Educational Note

IFRS 17 Discount Rates for Life and Health Insurance Contracts

Committee on Life Insurance Financial Reporting

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The actuary should be familiar with relevant educational notes. Educational notes are not binding; rather they are intended to illustrate the application of the standards of practice. A practice that an educational note describes for a situation is not necessarily the only accepted practice for that situation nor is it necessarily accepted practice for a different situation. Responsibility for ensuring that work is in accordance with accepted actuarial practice lies with the actuary. As accepted actuarial practice evolves, an educational note may no longer appropriately illustrate the application of standards. To assist the actuary, the CIA website contains a reference of pending changes to educational notes.

MEMORANDUM

To: Members in the life and health insurance practice area

From: Steven W. Easson, Chair
Actuarial Guidance Council

Steve Bocking, Chair and Marie-Andrée Boucher, Immediate Past Chair
Committee on Life Insurance Financial Reporting

Date: June 30, 2022

Subject: **Educational Note: IFRS 17 Discount Rates for Life and Health Insurance Contracts**

The Committee on Life Insurance Financial Reporting (CLIFR) has prepared this educational note to provide guidance related to setting the discount rates for the purpose of calculating the present value of estimates of future cash flows under IFRS 17.

This educational note is structured in two chapters. The first chapter is intended to illustrate various considerations in developing an entity's IFRS 17 discount curve, without narrowing the choices available to the entity under the IFRS 17 Standard. The chapter focuses on aspects of setting the discount rates that are specific to the Canadian market. The second chapter presents reference curves for insurance contracts that are deemed to be liquid and illiquid. It outlines how these curves are constructed in the observable period and beyond the observable period. It also outlines considerations with respect to the parameters used beyond the observable period. In addition, guidance is provided for suggested disclosures in the Appointed Actuary's Report (AAR) filed with the insurance regulator, to support practitioners and reviewers in assessing the reasonableness of the discount curves used versus the reference curves defined in this educational note. Additional details related to the content of the different chapters can be found in the introduction. The CIA has retained the services of Fiera Capital (Fiera) to publish the reference curves and market curves used to build the reference curves on a monthly basis. The resulting reference curves can be found on Fiera's website at https://www.fieracapital.com/en/institutional-markets/cia-ifrs-17-curves.

This educational note is written primarily from the perspective of Canadian actuaries and is not intended to duplicate any other guidance. Further information ("guidance") can be found in International Actuarial Association (IAA) guidance and other Canadian Institute of Actuaries (CIA) documents.

This educational note is focused on the Canadian market, economic environment and products. Similar considerations and approaches could be used for setting the discount rates for other currencies.

The *IFRS 17 Discount Rates and Cash Flow Considerations for Property and Casualty Insurance Contracts* educational note publish by PCFRC discusses the reference curves and refers to

CLIFR's educational note for guidance on this topic. The *Application of IFRS 17 Insurance Contracts to Public Personal Injury Compensation Plans* educational note published by the Committee on Workers' Compensation (CWC) also refers to CLIFR's and the Property and Casualty Financial Reporting Committee's (PCFRC) educational notes on the topic of discount rates. As such, this educational note applies to members in the life insurance, property and casualty insurance, and public personal injury compensation plan areas.

A preliminary version of the draft of this educational note and the Update to draft educational notes was shared with the following committees prior to publication:

- Property and Casualty Financial Reporting Committee
- Committee on Risk Management and Capital Requirements
- Committee on the Appointed/Valuation Actuary
- International Insurance Accounting Committee
- Committee on Workers' Compensation
- ASB's Designated Group on IFRS 17.

A preliminary version of the draft of this educational note was also shared with the staff of the Accounting Standards Board (AcSB) to broaden consultations with the accounting community. Given that this educational note provides actuarial guidance rather than accounting guidance, the AcSB staff review was limited to citations of and any inconsistencies with IFRS 17. CIA educational notes do not go through the AcSB's due process and therefore, are not endorsed by the AcSB.

The draft of this educational note was also presented several times at the Actuarial Guidance Council (AGC) in the months preceding this request for approval. CLIFR satisfied itself that it had sufficiently addressed the comments received on the draft of this educational note and it was published in June 2020.

Subsequent to the publication of the draft note, the AGC, with the support of CLIFR) and in collaboration with PCFRC, initiated an external consultation on the draft educational note in the fall of 2020. CLIFR and its IFRS 17 Discount Rate subcommittee ("subcommittee") have reviewed the comments received as part of the external consultation process. This consultation process and review of the comments received resulted in the subcommittee recommending changes to the reference curves outlined in Chapter 2 of this educational note. This educational note reflects the changes recommended by the subcommittee. A summary of the changes made to the reference curve was published on June 30, 2021 in the *Update to draft educational notes: Changes to the reference curves outlined in CLIFR's and PCFRC's draft educational notes on IFRS 17 Discount Rates* (Update to draft educational notes).

In addition to the changes to the reference curves presented in Chapter 2 of this educational note, the subcommittee reviewed Chapter 1 to reflect changes in the methodology used to develop the ultimate risk-free rate and address some comments received on the illiquidity premium.

CLIFR feels that it has addressed the material comments received as a result of the external consultation and by the various committees. A summary of the key issues raised by the stakeholders as part of the external consultation process, and the associated responses provided by CLIFR and the AGC, are included in Appendix 7.

The following highlights the changes between this educational note and the draft published version:

- Updates on references and wording to the final version of the *Application of IFRS 17 Insurance Contracts* educational note (published in August 2021);
- Updates on document references to IFRS 17 publications since June 2021; and
- Minor updates to wording.

Given that the changes made to the final version of this educational note relative to the draft published version and Updates to draft educational notes were not substantial, the final version of this educational note was only subject to a limited review by the CIA committees.

As this educational note covers such a vital IFRS 17 issue, CLIFR and the AGC wish to emphasize the substantial amount of ongoing professional judgment that is necessary in setting discount rates in the unobservable period. There were rigorous debates amongst many practice committees within the CIA on the methodologies and data used to set the ultimate risk-free rate. Potential approaches included: (i) providing guidance on specific rate(s) based on a selected methodology; (ii) providing guidance on specific rate(s) based on a basket of methodologies; (iii) providing no guidance on specific rate(s) and instead only providing historical data for individual company determination. On balance, CLIFR and the AGC have concluded that the best approach, including for purposes of fulfilling the IASB® objective of comparability, is approach (i) which uses specific rates based on a selected methodology.

The creation of this memorandum and educational note has followed the AGC's protocol for the adoption of educational notes. In accordance with the Institute's *Policy on Due Process for the Approval of Guidance Material other than Standards of Practice and Research Documents*, this educational note has been prepared by CLIFR and has received approval for distribution from the AGC on May 26, 2022.

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CLIFR would like to acknowledge the contribution of its subcommittee that assisted in the development of this educational note: Stéphanie Fadous (Chair), Wesley Foerster, Emmanuel Hamel, Étienne Morin, Amal Rajwani, Denis Cantin, Saul Gercowsky, Benoît-

Pierre Blais, Gwen Yun Weng, Ivy Lee, Junyu Chen, Shaonan Fang, Matthew Garnier, Abid Kazmi, and Ling Cen.

Questions or comments regarding this educational note may be directed to the Chairs of CLIFR and this subcommittee (noted above) at guidance.feedback@cia-ica.ca.

SWE, SB, MAB

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Introduction

IFRS 17 establishes principles for the recognition, measurement, presentation, and disclosure of insurance contracts. The purpose of this educational note is to provide practical application guidance on Canadian-specific issues relating to setting the discount rates for calculating the present value of estimates of future cash flows under IFRS 17 and disclosure requirements in the Appointed Actuary's Report (AAR) filed with the insurance regulator; additional guidance is also available in the *Application of IFRS 17 Insurance Contracts* educational note. References to specific paragraphs of the IFRS 17 Standards are denoted by IFRS 17.XX in this educational note, where XX represents the paragraph number.

The discount rates applied to the estimates of future cash flows, are described in IFRS 17.36 shall:

> (a) reflect the time value of money, the characteristics of the cash flows and the liquidity characteristics of the insurance contracts;
>
> (b) be consistent with observable current market prices (if any) for financial instruments with cash flows whose characteristics are consistent with those of the insurance contracts, in terms of, for example, timing, currency and liquidity; and
>
> (c) exclude the effect of factors that influence such observable market prices but do not affect the future cash flows of the insurance contracts.

IFRS 17.B74 provides further guidance when cash flows vary based on the returns on any financial underlying items:

> Estimates of discount rates shall be consistent with other estimates used to measure insurance contracts to avoid double counting or omissions; for example:
>
> (a) cash flows that do not vary based on the returns on any underlying items shall be discounted at rates that do not reflect any such variability;
>
> (b) cash flows that vary based on the returns on any financial underlying items shall be:
>
> (i) discounted using rates that reflect that variability; or
>
> (ii) adjusted for the effect of that variability and discounted at a rate that reflects the adjustment made…

Further considerations are provided in IFRS 17. B72-B85. Those paragraphs outline two approaches to set the discount rate, bottom-up and top-down. The bottom-up approach is based on adjusting a liquid risk-free yield curve to reflect the differences between the liquidity characteristics of the financial instruments that underlie the risk-free rates observed in the market and the liquidity characteristics of the insurance contracts. The top-down approach is based on a yield curve that reflects the current market rates of return implicit in a fair value measurement of a reference portfolio of assets and adjusted to eliminate any factors that are not relevant to the insurance contracts.

IFRS 17.B82 describes how the inputs to the yield curve in a top-down approach would be identified where there are observable market prices and where no such data are available:

(a) if there are observable market prices in active markets for assets in the reference portfolio, an entity shall use those prices (consistent with paragraph 69 of IFRS 13).

(b) if a market is not active, an entity shall adjust observable market prices for similar assets to make them comparable to market prices for the assets being measured (consistent with paragraph 83 of IFRS 13).

(c) if there is no market for assets in the reference portfolio, an entity shall apply an estimation technique. For such assets (consistent with paragraph 89 of IFRS 13) an entity shall:

 (i) develop unobservable inputs using the best information available in the circumstances. Such inputs might include the entity's own data and, in the context of IFRS 17, the entity might place more weight on long-term estimates than on short-term fluctuations; and

 (ii) adjust those data to reflect all information about market participant assumptions that is reasonably available.

Chapter 3 of the *Application of IFRS 17 Insurance Contracts* educational note provides further general guidance on setting IFRS 17 discount rates. The educational note, published in October 2021, is an adoption of the International Actuarial Note (IAN) 100, which is accompanied by a preamble. The preamble outlines a number of additional clarifications that are needed to several of the topics discussed in the final version of the IAN 100 that CIA members should be aware of.

This educational note provides more specific application guidance for Canadian actuaries and is comprised of two chapters. The first chapter is intended to illustrate various considerations in developing an entity's IFRS 17 discount curve, without narrowing the choices available to the entity under the IFRS 17 Standard. The chapter focuses on aspects of setting the discount rates that are specific to the Canadian market:

a. Establishing the last observable point on the yield curve in Canada: Consistent with IFRS 17.B82, observable market prices would be used where available in active markets.
b. Setting the ultimate risk-free rate: Consistent with IFRS 17.B82, an actuary shall develop unobservable inputs using the best information available, and might place more weight on long-term estimates than on short-term fluctuations.
c. Setting the illiquidity premium for products sold in Canada and in Canadian currency: Consistent with IFRS 17.36, the discount rates would reflect the characteristics of the insurance contracts, including liquidity.
d. Setting the discount rates for Canadian products that contain cash flows that vary with an underlying item.

In addition to the guidance above, this chapter discusses different approaches to setting the discount curve such as using spot rates versus forward rates, methodologies to interpolate between the last observable point and ultimate point, and the period over which the discount curve would converge to an ultimate rate.

The second chapter presents reference curves for insurance contracts that are deemed to be liquid and illiquid. It outlines how these curves are constructed in the observable period and beyond the observable period. It also outlines specific requirements with respect to the parameters used beyond the observable period. In addition, guidance is provided for recommended disclosures in the AAR filed with the insurance regulator, to support practitioners and reviewers in assessing the reasonableness of the discount curves used versus the reference curves defined in this educational note.

The guiding principles that the CLIFR Discount Rate subcommittee followed in writing this educational note were the following:

- First and foremost, consider Canadian-specific perspectives, rather than simply repeating international actuarial guidance.
- Provide application guidance that is consistent with the IFRS 17 standard and applicable Canadian actuarial standards of practice and educational notes, without unnecessarily narrowing the choices available in the IFRS 17 standard.
- Consider practical implications associated with implementation of potential methods; in particular, ensure that due consideration is given to options that do not require undue cost and effort to implement and manage.

Terminology

The following terminology is used in this educational note:

- **Discount rate or curve**: Rate used to discount estimates of future cash flows which is consistent with the timing, liquidity and currency of the insurance contract cash flows.
- **Spot rate**: The spot yield to maturity (YTM) is the estimated annual rate of return for a bond assuming that the investor holds the bond until its maturity date. The zero spot YTM is the estimated annual rate of return of a zero-coupon bond assuming that the investor holds the latter until its maturity date. In this document, the spot rates are defined as the zero spot YTM.
- **Forward rate**: The interest rate implied by the yield curve over a given future period. Mathematically, the forward rate over time [n-1, n] is

  $$f_n = \frac{(1 + y_n)^n}{(1 + y_{n-1})^{n-1}} - 1 \,,$$

  where y_n denotes the spot rate for maturity *n*. The forward rate over time [n-1, n] can be conceptualized as the interest rate that equates the strategies of

    - investing in the n-year spot rate; and

  - investing in the (n-1)-year spot rate and then in the [1-year] forward rate.

- **Estimates of future cash flows**: Future undiscounted cash flows arising from the insurance contracts or reinsurance held contracts.
- **Insurance finance income or expense**: The change in the carrying amount of the group of insurance contracts arising from the effect of the time value of money and changes in the time value of money.
- **Illiquidity premium**: Adjustment made to a liquid risk-free yield curve to reflect differences between the liquidity characteristics of the financial instruments that underlie the (risk-free) rates observed in the market and the liquidity characteristics of the insurance contracts.
- **Reference portfolio**: A portfolio of assets used to derive discount rates based on current market rates of return, adjusted to remove any premium related to risk characteristics embedded in the portfolio that are not inherent in insurance contracts. For cash flows of insurance contracts that do not vary based on the returns on the assets in the reference portfolio, such adjustments include:
  - adjustments for differences between the portfolio and the insurance contract cash flows in respect of the amount, timing and uncertainty of cash flows; and
  - excluding market risk premiums for credit risk which are relevant only to the assets included in the reference portfolio.

Chapter 1 – Developing the discount curve

1. Establishing the last observable point on the yield curve in Canada

This section aims to provide guidance on how to establish the observable period in Canada for risk-free assets given the information that is directly observable in the market. Beyond this point, an actuary would estimate risk-free rates as described in Section 2.

To the extent an actuary is using a top-down approach and a reference portfolio that is composed of shorter-term fixed income assets, the actuary would consider the information available for risk-free assets to the last observable point when setting the discount rate.

1.1 Key principles

IFRS 17 recognizes that discount rates for instruments with the same characteristics as insurance contracts may not be directly observable in the market. IFRS 17 does not require a particular estimation technique for determining the discount rates. However, it does establish principles that a company would follow (IFRS 17.B78, B80–B82, and B44). These principles are consistent with some of the requirements of fair value measurement set out in IFRS 13 (IFRS 13.69, 79, 83, 89, and Appendix A).

These key principles may be summarized as follows:

1. Maximise the use of observable market inputs.
2. Observable market prices from active markets would be used without adjustment.
3. Observable market prices from non-active markets would be adjusted to make them comparable with market prices from active markets.

The considerations for assessing the end of the observable period in Canada are the same for entities applying the top-down or the bottom-up approach for developing discount rates.

1.2 Setting the last observable point

The last observable point for risk-free discount rates would correspond to the term of the asset with the longest maturity for which there is a quoted price from an active market (i.e., a Level 1 input under IFRS 13). IFRS 13 defines an active market as a market in which transactions for an asset take place with sufficient frequency and volume to provide pricing information on an ongoing basis. This section illustrates how the principles of IFRS 13 could be applied in Canada in order to determine the last observable point for risk-free assets.

To assess the volume of risk-free assets in Canada, either Government of Canada (GoC) bonds or Canadian-dollar interest rate swaps would be considered. GoC debt securities[1] were used to assess the terms of risk-free assets available in the Canadian market (see Section 1.2.1). GoC bonds were chosen because they area large and liquid market in Canada.

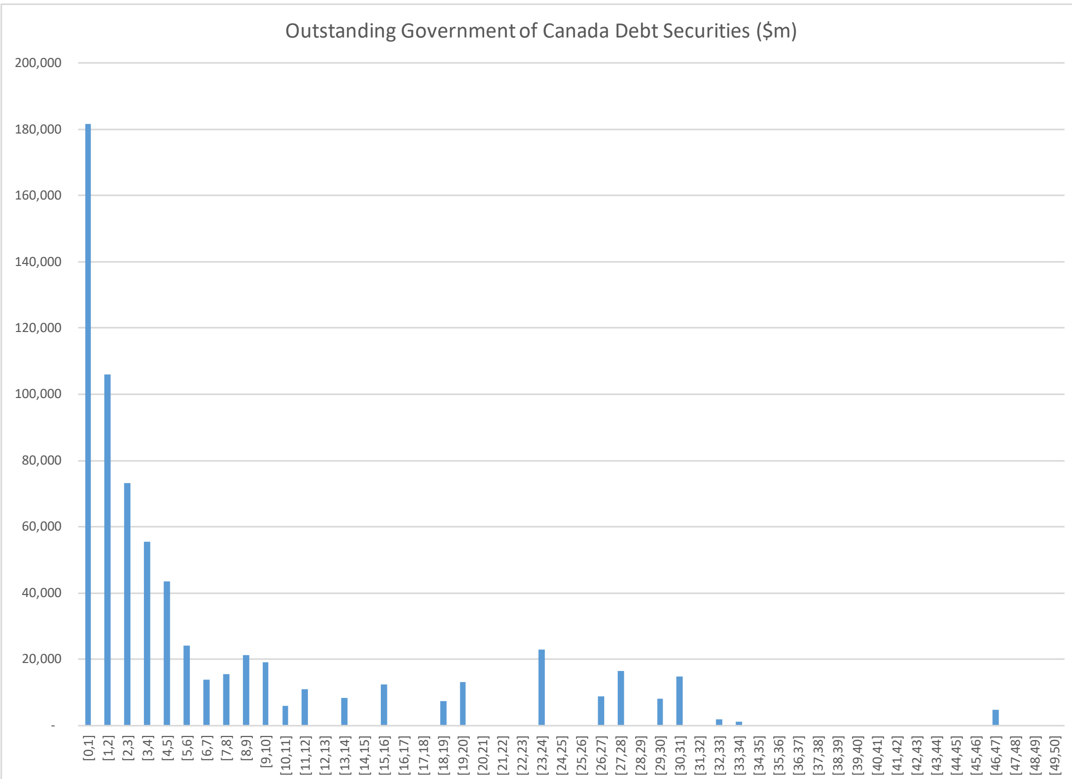
[1] GoC debt securities include both treasury bills (up to 1-year term) and bonds (over 1-year term). The terms “debt securities” and “bonds” are used interchangeably in this educational note since the focus is on longer-term rates and the impact of treasury bills is limited.

To assess whether there is a sufficient frequency of transactions for risk-free assets in the market, factors such as bid-ask spread, trading volume, trade size, and the impact of trades (see Appendix 1) were considered.

Based on the analysis outlined in this section, it would be reasonable to set the last observable point for GoC bonds at 30 years.

1.2.1 Volume of Outstanding Government of Canada Debt Securities

Chart 1



Source data are available at https://www.bankofcanada.ca/stats/goc/results/en-goc_tbill_bond_os_2017_12_31.html.

Chart 1 shows the par value of outstanding GoC debt securities as of December 31, 2017. This represents the universe of potential terms that would be considered in establishing the last observable point. More recent data was reviewed and did not produce a materially different result.

The longest-term GoC bonds have a maturity of December 1, 2064. These bonds are part of the GoC's tactical issuance of 'ultra-long' bonds. The government has issued these bonds in five tranches over the period 2014 – 2017.

In developing risk-free rates for Solvency II application for Euro denominated rates, European Insurance and Occupational Pensions Authority (EIOPA)[2] used a residual value criterion to assess whether there was a deep and liquid market (or active market) for debt securities. Under

[2] EIOPA is one of the three European supervisory authorities responsible for microprudential oversight at the European Union level, being part of the European System of Financial Supervision.

this methodology the amount of assets in excess of a certain term is compared to the total outstanding amount of assets. When the ratio of these two amounts falls below a certain level, the market is considered not to be deep, liquid, and transparent. EIOPA used a 6% criterion. When developing risk-free rates for Solvency II application for other currencies, EIOPA used the depth, liquidity, and transparency assessment which provided a non-exhaustive list of criteria that would be considered when setting the last liquid point[3]. This resulted in setting the last observable point at 30 years in Canada.

The data in Chart 1 has the following distribution of assets:

- 67% of GoC debt securities mature between 0 to 5 years.
- 14% of GoC debt securities mature between 5 to 10 years.
- 8% of GoC debt securities mature between 10 to 20 years.
- 8% of GoC debt securities mature between 20 to 30 years.
- 3% of GoC debt securities mature in over 30 years.

While there is significant judgment involved in the residual volume approach, it is noted that only 3% of outstanding GoC debt securities outstanding having a term in excess of 30 years. In addition, due to the fact that the GoC has only issued ultra-long bonds five times, there may not be a sufficient amount of bonds that trade in the over 30-year market to be considered an active and relevant market.

Based on this analysis, it would be reasonable to set the last observable point for GoC bonds at 30 years. Estimates for risk-free discount rates beyond 30 years would be estimated per the requirements of IFRS 17.

A second set of considerations for assessing the last observable point includes factors such as bid-ask spread, trading volume, trade size, and the impact of trades. Appendix 1illustrates how these factors would be used in determining the observable period for GoC bonds.

1.3 Government of Canada bonds data from non-active markets

As noted above, GoC bonds with a maturity date longer than 30 years infrequently trade in the market. Given the lack of an active market for these assets, they are usually priced with reference to the nearest benchmark GoC bond (i.e., at a premium or discount to the 30-year bond).

When interpolating the risk-free discount curve beyond 30 years, IFRS 17 requires observable data from non-active markets to be considered. For terms along the yield curve where prices from non-active markets exist for GoC bonds, an actuary would assess if the interpolated rate at the same term is reasonable.

Given the current limited supply of longer than 30-year GoC bonds, significant judgment is required to make this assessment. Due to the high demand for these bonds, their yields may be artificially depressed and would need to be adjusted for the purpose of setting the discount

[3] https://eiopa.europa.eu/regulation-supervision/insurance/solvency-ii-technical-information/risk-free-interest-rate-term-structures

curve. The results of an interpolation method that grades to an ultimate rate, such as described in Section 2, could be viewed as an acceptable set of adjusted yields.

1.4 Assessing the last observable point for assets other than Government of Canada bonds

The factors and analysis prepared in Section 1.2 for GoC bonds would be considered in establishing the last observable point for other fixed income securities, such as corporate bonds. If it is concluded that the last observable point is earlier for a class of assets other than GoC bonds, then the observable market prices of GoC bonds would be considered when interpolating the yield curve for such assets beyond their last observable point.

2. Setting the long-term risk-free rates (unobservable portion of the curve)

This section provides guidance on how to derive long-term risk-free rates in Canada when such rates are not directly observable in the Canadian market. Risk-free rates in Canada are typically observable and relevant over a period of 30 years, as discussed in Section 1. Beyond this point, an actuary would estimate an ultimate risk-free rate (URFR) and derive an interpolation technique to grade from the last observable rate to the ultimate rate. This section provides guidance on both.

2.1 Key principles

IFRS 17 does not require a particular estimation technique for determining the long-term rates. However, IFRS 17.B78 and B82 highlight the key principles to follow when performing such estimation:

1. Maximise the use of observable inputs. Discount rates shall not contradict any available and relevant market data, and any non-market variables shall not contradict observable market variables.
2. Reflect current market conditions from the perspective of a market participant.
3. Develop unobservable inputs using the best information available in the circumstances.
4. Might place more weight on long-term estimates than on short-term fluctuations.

On this basis, listed below are some characteristics that may be desirable when setting the discount curve beyond the last observable point:

1. Stability: The ultimate interest rate would be more stable over time. That is, on average, one might expect the variability of long-term interest rates to be lower than short-term rates.
2. Smoothness: Interpolated rates would follow a smooth path from the last observable rate to the ultimate rate point.
3. Simplicity and predictability: The approach would be easy to understand, implement, and forecast under various economic scenarios.

2.2 Setting the ultimate risk-free rate

In developing long-term estimates of interest rates, market participants may take into consideration multiple observable inputs (e.g., historical information, forward-looking expectations, economic environment, etc.). Multiple considerations to set the ultimate risk-free rate are discussed in this section. The actuary would consider all the available information when developing the estimate. This section also outlines the methodology recommended for the purpose of the reference curves presented in Chapter 2. Finally, a discussion on the Bank of Canada (BoC) neutral rate[4] and how it can inform the continued appropriateness of the estimated ultimate risk-free rate concludes the section.

2.2.1 Summary of various considerations

Historical vs forward looking

Using historical data has the advantage of having a predictable and stable ultimate risk-free rate assumption. It is also possible to set the historical period to cover multiple economic environments and cycles. However, it assumes that rates would be mean-reverting and there is no clear evidence that it is the case in Canada[5].

On the other hand, using only forward-looking assumptions (i.e., BoC inflation target, gross domestic product (GDP) growth forecast from the Organisation for Economic Co-operation and Development (OECD), forecast from economists) could create an assumption that puts too much weight on short-term fluctuations and would be less predictable. Also, the forecasts are usually not done for the purpose of the IFRS 17 ultimate risk-free rate, and some adjustments could be needed. Different recognition periods for changes in forward-looking assumptions (instant recognition vs gradual recognition) could be considered to bring stability to the ultimate risk-free rate assumption.

A method that uses a combination of historical data and forward-looking assumptions would be a good compromise between having an assumption that reflects current market conditions, uses the best information available and places more weight on long-term estimates. Also, putting more weight on recent data while using historical data to set an assumption could bring balance between historical inputs and considering recent trends.

Length of the historical period

When using historical data to set the ultimate risk-free rate assumption, the length of the historical period would be considered. Since the ultimate risk-free rate is an assumption for discount rates applicable to long term cashflows, it is expected that a historical period covering multiple economic cycles would be considered as the current economic environment would not necessarily be maintained throughout the projection period. The length of the historical period would also take into consideration any structural changes that would make historical rates not relevant for future rates assumptions.

Nominal vs real historical rates

The ultimate nominal interest rate expectation can be decomposed into two parts: the ultimate real interest rate and the ultimate inflation expectation.

[4] The neutral rate is defined as the policy rate needed to maintain economic output at its potential level and inflation at target after the effects of all cyclical shocks to the economy have dissipated (Mendes 2014).

[5] Article on this topic: Zisimos Koustas & Jean-François Lamarche (2010) Evidence of nonlinear mean reversion in the real interest rate, Applied Economics, 42:2, 237-248, DOI:10.1080/00036840701579242.

Nominal rates are directly accessible for a long historical period for GoC benchmark bonds and can be used directly to calibrate the ultimate risk-free rate under IFRS 17. However, as stated earlier, this method implies mean reversion of nominal rates, which may not be a valid assumption in Canada. Also, any structural change would have to be addressed appropriately. For example, the actuary would have to be careful when using nominal rates before 1991 since the BoC adopted an inflation-control target policy that year.

Economic and financial theory suggests that real rates are more likely to be mean reverting than nominal ones, but mean reversion for real rates is debatable as it assumes real economic growth is stable over time. Nevertheless, using historical real rates plus an inflation target has the advantage of bringing a forward-looking component into the estimate, and eliminating some of the issues with structural changes in the economy. However, real rates are not publicly available for a long period and must be derived using nominal rates and historical inflation or approximated using historical GDP Growth rates. Further, a specific assumption has to be defined for ultimate inflation when historical real rates are used.

Inflation indexes

Nominal rates are based on pricing of real rates plus an inflation *expectation* so there can be inaccuracies in determining real rates as nominal less growth in an inflation i*ndex*. However, given the short history of real rate data in Canada, deriving the real rates from the nominal rates may be a necessity. If pursuing the decomposition approach, the actuary would consider different inflation inputs. In Canada, there are multiple indices and measures that are observed when analyzing inflation.

First, there is the total consumer price index (CPI) which is widely used as an indicator of the change in general level of consumer prices or the rate of inflation. Calculated each month, it can be quite volatile. The core inflation measures (CPI-trim, CPI median and CPI-common)[6] reflect the price of certain CPI components which are more stable and can exclude the change in indirect taxes. CPI-trim excludes components whose rates of change are in each of the bottom and top 20% of the distribution of price changes. CPI-median corresponds to price changes at the 50th percentile. CPI-common filters out price movements that might be caused by factors specific to certain components. In setting monetary policies, the BoC seeks to look through transitory movements and focuses more on these core inflation measures.

While the total CPI index is broadly used and is also used to index the coupon on real return bonds, the core inflation measures are more stable. The actuary would apply judgment to decide which information is better suited to the exercise.

Short-term rates vs. term premium

Since the short-term rates and the term premiums do not behave in the same way (e.g., term premiums may be more likely to follow economic cycles than the short-term rate), the method to derive the ultimate risk-free rate could be different for each component. For example, the ultimate risk-free rate could be the sum of the assumptions for the short-term real rate, the term premium and the inflation rate.

[6] https://www.statcan.gc.ca/en/statistical-programs/document/2301_D63_T9_V2

Frequency of updates

According to IFRS 17, the discount rates should be consistent with observable current market prices for each reporting period. Since the ultimate risk-free rate is an assumption for rates applicable to long-term cash flows, it is not expected to vary substantially at each reporting period. However, changes in the economic environment or monetary policy could have an impact on the ultimate risk-free rate. The actuary would consider these factors when determining the frequency of updates for the ultimate risk-free rate.

Formula vs judgment

As stated above, changes in the economic environment or monetary policy could have an impact on the ultimate risk-free rate. Using a formula to systematically update the ultimate risk-free rate has the advantage of being transparent and predictable. However, judgment is required to ensure the formula reflects all information available at the reporting period and that the assumption remains current (i.e., formula is responsive enough to react to a major structural change).

Other inputs

The actuary could also consider other inputs when setting the ultimate risk-free rate. For example, the impact of prospective socio-economic variables on the chosen methodology could be particularly pertinent. The following is a non-exhaustive list:

- Monetary policy: Can impact the inflation rate. Unconventional monetary policies such as quantitative easing, affecting the supply-demand equilibrium in the markets, can have an impact on the level of interest rates.
- Demography: Demographic growth (positive or negative) and structure (e.g., 30 to 64 year old productive person relative to person 65 year old and more in retirement) can put a downward pressure on interest rates if the proportion of people in their saving period relative to people in their dissaving-period increases which also increases the demand for saving investments. An increased demand for saving investments such as bonds generates a downward pressure on interest rates.
- Level of debt: A government with a high level of debt can have a limited capacity to stimulate the economy with investments which can result in a lower level of growth and interest rates.

While all these inputs are considerations, their use involves judgment and incorporating them systematically in the methodology to develop the ultimate risk-free rate estimate could be challenging.

2.2.2 Recommended methodology to set the reference curves presented in Chapter 2

As mentioned in the previous section, a method that uses a combination of historical data and forward-looking assumptions has the advantage of being predictable, while remaining current.

Using the construct of a historical real interest rate + inflation expectation to develop the ultimate risk-free rate would balance historical and forward-looking assumptions. In addition, this methodology is used for other purposes: (i) it was proposed and endorsed by the European Insurance and Occupational Pensions Authority (EIOPA) and, at the time this educational note was drafted, it was used under Solvency II[7], and (ii) it was also the method proposed by the International Association of Insurance Supervisors (IAIS) for the Insurance Capital Standard (ICS).

For these reasons, it is recommended that a similar formula be used to derive the ultimate risk-free rate (URFR), as follows:

URFR = Historical short-term real rates + Historical term premium + Inflation expectation

Where:

- Historical short-term real rates would represent a time-weighted average of the historical estimated short-term real rates. The estimation would be based on the BoC's 3-month T-Bill nominal rates (V122541) from which the actual year-over-year inflation is subtracted. The inflation could be derived using CPI-common index growth (V108785713
- A historical term premium[8] would be added to reflect the term structure of interest rates and compensation required by investors for long-term investments. The estimation would be derived by comparing the historical BoC nominal long-term bond rates (V122487) to the 3-month T-Bill rates (V122541);
- The inflation expectation would be defined consistent with the mid-point of the inflation-control target range in Canada (expressed as the year-over-year increase in the total consumer price index).

The methodology used to set the ultimate risk-free rate for the reference curves places more weight on recent historical information, which applies to the real rates and the term premium. Multiple time-weighted average methodologies could be used; the exponential moving average (EMA) technique was chosen. This methodology is simple, broadly used in the financial community to investigate recent trends, and historical moving weights remain stable over time. The EMA formula only includes one parameter and can be expressed as a recursive relationship:

$$EMA(t) = Data(t) \times \alpha + EMA(t-1) \times (1 - \alpha)$$

Where **Data(t)** represents the most recent observation at time t; and **α** represents the degree of exponential decrease. A commonly used value for **α** is 2 / (N + 1), as the resulting weights of the EMA have the same center of mass as a simple moving average done on N periods. This must not be confused with the historical period considered, which would need to be higher than N, so that the weight on the initial value would be as small as possible.

A parameter N = 25 years (i.e., 300 months) was used to reach to right balance between reflecting current trends while remaining reasonably stable. An example of the historical weights applied to each data point using an EMA with **α = 2 / 301** as at Dec 31, 2020, is presented below:

[7] https://eiopa.europa.eu/Publications/Reports/Calculation%20of%20the%20UFR%20for%202019.pdf
[8] The addition of a term premium is the main difference between the approach proposed and Solvency II methodology.

Historical period	Weights applied to data
< 1980	5 %
1980-1990	5 %
1990-2000	10 %
2000-2010	25 %
2010-2020	55 %
Total	***100 %***

2.2.3 Neutral rate discussion

Having a specific formula to derive the ultimate risk-free rate is advantageous since it remains simple and predictable. However, it is good practice to compare the resulting ultimate risk-free rate to other available market inputs to validate that the formula remains reasonable.

The BoC neutral rate is a good reference in this regard, since the BoC publishes annually a Canadian neutral rate range, on a nominal as well as on a real-rate basis. The neutral rate is forward-looking and is defined as a "policy rate needed to maintain economic output at its potential level and inflation at target after the effects of all cyclical shocks to the economy have dissipated" (Mendes 2014).

In the April 2021 BoC paper, "Potential output and the neutral rate in Canada: 2021 update", the neutral rate was assessed to be in the 1.75-2.75% range. It was the same assessment as in the October 2020 BoC report and 0.50% lower than the 2019 assessment.

The estimated range for the nominal neutral rate is based on outputs from four models:

Table 1: Summary of estimates of the Canadian nominal neutral policy rate

	2020 estimates (%)	2019 estimates (%)
Pure interest rate parity	1.75–2.75	2.25–3.25
Risk-augmented neoclassical growth model	1.75–2.75	2.25–3.25
Reduced-form model	2.0–2.50	2.25–3.0
Overlapping-generations model	2.25–3.0	2.50–3.25
Overall assessment	1.75–2.75	2.25–3.25

The BoC Neutral rate on its own would not be sufficient to develop an assumption for the ultimate risk-free rate for IFRS 17 purposes since it does not include a term premium, it is a short-term rate and can only inform determination of trends in interest rates on a short-to-mid term basis.

However, the BoC Neutral Rate is an additional input that could serve as a barometer to ensure the formula used to set the ultimate risk-free rate remains appropriate. For example, if the BoC neutral rate decreases/increases consistently year after year and the ultimate risk-free rate stays level or moves in the opposite direction, then this would be a good indicator that the fundamentals of the method used to derive the ultimate risk-free rate may not reflect future interest rate expectations. This could indicate a need to investigate further improvements to the methodology.

2.3 Interpolation methodologies

2.3.1 Ultimate spot versus ultimate forward rate and convergence period

Once the ultimate risk-free rate level is set, the actuary would determine the construct to interpolate to the ultimate risk-free point from the last observable point. One important aspect is to determine if the ultimate risk-free rate derived previously corresponds to a forward or a spot rate.

Forward rates represent future implicit market rate expectations. They correspond to future period estimated interest rates. To calculate the current price of cash flows beyond the last observable point, one needs to discount using current interest rates (during the observable period) and future expectations. As it might be difficult to derive future market expectations beyond the last observable point, it is expected that the convergence period between the last observable point and the ultimate rate would be quite short.

Spot rates represent current rates used to derive today's market price of a future cash flow. To calculate the current price of a cash flow beyond the last observable point, only one spot rate is needed. As ultimate spot rates encompass the observable (current market interest rate information) and unobservable (future interest rate expectations) period, one would be cautious to ensure that the assumption used does not contradict observable inputs. For this reason, it is expected that the convergence period between the last observable market data and the ultimate duration would be longer than for the forward rate construct.

IFRS 17 is silent on how to express the ultimate rate; as a result, both methods are deemed acceptable. In both cases, expert judgment is required and the resulting curve (expressed as a forward curve and a spot curve) would not contradict observable and relevant inputs. The convergence period and the interpolation technique are key inputs to ensure that the choice of how to express the rate will not materially impact the value of the estimates of future cash flows[9]. A convergence period as short as one year could be reasonable when using an ultimate forward rate, while a convergence period of 30 or more years could be reasonable when using an ultimate spot rate. The length of the convergence period would depend on the differential between the forward rate of the last observable point and the ultimate forward rate under the forward rate methodology (a short period would be reasonable with a small differential and vice versa) and on the reasonableness of the underlying forward rate progression under the spot rate methodology.

2.3.2 Interpolation techniques

Once the ultimate risk-free rate level, the construct of the curve and the convergence period are set, the actuary would determine the method to interpolate from the last observable input to the ultimate rate. Multiple interpolation methods exist for curve construction. The

[9] Forward and spot curves can be quite different. However, if the two are based on consistent underlying assumptions, the resulting present values would be similar.

methodology chosen impacts the speed of grading to the ultimate rate and as a result impacts the value of the estimates of future cash flows.

In their June 2006 paper, Hagan and West explored a variety of techniques and the characteristics of a good interpolation approach. These can be summarized as:

- easy to understand and implement; and
- the continuity, positivity, and stability of forward rates.

The paper also highlights the pros and cons related to each technique explored. Some of these techniques are discussed below:

1. **Linear interpolation**

Linear interpolation is a straight-line interpolation from the last observable rate to the ultimate rate. It only requires two rates as well as an interpolation period. Linear interpolation can be applied on the rates themselves (spot or forward), on the log of the rates, on the discount factors, or on the log of the discount factors.

Ease of understanding and implementation	✔
Continuity of forwards	✗
Positivity/stability of forwards	✗
Sensitivity to changes in observable rates*	Medium

*Relative to the Cubic-Spline interpolation and the Monotone Convex splines

2. **Cubic-spline interpolation**

Cubic-spline interpolation is a special case of spline interpolation. A spline is a piecewise polynomial in which the coefficients of each polynomial are fixed between joints. Then, the coefficients are chosen to match the function and its first and second derivatives at each joint. Though more complicated than linear, this method gives an interpolating polynomial that is smoother (continuity of first and second derivative) and has smaller error than various other interpolating polynomials. However, even if the spline is supposed to alleviate the problem of oscillation seen when fitting using a single polynomial, significant oscillatory behaviour can still be present, strongly depending on the number and the relative value of each joint.

Ease of understanding and implementation	✗
Continuity of forwards	✔
Positivity/stability of forwards	✗
Sensitivity to changes in observable rates*	High and unpredictable

*Relative to the Linear interpolation and the Monotone Convex splines

3. Monotone convex splines

The possibility of finding a spline interpolant which is monotone (or convex) is considered with this technique. The investigation is carried out by constructing an auxiliary set of points and using monotonicity and convexity preserving properties. Using such a method, the forward curve is typically continuous and guaranteed to be positive. Moreover, the forward rates are more stable as inputs change (i.e., they change more or less proportionately).

Ease of understanding and implementation	✗
Continuity of forwards	✔
Positivity/stability of forwards	✔
Sensitivity to changes in observable rates*	Medium

*Relative to the Linear and Cubic-Spline interpolation

Other common approaches, as described below, could also be used:

4. Smith & Wilson

Smith & Wilson (2000) published a model for bond prices using linear combinations of spline functions with long-term yield constraints. The pricing function is set up as the sum of a term representing the long-term behaviour of the discount factor (ultimate rate) and a linear combination of N kernel functions. This model is well known since it is used to derive the discount curve under Solvency II. It is attractive from a calibration perspective (good fit to observed market data) as well as generating a smooth and reasonable yield curve. As with any other technique, it requires some expert judgment (e.g., setting the speed of convergence parameter).

5. Nelson and Siegel

Nelson and Siegel (1987) introduced a parametric model for yield curves that can represent the shapes generally associated with various yield curves. It is widely used in practice for fitting the term structure of interest rates. The model requires four parameters: a long-term component, a short-term component, a medium-term component, and a decay factor. Parameters are fitted via a least squares or similar algorithm. The model generally behaves well at long maturities and parameters can be set to virtually fit any yield curve.

All of the approaches described above, as well as others not covered in this educational note, could be appropriate methodologies to use to interpolate between the last observable market data and the ultimate rate.

3. Liquidity characteristics of insurance contracts

This section provides guidance on how to qualitatively assess the liquidity characteristics of insurance contracts for the purpose of constructing discount rates. For practical purposes, entities could assign groups of insurance contracts to a number of liquidity categories, and construct discount curves for each liquidity category rather than for each group. This note does not limit or prescribe an exact number of liquidity categories, as it is difficult to generalize all product features in the Canadian market to fit into a specific number of liquidity categories. Actuaries would apply judgment when setting the number of categories, and then assign groups of contracts to these categories.

Observable inputs and current market conditions would not impact the qualitative assessment of insurance contract liquidity, as the liquidity characteristics are based on product designs and features. The current market information will be reflected in the quantitative development of the illiquidity premium.

3.1 Key principles

1. The liquidity characteristics of an insurance contract can be qualitatively assessed by considering product features that could produce an exit value, along with other considerations such as inherent value and exit cost criteria[10] introduced by the *Application of IFRS 17 Insurance Contracts* educational note.
2. Contracts with similar characteristics would have similar illiquidity premiums.

3.2 Liquidity characteristics based on exit value

The standard provides guidance on how to assess the liquidity of an insurance contract in paragraph B79:

> Yield curves reflect assets traded in active markets that the holder can typically sell readily at any time without incurring significant costs. In contrast, under some insurance contracts the entity cannot be forced to make payments earlier than the occurrence of insured events, or dates specified in the contracts.

Accordingly, the liquidity characteristics of a group of insurance contracts can be assessed by looking at features that could force the entity to make payments earlier than the occurrence of insured events, or dates specified in the contracts. This criterion is referred to in the *Application of IFRS 17 Insurance Contracts* educational note as the "exit value".

Below are some features of typical Canadian products that could create an exit value. An exit value is an important feature to consider when assessing liquidity, but the additional criteria in Section 3.3 would also need to be considered.

The table below lists typical Canadian products and provides a liquidity consideration based on the exit value present in the contract.

[10] Contracts with low inherent value could be considered liquid even though they have no exit value. Alternatively, contracts with high inherent value and exit costs could be illiquid even if they have an exit value.

Product type	Product features that could create an exit value (Increases liquidity)
Traditional Whole Life Insurance/Endowment	Cash surrender value (CSV)
Term Life Insurance	None
Universal Life Insurance	CSV
Critical Illness Insurance	Return of premium (ROP) on surrender rider
Long-term Care	None
Deferred (Accumulation) Fixed Annuity	Most policies have voluntary withdrawal rights; some can withdraw on a book value basis or the lesser of book and market value
Segregated Funds Guarantee	Account value
Group Life and Health Insurance (including Group Disability Income)	None
Individual Disability Income	ROP on surrender or maturity rider
Liabilities for Incurred Claims (e.g., Group/Individual LTD claims)	None; claimants do not receive any value upon termination
Payout Annuity	None; annuitants do not receive any value upon termination
Creditor Insurance	ROP on surrender rider without restrictions
Stop Loss, Catastrophe Reinsurance	None
YRT reinsurance (mortality or morbidity risk only) – reinsurance held	None
Coinsurance Modified Coinsurance with and without Funds Withheld – reinsurance held	The reinsurance contract would be evaluated separately from the direct contract. For coinsurance, the liquidity characteristics could be the same as the underlying contracts. However, this could vary based on the specific provisions in the reinsurance contract, including recapture provisions contained in the reinsurance contracts.

3.3 Liquidity characteristics based on inherent value and exit cost

The educational note on *Application of IFRS 17 Insurance Contracts* recommends that entities consider “inherent value” and “exit cost” criteria when assessing liquidity characteristics of insurance contracts. Although IFRS 17 does not explicitly cover these criteria, the actuary is encouraged to take these factors into consideration. The table below lists typical Canadian products and the product features that will have an influence on liquidity characteristics based on inherent value and exit cost.

Product type	Product features that could build up the contract's inherent value (Decreases liquidity)	Product features that could create an exit cost (Decreases liquidity)
Traditional Whole Life Insurance / Endowment	•Level premium payments •Long contract boundary •Waiver of Premiums	•Surrender charges, typically short term and decreasing over time
Participating Life Insurance	•Level premium payments •Long contract boundary •Policyholder dividend features, especially the paid-up addition (PUA) option •Product guarantees	•Surrender charges, typically short term and decreasing over time
Term Life Insurance	•Level premium payments •Long contract boundary (T75/T100 less liquid than T10/T20) could be correlated with higher inherent value •Convertible features – convertible to a permanent product without underwriting •Renewable features – no underwriting at renewal	
Universal Life Insurance	•Minimum interest rate guarantee on GIC-type investment accounts •Long contract boundary •Level Cost of Insurance •Limited Pay features	•Surrender charges, typically short term and decreasing over time •Market value adjustments
Critical Illness Insurance	•Medium to long contract boundary •Optional riders such as ROP on expiry, waiver of premium (maintains coverage if the owner of the policy becomes totally disabled and/or dies depending on the option chosen) •Long-term care conversion option	
Long-term Care	•Medium to long contract boundary •Riders such as waiver of premiums, restoration of original benefits, and inflation protection benefit	

Product type	Product features that could build up the contract's inherent value (Decreases liquidity)	Product features that could create an exit cost (Decreases liquidity)
Deferred (Accumulation) Fixed Annuity	• Minimum interest rate guarantee	• Withdrawal basis; lesser of book and market value
Segregated Funds Guarantee	• Death, maturity, withdrawal, income, or other guarantees	• Surrender charges, typically short term and decreasing over time
Group Life and Health (including Group Disability Income)	• Pooled risks and profit-sharing arrangements	
Individual Disability Income	• Optional riders such as ROP when little or no claims have occurred, and inflation protection benefit • Benefit continues for life rather than a shorter benefit period (typically to age 65 or 71).	
Adjustable Life and Health Insurance	• Adjustability does not change liquidity from the policyholder's perspective	
Reinsurance	• Facultative submission (involves excess capacity, underwriting assistance, shopping for competitive rates, etc.) • Assumption reinsurance • Recapture is not available	• Recapture fee

The actuary would consider all characteristics of a product to assess its liquidity. The tables above provide some guidance on characteristics to consider when making such assessment. Lapse level, tax implications and underwriting considerations are additional factors that could be considered when assessing liquidity.

If the actuary decides to utilize more quantitative measures to aid in the analysis of highly complex contracts, one approach to consider is to differentiate cash flows that policyholders can force the entity to pay prior to contractual events, net of exit costs, from cash flows that cannot be paid out earlier to the policyholders. Comparing the relative magnitude of these two types of cash flows can give some indication of the liquidity level of the contracts. It is not expected that the actuary would develop a single quantitative measure that is suitable for all products in all circumstances. A quantitative measure, if used at all, could be used to support qualitative arguments.

The presence of some features that add liquidity does not necessarily imply that a product is highly liquid; all characteristics would be considered. For example, a whole life product with cash surrender values could still be considered illiquid if the inherent value build-up is high and the policyholder cannot access it. Alternatively, a product without cash surrender values but with little inherent value build-up could be considered liquid.

4. Development of illiquidity premiums

This section provides guidance on how to quantitatively derive the market-based illiquidity premium for the purpose of constructing discount rates, including practical ways to implement the top-down and bottom-up approaches. This section also provides guidance on approaches that can be used to set the illiquidity premium in the unobservable period.

4.1 Key principles

IFRS 17 does not require a particular technique for determining the illiquidity premium. However, IFRS 17.B78–B85 highlight the key principles to follow when performing such estimation:

1. Maximize the use of observable inputs and reflect current market conditions.
2. Exercise judgment to assess the degree of similarity between the features of the insurance contracts and assets with observable prices and make further adjustments as needed.
3. For illiquidity premiums beyond the last observable point, the entity might place more weight on long-term estimates than on short-term fluctuations.

In theory, where insurance contracts are highly illiquid, the discount rates could be set at a rate that is higher than the expected yield or market return on a portfolio of (more liquid) assets. The actuary would understand the implications of setting discount rates that create a negative bias in investment results.

4.2 The top-down approach

The top-down approach requires the actuary to first construct a yield curve based on returns on a reference portfolio of assets, and to adjust the yield curve to eliminate factors not relevant to the insurance contract (e.g., credit and market risks) to arrive at a discount curve. This section discusses these two steps and provides practical examples of how to adjust the yield curve for credit and market risk.

4.2.1 Reference portfolio

A portfolio of assets can be used as the reference portfolio if it reflects the characteristics of the insurance contracts (e.g., currency, liquidity).

An actuary may be able to justify using the entity’s assets as a reference portfolio if it reflects the characteristics of the contracts or the yield curve can be adjusted to reflect those characteristics.

The following section discusses the pros and cons of two types of reference portfolios.

	Advantages	Disadvantages
Own Assets Portfolio (The portfolio would consist of own assets)	• Enables partial linkage between the insurance contract discount rates and supporting asset returns. • Reduces earnings and/or balance sheet volatility as assets/liabilities will move together for changes in risk-free rates and illiquidity premium.	• Operationally more difficult to produce as the reference portfolios must be adjusted as the asset holdings change. • The actuary would need to demonstrate that the portfolio reflects the characteristics of the liabilities. • Trading activities in the asset portfolio can affect the insurance contract value and if the impact is significant, it would be disclosed.
Custom/Reference Portfolio (The portfolio would be composed of assets that best reflect the characteristics of the insurance contracts)	• Operational simplicity • Separation between insurance contract reference portfolio and actual asset portfolio; easier to make adjustments to align liquidity characteristics, if needed • Actual trading activities will not affect the discount rates	• Can increase earnings and/or balance sheet volatility if there are differences between underlying assets held and the custom reference portfolio.

4.2.2 Credit risk adjustment

Once a reference portfolio is selected, adjustments are required to eliminate factors that are not relevant to insurance contracts such as credit risk. In this section, two approaches are discussed for the derivation of the credit risk adjustment: a credit loss model approach, and a market-based approach using credit default swaps.

Credit loss model approach

The actuary can build a credit loss model to explicitly calculate both the expected and unexpected credit losses (ECL and UCL); the ECL and UCL are both deducted from the yield. The ECL represents the expected present value of losses that arise if a borrower defaults on its obligations at some time during the life of the financial asset. One common formula used to calculate ECL is: $ECL_t = PD_t$ (probability of default) x LGD_t[11] (loss given default) x EAD_t (exposure at default) for each point in time t. The total ECL would be equal to the sum of the present value of all future ECL_t's.

[11] LGD is the percentage of the loan that is not recoverable if a default occurs.

One way to value the ECL is to look at historical information, which is often referred to as a "through-the-cycle" (TTC) estimation. This approach would lead to a very stable deduction for ECL and UCL, and as a result, adjustments may be required in some market conditions. Forward-looking techniques or "point-in-time" (PIT) estimations, such as those used for IFRS 9, could be applied to reflect current actual default behaviour, market dynamics and current economic cycle. Some approaches can be found in Appendix 4.

UCL represent the cost of bearing the risk. It represents the compensation sought by an investor to face variations in credit losses. Several approaches to determine the UCL can be found in Appendix 4.

Market-based approach

Credit default swap (CDS) spreads compensate investors for taking on the credit risk associated with underlying reference entities. The CDS spreads therefore inherently account for both the ECL and UCL that would be deducted from the reference portfolio yield when using a top-down approach to derive IFRS 17 discount rates.

However, CDS information in Canada is limited. According to a published note from BoC: "A CDS index does not currently exist for Canada and only eight Canadian reference entities are included in the various North American indexes. The universe of liquid CDSs on Canadian-based entities is too small to create a diversified index." In addition, CDS spread reflects risks other than credit such as counterparty risk and liquidity risk. It may be difficult to extract the credit component out of the CDS spread. Hence, it is not recommended that entities rely on Canadian CDS data solely when deriving the credit risk adjustment.

Entities can extract CDS information from other markets, such as the US market and adapt it for Canadian use. Still, in practice, only a select number of reference entities are available under the CDS indexes. Therefore, it would be up to the actuary to make the appropriate adjustments to account for both the difference in asset composition between the reference portfolio and the CDS index as well as the difference in markets. A description of how CDS information from the US/North American market can be adapted for Canadian use can be found in Appendix 4.

4.2.3 Market risk adjustment

A reference portfolio could contain non-fixed income assets such as public equity and real estate. Public equities are considered to be highly liquid since they can usually be sold at any time at the prevailing market price. Therefore, the risk premium over risk-free rate represents a premium for market risk and would not be considered relevant to the insurance contract and would be removed from the discount rate. However, investments such as real estate which are real property consisting of land and improvements, which include buildings, fixtures, roads, structures, and utility systems, typically include an illiquidity component in their price and expected return. The actuary could take the position that such an illiquidity premium is a component of the return and include it in the discount rates derived from the reference portfolio.

For example, for real estate, the accounting carrying value of the asset is the result of an estimation done by evaluators whose models incorporate expected cash flow projections and a discount rate. The cash flows include inflows (lease income, growth, etc.) as well as outflows (vacancy rate, leasehold improvements, maintenance and repairs, administration expenses, cost of leverage). The discount rate represents the required rate of return on the asset. If the cash flows include all expected inflows/outflows, the future income method of valuing business assumes that the discount rate is mainly composed on the following elements:

1. Current risk-free rate
2. An illiquidity risk premium
3. Market risk premium (encompassing all other risks associated with real estate, except illiquidity)

The market risk premium could be estimated using multiple techniques. One possible technique could be to use the cost-of-capital approach (e.g., based on LICAT), as for fixed-income asset unexpected losses. Then, the illiquidity premium is estimated as the discount rate less the risk-free rate less the market risk premium. The actuary would need to ensure the relationship between the cash flows and the discount rate is consistent. For example, when cash inflows do not include the long-term growth assumption, the rate used to present value would be the Cap Rate (i.e., Cap Rate = Discount Rate – Long Term Growth).

4.3 The bottom-up approach

The bottom-up approach aims to explicitly derive an illiquidity premium over risk-free rates. The following approaches were considered in deriving the illiquidity premium:

- A hybrid approach that combines a market spread based on an asset reference portfolio adjusted to remove the ECL and UCL, and a constant adjustment to account for the difference in liquidity level between the asset reference portfolio and the insurance contracts.
- A market-based approach using covered bonds and National Housing Act (NHA) mortgages.

Bottom-up approach, but with an illiquidity premium curve derived from a top-down analysis (referred to as the hybrid approach)

The illiquidity premium can be expressed as a fixed percentage of asset reference portfolio spread over risk-free rates and an additional constant adjustment to reflect the difference between the liquidity characteristics of the insurance contract and the asset reference portfolio.

$$IllLiquidity\ Premium = r * asset\ reference\ portfolio\ spread\ over\ risk\ free + constant$$

The multiplicative factor *r* represents the portion of the asset spread that relates to the illiquidity premium and can be calibrated historically by calculating [asset spread – (expected loss + unexpected loss)] / (asset spread). For simplicity, *r* can be a single percentage across the curve. Alternatively, entities can also calibrate *r* based on the term structure of the credit default adjustment. With the term structure, and, if the same reference portfolio is used, the bottom-up approach and the top-down approach can be reconciled exactly.

The multiplicative factor r would depend on the assets in the reference portfolio. If the reference portfolio is comprised of Canadian publicly traded corporate bonds, then based on the top-down approach and empirical research results (see Appendix 3), credit risk typically accounts for 10%-%-40% of the overall asset spread. The multiplicative factor *r* would then be in the range of 60%-%-90%. The multiplicative factor tends to be higher for shorter durations than longer durations; however, it is at the discretion of the entity to determine whether a term structure needs to be reflected. If a single multiplicative factor *r* is applied throughout the curve, the high end of the range (i.e., 90%) could be appropriate in some circumstances such as in a liquidity crisis event or when using higher credit quality corporate bonds. Similarly, the low end would only be appropriate in circumstances where credit risk has significantly increased. It would be reasonable to use a factor closer to the middle of the range (~70%, more discussion in Appendix 3) in normal market conditions. If the reference portfolio is comprised of Canadian provincial bonds or government bonds, credit risks could be lower, given the extremely low historical default experience.

Note that instead of a multiplicative adjustment a flat or varying credit adjustment (in basis points) could be directly applied.

The constant in the formula is to account for the liquidity difference between assets in the reference portfolio (asset spread) and the insurance contracts. The application of the constant adjustment depends on the combination of reference portfolio and the liquidity characteristic of the insurance contracts:

- For highly liquid cash flows (e.g., amounts on deposit), it is likely that a reference portfolio can be found from the market that approximates the liquidity characteristics of the insurance contract very well, therefore the constant adjustment is not needed.
- For illiquid cash flows (e.g., T100), with liquidity characteristics similar to those of mortgages and private debts, if the reference portfolio already contains illiquid assets such as private debts and mortgages, the constant adjustment may also not be necessary. If the illiquidity premium was set using a combination of investment grade bonds (A to BBB) and a constant adjustment, then the constant could be defined as the historical difference between mortgage and private debt spread versus investment grade bonds. This approach may be favored as the spread data for investment grade bonds are more easily observable than for mortgages and private debts.
    - In this paper it is estimated that an adjustment of up to 50 basis points could be appropriate. This was estimated using the historical spread difference of privates and mortgages versus investment grade bonds with similar credit ratings.
- It is noted that certain insurance contracts may be even less liquid than these types of assets. It could be concluded that some of the Canadian products, such as Term to 100 without cash surrender value, are very illiquid and that the illiquidity premium could exceed that of mortgages or private debts. The actuary would use their professional judgment when determining the illiquidity premium for these types of contracts, the pricing of these contracts may be a good reference to inform this judgment. The actuary

would understand the implications of setting a discount curve that creates a negative bias in investment results.

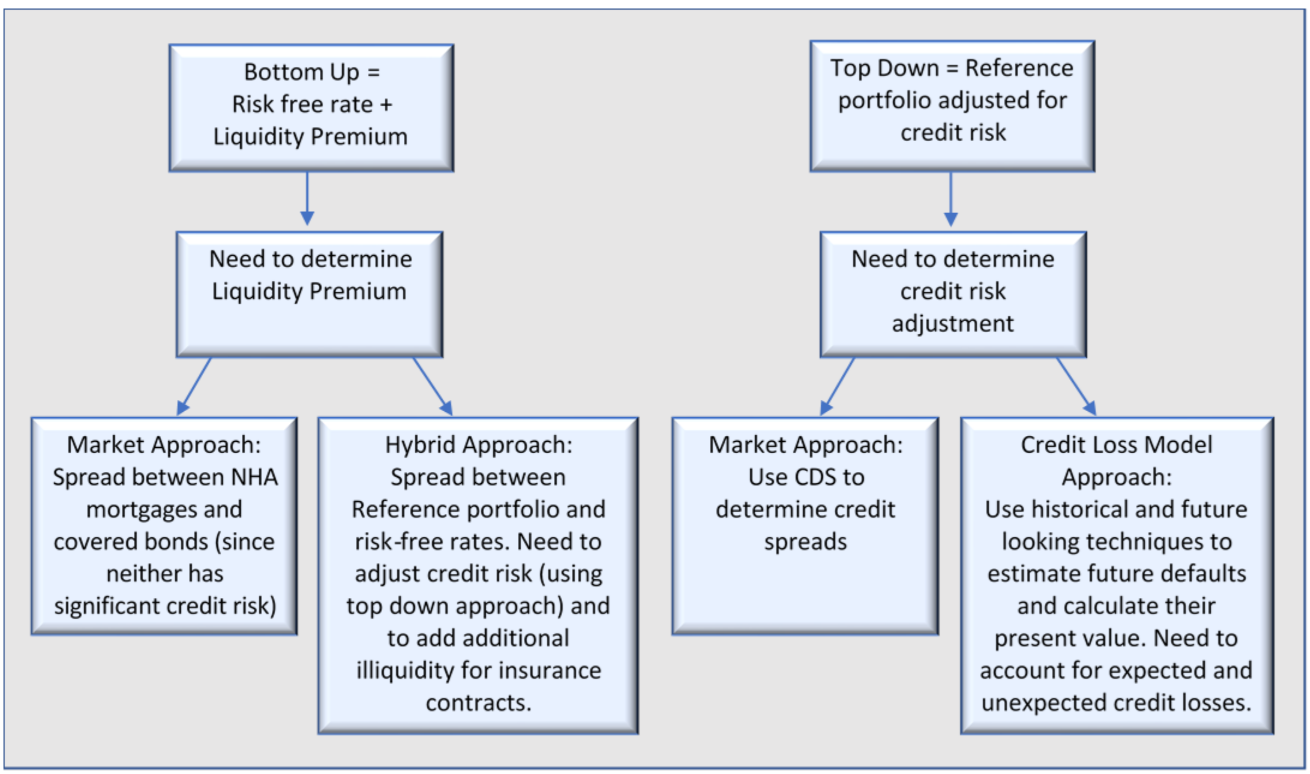
Market-based techniques

Market based techniques aim to use the spread difference between covered bonds and risk-free bonds in the same currency to directly derive the illiquidity premium. In Canada, the Canadian registered covered bonds and NHA mortgage-backed securities (NHA MBS) are both insured by Canada Mortgage and Housing Corporation and thus carry no credit risk. Any spreads over the GoC risk-free rates can be interpreted as an illiquidity premium. However, there are a number of limitations:

- Covered bonds: There are a limited number of issuers and all of the issuers are banks. They are mostly denominated in Euro. There is a lack of index data. The longest maturity is 10 years and significant interpolation is required.
- NHA MBS: They have maturity of up to five years and significant interpolation is required. The spread over GoC risk-free rates is only published at the time of transaction. There is no established index for NHA MBS.

Due to the limitations described above, neither would be appropriate as a standalone source for calculating the illiquidity premium in the IFRS 17 discount curves.

The following diagram summarizes the different approaches that can be used to determine the discount rate:



4.4 Ultimate illiquidity premium

Beyond the observable period, the discount rates will grade to an ultimate rate which can be set in the form of ultimate risk-free rate plus ultimate illiquidity premium. Below is an example on how to derive an ultimate illiquidity premium applying the bottom-up approach and using the credit loss model.

Example:

1) An entity sells two types of products, one liquid and one illiquid, and as a result two liquidity categories are set up to derive the discount rate.
2) Two asset reference portfolios were selected that reflect the characteristics of the insurance contracts as the basis of the analysis.
3) The ultimate illiquidity premium is assumed to be equal to the historical average of the illiquidity premium on the 30-year term for each reference portfolio. No further adjustment was made for any term premium.
4) The credit loss model approach was used to calculate the credit adjustment, as well as the approaches described in Appendix 4 to calculate an unexpected credit loss component. This led to a range of outcomes and the ultimate illiquidity premium was selected by considering the range of historical outcomes and the level of the overall ultimate rate.

Liquidity categories	Asset reference portfolio	Example of ultimate illiquidity premium (Basis points)
Liquid (Amounts on deposit)	Provincial bonds	70
Illiquid (T100)	Privates and uninsured mortgages	150

It is interesting to note that the illiquidity premium could converge to an ultimate illiquidity premium at a faster pace than risk-free rates. As opposed to the risk-free rate, which is observable up to 30 years, the illiquidity premium is not directly observable. It is estimated based on techniques discussed previously and relevant market information is only available on a short-term basis (e.g., CDSs are generally only observable up to five years). As illiquidity premiums are mostly based on estimation techniques, a faster convergence period might be more appropriate, would not contradict observable market data and would avoid short-term fluctuations.

5. Other observations

When setting the discount curve, the actuary would also consider and understand the implications associated with the chosen formulation. In theory, the discount rates could be set at rates that are higher than the expected yields or market returns on a portfolio of assets, for example:

- The higher the ultimate risk-free rate or illiquidity premium, the higher the insurance finance expense (and vice versa).

- The higher the illiquidity premium in the observable period, the higher the insurance finance expense (and vice versa).
- The methodology chosen to interpolate the curve between the last observable point and the ultimate rate impacts the speed of grading to the ultimate rate. To the extent the ultimate rate is higher than current rates, the faster the grading the higher the insurance finance expense (and vice versa).

In addition, the discount curve has implications on other aspects of the financial statements, such as:

- the discount curve impacts the initial contractual service margin (CSM) and subsequent insurance service results; and
- the discount rate formulation impacts the sensitivity of the estimate of future cash flows to changes in interest rates, etc.

Appendix 5 presents a very simple example based on a five-year life insurance contract. In this example, it can be observed that the IFRS 17 discount curve does not increase or decrease total profits. It only impacts the profit timing and the allocation between investment and insurance results.

6. Cash flows that vary based on the returns on underlying items

This section describes the application of discount rates for typical universal life products available in the Canadian market.

Separate educational notes provide guidance with respect to cash flows that vary with underlying items for other products. The *IFRS 17 Market Consistent Valuation of Financial Guarantees for Life and Health Insurance Contracts* educational note includes some specific guidance related to segregated fund products. The *IFRS 17 Measurement and Presentation of Canadian Participating Insurance Contracts* educational note provides guidance on participating insurance contracts.

6.1 Key principles

IFRS 17.B74(b) provides guidance with respect to estimating discount rates for insurance contracts that have cash flows that vary with returns on underlying items. It states that an entity can either (i) discount using rates that reflect that variability or (ii) adjust the cash flows for the effect of that variability and discount them at a rate that reflects the adjustment made.

- Option (i) could be analogous to a real-world valuation framework which is concerned with producing a realistic view of potential future economic variables. In this framework, the discount rates for cash flows that vary would reflect the rates of return used to project the underlying items on a real-world basis (asset-based discount rates).
- Option (ii) permits a rate of return on underlying items that is not necessarily a real-world framework, with cash flows adjusted to be consistent. This framework relies on mathematical relationships within and among financial instruments and could include a risk neutral valuation where risk-free rates of return (with or without illiquidity

premium) are used to project the underlying items and to discount the cash flows. This framework could also include using the discount rates for cash flows that do not vary with underlying items as both the rate of return for underlying items and the discount rates for cash flows that vary.

IFRS 17.B75 states that the variability of insurance cash flows would be considered even if the entity exercises discretion or the underlying items are not held by the entity.

IFRS 17.B77 indicates that it is not required to divide cash flows between those that vary and those that do not vary. If the cash flows are not divided, then the discount rates would be appropriate for the estimated cash flows as a whole.

IFRS 17.B47--B48 notes that a replicating portfolio technique does not need to be applied, and that other techniques such as stochastic modelling may be more robust and easier to implement. However, where replicating assets do exist for some cash flows, the entity shall satisfy itself that the replicating portfolio technique would be unlikely to produce a materially different result. Judgment is required to determine the technique that best meets the objective of consistency with observable market variables based on the specific facts and circumstances.

Guarantees and other product features create non-linearity in the future cash flows estimation which means that the present value of future cash flows depends on the return used to project the underlying items. Features that create non-linearity often require the use of stochastic modelling techniques. Guidance relating to stochastic modelling under IFRS 17 is available in the *IFRS 17 Market Consistent Valuation of Financial Guarantees for Life and Health Insurance Contracts* educational note.

6.2 Separation of cash flows for typical Canadian universal life products

Under IFRS 17, it is possible to separate the insurance contract cash flows between those that vary with returns on underlying item and those that do not, and to use different discount rates to calculate the present value of each set of cash flows. This section describes the application of bifurcation before adjusting for the non-linearity that can be introduced by minimum crediting rate guarantees or policyholder behaviour. Section 6.3 will cover product features that create non-linearity and may require stochastic valuation.

In general, ignoring features that create non-linearity, the present value of cash flows that vary would be insensitive to changes in the rate of return on underlying items when discounted at the rate of return on underlying items, whereas the present value of cash flows that do not vary would be insensitive to changes in the rate of return on underlying items when discounted at a fixed rate.

Cash flows for universal life products can be projected under the following views:

- Whole Contract view includes all cash flows transferred between the insurer and the policyholder. This view includes cash flows such as deposits that cannot naturally be bifurcated between cash flows that do and do not vary with underlying items.
- Core Cash Flows view includes just cash flows transferred between the insurer and the product's account value. Transfers in and out of the account value by the policyholder are excluded, but the fees collected from the account value are included. This view

more readily lends itself to bifurcation and is mathematically equivalent as it results in the same present value of cash flows as the Whole Contract view when all cash flows are discounted at the rate of return used to project the cash flows.

In the illustrative example below, the equivalency of the two views is demonstrated. The whole contract view projects deposits into the account and payouts from the account to the policyholder, while the core cash flows view only projects the management expense ratio (MER) cash flows.

- Initial deposit of $10,000 at the beginning of Year 1
- Accumulated account value withdrawn at the end of Year 2
- Management expense ratio of 2%
- Return on account value of 10%
- Insurance contract discount rate of 10% (same as return on account value)

Year	Deposit	MER	Account value (end of year)
1	10,000	(220) = 10,000 * (1 + 10%) * -2%	10,780 = 10,000 * (1 + 10%) * (1 – 2%)
2	n/a	(237) = 10,780 * (1 + 10%) * -2%	11,621 = 10,780 * (1 + 10%) * (1 – 2%)

Initial reserve	Core Cash Flows calculation: Present value of MER	Whole Contract calculation: Present value of payouts less deposits
(396)	(220) / (1 + 10%) + (237) / (1 + 10%)^2	11,621 / (1 + 10%)^2 – 10,000

The chart below illustrates potential bifurcation under both views. An alternative approach which does not require bifurcation would be to use the discount rate for cash flows that do not vary as the growth rate of the underlying items for cash flows that vary, and then to discount all cash flows at that rate. Any adjustment for guarantees would need to be updated accordingly. Judgment is required to determine the most appropriate bifurcation (if any) based on the product features.

Method	Whole Contract	Core Cash Flows bifurcation for increasing face amount	Core Cash Flows bifurcation for level face amount
Description	Cash flows between the insurer and the policyholder are considered.	Cash flows between the insurer and the account value are considered. Cash flows between the account value and the policyholder are not considered.	Same as increasing face amount, but for level face amount products, the death benefit and cost of insurance are also split between a face amount component and a negative account value component.

Cash flows that do not vary	Deposits, death benefit, commissions, general expenses	Death benefit, cost of insurance rate * net amount at risk, expenses, initial account value	Face amount, cost of insurance rate * face amount, expenses, initial account value
Cash flows that vary	Withdrawals	Management expense ratio	Management expense ratio, (net amount at risk – face amount), cost of insurance rate * (net amount at risk – face amount)

The net amount at risk (NAAR) for a level face amount product is equal to the face amount which is fixed less the account value which varies based on the rate of return on underlying items. Cash flows such as death benefits and cost of insurance (COI) charges depend on the NAAR.

The bifurcation can be accommodated by splitting the NAAR into face amount and negative account value components and then discounting the face amount component at the IFRS 17 discount rates used for cash flows that do not vary and the negative account value component at the rate of return on underlying items.

6.3 Features that create non-linearity for typical Canadian universal life products

The present value of cash flows that vary is theoretically insensitive to any change in the rate of return on underlying items since these cash flows grow and are discounted at the same rate. However certain product features could lead to changes in the present value of cash flows when there is a change in the rate of return on underlying items (i.e., non-linearity). This section describes features that could create non-linearity in future cash flows.

Features that create non-linearity often require the use of stochastic modelling techniques. Guidance relating to stochastic modelling under IFRS 17 is available in the *IFRS 17 Market Consistent Valuation of Financial Guarantees for Life and Health Insurance Contracts* educational note.

6.3.1 Dynamic lapses

For many universal life products, the lapse assumption depends on the rate of return on underlying items. For example, fewer lapses would be expected when market rates are below the guaranteed crediting rate (in the money) compared to a situation where market rates exceed the guaranteed crediting rate (out of the money) because the guarantee is worth more for the policyholder in that situation.

Since the lapses depend on the rate of return on underlying items, the present value of future cash flows will be impacted non-linearly by the rate of return on underlying items. An example is shown in Appendix 6.

6.3.2 Minimum return guarantee

Minimum return guarantees are a type of investment option for universal life insurance. They create non-linearity because the guarantees kick in when the returns of underlying items are lower than the guaranteed returns and the credited returns are calculated based on the guarantees rather than the returns of the underlying items.

6.4 Replicating portfolio

If a replicating portfolio is used for the valuation, then a stochastic valuation is not required and bifurcation of cash flows between those that do and do not vary may not be needed.

Paragraph B46 indicates that a replicating portfolio is one whose cash flows exactly match the cash flows of a group of insurance contracts and that if a replicating portfolio of assets exists for some or all of the cash flows that arise from a group of insurance contracts then the fair value of those assets can be used to measure the present value of the cash flows.

IFRS 17.B47–B48 note that a replicating portfolio technique does not need to be applied, and that other techniques such as stochastic modelling may be more robust and easier to implement. However, where replicating assets do exist for some cash flows, the entity shall satisfy itself that the replicating portfolio technique would be unlikely to produce a materially different result. Judgment is required to determine the technique that best meets the objective of consistency with observable market variables based on the specific facts and circumstances.

Chapter 2 – Reference curves, deviations from the reference curves, and guidance for disclosures in the Appointed Actuary's Report

1. Introduction

The language related to discount rates in IFRS 17 is brief and principles-based. The principles-based nature of IFRS 17 could lead to a wide range of practice among actuaries, particularly when setting discount rates beyond the observable period. Consequently, CLIFR and PCFRC have created parameters for a set of reference curves to facilitate comparison of discount rates among entities. It is expected that the actuary comments on the entity's discount curves used to calculate the discounted value of the estimate of future cash flows versus these reference curves in the AAR to the regulator. The items that would be discussed are outlined in Section 4. In some instances, it is also expected that the actuary would compare the present value of the estimates of future cash flows obtained using the entity's curve with the present value obtained when using the reference curve parameters for the unobservable period.

This chapter presents reference curves for insurance contracts that are deemed to be liquid and illiquid and outlines how these curves are constructed in the observable period and beyond the observable period.

This educational note only defines reference curves for liquid and illiquid insurance contracts. In assessing the liquidity characteristics of the insurance contracts, an entity may have insurance contracts that fall between the two defined reference curves. For example, an entity may only have insurance contracts that have medium liquidity or may have different insurance contracts that fall in multiple liquidity categories. The actuary would use judgment to derive the reference curve that would apply to the insurance contracts that fall between the defined liquid and illiquid categories.

2. Defining the reference curves

In this section, the reference curves are defined for liquid and illiquid insurance contracts based on the following parameters:

- the length of the observable period;
- the risk-free rates and illiquidity premiums for the observable period;
- the ultimate risk-free rate and the ultimate illiquidity premiums;
- the approach used to interpolate between the last observable point and the ultimate point; and
- the methodology to update the ultimate risk-free rate and ultimate illiquidity premiums going forward.

The parameters presented in this chapter are discussed in Appendix 2 and Appendix 3 and will **be applicable until October 15, 2023**. Subsequently, the parameters of the reference curves will be updated annually by CLIFR.

2.1 Defining the reference curves in the observable period

In the observable period, for terms up to 30 years, the risk-free rates are derived from GoC debt securities.

The last observable point is set at the 30-year term based on GoC debt securities as outlined in Chapter 1. The actuary would not deviate from the 30-year observable period for insurance contracts sold in Canada and in Canadian currency.

The reference curve illiquidity premiums for liquid insurance contracts (e.g., amounts on deposit or liability for remaining coverage (LRC) for most P&C products) are set using provincial bonds as a reference portfolio and a credit risk adjustment. For each term up to 30 years, the illiquidity premium is defined as the interest rate spread of the portfolio, adjusted for credit risk, over the risk-free rate derived from the GoC debt securities. This is approximately equivalent to an illiquidity premium equal to 90% of the provincial bonds spread, more information on the derivation of the 90% is available in Appendix 3.

The reference curve illiquidity premiums for illiquid insurance contracts (e.g., T100, or liability for incurred claims (LIC) for most P&C products) are set using Canadian investment grade corporate bonds as a reference portfolio, adjusted with a constant to reflect the fact that these insurance contracts are less liquid than corporate bonds, and a credit risk adjustment. For each term up to 30 years, the illiquidity premium is defined as 0.50% + 70% of the Canadian investment grade bonds spread over the risk-free rate derived from the GoC debt securities; more information on the derivation of the 70% is available in Appendix 3.

A linear interpolation method is used to interpolate the rates between the different data points available during the observable period for the purpose of the reference curve.

The resulting reference curves in the observable period are therefore:

a. Liquid curve: Risk-free rate + 90% of provincial bonds spread
b. Illiquid curve: Risk-free rate + 0.50% + 70% of Canadian investment grade corporate bonds spread

2.2 Defining the reference curves in the unobservable period

The unobservable period begins after the last observable point, which is set at the 30-year term. To derive the curve in the unobservable period, the ultimate risk-free rate, the ultimate illiquidity premium, and the period of time between the last observable point and the ultimate point are defined. The reference curve is then interpolated from the last observable point to the ultimate point and held constant beyond that point.

The ultimate risk-free rate and the ultimate illiquidity premiums are reached at the 70-year term. A linear interpolation method is used between the last observable point (i.e., 30-year term) and the 70-year term for purposes of the reference curve.

The ultimate risk-free rate is set based on the formula described in Section 2.3, at 3.65%, and is on a spot rate basis. The methodology used to derive the 3.65% is presented in Appendix 2.

The ultimate illiquidity premiums for the liquid and illiquid categories are set at 0.70% and 1.50% respectively, on a spot rate basis[12], at the 70-year term. The ultimate risk-free rate and the ultimate illiquidity premiums are held constant beyond the 70-year term for purposes of the reference curves.

The resulting reference curves in the unobservable period are therefore:

a. Liquid curve: grade linearly from the 30-year point to the ultimate 70-year point of 4.35%
b. Illiquid curve: grade linearly from the 30-year point to the ultimate 70-year point of 5.15%

The methodology used to derive these rates is presented in Appendix 3.

When developing a curve for the unobservable period for insurance contracts sold in Canada and in Canadian currency, the actuary needs to select various parameters, such as an ultimate risk-free rate, an ultimate illiquidity premium, a period of time between the last observable point and the ultimate point, a methodology to interpolate between the last observable point and the ultimate point, and a spot versus forward construct. When selecting these parameters, the actuary would choose parameters that result in the discounted value of the estimates of future cash flows being at least as high as the discounted value of the estimates of future cash flows obtained using the reference curve parameters beyond the observable period. This comparison would be performed in aggregate for all insurance contracts sold in Canada in Canadian currency (see Section 4 for examples).

Section 2.3 Calculation of the ultimate rates

This section describes the methodology used to calculate the ultimate rates for the reference curves.

2.3.1 Risk-free rate

The ultimate risk-free rate is set with consideration of the real interest rate and the BoC inflation target. Real interest rates consist of short-term real rates and term premiums. A 25-year exponential moving average (EMA) is used to place more weight on recent data both for the short-term real rate and term premium. The EMA formula used to calculate both the short-term real rate and term premium is as follows:

$$EMA(t) = Data(t) * \alpha + EMA(t-1) * (1 - \alpha)$$

Where:

i. **Data(t)** represents the observable short-term real rate or term premium for the current period at time t. The starting date was set at December 31st 1960;
ii. **α** = 2 / (N + 1) and **N** is equal to 300 months (i. e. α = 2 / 301).

[12] Refer to Appendix 3 for the methodology used to derive the ultimate long-term illiquidity premiums.

The ultimate risk-free rate (URFR) is then calculated as follows:

$$URFR(t) = EMA(t)_{\text{short-term real rate}} + EMA(t)_{\text{term premium}} + \text{inflation target}(t)$$

Where

- **Short-term real rates** are approximated using the monthly BoC V122541 series from which the monthly year over year growth of the V108785713 index is subtracted.
- **Term premium** is derived as the difference between the monthly BoC V122487 and V122541 series.
- **Inflation target(t)** is the mid-point of the inflation target range determined by the BoC at time t, which is set at 2% at the time of publication of this educational note.

Additional information related to the URFR is available in Appendix 2.

2.3.2 Ultimate illiquidity premiums

The ultimate illiquidity premiums outlined in Section 2.2 are derived by deducting credit adjustments from the reference portfolio total asset spread. The total asset spread is calculated as follows:

$$\text{Total asset spread}(t) = \text{reference portfolio yield}(t) - \text{risk-free rate}(t)$$

Where:

- **reference portfolio yield(t)** is calculated as the lifetime historical average of liquid or illiquid reference portfolio yields at the 30-year tenor up to time t, where the historical starting point is March 31, 1992. Reference portfolio yields are based on the following indices: Canadian Corporate A Bonds (C287 Index), Canadian Corporate BBB Bonds (C288 Index), and Canadian Provincial bonds (BVCSCE Index);
- **risk-free rate(t)** is calculated as the lifetime historical average of the BoC rates at the 30-year tenor up to time t, where the historical starting point is December 30, 1992. Risk-free rates are based on GCAN Index.

A simple average is used to calculate the reference portfolio yield rather than EMA due to the shorter data period available, and to be consistent with the calculation of credit risk adjustment. The ultimate illiquidity premiums for the reference curves are then calculated as follows:

$$\text{Ultimate illiquidity premiums}(t) = \text{total asset spread}(t) - \text{credit adjustment}(t) + \text{illiquidity adjustment}$$

Where:

- **credit adjustment(t)** is the sum of the expected credit loss (ECL) and the unexpected credit loss (UCL). More details on the methodology and data used to determine ECL and UCL are available in Appendix 3.
- **illiquidity adjustment** is 0 basis points for the liquid reference curve and 50 basis points for the illiquid reference curve.

2.3.3 Additional mechanics

CLIFR will update the ultimate risk-free rate, observable illiquidity premium and ultimate illiquidity premiums parameters annually. CLIFR will also consider whether adjustments to other parameters are necessary; we expect these would not be updated as frequently. The next update will be effective on October 15, 2023. Annual changes will be based on data up to the prior year end. In addition, annual changes to the ultimate risk-free rate and ultimate illiquidity premiums will be capped at 15 basis points for each rate to ensure we are not introducing too much volatility in discounting long-term cash flows.

The ultimate rates will be rounded to the nearest 5 basis point and the rounding will be applied separately to the short-term real rates (i.e. $EMA(t)_{\text{short-term real rate}}$), the term premium (i.e., $EMA(t)_{\text{term premium}}$) and the ultimate illiquidity premiums.

Furthermore, CLIFR will assess the continued appropriateness of the current methodology going forward. The subcommittee noted a few considerations:

a. The short-term real rates are calculated using nominal rates less CPI, CPI can be a volatile source of inflation data, the subcommittee considered whether an alternate source would be more appropriate and settled on using CPI-common index data. The appropriateness of this decision would be considered going forward.

b. The subcommittee debated using nominal long-term rates and the EMA formula to set the ultimate risk-free rate. This could be reconsidered in the future.

c. The subcommittee considered using simple average and different moving average approaches to derive the illiquidity premiums. The averaging method may be reconsidered in the future. In addition, both parameters and methods used to calculate the ECL and UCL could be subject to future refinements.

3. Other considerations

3.1 Insurance finance expense versus investment income

There could be cases where the expected return on the assets of the insurer is lower than the discount rates applied to the estimates of future cash flows which would lead to the investment income for the assets supporting the insurance contracts being lower than the insurance finance expense. The actuary would understand the implications of setting discount rates that create a negative bias in investment results.

3.2 Negative estimates of future cash flows and applicability of the reference curves

In instances where the present value of estimates of future cash flows beyond the observable period is negative, in aggregate, a lower discount curve may lead to a lower present value of estimates of future cash flows. If this occurs, the facts and circumstances may justify the situation and a deviation between the entity’s discount curve from the reference curve may be appropriate and still represent the characteristics of the liabilities.

3.3 Segregated funds

The *IFRS 17 Market Consistent Valuation of Financial Guarantees for Life and Health Insurance Contracts* educational note provides additional considerations for segregated fund business.

4. Suggested disclosures in the Appointed Actuary's Report

The discount curve applied to the estimates of future cash flows is a significant assumption impacting many aspects of the financial statements. The discount curve will be a driver of the fulfilment cash flows, the CSM at initial recognition and the insurance finance expense. As a result, it is recommended that the actuary include information in the AAR to outline the methodology used to develop the discount curves for all insurance contracts inforce. In addition, for insurance contracts issued in Canadian currency, it is recommended that the actuary comments on the resulting discount curves versus the reference curves outlined in this section. The items that would be discussed are outlined below.

The information provided would include a description of the methodology used to set the discount curves for all currencies, and would cover:

1. the last observable point;
2. the ultimate risk-free rates and whether a spot or forward ultimate rate is used;
3. the convergence period between the last observable point and the ultimate rate;
4. the interpolation methodology used to interpolate between the last observable point and the ultimate point;
5. the derivation of the illiquidity premiums in the observable period and beyond the last observable point;
6. the derivation of the reference curves used for liabilities that fall between the liquid and illiquid categories described in this educational note; and
7. a demonstration that the discounted value of the estimates of future cash flows calculated using the parameters of the entity's discount curves beyond the observable period is not lower than the value obtained using the parameters of the reference curves beyond the observable period. This demonstration would be performed in aggregate for all insurance contracts sold in Canada in Canadian currency.

   Below are two possible approaches to demonstrate the point above; other approaches may also be appropriate:

   a. For long term insurance contracts where only net cash outflows are expected beyond the observable period, the actuary could demonstrate that the discounted value of the estimates of future cash flows calculated using the entity's discount curve is at least as high as if using the parameters of the reference curve beyond the observable period by ensuring its curve is always lower than the reference curve in the unobservable period.

   b. Alternatively, if the facts and circumstance differ from above, the actuary could compare the discounted value of the estimates of future cash flows obtained using the entity's own curve with the discounted value of the estimates of future cash flows obtained when using the entity's own curve in the observable period and the parameters of the reference curve in the unobservable period (i.e., the only difference being the discount curve within the unobservable period).

If an actuary selected the parameters below to build the entity's discount curve, approach (a) may be applicable without requiring the calculations under approach (b):

i. Observable period of 30 years.

ii. Illiquidity premium in the observable period is set at 85% of investment grade corporate bonds.

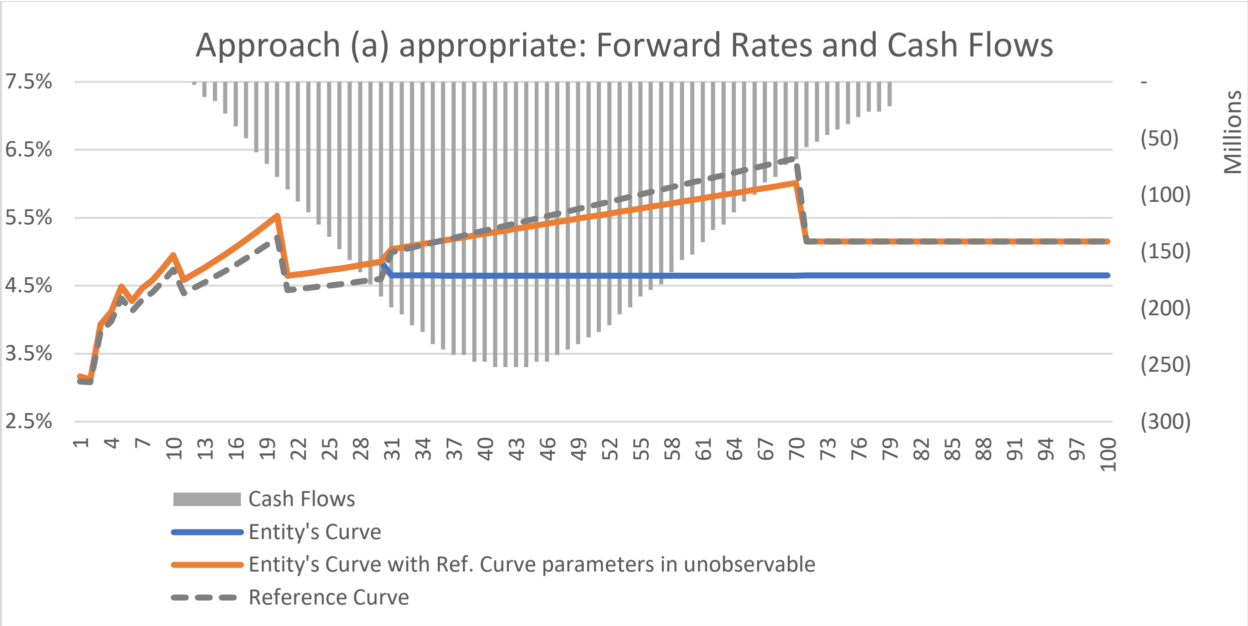
iii. A spot construct is chosen, and the ultimate point is reached in year 70.

iv. Linear grading of spot rates from the 30-year point to the ultimate 70-yr point is used.

v. The ultimate risk-free spot rate is set at 3.65% and the ultimate illiquidity premium is set at 1.0%.

vi. Sample cash flows (all outflows) are used in the example that follows.

The actuary could graph the entity's discount curve and compare it to the entity's curve with the reference curve parameters in the unobservable period. Based on the graph below, the entity's own curve is always below the reference curve in the unobservable period (beyond 30 years). To the extent the actuary only expects net cash outflows beyond the observable period, the graph would be sufficient to demonstrate that the actuary's own curve leads to a discounted value of estimates of future cash flows that is at least as high as if the actuary used the parameters of the reference curve in the unobservable period.



If an actuary selected the following parameters to build the entity's discount curve, approach (b) may be required:

i. Observable period of 30 years.

ii. Illiquidity premium in the observable period is set at 85% of investment grade corporate bond spreads.

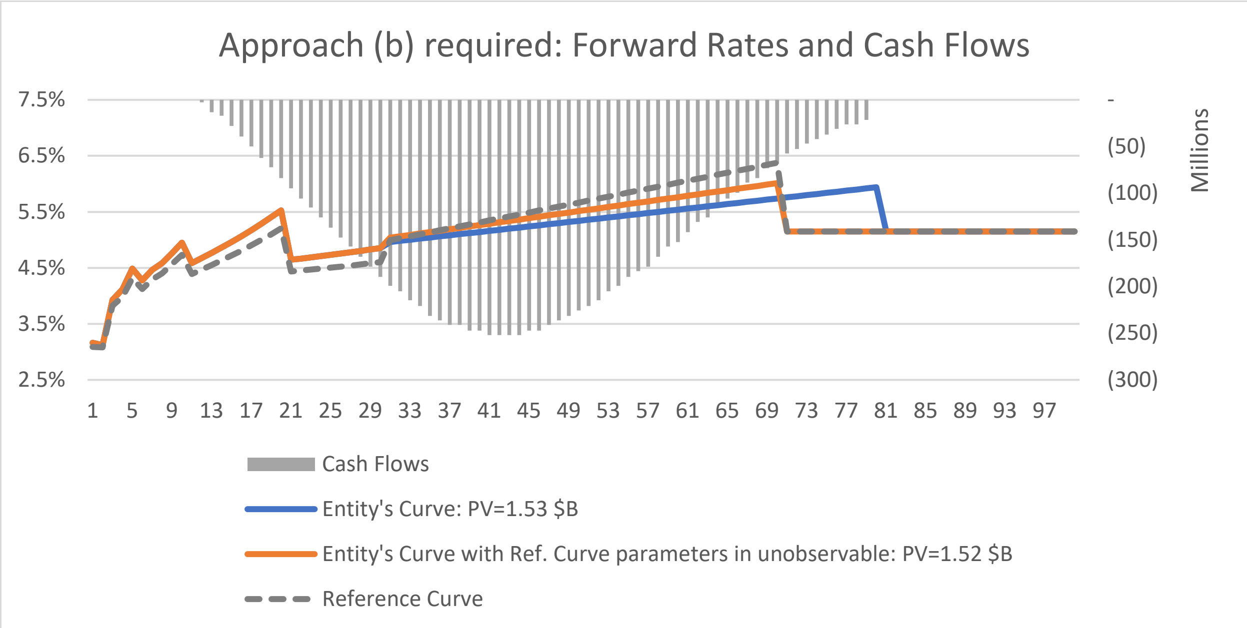
iii. A spot construct is chosen, and the ultimate point is reached in year 80.

iv. Linear grading of spot rates from the 30-year point to the ultimate 80-yr point is used.

v. The ultimate risk-free spot rate is set at 3.65% and the ultimate illiquidity premium is set at 1.5%.

vi. Sample cash flows (all outflows) are used in the example that follows.

In this example, the entity's curve is not always below the entity's curve with the reference curve parameters in the unobservable period. In this case the actuary could compare the discounted value of the estimates of future cash flows using the entity's curve to using the entity's curve modified to use the parameters of the reference curve in the unobservable period (i.e., the only difference being the discount curve within the unobservable period).



The present value of the estimates of future cash flows using the entity's curve is $1.53 billion, which is higher than the present value using the entity's curve adjusted to use the reference curve parameters in the unobservable period of $1.52 billion.

If the present value of the estimates of future cash flows using the entity's curve is lower than the present value using the entity's curve adjusted to use the reference curve parameters in the unobservable period, then the actuary would adjust the entity's curve in the unobservable period until the amount is equal to or higher.

Appendix 1 – Trading of Government of Canada bonds

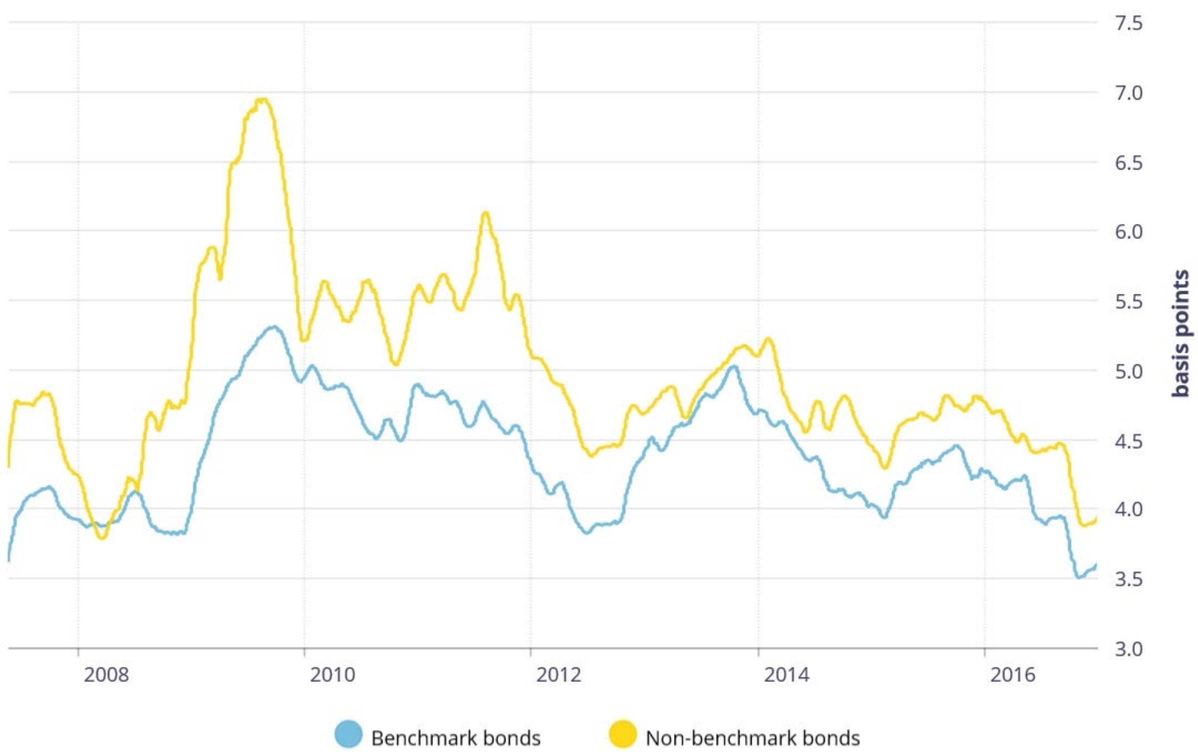
This appendix discusses assessing the end of the observable period using factors such as bid-ask spread, trading volume, trade size, and the impact of trades.

There are limited sources to assess the liquidity of GoC bonds; however, one source is a 2017 BoC staff analytical note[13] (the "analytical note"). The analytical note analyzed the bid-ask spread, trading volume, trade size and the impact of trades for GoC bonds with terms of 2, 5, 10, and 30 years. The analytical note also compared these metrics for benchmark bonds vs. non-benchmark bonds. For the same bond term, non-benchmark issues tend to have less liquidity than benchmark issues.

The analytical note analysis on the bid-ask spread is illustrated in the graph below. During the financial crisis it may be observed that the bid-ask spread spiked and has since returned to pre-crisis levels. As the bid-ask spread is relatively small (3.5--5.0 basis points), this is indicative of an active market out to 30 years (the longest-term bonds included in the analysis).

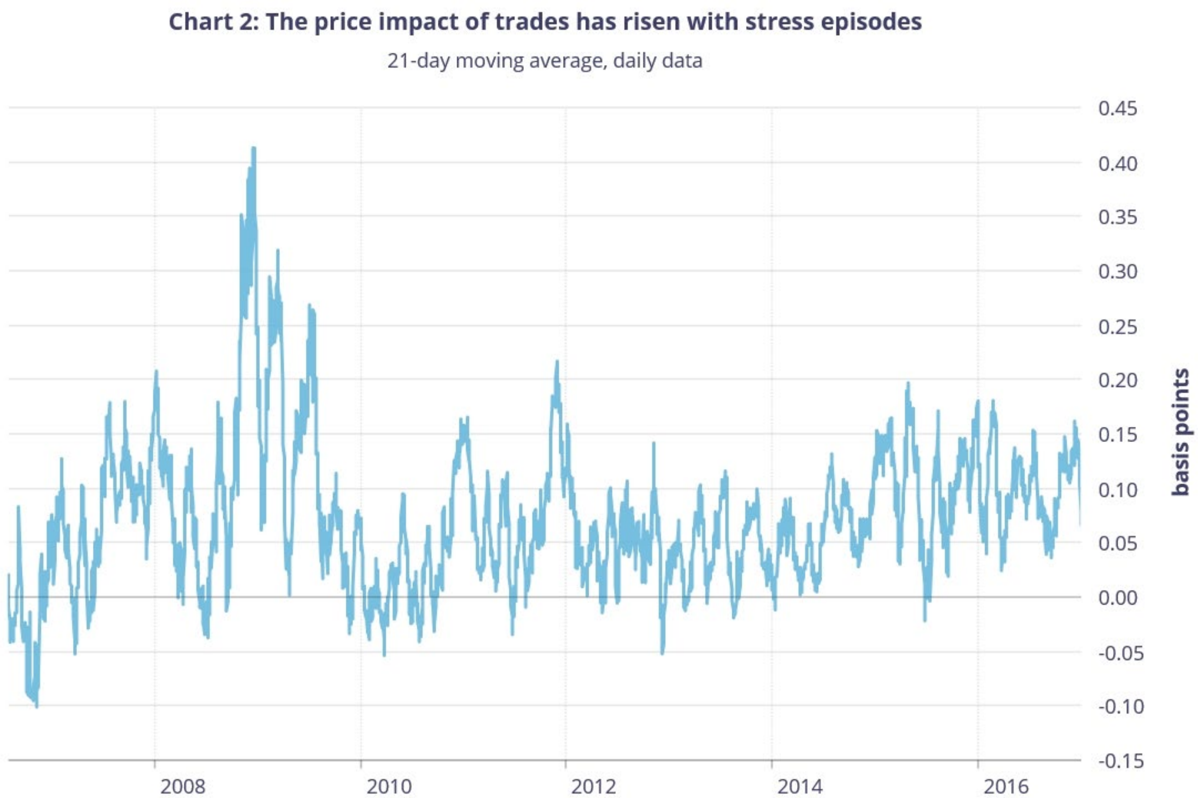
Chart 1: The bid-ask spread has been stable for benchmark and non-benchmark bonds since the financial crisis

21-day moving average, daily data



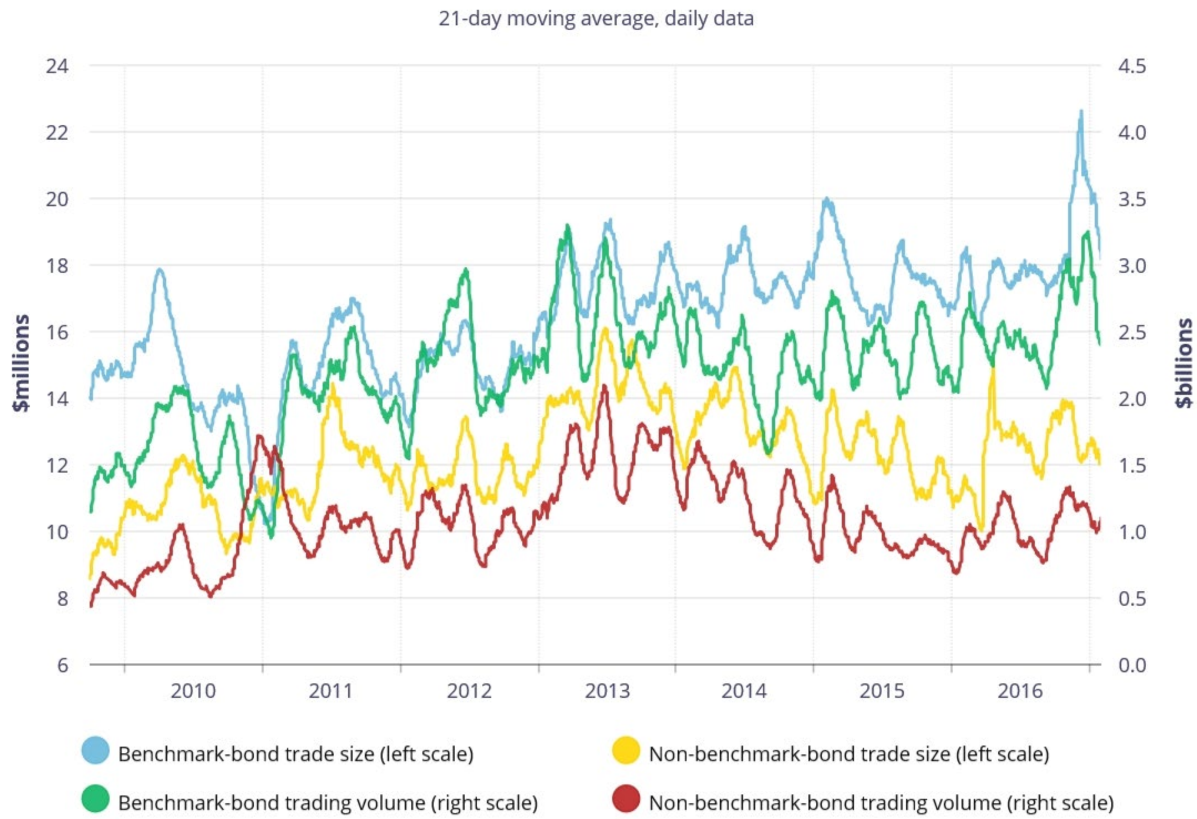
To assess the impact of trades, the BoC analyzed the price impact of trades normalized to a $1 million trade size. The price sensitivity to trade size of GoC bonds up to 30-year term is relatively small indicating an active market.

[13] https://www.bankofcanada.ca/2017/08/staff-analytical-note-2017-10/

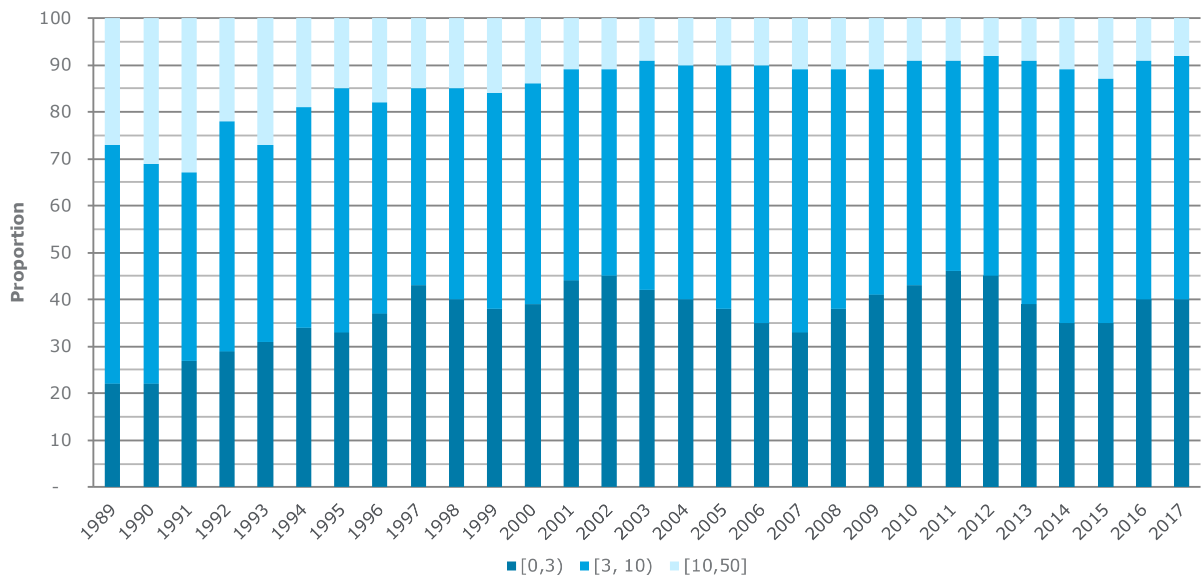


Lastly, the analytical note analyzed the trading volume and trading size for GoC bonds. This analysis showed that the daily volume for benchmark GoC bonds has recently ranged between approximately $2--$3 billion while the daily volume for non-benchmark GoC bonds has recently ranged between approximately $0.75-$1.25 billion.

Chart 3: Trading volume and trade size have increased for benchmark bonds but remained stable for non-benchmark bonds



The BoC also publishes information on market trading by duration of security, as shown in the chart below:



Source: Bank of Canada (Historical bond market trading by type of security – formerly F12)

This chart shows that approximately 10% of the GoC bonds that trade have a maturity of 10 or more years.

Unfortunately, more refined data on the trading volume on GoC bonds with a maturity over 10 years is limited. To estimate the trading volume of GoC bonds with a term over 30 years the above information was combined with trading data from the analytical note.

GoC bonds with a term of more than 30 years are non-benchmark bonds. From the analytical note, approximately 30%-40% of GoC bonds that trade are non-benchmark bonds. It was assumed that this proportion holds for bonds trading with a term over 10 years.

For non-benchmark bonds with a term over 10 years, approximately 10% have a term of over 30 years.

Using the above, the proportion of GoC bonds trading with a maturity over 30 years is estimated as:

- proportion of GoC bonds trading with a maturity over 10 years (~10%); *times*
- proportion of non-benchmark bonds trading (~30-40%); *times*
- proportion of non-benchmark bonds with a term over 10 years that have a term over 30 years (~10%).

Assuming that trading was to occur uniformly across all durations per above, GoC bonds with a term greater than 30 years would represent 0.4% of the total trading volume of GoC bonds. Based on this, it is doubtful that there is an active market for GoC bonds of more than 30 years.

Appendix 2 – Approach to set the ultimate risk-free rate (URFR)

The ultimate risk-free rate presented in this document will be updated each year in accordance with the methodology outlined in Chapter 2, Section 2.3.1. Note, CLIFR intends to monitor the results of the current approach. If the URFR is unintuitive as a result of the calculation approach, the approach may be revised as appropriate.

Exceptionally in 2021, and to ease the transition to IFRS 17, the first URFR was set based on a calculation with information available as of December 31, 2021 and taking into account a projection up to December 31, 2022. The intent was to avoid any change and confusion during the transition year (2022), up to the next CLIFR update of the URFR which will happen in 2023, based on current information up to December 31, 2022.

The methodology used to set the URFR was developed in summer 2021 and at that time using the total CPI and three scenarios (Constant rate scenario; Professional forecaster scenario; Long term view scenario) the URFR estimate as of December 31, 2022 was 3.65%. Since the inflation metric choice was refined to CPI-common. Using this metric:

- **Most recent year-end:** Using information up to December 31, 2021, the URFR obtained is 3.70%.
- **Constant economic environment scenario**: Using information up to January 31, 2022, the V122541 and V122487 rates are assumed to remain constant forever at their January 31, 2022 levels. The CPI-common index growth rate is assumed to stay at its January 31, 2022 rate, which was at a relatively high level. Under this scenario, the URFR obtained as of December 31, 2022 is 3.55%.

Taking this information into account, a 3.65% URFR up to December 31, 2022, remains appropriate.

Appendix 3 – Methodologies used to analyze the historical illiquidity premiums

This section documents how the illiquidity premium examples for the observable and non-observable periods in Sections 4.3 and 4.4 were developed. Historical public bond market spreads were reviewed and adjusted to remove the expected and unexpected risk of default. It is expected that the illiquidity premiums will follow the same rounding methodology, update frequency and update cap as the ultimate risk-free rate.

Data sources

Yields for Canadian risk-free and corporate bonds: Canadian Corporate A Bonds, (C287 Index) Canadian Corporate BBB Bonds (C288 Index), Canadian Provincial bonds (BVCSCE Index) and Canada risk-free Bonds (GCAN Index) information going as far back as possible were sourced from Bloomberg.

Credit migration matrix: The North American matrices from the S&P Annual Global Corporate Default Study[14].

Privates and mortgages data: As there is no data available from public sources, information from an independent research report was sought. High level ranges for the illiquidity premiums paid on these instruments over public investment grade instruments are around 35–200bps level. An illiquidity premium of 50 basis points[15] was used based on available reports, feedback from the subcommittee and to recognize that this is only an approximation.

The subcommittee reviewed different methods of weighting recent data more heavily but found this led to higher illiquidity premiums as the most recent data indicates an increasing trend in spreads. A simple average method was used for this reason, as well as the fact that it creates consistency between credit spreads and the calculation of credit default adjustments. The credit default adjustments are non-time varying and the underlying credit data reflects a longer historical period than the available data for spreads.

Calculation

<u>Calculating the expected credit loss (ECL):</u>

$$Expected\ default\ adjustment_t = \left(1 - (1 - cumulative\ PD_t)^{\frac{1}{t}}\right) * LGD$$

The one-year credit migration matrix was used as the basis to calculate the longer duration transition probabilities (from two years to 30 years), because the longer duration matrices provided in the report do not cover all the tenors. Cumulative default probabilities were converted into an annual number. The loss given default (LGD) is assumed to be 45%[16] based on research findings and applied to the annualized credit default spread.

[14] The North American data was used because of lack of Canadian specific public data. It should also be recognized that the study period of default data and the credit spread data do not exactly align but credit spread data was used as far back as available and the difference in study period was deemed immaterial.

[15] Fifty basis points is consistent with the lower end estimate of available reports from Willis Towers Watson, Phillips, Hager & North Investment Management, and Pemberton Asset Management.

[16] References: Various studies were reviewed including S&P, Moody’s, and Global Credit Data reports.

ECL - Default / Maturity	1	2	3	5	7	10	20	30
A	0.02%	0.03%	0.03%	0.04%	0.05%	0.07%	0.14%	0.20%
BBB	0.08%	0.09%	0.11%	0.14%	0.17%	0.22%	0.34%	0.41%

Calculating the unexpected credit loss (UCL):

Three approaches of calculating UCL were tested to provide a range of outcomes for the credit default spread:

(i) A fixed margin of 100% of ECL. This level was selected to be at the conservative end of the existing asset credit margins used in the Canadian Asset Liability Method (CALM).

(ii) The Life Insurance Capital Adequacy Test (LICAT) Cost of Capital (CoC) approach using a CoC assumption of 10% (after adjusting for risk-free returns), LICAT target ratio of 115%, scalar of 105% and diversification factor of 84%.

(iii) The cost of capital approach as defined by Basel III.

Building a reference portfolio:

To conduct our analysis, two reference portfolios representative of liquid and illiquid insurance contracts were selected:

- Liquid: Portfolio consists of provincial bonds.
- Illiquid: Portfolio consists of private placements and mortgages, formulated as the Canadian investment grade corporate bonds plus a fixed spread due to lack of publicly available data.

Calculating the credit risk adjustment and illiquidity premiums:

The credit risk adjustments were calculated as the sum of ECL and UCL for each credit rating. ECL and UCL derived using this approach are TTC estimates and remain flat regardless of current market environment. Point in time adjustments may be necessary to incorporate a forward-looking view if market conditions were to change. However, historical statistics were used so no point in time adjustments were made to the data. The three UCL methods provided a range for the adjustment, from which the average was calculated with rounding.

For illiquid insurance contracts:

Corp A ECL + UCL								
UCL Methods	1	2	3	5	7	10	20	30
Flat 100% ECL	0.05%	0.06%	0.06%	0.08%	0.11%	0.14%	0.28%	0.41%
LICAT CoC	0.10%	0.13%	0.18%	0.24%	0.30%	0.38%	0.44%	0.51%
Basel III	0.06%	0.07%	0.08%	0.10%	0.13%	0.16%	0.30%	0.41%
Average	**0.07%**	**0.08%**	**0.11%**	**0.14%**	**0.18%**	**0.23%**	**0.34%**	**0.44%**
Corp BBB ECL + UCL								
UCL Methods	1	2	3	5	7	10	20	30
Flat 100% ECL	0.15%	0.18%	0.21%	0.28%	0.34%	0.43%	0.68%	0.82%
LICAT CoC	0.23%	0.37%	0.44%	0.54%	0.61%	0.70%	0.82%	0.89%
Basel III	0.17%	0.20%	0.23%	0.29%	0.35%	0.44%	0.65%	0.77%
Average	**0.19%**	**0.25%**	**0.30%**	**0.37%**	**0.43%**	**0.52%**	**0.71%**	**0.83%**
Average of Corp A and Corp BBB	0.13%	0.17%	0.20%	0.26%	0.30%	0.37%	0.53%	0.63%

The illiquidity premiums for different credit ratings were derived applying a top-down approach as the asset spreads minus the credit risk adjustment at each time point. The asset spreads were calculated as the difference between the yields of the provincial bonds or corporate bonds and the risk-free bonds.

Ratio of credit adjustment/ average credit spreads	1	2	3	5	7	10	20	30
Corp A	13%	12%	14%	16%	18%	21%	26%	34%
Corp BBB	22%	24%	26%	28%	29%	31%	37%	42%
Average of Corp A and Corp BBB	**18%**	**18%**	**20%**	**22%**	**24%**	**26%**	**32%**	**38%**

The subcommittee noted that the shorter terms tend to have lower credit adjustments as a percentage of the average credit spreads than longer terms. A simplifying assumption was made to calculate the average over 5 years, 10 years, and 30 years which resulted in the overall curve average of 30%, used in the illiquid reference curve.

For liquid contracts, the reference portfolio has low credit risks that fall somewhere between zero and that of AA rated corporate bonds. The subcommittee performed a range of calculations and landed on using 10% across the curve for the reference curve.

The ultimate illiquidity premiums were calculated as the historical averages of the illiquidity premiums at the 30-year term. The illiquidity premium for the most liquid products was set using the historical average illiquidity premiums for provincial bonds, but with credit risk adjustment based on AA rating corporate bond data, which is higher than 10%. This assumption required judgment to applied and was agreed upon subsequent to discussion with the appropriate practice committees.

The illiquidity premium for the most illiquid products was set using the historical average illiquidity premiums at the 30-year term of Canadian investment grade corporate bonds plus a fixed spread due to lack of publicly available data.

Ultimate illiquidity premium (%)		
UCL methods	**Most liquid**	**Most illiquid**
1	0.75	1.53
2	0.69	1.44
3	0.73	1.56
Average	**0.72**	**1.50**

Appendix 4 – Considerations in applying the top-down approach

This appendix covers various considerations in applying the top-down approach

Steps to adapt US CDS information for Canada

This section describes a methodology that users could use to adapt the US CDS information for use in Canada.

Example:

- Available CDS spreads data can be obtained using Bloomberg for Markit CDX North America Investment Grade Index for maturities 1, 3, 5, 7, and 10 years.
- Observed CDS spreads will need to be interpolated to the end of observable period.
- CDS spreads can be compared to the underlying bond portfolio spread to derive the percentage of the total spread representing credit risk.
- The same percentage could be applied to the reference portfolio spread in Canada to derive the equivalent credit risk adjustment.
- Additional adjustments could be made to account for basis and other risks.

Approaches to make forward-looking adjustment to credit risk

The approach used to derive examples of illiquidity premium in Canada used historical information and TTC default expectations. Adjustments could be made to reflect the current and forward-looking credit expectations. The IFRS 9 lifetime default provision models could be leveraged to convert TTC to point in time ECL estimates, since IFRS 9 requires ECL to be point in time.

One approach could be to use multiple sets of assumptions that adequately reflect the credit cycle. Accordingly, multiple (or dynamic) transition matrix models (e.g., low default experience, average default experience, high default experience) could be used based on current market and anticipated economic conditions.

Another approach (commonly by banks) would be the Z-score method (see more information in JPMorgan paper). Under such technique, default transition matrices are calculated conditionally on an assumed value of Z. The Z score is calibrated using historical information and measures the credit cycle of past credit conditions. In good years, Z is positive (lower default rate, higher credit ratings) and in bad years, Z is negative. Based on current and anticipated macroeconomic variables, one could estimate current and future values of Z, and apply it to derive forward-looking rating transition matrices.

Approaches to calculate unexpected credit loss

One possible approach for calculating the UCL would be to apply a simple margin (i.e., 100%) to the credit risk default adjustment estimated for the ECL. This method could be based on a certain confidence level sought by investors to ensure that ECL+UCL will cover the credit risk. Such a method has the advantage of being simple to apply operationally. The difficulty comes from the calibration of the margin to relevant market information, on an ongoing basis.

Another possible approach would be to use the cost of capital approach. For example, the Basel Capital Framework could be used and was developed in Gordy-Jones. The underlying capital requirement is based on a Value-at-Risk measure.

The advantage of this method is that it is linked to the cost of capital incurred by major financial institutions trading securities. It also directly makes use of key parameters derived in the ECL section, ensuring consistency between ECL and UCL. (For example, UCL could be point in time or TTC, depending on how the ECL parameters were derived). One disadvantage is that it still relies on some parameters that could be hard to calibrate with the market (e.g., the cost of capital itself).

Appendix 5 – Discount curve formulation implications

This appendix illustrates implications using a five-year life insurance contract with the following characteristics:

- Expected and actual premiums of $1,300 per year (end-of-year);
- Expected and actual claims of $6,500 at end of year 5 (with $65 risk adjustment); and
- No expense and tax-free environment.

Scenario 1 – Illiquidity premium of the insurance contract = Illiquidity premium of the assets

Assumptions:

	1	2	3	4	5
Actual investment rates:	**2.0%**	**3.5%**	**4.5%**	**4.5%**	**4.5%**
- Illiquidity part	**1.0%**	**2.3%**	**3.0%**	**3.0%**	**3.0%**
- Credit part (ECL/UCL)	1.0%	1.2%	1.5%	1.5%	1.5%
Valuation rates:	**1.0%**	**2.3%**	**3.0%**	**3.0%**	**3.0%**

Then, initial CSM = $290.

Profit & Losses correspond to:

		1	2	3	4	5	TOTAL
Insurance revenue		62	62	62	62	6,627	
Insurance expense		-	-	-	-	(6,500)	
Insurance results	-	62	62	62	62	127	**373**
Investment revenue		-	46	119	183	250	
Interest expense		-	(28)	(75)	(115)	(155)	
Investment results		-	17	44	68	94	**224**
Total results	**-**	**62**	**79**	**106**	**130**	**221**	**597**

Scenario 2 – Illiquidity premium of the insurance contract > Illiquidity premium of the assets

Assumptions:

	1	2	3	4	5
Actual investment rates:	**2.0%**	**3.5%**	**4.5%**	**4.5%**	**4.5%**
- Illiquidity part	**1.0%**	**2.3%**	**3.0%**	**3.0%**	**3.0%**
- Credit part (ECL/UCL)	1.0%	1.2%	1.5%	1.5%	1.5%
Valuation rates:	**1.8%**	**3.1%**	**3.8%**	**3.8%**	**3.8%**

Then, initial CSM = $368.

Profit & Losses correspond to:

		1	2	3	4	5	TOTAL
Insurance revenue		80	80	80	80	6,645	
Insurance expense		-	-	-	-	(6,500)	
Insurance results	-	80	80	80	80	145	**465**
Investment revenue		-	46	119	183	250	
Interest expense		-	(37)	(93)	(142)	(193)	
Investment results		-	8	26	41	56	**132**
Total results	**-**	**80**	**88**	**106**	**121**	**202**	**597**

Scenario 3 – Higher ultimate rate

Assumptions:

	1	2	3	4	5
Actual investment rates:	**2.0%**	**3.5%**	**4.5%**	**4.5%**	**4.5%**
- Illiquidity part	**1.0%**	**2.3%**	**3.0%**	**3.0%**	**3.0%**
- Credit part (ECL/UCL)	1.0%	1.2%	1.5%	1.5%	1.5%
Valuation rates:	**1.0%**	**2.5%**	**5.0%**	**5.0%**	**5.0%**

Then, initial CSM = $485.

Profit & Losses correspond to:

		1	2	3	4	5	TOTAL
Insurance revenue		106	106	106	106	6 671	
Insurance expense		-	-	-	-	(6 500)	
Insurance results	-	106	106	106	106	171	**593**
Investment revenue		-	46	119	183	250	
Interest expense		-	(30)	(121)	(187)	(256)	
Investment results		-	16	(2)	(4)	(6)	**4**
Total results	**-**	**106**	**121**	**104**	**102**	**165**	**597**

Appendix 6 – Cash flows that vary example on dynamic lapses

Below are the assumptions used for this example:

- Initial account value of $10,000 is withdrawn at the end of year 2.
- Management expense ratio of 2%.

Without dynamic lapses

Examples A and B assume returns of -10% and +10%, respectively. The annual lapse rate is 1% in both years.

Example A	1	2	Calculation for year 2
Account value	9,000	7,857	(9,000 – 180 – 90) * (1 - 10%)
MER	(180)	(157)	7,857 * 2%
Lapses	(90)	(79)	7,857 * 1%
Withdrawals	-	(7,621)	-(7,857 – 157 – 79)

Example A	FCF	Calculation
That do not vary	10,000	Initial account value
That vary	(9,606)	-(7,621 + 79)/(1 - 10%)^2 - 90/(1 - 10%)
Total	**394**	10,000 – 9,606

Example B	1	2	Calculation for year 2
Account value	11,000	11,737	(11,000 – 220 – 110) * (1 + 10%)
MER	(220)	(235)	11,737 * 2%
Lapses	(110)	(117)	11,737 * 1%
Withdrawals	-	(11,385)	-(11,737 – 235 – 117)

Example B	FCF	Calculation
That do not vary	10,000	Initial account value
That vary	(9,606)	-(11,385 + 117)/(1 + 10%)^2 - 110/(1 + 10%)
Total	**394**	10,000 – 9,606

Since the total insurance contract in example A and B is the same, the result is not dependent on the asset return used and there is no “non-linearity”.

With dynamic lapses

Examples A and B assume returns of -10% and +10%, respectively. The annual lapse rate is 5% if returns are higher than 0%, 1% otherwise.

Example A	1	2	Calculation for year 2
Account value	9,000	7,857	(9,000 – 180 – 90) * (1 - 10%)
MER	(180)	(157)	7,857 * 2%
Lapses	(90)	(79)	7,857 * 1%
Withdrawals	-	(7,621)	-(7,857 – 157 – 79)

Example A	FCF	Calculation
That do not vary	10,000	Initial account value
That vary	(9,606)	-(7,621 + 79)/(1 - 10%)^2 - 90/(1 - 10%)
Total	**394**	10,000 – 9,606

Example B	1	2	Calculation for year 2
Account value	11,000	11,253	(11,000 – 220 – 550) * (1 + 10%)
MER	(220)	(225)	11,253 * 2%
Lapses	(550)	(563)	11,253 * 5%
Withdrawals	-	(10,465)	-(11,253 – 225 – 563)

Example B	FCF	Calculation
That do not vary	10,000	Initial account value
That vary	(9,614)	-(10,465 + 563)/(1 + 10%)^2 - 550/(1 + 10%)
Total	**386**	10,000 – 9,614

Since the total insurance contract in example A and B is not the same (394 vs 386), the result is dependent on the asset return used and there is “non-linearity”.

Appendix 7 – Summary of key issues raised by external stakeholders and responses from the AGC and CLIFR

Given the importance of the IFRS 17 discount rate issue, in addition to its usual protocol of seeking feedback from CIA members, the AGC conducted an external consultation during August to October 2020 to seek feedback on the draft educational note which was published in June 2020. The AGC contacted multiple external stakeholders within the insurance industry to seek comments on the draft educational note, and to seek views from distinguished economists on the following five topics:

1. The derivation of the risk-free rates beyond the last observable point, including setting the ultimate risk-free rate.
2. Establishing the illiquidity premium in the observable and unobservable periods.
3. Developing a process to update the value of the reference curves' parameters.
4. The identification of the last observable point on the risk-free curve in Canada.
5. The basis used to interpolate the rates between the last observable point and the ultimate point.

The AGC and CLIFR appreciate the insightful feedback received and have diligently taken it into account in the preparation of this educational note. This summary consolidates comments received and the AGC and CLIFR responses[17].

The topics for which the most feedback was received is related to the first three topics above. Hence, they were the focus of the review in updating the educational note.

The following outlines the input received from the external stakeholders on the five topics above, as well as a sixth category containing other input, and the responses to such input by the AGC and CLIFR.

1. **The derivation of the risk-free rates beyond the last observable point, including setting the ultimate risk-free rate (URFR).**

   There were two main categories of comments from stakeholders to derive assumptions for the URFR:

   - methodology – the relative weightings of the use of historical data vs. views on forward-looking inputs.
   - socioeconomic variables – the use of judgment assessing their future expected impact.

[17] Many of the responses from organizations/individuals were, with appreciation, very thorough. As such, for the purpose of a suitable degree of brevity in this memorandum: (i) the AGC and CLIFR responses consolidate different descriptions of similar themes; (ii) some of the specific comments not related to common themes (i.e., they were unique to specific organizations/individuals) were considered but not explicitly cited in this summary.

1.1a External Stakeholder comments on methodology are recapitulated in the following:

i. Historical data vs. forward-looking inputs

More weight should be placed on observable/recent data, hence more consideration is needed of historical data and views on forward-looking inputs. The use of the average of historical rates is contentious in economics literature because it holds low predictive power. The extrapolation into the future of historical long term nominal rates is not grounded in economic and financial theory. Likewise, the use of historical average real GDP growth rates to serve as a measure of the long run risk free rate is questionable. The use of long-term real GDP growth expectations should be used as a better foundation for estimating the risk-free interest rate.

ii. Mean reversion

There is no evidence to support long-term mean reversion of equity prices; the evidence is mixed regarding interest rates (one stakeholder commented that there is statistical evidence that historical interest rates are not mean reverting). Economic and financial theory suggests that real rates are more likely to be mean reverting than nominal ones, but mean reversion for real rates is debatable as it assumes real economic growth is stable over time. Despite the presence of business cycles, macro-economic models do not predict that real economic growth is inherently mean reverting over the long run.

iii. Relationships of interest rates and economic growth

There is a strong relationship between interest rates and the long-run rates of real per capita economic growth. This relationship between the long run real per capita growth rate and interest rates can be observed in Canadian data. There is a strong relation between real interest rates and real GDP growth. However, there are several reasons why the long-run real rate can be different from the real GDP growth rate, for example, we are strained by the recent savings glut. Growth theory implies that the risk-free real rate of return should be greater than the average rate of growth of per capita output over a multi-decade period. Ultimately, the real rate is more closely associated with fundamentals of the economy and is based on views on the long-term rate in the growth of the Canadian labour force plus productivity growth.

iv. Term premium

Clarification is needed for the duration of the term premium for the estimated rate as there is some ambiguity in the draft educational note about whether this is a short-term risk-free real rate or a long-term real rate that incorporates a real term premium.

v. Inflation

General support for the use of the inflation target of 2%. One stakeholder suggested the use of an inflation curve by duration.

vi. Level

The general opinion of the starting level of the URFR (4.0%) was that it was too high. Some stakeholders suggested that a range of 3.0% to 3.5% would be more appropriate.

1.1b External stakeholder comments on assessing the future expected impact of socioeconomic variables are recapitulated in the following:

i. Need deep consideration of the impact of future drivers:

a. Demography (e.g., aging);

b. Productivity (e.g., slowing);

c. Technological innovations (e.g., in recent years businesses are becoming less capital intensive);

d. Monetary policy (e.g., emergence of new tools to manage monetary policies in many countries and regions; the general direction of such policies has been to drive interest rates lower); and

e. Global excess of savings searching for yields from a limited set of investments.

ii. Long term assumptions should be set excluding the influences of business-cycle and other short-term fluctuations.

1.1.c Specific comments from the external stakeholders on the four methodologies included in the draft educational note are included in the following:

Methodology #1. Historical long term nominal rate median using data since 1991: Nominal rates might not be mean-reverting and lack forward-looking inputs.

Methodology #2. Average historical long-term real interest rate using data since 1936 + inflation target: This is a more robust approach. Consideration could be given to the use of other variables (e.g., monetary policy, demographics, saving glut, etc.)

Methodology #3. OECD GDP growth expectation + inflation target: Real rates might differ from GDP growth forecast; hence adjustments might be needed.

Methodology #4. Historical GDP growth using data since 1999: blend of the above considerations (e.g., not forward-looking, real rate/GDP growth relationship).

1.2 AGC and CLIFR response:

The feedback received on the application of economic theory to deriving assumptions for the URFR was extremely valuable.

The challenge for setting discount rates for IFRS 17 liabilities of the life insurance contracts is that rates are needed for durations well beyond typical forecasting horizons which are shorter duration, such as five-years. Forecasting over such lengthy periods requires significant judgment.

Accordingly, the AGC and CLIFR concluded to adopt the following desirable characteristics when setting the URFR:

- *Stability*: URFR would be more stable over time than the rates in the observable period.
- *Smoothness*: Interpolated rates would follow a smooth path from the last observable rate to the ultimate rate.
- *Simplicity*: The approach would be understandable and implementable.
- *Balance*: All principles and characteristics cannot necessarily be met to the same degree at once.

Combining these characteristics and the feedback from the external stakeholders, the AGC and CLIFR reached the following conclusions:

i. Choice of methodology

a. Methodology #1 and #4. historical rates are dismissed as they do not place enough weight on recent data.

b. Methodology #3. real GDP growth expectation + inflation target is dismissed as GDP might need adjustments to better serve as the proxy for real interest rate assumptions.

c. A single time-weighted average of real-rates (increased by an inflation target) best achieves the above referenced desire overall. Methodology #2. historical real interest rate + inflation target with further adjustment will be appropriate.

Several approaches were analyzed. The AGC and CLIFR agree with, and have adopted, the construct suggested by the external stakeholders for deriving assumptions for the URFR, as follows:

URFR = Historical short-term real rates + Historical term premium + Inflation expectation

ii. Specific conclusions and observations on the modified URFR methodology

a. Applying the three-component construct cited above for the assumption for the risk-free rate over a representative economic forecast period of five years produces rates in the 3.15%–3.70% range.

b. The Bank of Canada neutral rate is a good forward-looking reference for short-term real rate expectations. The CPI-common measure, published by the Bank of Canada, was chosen to derive short-term real rates.

c. The term premium is more open to debate, as some external stakeholders suggested 0.75% and other inputs pointed towards 1.2% to 1.5%. Hence considerable judgment is needed.

d. The inflation target is still relevant as a forward-looking add-on to the real rate.

e. Regarding external stakeholder comments that the 4.0% rate in the draft educational note is too high and that more weight should be put on recent data. CLIFR has adopted an exponential moving average (EMA) with a 25-year parameter approach which places more weight on recent data. The selection of a 25-year parameter was based on analysis of projections utilizing 20-year, 25-year and 30-year parameters as potential parameters. The 25-year period was selected using judgment as there are no clear answers on lengths of "through the economic cycle". As a result, the 4.0% rate in the draft educational note has been reduced to 3.65% in this educational note. This rate is applicable up to October 15, 2023.

f. If low interest rates, in comparison to historical rates, continue, the URFR will continue to decline for the foreseeable future.

g. Stabilizing measures should be implemented (such as capping the annual change and rounding) to prevent drastic changes (e.g., inflation target change).

h. Establishing the 70-year spot rate by combining current (market consistent) 30-year spot rates and constant assumptions for 40-year forward rates hence would result in inappropriate volatility.

i. In response to one of the comments received, the inclusion of guidance in the educational note for deriving inflation curves by duration was discussed, but it was ultimately decided to not include specificity in this educational note.

iii. Criteria for updating the URFR

a. Update frequency: Annual

- We believe that annual updates are appropriate and would result in smaller changes of the URFR, which is a desirable outcome.

b. Rounding: Nearest five (5) bps

- Real rates and term premiums are rounded separately.
- This is a balance between simpler representation and minimum change.

c. Update cap: Cap any annual update to a +/- 15 bps change

- This avoids drastic changes coming from any Bank of Canada inflation target changes.
- It is consistent with the Solvency II method.

2. Establishing the illiquidity premiums in the observable and unobservable periods

The overarching principles suggested by stakeholders can be summarized as follows:

- There is much more judgment involved in setting assumptions for illiquidity premiums than for risk-free interest rates.

- Cautious is required in using historical data to split credit spread data into its credit default and liquidity risk components.

2.1 External Stakeholder comments included the following:

i. The illiquidity premiums in the draft educational note might be too high

a. Exert caution in considering historical data.

- Historical averages are too large in today's environment. The actual illiquidity premiums appear to be lower today than they were in the past.
- In addition, there are several reasons to believe that some of the declines are permanent. There have been structural changes in financial markets. It would seem reasonable to allow for methods that put greater weights on recent observations. Nonetheless, because these structural changes evolve slowly over time, this weighting scheme should not be too sensitive to adding only a few years of data when illiquidity premiums are depressed or amplified due to business cycle fluctuations or transitory market conditions. More weight should be placed on currently observed illiquidity premiums in financial markets.
- Investment grade provincial and corporate yields relative to the Government of Canada yields are historically low. They have narrowed considerably in the last 30 years with the decline in interest rates. Given lower risk-free rates, liquidity now has a much higher relative impact. Since there is no theoretical foundation, err on side of caution.

b. The draft educational note indicates that most of the spread is attributable to the liquidity of the security. Hence illiquidity premiums may be too high and not necessarily related to liquidity. For example, there may be supply or demand imbalances that may artificially drive-up yields, some investments may have unusual tax advantages that affect yields, or the profit expectation of investors and other risk takers may not be related solely to liquidity.

c. International credit default swap (CDS) data suggests that the credit risk premium in those markets, particularly in the USA, may be much greater than indicated by historical default.

ii. Quantitative criteria to classify insurance contracts as liquid/illiquid

a. Minimum quantitative criteria should be set for defining insurance contracts that may be deemed to be illiquid.

iii. There should be further documentation of the methodology used and of a clear and predictable process to update the ultimate illiquidity premium assumption.

iv. One stakeholder suggested we remove outliers (e.g., financial crisis).

2.2 AGC and CLIFR response:

i. The yields of Government of Canada and corporate bonds are trending down over time. However, current spreads are higher than their long-term historical average.

ii. After the removal of the credit risk adjustment from the average of the spreads, the resulting illiquidity premiums would also follow the same pattern as the spreads indicated in a. above.

iii. Regarding the external stakeholder comment about the illiquidity premium might be too high

- Comments imply illiquidity premiums are lower today than in the past. The AGC and CLIFR acknowledge that it is heavily dependent on the deduction that is assumed for credit risk from the total spread. The AGC and CLIFR are comfortable with the deduction for credit risk assumed in the illiquidity premium determination under IFRS 17 and that the deduction can be based on longer-term data.
- If more weight was placed on recent data, revisions to estimates would be up rather than down.
- There may be different views around the illiquidity premium definition, but the AGC and CLIFR are of the opinion that the approach adopted is aligned with IFRS 17 requirements (IFRS 17.B81–B85).

iv. Regarding another comment about using quantitative criteria to classify insurance contracts

- Given the diverse nature of products within the Canadian industry, it is difficult to set out minimum quantitative criteria to follow to assess the liquidity of the insurance contracts. Therefore, the educational note focused on qualitative criteria to consider when evaluating the liquidity of the insurance contracts being valued. This is similar, but more expansive, than the guidance provided within the *Application of IFRS 17 Insurance Contracts* educational note.
- Companies need to set illiquidity premiums based on their own product design, views on liquidity, and asset mix where a top-down approach is used.

The AGC and CLIFR concluded that the top-down approach with the removal of credit risk and market risk premiums is appropriate and aligned with IFRS 17.

However, the following refinements were implemented as a result of the feedback:

- The weighting scheme of historical data, notably the weight on recent data. Although the EMA approach was considered, a simple averaging of the market data was chosen. The subcommittee reviewed different methods of weighting recent data more heavily but found this led to higher illiquidity premiums as the most recent data indicates an increasing trend in spreads. A simple average method was sued for this reason, as well as the fact that it creates consistency between credit spreads and the calculation of credit default adjustments. The credit default adjustments are non-time varying and the underlying credit data reflects a longer historical period than the available data for spreads.

- The approaches to calculate the market risk premium (unexpected credit loss).
- The loss given default assumption.
- The approach to calculate the illiquidity premium ratio by term.

The refinements did not significantly impact the illiquidity premiums concluded in the draft educational note. The method used and the process to update the ultimate illiquidity premium has been documented in the educational note.

3. Developing a process to update the value of the reference curves' parameters.

3.1 External stakeholder comments are included the following:

i. The consultation process should be handled in a completely transparent manner, given the importance of the process, and all such comments should be reviewed in full by all members responsible for drafting the educational note. In addition, a summary of the comments received and the decision for each one should be presented to CIA members. This presentation could be included in a memorandum accompanying the final version.

ii. Using additional information about market rates available from surveys of professional forecasters can assist with forecasting.

iii. The key trade-off that the review process should address is between having key parameters that change too often (short-term fluctuations driving estimates of long-run concepts) and having key parameters that change too infrequently (creating abrupt impacts and uncertainty, and a constituency opposing changes, when a revision occurs).

iv. It was suggested to examine formal review processes in other major jurisdictions. Five-year review frequency is consistent with financial sector policy legislation. Smooth changes may be desirable. Include external experts. A public consultation process would also help reinforce credibility of decisions. It is suggested the review process not be mechanistic, economic triggers and other reasons could activate updates.

v. Obtain projections from the International Monetary Fund and Bank of Canada.

3.2 AGC and CLIFR response:

We are committed to a disciplined and transparent approach to update the URFR and illiquidity premiums. The process the AGC and CLIFR have derived to implement this approach involves the following:

i. Considers all of the above comments.

ii. Updates will be done in a clear transparent, predictable, formal, impartial, and systematic manner.

iii. The annual update frequency, the triggers and the external input related to the update have been established.

iv. The approach commits to transparency to facilitate maximum forward planning, notably the impact of persisting lower rates will take longer to converge, conversely spikes in rates (e.g., due to inflation) will mute increases in the URFR.

v. The Bank of Canada's neutral rate could be used as an economic barometer to review the appropriateness of the resulting URFR in the future.

4. The establishment of the last observable point in Canada.

On the topics of the last observable point, we received either no comments or concurrence with the 30-year horizon.

AGC and CLIFR response:

The educational note retains the assumption of the 30-year observable period.

5. The basis used to interpolate the rates between the last observable point and the ultimate rate.

On the topic of interpolation between the last observable point and the ultimate point, we received few comments. Two reviewers pointed out the importance of continuity of forward rates. One considered the approaches reasonable. In relation to choices of methods for the entity's own curves in Chapter 1 of the draft educational note, two believed there should be only one method of interpolation.

AGC and CLIFR response:

For ease of understanding and implementation, the educational note uses the linear interpolation approach for the reference curves between the last observable point and the ultimate point. Various interpolation methodologies were considered, but ultimately it was decided to adopt the linear approach for the reference curves due to its simplicity given it is the industry standard methodology. The other interpolation methods are more complex, and have various permutations (e.g., cubic spline use more or less points on the yield curve). In relation to the interpolation used for the entity's own curves, the AGC and CLIFR are of the view that it would be too prescriptive to choose one of the methods thereby limiting entities who have the capability to utilize more complex methods than linear.

6. Other Input

A. Comparability

6.1 External stakeholder comments included the following:

i. We recommend that insurers disclose the results of applying a uniform benchmark valuation.

ii. The CIA is in a unique position to standardize actuarial practice, they need to be more binding.

iii. The public interest would be better served if the CIA were to adopt an effective standard that includes a recommended benchmark.

iv. Actuaries are permitted a variety of options with respect to selecting risk-free rates, reference portfolios, bond index spreads, illiquidity premiums, and interpolation methods. Such latitude in methods and assumptions makes it more difficult to understand the overall interaction and impact of those selections and does not allow for meaningful cross-company comparisons.

v. In our view, smoothing of financial results from period to period with the objective of achieving a more desirable pattern of earnings is not consistent with either CALM or IFRS 17 principles. The educational note should go to extra lengths to ensure that the principle of smoothing and stability described therein is clearly understood and not subject to misinterpretation.

vi. It is reasonable to expect consistency with other educational notes on accounting standards provided by the CIA. For example, the educational note *Setting the Accounting Discount Rate Assumption for Pension and Post-employment Benefit Plans*, which addresses International Accounting Standards 19.

6.2 AGC and CLIFR response

The Actuarial Standards Board (ASB), AGC and CLIFR believe the best course of initial action, consistent with how the ASB and CIA has handled new methodology and assumption items in the past via research papers or guidance, is to evaluate the bases and industry practices for discount rates before, and if, committing actuaries to specific promulgations from the ASB. We also expect the disclosure requirements with respect to discount rates under IFRS 17 to allow for a comparison between companies.

The ASB, AGC, and CLIFR note that the IFRS 17 core standard which underlies the valuation method, assumptions, and rules to be followed is an accounting standard (not an actuarial standard) that is designed to support global consistency of practice, and which does not contemplate promulgation in this area. IFRS 17 requires the application of judgment in setting assumptions, including the discounting assumptions. The use of guidance allows for some flexibility for those companies implementing IFRS 17 on a global basis, while providing sufficient structure for all Canadian-based companies to use highly comparable discount rate curves. Furthermore, as IFRS 17 is an international standard, there is the guiding principle that states that the guidance should not unnecessarily narrow the choices available in the IFRS 17 standard. Finally, for some entities, promulgating the discount rate may not address the main source for which consistency is most needed.

The ASB, AGC, and CLIFR will closely monitor the extent of the impact of market benchmarking, IFRS 17 disclosures, CIA guidance and regulatory influence on narrowing ranges of practice. These items will provide insights on the need for any potential changes to standards and/or guidance. The AGC and CLIFR are also of the view that the requirements with respect to the parameters used beyond the observable period described in the educational note may contribute to narrowing the range of practice.

In principle, the AGC and CLIFR are of the view that guidance for assumptions is most suitable for circumstances for which individual actuaries cannot be expected to derive significantly more appropriate assumptions than the profession collectively. Accordingly, this educational note provides guidance on specific assumptions for the reference curve's unobservable period, but not the observable period.

The use of long-term estimates that tend to be stable are an appropriate basis to set rates in the unobservable period under IFRS 17.

In relation to the comment on consistency with other practice areas, notably in comparison of guidance for the insurance and pension practice areas, the AGC continually strives to achieve this when appropriate. It is of the view that consistency should be viewed in the context of the purpose of the work and the context of any other standards/guidance. In the context of comparing discount rate assumptions for insurance and pensions, it is particularly important to recognize that the underlying accounting frameworks for valuations are different. Hence consistency is not always the appropriate criteria in some circumstances, rather the ability to reconcile is the suitable goal. For example, the accounting standard criteria for discount rates under IAS 19 is different from IFRS 17; however, the resulting risk-free component in the observable period in each standard is indeed comparable and consistent.

B. Other valuation considerations

6.3 External stakeholder comments are included the following:

i. It is suggested to avoid stretched interpretations to justify continuation of practice.

ii. One respondent indicated the need to understand the transfer value of policyholder liabilities to be ready to resolve a failed insurer. A benchmark valuation using a standard transfer value discount rate basis would provide this information.

iii. A person choosing a discount rate should be impartial with respect to the intertemporal/intergenerational allocation of costs and benefits. Appropriate market-based rates should do that, but it would help to state it explicitly when it comes to choosing the ultimate rate.

6.4 AGC and CLIFR response

The methodology for setting discount rates changed from IFRS 4 to IFRS 17. We do not feel that the interpretations of the IFRS 17 standard within the educational note are stretched nor do they attempt to justify the continuation of practice under IFRS 4 as the methodologies used to develop the discount curves under IFRS 17 are significantly different from the methodologies used under IFRS 4.

Unlike under IFRS 4 / CALM, IFRS 17 in Canada does not also directly serve as a solvency measure (e.g., minimum valuation bases). Any concerns about insufficiency of IFRS 17 liabilities within a solvency context should be addressed in regulatory capital regimes. To address the one comment received on transfer values, the AGC and CLIFR feel this issue is out of scope for this educational note. The point about intertemporal/ intergenerational equity allocation of costs and benefits is an interesting one; however, our view is that the liability valuation under IFRS 17 is not the primary driver for this equity allocation. Rather, it is the contractually defined premiums and benefits that are typically determined at the outset of the contract.