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Educational Note

Accounting Discount Rate Assumption for Pension and Post-employment Benefit Plans

Task Force on Pension and Post-retirement Benefit Accounting Discount Rates

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Members should be familiar with Educational Notes. Educational Notes describe but do not recommend practice in illustrative situations. They do not constitute Standards of Practice and are, therefore, not binding. They are, however, intended to illustrate the application (but not necessarily the only application) of the Standards of Practice, so there should be no conflict between them. They are intended to assist actuaries in applying Standards of Practice in respect of specific matters. Responsibility for the manner of application of Standards of Practice in specific circumstances remains that of the members in the pension practice area.

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Memorandum

To: All Pension Actuaries

From: Phil Rivard, Chair
Practice Council

Gavin Benjamin, Chair
Task Force on Pension and Post-retirement Benefit Accounting Discount Rates

Date: September 20, 2011

Subject: **Educational Note – Accounting Discount Rate Assumption for Pension and Post-employment Benefit Plans**

This Educational Note offers advice to pension actuaries who are engaged to provide guidance to a pension plan sponsor on the selection of the discount rate for a Canadian pension plan under Canadian, U.S., or international accounting standards.

This Educational Note has been prepared by the Task Force on Pension and Post-retirement Benefit Accounting Discount Rates ("the Task Force") which was appointed by the Practice Council. Members of the Task Force consist of certain members of the Committee on Pension Plan Financial Reporting (PPFRC), members of the Canadian Institute of Actuaries ("the Institute") who were not members of the PPFRC, and individuals who are not members of the Institute. The Practice Council wishes to express its gratitude to all the Task Force members, who are listed below. (*Not a member of the Institute.)

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In accordance with the Institute's Policy on Due Process for the Approval of Guidance Material other than Standards of Practice, this Educational Note has been prepared by the Task Force and has received final approval for distribution by the Practice Council on September 13, 2011.

As outlined in subsection 1220 of the Standards of Practice, "*The actuary should be familiar with relevant Educational Notes and other designated educational material*." That subsection explains further that a "practice which the Educational Notes describe for a situation is not necessarily the only accepted practice for that situation and is not necessarily accepted actuarial practice for a different situation." As well, "Educational Notes are intended to illustrate the application (but not necessarily the only application) of the standards, so there should be no conflict between them."

If you have any questions or comments regarding this Educational Note, please contact Gavin Benjamin at his CIA Online Directory address, gavin.benjamin@towerswatson.com.

1. INTRODUCTION

This Educational Note has been prepared by the Task Force on Pension and Post-retirement Benefit Accounting Discount Rates ("the Task Force") which was appointed by the Practice Council.

When preparing pension-related information for their financial statements, pension plan sponsors are responsible for the selection of the assumptions used to value the plan liabilities. One of the most material assumptions that plan sponsors must select is the discount rate assumption (i.e., the assumption used to discount the projected pension plan cash flows to the accounting measurement date). Plan sponsors often engage actuaries to provide guidance on the selection of pension accounting assumptions. The purpose of this Educational Note is to highlight some of the considerations of which an actuary ought to be mindful when engaged to provide guidance to a plan sponsor on the selection of the discount rate for a Canadian pension plan under accounting standards. In addition, the Educational Note describes a methodology to extrapolate the long end of the high-quality corporate yield curve that the Task Force believes would be appropriate in the current economic environment.

More specifically, this Educational Note provides guidance for the selection of the discount rate for a Canadian defined benefit pension plan under the requirements of section 3461 of part II[1] and part V of the *Handbook* of the Canadian Institute of Chartered Accountants, codification 715.30.35-43 and 44 of the U.S. accounting standards, and section 19 of the International Accounting Standards (referred to collectively in this Educational Note as "Accounting Standards"). The guidance contained in this Educational Note may not be appropriate for the selection of discount rates in accordance with other accounting requirements. In such case, the actuary would use his or her judgment to determine whether the guidance contained in this Educational Note applies.

The guidance contained in this Educational Note would also be appropriate for post-employment benefits other than pensions that are accounted for in accordance with the Accounting Standards.

2. REQUIREMENTS OF ACCOUNTING STANDARDS

Accounting Standards generally require that, for an ongoing pension plan, the discount rate be selected by reference to market yields at the accounting measurement date of high-quality corporate[2] debt instruments with cash flows that match the timing and amount of expected benefit payments.

This definition can leave room for a wide range of different interpretations on issues such as:

what "high quality" means,

which debt instruments are to be included, and

how to address the lack of suitable debt instruments at certain maturities.

[1] Under the deferral and amortization approach.

[2] Note that U.S. accounting standards do not specifically refer to corporate bonds, but this category of debt instruments has been widely used in setting discount rates in practice.

On the first issue, it is understood that "high quality" in Canada has generally been interpreted as referring to market yields on corporate bonds rated Aa or higher, as is the practice in most other countries where Accounting Standards also apply. It is worth noting that in the U.S., the Securities Exchange Commission has provided an interpretation under U.S. accounting standards that "high quality" means the two highest credit ratings given by a recognized ratings agency (e.g., a fixed income security that receives a rating of Aa or higher from Moody's Investors Service). An excerpt from that interpretation is provided in appendix A.

It is worth noting that at the time of preparation of this Educational Note, there were no Aaa-rated corporate bonds denominated in Canadian dollars with long maturities. As a practical matter, the rest of this Educational Note references Aa-rated corporate bonds as being representative of "high quality" bonds in Canada. An actuary may consider including Aaa-rated corporate bonds as "high quality" bonds in the analysis if they become available.

The second and third issues are discussed in the sections that follow.

Appendix B to this Educational Note contains a summary of the key elements of the Accounting Standards that are relevant to the selection of the discount rate.

3. INSUFFICIENT HIGH-QUALITY CORPORATE BONDS WITH LONG MATURITIES IN CANADA

Given the long-term nature of pension plan obligations, the yields that matter most for purposes of selecting the discount rate for a pension plan are often the yields for debt instruments with long terms to maturity (e.g., maturities of 15 years and above). While there is a deep market of Aa-rated corporate bonds denominated in Canadian dollars with short and medium terms to maturity, there are few Aa-rated corporate bonds with terms to maturity beyond 15 years. For example, based on one data source which is considered representative of the Canadian market, at March 31, 2011 there were five Aa-rated corporate bonds with maturities beyond 10 years that had a market capitalization of at least $100 million, only one of which had a maturity beyond 20 years.

In light of such scarcity in Aa-rated corporate bonds with long maturities, actuaries would consider the fact that yield curves developed from such a small pool of bonds may require a significant amount of subjectivity and may also lead to a lack of credibility in the outcome which could be heavily influenced by only a handful of issuers of long corporate bonds. Therefore, in preparing this Educational Note, various possibilities for improving the information used in the construction of the yield curve were reviewed.

4. APPROACH FOR SELECTING THE DISCOUNT RATE

When engaged to provide guidance on the selection of the discount rate assumptions, a reasonable approach commonly used by actuaries would consist of,

> developing a yield curve based on Aa-rated corporate bond data or alternatively obtaining such a curve from a third party provider. When developing the curve (or analyzing the curve provided by a third party), it is important that the actuary understand the underlying data, methods and assumptions that were used in constructing the curve, in particular with respect to extrapolating the long end of the yield curve.

converting the yields on the curve described in the immediately preceding step into spot rates (i.e., yields on zero coupon bonds). This is done because the yield at any point on the curve described in the immediately preceding step represents a blend of the yields on the semi-annual coupons and the yield on the principal that is repaid at the time the bond matures. The appropriate yields to reference in order to discount the projected stream of pension benefit payments would be yields on zero coupon bonds. Pension actuaries would be familiar with the difference between yield and spot curves.

calculating the present value of the pension plan's expected benefit payments using the spot rates developed in the immediately preceding step.

the actuary recommending the discount rate assumption that would be the unique discount rate that, when applied to the plan's expected benefit payments, provides for an equivalent present value as calculated in the immediately preceding step.

5. CONSIDERATIONS WHEN DEVELOPING AA-RATED CORPORATE YIELD CURVE

The following are some factors the actuary would consider when assessing the appropriateness of an Aa-rated corporate yield curve developed for accounting discount rate purposes, as described in the first step of section 4 above.

A. The approach used to extrapolate the long end of the yield curve, given the scarcity of Aa-rated corporate bonds with long maturities.

   Due to the long-term nature of pension obligations, the long end is often the portion of the yield curve that matters most for purposes of establishing the discount rate. A detailed discussion on extrapolating the long end of the yield curve is contained in sections 6 and 8 and in appendix C.

B. The characteristics of the bonds that have been included in the universe used to develop the yield curve.

   It may be appropriate to consider excluding bonds with an outstanding market value below a certain threshold (e.g., $100 million) because bonds with smaller market values tend to be traded less frequently than bonds with larger market values and, thus, their pricing may be considered less reliable.

   The actuary would consider excluding any bonds with characteristics that render the bond inappropriate for purposes of matching the timing and amount of expected payments from a pension plan. For example, the actuary would consider excluding bonds with one or more of the following features: callable (unless the call option includes a make-whole provision or the actuary is comfortable that the call option does not have a material effect on the bond price), putable, convertible, sinkable, extendable, perpetual, variable coupon, and inflation linked. At the time of preparation of this Educational Note, there are few corporate bonds denominated in Canadian dollars with characteristics that render them inappropriate for matching the timing and amount of expected benefit payments from a pension plan.

   The actuary would determine whether debt instruments such as private placements have been included in the universe. For a private placement, the

robustness of its pricing would be a key consideration in determining whether to include it or not.

The actuary would consider whether it is appropriate for bonds issued by government agencies or quasi-government entities, such as energy utilities, airport authorities or universities, to be considered corporate bonds. If so, they would be eligible for inclusion in the universe used to develop the yield curve. Alternatively, if they are not considered corporate bonds, they could be included when extrapolating the long end of the yield curve subject to further adjustments to reflect Aa-rated corporate risk.

The actuary would consider whether to include outlier bonds (i.e., bonds with very high or very low relative yields). If the actuary decides to exclude outlier bonds, the actuary would consider the yield thresholds beyond which a bond would be classified as an outlier. A possible rationale for excluding outlier bonds could be that very high or low relative yields may indicate unusual characteristics of the bonds, market concerns about the strength of the bond issuer or the credit rating of these bonds, or may suggest an issue with the reliability of the pricing. On the other hand, a possible rationale for including outlier bonds could be that the classification of a bond as an outlier is subjective and the actuary often does not have sufficient knowledge to second-guess the bond ratings or the yield information provided by the bond data source.

Different ratings agencies may assign different ratings to a particular bond. For example, one ratings agency may rate a bond as Aa while another ratings agency may rate the same bond as A. The actuary would consider which ratings agency/agencies have been relied upon for purposes of selecting the bonds used to develop the yield curve and whether the choice of the ratings agency/agencies could materially affect the resulting discount rate.

C. During periods of financial market volatility, the actuary would consider the following matters with respect to the appropriateness of the bond yield information used to develop the yield curve.

If a bond has not been traded recently, the yield information provided for the bond is often based on the yields of similar bonds that were recently traded. During periods of financial market volatility, this approach for estimating the yield may become less reliable.

During periods of financial market volatility, the spread between the bid and ask yields may increase. The actuary would consider whether to use the bid yields, ask yields, or something in between the two (e.g., the average of the bid and ask yields).

The actuary would consider whether the yield information is dominated by either new issues or secondary sales. Bond issuers will often offer a new issue concession (i.e., higher yield) relative to the yield on the secondary sale of the same bond. While new issue concessions are not normally significant, they can increase significantly and become material during periods of financial market volatility.

The above information may not be readily available from the bond information the actuary normally receives. In that case, the actuary would generally question the data provider to understand how these issues are reflected in the data provided.

D. The actuary would consider the manner in which bond yields are weighted when developing the yield curve.

One approach is to weight each bond by its market capitalization. However, the actuary would consider whether a few bonds with large relative market capitalizations are having undue influence on the resulting discount rate.

A second approach is to weight each bond equally. However, the actuary would consider whether a large number of bonds with small relative market capitalizations are having undue influence on the resulting discount rate.

A third approach is to use weightings which are between the two approaches above.

E. Fitting a yield curve to the available bond yield data requires judgment and the use of methodologies (e.g., a regression technique). The actuary would consider whether appropriate judgment is being applied, especially at the long end of the curve where bond yield information may be scarce.

6. EXTRAPOLATING THE LONG END OF THE YIELD CURVE: APPROACHES CONSIDERED

A number of approaches for extrapolating the long end of the yield curve have been assessed, given the scarcity of corporate bonds rated Aa and above with maturities beyond 10 years. The underlying objective of all the approaches that were examined is to increase the number of relevant data points used to extrapolate the long end of the yield curve, thereby avoiding reliance on too few data points.

The following approaches to extrapolate the long end of the yield curve have been considered and analyzed in detail.

A. For maturities greater than 10 years, supplement the Aa-rated corporate bonds with A-rated corporate bonds with or without a spread adjustment to reflect the additional credit risk of A-rated bonds (both approaches were analyzed).

B. For maturities greater than 10 years, supplement the Aa-rated corporate bonds denominated in Canadian dollars with Aa-rated corporate bonds denominated in U.S. dollars that are further translated into Canadian dollars.

C. For maturities greater than 10 years, use Canadian provincial bonds rated Aa to which a spread adjustment is added to reflect the additional credit risk of Aa-rated corporate bonds.

Further details and commentary regarding each of the above approaches are provided below.

A. For maturities greater than 10 years, supplement the Aa-rated corporate bonds with A-rated corporate bonds, with or without a spread adjustment to reflect the additional credit risk of A-rated bonds.

In order to increase the number of data points used to extrapolate the long end of the yield curve, the Aa-rated corporate bonds used to develop the long end of the yield curve are supplemented with A-rated corporate bonds.

The addition of A-rated corporate bonds adds a significant number of data points at longer maturities. For example, at March 31, 2011, based on one data source which is considered representative of the Canadian market, there were 105 A-rated corporate bonds with maturities beyond 10 years that had a market capitalization of at least $100 million, 67 of which had maturities beyond 20 years.

A-rated bonds are generally considered upper-medium grade (compared to high grade for Aa-rated bonds) and the issuers of such bonds are generally seen as having a strong capacity to meet their financial commitments (compared to a very strong capacity for Aa-rated bond issuers) and the market would generally assign wider credit spreads for A-rated versus Aa-rated bonds of similar duration/maturity in the same sector. Therefore, a spread adjustment may be subtracted from the yields on A-rated corporate bonds when extrapolating the long end of the yield curve.

B. For maturities greater than 10 years, supplement the Aa-rated corporate bonds denominated in Canadian dollars with Aa-rated corporate bonds denominated in U.S. dollars that are further translated into Canadian dollars.

   This approach is based on the premise that Canadian pension plans have access to deep international high-quality corporate bond markets, whose cash flows could be used to match the timing and amount of expected benefit payments from a Canadian pension plan. Under this approach, Aa-rated corporate bonds denominated in Canadian dollars are supplemented with Aa-rated corporate bonds denominated in U.S. dollars with maturities greater than 10 years in order to increase the number of data points used to establish the long end of the yield curve.

   This approach adds a significant number of data points at longer maturities. For example, at March 31, 2011, based on one data source which is considered representative of the U.S. market, there were 117 Aa-rated corporate bonds denominated in U.S. dollars with maturities beyond 10 years that had a market capitalization of at least $100 million, 81 of which had maturities beyond 20 years.

   For the U.S. bonds, the U.S. dollar yields would be translated into Canadian dollar yields using market data on swap rates.

   This approach is included in the initial analysis of the different approaches that is summarized in appendix C. Although this approach appears to be attractive because of the deepness of the U.S. bond market, it is understood that it may not be considered permissible under current Accounting Standards due to the underlying data being denominated in a currency other than Canadian dollars. Therefore, Approach B was not retained as a viable option by the Task Force.

C. For maturities greater than 10 years, use Canadian provincial bonds rated Aa to which a spread adjustment is added to reflect the additional credit risk of Aa-rated corporate bonds.

   This approach takes advantage of the fact that the market for high-quality Canadian provincial bonds is deep across the entire yield curve. For example, at March 31, 2011, based on one data source which is considered representative of the Canadian market, there were 71 Aa-rated provincial bonds with maturities beyond 10 years that had a market capitalization of at least $100 million, 42 of which had maturities beyond 20 years.

   For purposes of developing the yield curve, Aa-rated corporate bonds are used for maturities up to 10 years since the market is sufficiently deep at these maturities. For maturities greater than 10 years, the yield curve is extrapolated using Aa-rated Canadian provincial bonds. In order to reflect the difference in credit risk between Aa-rated corporate bonds and Aa-rated provincial bonds, a spread adjustment is added to the provincial bond yields.

7. FEEDBACK ON EXTRAPOLATION APPROACHES

In order to increase the likelihood that this guidance will be acceptable to auditors, feedback was requested from the Canadian audit firms' Technical Partners Committee (TPC) on Approaches A and C for extrapolating the yield curves that are described in section 6. While guidance from the TPC is not binding on Canadian auditors, it is understood that TPC guidance provides a strong indication of the approaches and methods that will likely be acceptable to Canadian auditors.

After considering the information provided, the TPC indicated that they have a preference for Approach C, since they view the methodology for extrapolating the Aa-rated corporate yield curve beyond 10 years to be reasonable. Also, in their view, this approach is most consistent with Canadian accounting standards as it is somewhat consistent with question and answer 41R of the CICA's *Employee Future Benefits Implementation Guide*. (Question and answer 41R is reproduced in appendix B.) In addition, Approach C is not based on bonds rated below Aa, which is a characteristic of Approach A.

Based on the Task Force's analysis and the guidance provided by the TPC, it was concluded that Approach C is an appropriate approach for extrapolating the yield curve in accordance with current Accounting Standards.

8. DERIVING THE SPREAD ADJUSTMENT TO ACCOUNT FOR THE CREDIT RISK OF AA-RATED CORPORATE BONDS

In order to implement Approach C, a methodology is needed for deriving an appropriate spread adjustment to the Aa-rated Canadian provincial bond yields to account for the additional credit risk of Aa-rated corporate bonds.

Deriving an appropriate spread adjustment under Approach C to translate Canadian provincial Aa bond yields into Canadian corporate Aa bond yields for bonds with maturities in excess of 10 years requires judgment. It is recognized that there are different ways to calculate such spread, but herein is suggested a methodology that is believed to be reasonable while not overly complex.

The suggested methodology can be described as follows:

A base spread, denominated $Spread^{base}$, would be calculated first. This base spread would be measured in a portion of the universe where there are sufficient data to derive a credible spread. For example, it may be reasonable to use the average spread between Aa-rated corporate and Aa-rated provincial bond yields with terms between five and 10 years.

It is recognized that there may be an additional spread between Aa-rated corporate bonds and Aa-rated provincial bonds at longer maturities, but such additional spread is difficult to measure (due to lack of data) and is thought to be usually relatively small. A study was done over the period from June 2004 to December 2009, which compared the spread between Aa-rated corporate bonds and Aa-rated provincial bonds at different maturities. The provincial bonds were comprised of an equal blend of issues from Québec and Ontario. Based on the study, the additional spread at terms from 21 to 30 years relative to the spread at terms from six to 10 years was, on average, 0.11% over the period, but ranged from 0% to 0.57% with the following exception. At December 31, 2008, which was at the height of the financial crisis, the additional spread was negative (-0.63%).

It is believed that most of the increase in spreads in corporate Aa yields above "risk-free" yields (i.e., above yields on securities issued by the Government of Canada) expected as the maturity of a bond increases is typically already reflected in the pricing of Aa-rated provincial bonds. Initially, it was suggested that, typically, no such additional spread need be assumed. However, following comments from various parties arguing for the use of as much as possible of the available data at long maturities, even if the data are scarce, it was concluded that it would be appropriate to suggest making an allowance for the additional spread at maturities beyond 10 years. One possible methodology for making this additional allowance would be to reflect one-half of the average spread calculated over the period from 11 to 30 years that is in excess of the average base spread calculated between five and 10 years. This methodology is described more precisely in the remainder of this section.

If the average spread calculated between 11 and 30 years is defined as $Spread^{long}$ and the excess spread as $Spread^{excess}$ then,

$Spread^{long}$ is calculated as the average spread between Aa-rated corporate and Aa-rated provincial bond yields with terms between 11 and 30 years using available data, even if scarce, and

$Spread^{excess}$ is calculated as 50% x ($Spread^{long} - Spread^{base}$).

Based on this methodology, the total spread to be added to the yields of Aa-rated provincial bonds with maturities in excess of 10 years would be calculated as

$$Spread^{Prov10+} = Spread^{base} + Spread^{excess}$$

which is equivalent to

$$Spread^{Prov10+} = Spread^{base} + 50\% \times (Spread^{long} - Spread^{base})$$

which is equivalent to

$$Spread^{Prov10+} = 50\% \times Spread^{base} + 50\% \times Spread^{long}$$

It is recognized that the suggested methodology includes a number of simplifications and a judgmental estimate of the credibility factor of 50% applied to the additional spread measured at maturities over 10 years. However, the suggested methodology has the advantage of being relatively easy to implement. Also, the credibility factor of 50% represents a reasonable compromise between no allowance at all for an additional spread beyond 10 years, which would imply that available corporate Aa-rated data beyond 10 years are not reflected, and a credibility factor of 100%, which would ignore the reality, as described in section 3, that in Canada there are few high-quality corporate bonds with long maturities. The actuary would use judgment in applying this methodology.

9. ILLUSTRATION OF THE YIELD CURVE DEVELOPED AS PER APPROACH C

The objective of this section is to illustrate the development of a yield curve based on Approach C described in section 6 above and the calculation of the spread described in section 8 above. The illustration describes one possible approach to develop the yield curve but it is recognized that other approaches may exist. The key steps in developing the yield curve are described below.

1. Select a suitable set of Aa-rated corporate and provincial bonds after consideration of the factors described in section 5.
2. Calculate the spread adjustments described in section 8 as follows.
   a) Calculate the difference/spread in bond yields between the corporate and provincial bonds of similar maturities for all bonds with a maturity between five and 10 years and for all bonds with a maturity above 10 years. This calculation could be simplified by grouping bonds that fall within a maturity band. For example, all bonds with a maturity between 7.50 and 8.49 years would be grouped and referenced as bonds with an eight-year maturity;
   b) Calculate $Spread^{base}$ as the average of the spreads calculated in 2.a) for bonds of maturities between five and 10 years. If using the simplified grouping approach mentioned in 2.a), this average could be derived by averaging the spreads calculated at maturities of five, six, seven, eight, nine, and 10 years;
   c) Calculate $Spread^{long}$ as the average of the spreads calculated in 2.a) for bonds of maturities between 11 and 30 years. Due to the small number of corporate bonds with maturities beyond 11 years, these bonds are not grouped into smaller maturity bands;
   d) Calculate $Spread^{excess}$ as 50% x ($Spread^{long} - Spread^{base}$).
   e) $Spread^{Prov10+} = Spread^{base} + Spread^{excess}$.
3. Add $Spread^{Prov10+}$ to the yield of each Aa-rated provincial bond with a maturity greater than 10 years.
4. Finally, fit a curve to the Aa-rated corporate bonds of maturities up to 10 years and the provincial bonds of maturities greater than 10 years adjusted with the spread calculated as described above. The resulting yield curve would be the starting point to derive accounting discount rates following the steps described in the last three steps of section 4.

This yield curve could be developed using a smoothing or regression technique that aims at fitting a yield curve to the selected bond yield data at the measurement date.

10. PUBLISHING A MONTHLY CURVE

The Task Force has recommended that the Canadian Institute of Actuaries consider partnering with a third party to produce a monthly spot curve derived from a yield curve based on Approach C that will be accessible to pension actuaries. Engaging a third party to produce monthly spot curves creates efficiencies by avoiding the need for actuarial firms and other parties to each set up their systems to implement Approach C. It would also lend itself to a consistent application of the suggested methodology.

This recommendation is not intended to imply that the Task Force believes that Approach C represents the only appropriate methodology for developing a high-quality corporate spot curve to be used in developing discount rates for accounting purposes. While other appropriate methods likely exist, the intention is to provide pension practitioners, plan sponsors, auditors and others with ready access to a monthly spot curve that the Task Force believes is appropriate given the research that it has conducted.

11. STANDARDS OF PRACTICE AND USING THE WORK OF OTHERS

Whether an actuary is relying on a yield curve purchased from a third party or pricing and ratings data for individual bonds, the actuary is using the work of another person. If the actuary's work is destined for use in Canada, the actuary's work is subject to Canadian actuarial standards of practice. When subject to Canadian actuarial standards of practice, the actuary would consider the following paragraphs of the Standards of Practice, which are reminders of the responsibility of an actuary to assess whether work obtained from others is appropriate to use for purposes of the actuary's work.

> Paragraph 1610.03: "Use of the work of outsiders raises questions. Is their work appropriate? Should the actuary take responsibility for it?"
>
> Paragraph 1610.05: "If the actuary does not take such responsibility, then the actuary reports with reservation . . ."
>
> Paragraph 1610.06: "Even when the actuary is not taking responsibility for the data, however, he or she would not accept supplied data blindly, but would make checks of reasonableness, if only to assure that the data had lost nothing in the transmission and that the actuary's understanding of the data is the same as the supplier's."

When assessing whether the yield curve purchased from a third party or the pricing and ratings data for individual bonds provided to the actuary is appropriate, the actuary would consider the guidance contained in this Educational Note. The actuary would pay particular attention to the manner in which the scarcity of Aa-rated corporate bonds with long maturities was addressed when developing the yield curve or in the data provided.

12. CONCLUSION

The various issues mentioned in the preceding sections of this Educational Note were examined and different approaches were explored for developing a high-quality corporate bond yield curve from which discount rates could be derived to value pension obligations. Subsequently the possible options were narrowed down, feedback was sought from the TPC and it was concluded that Approach C represents an appropriate approach in most economic environments, including the current environment. Further

information about the associated work was provided in a webcast held on November 25, 2009 and in a session at the CIA Pension Seminar in Montréal on November 3, 2010.

Throughout its work, the objective of the Task Force was to address the scarcity of Aa-rated corporate bonds with long maturities in the Canadian market. Approach C uses Aa-rated provincial bonds at maturities beyond 10 years. The Aa-rated provincial bond market is liquid and deep across all terms to maturity and provides a solid base from which to extrapolate the corporate Aa-rated yield curve beyond 10 years. In order to adjust the yields on the provincial Aa-rated bonds to reflect the risk characteristics of high-quality corporate bonds, the use of as much information from current long-term high-quality corporate bonds as possible was reviewed. Although some judgment is required in developing this spread adjustment, it was concluded that the identified approach will provide for a reasonable yield curve to be used in providing guidance to plan sponsors on the selection of accounting discount rates.

If the number of long-term Aa-rated corporate bonds increases in the future (e.g., due to the issuance of more of these bonds or due to the upgrade of A-rated bonds to Aa rating), the actuary would use his or her judgment in deciding whether the changed environment enables reference to Aa-rated corporate bonds alone for purposes of developing a high-quality corporate yield curve.

Similarly, if a significant number of Aa-rated provincial bonds were to lose their Aa ratings, the actuary would evaluate the continued appropriateness of Approach C.

Pension actuaries are encouraged to consider the guidance described in this Educational Note, while recognizing that approaches other than Approach C could be acceptable with sufficient justification by the actuary. Pension actuaries are also reminded that decisions with respect to methods and assumptions used to prepare financial statements are made by the plan sponsor and not the actuary (although actuaries would be mindful of the potential application of Rule 6 of the Rules of Professional Conduct, Control of Work Product).

APPENDIX A

EXCERPT FROM AN INTERPRETATION OF THE SECURITIES AND EXCHANGE COMMISSION IN THE UNITED STATES ON THE DEFINITION OF HIGH-QUALITY BONDS

In the U.S., a quote from the September 23, 1993 U.S. FASB Emerging Issues Task Force meeting minutes on Administrative and Technical Matters is as follows: "The staff suggests that fixed-income debt securities that receive one of the two highest ratings given by a recognized ratings agency be considered high quality (for example, a fixed-income security that receives a rating of AA or higher from Moody's Investors Service, Inc.)."[3]

[3] Source: Question and answer 41R of the CICA's *Employee Future Benefits Implementation Guide.*

APPENDIX B

ACCOUNTING STANDARDS

This appendix contains a summary of certain Canadian, U.S. and International accounting standards and guidance that are relevant to the determination of the discount rate.

Canadian Accounting Standards

Part II—CICA 3461[4]

Discount rate

.063 *The discount rate used to determine the accrued benefit obligation shall be an interest rate determined by reference to:*

(a) market interest rates at the measurement date on high-quality debt instruments with cash flows that match the timing and amount of expected benefit payments; or

(b) the interest rate inherent in the amount at which the accrued benefit obligation could be settled.

.064 The objective of selecting a discount rate is to measure the single amount that, if invested at the measurement date in a portfolio of high-quality debt instruments, would provide the necessary pre-tax cash flows to pay the accrued benefits when due. For example, the current market value of a portfolio of high-quality zero coupon bonds acquired to pay the cost of benefits, when due, equals the amount of the actuarial present value of the benefits because cash inflows equal cash outflows in timing and amount. There is no reinvestment risk in the yields to maturity of the portfolio. However, in other than a zero coupon portfolio, such as a portfolio of long-term debt instruments that pay interest semi-annually or have maturities that do not extend far enough into the future to meet expected benefit payments, the discount rate (the yield to maturity) needs to incorporate reinvestment rates expected to be available in the future. Those reinvestment rates are extrapolated from the existing yield curve at the measurement date.

.065 When rates on high-quality corporate bonds are available, they are used to determine the discount rate. When the maturities of corporate bonds do not extend far enough into the future to match the cash flows inherent in the accrued benefit obligation, the rates on government bonds are used to determine the discount rate for the expected benefit payments that are farther into the future than the corporate bond maturities.

.066 The discount rate reflects the estimated timing of benefit payments. When some benefits are payable after the maturity of all available corporate or government bonds, the present value of that portion of the benefits is unlikely to vary significantly as a result of the selected discount rate. For that portion of the

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benefits, an entity may use a discount rate based on the yield of the last maturing corporate or government bond available.

.067 The discount rate is re-evaluated at each measurement date. When long-term interest rates rise or decline, the discount rate changes in a similar manner.

.068 Immediate settlement of an accrued benefit obligation may be possible through, for example, the purchase of an **insurance contract**, such as an annuity contract, that transfers the significant risks associated with the accrued benefit obligation to a third-party insurer. In such circumstances, the interest rate inherent in the amount at which the accrued benefit obligation could be settled may be used in determining the discount rate.

Employee Future Benefits Implementation Guide—Questions and Answers[5]

Question 41R: What constitutes a "high-quality debt instrument" in terms of the discount rate used to determine the accrued benefit obligation?

*Answer 41R***:** In the U.S., a quote from the September 23, 1993 U.S. FASB Emerging Issues Task Force meeting minutes on Administrative and Technical Matters is as follows: "The staff suggests that fixed-income debt securities that receive one of the two highest ratings given by a recognized ratings agency be considered high quality (for example, a fixed-income security that receives a rating of AA or higher from Moody's Investors Service, Inc.)."

In Canada, ratings on corporate bonds of AA or higher are not as common and there is no specific guidance on what a high-quality debt instrument is. Professional judgment is required in determining the appropriate discount rate. One possibility is to start with the yield on government of Canada bonds, and to add an appropriate adjustment to reflect the risk characteristics of high-quality corporate bonds.

Question 45: If an entity changes its basis of estimating assumed discount rates, for example, by using high-quality bond rates for one year and annuity rates for the following year, is that a change in method of applying an accounting principle?

*Answer 45***:** No. The purpose of paragraphs 3461.050 – .051 *[comments from the editor: these have now been renamed paragraphs 3461.063 - .064 under Part II CICA 3461]* is to describe the objective of selecting assumed discount rates, namely, to determine the interest rates inherent in the price at which the pension benefits could be effectively settled — currently. If an entity that previously used AA bond rates believes that in a subsequent year, in consideration of its pension plan's particular facts and circumstances, the interest rates that would be inherent in an effective settlement of the pension benefits are now more closely reflected by the rates implicit in current prices of annuity contracts, then those rates should be used. The change is viewed as a change in estimate (the estimate is the determination of the effective settlement rates). The key point is that the entity is using the rates implicit in current prices of annuity contracts as the basis to

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determine the best estimate of the effective settlement rates. The decision to use a particular methodology in a particular year does not mean that the entity must use that methodology in subsequent years. A change in the facts and circumstances may warrant the use of a different source that better reflects the rates at which the obligation could be effectively settled — currently. A position that holds such a change as a change in accounting principle would lend credence to the view that there are two or more acceptable alternatives. That is not the case. The objective is to select the best estimate of the effective settlement rates.

Another aspect of this issue is to determine when to change the basis of estimation from one particular methodology (for example, AA bond rates) to another (for example, rates implicit in current prices of annuity contracts). There is no prescribed mathematical formula for making that decision. As indicated above, the emphasis in selecting assumed discount rates should be the use of the best estimate. Changes in the methodology used to determine that best estimate should be made when facts or circumstances change (for example, a general decline or rise in interest rates that has not, as yet, been reflected in the rates implicit in the current prices of annuity contracts). If the facts and circumstances do not change from year to year, it would be inappropriate to change the basis of selection, particularly if the intent in changing the basis is to avoid a change in the assumed discount rate.

U.S. Accounting Standards

Codification 715.30.35-43 and -44[6]

43. Assumed discount rates shall reflect the rates at which the pension benefits could be effectively settled. It is appropriate in estimating those rates to look to available information about rates implicit in current prices of annuity contracts that could be used to effect settlement of the obligation (including information about available annuity rates published by the Pension Benefit Guaranty Corporation). In making those estimates, employers may also look to rates of return on high-quality fixed-income investments currently available and expected to be available during the period to maturity of the pension benefits. Assumed discount rates are used in measurements of the projected, accumulated, and vested benefit obligations and the service and interest cost components of net periodic pension cost.

44. The preceding paragraph permits an employer to look to rates of return on high-quality fixed-income investments in determining assumed discount rates. The objective of selecting assumed discount rates using that method is to measure the single amount that, if invested at the measurement date in a portfolio of high-quality debt instruments, would provide the necessary future cash flows to pay the pension benefits when due. Notionally, that single amount, the projected benefit obligation, would equal the current market value of a portfolio of high-quality zero coupon bonds whose maturity dates and amounts would be the same as the timing and amount of the expected future benefit payments. Because cash inflows would equal cash outflows in timing and amount, there would be no reinvestment risk in the yields to maturity of

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the portfolio. However, in other than a zero coupon portfolio, such as a portfolio of long-term debt instruments that pay semiannual interest payments or whose maturities do not extend far enough into the future to meet expected benefit payments, the assumed discount rates (the yield to maturity) need to incorporate expected reinvestment rates available in the future. Those rates shall be extrapolated from the existing yield curve at the measurement date. The determination of the assumed discount rate is separate from the determination of the expected rate of return on plan assets whenever the actual portfolio differs from the hypothetical portfolio described in this paragraph. Assumed discount rates shall be reevaluated at each measurement date. If the general level of interest rates rises or declines, the assumed discount rates shall change in a similar manner.

International Accounting Standards

IAS 19 (last revised in 2008)[7]

78 The rate used to discount post-employment benefit obligations (both funded and unfunded) shall be determined by reference to market yields at the end of the reporting period on high quality corporate bonds. In countries where there is no deep market in such bonds, the market yields (at the end of the reporting period) on government bonds shall be used. The currency and term of the corporate bonds or government bonds shall be consistent with the currency and estimated term of the post-employment benefit obligations.

79 One actuarial assumption which has a material effect is the discount rate. The discount rate reflects the time value of money but not the actuarial or investment risk. Furthermore, the discount rate does not reflect the entity-specific credit risk borne by the entity's creditors, nor does it reflect the risk that future experience may differ from actuarial assumptions.

80 The discount rate reflects the estimated timing of benefit payments. In practice, an entity often achieves this by applying a single weighted average discount rate that reflects the estimated timing and amount of benefit payments and the currency in which the benefits are to be paid.

81 In some cases, there may be no deep market in bonds with a sufficiently long maturity to match the estimated maturity of all the benefit payments. In such cases, an entity uses current market rates of the appropriate term to discount shorter term payments, and estimates the discount rate for longer maturities by extrapolating current market rates along the yield curve. The total present value of a defined benefit obligation is unlikely to be particularly sensitive to the discount rate applied to the portion of benefits that is payable beyond the final maturity of the available corporate or government bonds.

Note that the amended version of IAS 19 published by the International Accounting Standards Board in June 2011 has changed the numbering of the paragraphs above but not the content.

APPENDIX C

ANALYSIS OF ALTERNATIVES FOR EXTRAPOLATING THE LONG END OF THE YIELD CURVE

The Task Force retained Twist Financial to analyze various approaches for extrapolating the long end of the yield curve. The remainder of this section contains highlights from the analysis. Further details regarding the methodology used and the results of the analysis are contained in the slides prepared for a November 25, 2009 Canadian Institute of Actuaries ("CIA") webcast entitled Pension Accounting Discount Rates.

The following approaches for developing the long end of the yield curve were initially analyzed.

A1. For maturities greater than 10 years, supplement the Aa-rated corporate bonds with A-rated corporate bonds. No adjustment was made to the yields of the A-rated bonds to account for credit spreads between A-rated and Aa-rated bonds.

A2. For maturities greater than 10 years, supplement the Aa-rated corporate bonds with A-rated corporate bonds. In this case, an adjustment was made to the yields of the A-rated bonds to account for credit spreads between A-rated and Aa-rated bonds. The adjustment was determined as the average difference in yields between Aa-rated and A-rated corporate bonds for maturities of six years and less.

B. For maturities greater than 10 years, supplement the Aa-rated corporate bonds denominated in Canadian dollars with Aa-rated corporate bonds denominated in U.S. dollars that are further translated into Canadian dollars.

C. For maturities greater than 10 years, use Canadian provincial bonds rated Aa to which a spread adjustment is added to reflect the additional credit risk of Aa-rated corporate bonds. For purposes of the analysis, the spread adjustment was initially determined as the average difference in yields between Aa-rated corporate bonds and Aa-rated provincial bonds for maturities of six years and less.

D. For illustration purposes and comparison, the Task Force also developed the yield curve using only the available information on Aa-rated corporate bonds.

For each of the five approaches described above, a yield curve and discount rates were developed using available bond yield data after applying the methodology described in section 4. Three illustrative plans were used; a "short-duration" plan, with a modified duration of approximately nine years, a "mid-duration" plan, with a modified duration of approximately 12 years and a "long-duration" plan, with a modified duration of approximately 17 years.

This analysis was conducted using bond yield data at the following three dates:

December 31, 2006, i.e., before the financial crisis of 2008 and early 2009,

December 31, 2008, during the financial crisis, and

October 30, 2009, the most recent month-end prior to the CIA webcast.

The resulting discount rates obtained for the long-duration plan were

Discount Rate for Long-duration Plan			
Approach	**31/12/2006**	**31/12/2008**	**30/10/2009**
A1: supplement with A-rated bonds	5.35%	7.38%	5.88%
A2: supplement with A-rated bonds, adjusted for credit spreads	5.28%	6.54%	5.48%
B: supplement with U.S. Aa-rated bonds, translated into Cdn $	5.20%	6.99%	N/A
C: use Aa-rated provincial bonds, adjusted for credit spreads	4.82%	7.18%	5.51%
D: Aa-rated corporates only	5.01%	7.39%	6.41%

The following are some observations regarding the results of the analysis summarized above.

The discount rates using the different approaches at December 31, 2006 were relatively close, with the exception of Approach C. The difference between the highest and lowest rates was 53 basis points (bps).

The dispersion in discount rates between approaches at December 31, 2008 is much greater than at December 31, 2006. The increase in the dispersion is not surprising, as December 31, 2008 was in the midst of a financial market crisis. The difference between the highest and lowest discount rates at December 31, 2008 was 85 bps.

At October 30, 2009, with the exception of Approach D, the discount rates had converged considerably compared to December 31, 2008. This convergence likely reflected more stability in the fixed income markets relative to December 31, 2008.

One would typically expect that discount rates developed using Approach A (supplement with A-rated bonds) would be higher than discount rates developed using Approach D (Aa-rated bonds alone). However, at October 30, 2009 the discount rate using Approach D was higher by 53 bps. The reason for this apparent anomaly is that, under Approach D, because of the scarcity of Aa-rated corporate bonds of long maturities, the discount rates at December 31, 2008 and October 30, 2009 were heavily influenced by one bond which matures in 2037. This bond is from an issuer in the financial sector and the yields on financial sector bonds increased significantly relative to other industries during the financial crisis, whereas A-rated corporate bonds were better diversified into different industries and were less influenced by the financial crisis.

In light of the analysis performed and comments received after the November 2009 webcast, the Task Force deliberated on the alternatives and decided to remove Approach B as a viable approach. It did so because this approach was generally viewed by auditors as not acceptable under current Accounting Standards as it relies on bonds that are not of the same currency as the obligations.

After obtaining guidance from the TPC, it was concluded that Approach C is a reasonable approach for extrapolating the yield curve based on current Accounting Standards. However, it was also concluded that refinement to the method for calculating the spread adjustment to the yields on the Aa-rated provincial bonds would be appropriate. A possible method for calculating the spread is described in section 8.