the 2013 GCOC decision, he used both observed and expected measures of the long-term government bond rates for both Canada and the U.S. Specifically, Mr. Hevert calculated the risk-free rate for Canada to be 2.59 per cent. To reach this value, Mr. Hevert used the average of two different values: the then-current (as of the date of his written evidence) 30-day average yield on 30-year GOC bonds of 2.14 per cent and the near-term (through the fourth calendar quarter of 2017) projected 30-year GOC bond yield of 3.04 per cent.¹²⁸ Mr. Hevert calculated his risk-free rate value for the U.S. as 3.20 per cent. This value represented an average of the then-current 30-day

¹²⁷ Exhibit 20622-X0105, evidence of Dr. Villadsen, Appendix B, PDF page 18.

¹²⁸ Mr. Hevert indicated that the 3.04 per cent figure was derived based on information included in a publication issued by RBC Economics Research entitled *Financial Markets Monthly*. Mr. Hevert added that this publication was dated December 9, 2015.

average yield on 30-year U.S. treasury bonds of 2.96 per cent and the near-term (through the second calendar quarter of 2017) projected 30-year U.S. treasury bond yield of 3.45 per cent.¹²⁹

113. Mr. Hevert explained that he relied on data through the fourth calendar quarter of 2017 for 30-year GOC bonds and through the second calendar quarter of 2017 for 30-year U.S. treasury bonds because he used two different sources for the forecasts of those bonds. Mr. Hevert further noted that both sources are based on multiple forecasts and in his opinion are representative of the market consensus.¹³⁰

114. Dr. Villadsen expressed the view that current yields on long-term GOC bonds are near historic lows for a variety of circumstances that should not be expected to persist. Therefore, she submitted that long-term GOC bonds are not a good estimate for the risk-free rate that will prevail over the time period relevant to the 2016-2017 time period.¹³¹ Dr. Villadsen relied on a forecast of what GOC bond yields will be at the end of 2016.¹³² Specifically, Dr. Villadsen relied on the December 2015 Consensus Forecasts report issued by Consensus Economics, which predicted that the yield on a 10-year GOC bond will be 2.2 per cent at the end of 2016. Because consensus forecasts reports do not provide any projections for the long-term GOC bond yields, Dr. Villadsen then adjusted this value upward by 40 bps, which was her estimate of the representative maturity premium for the 30-year over the 10-year GOC bond over the 1990-2015 period. This resulted in a lower bound of her risk-free rate recommendation of 2.6 per cent.

115. Dr. Villadsen also considered a scenario in which the risk-free rate was 3.4 per cent¹³³ to account for her observation that “current and near-term expected levels of government bond yields are artificially depressed due to global monetary policy.”¹³⁴ This upper bound risk-free rate recommendation was based on the application of an 80 bps adjustment to her lower bound estimate to reflect the “downward pressure on the government bond yield or an increase in the MERP.”¹³⁵ Dr. Villadsen considered the proposed 80 bps adjustment to be conservative based on her observation of the currently prevailing elevated spreads between utility and government bond yields relative to the historical norm (i.e., the pre-crisis period of 2002-2007).¹³⁶ Dr. Villadsen also indicated that this upper bound risk-free estimate is consistent with the December 2015 Consensus Forecasts report issued by Consensus Economics, which predicted 10-year GOC bond yields to increase to 3.5 per cent by 2018.

116. Dr. Booth based his risk-free estimates on the RBC Economics Research publication titled “Financial Markets Monthly,” dated March 11, 2016. Specifically, for 2016, Dr. Booth estimated a 30-year GOC bond yield of 2.30 per cent, calculated as the average of the forecasts for each of the four quarterly periods of 2016. In a similar vein, and using the same reference material, by averaging the forecasts for each of the four quarterly periods for 2017, Dr. Booth’s risk-free estimate for 2017 was 3.14 per cent. Dr. Booth observed that the March 7, 2016

¹²⁹ Mr. Hevert indicated that the 3.45 per cent figure was derived from information obtained from Blue Chip Financial Forecasts, dated December 1, 2015. In Exhibit 20622-X0215, in response to AML/EDTI-AUC-2016FEB18-005(b) and (d), PDF page 57, Mr. Hevert indicated that the correct date was January 1, 2016.

¹³⁰ Exhibit 20622-X0215, response to AML/EDTI-AUC-2016FEB18-005(a) and (b), PDF pages 56-57.

¹³¹ Exhibit 20622-X0105, evidence of Dr. Villadsen, Appendix B, PDF page 19.

¹³² Transcript, Volume 4, page 588, lines 2-9.

¹³³ Exhibit 20622-X0104, evidence of Dr. Villadsen, PDF page 45.

¹³⁴ Exhibit 20622-X0104, evidence of Dr. Villadsen, PDF page 22.

¹³⁵ Exhibit 20622-X0104, evidence of Dr. Villadsen, PDF page 45.

¹³⁶ Exhibit 20622-X0104, evidence of Dr. Villadsen, PDF page 45. Exhibit 20622-X0105, evidence of Dr. Villadsen, Appendix B, PDF page 20.

Consensus Forecasts report issued by Consensus Economics, generally supports the RBC Economics Research forecast material.¹³⁷

117. While Dr. Booth was prepared to use these estimates for his CAPM model, he noted that under current conditions in the Canadian bond market, the underlying assumption behind the CAPM model that the risk-free bond yield plus a risk premium is a representative opportunity cost for an equity investor does not hold. To account for this, Dr. Booth proposed making an adjustment to the CAPM model for the “the abnormally low Canada bond yields resulting from rampant bond buying programs by central banks.”¹³⁸ Dr. Booth referred to this as an “operation twist” adjustment, meaning that major central banks around the world are flattening or twisting the shape of the yield curve, trying to get long-term rates down via QE programs.¹³⁹ Dr. Booth calculated this adjustment to be 80 bps, representing the difference in yields between the long-term GOC bonds and the U.S. bonds as of the first quarter of 2016.¹⁴⁰

118. Dr. Cleary rounded up the actual prevailing 30-year GOC bond yield as of February 2016 of 1.94 per cent to two per cent and used it as his lower bound of the risk-free rate estimate. By adding a long-term average spread between 10-year and 30-year GOC bond yields of 50 bps to the January 2016 Consensus Forecasts report forecast for 10-year GOC bond yields of 2.1 per cent for January 2017, Dr. Cleary obtained an upper limit of 2.6 per cent for his risk-free rate estimate.¹⁴¹

119. In his evidence for the CCA, Mr. Thygesen expressed his view that the 10-year GOC bond yield forecasts included in the consensus forecasts reports “should be viewed at best as an upper limit to where the 10-year Canada bond will be.”¹⁴² Mr. Thygesen presented a table comparing the 10-year GOC bond yield forecasts included in various consensus forecasts reports to actual 10-year GOC bond yields for selected months in the 2010-2015 period. Mr. Thygesen stated that this analysis demonstrates that the forecasts included in the consensus forecasts reports have only under-forecast the actual 10-year GOC bond yield rates once.¹⁴³

120. As an alternative to using information from the consensus forecasts reports, Mr. Thygesen proposed using the forward curve rates for the 30-year GOC bond yield. Based on his view that the forecasts included in the consensus forecasts reports consistently over-forecast the 10-year GOC bond yields, a review of historical forward curve rates demonstrates that they were both above and below the actual rate on the date forecast. Based on this review, Mr. Thygesen submitted that forward curve rates do not seem to have the same systematic bias that the forecasts included in the consensus forecasts reports have.

121. In support of his view that the forward curve rates may be less biased, Mr. Thygesen referenced the following material provided by Mr. Buttke during the interrogatory process:

Futures prices are a current indicator of future prices (excluding some costs noted above).
Economic forecasts are harder to characterize because, despite being forward-looking,

¹³⁷ Exhibit 20622-X0242, evidence of Dr. Booth, PDF page 25.

¹³⁸ Exhibit 20622-X0242, evidence of Dr. Booth, PDF pages 57-58.

¹³⁹ Transcript, Volume 7, page 1052, lines 9-14.

¹⁴⁰ Exhibit 20622-X0242, evidence of Dr. Booth, PDF page 89.

¹⁴¹ Exhibit 20622-X0306, evidence of Dr. Cleary, PDF page 37.

¹⁴² Exhibit 20622-X0343, evidence of Mr. Thygesen, PDF page 5.

¹⁴³ Exhibit 20622-X0413, response to CCA-AUC-2016APR28-001, PDF page 1.

they are sometimes viewed as a lagging indicator, since by definition they are revised only periodically, not every day based on new data.¹⁴⁴

122. In addition, Mr. Thygesen pointed to the following determinations made by the Commission in Decision 3539-D01-2015:¹⁴⁵

836. The Commission is of the view that the *Consensus Forecast* is unrelated to market transactions, while forward curves reflect actual market transactions. Accordingly, the Commission accepts the forward curve as a reasonable indicator of interest rates during the test period.¹⁴⁶

123. In light of the above, Mr. Thygesen contended that a forecast risk-free rate implied by forward curve rates “is helpful as it adds another data point to cross check against the *Consensus Forecasts* and assist in determining the risk-free rate.”¹⁴⁷ In a similar vein, with reference to forward curves, Dr. Booth stated that “the market is usually a better forecaster than economists.”¹⁴⁸

124. In this regard, Mr. Thygesen noted the forecast figure of 1.5 per cent for the 10-year GOC bond yield for May 2016 included in the *Consensus Forecasts* report from February 2016. Adding a 50-60 bps term spread to estimate the 30-year GOC bond yield resulted in a risk-free rate of 2.0 to 2.1 per cent. Given that this estimate was “at or slightly above the Forward Curve rate of 1.94–1.97% for 2016,” Mr. Thygesen stated that a rate of 2.0 per cent appeared to be a reasonable upper limit for the 2016 risk-free rate.¹⁴⁹

125. For the 2017 forecast, Mr. Thygesen noted the forecast figure of 1.9 per cent for the 10-year GOC bond yield for May 2017 included in the *Consensus Forecasts* report from February 2016. Adding a 50 to 60 bps term spread to estimate the 30-year GOC bond yield resulted in a risk-free rate of 2.4 to 2.5 per cent. However, this rate was “substantially above the Forward Curve rate of 2.01-2.04% for 2017.”¹⁵⁰ According to Mr. Thygesen, given the “historical over-statement and the *Consensus Forecast* bias, more weight should be put on the forward curve rate of 2.01-2.04 [per cent] for 2017.” Therefore, Mr. Thygesen recommended a risk-free rate of 2.1 per cent for 2017.¹⁵¹

126. Dr. Villadsen did not agree with Mr. Thygesen’s view that the consensus forecasts reports exhibit a consistent systematic upward bias. As she explained:

While Mr. Thygesen relies on a narrow sample to assert that *Consensus Forecasts* consistently over-predicts actual government bond yields, academic analyses of economic forecasts of government bond yields more generally have found that any “bias” in forecasts is not consistently upward or downward, but rather towards the status quo. In other words, economic forecasters place too much weight on yields prevailing at the time they are predicting future yields. Under the “status quo bias” hypothesis, forecasts will

¹⁴⁴ Exhibit 20622-X0343, evidence of Mr. Thygesen, PDF page 6.

¹⁴⁵ Decision 3539-D01-2015: EPCOR Distribution & Transmission Inc. 2015-2017 Transmission Facility Owner Tariff, Proceeding 3539, Application 1611027-1, October 21, 2015.

¹⁴⁶ Decision 3539-D01-2015, paragraph 836.

¹⁴⁷ Exhibit 20622-X0343, evidence of Mr. Thygesen, PDF page 7.

¹⁴⁸ Exhibit 20622-X0396, response to CAPP-AUC-2016APR12-002(d), PDF pages 6-7.

¹⁴⁹ Exhibit 20622-X0343, evidence of Mr. Thygesen, PDF page 7.

¹⁵⁰ Exhibit 20622-X0343, evidence of Mr. Thygesen, PDF pages 7-8.

¹⁵¹ Exhibit 20622-X0343, evidence of Mr. Thygesen, PDF page 9.

tend to over-predict actual yields when yields are decreasing (as they have done recently) and under-predict yields when yields are increasing.¹⁵²

127. As such, Dr. Villadsen indicated that Mr. Thygesen's results only show consistent over-prediction on the part of the consensus forecasts reports as an artifact of the period he chose: one in which interest rates declined steadily (and at times steeply) following the onset of the crisis.¹⁵³ A similar view was expressed by Mr. Hevert.¹⁵⁴

128. In addition, Dr. Villadsen did not agree with Mr. Thygesen and Dr. Booth that forward interest rates are better predictors of future bond yields than economic forecasts. She pointed out that it is impossible to draw statistically meaningful conclusions based on Mr. Thygesen's sample of three data points, especially when they all relate to the same "actual" date. Dr. Villadsen referenced an academic paper that found that "the accuracy of the six month-ahead futures and survey forecasts is comparable;" however, in her view, this conclusion did not hold for the forward interest rates because of the time-varying premium in the forward rate.¹⁵⁵

129. In a similar vein, Mr. Hevert pointed out that, while forward yields have been quite volatile, they have consistently indicated expectations for interest rate increases.¹⁵⁶ Mr. Hevert also noted that the implied forward curve yields are certainly known and considered by the professionals that contribute to consensus-type long-term bond yield projections¹⁵⁷ and as such, it can be assumed that they are reflected in economists' projections.¹⁵⁸

130. The CCA noted that the affected utilities did not explain why it is appropriate to use forward curves in currency and energy markets, but not for interest rates.¹⁵⁹ In support of their submission, the CCA pointed out that Mr. Hevert did not object to looking at the forward curve; Mr. Buttke relied on forward curves in his evidence; and Dr. Carpenter used forward curves when examining other markets.

Commission findings

131. In the 2013 GCOC decision, the Commission considered a reasonable risk-free rate to be in the range of 2.8 to 3.7 per cent. As noted in Section 4 of this decision, rather than increasing as predicted in the last proceeding, yields on 30-year GOC bonds fell another 100 bps, from approximately 3.0 per cent to some 2.0 per cent. Dr. Booth attributed falling interest rates to the monetary policies of central banks and increased foreign ownership in Canadian government bonds in a "search for yield." All experts generally agreed that when economic conditions improve, more central banks will likely move away from accommodative monetary policies, with the effect that interest rates are expected to rise.

132. Experts in this proceeding have formed an expectation, supported by consensus forecasts reports, that interest rates are likely to rise by the end of the 2016-2017 period. Although this expectation is consistent with the evidence discussed in Section 4, that economic forecasts point

¹⁵² Exhibit 20622-X0457, rebuttal evidence of Dr. Villadsen, PDF pages 8-9.

¹⁵³ Exhibit 20622-X0457, rebuttal evidence of Dr. Villadsen, PDF page 12.

¹⁵⁴ Exhibit 20622-X0443, rebuttal evidence of Mr. Hevert, PDF page 15.

¹⁵⁵ Exhibit 20622-X0457, rebuttal evidence of Dr. Villadsen, PDF pages 12-13.

¹⁵⁶ Exhibit 20622-X0443, rebuttal evidence of Mr. Hevert, PDF page 16.

¹⁵⁷ Such as the consensus forecasts reports.

¹⁵⁸ Exhibit 20622-X0443, rebuttal evidence of Mr. Hevert, PDF page 18.

¹⁵⁹ Transcript, Volume 12, pages 2072-2073.

to recovery in the Canadian economy by the end of 2017, experts differed on the speed and magnitude of any interest rate increase in the short term.

133. Based on the foregoing, the Commission notes that although the prevailing risk-free interest rate is lower than at the time of the 2013 GCOC decision, general expectations are that interest rates will rise during the 2016-2017 period. Uncertainty remains, however, regarding the speed and magnitude of the expected interest rate increases.

6.1.2 Market equity risk premium

134. The next element of the CAPM analysis to be addressed is the MERP. The MERP value is not directly observable but can be estimated as the difference between estimates for the expected market return and the value used for the risk-free rate. The experts in this proceeding varied in their views of what MERP value to use for the 2016-2017 period.

135. Dr. Booth recommended a MERP value between 5.0 and 6.0 per cent based on two considerations. First, this range was drawn from historic Canadian and U.S. market data spanning a period of approximately 100 years.¹⁶⁰ Second, Dr. Booth gave weight to survey results by Professor Fernandez, “who annually surveys thousands of academics, financial analysts and corporate executives making investment decisions.”¹⁶¹ Dr. Booth referenced the results of Professor Fernandez’s 2015 survey,¹⁶² which estimated the MERP in Canada to be around 6.0 per cent, while the U.S. MERP was estimated at approximately 5.5 per cent. According to Dr. Booth, this survey demonstrated “an obvious 5.0-6.0% grouping” of MERP values for the 41 developed countries surveyed, which included Canada.¹⁶³

136. Dr. Cleary also took note of survey results by Professor Fernandez. Based on an independent research publication,¹⁶⁴ Dr. Cleary indicated that the long-term MERP for U.S. and Canadian markets averaged 6.4 per cent and 5.3 per cent, respectively, over the 1900 to 2010 period. Dr. Cleary pointed out that these long-term MERP values were consistent with the 2011-2013 MERP results from the 2013 survey by Professor Fernandez,¹⁶⁵ which were in the 5.5 to 6.0 range for Canada and the U.S.¹⁶⁶ Dr. Cleary ultimately recommended a MERP of 6.0 per cent for the following reasons:

Based on the previous discussion of capital markets, I concluded that stock markets reflect fairly normal conditions, but are experiencing slightly more volatility than at the time of the 2013 Hearings. Therefore, I will use an [MERP] of 6%, which is at the upper bound of the commonly used 4-6% range, 70 basis points above the long-term average of 5.3%. This seems appropriate in today’s environment, where economic and market conditions are fairly normal in terms of valuation metrics like P/E [price/earnings] ratios and dividend yield measures. This is consistent with the practice of using 6 percent when market uncertainty is above average, using 5 percent when markets are normal, and using

¹⁶⁰ Exhibit 20622-X0242, evidence of Dr. Booth, PDF pages 46-47.

¹⁶¹ Exhibit 20622-X0242, evidence of Dr. Booth, PDF page 47.

¹⁶² *Market Risk Premium and Risk-Free Rate Used for 41 countries in 2015*, IESE Business School, November 19, 2015.

¹⁶³ Exhibit 20622-X0242, evidence of Dr. Booth, PDF page 48.

¹⁶⁴ Dimson, Elroy, Marsh, Paul, and Staunton, Mike, *Equity Premiums Around the World*, in *Rethinking the Equity Risk Premium* (Research Foundation of the CFA Institute, December 2011).

¹⁶⁵ *Market Risk Premium and Risk Free Rate used for 51 countries in 2013: a survey with 6,237 answers*, 2013, by Pablo Fernandez, Javier Aguirreamalloa, and Pablo Linares, Working Paper, IESE Business School.

¹⁶⁶ Exhibit 20622-X0306, evidence of Dr. Cleary, PDF pages 37-38.

