

Second Revision Educational Note

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

Committee on Pension and Post-retirement Benefit Accounting Discount Rates

December 2020

Document 220174

Ce document est disponible en français
© 2020 Canadian Institute of Actuaries

The actuary should be familiar with relevant educational notes. They do not constitute standards of practice and are, therefore, not binding. They are, however, intended to illustrate the application of the Standards of Practice, so there should be no conflict between them. The actuary should note however that a practice that 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. Responsibility for the manner of application of standards of practice in specific circumstances remains that of the members. As standards of practice evolve, an educational note may not reference the most current version of the Standards of Practice; and as such, the actuary should cross-reference with current Standards. To assist the actuary, the CIA website contains an up-to-date reference document of impending changes to update educational notes.

MEMORANDUM

To: All Pension Actuaries

From: Steven W. Easson, Chair
Actuarial Guidance Council

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

Date: December 15, 2020

Subject: **Second Revision to Educational Note – Setting the Accounting Discount Rate Assumption for Pension and Post-employment Benefit Plans**

In September 2011, the Task Force on Pension and Post-retirement Benefit Accounting Discount Rates (the task force) published an educational note entitled [Accounting Discount Rate Assumption for Pension and Post-employment Benefit Plans](#). The educational note offered advice to actuaries who are engaged to provide guidance to a pension or post-employment plan sponsor on the selection of the discount rate for a Canadian plan under Canadian, U.S., or international accounting standards.

The educational note included a suggested approach for extrapolating the corporate Aa yield curve for maturities greater than 10 years. Under this approach, the curve was extrapolated using Aa-rated Canadian provincial bonds, to which a spread adjustment was added to reflect the additional risk of Aa-rated corporate bonds. The educational note also included a suggested approach for calculating the spread to be added to the provincial bond yields.

The approach suggested in the educational note relied upon having a sufficient number of Aa-rated corporate bonds with maturities greater than 10 years. Following changes in the Canadian bond market since the educational note was published, in particular regarding the significant decrease in the number of Aa-rated corporate bonds with maturities greater than 10 years, the Practice Council requested that the committee develop a new approach that would be more appropriate and sustainable in the new environment. The revised approach suggested by the committee at the time is documented in the June 2018 revised educational note [Setting the Accounting Discount Rate Assumption for Pension and Post-employment Benefit Plans](#).

In March 2020, financial markets became very volatile due to concerns about the economic effects of the COVID-19 pandemic. During March 2020 and the months that followed, the approach for extrapolating the corporate Aa yield curve documented in the June 2018 revised educational note resulted in yields at the long end of the curve

that appeared high relative to the yields on corporate A bonds. As a result, the committee decided to conduct another review in 2020 of the approach for extrapolating the corporate Aa yield curve.

This educational note has been prepared by the Committee on Pension and Post-retirement Benefit Accounting Discount Rates and describes a revised approach for extrapolating the corporate Aa yield curve for maturities greater than 10 years that is being recommended by the committee. The revised approach will be used by Fiera Capital Corporation to publish a monthly corporate Aa spot curve beginning in December 2020. The committee would like to thank Fiera Capital Corporation for the analyses they performed that were instrumental to the development of this revised educational note.

This revised educational note has been prepared by the committee in accordance with the Institute's *Policy on Due Process for the Approval of Guidance Material other than Standards of Practice and Research Documents* and has received final approval for distribution by the Actuarial Guidance Council on December 15, 2020.

If you have any questions or comments regarding this educational note, please contact Gavin Benjamin at his CIA online directory address, gbenjamin@morneaushepell.com.

SWE, GB

Table of Contents

1. Introduction	5
2. Requirements of Accounting Standards	5
3. Insufficiency of High-Quality Corporate Bonds with Long Maturities in Canada.....	6
4. Approach for Selecting the Discount Rate.....	7
5. Considerations when Developing Aa-Rated Corporate Yield Curve.....	7
6. Extrapolating the Long End of the Yield Curve: Approaches Considered	10
7. Feedback on Extrapolation Approach	13
8. Deriving the Spread Adjustment to Account for the Risk of Aa-Rated Corporate Bonds	14
9. Illustration of Developing the Yield Curve in Accordance with Approach A	15
10. Publishing a Monthly Curve	17
11. Standards of Practice and Using the Work of Others.....	17
12. Conclusion.....	18

1. Introduction

This educational note has been prepared by the Committee on Pension and Post-retirement Benefit Accounting Discount Rates (the committee).

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. This educational note highlights 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, this educational note describes an approach for extrapolating the long end of the high-quality corporate yield curve that the committee believes would be sufficiently robust to be appropriate in a variety of economic environments, including the current economic environment.

Many accounting standards provide that the discount rate assumption can be determined with reference to high-quality corporate bond yields. These accounting standards include part II¹, part III, and part IV of the *CPA Canada Handbook – Accounting* of the Chartered Professional Accountants of Canada, 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”). This educational note provides guidance for the selection of the discount rate for a Canadian defined benefit pension plan under the 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 that are not based on high-quality corporate bond yields. The actuary would use his or her judgment to determine when 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 corporate² debt instruments with cash flows that match the timing and amount of expected benefit payments.

¹ Under the approach using a separate accounting valuation basis (not the funding 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.

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

- a. What “high quality” means;
 - b. How to address the lack of suitable debt instruments at certain maturities; and
 - c. Which debt instruments to include.
- a. 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).

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” corporate bonds in Canada. An actuary may consider including Aaa-rated corporate bonds as “high quality” corporate bonds in the analysis if they become available.

Issues b. and c. above are discussed in the sections that follow.

3. Insufficiency of 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 10 years and above). While there is a reasonably deep market of Aa-rated corporate bonds denominated in Canadian dollars with short and medium terms to maturity, there are either few or no Aa-rated corporate bonds with terms to maturity beyond 10 years.

For example, based on one data source which is considered representative of the Canadian market, on October 31, 2020 there were no corporate bonds rated Aa³ with maturities beyond 10 years that had a market capitalization of at least \$100 million. This lack of long maturity Aa-rated bonds could continue for the foreseeable future.

In light of such scarcity in Aa-rated corporate bonds with long maturities, actuaries would consider the fact that the development of corporate Aa yield curves may require a significant amount of subjectivity and may also lead to a lack of credibility in the

³ Excluding bonds issued by quasi-governmental entities and rated Aa by at least one of the following rating agencies: Standard & Poor’s (S&P), Moody’s, Fitch Group, and Dominion Bond Rating Service (DBRS).

outcome. 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 assumption, a reasonable approach commonly used by actuaries would consist of the following steps:

- Step 1: 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 understands 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.
- Step 2: Converting the yields on the curve described in step 1 into spot rates (i.e., yields on zero coupon bonds). This is done because the yield at any point on the curve described in step 1 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 benefit payments would be yields on zero coupon bonds. Actuaries would be familiar with the difference between yield and spot curves.
- Step 3: Calculating the present value of the plan's expected benefit payments using the spot rates developed in step 2.
- Step 4: Recommending the discount rate assumption that would be the single rate that, when used to discount the plan's expected benefit payments, provides for an equivalent present value to the one calculated in step 3.

Some plan sponsors have adopted the "granular approach" when accounting for their pension plans. Under this approach, instead of selecting a single discount rate assumption, as described in step 4 above, the spot curve described in step 2 is applied directly to the defined benefit obligation and service cost expected future cash flows to calculate the pension obligations and net costs that are reflected in the sponsor's financial statements.

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 step 1 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.

- 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 amount below a certain threshold (e.g., \$100 million) because bonds with a smaller outstanding amount tend to be traded less frequently than bonds with a larger outstanding amount 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), puttable, 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 reliability of its pricing would be a key consideration in determining whether to include it.

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 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 a mathematical technique (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

Several 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.

To help develop and evaluate the appropriateness of different approaches, the following guiding principles have been used by the committee:

- Compliance with accounting standards⁴;
- Consistency with the principles outlined in this educational note;
- Approach that is robust and appropriate for both current and, to the extent possible, changing market conditions;
- Avoidance of relying on very few data points for extrapolating the yield curve; and
- Preference for an approach that requires fewer subjective judgment calls and avoids unnecessary complexity.

As described in the June 2018 educational note, when the previous detailed review of the approaches to extrapolate the long end of the yield curve was conducted, the following approaches were considered and analyzed.

- A. For maturities greater than 10 years, use Aa-rated provincial bonds to which a spread adjustment is added to reflect the additional risk of Aa-rated corporate bonds.
- B. For maturities greater than 10 years, use Aa-rated provincial bonds and A-rated corporate bonds to derive a spread adjustment that is added to Aa-rated provincial bonds based on the relative risk of Aa-rated corporate bonds. This approach attempts to range bound the yields expected for Aa-rated corporate bonds between the yields on provincial Aa-rated bonds and the yields on corporate A-rated bonds.
- C. For maturities greater than 10 years, use A-rated corporate bonds from which a spread adjustment is removed to reflect the lower risk of Aa-rated corporate bonds.

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

⁴ For example, an approach that would rely on Aa-rated corporate bonds denominated in U.S. dollars was considered but ultimately rejected as it would likely not be considered permissible under current Accounting Standards due to the underlying data being denominated in a currency other than Canadian dollars.

At the time of the previous review conducted by the committee and described in the June 2018 educational note, the committee recommended approach A. It is worth noting that approaches A and B produced similar results in the previous review, but approach A was preferred at the time because it is less complex than approach B and relies exclusively on high-quality bonds. However, due to changes in the bond market that have occurred since the previous guidance, the financial market volatility that occurred in early 2020, and a review conducted by the committee in 2020, the committee is now recommending approach B.

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

In order to increase the number of data points used to extrapolate the long end of the yield curve, this approach uses information from Aa-rated provincial bonds, for which there is a deep market across the entire maturity spectrum.

This approach is based on the premise that an additional yield spread is generally expected between Aa-rated corporate bonds and Aa-rated provincial bonds of similar duration/maturity.

Therefore, to reflect the difference in risk between Aa-rated corporate bonds and Aa-rated provincial bonds, a spread adjustment is added to the provincial bond yields.

The methodology for determining the spread adjustment to be added to the provincial bonds' yields described in the June 2018 educational note can be summarized as follows:

The spread of Aa-rated corporate bond and Aa-rated provincial bond yields is calculated relative to Canada yields for terms to maturity of 4.5 to 10.5 years.

A *spread ratio* is calculated by dividing the average Aa-rated corporate spreads by the average Aa-rated provincial bond spreads calculated in accordance with the paragraph above. At any point in time, it is generally expected that the *spread ratio* would be higher than 100%.

Any long-term Aa-rated corporate bond yields are supplemented by long-term provincial bond yields adjusted upward by each long-term Aa-rated provincial bond's spread relative to Canada yields multiplied by [*spread ratio* - 100%].

An advantage of this approach is that it relies exclusively on high-quality bonds (from the corporate and government sectors).

However, there have been very few new issues of corporate Aa bonds denominated in Canadian dollars with long and mid maturities over the past few years. As a result, the number of corporate Aa bonds that fall within the maturity band of 4.5 to 10.5 years has decreased. For example, based on one data source which is considered representative of the Canadian market, there were 26 such bonds as of December 31, 2017, while there were only 18 such bonds as of

October 31, 2020. If the number of corporate Aa bonds in this maturity band continues to decrease, at some point the robustness of the *spread ratio* described above may be called into question. It should be noted that this potential concern is relevant to approaches A, B and C.

Also, in March 2020 the financial markets became very volatile due to concerns about the economic effects of the COVID-19 pandemic. This resulted in a significant increase in the *spread ratio*. For example, the *spread ratio* increased from 141.7% as at February 28, 2020 to 200.5% as at March 31, 2020. Due to the increase in the *spread ratio*, approach A produced a corporate Aa yield curve that at the long end was higher than a corporate A yield curve, where the corporate A yield curve was based on observable corporate A bond data across the maturity spectrum. The committee considers this relationship potentially problematic, as it is expected that the market would generally assign wider yield spreads to A-rated versus Aa-rated corporate bonds of similar duration/maturity and sector.

B. For maturities greater than 10 years, use Aa-rated provincial bonds and A-rated corporate bonds to derive a spread adjustment that is added to Aa-rated provincial bonds based on the relative risk of Aa-rated corporate bonds.

In order to increase the number of data points used to extrapolate the long end of the yield curve, this approach uses information from both Aa-rated provincial bonds and A-rated corporate bonds, two subsets of the bond universe that are deep across the entire maturity spectrum.

This approach is based on the premise that the yields of Aa-rated corporate bonds are expected to be higher than the yields of Aa-rated provincial bonds but lower than the yields of A-rated corporate bonds (of similar duration/maturity and sector).

Therefore, to reflect the relative risk of Aa-rated corporate bonds, a spread adjustment is added to the Aa-rated provincial bond yields.

An advantage of this approach is that it uses not only information from other high-quality bonds (i.e., provincial Aa-rated bonds), but also uses information from the upper-medium grade portion of the corporate bond sector (i.e., corporate A-rated bonds). This provides a mechanism to range bound the yields that could be reasonably expected for Aa-rated corporate bonds and mitigate the concern with approach A described in the last paragraph of subsection A above.

Some drawbacks of this approach are that it does not rely solely on high-quality bonds and is more complex from an implementation perspective than approaches A and C. Examples of the implementation complexities of this approach are the needs to address questions such as the following:

- Should certain sectors of the corporate bond market be excluded to promote consistency between Aa-rated and A-rated corporate bonds used to draw relationships? If so, what classification criteria would be used?
- Should some or all rate-regulated utilities (which represent an important portion of the A-rated corporate bond market but have a distinctive risk profile and pricing behavior) be included or excluded? What would be the basis for inclusion/exclusion?
- Is the mix of A-rated corporate bonds sufficiently homogenous across the maturity spectrum (i.e., would relationships drawn at maturities below 10 years be expected to hold beyond 10 years)? If not, what adjustments may be warranted?

A description of the methodology recommended in this educational note is contained in section 8.

C. For maturities greater than 10 years, use A-rated corporate bonds from which a spread adjustment is removed to reflect the lower risk of Aa-rated corporate bonds.

To increase the number of data points used to extrapolate the long end of the yield curve, this approach would use information from A-rated corporate bonds, a market that is deep across the entire maturity spectrum.

This approach is based on the premise that the market would generally assign wider yield spreads to A-rated versus Aa-rated corporate bonds of similar duration/maturity and sector.

Therefore, a spread adjustment would be subtracted from the yields on A-rated corporate bonds when extrapolating the long end of the yield curve.

Similar to approach B above, a key benefit of this approach is that it uses information from the upper-medium grade portion of the corporate bond sector.

A drawback of this approach is that it does not incorporate all information available from high quality-bonds (i.e., as it excludes Aa-rated provincials). In addition, it suffers from the same implementation challenges as approach B with regard to inclusion/exclusion of certain bonds (e.g., rate-regulated utilities).

In light of the drawbacks described above, particularly that it does not incorporate information from Aa-rated provincial bonds, approach C was not considered during the committee's 2020 review of the curve extrapolation approach.

7. Feedback on Extrapolation Approach

At a September 23, 2020 presentation to the IFRS Discussion Group (IDG), the committee's 2020 review of the corporate Aa yield curve extrapolation approach was discussed and feedback was requested on approach B. Overall, there was general agreement from the IDG with the committee's intention to recommend approach B.

While feedback from the IDG is not binding, agreement from the group provides an indication of the likely acceptance of the approach by Canadian auditors.

Based on the committee's analysis and the feedback provided by the IDG, it was concluded that the committee would recommend approach B as an appropriate approach for extrapolating the yield curve in accordance with current Accounting Standards.

8. Deriving the Spread Adjustment to Account for the Risk of Aa-Rated Corporate Bonds

In order to implement approach B, a methodology is needed for deriving an appropriate spread adjustment to add to the long-term Aa-rated provincial bond yields to account for the additional credit risk of Aa-rated corporate bonds.

Deriving an appropriate spread adjustment under approach B to translate Aa-rated provincial bond yields into Aa-rated corporate bond yields for bonds with maturities in excess of 10 years requires judgment. It is recognized that there are different approaches for calculating the spread. Based on the analysis conducted, the committee concluded that the methodology recommended below is reasonable, pragmatic, and sustainable given the scarcity of long Aa-rated corporate bonds.

This methodology is underpinned by the following premises:

The yields of Aa-rated corporate bonds are expected to be higher than the yields of Aa-rated provincial bonds but lower than the yields of A-rated corporate bonds (of similar duration/maturity and sector).

The ratio of the difference between Aa-rated corporate bond yields and Aa-rated provincial bond yields to the difference between A-rated corporate yields and Aa-rated provincial bond yields is relatively stable across the maturity spectrum.

The suggested methodology can be summarized as follows:

Calculate ***Spread*_{CorpAa-CorpA}** as the average spread between the yields on Aa-rated corporate bonds with maturities between 3.5 and 10.5 years and corporate A yields at similar maturities. It is expected that ***Spread*_{CorpAa-CorpA}** will be less than zero. (Note that the mid maturity band used to calculate the spread adjustment has been increased from the 4.5 to 10.5 years used in prior approaches to 3.5 to 10.5 years under this approach in order to increase the number of bonds and thereby the robustness of the spread adjustment calculation, while still excluding bonds with shorter terms to maturity (i.e., less than 3.5 years) from the calculation. The committee deems it more appropriate to use only mid maturity bonds than to use both short and mid maturity bonds to calculate the spread adjustment that is utilized to extrapolate the long end of the corporate Aa yield curve.)

Calculate ***Spread*_{CorpAa-ProvAa}** as the average spread between the yields on Aa-rated corporate bonds with maturities between 3.5 and 10.5 years and provincial Aa yields at similar maturities. It is expected that ***Spread*_{CorpAa-ProvAa}** will be greater than zero.

Any long-term Aa-rated corporate bonds are supplemented by long-term Aa-rated provincial bonds, with the bond yield for each long-term provincial bond adjusted as follows:

If **Provincial Spread** is the difference between the corporate A yield at the same maturity as the provincial bond and the provincial bond's yield, increase the provincial bond's yield by:

$$\text{Provincial Spread} \times \text{Spread}_{\text{CorpAa-ProvAa}} / (\text{Spread}_{\text{CorpAa-ProvAa}} - \text{Spread}_{\text{CorpAa-CorpA}})$$

9. Illustration of Developing the Yield Curve in Accordance with Approach B

This section illustrates the development of a yield curve based on approach B described in section 6 above and the calculation of the spread adjustment described in section 8 above. This illustration describes one possible approach to develop the yield curve, but it is recognized that other approaches may be appropriate. The key steps in developing the yield curve are as follows:

1. Select suitable Aa-rated corporate, Aa-rated provincial and A-rated corporate bonds based on the considerations described in section 5.
2. Fit curves to the Aa-provincial bonds and A-rated corporate bonds across all terms to maturity.
3. Calculate **Spread_{CorpAa-CorpA}**:
 - a) Calculate the difference/spread between the yield of every Aa-rated corporate bond with a maturity between 3.5 and 10.5 years and the yield at the corresponding maturity on the corporate A curve.
 - b) Calculate the **Spread_{CorpAa-CorpA}** as the average of the spreads calculated in a) above. For purposes of this illustration, assume that **Spread_{CorpAa-CorpA}** is equal to -50 basis points (bps).
4. Calculate **Spread_{CorpAa-ProvAa}**:
 - a) Calculate the difference/spread between the yield of every Aa-rated corporate bond with a maturity between 3.5 and 10.5 years and the yield at the corresponding maturity on the provincial Aa curve.
 - b) Calculate the **Spread_{CorpAa-ProvAa}** as the average of the spreads calculated in a) above. For purposes of this illustration, assume that **Spread_{CorpAa-ProvAa}** is equal to 75 bps.
5. For every Aa-rated provincial bond with a maturity greater than 10.5 years, calculate a **Provincial Spread Adjustment**.
 - a) Calculate the **Provincial Spread** as the difference/spread between the yield at the corresponding maturity on the corporate A curve and the yield of the provincial bond.
 - b) Calculate **Provincial Spread Adjustment** =

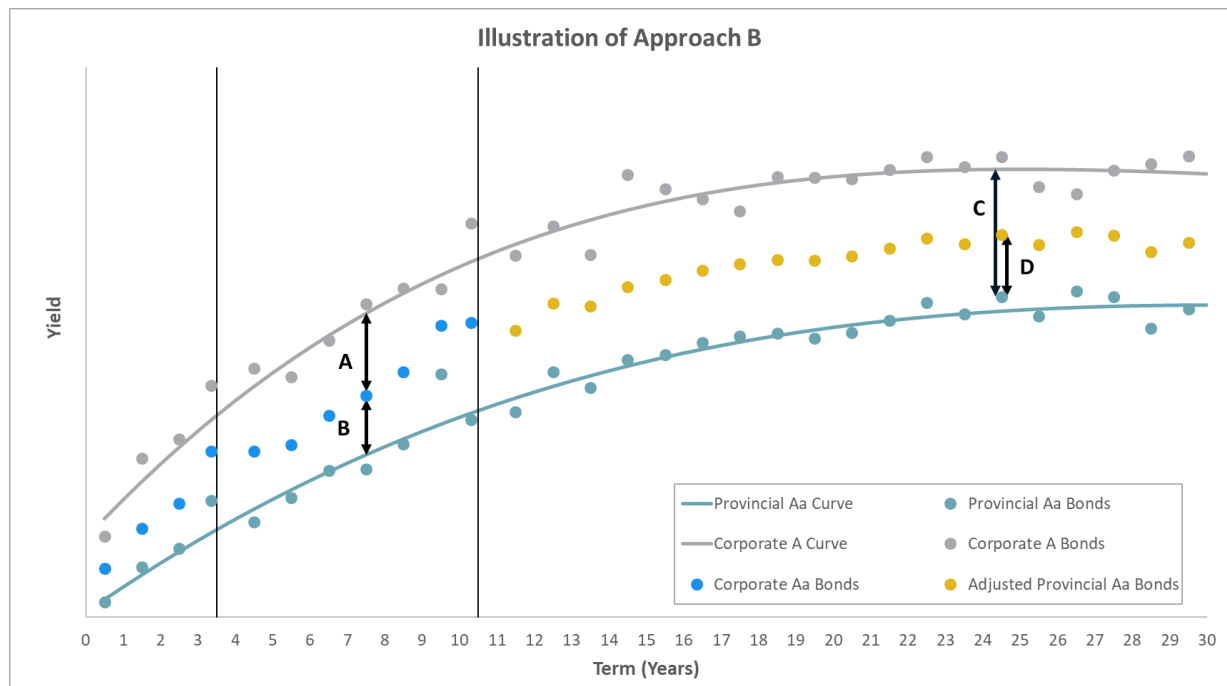
$$\text{Provincial Spread} \times \text{Spread}_{\text{CorpAa-ProvAa}} / (\text{Spread}_{\text{CorpAa-ProvAa}} - \text{Spread}_{\text{CorpAa-CorpA}})$$

For example, if the *Provincial Spread* for a particular bond is 200 bps, then the **provincial spread adjustment** for the bond is 120 bps calculated as follows (Note the double negative in the denominator.):

$$200 \times 75 / (75 - (-50)) = 120 \text{ bps}$$

- Finally, fit a curve to the Aa-rated corporate bonds taken across all terms to maturity and the provincial bonds of maturities greater than 10.5 years with the provincial yields adjusted upward by the **provincial spread adjustment** for each provincial bond. The resulting yield curve would be the starting point for deriving accounting discount rates following the steps described in section 4.

Below is a graphic illustration (graph not to scale) of approach B:



In the graph above and consistent with the illustration in this section:

$$A = \text{Spread}_{\text{CorpAa-CorpA}} = -50 \text{ bps}$$

$$B = \text{Spread}_{\text{CorpAa-ProvAa}} = 75 \text{ bps}$$

C = Provincial Spread = 200 bps, for a specific provincial bond

$$D = \text{Provincial Spread Adjustment} = 200 \times \frac{75}{75 - (-50)}$$

= 120 bps, which is added to the yield of the specific provincial bond

A [webcast](#) was held on November 25, 2020 which provided additional details on approach B, including the results of back testing of approach B that was conducted by the committee.

10. Publishing a Monthly Curve

The Canadian Institute of Actuaries has chosen to partner with Fiera Capital Corporation to produce a monthly spot curve derived from a yield curve based on approach B that is accessible to actuaries and other interested parties. 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 B. It would also lend itself to a consistent application of the suggested approach.

The spot curve and additional information and documentation with respect to implementation details can be found at the following web address:

<https://www.fieracapital.com/en/institutional-markets/cia-curve/cia-curve-overview>.

This recommendation is not intended to imply that the committee believes that approach B represents the only appropriate approach for developing a high-quality corporate spot curve to be used in developing discount rates for accounting purposes. While other appropriate approaches likely exist, the intention is to provide actuaries, plan sponsors, auditors, and others with ready access to a monthly spot curve that the committee has concluded 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 1510.04: "If the actuary uses the work of a person other than colleagues and assistants, the actuary may or may not take responsibility for that person's work. Taking responsibility may require more work of the actuary and may expose the actuary to risk of legal liability, but may give the user greater confidence that the other person's work is appropriate"

Paragraph 1510.06: "If the actuary does not take such responsibility, the actuary reports with reservation . . ."

Paragraph 1510.12: "If the actuary uses but does not take responsibility for another person's work, the actuary would nevertheless examine the other person's work for evident shortcomings and would either report the results of such examination or avoid use of the work. For clarity, even though the other person may use a model in his or her work, the actuary is not considered to have used that model."

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 during the committee's 2020 review of the approach for developing a high-quality corporate bond yield curve from which discount rates could be derived to value pension and other post-employment benefit obligations. Subsequently, feedback was sought from the IDG and it was concluded that approach B combined with the methodology described in this educational note for deriving the spread adjustments represents an appropriate approach in varying financial market environments, including the current environment. Further information about the associated review was provided in a [webcast](#) held on November 25, 2020.

Throughout its work, the objective of the committee was to address the scarcity of Aa-rated corporate bonds with long maturities in the Canadian market. Approach B and the methodology proposed to derive the spread adjustment rely on having a deep market for Aa-rated corporate bonds with maturities of less than 10 years and a deep market for Aa-rated provincial bonds and A-rated corporate bonds across all terms to maturity. Although some judgment is required in developing the spread adjustment, it was concluded that the identified approach provides 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 were to increase in the future (e.g., due to the issuance of more of these bonds or the upgrade of existing corporate bonds from an A 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 corporate bonds (with 3.5 to 10.5 years to maturity) were to lose their Aa ratings, the actuary would evaluate the continued appropriateness of approach B.

Actuaries are encouraged to consider the guidance described in this educational note, while recognizing that other approaches could be acceptable with sufficient justification by the actuary. Furthermore, the actuary would use his or her judgment in deciding whether changes in the environment enable continuation of any approach chosen or warrant adoption of another approach.

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).