Autorité
des marchés
financiers

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CAPITAL ADEQUACY REQUIREMENTS GUIDELINE

Life and Health Insurance

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Introduction

Objective of the Guideline

The *Insurers Act*, CQLR, Chapter A-32.1 (the "Act") prescribes that every insurer must adhere to sound and prudent management practices. Moreover, under the Act, the Autorité des marchés financiers may establish guidelines for all authorized insurers informing them of measures that may be established to satisfy their obligations under Titles II and IV of the Act, including the obligation to adhere to practices that provide for the maintenance of adequate capital to ensure their sustainability.[1]

The main purpose of these guidelines is to increase the transparency and predictability of the criteria used by the Autorité des marchés financiers (the "AMF") to assess whether financial institutions are complying with their obligation to adhere to sound and prudent management practices. The ability of institutions to discharge their obligations to policyholders and beneficiaries constitutes in particular one of the fundamental components of achieving this objective. This principle is reflected in the capital adequacy requirements for life and health insurers set forth in this guideline.

Application

This guideline applies to insurers authorized to carry on activities as insurers of persons (life and health insurers) in Québec (the "insurers").

Effective Date

This version of the guideline takes effect on January 1, 20254 and is applicable for fiscal years beginning on or after this date. Early application is not permitted.

Interpretation

Because the requirements set forth in this guideline are intended mainly as guidance for insurers, the terms, conditions and definitions contained therein may not cover all situations arising in practice. The results of applying these requirements should therefore not be interpreted as being the only indicator for assessing an insurer's financial position or the quality of its management. Insurers are expected to submit to the AMF beforehand, where applicable, any situation whose treatment is not provided for in this guideline or for which the recommended treatment seems inadequate. This also applies with respect to any issue arising from an interpretation of the requirements set forth in this guideline.

Furthermore, despite the requirements described forth in the guideline, a specific capital requirement may be established for a particular insurer where the AMF determines that the capital treatment is inappropriate.

1 Sections 74, 463 and 464 of the Act.

Chapter 1. Overview and General Requirements

This chapter provides an overview of the Capital Adequacy Requirements for life and health insurance (insurance of persons) (“CARLI”). Details on specific elements of CARLI are contained in subsequent chapters.

1.1 Overview

1.1.1 CARLI Ratios

CARLI measures the capital adequacy of an insurer. It is one of several indicators used by the AMF to assess an insurer’s financial condition. The ratios must not be used in isolation for ranking and rating insurers.

Capital considerations include elements that contribute to financial strength through periods when an insurer is under stress as well as to protect policyholders, beneficiaries and creditors in the event of the insurer's wind-up.

The **Total CARLI Ratio** is based on policyholder, beneficiary and creditor protection in the event of the insurer’s wind-up. The following formula is used to calculate the ratio:

$$\frac{\text{Available Capital + Surplus Allowance + Eligible Deposits}}{\text{Base Solvency Buffer}}$$

The **Core CARLI ratio** is based on the insurer’s financial strength when under stress. The following formula is used to calculate the ratio:

$$\frac{\text{Tier 1 Capital + 70\% of Surplus Allowance + 70\% of Eligible Deposits}}{\text{Base Solvency Buffer}}$$

The elements included in these formulas are described below.

1.1.2 Available Capital

Available Capital comprises Tier 1 and Tier 2 Capital, and involves certain deductions, limits and restrictions. It includes the capital of subsidiaries consolidated for CARLI purposes (refer to section 1.3). Available Capital is defined in Chapter 2.

1.1.3 Risk Adjustments and Surplus Allowance

The term “Risk Adjustment”, as used in the guideline in relation to a specific block of business, refers to the risk adjustment for non-financial risk reported in the financial statements that is associated with the block of business. The Risk Adjustment excludes all expected credit risk and counterparty default losses, as these are financial risks.

The amount of the Surplus Allowance used in the calculation of the Total and Core CARLI Ratios (the “CARLI Ratios”) is equal to the Net Risk Adjustment (i.e., the Risk Adjustment net of all reinsurance[2]) reported in the financial statements in respect of all insurance contracts ~~other than the Risk Adjustment arising from segregated fund contracts with guarantee risks~~.

Determination of the Surplus Allowance amount must be clearly set out in the Capital Guideline Certification Report (refer to section 1.4.1).

1.1.4 Eligible Deposits

Subject to limits in section 6.7.1, guarantee instruments provided by unregistered reinsurers (refer to section 10.4.4) and claims fluctuation reserves (refer to section 6.7.4) may be recognized as Eligible Deposits in the calculation of the CARLI Ratios. Recognition of these amounts is subject to the risk transfer conditions described in section 10.4.

Determination of the amount of Eligible Deposits must be clearly set out in the Capital Guideline Certification Report (refer to section 1.4.1). This description must include the calculation of the guarantee instrument limits and claims fluctuation reserves.

1.1.5 Base Solvency Buffer

Insurers' capital requirements have been set at an intervention target level that aims to align with a conditional tail expectation ("CTE") of 99% ("CTE 99") over a one-year time horizon including a terminal provision. Where necessary, these requirements are set based on expert judgment. The risk capital requirements in this guideline are used to compute capital requirements at the target level.

An insurer's Base Solvency Buffer (refer to section 11.3) is calculated in respect of all of its assets, all written insurance business[3] and all other liabilities. It is equal to the sum of the aggregate capital requirement net of credits, for each of the six geographic regions, multiplied by a coefficient of [1.0]. An aggregate capital requirement is calculated for the following regions:

- Canada
- United States
- United Kingdom
- Europe (not including the United Kingdom)
- Japan
- Other countries

The aggregate capital requirement within a geographic region comprises capital requirement amounts for each of the following five risk components:

[2] The Surplus Allowance must be reported net of all modified coinsurance, whether it concerns registered or unregistered reinsurance.

[3] All future business written is excluded from the calculation of the Base Solvency Buffer.

- credit risk (Chapter~~s~~ 3 and Chapter 4);
- market risk (Chapter 5);
- insurance risk (Chapter 6);
- segregated fund~~s~~ guarantee (“SFG”) ~~-~~risk~~-~~ (Chapter 7);
- operational risk (Chapter 8).

The geographic regions to which an insurer’s assets and liabilities are allocated vary with the risk for which the capital requirement is calculated.

1. For credit risk and all market risks other than currency risk, all on- and off-balance sheet assets and liabilities are allocated to the geographic region in which they are held as at the balance sheet date, with the exception of the following items:

   a. reinsurance contracts reported as assets;

   b. assets pledged as security for reinsurance contracts issued;

   c. synthetic asset exposures arising from reinsurance contracts issued (refer to sections 3.1.11 and 5.2.3).

   If an asset or liability is held in a branch, the region in which it is held is deemed to be the region in which the branch is registered. Otherwise, the region in which an asset or liability is held is deemed to be the region in which the legal entity holding the asset or liability is incorporated.

   The exceptions listed above are allocated to the same geographic regions as those of the corresponding insurance liabilities.

2. For currency risk, the allocation of the capital requirement to geographic regions is described in section 5.6.7.

3. For insurance risk, segregated fund guarantee risk, and operational risk, liabilities and all associated risks are allocated to the geographic regions in which the original contracts underlying the liabilities were issued directly.

Aggregate capital requirements are reduced by credits for qualifying in-force participating and adjustable products (Chapter 9), and risk diversification (Chapter 11). Additionally, the insurer may obtain credit (via a reduction of specific risk requirements or an amount recognized in Eligible Deposits) for the following risk mitigation arrangements:

- reinsurance (capital requirement for insurance risk as well as other risks for which reinsurance is explicitly recognized);
- collateral, guarantees and credit derivatives (capital requirement for credit risk for fixed-income assets and reinsurance contracts held);
- other derivative instruments serving as hedges (capital requirement for market risk);
- asset securitization (capital requirement for credit risk).

Any arrangement (including securitization) under which a third party accepts to (or consents to) indemnify an insurer for losses arising from insurance risk is treated as reinsurance for capital requirement purposes, and is subject to the requirements in Chapter 10.

Collateral, guarantees and credit derivatives may be used to reduce credit risk requirements for fixed-income financial assets and registered reinsurance contracts held. The conditions for their use and the capital treatment are described in sections 3.2, 3.3 and 10.4.3. Available capital deductions for unregistered reinsurance as described in section 10.2 may be reduced by the use of guarantee instruments, subject to the conditions set out in section 10.3. Derivatives serving as equity hedges may be applied to reduce the market risk requirements for equities, as described in section 5.2.4, and derivatives serving as currency risk hedges may be applied to reduce the currency risk capital requirements, as described in sections 5.6.2 and 5.6.4. Asset securitization may be used to reduce the capital requirement for credit risk, as stipulated in Chapter 6 (Securitization) of the AMF's *Capital Adequacy Guideline* for financial services cooperatives belonging to a network, credit unions not members of a federation, trust companies, savings companies and other authorized deposit institutions (the "Capital GL"). Guarantees providing tranched protection are treated as synthetic securitization and fall within the scope of that same chapter.

Reinsurance that is intended to mitigate credit or market risks associated with a ceding insurer's on-balance sheet assets (e.g., equity risk, real estate risk), irrespective of whether it mitigates other risks simultaneously, must meet the conditions and follow the capital treatment specified in sections 10.4.3 and 10.4.4 in order for an insurer to reduce the capital requirements for these risks.

1.2 Minimum ratio, intervention target ratio and internal capital target ratio

Capital management is a broad process that covers not only the measurement of capital adequacy, but also all the strategies, policies and procedures used by an institution to determine and plan how its capital will be used.

While this guideline sets out the AMF's expectations regarding capital adequacy required for sound and prudent management, the objective of the *Capital Management Guideline* issued by the AMF is to articulate the principles that must guide and oversee financial institutions' management of capital on a more global basis; that is, even ahead of the determination of the minimum level of regulatory capital.

In addition to capital management principles such as:

- integration into strategic planning and risk management activities;
- presence of a sound governance structure;
- implementation of a capital management framework consistent with the institution's risk profile as well as of a strategy conducive to maintaining adequate capital levels;

The *Capital Management Guideline* sets out the AMF's expectations regarding the different incremental levels of capital[4] that a financial institution should maintain, taking into account regulatory requirements, its risk profile and its other current and projected needs. These levels are established in relation with the requirements related to the calculation of the Total CARLI Ratio.

In the course of its supervisory activities, the AMF expects insurers to maintain a Total CARLI Ratio of 100% and a Core CARLI Ratio of 70%. These ratios make up the **intervention target ratios**.[5] They allow for early detection of issues by the AMF, so that intervention can be timely if the insurer's situation so requires, and for there to be a reasonable expectation that the insurer's actions can successfully address the difficulties.

For policyholder and beneficiary protection, an insurer is also required to maintain, continuously and at a minimum, a Total CARLI Ratio of 90%. Likewise, for its overall financial strength, an insurer is required to maintain, continuously and at a minimum, a Core CARLI Ratio of 55%. These are the **minimum ratios**. Thus, the intervention target ratios provide additional capacity to absorb unexpected losses arising from the risks covered in this guideline compared with the minimum ratios.

The intervention target ratios and the minimum ratios correspond to the regulatory capital requirement levels as defined in the *Capital Management Guideline*.

However, the CARLI Ratios do not explicitly consider all risks. In fact, these ratios are based on simplifying assumptions common to a standard approach to solvency valuation. Quantifying several of these risks using a standard methodology for all insurers is not warranted at this time, given that, on the one hand, the level of exposure to these risks and the risk profile vary from one insurer to the other and, on the other hand, that using a standard approach to measure them is difficult.

Consequently, the AMF requires that each insurer assess its overall capital adequacy based on its risk profile for the purposes of sound and prudent management. This assessment is made by establishing **internal capital target ratios** that are higher than the intervention target ratios.

To establish its internal capital target ratios, an insurer must determine the required capital ~~required~~ to cover the risks related to its operations, considering specifically its risk appetite and the results of sensitivity analyses based on various scenarios and simulations.[6] Therefore, in addition to the risks covered in the calculation of the CARLI Ratios, the internal capital target ratios must also take into account other risks, including:

4 Regulatory capital, internal capital target and excess capital.

5 The intervention target ratios do not apply to a group that is the holder of control of an insurer and that, without being a financial institution, is subject to certain requirements of this guideline.

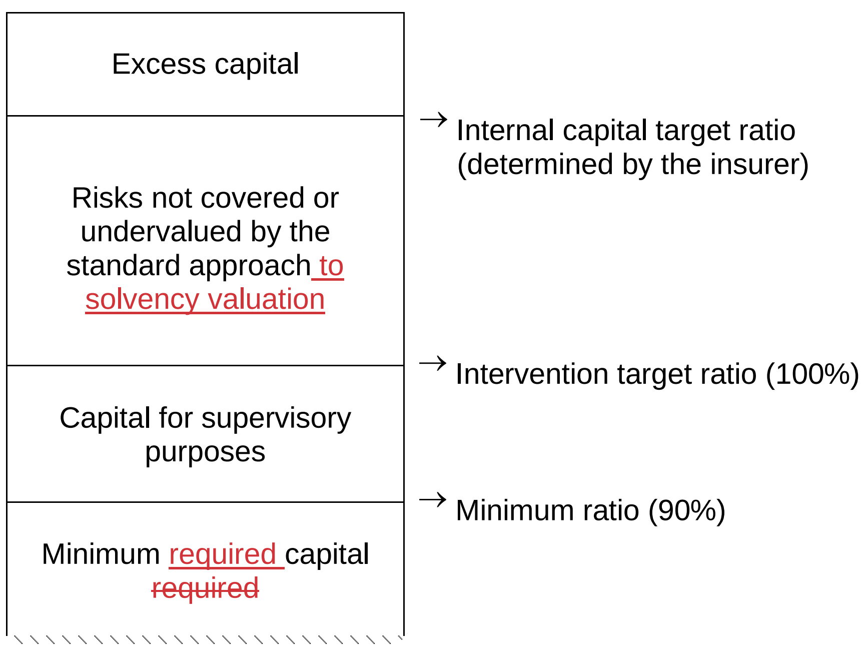
6 To make sure that internal capital target ratios exceed intervention target ratios, the insurer must express its level of internal target capital as a percentage of the Base Solvency Buffer, assessed as set out in this guideline, and compare the whole with the minimum capital ratios and the intervention target capital ratios.

- residual credit, market and insurance risks; for example, some risks related to risk transfers are types of market risks not covered in the calculation of the CARLI Ratios;
- liquidity risk;
- concentration risk;
- legal and regulatory risks;
- strategic risk;
- risk related to access to market capital;
- reputation risk.

The determination of the internal capital target ratios allows each insurer to appropriately consider these risks. To be consistent with the required capital for the risks covered by the calculation of the CARLI Ratios, the capital requirement for each identified risk must be calculated at a minimum confidence level equivalent to a CTE (99) over a one-year horizon, including a terminal provision. An insurer can meet this requirement by drawing on, for example, plausible adverse scenarios for financial condition testing ("FCT"), or stress testing scenarios. The impact of the various scenarios should be compared with the internal capital target ratios instead of the insurer's actual capital ratio.

The AMF's expectations for the Total CARLI Ratio are illustrated in the diagram below:

Minimum ratio, intervention target ratio and internal capital target ratio



In addition, the AMF expects insurers to hold a level of capital in excess of the level the insurer has determined for its internal capital target ratio. This capital may be needed in order to:

- take into account the variable nature of the CARLI Ratios and the possibility that they will fall below their internal capital target ratios in the course of routine operations owing to, among other things, the normal volatility of the markets and the insurer's results;
- maintain or attain a credit rating;
- innovate by, for example, developing new products;
- take into account business consolidation trends, in particular, opportunities to acquire portfolios or companies;
- prepare insurers for global industry-wide change, including standard-setting developments such as changes in accounting and actuarial standards.

The internal capital target ratios must be reported in the Capital Guideline Certification Report (refer to section 1.4.1). At the AMF's request, an insurer will be required to justify their internal capital target ratios and document their explanations with an appropriate calculation method and data. The AMF may require an insurer to establish new internal capital target ratios if the justifications do not demonstrate to the AMF's satisfaction that the capital ratios submitted are relevant and sufficient.

In the course of the AMF's supervisory activities, any identified failure to comply with internal capital target ratios will result in AMF intervention commensurate with the circumstances and corrective actions on the part of the insurer to comply with the established targets.

1.3 Accounting basis

Unless indicated otherwise, the starting basis for the amounts used in calculating Available Capital, Surplus Allowance, Base Solvency Buffer and any of their components (such as Risk Adjustments and contractual service margins) are those reported in, or used to calculate the amounts reported in, the insurer's financial statements and other financial information contained in the LIFE Quarterly Return and LIFE Annual Supplement. These amounts are prepared in accordance with the Generally Accepted Accounting Principles in effect in Canada (GAAP)[7] in conjunction with the LIFE Annual Return and AMF accounting instructions. Unless indicated otherwise, the contract boundaries used for insurance liability cash flow projections and all other CARLI components must be the same as those used to prepare the insurer's financial statements.

The financial statements and information must be adjusted as specified below to determine the carrying amounts that are subject to capital charges or are otherwise used in CARLI calculations. The Canadian GAAP financial statements and information must be restated for CARLI purposes and reported in accordance with the following specifications:

[7] The Canadian Accounting Standards Board (ASB) has adopted International Financial Reporting Standards (IFRS) as Canadian GAAP for publicly accountable enterprises, including insurers. The primary source of Canadian GAAP is the Chartered Professional Accountants of Canada Handbook.

- Financial statements must be restated so that only subsidiaries that are not damage insurance (P&C insurance) subsidiaries, dissimilar regulated financial subsidiaries or non-qualifying subsidiaries[8] are reported on a consolidated basis.
- P&C insurance subsidiaries, dissimilar regulated financial subsidiaries and non-qualifying subsidiaries must be deconsolidated and reported using the equity method of accounting.

Respecting the treatment of elements related to deconsolidated subsidiaries, only the insurer's share in proportion to all categories of Available Capital must be considered. For example, if the insurer holds an amount of 60 of the shareholder's equity in a deconsolidated subsidiary (Tier 1 Capital of the subsidiary) and an amount of 10 of subordinated debt (Tier 2 Capital of the subsidiary) and an outside investor holds an amount of 20 of shareholder's equity and an amount of 10 of subordinated debt, the insurer's share is 70% (i.e., (60 + 10) / (60 + 20 + 10 + 10)).

1.4 General requirements

1.4.1 Prescribed disclosure form and Capital Guideline Certification Report

The calculations required by this guideline and their results must be reported in the prescribed disclosure form (the “CARLI form”). This form is composed of pages from the Quarterly CARLI report, with additional pages from the Annual CARLI Supplement for year-end reporting.

The required report under CIA *Standards of Practice* (the “Capital Guideline Certification Report”) must include the memorandum of opinion as to the appropriateness of the capital requirement calculations and, where applicable, the memorandum of opinion as to the appropriateness of internal models used to determine capital requirements respecting segregated fund guarantees.

The CARLI form and the Capital Guideline Certification Report must be delivered to the AMF according to the requirements contained in the AMF Notices relating to filing of returns and other documents available on the AMF website (http://www.lautorite.qc.ca).

1.4.2 Designated representative's signature and actuary's signature

The first attestation on the CARLI form cover page must be signed by a representative designated by senior management (the “designated representative”). The designated representative must not be directly involved in the preparation of the CARLI form and must have the knowledge and expertise required to interpret CARLI.

The second attestation on the CARLI cover page is required only for year-end reporting. It must be signed by the actuary appointed to perform the duties set out in Chapter VII of Title II of the Act (the “actuary”),[9] who cannot be the designated representative.

8 Refer to~~See~~ section 2.1.2.7 for the definitions of “P&C insurance subsidiary~~ies~~,” “dissimilar regulated financial subsidiary~~ies~~” and “non-qualifying subsidiary~~ies~~.”

9 Section 115 of the Act.

The AMF expects senior management attestations to be submitted to it based on the CARLI form filing frequency and requirements.

The AMF expects the designated representative to perform a review of the CARLI form to inform the senior management attestations, and to provide an attestation on the accuracy and completeness of the CARLI form by signing the CARLI form cover page.

The designated representative's annual attestation submission is to be accompanied by a summary of unadjusted errors[10] identified by the external auditor. Submission of unadjusted errors is limited to those impacting the calculation of the CARLI Ratios.

1.4.3 Audit

1.4.3.1 External audit

Effective for fiscal years beginning before January 1, 2025

The AMF expects the CARLI Ratios to be audited annually by an external auditor. The external auditor's opinion should address compliance with this guideline with respect to the calculation of the CARLI Ratios.

The AMF expects the external auditor to provide the external audit opinion to the AMF annually within 90 days of fiscal year-end.

Effective for fiscal years beginning on or after January 1, 2025

The AMF expects an external auditor to evaluate and opine on whether the numerator and denominator of the annual CARLI Ratios have been prepared, in all material respects, in accordance with CARLI.

The AMF expects the external auditor to provide the external audit opinion to the AMF annually within 90 days of fiscal year-end.

1.4.3.2 Internal audit

The AMF expects an internal auditor to evaluate and opine on the effectiveness of the processes and internal controls in place for the CARLI form, including related systems, and the monitoring of compliance with AMF-approved models.

The AMF expects the internal auditor to provide his or her opinion to it within 90 days of the fiscal year-end at a minimum once every three years based on the insurer's risk-based frequency of review.

[10] Unadjusted errors below misstatement posting thresholds identified by external auditors in the performance of their work can aid AMF in understanding where errors reside in regulatory ratio calculations, which can support their effective supervision.

The internal audit may be completed at any time during the fiscal year. If the internal auditor's opinion does not include testing of controls at year-end, the insurer must attest to the AMF that the processes and controls continue to be in place and no material changes occurred at year-end.

An insurer may appoint any independent qualified party to conduct this audit.

1.4.4 Best Estimate Liabilities, Cash Flows and Assumptions

Best Estimate Liabilities for one or more contracts represent~~s~~ the present value of the probability-weighted mean taken over the full range of possible future cash flows for the contracts. If the insurance contract liability for the contracts is reported using the IFRS 17 general measurement model or variable fee approach, then the Best Estimate Liability for the contracts is equal to the reported insurance contract liability minus the sum of the Risk Adjustment and contractual service margin.[11]

Best Estimate Cash Flows for one or more contracts, which are used to calculate capital requirements for insurance risk, are the estimate of future cash flows whose present value determines Best Estimate Liabilities. If the estimate of future cash flows consists of multiple cash flow projections, then Best Estimate Cash Flows are the probability-weighted estimate of future cash flows. If an insurance contract liability for one or more contracts is reported using the IFRS 17 premium allocation approach, then Best Estimate Cash Flows comprise outflows of projected future reductions in the liability for the remaining coverage that will be recognized as insurance revenue, and inflows of projected future premium receipts.

Best Estimate Assumptions are the assumptions underlying Best Estimate Cash Flows. If the estimate of future cash flows consists of multiple cash flow projections, then Best Estimate Assumptions comprise all sets of assumptions that are used to determine any of the cash flow projections.

1.4.5 Use of approximations

Insurers must adhere to CIA *Standards of Practice* on materiality and approximations with respect to approximations permitted within the CARLI. All approximations used, along with the vetting completed to measure the effectiveness of approximations, and the steps taken to refine and correct ineffective approximations, must be reported in the Capital Guideline Certification Report.

In addition, insurers must adhere to the following specifications:

Approximations of CARLI calculations are not permitted if most of the data or information is available from other internal processes and is used to calculate liabilities for financial statement purposes. For example, if the insurer performs its liability cash flow projections in real time, it must not use in-arrears asset and liability cash flows for CARLI purposes.

[11] For participating policies, the Best Estimate Liability excludes all liability accounts that are recognized within Available Capital.

In this case, the approximations for CARLI must only be used if the actual calculation cannot be performed in real time (i.e., it is done in-arrears for valuation).[12]

Insurers must use approximations consistently from one quarter to the next, unless reviews of their effectiveness require a modification to improve accuracy or an improvement in the insurer's processes renders the approximation unnecessary.

The following approximations may be used in the calculation of the corresponding CARLI components.[13]

1. Section 2.1.1: For the volatility adjustment for changes in cost of guarantee liabilities included in Gross Tier 1 Capital, the insurer may approximate the quarterly change in the intrinsic value of the guarantees by calculating the sensitivity of the intrinsic value at the start of the quarter and then estimating the change in the intrinsic value based on the actual market movements that have occurred during the quarter. If such an approximation is used, the approximation method must be used consistently over the entire permitted period and sensitivities must be updated each quarter to ensure that quarter-end estimates remain appropriate.

2. Sections 2.1.1.5, 2.1.2.6 and 2.2.1.4: Insurers may approximate marginal capital requirements by using quarter-in-arrears data to determine the ratio of the marginal solvency buffer to the stand-alone solvency buffer (refer to section 1.5.3), and then multiplying this ratio by the current standalone solvency buffer. Additionally, an approximation based on quarter-in-arrears data may be used to calculate marginal capital requirements in sections 2.1.1.5 and 2.2.1.4 if the amount of capital held by third-party investors or attributable to non-controlling interests remains well below the applicable limit.

3. Section 2.1.2.9: Contract-by-contract liabilities may be calculated with either the time value of guarantees (refer to section 5.1.3.23) or total cost of guarantees allocated proportionally by face amount.

~~3.~~4. Section 2.1.2.9: For insurers that use the simplified option (refer to section 7.4), amounts recoverable on surrender related to negative liabilities from segregated fund guarantees can be approximated by 60% of the capital requirement calculated in section 7.5.

5. Section 2.1.2.9.2: An insurer may use quarter-in-arrears data to determine the individual and total contract requirements rc_{vol}, rc_{cat}, RC_{vol}, and RC_{cat}.

~~4.~~6. Section 2.1.2.9.2: Marginal requirements for segregated fund guarantee mortality, longevity and expense risk relative to the standard approach may be calculated by multiplying mortality, longevity and expense risk components in sections 7.2.3.1 and 7.2.3.3 by 80%.

~~5.~~7. Section 3.1.2: Quarter-in-arrears cash flows may be used to approximate the effective maturities of credit exposures subject to this section. If this approximation is used, an

[12] Approximations 8 and 9 below may be used despite this condition.

[13] Only the approximations listed below may be used to calculate CARLI components that affect the CARLI Ratios materially. Other immaterial approximations may be used in the determination of the CARLI Ratios.

insurer must make appropriate adjustments for significant changes in asset inventory, due in particular to disposals or maturities that have occurred since the last quarter-end.

In a low-interest rate environment where an insurer is using the weighted average approach to calculate the effective maturity of exposures to affiliated companies, the insurer may apply weights based on market value instead of undiscounted cash flows to the individual exposures.

~~6.~~8. Section 3.1.7: Insurers may estimate the proportion of registered reinsurance contract held assets that is currently receivable using quarter-in-arrears data.

~~7.~~9. Section 3.1.7: Insurers may approximate reinsurance contract held assets by reinsurer for the purpose of applying the zero floor by using quarter-in-arrears data to determine the percentage of liabilities ceded to each reinsurer, and multiplying these percentages by total current ceded liabilities.

~~8.~~10. Section 3.1.8: An insurer may estimate the proportions of balance sheet receivables that have been outstanding for less than 60 days and 60 days or more using quarter-in-arrears data.

~~9.~~11. Sections 5.1.2 and 5.1.3: Quarter-in-arrears cash flows, in combination with roll-forwards and true-ups to capture material changes during the quarter, may be used to determine the most adverse scenario and project all cash flows. If such an approximation is used, the insurer must be able to demonstrate that the adjusted cash flows were developed from the same data used for financial statement reporting of the previous quarter.

~~10.~~12. Section 5.1.3.3: Adverse impacts of restating dividends on paid-up additional insurance may be ignored.

~~11.~~13. Section 5.6.1: An insurer may approximate the maximum amount of the offsetting short position for a currency within a geographic region (refer to section 1.1.5) using the following formula:

$$120\% \times \frac{BCR_{currency}}{\sum \mathrm{BCR}} \times ICR$$

where:

- $BCR_{currency}$ is the basic capital requirement, defined below, for business denominated in the currency under consideration;
- $\sum \mathrm{BCR}$ is the sum of all basic capital requirements in all currencies within the region;
- *ICR* is the individual capital requirement for the region, with all requirements for currency risk excluded, the requirement for insurance risk calculated net of all reinsurance, and all credits for within-risk diversification, between-risk diversification, and participating and adjustable products applicable to the aggregated requirements taken into account.

The basic capital requirement, $BCR_{currency}$, is the sum of the following amounts that are denominated in the currency under consideration:

- 2.8% of all liabilities;
- 0.24% of the net amount at risk (i.e., the death benefit~~face amount~~ minus Best Estimate Liability) for term insurance products and other life insurance products that do not have significant cash values;
- 2.4% of liabilities:
  - life insurance products that offer significant cash values;
  - participating contracts;
  - accident, health and disability coverage;
- 4.8% of annuity liabilities;
- 4.4% of liabilities for guaranteed investment certificates (GICs) or of notional value for synthetic GICs (e.g., wraps); and
- 4.8% of guaranteed value for segregated funds.

In the above sum, insurance liabilities, net amounts at risk and guaranteed value of segregated funds must be based on Best Estimate Assumptions and must be measured net of all reinsurance. The guaranteed value of segregated funds is defined to be the actuarial present value of all benefits payable to policyholders and beneficiaries assuming that all account values are zero, and remain at zero for the life of the contracts.

~~12.~~14. Sections 6.2.1 and 6.5.1: Insurers may use cash flows with a lag of up to one year when conducting the tests used to determine which products are life supported and death supported, or lapse supported and lapse sensitive.

~~13.~~15. Section 6.2.2.1: Insurers may use a lag of up to one year when calculating the ratio of the individual life volatility risk component to the amount of the following year's expected claims.

~~14.~~16. Sections 6.4.3, 6.4.4, 6.5.3, 6.5.4 and 6.6.1: For the volatility and catastrophe components of morbidity and lapse risks, the shocks applied to best estimate assumptions are for the first year only, and zero thereafter. If an insurer is unable to apply shocks for partial calendar years due to software limitations, it may instead apply the shock for the remaining portion of the calendar year, and a different shock for the entirety of the following calendar year. The second shock must be equal to the CARLI shock multiplied by the proportion of the current calendar year that has elapsed. For example, if the insurer is preparing a CARLI filing for the end of Q1 year A, and CARLI specifies an insurance risk shock of 30%, then the insurer may use a shock of 30% for the remainder of year A, and a 7.5% shock for all of year A+1.

If this approximation is used for expense risk, the second shock representing the carryover from the first year must be added to the 10% shock in the second year.

~~15.~~17. Section 6.5.3: An insurer may approximate the requirement for lapse volatility by determining the present value of cash flows for a shock of +/- 30% in the first year, and subtracting the present value of Best Estimate Cash Flows.

18. Sections 6.7.1, 6.7.4 and 9.2: In order to determine a marginal insurance risk solvency buffer, insurers may use quarter-in-arrears data to determine the ratio of the marginal

insurance risk solvency buffer to the standalone insurance risk solvency buffer, and then apply this ratio to the current standalone insurance risk solvency buffer. An insurer may use this approximation if changes from the previous quarter (e.g., diversification credit or the relative weights of different risks) do not have a material impact on the results.

19. Sections 7.2.3.1 and 7.2.3.3: Up to and including year-end 2026, an insurer may approximate the required capital for mortality, longevity and expense risk using data with a lag of up to one year, in combination with roll-forwards and true-ups to capture material changes during the quarter.

20. Sections 7.2.3.1, 7.2.3.2 and 2.1.2.9: For segregated fund guarantees relative to the standard approach, an insurer may calculate the required capital for mortality, longevity and lapse risk at the block level provided that the policies in the block have similar characteristics. If the requirements are calculated at the block level, for purposes of section 2.1.2.9, the resulting requirements are first pro-rated by the ratio of the guaranteed value of policies with negative restated liabilities to the total guaranteed value of all segregated funds before calculating the offsets to negative reserve deductions.

21. Sections 7.2.3.1, 11.1, 11.2.1, and 2.1.2.9: For segregated fund guarantees relative to the standard approach, shocks may be applied simultaneously in the calculation of the level, trend and catastrophe components for the mortality risk requirements, and in the calculation of the level and trend components for the longevity risk requirements. If shocks are applied simultaneously, the within risk diversification calculation in section 11.1 does not apply, and the level and trend components for mortality and longevity risk should be set to zero in the calculation of the insurance risk requirement (I) in section 11.2.1.

~~16.~~22. Section 7.2.3.3: Insurers may use one-month-in-arrears data to calculate equity risk requirements reflecting dynamic hedging as a percentage of the equity risk requirements for the downward price shock component. The same percentage can then be applied to the quarter end equity risk requirements for the downward price shock component to calculate the dynamic hedging capital credit.

1.4.6 Joint operation of life and health insurance and P&C insurance

The financial statements of an insurer operating in both life and health insurance and P&C insurance must be split into a life and health insurance sector and a P&C insurance sector while attributing all balance sheet items and off-balance-sheet instruments to one or the other sector. The P&C insurance sector must be treated as if it were a qualifying P&C insurance subsidiary and the treatment provided for this type of subsidiary under this guideline must be applied to it (refer to sections 1.3, 2.1.2.7 and 2.2.3.2).

For a subsidiary operating in both life and health insurance and P&C insurance, the P&C insurance sector must also be treated as if it were a P&C subsidiary and the treatment provided for this type of subsidiary under this guideline must be applied to it (refer to sections 1.3, 2.1.2.7 and 2.2.3.2).

1.5 Definitions

1.5.1 Concepts pertaining to corporate relationships and terminology

Unless the context indicates otherwise, concepts pertaining to corporate relationships, such as subsidiaries, associates, joint ventures and related entities, as well as terminology, must be interpreted in accordance with GAAP.

1.5.2 Significant interest in a legal person

For the purposes of this guideline, an insurer has a significant interest in a legal person when it and the entities it controls have effective ownership:

- either a total number of shares with more than 10% of the voting rights attached to all outstanding shares of this legal person;
- or a total number of shares representing ownership of more than 25% of the shareholders' equity of this legal person.

1.5.3 Individual capital requirement and marginal capital requirement

Whereas the Base Solvency Buffer is the capital requirement calculated for the aggregate of an insurer's business, an individual capital requirement is calculated for a portion of the business independently of the insurer's other business, and a marginal capital requirement is calculated for a part of the business taking into account the insurer's other business. The marginal capital requirement measures the impact on the Base Solvency Buffer of removing a portion of the business, taking into account the effect of the risk diversification credit. For example, if the business of an insurer consists of two portfolios A and B and their individual capital requirements are respectively 30 and 50, and the insurer's Base Solvency Buffer is 70, the marginal capital requirement of portfolio A is equal to 20, or the difference between the insurer's Base Solvency Buffer (70) and the individual capital requirement of portfolio B (50). In other words, the marginal capital requirement of portfolio A represents the impact on the insurer's Base Solvency Buffer of removing this portfolio.

Chapter 2. Available Capital

This chapter defines the elements included in Available Capital, sets out eligibility criteria for capital instruments, and sets capital composition limits.

The primary considerations to determine the eligibility of an insurer's capital elements include:

1. availability: whether the capital element is fully paid in, and the extent to which it is fully available to absorb losses;
2. permanence, the period for which the capital element is available to absorb losses;
3. absence of encumbrances and mandatory servicing costs: the extent to which the capital element is free from mandatory payments or encumbrances; and
4. subordination: the extent to and circumstances under which the capital element is subordinated to the rights of policyholders, beneficiaries and general creditors of the insurer in an insolvency or winding-up.

Total Available Capital comprises Tier 1 and Tier 2 capital, which are defined in sections 2.1 and 2.2 below.

2.1 Tier 1 Capital

2.1.1 Gross Tier 1 Capital

Gross Tier 1 Capital is equal to the sum of the following items, from which the equity adjustment for CARLI purposes is subtracted:

Tier 1 Capital Instruments

- Common shares issued by the insurer that meet the criteria specified in section 2.1.1.1;
- Tier 1 Capital Instruments issued by the insurer, other than Common Shares:
  - ➢ that meet the criteria specified in sections 2.1.1.2 to 2.1.1.4; or
  - ➢ that do not meet the criteria specified in sections 2.1.1.2 to 2.1.1.4, but, if they were issued prior to September 25, 2014, they meet the criteria specified in sections 2.2.5.1 or 2.2.5.2 of the version of the *Capital Adequacy Requirements Guideline* issued by the AMF effective January 1, 2014 (the "2014 CAR Guideline")[14] (these instruments are subject to the transition measures in section 2.4.1);

[14] The 2014 CAR Guideline is available starting on page 1,792 of section 5.2 of the *AMF Bulletin* of December 19, 2013, Volume 10, No. 50.

- Instruments issued by consolidated subsidiaries of the insurer and held by third-party investors:
  - ➢ that meet the criteria for classification as Common Shares as specified in section 2.1.1.1, or as Tier 1 Capital Instruments other than Common Shares as specified in sections 2.1.1.2 to 2.1.1.4 (these instruments are subject to the conditions in section 2.1.1.5 and the transition measures in section 2.4.2); or
  - ➢ that do not meet the criteria specified in sections 2.1.1.2 to 2.1.1.4, but, if they were issued prior to September 25, 2014, they meet the criteria specified in sections 2.2.5.1 or 2.2.5.2 of the 2014 CAR Guideline (these instruments are subject to the transition measures in sections 2.4.1 and 2.4.2);

Tier 1 elements other than capital instruments

- contributed surplus, comprising:
  - ➢ share premium resulting from the issuance of capital instruments included in Gross Tier 1 Capital;[15] and
  - ➢ other contributed surplus, resulting from sources other than profits (e.g., members' contributions and initial funds for mutual companies and other contributions by shareholders in excess of amounts allocated to share capital for joint stock companies), with the exception of any share premium resulting from the issuance of capital instruments included in Tier 2 Capital;
- retained earnings;
- volatility adjustment for changes in cost of guarantee liabilities: an insurer may, at its option and for a limited period of seven quarters, elect to partially reverse the changes in liabilities that have occurred for the cost of guarantees for all products (excluding segregated funds) since the end of the previous quarter. This is a one-time election that must be made within six months after the effective date of IFRS 17 and cannot be changed thereafter. If the insurer elects to use the adjustment, then starting one quarter after the implementation of IFRS 17, a percentage of the quarterly increase (decrease) in the liability for cost of guarantees caused by market movements is added to (subtracted from) Gross Tier 1 Capital.[16] The percentage used for the adjustment is 50% during the first year after the adoption of IFRS 17 and 25% during the following year.

  Market movements include changes in risk-free interest rates, equity prices and credit spreads. Insurers may use their own internal processes to determine the portion of the change in liability for cost of guarantees that has occurred due to market movements. The liability for cost of guarantees to which the partial reversal is applied comprises the liabilities for both the intrinsic value of the guarantees and the time value of the guarantees (refer to section 5.1.3.23).
- adjusted accumulated other comprehensive income ("AOCI");

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15 Where repayment of the premium is subject to AMF approval.

16 An approximation may be used under section 1.4.5.

- participating account;[17]
- non-participating account of mutual companies;[18]
- Tier 1 elements, other than capital instruments, attributable to non-controlling interests that satisfy the conditions in section 2.1.1.5;
- tax adjustments and amounts recoverable on surrender related to contract-by-contract negative liabilities ceded under unregistered reinsurance (refer to sections 10.2.5 and 10.2.6).

To determine adjusted AOCI, the following adjustments are applied to AOCI:

- the impact of accumulated after-tax gains or losses on fair-valued liabilities arising from changes to the insurer's own credit risk is reversed;
- the impact of accumulated fair value gains and losses on derivatives held as cash flow hedges relating to the hedging of items that are not fair-valued on the balance sheet (e.g., loans and debt obligations) is reversed;
- the accumulated after-tax fair value revaluation gains on own-use property (revaluation method) are subtracted.[19]

The equity adjustment for CARLI purposes includes the adjustment of the following items:

- the impact of all contractual service margins reported in the financial statements is reversed:
  - all margins reported as liabilities in the financial statements,[20] ~~other that those in respect of segregated fund contracts with guarantee risks~~, are subtracted from the adjustment;
  - all margins reported as assets in the financial statements,[21] ~~other than those in respect of segregated fund contracts with guarantee risks~~, are added to the adjustment;

[17] For mutual companies, this refers to residual interest reported as equity or as a liability in the LIFE return. For joint stock companies, this refers to: (i) contributions to the participating surplus reported as liabilities in the LIFE return; and (ii) amounts reported as Participating Account Policyholders' Equity in the LIFE return. Expected shareholder transfers from the participating account included within the contractual service margins are excluded from the participating account, as contractual service margins are included in the determination of equity for CARLI purposes below.

[18] This amount also includes residual interest reported as a liability in the LIFE return.

[19] If, under IAS 16, an insurer elects to measure owner-occupied properties on a fair value basis, the properties must be treated as investment properties under CARLI and be excluded from the calculation of the amount to be subtracted related to owner-occupied properties in the adjustments applied to AOCI.

[20] The portion of contractual service margins attributable to non-controlling interests, as described in section 2.1.1.5, is excluded from this section and must instead be subject to the limits set out in section 2.1.1.5.

[21] The portion of contractual service margins attributable to non-controlling interests, as described in section 2.1.1.5, is excluded from this section and must instead be subject to the limits set out in section 2.1.1.5.

- the impact of accumulated after-tax gains or losses on fair-valued liabilities arising from changes to the insurer's own credit risk is reversed;
- the impact of the following items related to property[22] is reversed:
  - after-tax fair value gains or losses on owner-occupied property upon conversion to IFRS (cost model);[23]
  - accumulated after-tax revaluation loss on owner-occupied property (revaluation method);
  - gains or losses up to the transfer date on owner-occupied property that was previously classified as investment property;[24]
- the impact of any discretionary participation features reported in a component of equity that is included in Gross Tier 1 Capital is reversed.
- the difference between restated liabilities for segregated fund guarantees (refer to section 7.1) and the Best Estimate Liability for these guarantees, after applicable smoothing transition measure (refer to section 7.5.2), if positive, is added.

2.1.1.1 Qualifying criteria for common shares

Capital instruments classified as common shares must meet all of the following criteria.

1. The instrument represents the most subordinated claim in the event of liquidation of the insurer.
2. The investor is entitled to a claim on the residual assets that is proportional with its share of issued capital, after all senior claims have been repaid in the event of liquidation (i.e., it is an unlimited and variable claim, not a fixed or capped claim).
3. The instrument is perpetual and never repaid outside of liquidation, setting aside discretionary repurchases or other means of effectively reducing capital in a discretionary manner that are allowable under relevant law and subject to the prior authorization of the AMF.
4. The insurer does not create an expectation at issuance that the instrument will be bought back, redeemed or cancelled, nor do the promotional material and the

22 If, under IAS 16, an insurer elects to measure owner-occupied properties on a fair value basis, the properties must be treated as investment properties under LICAT and be excluded from the calculation of the amount to be reversed related to owner-occupied properties in the equity adjustment.

23 Amounts reversed must equal the difference between deemed cost on transition to IFRS (January 1, 2010 for insurers whose fiscal year ends on December 31) and the moving average market value immediately prior to conversion to IFRS (December 31, 2010 for these same insurers).

24 The amount of the reversal is the difference between the property's deemed cost on the date of transfer into owner-occupied property and either the moving average market value immediately prior to conversion to IFRS, net of subsequent depreciation (if booked) if the property was acquired before conversion to IFRS, or the original acquisition cost net of subsequent depreciation (if booked) if the property was acquired after conversion to IFRS.

statutory or contractual terms provide any feature which might give rise to such expectation.

5. Distributions are paid out of distributable items (retained earnings included). The level of distributions is not in any way tied or linked to the amount paid in at issuance and is not subject to a contractual cap (except to the extent that an insurer is unable to pay distributions that exceed the level of distributable items or to the extent that distributions on senior ranking capital must be paid first).

6. There are no circumstances under which the distributions are obligatory. Non-payment is therefore not an event of default.

7. Distributions are paid only after all legal and contractual obligations have been met and payments on more senior capital instruments have been made. This means that there are no preferential distributions, including in respect of other elements classified as the highest quality issued capital.

8. It is in the form of issued capital that takes the first and proportionately greatest share of any losses as they occur. Within the highest quality capital, each instrument absorbs losses on a going-concern basis proportionately and *pari passu* with all the others.

9. The paid-in amount is recognized as equity capital (i.e., not recognized as a liability) for determining a liquidation balance sheet (insolvency balance sheet).

10. It is directly issued and paid-in,[25] and the insurer cannot directly or indirectly have funded the purchase of the instrument. Where the consideration for the share is other than cash, the issuance of the common share is subject to the prior authorization of the AMF.

11. The paid-in amount is neither secured nor covered by a guarantee[26] of the issuer or related entity.[27] Nor is it subject to any other arrangement that legally or economically enhances the seniority of the claim.

12. It is only issued with the approval of the owners of the issuing insurer, either given directly by the owners or, if permitted by applicable law, given by the Board of Directors or by other persons duly authorized by the owners.

13. It is clearly and separately disclosed as equity on the insurer's balance sheet, prepared in accordance with relevant accounting standards.

The criteria for common shares also apply to non-joint stock companies, such as mutual insurance companies, taking into account their specific constitutions and legal structures. The application of the criteria must preserve the quality of the instruments by requiring that they are deemed fully equivalent to common shares in terms of their capital quality, including their loss absorption capacity, and do not possess features which could cause

[25] Paid-in capital generally refers to capital that has been received with finality by the insurer, is reliably valued, fully under the insurer's control and does not directly or indirectly expose the insurer to the credit risk of the investor.

[26] In the context of this guideline, the terms "secured" and "guarantee" are used generically.

[27] A related entity can include a parent company, a sister company, a subsidiary or any other affiliate. A holding company is a related entity irrespective of whether it forms part of the consolidated insurance group.

the condition of the insurer to be weakened as a going concern during periods when the insurer is under stress.

2.1.1.2 Qualifying criteria for tier 1 capital instruments other than common shares

Instruments, other than common shares, qualify as Tier 1 Capital if all of the following criteria are met.

1. The instrument is issued and paid-in in cash or, subject to the prior authorization of the AMF, in other means.
2. The instrument is subordinated to policyholders, beneficiaries, general creditors, and subordinated debt holders of the insurer.
3. The instrument is neither secured nor covered by a guarantee of the issuer or related entity or other arrangement that legally or economically enhances the seniority of the claim vis-à-vis the insurer's policyholders, beneficiaries and creditors.[28]
4. The instrument is perpetual, i.e., there is no maturity date and there are no step-ups[29] or other incentives to redeem.[30]
5. The instrument may be callable at the initiative of the issuer only after a minimum of five years.
    a. To exercise a call option an insurer must receive prior authorization of the AMF.
    b. An insurer's actions and the terms of the instrument must not create an expectation that the call will be exercised.
    c. An insurer must not exercise the call unless it fulfils one of the following conditions:
        i. It replaces the repurchased or called instrument with the same amount of capital of the same or better quality, including through an increase in retained earnings, and the replacement of this capital is made on terms that are sustainable for the income capacity of the insurer.[31]
        ii. The insurer demonstrates that its capital position is well above internal capital target ratios after the call option is exercised.[32]

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[28] Further, where an issuer uses a "special purpose entity" (SPE) to issue capital to investors and provides explicit support, including overcollateralization, such support would constitute enhancement in breach of this criterion.

[29] A step-up is defined as a call option combined with a pre-set increase in the initial credit spread of the instrument at a future date over the initial dividend (or distribution) rate after taking into account any swap spread between the original reference index and the new reference index. Conversion from a fixed rate to a floating rate (or vice versa) in combination with a call option without any increase in credit spread would not constitute a step-up.

[30] A call option combined with a requirement or an investor option to convert the instrument into common shares if the call is not exercised constitutes an incentive to redeem.

[31] Replacement issuances can be concurrent with but not after the instrument is called.

[32] Internal capital target ratios are defined in section 1.2.

6. Any repayment of principal (e.g., through repurchase or redemption) requires the AMF's prior authorization and insurers must not assume or create market expectations that such authorization will be given.

7. The dividend or coupon payments must be discretionary.

   a. The insurer must have full discretion at all times to cancel distributions/payments.[33]

   b. Cancellation of discretionary payments must not be an event of default or credit event.

   c. Insurers must have full access to cancelled distributions to meet obligations as they fall due.

   d. Cancellation of distributions/payments must not impose restrictions on the insurer except in relation to distributions to common shareholders.

8. Dividends/coupons must be paid out of distributable items.

9. The instrument cannot have a credit sensitive dividend feature, i.e., a dividend/coupon that is reset periodically based in whole or in part on the insurer's credit standing, such as its credit rating or its CARLI Ratios.[34]

10. The instrument cannot contribute to liabilities exceeding assets if such a balance sheet test forms part of insolvency law.

11. Other than preferred shares, instruments included in Tier 1 capital instruments must be classified as equity per relevant accounting standards.

12. Neither the insurer nor a related party over which the insurer exercises control or significant influence can have purchased the instrument, nor can the insurer directly or indirectly have funded the purchase of the instrument.

13. The instrument cannot have any features that hinder recapitalization, such as provisions that require the issuer to compensate investors if a new instrument is issued at a lower price during a specified time frame.

14. If the instrument is not issued out of an operating entity[35] or the holding company in the consolidated group (e.g., it is issued by a special purpose entity), proceeds must be immediately available without limitation to an operating entity or the holding

[33] A consequence of full discretion at all times to cancel distributions/payments is that "dividend pushers" are prohibited. An instrument with a dividend pusher obliges the issuing insurer to make a dividend/coupon payment on the instrument if it has made a payment on another (typically, more junior) capital instrument or share. This obligation is inconsistent with the requirement for full discretion at all times to cancel distributions/payments. Furthermore, the term "cancel distributions/payments" means to forever extinguish these payments. It does not permit features that require the insurer to make distributions/payments in kind at any time.

[34] Insurers may use a broad index as a reference rate in which the issuing insurer is a reference entity; however, the reference rate must not exhibit significant correlation with the insurer's credit standing. If an insurer plans to issue capital instruments where the margin is linked to a broad index in which the insurer is a reference entity, the insurer must ensure that the dividend/coupon is not credit-sensitive.

[35] An operating entity is an entity set up to conduct business with clients with the intention of earning a profit in its own right.

company in the consolidated group in a form that meets or exceeds all of the other qualifying criteria of Tier 1 Capital.[36]

Purchase for cancellation of Tier 1 Capital Instruments Other than Common Shares is permitted at any time with the prior authorization of the AMF. For further clarity, a purchase for cancellation does not constitute a call option as described in the qualifying criteria of this section.

Tax and regulatory event calls are permitted during an instrument's life subject to the prior authorization of the AMF and provided the insurer was not in a position to anticipate such an event at the time of issuance. Where an insurer elects to include a regulatory event call in an instrument, this event must be "the date specified in a letter from the AMF to the insurer on which the instrument will no longer be recognized in full as eligible Tier 1 Capital of the insurer on a consolidated basis".

Dividend stopper arrangements that stop payments on Common Shares or Tier 1 Capital Instruments Other than Common Shares are permissible provided the stopper does not impede the full discretion the insurer must have at all times to cancel distributions or dividends on the Tier 1 Capital Instruments Other than Common Shares, nor must it act in a way that could hinder the recapitalization of the insurer pursuant to criterion 13 above. For example, it would not be permitted for a stopper on Tier 1 Capital Instruments Other than Common Shares to:

- attempt to stop payment on another instrument where the payments on the other instrument were not also fully discretionary;
- prevent distributions to shareholders for a period that extends beyond the point in time that dividends or distributions on this instrument are resumed;
- impede the normal operation of the insurer or any restructuring activity, including acquisitions or disposals.

A dividend stopper may also act to prohibit actions that are equivalent to the payment of a dividend, such as the insurer undertaking discretionary share buybacks.

Where an amendment or variance of the terms and conditions of a Tier 1 Capital Instrument Other than Common Shares affects its recognition as Available Capital, such amendment or variance will only be permitted with the prior authorization of the AMF.[37]

Insurers are permitted to "re-open" offerings of capital instruments to increase the principal amount of the original issuance provided that call options will only be exercised, with the

[36] For greater certainty, the only assets the special purpose entity may hold are intercompany instruments issued by the insurer or a related entity with terms and conditions that meet or exceed the Tier 1 criteria. Put differently, instruments issued to the special purpose entity have to fully meet or exceed all of the eligibility criteria for Tier 1 Capital as if the special purpose entity itself was an end investor – i.e., the insurer cannot issue a lower quality capital or senior debt instrument to a special purpose entity and have the special purpose entity issue higher quality capital instruments to third-party investors so as to receive recognition as Tier 1 Capital.

[37] Any modification of, addition to, or renewal of an instrument issued to a related party is subject to the provisions of the Act relative to transactions with persons or groups related to the insurer.

prior authorization of the AMF on or after the fifth anniversary of the closing date of the latest re-opened tranche of securities. However, the insurer may not re-open the offering if:

- the initial issue date for the offering was on or before September 24, 2014; and
- the offering does not meet the criteria of this section.

Defeasance options may only be exercised on or after the fifth anniversary of the closing date with the prior authorization of the AMF.

2.1.1.3 Tier 1 capital instruments other than common shares issued to a parent

In addition to the qualifying criteria and minimum requirements specified in this guideline, Tier 1 Capital Instruments Other than Common Shares Issued to a Parent by an insurer, either directly or indirectly, can be included in Available Capital subject to the insurer providing prior notification of the intercompany issuance to the AMF together with the following:

- a copy of the instrument's terms and conditions;
- the intended classification of the instrument for Available Capital purposes;
- the rationale for not issuing common shares in lieu of the subject capital instrument;
- confirmation that the rate and terms of the instrument are at least as favourable to the insurer as market terms and conditions;
- confirmation that the failure to make dividend or interest payments, as applicable, on the subject instrument would not result in the parent, now or in the future, being unable to meet its own debt servicing obligations, nor would it trigger cross-default clauses or credit events under the terms of any agreements or contracts of either the insurer or the parent.

2.1.1.4 Tier 1 capital instruments other than common shares issued out of branches and subsidiaries outside Canada

In addition to any other requirements prescribed in this guideline, where an insurer wishes to include, in its consolidated Available Capital, Tier 1 Capital Instruments Other than Common Shares issued out of a branch or subsidiary of the insurer outside Canada, it must provide the AMF with the following:

- a copy of the instrument's terms and conditions;
- certification from a senior executive of the insurer, together with the insurer's supporting analysis, that confirms that the instrument meets the qualifying criteria for the tier of Available Capital in which the insurer intends to include the instrument on a consolidated basis;
- an undertaking whereby both the insurer and the subsidiary confirm that the instrument will not be redeemed, purchased for cancellation, or amended without

the prior authorization of the AMF. Such undertaking will not be required where the prior authorization of the AMF is incorporated into the terms and conditions of the instrument.

2.1.1.5 Consolidated subsidiaries having issued Tier 1 Capital instruments to third-party investors and non-controlling interests

The following capital instruments and elements may receive partial recognition in the consolidated Tier 1 Capital of the parent insurer:[38]

i. Common Shares and Tier 1 Capital Instruments Other than Common Shares, issued by subsidiaries of the insurer (with the exception of deconsolidated subsidiaries for the purposes of this guideline) and held by third-party investors; and

ii. Tier 1 elements, other than capital instruments, attributable to non-controlling interests.[39]

A Tier 1 Capital instrument issued by a consolidated subsidiary and held by a third-party investor may be included in the consolidated Tier 1 Capital if:

1. it is issued for the capitalization of the parent insurer and meets all of the following criteria:
    a. the subsidiary uses the proceeds of the issue to purchase a similar instrument from the parent insurer that meets the criteria in section 2.1.1.1 or sections 2.1.1.2 to 2.1.1.4;
    b. the terms and conditions of the issue, as well as the intercompany transfers, must ensure that the investor is placed in the same position as if the instrument were issued by the parent insurer;
    c. the instrument held by the third-party investor is not implicitly secured by other assets, such as cash, held by the subsidiary;

    or

2. it was issued prior to October 28, 2016 and qualifies for recognition in consolidated Available Capital under section 2.4.2.

Tier 1 capital instruments issued by a consolidated subsidiary and held by third-party investors that do not meet the preceding criteria, and Tier 1 elements, other than capital instruments, attributable to non-controlling interests may be included in the consolidated

[38] If an insurer's consolidated financial statements include an unleveraged mutual fund entity that is not subject to deduction from Available Capital, and a portion of the fund's units are exempt from the requirements of section 5.4, all non-controlling interests in the mutual fund entity must be excluded from the insurer's Available Capital.

[39] Tier 1 elements, other than capital instruments, attributable to non-controlling interests associated with a consolidated subsidiary is the amount of Tier 1 elements of non-controlling interests related to the subsidiary (including contractual service margins) that meet Tier 1 eligibility criteria, less any amount of Tier 1 and Tier 2 capital instruments issued by the subsidiary and held by third-party investors included therein.

Tier 1 Capital of the parent insurer by applying the Third Party Share Limit, calculated as follows:

Third Party Share Percentage
× (Marginal capital requirement for the subsidiary
+ Total deductions from the subsidiary's Available Capital)

where:

- "Third Party Share Percentage" is equal to the result of dividing:
  - the total amount of all Tier 1 and Tier 2 capital instruments issued by the subsidiary and held by third-party investors that do not meet the above criteria, plus Tier 1 elements, other than capital instruments, attributable to non-controlling interests;[40] by
  - the sum of Available Capital and the Surplus Allowance of the subsidiary;
- "Marginal capital requirement for the subsidiary"[41] is equal to:
  - the difference between the Base Solvency Buffer (refer to section 11.3) of the insurer, and the Base Solvency Buffer of the insurer excluding the subsidiary, with both requirements calculated net of all reinsurance, if the sum of Tier 1 and Tier 2 capital instruments issued by a subsidiary and held by third parties and of Tier 1 elements, other than capital instruments, attributable to non-controlling interests is equal to or greater than 1% of Gross Tier 1 Capital; or
  - the capital requirement of the subsidiary calculated based on local regulatory requirements at the equivalent local level of the CARLI supervisory target,[42] if the sum of Tier 1 and Tier 2 capital instruments issued by a subsidiary and held by third parties and Tier 1 elements, other than capital instruments, attributable to non-controlling interests is less than 1% of Gross Tier 1 Capital.

Details of the calculation of the amount included in Tier 1 Capital must be reported in the Capital Guideline Certification Report.

2.1.2 Deductions from Gross Tier 1 Capital

The items below are deducted from Gross Tier 1 Capital to determine Net Tier 1 Capital. Credit risk factors are not applied to items that are deducted from Gross Tier 1 Capital.

40 Tier 1 elements, other than capital instruments, attributable to non-controlling interests associated with a consolidated subsidiary is the amount of Tier 1 elements of non-controlling interests related to the subsidiary (including contractual service margins) that meet the Tier 1 eligibility criteria, less any amount of Tier 1 and Tier 2 capital instruments issued by the subsidiary and held by third-party investors included therein.

41 An approximation may be used under section 1.4.5.

42 Insurers must contact the AMF in writing to determine the equivalence for a subsidiary's local jurisdiction if that jurisdiction has not established a CTE (99) or VAR (99.5).

2.1.2.1 Goodwill and other intangible assets

The amount of goodwill to deduct is the amount after deconsolidation of subsidiaries as per section 1.3. The deduction must also incorporate goodwill included in the carrying amount of equity in deconsolidated P&C insurance subsidiaries as per section 1.3 and equity-accounted substantial investments (refer to section 1.5.2). However, this amount must exclude goodwill deducted under the terms of 2.1.2.7 for P&C insurance subsidiaries.

The amount deducted is net of any associated deferred tax liabilities (DTLs) that would be extinguished if the goodwill were to become impaired or otherwise derecognized.

Additionally, an amount for other intangible assets (including software intangibles) must be deducted from Gross Tier 1 Capital. The amount to deduct is the amount after deconsolidation of subsidiaries as per section 1.3. The deduction must also incorporate other intangible assets in the carrying amount of equity in deconsolidated P&C insurance subsidiaries as per section 1.3 and equity-accounted substantial investments (refer to section 1.5.2). This amount must however exclude amounts for other intangible assets that are deducted according to the terms of section 2.1.2.7 for P&C insurance subsidiaries.

The amount to deduct is net of any associated DTLs that would be extinguished if the intangible assets were to become impaired or otherwise derecognized.

2.1.2.2 Investments in own Tier 1 Capital

An insurer's investments in its own common shares (e.g., treasury stock) and its own Tier 1 Capital Instruments Other than Common Shares, whether held directly or indirectly, are deducted from Gross Tier 1 Capital unless they are already derecognized under IFRS.

In addition, any Tier 1 capital instrument that the insurer could be contractually obliged to purchase is deducted from Gross Tier 1 Capital.

2.1.2.3 Reciprocal cross holdings of Tier 1 Capital instruments of banking, insurance and financial entities

Reciprocal cross holdings in Tier 1 capital instruments (e.g., Insurer A holds investments in Tier 1 capital instruments of Insurer B, and in return, Insurer B holds investments in Tier 1 capital instruments of Insurer A) that are designed to artificially inflate the capital position of insurers, whether directly or indirectly, are deducted from Gross Tier 1 Capital.

2.1.2.4 Net defined benefit pension plan assets

Each net defined benefit pension plan asset (DB pension plan), inclusive of the impact of any asset ceiling limitation, is deducted from Gross Tier 1 Capital. Each asset is net of any associated DTLs that would be extinguished if the asset were to become impaired or derecognized. The asset amount to deduct is the amount after deconsolidation of subsidiaries as per section 1.3.

Subject to prior written AMF authorization, an insurer may reduce this deduction by the amount of available refunds of defined benefit pension plan surplus assets to which the insurer has unrestricted and unfettered access.[43] Details of the calculation of the deduction must be reported in the Capital Guideline Certification Report.

2.1.2.5 Deferred tax assets

The adjustments described in this section are based on non-discounted deferred tax amounts as reported on the insurer's balance sheet, and on the deferred tax position of each consolidated legal entity, except for subsidiaries deconsolidated as per section 1.3.

Deferred tax assets (DTA) must be classified as either DTA arising from temporary differences (DTA Temporary) or DTA other than those arising from temporary differences (DTA Non-Temporary). For example, DTA relating to tax credits and to carry forwards of operating losses are classified as DTA Non-Temporary.

No adjustments are required under this section for legal entities in a net Deferred Tax Liability ("DTL") position. Adjustments associated with legal entities with net DTA positions are set out in sections 2.1.2.5.1 and 2.1.2.5.2 below.

Eligible DTL in this section, are those permitted to offset DTA for accounting purposes at the legal entity level, excluding DTL that have been netted against the deductions for goodwill, other intangible assets and defined benefit pension plan assets. Eligible DTL are allocated on a pro-rata basis between DTA Temporary and DTA Non-Temporary.

Details of the calculation of the amounts related to DTA must be reported in the Capital Guideline Certification Report.

2.1.2.5.1 DTA – other than those arising from temporary differences

Insurers must deduct 100% of DTA Non-Temporary, net of eligible DTL, from Gross Tier 1 Capital.

2.1.2.5.2 DTA – arising from temporary differences

The amount that insurers must deduct from Gross Tier 1 Capital is obtained by the following formula:

$$\frac{max\left[DTAT_{net} - 0.1 \times \left(T1_{gross} - T1_{deductions}\right), 0\right]}{0.9}$$

where:

43 To obtain this authorization, the insurer must demonstrate to the AMF's satisfaction that it has clear entitlement to the surplus and that it has unrestricted and unfettered access to the surplus pension assets. Evidence required by the AMF may include, among other things, an acceptable independent legal opinion and the prior authorization from the pension plan members and the pension regulator.

- $DTAT_{net}$ is equal to DTA Temporary net of eligible DTL.
- $T1_{gross}$ is equal to Gross Tier 1 Capital.
- $T1_{deductions}$ is equal to the sum of all deductions from Gross Tier 1 Capital in sections 2.1.2.1 to 2.1.2.5.1 and sections 2.1.2.6 to 2.1.2.10.

DTA Temporary included in Available Capital is limited to 10% of Net Tier 1 Capital. It is subject to a 25% credit risk factor (refer to section 3.1.8).

Example: DTA

The following example presents the DTA amounts for a single legal entity:

Item	Amount	Calculation
Gross Tier 1 Capital	4,075	
All deductions from Gross Tier 1 Capital except those relating to both types of DTA	2,000	
DTA Non-Temporary	100	
DTA Temporary	300	
DTL associated with goodwill	50	
DTL other	100	
Net DTA position	250	= (100 + 300) – (50 + 100)
DTL allocated to DTA Non-Temporary	25	= 100 ×100 / 400; calculation excludes DTL associated with goodwill
DTL allocated to DTA Temporary	75	= 100 × 300 / 400; calculation excludes DTL associated with goodwill
DTA Non-Temporary, net of eligible DTL	75	= 100 – 25
DTA Temporary, net of eligible DTL	225	= 300 – 75
Gross Tier 1 Capital, net of deductions from sections 2.1.2.1 to 2.1.2.5.1 and 2.1.2.6 to 2.1.2.10	2,000	= 4,075 – 2,000 – 75
DTA deducted from Gross Tier 1 Capital		
DTA Non-Temporary	75	
DTA Temporary	28	= (225 – 10% × 2,000) / 0.9

Item	Amount	Calculation
Validation		
Amount included in Available Capital does not exceed	197	= 225 – 28
10% of Net Tier 1 Capital	197	=10% × (4,075 – 2,000 – 75 – 28)
Requirements for DTA Temporary included in Available Capital	49	= 197 × 25%

2.1.2.6 Encumbered assets

Encumbered assets in excess of the allowable amount are deducted from Gross Tier 1 Capital.[44] The allowable amount, calculated for each portfolio of encumbered assets and the liabilities they secure,[45] is equal to the sum of:

- the value of on-balance sheet liabilities secured by the encumbered assets;
- the marginal capital requirement,[46] floored at zero, for the encumbered assets and the liabilities they secure.

The deduction is reduced by the following amount:

- 50% of the calculated deduction amount relating to real property pledged to secure mortgage borrowing activities.

For the purpose of calculating the allowable amount, the marginal capital requirement is equal to the difference between the Base Solvency Buffer (refer to section 11.3) of the insurer and the Base Solvency Buffer of the insurer excluding the encumbered assets and the liabilities they secure, where both requirements are calculated net of all reinsurance. This calculation must use the amounts after deconsolidation of the subsidiaries as per section 1.3.

The balance sheet amount of liabilities secured by encumbered assets not in excess of the allowable amount and not deducted from Available Capital is subject to section 3.5 of this guideline.

The following encumbered assets are exempt and must not be included in the calculation of the encumbered assets deduction above:

44 Encumbered assets are still subject to the requirements for credit and market risk in Chapters 3 and 5, as these requirements can offset the deduction from Gross Tier 1 Capital.

45 The defining characteristic of a portfolio is that any asset in the portfolio is available to pay any of the corresponding liabilities.

46 An approximation may be used under section 1.4.5.

- assets relating to off-balance sheet securities financing transactions (i.e., securities lending and borrowing, repos and reverse repos) that do not give rise to any liability on the balance sheet;
- assets pledged to secure centrally cleared and over-the-counter derivative liabilities;
- assets pledged in accordance with the rules of the Civil Code of Québec to secure mortgage borrowing activities.

Encumbered assets that are exempt under the above assets relating to off-balance sheet securities financing transactions are subject to section 3.5 of this guideline.

2.1.2.7 Investments in capital instruments of P&C insurance subsidiaries, dissimilar regulated financial subsidiaries and non-qualifying subsidiaries

Under this guideline:

- A P&C insurance subsidiary is a subsidiary that is a P&C insurer or that could be considered a P&C insurer if it were constituted in Canada;
- a dissimilar regulated financial subsidiary is either a subsidiary for which the applicable regulations require capital adequacy or one that, if it were constituted in Canada, would be subject to such requirements. However, this subsidiary is not a life and health insurer or a P&C insurance subsidiary;
- a non-qualifying subsidiary is any other subsidiary, except one ~~that is~~:
    - that is a life and health insurer;
    - that carries on only activities similar to those the insurer is authorized to carry on;
    - whose principal activity is the offering or the soliciting of shares in investment portfolios, the making of loans, the distribution of securities, including bonds or contributed capital securities of legal persons, factoring, leasing, the offering of computing services or actuarial advisory services;
    - whose principal activity is the purchase, holding, leasing, sale, operation or administration of an immovable~~, management, sale or leasing of immovables~~;
    - ~~whose principal activity is the offering of shares in investment portfolios, the making of loans and investments, factoring, leasing, the offering of computing services or actuarial advisory services;~~
    - whose principal activity is complementary to the distribution of certain insurance products, such as travel assistance, legal assistance and road assistance;
    - that is registered as a firm under the *Act respecting the distribution of financial products and services*, CQLR, chapter D-9.2;~~whose activities are those of a firm within the meaning the *Act respecting the distribution of financial products and services* (CQLR, Chapter D-9.2) or that offers financial products and services outside Québec, or~~

-
- that offers financial products and services only outside Québec;
- that is registered as a mutual fund dealer under the *Securities Act*, CQLR, chapter V-1.1, or registered as such under extra-provincial securities laws within the meaning of section 305.1 of that Act; or
- that operates a residential and long-term care center~~re~~.

For each P&C insurance subsidiary, the sum of all amounts deducted and reversed from the subsidiary's Available Capital calculated in accordance with the AMF's *Capital Adequacy Requirements Guideline* for Property and casualty insurance (the "MCT") is deducted from Gross Tier 1 Capital (refer to section 1.3 for subsidiaries in which the percentage ownership is less than 100%).

Investments in the financial instruments of dissimilar regulated financial subsidiaries and non-qualifying subsidiaries are deducted in the capital category where the instrument would be eligible if it were issued by the insurer itself. When an instrument issued by such a subsidiary meets the criteria set out in section 2.1.1.1 or section 2.1.1.2, it is deducted from Gross Tier 1 Capital. If an instrument in which the insurer has invested does not meet the qualifying criteria for either Tier 1 or Tier 2 Capital, the instrument is deducted from Gross Tier 1 Capital.

The amount deducted is the carrying amount of the deconsolidated subsidiary reported as an investment using the equity method of accounting, as described~~specified~~ in section 1.3. The deduction of this amount therefore includes the goodwill, all other intangible assets, net DB pension plan assets, DTAs, encumbered assets, AOCI and all other net assets of the deconsolidated subsidiary, as the deconsolidation should reverse these amounts prior to their respective Gross Tier 1 Capital deductions.

Where the insurer provides a facility such as a letter of credit or guarantee that is treated as capital[47] by the dissimilar regulated financial subsidiary, the full amount of the facility must be deducted from the Gross Tier 1 Capital.[48]

A credit risk factor will not be applied to investments in dissimilar regulated financial subsidiaries and non-qualifying subsidiaries, or to letters of credit or guarantees or other facilities provided to these subsidiaries where these have been deducted from Available Capital. Where letters of credit or guarantees are provided to them and are not deducted from Available Capital, they are treated as direct credit substitutes in accordance with this guideline (refer to Chapters 3 and 4).

The details of the calculation must be included in the Capital Guideline Certification Report.

[47] That is, the facility is available for drawdown in the event of impairment of the dissimilar regulated financial subsidiary and is subordinated to the rights of its clients.

[48] Although the facility has not been drawn, resources would not be available to cover the insurer's capital requirements if it were drawn.

2.1.2.8 Cash surrender value deficiencies calculated on an aggregate basis by set of contracts

Cash surrender value deficiencies ("Deficiencies") are calculated on an aggregate basis by set of contracts net of all reinsurance. Deficiencies are calculated relative to the present value of ~~in relation to~~ fulfilment cash flows. The deduction from Gross Tier 1 Capital is the sum of the positive Deficiencies calculated for each set of contracts, where the positive Deficiency for a set is the higher of the set's aggregate Deficiency and zero. All of the contracts in a set must be within the same line of business (as defined in the LIFE return), be contractually similar and must eventually offer a meaningful cash surrender value (CSV).[49] Contracts that never pay CSVs may not be used to offset Deficiencies in contracts that do. The CSVs used in the calculation of Deficiencies must be net of all surrender charges, market value adjustments and other deductions[50] that an insurer could reasonably expect to apply in the event the contract were to be surrendered.

2.1.2.9 Contract-by-Contract Negative Liabilities and deferred acquisition costs

In this section, Contract-by-Contract Negative Liabilities are defined as Negative Best Estimate Liabilities calculated on a contract-by-contract basis at the level of directly issued underlying original contracts. Contract-by-Contract Negative Liabilities must be calculated net of all reinsurance.~~51,~~[52] Contract-by-Contract Negative Liabilities are reduced by a percentage factor of 10% or 30%, and then reduced further for amounts that may be recovered on surrender. The deduction from Gross Tier 1 Capital is the total amount of Contract-by-Contract Negative Liabilities net of the preceding reductions, with the net amount for each contract subject to a minimum of zero.

Contract-by-Contract Negative Liabilities must be calculated for all products and lines of business, including group and accident and sickness business, and future business assumed through reinsurance contracts issued.[53] The calculation must include:

- the Negative Liabilities for each certificate of group insurance contracts for which premiums or liabilities are based on individual insured characteristics, such as group association or creditor insurance;

[49] If the IFRS fulfillment cash flows reflected in the insurer's financial statements as at the reporting date include meaningful CSVs expected to be paid on certain policies, those CSV cash flows should be included in the calculation of Deficiencies for the same reporting date. A contract does not offer a meaningful CSV if the amount is insignificant in all circumstances.

[50] Other deductions to Deficiencies should only include minor, miscellaneous items that an insurer can use to reduce the amount payable to policyholder upon surrender. Changes to CSVs should not be made for anticipated management adjustments of non-guaranteed benefits if those non-guaranteed benefits are included in the IFRS fulfilment cash flows for financial statement purposes.

[51] Contract-by-contract negative liabilities are defined to be the negative restated liabilities (refer to section 7.1) on a contract-by-contract basis for segregated fund products relative to the standard approach, including the simplified option.

[52] Negative Liabilities include those that an insurer has assumed under modified coinsurance contracts and exclude those that the insurer has ceded under modified coinsurance contracts deemed to be registered and unregistered reinsurance.

[53] An approximation may be used under section 1.4.5.

- the excess, if positive, of the deferred acquisition costs for any contract (including deferred acquisition costs for contracts for which coverage has not yet become effective) over its termination or surrender charges; and
- negative group insurance refund provisions where recovery is not completely assured, calculated contract by contract.

The Negative Liability for any contract may be reduced by 10%. To account for the effect of income taxes, the Negative Liability for a contract may be reduced by an additional 20% of the original Negative Liability if it comes from the following portfolios:

- active lives for individually underwritten Canadian health insurance products
- individually underwritten Canadian life insurance products.[54]

No reduction for the effect of income taxes is applied to Negative Liabilities relating to any other portfolio.

The Negative Liability may then be further reduced, to a minimum of zero, by the sum of the following amounts recoverable on surrender:

- 85% of the net commission chargeback for the contract;
- For products other than segregated fund guarantees: the product of γ, 1 + *f,* and 70% of the contract's marginal insurance risk requirement, where γ is the coefficient defined in section 1.1.5, and *f* is the operational risk factor applied to required capital for insurance risk in section 8.2.3;[55]
- For segregated fund guarantees relative to the standard approach, including the simplified option[56]: the product of *γ*, 1 + *g*, and 70% of the marginal capital requirements for credit, market and insurance risks, where *γ* is the coefficient defined in section 1.1.5 and *g* is the operational risk factor applied to required capital for segregated fund guarantees in section 8.2.3;[57]
- For segregated fund guarantees relative to the internal model approach: the product of *γ*, 1 + *g*, *α*, and 70% of the required capital (SFG_{im}) as defined in section 7.7.8.7, where *γ* is the coefficient defined in section 1.1.5, *g* is the operational risk factor applied to required capital for segregated fund guarantees in section 8.2.3[58] and *α* is an adjustment factor defined as follows:

$$\alpha = 95\,\% \times \frac{NL_{im}}{TL_{im} + (2 \times NL_{im})}$$

[54] For the purpose of this section, individually underwritten life business excludes segregated fund guarantees.

[55] This reduction may not be applied to Negative Liabilities for contracts that constitute future business.

[56] For insurers adopting the simplified option (refer to section 7.4), an approximation may be used under section 1.4.5.

[57] This reduction may not be applied to Negative Liabilities for contracts that constitute future business.

[58] This reduction may not be applied to Negative Liabilities for contracts that constitute future business.

where:

- NL_{im} is the absolute value of Contract-by-Contract Negative Liabilities of segregated funds with guarantees
- TL_{im} is the value of Contract-by-Contract Best Estimate Liabilities of segregated funds with guarantees

This amount is allocated by contract, proportionate to Negative Liabilities, for purposes of calculating the net amount for each contract subject to a minimum of zero.

- a specified amount if the contract is part of a yearly renewable term (YRT) reinsurance contract; ~~and~~
- outstanding earned premiums on group insurance business; and~~.~~
- 100% of the surrender charge of a segregated fund guarantee contract.

However, the maximum total reduction for amounts recoverable on surrender, applicable to the deduction from Tier 1 Capital for the reduced amount of Contract-by-Contract Negative Liabilities~~Reserves~~, may be increased up to a limit of 130% of:

- Gross Tier 1 Capital (refer to section 2.1.1), excluding tax adjustments and amounts recoverable on surrender related to contract-by-contract negative liabilities ceded under unregistered reinsurance; plus
- 70% of the Surplus Allowance; less
- all deductions from Gross Tier 1 Capital used to determine Net Tier 1 Capital as specified in section 2.1.2, excluding deductions from Negative Liabilities and adjustments for unregistered reinsurance, and DTA arising from temporary differences; less
- total Contract-by-Contract Negative Liabilities reduced by percentage factors, but not by any amounts recoverable on surrender; less
- the deductions from Gross Tier 1 Capital for unregistered reinsurance in sections 10.2.1 to 10.2.4, net of any credits applicable in sections 10.2.1 and 10.2.2; plus
- the addition to Gross Tier 1 Capital in section 10.2.5.

If the amount by which Contract-by-Contract Negative Liabilities are reduced for amounts recoverable on surrender is below the applicable limit, then the difference may be allocated among unregistered reinsurers to increase the corresponding limits in the unregistered reinsurance adjustments for amounts recoverable on surrender (refer to section 10.2.6).

In order to use any amount recoverable on surrender to offset a contract's adjusted Negative Liability, the amount must be calculated for that contract alone. The following sections provide additional details on the calculation of each amount.

2.1.2.9.1 Net commission chargebacks

The net commission chargeback for a contract is equal to $S \times C$, where:

- S is 70% if the contract's Negative Liability was reduced by 20% to account for the effect of income taxes, and is 100% if it has not; and
- C is the contract's commission chargeback that the insurer could reasonably expect to recover in the event the contract were to be surrendered. The chargeback amount used must be based on the contract's chargeback schedule, and must be calculated net of all ceded reinsurance allowances and commissions.

2.1.2.9.2 Marginal insurance risk requirements

The marginal insurance risk requirement for a contract is equal to the sum of the contract's marginal requirements for each insurance risk. In determining the offset to a contract's reduced Negative Liability, the contract's marginal insurance risk requirement must be net of the amount of any credits that an insurer has taken on account of policyholder deposits and group business adjustments (refer to sections 6.7.2 and 6.7.3). Each of the contract's marginal capital requirements must be calculated net of all reinsurance. All of the contract's marginal requirements for qualifying participating and adjustable products must be multiplied by 30%. A contract's reduced Negative Liability may not be offset by any marginal insurance risk component if an insurer has included a provision for fluctuating reinsurance claims covering the contract in its calculation of Eligible Deposits.

For a contract within a specific geographic region (refer to section 1.1.5), the contract's marginal capital requirement for mortality risk is equal to:

$$0.4 \times \left(\frac{rc_{vol}^2 + 2 \times rc_{cat} \times RC_{cat} - rc_{cat}^2}{\sqrt{RC_{vol}^2 + RC_{cat}^2}} \right) + 0.9 \times (rc_l + rc_t)$$

where:[59]

- rc_{vol} is the mortality volatility risk component for the contract;
- rc_{cat} is the mortality catastrophe risk component for the contract;
- RC_{vol} is the mortality volatility risk component for all business in the contract's geographic region;
- RC_{cat} is the mortality catastrophe risk component for all business in the contract's geographic region;
- rc_l is the contract's level component for mortality risk;
- rc_t is the contract's trend component for mortality risk.

[59] An approximation may be used under section 1.4.5.

The marginal contract requirement for expense risk is equal to 90% of the contract's total requirement for this risk. For all other insurance risks, except lapse risk for segregated fund guarantees, the contract's marginal requirement is obtained by the following formula:

$$0.4 \times \left(\frac{2 \times rc_{vol} \times RC_{vol} + 2 \times rc_{cat} \times RC_{cat} - rc_{vol}^2 - rc_{cat}^2}{\sqrt{RC_{vol}^2 + RC_{cat}^2}} \right) + 0.9 \times (rc_l + rc_t)$$

where:[60]

- rc_{vol} is the volatility component of the particular insurance risk for the contract (multiplied by the statistical fluctuation factor of the contract's geographic region, if applicable);
- rc_{cat} is the catastrophe component of the particular insurance risk for the contract;
- RC_{vol} is the volatility component of the particular insurance risk for all business in the contract's geographic region;
- RC_{cat} is the catastrophe component of the particular insurance risk for all business in the contract's geographic region;
- rc_l is the contract's level component for the particular insurance risk (multiplied by the statistical fluctuation factor of the contract's geographic region, if applicable);
- rc_t is the contract's trend component for the particular insurance risk.

2.1.2.9.3 Segregated fund guarantee marginal capital requirements for credit, market and lapse risks relative to the standard approach

The marginal requirements for a segregated fund guarantee contract relative to the standard approach for credit, market and lapse risks are equal to 80% of the sum of the following items, after applicable transition measures (refer to section 7.5):

- The lapse risk capital requirement (refer to section 7.2.3.2).
- The equity risk capital requirement for the contract, scaled to account for credit for hedging (refer to sections 7.2 and 7.3). This is equal to:
  - the equity risk capital requirement for the contract, multiplied by
  - the total equity risk capital requirement, net of hedging, for the block of business[61] to which the contract belongs, divided by
  - the total equity risk capital requirement, gross of hedging, for the block of business to which the contract belongs.

[60] An approximation may be used under section 1.4.5.

[61] A block of business refers to a set of contracts that are hedged and that obtain a capital credit under section 7.3.

- The credit risk capital requirement (refer to section 7.2.1).

~~2.1.2.9.3~~2.1.2.9.4 Insurance contracts assumed under YRT reinsurance contracts

If an insurance contract has been assumed under an eligible YRT reinsurance contract (defined as a contract that has fully guaranteed premiums and does not provide for profit sharing), the adjustment that may be used to reduce the insurance contract's Negative Liability is as follows:

$$NL \times \min\left(\frac{A-B}{A}, 0.25\right)$$

where:

- *NL* is the contract's Negative Liability reduced by~~net~~ ~~of the~~ percentage factors;
- *A* is the total of reduced Negative Liabilities for all insurance contracts within the insurer's eligible YRT reinsurance contracts calculated contract by contract.
- *B* is the total of reduced Negative Liabilities for all of the insurer's eligible YRT reinsurance contracts, calculated contract by contract.

~~2.1.2.9.4~~2.1.2.9.5 Outstanding earned premiums for group insurance business

If all premiums due under a group insurance contract are an obligation of the plan sponsor, an amount recoverable on surrender for outstanding earned premiums on the contract may be recognized. The outstanding earned premiums on the contract is defined to be:

$$R \times (EP - PR) - LIC$$

subject to a minimum of zero, In the above formula:

- *R* is 95% if the group policyholder is a federal, provincial or territorial government in Canada, and 85% otherwise;
- *EP* is the earned premium for the contract. If the IFRS 17 premium allocation approach is used to determine the liability for the contract, then *EP* is the difference between the total premium and liability for the remaining coverage for the contract. If the IFRS 17 general measurement model is used to determine the contract's liability, then:

  $$EP = TP \times \frac{ECU}{TCU}$$

  where:

  - *TP* is the total premium for the contract;
  - *TCU* is the total number of coverage units for the contract that the insurer uses to determine the contractual service margin;

- *ECU* is the total number of coverage units that the insurer has provided under the contract as at balance sheet date;

- *PR* is the amount of premiums that the insurer has received for the contract as at the balance sheet date;
- *LIC* is the Best Estimate Liability for incurred claims for the contract as at the balance sheet date.

2.1.2.10 Other Items deducted from Gross Tier 1 Capital

The following elements must also be deducted from Gross Tier 1 Capital:

- all requirements for liabilities ceded under unregistered reinsurance contracts, net of any applicable credits (specified in sections 10.2.1 to 10.2.4);
- the difference (if positive), calculated under Best Estimate Assumptions, between[62]:
  - the amount of aggregate reinsurance contracts held that are assets that correspond to future business, other than future business that has been assumed through reinsurance contracts issued; and
  - the amount of aggregate reinsurance contracts held that are liabilities that correspond to future business, other than future business that has been assumed through reinsurance contracts issued; and
- purchased options for which the insurer elects deduction under section 5.2.3.3; and
- negative dividend stabilization reserves and negative reserves resulting from similar experience levelling mechanisms related to participating products (refer to section 9.1.1), calculated by block of participating products.

2.1.3 Net Tier 1 Capital and Tier 1 Capital

Net Tier 1 Capital is defined as Gross Tier 1 Capital less deductions from Gross Tier 1 Capital.

Tier 1 Capital is equal to Net Tier 1 Capital less the sum of the following amounts:

- An insurer must elect to use one of the following approaches for the deduction related to P&C insurance subsidiaries. This election will be irrevocable and involve a specific calculation, detailed as follows, to be applied consistently across the P&C insurance subsidiaries (refer to section 2.1.2.7).

  Approach without transition

  50% of the amount obtained by multiplying the subsidiary's minimum capital requirement calculated under the MCT by the maximum of 150% and the

[62] For reinsurance contract assets and liabilities for segregated fund guarantees, the modified discount rate and expected return assumptions of section 7.1 should be used in place of the Best Estimate Assumptions.

subsidiary's internal target ratio (refer to section 1.3 for subsidiaries in which the percentage ownership is less than 100%).

Approach with transition

Before using this approach, an insurer must enter into an undertaking with the AMF not to distribute[63] the amount by which the deduction related to P&C insurance subsidiaries is reduced as a result of the transition or complete a transaction that would have an equivalent impact on its CARLI Ratios.

The product of the following amounts must be added to the amount without transition:

- 50% of the subsidiary's minimum capital calculated under the MCT;
- The remaining proportion of the transition, i.e., [max(100% - 20% × the number of quarters since December 31, 2023; 0%)];
- the difference between 150% and the maximum between 150% and the subsidiary's internal target ratio, i.e., [150% – max(150%; internal target ratio)].

- The amount of deductions from Gross Tier 2 Capital that are in excess of Gross Tier 2 Capital (refer to section 2.2.4).

The details of the calculations must be disclosed in the Capital Guideline Certification Report.

2.2 Tier 2 Capital

2.2.1 Gross Tier 2 Capital

Gross Tier 2 Capital is equal to the sum of the following elements:

- Tier 2 capital instruments issued by the insurer:
  - that meet the criteria specified in sections 2.2.1.1 to 2.2.1.3; or
  - that do not meet the criteria set out in sections 2.2.1.1 to 2.2.1.3, but, if they were issued prior to September 25, 2014, meet the criteria set out in sections 2.3.2.1 or 2.3.2.2 of the 2014 CAR Guideline (these instruments are subject to transition measures specified in section 2.4.1);

- Instruments issued by consolidated subsidiaries of the insurer and held by third-party investors:

[63] "To distribute" means to make dividend payments to shareholders beyond the regular payments, to distribute employee bonuses or other similar measures beyond regular distributions and to repurchase or redeem common shares. The undertaking may, however, allow the insurer to repurchase or redeem capital instruments other than common shares, subject to AMF prior approval and to any other requirement defined by this Guideline.

- that meet the criteria for classification as Tier 2 Capital, as specified in sections 2.2.1.1 to 2.2.1.3 (these instruments are subject to the conditions in section 2.2.1.4 and the transition measures defined in section 2.4.2);

  or

- that do not meet the criteria set out in sections 2.2.1.1 to 2.2.1.3, but, if they were issued prior to September 25, 2014, meet the criteria set out in sections 2.3.2.1 or 2.3.2.2 of the 2014 CAR Guideline (these instruments are subject to transition measures specified in sections 2.4.1 and 2.4.2);

- Tier 2 elements other than capital instruments, defined in section 2.2.1.5.

2.2.1.1 Qualifying criteria for Tier 2 Capital instruments

Instruments cannot qualify as Tier 2 capital instruments unless they meet all the following criteria.

1. The instrument is issued and paid-in in cash or, with the prior authorization of the AMF, in other means of payment.
2. The instrument is subordinated to policyholders, beneficiaries and general creditors of the insurer.
3. The instrument is neither secured nor covered by a guarantee of the issuer or related entity or any other arrangement that legally or economically enhances the seniority of the claim over those of the policyholders, beneficiaries or general creditors.
4. Maturity:
   a. The minimum original maturity of the instrument is at least five years.
   b. Its recognition in Available Capital in the remaining five years before maturity must be amortized on a straight-line basis.
   c. There are no step-ups[64] or other incentives to redeem.
5. The instrument may be callable at the initiative of the issuer only after a minimum of five years.
   a. To exercise a call option an insurer must receive prior authorization of the AMF.
   b. The insurer’s actions and the terms of the instrument must not create an expectation that the call will be exercised. [65]

[64] A step-up is defined as a call option combined with a pre-set increase in the initial credit spread of the instrument at a future date over the initial dividend (or distribution) rate after taking into account any swap spread between the original reference index and the new reference index. Conversion from a fixed rate to a floating rate (or vice versa) in combination with a call option without any increase in credit spread would not constitute a step-up.

[65] An option to call the instrument after five years, but prior to the start of the amortization period, will not be viewed as an incentive to redeem as long as the insurer does nothing that creates an expectation that the call will be exercised.

c. An insurer must not exercise the call unless it fulfils one of the following conditions:

   i. It replaces the repurchased or called instrument with the same amount of capital of the same or better quality, including through an increase in retained earnings on terms that are sustainable with regard to the insurer's income;[66]

   ii. The insurer demonstrates that its capital position is above the internal capital target ratios after the call option is exercised.[67]

6. The investor must have no rights to accelerate the repayment of scheduled payment (principal or interest), except in bankruptcy, insolvency, wind-up or liquidation.

7. The instrument cannot have a credit-sensitive dividend feature, i.e., a dividend/coupon that is reset periodically based in whole or in part on the insurer's credit standing, e.g., its credit rating or its CARLI Ratios.[68]

8. Neither the insurer nor a related party over which the insurer exercises control or significant influence can have purchased the instrument, nor can the insurer directly or indirectly have funded the purchase of the instrument.

9. If the instrument is not issued out of an operating entity[69] or the holding company in the consolidated group (e.g., a special purpose entity), proceeds must be immediately available without limitation to an operating entity or the holding company in the consolidated group in a form that meets or exceeds all of the other qualifying criteria of Tier 2 Capital.[70]

Tier 2 capital instruments must not contain restrictive covenants or default clauses that would allow the holder to trigger acceleration of repayment in circumstances other than the liquidation, insolvency, bankruptcy or winding-up of the issuer.

Purchase for cancellation of Tier 2 capital instruments is permitted at any time with the prior authorization of the AMF. For further clarity, a purchase for cancellation does not constitute a call option or acceleration clause as described in the qualifying criteria of this section.

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66 Replacement issuances can be concurrent with but not after the instrument is called. ~~Replacement issuances can be concurrent with but not after the instrument is called.~~

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67 The internal capital target ratios are defined in section 1.2.

68 Insurers may use a broad index as a reference rate in which the issuing insurer is a reference entity; however, the reference rate must not exhibit significant correlation with the insurer's credit standing. If an insurer plans to issue capital instruments where the margin is linked to a broad index in which the insurer is a reference entity, the insurer must ensure that the dividend/coupon is not credit-sensitive.

69 An operating entity is an entity set up to conduct business with clients with the intention of earning a profit in its own right.

70 It is understood that the only assets the special purpose entity may hold are intercompany instruments issued by the insurer or a related entity with terms and conditions that meet or exceed the Tier 2 criteria. Put differently, instruments issued to the special purpose entity have to fully meet or exceed all of the eligibility criteria for Tier 2 Capital as if the special purpose entity itself was an end investor – i.e., the insurer cannot issue a lower quality capital or senior debt instrument to a special purpose entity and have the special purpose entity issue qualifying capital instruments to third-party investors so as to receive recognition as Tier 2 Capital.

Tax and regulatory event calls are permitted during an instrument's life subject to the prior authorization of the AMF and provided the insurer was not in a position to anticipate such an event at the time of issuance. Where an insurer elects to include a regulatory event call in a Tier 2 capital instrument, this event must be "the date specified in a letter from the AMF to the insurer on which the instrument will no longer be recognized in full as eligible Tier 2 Capital of the insurer or included as risk-based Total Available Capital on a consolidated basis".

An amendment or variance of a Tier 2 Capital instrument's terms and conditions that affects its recognition as Available Capital will only be permitted with the prior authorization of the AMF.[71]

Insurers are permitted to "re-open" offerings of capital instruments to increase the principal amount of the original issuance provided that call options will only be exercised, with the prior authorization of the AMF on or after the fifth anniversary of the closing date of the latest re-opened tranche of securities. However, the insurer may not re-open the offering if:

- the initial issue date for the offering was on or before September 24, 2014; and
- the offering does not meet the criteria of this section.

Defeasance options may only be exercised on or after the fifth anniversary of the closing date with the prior authorization of the AMF.

Debt obligations made by life insurers that do not qualify as Available Capital are subject to an interest rate risk (refer to section 5.1).

2.2.1.2 Tier 2 Capital Instruments Issued to a parent

In addition to the qualifying criteria and minimum requirements specified in this guideline, Tier 2 capital instruments issued by an insurer to a parent, either directly or indirectly, can be included in Tier 2 Capital subject to the insurer providing prior notification of the intercompany issuance to the AMF together with the following:

- a copy of the instrument's terms and conditions;
- the intended classification of the instrument for Available Capital purposes;
- the rationale for not issuing common shares in lieu of the subject capital instrument;
- confirmation that the rate and terms of the instrument are at least as favourable to the insurer as market terms and conditions;
- confirmation that the failure to make dividend or interest payments, as applicable, on the subject instrument would not result in the parent, now or in the future, being unable to meet its own debt servicing obligations, nor would it trigger cross-default

[71] Any modification of, addition to, or renewal of an instrument issued to a related party is subject to the provisions of the Act relative to transactions with persons or groups related to the insurer.

clauses or credit events under the terms of any agreements or contracts of either the insurer or the parent.

2.2.1.3 Tier 2 Capital Instruments issued out of branches and subsidiaries outside Canada

Debt instruments issued out of an insurer's branches or subsidiaries outside Canada must be governed by Canadian law. The AMF may, however, waive this requirement where the insurer can demonstrate that an equivalent degree of subordination can be achieved as under Canadian law.

In addition to any other requirements prescribed in this guideline, where an insurer wishes to include, in its consolidated Available Capital, a capital instrument issued out of a branch or subsidiary of the insurer outside Canada, it must provide the AMF with the following documentation:

- a copy of the instrument's terms and conditions;
- certification from a senior executive of the insurer, together with the insurer's supporting analysis, that confirms that the instrument meets the qualifying criteria for the tier of Available Capital in which the insurer intends to include the instrument on a consolidated basis;
- an undertaking whereby both the insurer and the subsidiary confirm that the instrument will not be redeemed, purchased for cancellation, or amended without the prior authorization of the AMF. Such undertaking will not be required where the prior authorization of the AMF is incorporated into the terms and conditions of the instrument.

2.2.1.4 Consolidated subsidiaries having issued Tier 2 Capital instruments to third-party investors

Tier 2 capital instruments issued by subsidiaries of the insurer (with the exception of deconsolidated subsidiaries for the purposes of the present Guideline) and held by third-party investors may receive partial recognition in the consolidated Tier 2 Capital of the parent insurer.

Tier 2 capital instruments issued by a subsidiary and held by third-party investors are included in consolidated Tier 2 Capital if:

1. it is issued for the capitalization of the parent insurer and meets all of the following criteria:
   a. the subsidiary uses the proceeds of the issue to purchase a similar instrument from the parent insurer that meets the criteria in sections 2.2.1.1 to 2.2.1.3;
   b. the terms and conditions of the issue, as well as the intercompany transfers, must ensure that the investor is placed in the same position as if the instrument were issued by the parent insurer;

c. the instrument held by the third-party investor cannot effectively be secured by other assets (e.g., cash) held by the subsidiary;

or

2. it was issued prior to October 28, 2016 and qualifies for recognition in consolidated Available Capital under section 2.4.2.

The amount that may be included in the consolidated Tier 2 Capital of the parent insurer for Tier 2 capital instruments issued by a subsidiary and held by third-party investors that do not meet the above criteria is equal to the lowest of:

- the value of Tier 2 capital instruments issued by the subsidiary and held by third-party investors that do not meet the above criteria;
- the difference between the Third Party Share limit calculated in section 2.1.1.5 and the amount of capital instruments and Tier 1 elements, other than capital instruments, attributable to non-controlling interests, included in consolidated Tier 1 Capital that are issued by the subsidiary and held by third-party investors;
- 50% of the Third Party Share limit calculated in section 2.1.1.5.

Details of the calculation of the amount included in Tier 2 Capital must be reported in the Capital Guideline Certification Report.

2.2.1.5 Tier 2 Capital elements other than capital instruments

Tier 2 capital elements other than capital instruments include:

- amounts deducted from Gross Tier 1 Capital for:
  - ➢ Negative Liabilities, excluding the amount deducted that relates to future business assumed through reinsurance contracts issued; and
  - ➢ offsetting contract liabilities and Negative Liabilities ceded under unregistered reinsurance contracts specified in sections 10.2.2 and 10.2.4;
- 75% of the amount of cash surrender values over actuarial liabilities deducted from Gross Tier 1 Capital (refer to section 2.1.2.8);
- the Eligible Pension Plan Asset i.e., 50% of the pension plan asset deduction from Gross Tier 1 Capital for net assets of defined benefit pension plans (refer to section 2.1.2.4);
- the adjustment amount to amortize the impact in the current period on Available Capital on account of the net defined benefit pension plan liability (asset);
- share premium resulting from the issuance of capital instruments included in Tier 2 capital;[72]

[72] Share premium that does not qualify as Tier 1 Capital will only qualify as Tier 2 Capital if the shares that generated it qualify as Tier 2 Capital.

- Aggregate negative Best Estimate Liabilities ceded under unregistered reinsurance contracts eligible for recognition in Tier 2 Capital (refer to section 10.2.7).

Insurers may make a one-time election to amortize the impact on Available Capital on account of the net defined benefit pension plan liability (asset). The amounts subject to amortization in each period include the change, in each period, of the:

a) accumulated net defined benefit pension plan OCI remeasurements included in Gross Tier 1 Capital;

b) amount of Net Defined Benefit Pension Plan Asset deduction from Gross Tier 1 Capital (refer to section 2.1.2.4);

c) Eligible Pension Plan Asset included in Tier 2 Capital.

The amount subject to amortization in each period is the sum of a), b) and c) above. The amortization is made on a straight-line basis over the amortization period. This period is twelve rolling quarters and begins on the first day of the current quarter. The election will be irrevocable and the insurer must continue, in each quarter, to amortize the new impact on Available Capital in subsequent periods. Details of the adjustment amount must be reported in the Capital Guideline Certification Report.

2.2.2 Amortization of Tier 2 Capital instruments

Tier 2 capital instruments are subject to straight-line amortization in the final five years prior to maturity. As these instruments approach maturity, the outstanding balances are to be amortized based on the following schedule:

Years to Maturity	Included in Capital
5 years or more	100%
between 4 and 5 years	80%
between 3 and 4 years	60%
between 2 and 3 years	40%
between 1 and 2 years	20%
Less than 1 year	0%

Amortization must be calculated at the end of each fiscal quarter based on the schedule above. Thus amortization would begin during the first quarter ending in the fifth calendar year before maturity. For example, if an instrument matures on October 31, 2025, 20% of the issue is amortized on November 1, 2020. This is the amortization that must be reflected in the December 31, 2020 CARLI return. An additional 20% amortization must be reflected in each subsequent December 31 CARLI form.

The details of the calculation of the amortization must be disclosed in the Capital Guideline Certification Report.

2.2.3 Deductions from Gross Tier 2 Capital

The items below are deducted from Gross Tier 2 Capital. A credit risk factor is not applied to items that are deducted from Gross Tier 2 Capital.

2.2.3.1 Investments in own Tier 2 Capital

An insurer's investments in its own Tier 2 capital instruments, whether held directly or indirectly, are deducted from Gross Tier 2 Capital, unless they are already derecognized under IFRS.

In addition, any Tier 2 capital instrument that the insurer could be contractually obliged to purchase is deducted from Gross Tier 1 Capital.

2.2.3.2 Investments in capital instruments of P&C insurance subsidiaries and dissimilar regulated financial subsidiaries

For a P&C insurance subsidiary (refer to section 2.1.2.7), the deduction from Gross Tier 2 Capital is equal to the amount of the deduction related to P&C insurance subsidiaries calculated in section 2.1.3.

Investments in financial instruments of dissimilar regulated financial subsidiaries and non-qualifying subsidiaries (refer to section 2.1.2.7) are deducted in the capital category where the instrument would be eligible if it were issued by the insurer itself. When an instrument issued by such a subsidiary meets the criteria set out in section 2.2.1.1, it is deducted from Gross Tier 2 Capital. If an instrument in which the insurer has invested does not meet the qualifying criteria for Tier 2 Capital, the instrument is deducted from Gross Tier 1 Capital (refer to section 2.1.2.7).

A credit risk factor will not be applied to investments in dissimilar regulated financial subsidiaries and non-qualifying subsidiaries, or to other facilities provided to these subsidiaries where these have been deducted from Available Capital.

The details of the calculation must be included in the Capital Guideline Certification Report.

2.2.3.3 Reciprocal cross holdings in Tier 2 Capital instruments of banking, insurance and financial entities

Reciprocal cross holdings in Tier 2 capital instruments (e.g., Insurer A holds investments in Tier 2 capital instruments of Insurer B, and in return, Insurer B holds investments in Tier 2 capital instruments of Insurer A), whether arranged directly or indirectly, that are designed to artificially inflate the capital position of insurers are fully deducted from Gross Tier 2 Capital.

2.2.3.4 Negative liability tax adjustments and amounts recoverable on surrender ceded under unregistered reinsurance

Tax adjustments and amounts recoverable on surrender related to Contract-by-Contract Negative Liabilities ceded under unregistered reinsurance that are included in Gross Tier 1 Capital (refer to sections 10.2.5 and 10.2.6) are fully deducted from Gross Tier 2 Capital.

2.2.4 Net Tier 2 Capital and Tier 2 Capital

Net Tier 2 Capital is equal to Gross Tier 2 Capital minus the deductions from Gross Tier 2 Capital set out in Section 2.2.3. However, Net Tier 2 Capital may not be lower than zero. If the total of all Gross Tier 2 Capital deductions exceeds Gross Tier 2 Capital, the excess is deducted from Net Tier 1 Capital (refer to section 2.1.3).

Since Tier 2 Capital may not exceed Net Tier 1 Capital, Tier 2 Capital is defined to be the lower of Net Tier 2 Capital or Net Tier 1 Capital.

2.3 Capital composition and limitations

The following capital composition requirements and limitations apply to capital elements after all specified deductions and adjustments. For purposes of calculating the limitations set out below, the instruments subject to transition measures set out in sections 2.4.1 and 2.4.2 are excluded from Tier 1 Capital Instruments Other than Common Shares, and from Tier 2 capital instruments.

1. Common shareholders' equity and policyholders' equity must be the predominant form of an insurer's Tier 1 Capital. As a result, the aggregate of the following must equal or exceed 75% of Net Tier 1 Capital:
   a. Common shares issued by the insurer that meet the criteria specified in section 2.1.1.1;
   b. Instruments issued by consolidated subsidiaries of the insurer and held by third-party investors that meet the criteria for classification as Common Shares as specified in section 2.1.1.1, subject to section 2.1.1.5;
   c. Contributed surplus:
      i. Share premium resulting from the issuance of Tier 1 capital instruments included in the calculation of this limit;
      ii. Other contributed surplus, resulting from sources other than profits (e.g., members' contributions and initial funds for mutual companies and other contributions by shareholders in excess of amounts allocated to share capital for joint stock companies), with the exception of any share premium resulting from the issuance of capital instruments not included within this limit;
   d. retained earnings;
   e. Adjusted AOCI;

f. participating account;[73]

g. non-participating account of mutual companies;[74]

h. Tier 1 elements, other than capital instruments, attributable to non-controlling interests, subject to section 2.1.1.5;

i. equity adjustment for CARLI purposes defined in section 2.1.1;

j. tax adjustments and amounts recoverable on surrender related to contract-by-contract negative liabilities ceded under unregistered reinsurance (see sections 10.2.5 and 10.2.6).

2. Tier 2 Capital (taking into account the amortization of capital instruments) shall not exceed 100% of Net Tier 1 Capital.

3. The amount of Tier 1 Capital Instruments Other than Common Shares recognized in Net Tier 1 Capital is limited to 25% of Net Tier 1 Capital. Tier 1 Capital Instruments Other than Common Shares in excess of 25% of Net Tier 1 Capital may be included in Tier 2 Capital, subject to the preceding limit applicable to Tier 2 Capital.

2.4 Transitional provision

2.4.1 Capital instruments issued prior to September 25, 2014

Capital instruments issued before September 25, 2014 that do not meet the qualifying criteria set out in sections 2.1.1.1, 2.1.1.2 to 2.1.1.4 and 2.2.1.1 to 2.2.1.3, but that meet the criteria set out in sections 2.2.5.1 or 2.2.5.2 of the 2014 CAR Guideline, are subject to the following treatment.

1. Instruments will continue to be recognized as Available Capital until the first par call date or the effective date of any feature constituting an incentive to redeem (i.e., the effective maturity date) if it is prior.

2. Regulatory event calls, if any, will not be permitted to be exercised until the end of the recognition period for the instrument.

3. If a Tier 2 capital instrument has an effective maturity date within the recognition period and the issuer elects not to exercise the call option despite the incentive to redeem, that instrument will continue to be recognized as Available Capital, provided it meets the qualifying criteria specified in sections 2.2.1.1 to 2.2.1.3.

4. Tier 2 capital amortization rules will continue to apply to Tier 2 capital instruments in their final five years to maturity.

5. During the recognition period, special purpose entities associated with Tier 1 and Tier 2 Capital innovative instruments must not, at any time, hold assets that

[73] For mutual companies, this refers to residual interest reported as equity or as a liability in the LIFE return. For joint stock companies, this refers to: (i) contributions to the participating surplus reported as liabilities in the LIFE return; and (ii) amounts reported as Participating Account Policyholders' Equity in the LIFE return. Expected shareholder transfers from the participating account included within the contractual service margins are excluded from the participating account, as contractual service margins are included in the determination of equity for CARLI purposes below.

[74] This amount also includes residual interest reported as a liability in the LIFE return.

materially exceed the aggregate amount of the innovative instruments. The AMF will consider the structure to materially exceed the innovative instruments if the excess is greater than 25% in the case of an asset-based structure and 3% in the case of a loan-based structure. Amounts in excess of these thresholds requite AMF's authorization.

The above provisions apply equally to instruments issued by the insurers and to those issued by consolidated subsidiaries to third-party investors.

2.4.2 Consolidated subsidiaries having issued capital instruments to third-party investors

A Tier 1 or Tier 2 Capital instrument issued by a subsidiary of the insurer and held by a third-party investor qualifies as consolidated Available Capital if:

1. it meets the qualifying criteria of Tier 1 or Tier 2 Capital:
    a. included in sections 2.2.5.1, 2.2.5.2, 2.3.2.1 or 2.3.2.2 of the 2014 CAR Guideline, subject to the transition measures set out in section 2.4.1, if issued prior to September 25, 2014;
    b. set out in sections 2.1.1.1, 2.1.1.2 to 2.1.1.4 and 2.2.1.1 to 2.2.1.3, if issued prior to October 28, 2016;

and

2. it meets the following criteria:
    a. The instrument has not matured or been repurchased or redeemed;
    b. The first repurchase or redemption date at par after October 27, 2016 has not passed.

If such an instrument does not have a maturity, repurchase or redemption date at par, it no longer qualifies after January 1, 2028.

Chapter 3. Credit Risk – On-Balance Sheet Items

Credit risk is the risk of loss arising from the potential default of parties having a financial obligation to the insurer. Capital requirement takes account of the risk of actual default as well as the risk of an insurer incurring losses due to deterioration in a creditor's creditworthiness. The financial obligations to which credit risk factors apply include loans, debt instruments, reinsurance contracts held, reinsurance receivables, derivatives, amounts due from policyholders, agents and brokers, and other assets.

The capital requirement for on-balance sheet assets is calculated by applying credit risk factors to the balance sheet values of these assets[75], unless indicated otherwise. The same factors apply to assets backing qualifying participating and adjustable products. A reduction in required capital for the potential risk-mitigating effect of dividend reductions or contractual adjustability is calculated separately for participating and adjustable products (refer to Chapter 9). Collateral, guarantees, and credit derivatives may be used to reduce required capital ~~required~~ for credit risk.[76] A credit risk factor of zero is applied to assets of a securities portfolio guaranteed by the Caisse de dépôt et placement du Québec effective October 27, 2016 that removes all credit risk to the insurer at all times. The conditions of this guarantee must be the same as those discussed in Section 3.3. A credit risk factor of zero is applied to assets deducted from Available Capital. Investment income due and accrued must be reported with, and receive the same factor as, the assets to which it relates.

Additionally, the credit risk requirement for certain types of asset risks is calculated using techniques that are different from the application of regular factors.

- Capital requirement for asset-backed securities is described in section 3.4.
- Capital requirement for repurchase, reverse repurchase and securities lending agreements is described in section 3.5.
- Credit risk factors do not apply to assets backing index-linked products. Instead, they are considered as part of the correlation calculation described in section 5.5.
- Assets held in segregated funds by an insurer's policyholders are not subject to the requirements of this chapter.[77]

The calculation of required capital for off-balance sheet items is described in Chapter 4.

3.1 Credit risk required capital for on-balance sheet assets

Balance sheet carrying amounts are used to calculate capital requirements for credit risk.

75 The balance sheet values to which factors are applied are the values gross of IFRS 9 Stage 1 and 2 expected credit losses.

76 The capital requirement for credit risk may also be reduced under certain registered reinsurance contracts, as described in section 10.4.3.

77 ~~Refer to section 5.4 for the treatment of assets within consolidated mutual fund entities.~~Risks associated with segregated fund guarantees are covered in Chapter 7

3.1.1 Use of ratings

Many of the factors in this chapter depend on the rating assigned to an asset or an obligor. To use a factor that is based on a rating, an insurer must meet all of the conditions specified in this section. Insurers may recognize credit ratings from the following rating agencies:

- DBRS
- Fitch Ratings (Fitch)
- Moody's Investors Service (Moody's)
- Standard & Poor's Ratings Services (S&P)
- Kroll Bond Rating Agency (KBRA)
- Japan Credit Rating Agency (JCRA)
- Japan Rating and Investment Information (R&I)

Appendix 3-A presents the correspondence between the rating categories used in this guideline and individual agency ratings. Note that CARLI rating categories do not contain modifiers.

An insurer must choose the rating agencies it intends to rely on and then use their ratings consistently for each type of claim. Insurers may not selectively choose assessments provided by different rating agencies.

Any rating used to determine a factor must be publicly available, i.e., the rating must be published in an accessible form and included in the rating agency's transition matrix. Ratings that are made available only to the parties to a transaction or to certain parties do not satisfy this requirement.

If an insurer uses multiple rating agencies and there is only one assessment for a particular claim, that assessment must be used to determine the required capital for the claim. If there are two assessments from the rating agencies used by an insurer and these assessments differ, the insurer must apply the credit risk factor corresponding to the lower of the two ratings. If there are three or more assessments for a claim from an insurer's chosen rating agencies, the insurer must exclude one of the ratings that corresponds to the lowest credit risk factor, and then use the rating that corresponds to the lowest remaining credit risk factor (i.e., the insurer must use the second-highest rating from those available, allowing for multiple occurrences of the highest rating).

Where an insurer holds a particular securities issue that carries one or more issue-specific assessments, the credit risk factor for the claim will be based on these assessments. Where an insurer's claim is not an investment in a specifically rated security, the following principles apply.

1. In circumstances where the borrower has a specific rating for an issued debt security, but the insurer's claim is not an investment in this particular security, a

rating of BBB or better on the rated security may only be applied to the insurer's unrated claim if this claim ranks as equal (*pari passu*) or senior to the rated claim in all respects. If not, the credit rating of the rated claim cannot be used and the insurer's unrated claim must be treated as an unrated obligation.

2. In circumstances where the borrower has an issuer rating, this assessment typically applies to senior unsecured claims on that issuer. Consequently, only senior claims on that issuer will benefit from a high-quality (BBB or better) issuer assessment. Other unassessed claims on the issuer will be treated as unrated. If either the issuer or one of its issues has a rating of BB or lower, this equivalent rating must be used to determine the capital charge for an unrated claim on the issuer.

3. Short-term assessments are deemed to be issue specific. They can only be used to derive the credit risk factor applied for claims arising from the rated claim and cannot be extended to other short-term claims. Under no circumstances can a short-term rating be used to support a capital charge for an unrated long-term claim.

4. Where the credit risk factor for an unrated exposure is based on the rating of an equivalent exposure to the borrower, foreign currency ratings must be used for exposures in foreign currency. Canadian currency ratings, if separate, are only to be used to determine the credit risk factor for claims denominated in Canadian currency.

The following additional conditions apply to the use of ratings.

1. External assessments for one entity within a corporate group may not be used to determine the credit risk factors for other entities within the same group.

2. No rating may be inferred for an unrated entity based on assets that the entity possesses.

3. To avoid the double counting of credit enhancement factors, insurers may not recognize credit risk mitigation under sections 3.2 and 3.3 if the credit enhancement has already been reflected in the issue-specific rating.

4. An insurer may not recognize a rating if the rating is at least partly based on unfunded support (e.g., guarantees, credit enhancement or liquidity facilities) provided by the insurer itself or one of its affiliates.

5. Any assessment used must take into account and reflect the entire amount of credit risk exposure an insurer has with regard to all payments owed to it. In particular, if an insurer is owed both principal and interest, the assessment must fully take into account and reflect the total credit risk associated with repayment of both principal and interest.

Insurers may not rely on unsolicited ratings in determining the credit risk factor for an asset, except where the asset is a sovereign exposure and a solicited rating is not available.

3.1.2 Credit risk factors based on external ratings

The credit risk factors in the following table apply to rated credit exposures that meet the criteria set out in section 3.1.1. The exposures for which these factors may be used include bonds, loans, mortgages, guarantees, and off-balance sheet exposures. However, these factors may not be used for reinsurance exposures (refer to section 3.1.7), asset-backed securities (refer to section 3.4), and capital instruments (including subordinated debt) issued by Canadian or foreign financial institutions that qualify as regulatory capital for the issuer (refer to section 5.2.2). The factors depend on the rating and effective maturity of the exposure.

Rating Category[78]	Effective Maturity In Years					
	1	2	3	4	5	10
AAA	0.25%	0.25%	0.50%	0.50%	1.00%	1.25%
AA	0.25%	0.50%	0.75%	1.00%	1.25%	1.75%
A	0.75%	1.00%	1.50%	1.75%	2.00%	3.00%
BBB	1.50%	2.75%	3.25%	3.75%	4.00%	4.75%
BB	3.75%	6.00%	7.25%	7.75%	8.00%	8.00%
B	7.50%	10.00%	10.50%	10.50%	10.50%	10.50%
Lower than B	15.50%	18.00%	18.00%	18.00%	18.00%	18.00%

For effective maturities of 1 to 10 years, the factor must be determined using linear interpolation between the nearest effective maturities in the above table. For effective maturities greater than 10 years, the factor for 10-year effective maturity is used. For effective maturities less than 1 year, the factor for 1-year effective maturity is used.

For an instrument subject to a determined cash flow schedule, effective maturity[79] is defined as:

$$\text{Effective maturity (M)} = \frac{\sum_t t \times CF_t}{\sum_t CF_t}$$

where:

[78] Appendix 3-A contains a table showing equivalent ratings from DBRS, Moody's, S&P, Fitch, KBRA, JCR and R&I.

[79] An approximation may be used under section 1.4.5.

CF_t denotes the cash flows (principal, interest payments and fees) contractually payable by the borrower in period t.

If an insurer is unable to calculate the effective maturity of the contracted payments according to the above formula, it may use the maximum remaining time (in years) that the borrower may take to fully discharge its contractual obligation (principal, interest, and fees) under the terms of the loan agreement as the effective maturity. Normally, this will be the nominal maturity of the instrument.

If a traded bond has an embedded put option for the benefit of the bondholder, an insurer may use the cash flows up to the put date to calculate effective maturity if, at the bond's current market price, the yield to the put date is greater than the yield to maturity based on the bond's current market value. For any debt security, the presence of an obligor prepayment option (call option) does not affect the calculation of effective maturity.

For derivatives subject to a general netting agreement, the weighted average maturity of the transactions must be used when calculating the effective maturity. Further, the notional amount of each transaction must be used for weighting the maturity.

When an insurer has multiple exposures to an entity or to related entities,[80] it must aggregate the exposures within each rating grade and asset type (e.g., A-rated mortgages, BBB-rated bonds and loans) before calculating the effective maturity for the exposures.[81][82]

3.1.3 Short-term securities

A factor of 0.3% applies to demand deposits, cheques, acceptances and similar obligations of regulated deposit-taking institutions subject to the solvency requirements of the Basel Committee on Banking Supervision (Basel Committee) and that have an original maturity of less than three months.

The credit risk factors in the table below apply to rated credit exposures that meet the criteria set out in section 3.1.1.

Rating category[83]	Factor
S1	0.3%
S2	0.6%

[80] A related entity can include a parent company, a sister company, a subsidiary or any other affiliate.

[81] The effective maturity for the exposures to related entities within each rating grade can also be calculated as a weighted average of the effective maturities of the individual exposures. The weight to apply to each exposure's maturity is equal to the exposure's total non-discounted cash flows divided by the total non-discounted cash flows for all exposures to the related entities.

[82] An approximation may be used under section 1.4.5.

[83] Appendix 3-A contains a table showing equivalent ratings from DBRS, Moody's, S&P, Fitch, KBRA, JCR and R&I.

Rating category[83]	Factor
S3	2.5%
All other short-term ratings	10%

3.1.4 Entities eligible for a 0% factor

Bonds, notes and other obligations of the following entities are eligible for a 0% credit risk factor:

- the Government of Canada;
- Sovereigns rated AA or better and their central banks, provided such rating applies to the currency in which an obligation is issued;[84]
- Unrated sovereigns with a country risk classification of 0 or 1, as assigned by participants in the "Arrangement on Officially Supported Export Credits"[85] for obligations denominated in the sovereign's domestic currency;
- Canadian provincial and territorial governments;
- Agents of the Government of Canada, its provinces and territories whose debts are, by way of their enabling legislation, direct obligations of these governments;
- Bank for International Settlements;
- International Monetary Fund;
- European Community and European Central Bank;
- The following multilateral development banks:
  - International Bank for Reconstruction and Development (IBRD)
  - International Finance Corporation (IFC)
  - Asian Development Bank (ADB)
  - African Development Bank (AfDB)
  - European Bank for Reconstruction and Development (EBRD)
  - Inter-American Development Bank (IADB)
  - European Investment Bank (EIB)
  - European Investment Fund (EIF)
  - Nordic Investment Bank (NIB)

[84] Sovereign obligations rated lower than AA- may not receive a factor of 0%, and are instead subject to the requirements in section 3.1.2.

[85] This classification is available on the OECD website (http://www.oecd.org), on the "Export Credits" web page under the "Trade" topic.

- ➢ Caribbean Development Bank (CDB)
- ➢ Islamic Development Bank (IDB)
- ➢ Council of Europe Development Bank (CEDB)
- ➢ The International Finance Facility for Immunization (IFFIm)
- ➢ Multilateral Investment Guarantee Agency (MIGA)

- Public sector entities in jurisdictions outside Canada where:
  - ➢ the jurisdiction's sovereign rating is AA or better, and
  - ➢ the national bank supervisor in the jurisdiction of origin permits banks under its supervision to use a risk weight of 0% for the public sector entity under the Basel Framework

- recognized exchanges and clearing houses that serve as central counterparties[86] to derivatives and securities financing transactions.

3.1.5 Unrated claims

Unrated short-term facilities having an original maturity of less than one year must receive the credit risk factor corresponding to rating category C3, unless an issuer has a short-term facility with an assessment that warrants a capital requirement of 10%. If an issuer has such a short-term facility outstanding, all unrated debt claims on the issuer, whether long term or short term, also receive a capital credit of 10% unless the insurer uses recognized credit risk mitigation techniques (refer to sections 3.2 and 3.3) for such claims.

If it is not possible to infer a rating for a bond or loan using the rules in section 3.1.1, the insurer must use the risk factor of 6%. This factor also applies to derivative instruments or other capital market transactions for which a rating cannot be inferred. However, unrated Québec municipal bonds are allocated factors applicable to A-rated credit exposures, as specified in section 3.1.2.

86 A central counterparty (CCP) is an entity that interposes itself between counterparties to contracts traded within one or more financial markets, becoming the legal counterparty so that it is the buyer to every seller and the seller to every buyer. A qualifying central counterparty (QCCP) is an entity that is licensed to operate as a central counterparty (including a licence granted by way of confirmation and exemption), and is permitted by the appropriate regulatory or supervisory body to operate as such with respect to the products offered. This is subject to the provision that the CCP is prudentially supervised in the jurisdiction where it is established and that the regulatory or supervisory body of this jurisdiction has established and publicly indicated that it applies to this CCP on an ongoing basis the domestic rules and regulations that are consistent with the CPSS-IOSCO *Principles for Financial Market Infrastructures*. To qualify for a 0% factor, the CCP must mitigate, on a daily basis, its credit risk exposure to all its counterparties, to ensure its protection with regard to credit risk. The 0% factor may not be used in respect of transactions that have been rejected by the CCP, nor in respect of equity investments, guarantee fund or default fund obligations in relation to the CCP. Where the CCP operates in a jurisdiction that does not have a CCP regulator applying the Principles to the CCP, the AMF may make the determination of whether the CCP meets this definition.

3.1.6 Mortgages[87]

An insurer may use a ratings-based factor from section 3.1.2 for a mortgage if the mortgage meets the criteria for use of a rating set out in section 3.1.1.

For other mortgages, the following factors apply:

Factor	Mortgage Category
0%	Mortgages that are guaranteed by Canada Mortgage and Housing Corporation (CMHC), or that are otherwise insured under the *National Housing Act*, R.S.C. 1985, c. N-11 (NHA) or equivalent provincial mortgage insurance program
See below	Mortgages guaranteed by private sector mortgage insurers
2%	Qualifying residential mortgage loans and qualifying home equity lines of credit
6%	Commercial mortgage loans (office, retail store, industrial, hotel, other)
6%	Non-qualifying residential mortgage loans, and non-qualifying home equity lines of credit
10%	Mortgage loans guaranteed by undeveloped land (e.g., construction financing), other than land used for agricultural purposes or the production of minerals. A property recently constructed or renovated will be considered as under construction until it is completed and 80% leased.
10%	The portion of the mortgage that is based on an increase in value occasioned by a change in use of the mortgaged asset
18%	Impaired and restructured mortgages, net of write-downs and specific expected losses

Where a mortgage is comprehensively insured by a private sector mortgage insurer that has a backstop guarantee provided by the Government of Canada (e.g., a guarantee made pursuant to the *Protection of Residential Mortgage or Hypothecary Insurance Act*),[88] insurers must recognize the risk-mitigating effect of the counter-guarantee by reporting the portion of the exposure that is covered by the Government of Canada backstop as if this portion were directly guaranteed by the Government of Canada. The remainder of the exposure is treated as an exposure to the mortgage guarantor in accordance with the rules set out in section 3.3.

Residential mortgage loans and home equity lines of credit must meet one of the following criteria in order to qualify for a 2% factor:

1. The loan or line of credit is secured by a first mortgage on an individual condominium residence or one- to four-unit residential dwelling is made to one or more person or

87 Mortgage-backed securities, collateralized mortgage obligations or any other securities are not subject to this section and are covered in section 3.4.

88 S.C. 2011, ch. 15, s. 20.

guaranteed by one or more persons, is not more than 90 days past due, and does not exceed a loan-to-value ratio of 80%.

2. The loan or line of credit is guaranteed by a first or junior collateral mortgage on a condominium residence or one- to four-unit residential dwelling, is made to one or more persons or guaranteed by one or more persons, provided no party other than the insurer holds a senior or intervening lien on this property. Further, the loan or line of credit is no more than 90 days past due, and the loan-to-value ratio of all loans held by the insurer and secured by the same property does not, collectively, exceed 80%.

Investments in hotel and time-share properties do not qualify for a factor of 2%.

3.1.7 Registered reinsurance contracts held

Factor	Reinsurance contracts held
0.7%	The portion of registered reinsurance contract held assets that is currently receivable[89]
2.5%	The portion of registered reinsurance contract assets held that is not currently receivable

Refer to section 10.1 for the definitions of registered and unregistered reinsurance. For a registered reinsurance contract held asset, the portion that is deemed to be receivable is the amount of the asset that is due to be paid to the insurer within 90 days, and is related to claims that have already been incurred. The capital requirement for registered reinsurance contracts held that is calculated using the 2.5% factor may be reduced under specific circumstances (refer to section 10.4.3). The amounts to which the 2.5% factor for reinsurance contracts must be applied are the reinsurance contract held assets for:

- ceded existing business; and
- retroceded future business assumed through reinsurance.

These assets must be calculated under Best Estimate Assumptions, with the currently receivable portions excluded.

Reinsurance contract held assets due from a reinsurer may be offset by insurance and reinsurance liabilities due to the reinsurer. The total amount of reinsurance contract assets held per reinsurer is limited to zero[90] within each homogeneous block of participating products within a geographic region (refer to Chapter 9) and each non-participating block of products within a geographic region. Guarantee instruments provided by reinsurers under registered reinsurance arrangements may be recognized, provided the criteria of sections 3.2 and 3.3 are met.

[89] An approximation may be used under section 1.4.5.

[90] An approximation may be used under section 1.4.5.

3.1.8 Other items

Factor	Other Items
0%	Cash held on the insurer's own premises
0%	Unrealized gains and accrued receivables on forwards, swaps, purchased options and similar derivative contracts where they have been included in the off-balance sheet calculation
0%	Any item deducted from Available Capital, including goodwill, other intangible assets, deferred tax assets and investments in deconsolidated subsidiaries and considered under the equity method as per section 1.3
5%	Receivables reported as separate items on the balance sheet outstanding less than 60 days[91]
10%	Receivables reported as separate items on the balance sheet outstanding 60 days or more[92]
10%	Balance sheet value of miscellaneous items (e.g., agents' debit balances and prepaid and deferred expenses)
10%	The amount of available refunds from defined benefit pension plan surplus assets included in Tier 1 Capital (refer to section 2.1.2.4)
10%	Instruments or investments that are not specifically identified in sections 3.1, 5.2, 5.3 or 5.4
20%	Assets held for sale[93]
25%	Deferred tax assets not deducted from Available Capital

91 An approximation may be used under section 1.4.5.

92 An approximation may be used under section 1.4.5.

93 An insurer may use the 20% factor, or the option of reclassification. If the insurer elects to use the 20% factor, the associated liabilities that are held for sale must be included in the calculation of the capital requirement. Under the alternative reclassification approach, assets held for sale are reclassified on the balance sheet according to their nature. For example, real estate held for sale may be reclassified as a real estate investment or a disposal group classified as held for sale may be re-consolidated. If this option is elected, any write-downs made as a result of re-measuring the assets at the lower of carrying amount and fair value less costs to sell must not be reversed at the time of the reclassification or reconsolidation; the write-downs must be held in retained earnings for the purposes of CARLI. The write-down amount must be applied to the reclassified and reconsolidated assets in a manner consistent with the basis for the write-down of the held-for-sale assets. If an insurer applies this option for a disposal group, a pro-forma CARLI form that includes the anticipated impact of the sale must be filed with the regular form upon its transmission to the AMF. The calculation on the pro-forma form must include all items affecting the results (e.g., the projected gain or loss on sale, the projected impact of other related transactions and agreements entered into in relation to the sale), which may or may not be recognized at period-end. The details of the adjustments required on the pro-forma form must be disclosed in the Capital Guideline Certification Report.

3.1.9 Leases

3.1.9.1 Lessee

Where the insurer is the lessee, the capital requirement for the associated asset held on the balance sheet is based on the underlying property leased as per section 5.3.

3.1.9.2 Lessor

Insurers may use a 0% factor for leases that represent a direct obligation of an entity that is eligible for a 0% credit risk factor under section 3.1.4. This same factor may also be used for a lease that is guaranteed by such an entity if the guarantee meets the criteria for recognition under section 3.3. The 0% factor may not be used for leases where an insurer does not have direct recourse to an entity eligible for a 0% factor under the terms of the obligation, even if such an entity is the underlying lessee.

For finance leases, a 6% credit risk factor applies if the lease is secured only by equipment. If the lease is also secured by the general credit of the lessee and the lease is rated or a rating for the lease can be inferred under section 3.1.1, the credit risk factor for the lease is the same as the credit risk factor in section 3.1.2 for a bond having the same rating and effective maturity as the lease. Any rating used must be applicable to the direct obligor of the instrument held by the insurer (or the direct guarantor, if recognition is permitted under section 3.3), which may be different from the underlying lessee. If no rating can be inferred, the credit risk factor is 6%.

The details of the calculations and factors used must be included in the Capital Guideline Certification Report.

3.1.10 Impaired and restructured assets

The requirements for impaired and restructured assets in this section replace the requirements that would otherwise apply to a performing asset. They are to be applied instead of (not in addition to) the requirements for the asset before it became impaired or was restructured.

A factor of 18% applies to the unsecured portion of any asset (i.e., the portion not secured by collateral or guarantees) that is impaired, has been restructured, or for which there is reasonable doubt about the timely collection of the full amount of principal or interest (including a loan that, based on its terms and conditions, is more than 90 days in arrears), and that does not carry an external rating from an agency listed in section 3.1.1. This factor is applied to the net carrying amount of the asset on the balance sheet, and defined as the principal balance of the asset net of write-downs and specific expected losses. For the purpose of defining the asset portion of a past due obligation, eligible collateral and guarantees are the same as in sections 3.2 and 3.3.

An asset is considered to have been restructured when the insurer, for economic or legal reasons related to the obligor's financial difficulties, grants a concession that it would not otherwise have considered. The 18% factor will continue to apply to restructured assets until cash flows have been collected for a period of at least one year, in accordance with the terms of the restructuring.

3.1.11 Credit protection provided

When the insurer has guaranteed a debt security (e.g., through the sale of a credit derivative) or synthetically replicated the cash flows from a debt security (e.g., through reinsurance), it must hold the same amount of capital as if it had held the security directly. These exposures must be presented as off-balance sheet instruments according to Chapter 4.

Where an insurer provides credit protection on a securitization tranche rated BBB or better via a first-to-default credit derivative on a basket of assets, the capital requirements may be determined as the notional amount of the derivative times the credit risk factor corresponding to the tranche's rating, provided that this rating represents an assessment of the underlying tranche that does not take account of any credit protection provided by the insurer. If the underlying product does not have an external rating, the insurer may either 1) treat the full notional value of the derivative as a first-loss position within a tranched structure and apply a 60% credit risk factor (refer to section 3.4.3), or it may 2) calculate the required capital as the notional amount times the sum of the factors for each asset in the basket. In the case of a second-to-default credit derivative where the underlying product does not have an external rating, the insurer may exclude the asset in the basket having the lowest credit risk factor if using the second approach.

3.2 Collateral

A collateralized transaction is one in which:

- an insurer has an actual exposure or potential exposure to credit risk;
- that credit exposure or potential credit exposure is hedged in whole or in part by collateral posted by a counterparty[94] or by a third party on behalf of the counterparty.

The following criteria must be met before capital relief will be granted in respect of any form of collateral.

1. The effects of collateral may not be double counted. Therefore, insurers may not recognize collateral on claims for which an issue-specific rating is used that already reflects that collateral. All criteria in section 3.1.1 regarding the use of ratings remain applicable to collateralized transactions.
2. All documentation used in collateralized transactions must be binding on all parties and legally enforceable in all relevant jurisdictions. The insurer must verify this in advance with sufficient research and have a well-founded legal basis to reach this

[94] In this section, "counterparty" is used to denote a party to whom an insurer records an on- or off-balance sheet credit exposure or a potential credit exposure. That exposure may, for example, take the form of a loan of cash or securities (where the counterparty would traditionally be called the borrower), of securities posted as collateral, of a commitment, or of an exposure under an OTC derivatives contract.

conclusion. This research must be subsequently reviewed as needed to ensure the permanent legal validity of this documentation.

3. The legal mechanism by which collateral is pledged or transferred must ensure that the insurer has the right to liquidate or take legal possession of it, in a timely manner, in the event of the default, insolvency or bankruptcy (or one or more otherwise-defined credit events set out in the transaction documentation) of the counterparty (and, where applicable, of the custodian holding the collateral). Furthermore, insurers must take all steps necessary to fulfil those requirements under the law applicable to the insurer's interest in the collateral for obtaining and maintaining an enforceable security interest (e.g., by registering its rights to the collateral) or for exercising a right to net or set off in the case of title transfer of the collateral.

4. The credit quality of the counterparty and the value of the collateral must not have a material positive correlation. For example, securities issued by the counterparty or by any of its affiliates are ineligible.

5. Insurers must have clear and robust procedures for the timely liquidation of collateral to ensure that any legal conditions required for declaring the default of the counterparty and liquidating the collateral are observed, and that collateral can be liquidated promptly.

6. Where collateral is held by a custodian, insurers must take reasonable steps to ensure that the custodian segregates the collateral from its own assets.

Collateralized transactions are classified according to whether they are capital markets transactions or other secured lending arrangements. The category of capital markets transactions includes repo-style transactions (e.g., repos and reverse repos, and securities lending and borrowing) and other capital-markets driven transactions (e.g., OTC derivatives and margin lending).

The actuary must explain in the Capital Guideline Certification Report how he has verified that the collateral complies with the preceding criteria. Documentation supporting these explanations must be kept and be made available to the AMF upon request.

3.2.1 Eligible financial collateral

The following collateral instruments may be recognized for secured lending and capital markets transactions.

- Debt securities rated by a recognized rating agency (refer to section 3.1.1) where these securities are:
  - rated BB or better and issued by an entity eligible for a 0% bond factor;
  - rated BBB or better and issued by other entities (including banks, insurers, and securities firms); or
  - short-term and rated S3 or better.
- Debt securities not rated by a recognized rating agency where:

- the securities are issued by a Canadian bank whose equity is listed on a recognized exchange;
- the original maturity of the securities is less than one year;
- the securities are classified as senior debt;
- all debt issues by the issuing bank having the same seniority as the securities and that have been rated at least BBB or S3 by a recognized rating agency.

- Equities and convertible bonds that are included in a main index.
- Gold.
- Mutual funds where:
  - a price for the units is publicly quoted daily; and
  - the funds are limited to investing in the above-mentioned instruments.[95]

Additionally, the following collateral instruments may be recognized for capital markets transactions:

- Equities and convertible bonds that are not included in a main index but that are listed on a recognized exchange, and mutual funds that include such equities and bonds.

For collateral to be recognized in a secured lending transaction, it must be pledged for at least the life of the loan. For collateral to be recognized in a capital markets transaction, it must be secured in a manner that would preclude release of the collateral unless warranted by market movements, the transaction is settled, or the collateral is replaced by new collateral of equal or greater value.

3.2.2 Secured lending

Collateral received in secured lending must be revalued on a mark-to-market basis at least every six months. The market value of collateral that is denominated in a currency different from that of the loan must be reduced by 30%. The portion of a loan that is collateralized by the market value of eligible financial collateral receives the credit risk factor applicable to the collateral instrument, subject to a minimum of 0.375% with the exception noted below. The remainder of the loan is assigned the risk factor appropriate to the counterparty.

A 0% credit risk factor may be used for a secured lending transaction if:

1. the loan and the collateral are denominated in the same currency; and

[95] However, the use of derivative instruments by a mutual fund solely to hedge investments listed as eligible financial collateral shall not prevent units in that mutual fund from being recognized as eligible financial collateral.

2. the collateral consists entirely of securities eligible for a 0% credit risk factor; and
3. the market value of the collateral is at least 25% greater than the balance sheet value of the loan.

3.2.3 Capital markets transactions

3.2.3.1 Introduction

When taking collateral for a capital markets transaction, an insurer must calculate an adjusted exposure amount to a counterparty for capital adequacy purposes in order to take account of the effects of that collateral. Using haircuts, the insurer needs to adjust both the amount of 1) the exposure to the counterparty, and 2) the value of any collateral received in support of the counterparty's obligations. Such adjustments are made to take into account possible future fluctuations in these amounts[96] due to market fluctuations. This will produce volatility-adjusted amounts for both the exposure and the collateral. Unless either side of the transaction is in cash, the volatility-adjusted amount for the exposure will be higher than the exposure itself, and for the collateral it will be lower. Additionally, where the exposure and collateral are held in different currencies, an additional downwards adjustment must be made to the volatility-adjusted collateral amount to take into account the volatility related to possible future fluctuations in exchange rates.

Where the volatility-adjusted exposure amount is greater than the volatility-adjusted collateral amount (including any further adjustment for currency risk), required capital corresponds to the difference between the two, multiplied by the credit risk factor appropriate to the counterparty.

Section 3.2.3.2 describes the size of the individual haircuts used. These haircuts depend on the type of instrument and the type of transaction. The haircut amounts are then scaled using a square root of time formula depending on the frequency of remargining. Section 3.2.3.3 sets out the conditions under which insurers may use 0% haircuts for certain types of repo-style transactions that include government bonds. Finally, section 3.2.3.4 describes the treatment of general netting agreements.

3.2.3.2 Calculation of the capital requirement

For a collateralized capital markets transaction, the exposure amount after risk mitigation is calculated as follows:

$$E^* = \max(0, [E \times (1 + H_e) - C \times (1 - H_c - H_{fx})])$$

where:

- E^* is the exposure value after risk mitigation
- E is the current value of the exposure

[96] The exposure amount may vary where, for example, securities are being lent.

- H_e is the haircut appropriate to the exposure
- C is the current value of the collateral received
- H_c is the haircut appropriate to the collateral
- H_{fx} is the haircut appropriate for currency mismatch between the collateral and the exposure.

The exposure amount after risk mitigation is multiplied by the credit risk factor appropriate to the counterparty to obtain the requirements for the collateralized transaction.

When the collateral consists of a basket of assets, the haircut to be used on the basket is the average of the haircuts applicable to assets in the basket, where the average is weighted according to the market values of the assets in the basket.

The following are the standard haircuts, expressed as percentages:

<table>
<tr><th>Issue rating for debt securities</th><th>Remaining Maturity</th><th>Securities eligible for a 0% credit risk factor</th><th>Other securities</th><th>Securitizations</th></tr>
<tr><td rowspan="5">AAA to AA
S1</td><td>≤ 1 year</td><td>0.5</td><td>1</td><td>2</td></tr>
<tr><td>>1 year and ≤ 3 years</td><td rowspan="2">2</td><td>3</td><td rowspan="2">8</td></tr>
<tr><td>>3 years and ≤ 5 years</td><td>4</td></tr>
<tr><td>>5 years and ≤ 10 years</td><td rowspan="2">4</td><td>6</td><td rowspan="2">16</td></tr>
<tr><td>> 10 years</td><td>12</td></tr>
<tr><td rowspan="5">A to BBB
S2 and S3
Unrated bank debt securities</td><td>≤ 1 year</td><td>1</td><td>2</td><td>4</td></tr>
<tr><td>>1 year and ≤ 3 years</td><td rowspan="2">3</td><td>4</td><td rowspan="2">12</td></tr>
<tr><td>>3 years and ≤ 5 years</td><td>6</td></tr>
<tr><td>>5 years and ≤ 10 years</td><td rowspan="2">6</td><td>12</td><td rowspan="2">24</td></tr>
<tr><td>> 10 years</td><td>20</td></tr>
<tr><td>BB</td><td>All</td><td>15</td><td>Not eligible</td><td>Not eligible</td></tr>
<tr><td colspan="2">Main index equities and convertible bonds, and gold</td><td colspan="3">20</td></tr>
<tr><td colspan="2">Other equities and convertible bonds listed on a recognized exchange</td><td colspan="3">30</td></tr>
<tr><td colspan="2">Mutual funds</td><td colspan="3">Highest haircut applicable to any security in which the fund can invest</td></tr>
</table>

The standard haircut for currency risk where the exposure and collateral are denominated in different currencies is 8%.

For transactions in which an insurer lends cash, the haircut to be applied to the exposure is 0%.[97] For transactions in which an insurer lends non-eligible instruments (e.g., corporate debt securities rated lower than BBB-), the haircut to be applied to the exposure must be

[97] The insurer may use a haircut of 0% for cash received as collateral if the cash is held in Canada in the form of a deposit at one of the insurer's banking subsidiaries.

the same as that applied to an equity that is traded on a recognized exchange but not part of a main index.

For collateralized OTC derivatives transactions, the E^* component term $E \times (1 + H_e)$, representing the volatility-adjusted exposure amount before risk mitigation, is replaced by the exposure amount for the derivatives transaction calculated using the current risk assessment method as described in section 4.1. This is either the positive replacement cost of the transaction plus the add-on for potential future exposure, or, for a series of contracts eligible for netting, the net replacement cost of the contracts plus A_{Net} (refer to section 4.2.2 for the definition). The haircut for currency risk must be applied when there is a mismatch between the collateral currency and the settlement currency, but no additional adjustments beyond a single haircut for currency risk are required if there are more than two currencies involved in collateral, settlement and exposure measurement.

All of the standard haircuts listed above must be scaled by a square root of time factor according to the following formula:

$$\mathrm{H}_t = \mathrm{H} \times \sqrt{\frac{S + T - 1}{10}}$$

where:

- H_t represents the haircut used in calculating the exposure amount after risk mitigation
- H is the standard haircut specified above for the exposure or collateral
- N is the actual number of business days between remargining under the transaction
- T is equal to 5 for repo-style transactions, and 10 for all other capital markets transactions.

3.2.3.3 Conditions for using 0% haircuts

Insurers may apply 0% haircuts to both the exposure and collateral for repo-style transactions that satisfy the following conditions, and for which the counterparty is a core market participant as defined below.

1. Both the exposure and the collateral are cash or securities issued by the Government of Canada or a provincial or territorial government in Canada.

2. Both the exposure and the collateral are denominated in the same currency.

3. Either the transaction is overnight or both the exposure and the collateral are marked to market daily and are subject to daily remargining.

4. Following a counterparty's failure to remargin, the time that is required between the last mark to market before the failure to remargin and the liquidation[98] of the collateral is considered to be no more than four business days.

5. The transaction is settled across a settlement system proven for that type of transaction.

6. The documentation covering the agreement is standard market documentation for repo-style transactions in the securities concerned.

7. The transaction is governed by documentation specifying that if the counterparty fails to satisfy an obligation to deliver cash or securities or to deliver margin or otherwise defaults, then the transaction is immediately terminable.

8. Upon any default event, regardless of whether the counterparty is insolvent or bankrupt, the insurer has the unfettered right to immediately seize and liquidate the collateral for its benefit.

Core market participants include the following entities:

- sovereigns, central banks and public sector entities
- banks and securities firms
- other financial companies (including insurers) rated AA- or better
- regulated mutual funds that are subject to capital or leverage requirements
- regulated pension funds
- recognized clearing organizations.

3.2.3.4 Treatment of repo-style transactions covered under general netting agreements

The effects of bilateral netting agreements covering repo-style transactions will be recognized on a counterparty-by-counterparty basis if the agreements are legally enforceable in each relevant jurisdiction upon the occurrence of an event of default and regardless of whether the counterparty is insolvent or bankrupt. In addition, netting agreements must:

1. provide the non-defaulting party the right to terminate and close out in a timely manner all transactions under the agreement upon an event of default, including in the event of insolvency or bankruptcy of the counterparty;
2. provide for the netting of gains and losses on transactions (including the value of any collateral) terminated and closed out under it so that a single net amount is owed by one party to the other;

[98] This does not require an insurer to always liquidate the collateral but rather to have the capability to do so within the given time frame.

3. allow for the prompt liquidation or setoff of collateral upon the event of default;
4. be, together with the rights arising from the provisions required above, legally enforceable in each relevant jurisdiction upon the occurrence of an event of default and regardless of the counterparty's insolvency or bankruptcy.

For repo-style transactions governed by a general netting agreement, the exposure amount after risk mitigation will be calculated as follows:

$$E^* = \max(0, [\sum E - \sum C + \sum (E_s \times H_s) + \sum (E_{fx} \times H_{fx})])$$

where:

- E^* is the exposure value after risk mitigation
- E is the current value of the exposure
- C is the current value of the collateral received
- E_s is the absolute value of the net position in a given security in the agreement
- H_s is the haircut appropriate to E_s
- E_{fx} is the absolute value of the net exposure in each currency under the agreement that is different from the settlement currency
- H_{fx} is the haircut appropriate for currency mismatch.

All other rules regarding the calculation of haircuts in section 3.2.3.2 equivalently apply for insurers using bilateral netting agreements for repo-style transactions.

3.3 Guarantees and credit derivatives

Where guarantees[99] or credit derivatives are direct, explicit, irrevocable and without restriction, and insurers fulfil certain minimum operational conditions relating to risk management processes, they will be allowed to take account of such credit protection in calculating capital requirements. The capital treatment is founded on the substitution approach, whereby the protected portion of a counterparty exposure is assigned the credit risk factor of the guarantor or protection provider, while the uncovered portion retains the risk factor of the underlying counterparty. Thus, only guarantees issued by or protection provided by entities with a lower risk factor than the counterparty will lead to reduced capital requirements. A range of guarantors and protection providers is recognized.

The actuary must explain in the Capital Guideline Certification Report how he has verified that the guarantees and credit derivatives comply with the preceding criteria. Documentation supporting these explanations must be kept and be made available to the AMF upon request.

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[99] Letters of credit for which an insurer is the beneficiary are included within the definition of guarantees, and receive the same treatment.

3.3.1 Operational requirements common to guarantees and credit derivatives

The effects of credit protection may not be double counted. Therefore, no capital recognition is given to credit protection on claims for which an issue-specific rating is used that already reflects that protection. All criteria in section 3.1.1 around the use of ratings remain applicable to guarantees and credit derivatives.

A guarantee (counter-guarantee) or a credit derivative must meet all the following conditions to be recognized in the calculation of the capital requirement.

1. It must represent a direct claim on the protection provider and must be explicitly referenced to a specific exposure or a pool of exposures, so that the extent of the cover is clearly defined and incontrovertible.
2. Except in the case of non-payment by a protection purchaser of money due in respect of the credit protection contract, it must be irrevocable; there must be no clause in the contract that would allow the protection provider unilaterally to cancel the credit cover or that would increase the effective cost of cover as a result of deteriorating credit quality in the hedged exposure.[100]
3. It must also be unconditional; there must be no clause in the protection contract outside the direct control of the insurer that could prevent the protection provider from being obliged to pay out in a timely manner in the event that the original counterparty fails to make the payment(s) due.
4. All documentation used to warrant guarantees and credit derivatives must be binding on all parties and legally enforceable in all relevant jurisdictions. The insurer must verify this in advance with sufficient legal research and have a well-founded legal basis to reach this conclusion. This research must be subsequently reviewed as needed to ensure the permanent legal validity of this documentation[101].

3.3.2 Additional operational requirements for guarantees

The following conditions must be satisfied for a guarantee to be recognized.

1. In the event of default/non-payment of the counterparty, the insurer can in a timely manner pursue the guarantor for any monies outstanding under the documentation governing the transaction. The guarantor may make one lump sum payment of all outstanding monies to the insurer, or may assume the future payment obligations of the counterparty covered by the guarantee. The insurer must have the right to receive any such payments from the guarantor without first having to take legal action against the counterparty for payment of arrears.
2. The guarantee is an explicitly documented obligation assumed by the guarantor.

[100] Note that the irrevocability condition does not require that the credit protection and the exposure be maturity matched, but rather that the maturity agreed ex ante cannot be reduced ex post by the protection provider.

[101] The legal opinion and the documentation on which the insurer relies must be made available to the AMF upon request.

3. Except as noted in the following sentence, the guarantee covers all types of payments the obligor is expected to make under the documentation governing the transaction, for example notional amount and margin payments. Where a guarantee covers payment of principal only, interest and other uncovered payments must be treated as an unsecured amount in accordance with section 3.3.5.

3.3.3 Additional operational requirements for credit derivatives

The following conditions must be satisfied for a credit derivative to be recognized.

1. The credit events specified by the contracting parties must at a minimum cover:
    a. failure to pay the amounts due under terms of the underlying obligation that are in effect at the time of such failure (with a grace period that is closely in line with the grace period in the underlying obligation);
    b. bankruptcy, insolvency or inability of the obligor to pay its debts, or its failure or admission in writing of its inability generally to pay its debts as they become due, and analogous events;
    c. restructuring of the underlying obligation involving forgiveness or postponement of principal, interest or fees that results in a credit loss event (i.e., charge-off, specific expected loss or other similar debit to the profit and loss account).
2. If the credit derivative covers obligations that do not include the underlying obligation, the penultimate item below governs whether the asset mismatch is permissible.
3. The credit derivative shall not terminate prior to expiration of any grace period required for a default on the underlying obligation to occur as a result of a failure to pay.
4. Credit derivatives allowing for cash settlement are recognized for capital purposes insofar as a robust valuation process is in place in order to estimate loss reliably. There must be a clearly specified period for obtaining post-credit event valuations of the underlying obligation. If the reference obligation specified in the credit derivative for purposes of cash settlement is different than the underlying obligation, the penultimate item below governs whether the asset mismatch is permissible.
5. If the protection purchaser's right or ability to transfer the underlying obligation to the protection provider is required for settlement, the terms of the underlying obligation must provide that any required consent to such transfer may not be unreasonably withheld.
6. The identity of the parties responsible for determining whether a credit event has occurred must be clearly defined. This determination must not be the sole responsibility of the protection seller. The protection buyer must have the right or the ability to inform the protection provider of the occurrence of a credit event.
7. A mismatch between the underlying obligation and the reference obligation under the credit derivative contract (i.e., the obligation used for purposes of determining cash settlement value or the deliverable obligation) is permissible if: (1) the

reference obligation ranks *pari passu* with or is junior to the underlying obligation; and (2) the underlying obligation and reference obligation share the same obligor (i.e., the same legal entity) and legally enforceable cross-default or cross-acceleration clauses are in place.

8. A mismatch between the underlying obligation and the obligation used for purposes of determining whether a credit event has occurred is permissible if: (1) the latter obligation ranks *pari passu* with or is junior to the underlying obligation; and (2) the underlying obligation and reference obligation share the same obligor (i.e., the same legal entity) and legally enforceable cross-default or cross-acceleration clauses are in place.

Only credit default swaps and total return swaps that provide credit protection equivalent to guarantees will be eligible for recognition. Where an insurer buys credit protection through a total return swap and records the net payments received on the swap as net income, but does not record offsetting deterioration in the value of the asset that is protected (either through reductions in fair value or by increasing expected losses), the credit protection will not be recognized.

Other types of credit derivatives are not eligible for recognition.

3.3.4 Eligible guarantors and protection providers

Insurers may recognize credit protection given by the following entities:

- entities eligible for a 0% credit risk factor under section 3.1.4;
- externally rated public sector entities, banks and securities firms with a lower credit risk factor than that of the counterparty;
- other entities that are externally rated BBB or better, but that were rated A or better at the time the credit protection was provided. This includes credit protection provided by affiliates of an obligor when they have a lower credit risk factor than that of the obligor.

However, an insurer may not recognize a guarantee or credit protection on an exposure to a third party when the guarantee or credit protection is provided by an affiliate of the insurer. This treatment follows the principle that guarantees within a group of related enterprises cannot be substituted for the capital of the insurer.

3.3.5 Capital treatment

The protected portion of a counterparty exposure is assigned the capital factor of the protection provider and the uncovered portion of the exposure is assigned the factor of the underlying counterparty.

Where the amount guaranteed, or against which credit protection is held, is less than the amount of the exposure, and the secured and unsecured portions are of equal seniority (i.e., the insurer and the guarantor share losses on a pro-rata basis), capital relief will be afforded on a proportional basis, so that the protected portion of the exposure will receive the treatment applicable to eligible guarantees and credit derivatives, and the remainder will be treated as unsecured. Where an insurer transfers a portion of the risk of an exposure in one or more tranches to a protection seller or sellers and retains some level of risk, and the risk transferred and the risk retained are of different seniority, the insurer may obtain credit protection for the senior tranches (e.g., second-loss position) or the junior tranches (e.g., first-loss position). In this case, the rules as set out in Chapter 6 (Securitization) of the Capital GL will apply.

Materiality thresholds on payments below which no payment is made in the event of default are treated as first-loss positions in a tranched structure, and receive a credit risk factor of 60% in accordance with section 3.4.3.

3.3.6 Currency mismatches

Where the credit protection is denominated in a currency different from that in which the exposure is denominated, the amount of the exposure deemed to be protected will be 70% of the nominal amount of the credit protection, converted at current exchange rates.

3.3.7 Maturity mismatches

A maturity mismatch occurs when the residual maturity of the credit protection is less than that of the underlying exposure. If there is a maturity mismatch and the credit protection has an original maturity of less than one year, the protection may not be recognized. As a result, the maturity of protection for exposures with original maturities less than one year must be matched to be recognized. Additionally, credit protection with a residual maturity of three months or less may not be recognized if there is a maturity mismatch. Credit protection will be partially recognized in other cases where there is a maturity mismatch under the following conditions.

The maturity of the underlying exposure and the maturity of the credit protection must both be measured conservatively. The effective maturity of the underlying exposure must be gauged as the longest possible remaining time before the counterparty is scheduled to fulfil its obligation, taking into account any applicable grace period. For the credit protection, embedded options that may reduce the term of the protection must be taken into account so that the shortest possible effective maturity is used. Where a call is at the discretion of the protection seller, the maturity will always be at the first call date. If the call is at the discretion of the insurer buying protection but the terms of the arrangement at origination contain a positive incentive for the insurer to call the transaction before contractual maturity, the remaining time to the first call date will be deemed to be the effective maturity. For example, where there is a step-up cost in conjunction with a call feature or where the effective cost of cover increases over time even if credit quality remains the same or improves, the effective maturity will be the remaining time to the first call.

When there is a maturity mismatch, the following adjustment will be applied:

$$P_a = P \times \frac{t - 0.25}{T - 0.25}$$

where:

- P_a is the value of the credit protection adjusted for maturity mismatch
- P is the nominal amount of the credit protection, adjusted for currency mismatch if applicable
- t is the lower of T or the residual maturity of the credit protection arrangement expressed in years
- T is the lower of 5 or the residual maturity of the exposure expressed in years.

3.3.8 Sovereign counter-guarantees

Some claims may be covered by a guarantee that is indirectly counter-guaranteed by a sovereign borrower. Such claims may be treated as covered by a sovereign guarantee under the following conditions.

1. The sovereign providing the counter-guarantee is eligible for a 0% credit risk factor.
2. The sovereign counter-guarantee covers all credit risk elements of the claim.
3. Both the original guarantee and the counter-guarantee meet all the operational requirements for guarantees, except that the counter-guarantee need not be direct and explicit to the original claim.
4. The cover is robust, and there is no historical evidence suggesting that the coverage of the counter-guarantee is less than effectively equivalent to that of a direct sovereign guarantee.

3.3.9 Public sector guarantees

The insurer may not recognize guarantees made by public sector entities, including provincial and territorial governments in Canada, that would disadvantage private sector competition. The insurer must look to the host (sovereign) government to confirm whether a public sector entity is in competition with the private sector.

3.3.10 Other items related to the treatment of credit risk mitigation

In the case where the insurer has multiple types of mitigation techniques covering a single exposure (e.g., both collateral and a guarantee partially cover an exposure), the insurer will be required to subdivide the exposure into portions covered by each type of mitigation technique (e.g., portion covered by collateral, portion covered by guarantee) and the capital requirements for each portion must be calculated separately. When credit protection provided by a single protection provider has differing maturities, it must be subdivided into separate protections.

There are cases where an insurer obtains credit protection for a basket of reference names and where the first default among the reference names triggers the credit protection and the credit event also terminates the contract. In this case, the insurer may recognize credit protection for the asset within the basket having the lowest capital requirement, but only if the notional amount of the asset is less than or equal to the notional amount of the credit derivative. In the case where the second default among the assets within the basket triggers the credit protection, the insurer obtaining credit protection through such a product will only be able to recognize credit protection on the asset in the basket having the lowest capital requirement if first-to-default protection has also been obtained, or if one of the assets within the basket has already defaulted.

3.4 Asset-backed securities

The category of asset-backed securities encompasses all securitizations, including mortgage-backed securities and collateralized mortgage obligations, as well as other exposures that result from stratifying or tranching an underlying credit exposure. For exposures that arise as a result of securitization transactions, the insurer must refer to Chapter 6 (Securitization) of the Capital GL to determine whether there are functions provided (e.g., credit enhancement and liquidity facilities) that require capital for credit risk. The Capital Guideline Certification Report must indicate the functions provided and, if any, present the calculation of the capital requirement resulting from these functions.

3.4.1 NHA mortgage-backed securities

The factor applicable to mortgage-backed securities guaranteed by the CMHC under the NHA is 0%, in recognition of the fact that CMHC obligations are legal obligations of the Government of Canada.

3.4.2 Indirectly held mortgage-backed securities

Indirectly held mortgage-backed securities receive the capital charge of the underlying mortgage loans, provided that all of the following conditions are met.

1. The underlying mortgage pool contains only mortgages that were fully performing when the security was created.
2. The securities absorb their pro-rata share of any losses incurred.
3. A holding structure has been established for securitization and administration of the pooled mortgage loans.
4. The underlying mortgages are assigned to an independent third party for the benefit of the investors in the securities, who therefore hold them.
5. The arrangements for the holding structure and trustee provide that the following obligations are observed.
    a. If an administrator is employed to carry out administrative functions, the holding structure and trustee must monitor the performance of the administrator or agent.
    b. The holding structure or trustee must provide detailed and regular information on the structure and performance of the pooled mortgage loans.
    c. The holding structure and trustee must be legally separate from the originator of the pooled mortgage loans.

d. The holding structure and trustee must be responsible for any prejudice or loss to investors created by their own or their agent's mismanagement of the pooled mortgage loans.

e. The trustee must have a first priority charge on the underlying mortgage loans, on behalf of the holders of the securities.

f. The agreement must provide for the trustee's obligation to take clearly specified steps in cases when a mortgagor defaults.

g. The holder of the security must have a pro-rata share in the underlying mortgage loan pool, or the holding structure that issues the security must have only liabilities related to issuing the mortgage-backed security.

h. The cash flows of the underlying mortgages must meet the cash flow requirements of the security without undue reliance on any reinvestment income.

i. The holding structure or trustee may invest cash flows pending distribution to investors only in short-term money market instruments (without any material reinvestment risk) or in new fully performing mortgage loans.

A factor of 12% is applied to indirectly held mortgage-backed securities that do not meet the conditions listed above. Zero-coupon securities, issuances having different classes of securities (senior/junior debt, residual tranches) that bear more than their pro-rata share of losses, and mortgage-backed securities that are issued in tranches are subject to the capital treatment described in Chapter 6 (Securitization) of the Capital GL.

Where the underlying pool of assets contains mortgages having different capital requirements, the requirement applicable to the security corresponds to the average requirement associated with the pool of assets. Where the underlying asset pool contains mortgage loans that have become impaired, the proportion of the security attributable to these loans must be treated as an impaired loan in accordance with the requirements of section 3.1.10.

The details of the calculations and factors used must be disclosed in the Capital Guideline Certification Report.

3.4.3 Other Asset-Backed Securities

The capital requirements for all other asset-backed securities are based on their external ratings. Insurers can only use external ratings to determine a capital requirement if they comply with all of the operational requirements for the use of ratings set out in Chapter 6 (Securitization) of the Capital GL.

For asset-backed securities (other than resecuritizations) rated BBB or better, the capital requirement is the same as the requirements prescribed in section 3.1.2 for a bond having the same rating and maturity as the security. If an asset-backed security is rated BB, the insurer may recognize the rating only if it is a third-party investor in the security, and not its originator. The credit risk factor for an asset-backed security (other than a resecuritization) rated BB in which the insurer is a third-party investor is 300% of the requirement for a bond rated BB having the same maturity as the security.

The credit risk factors for short-term asset-backed securities (other than resecuritizations) rated S3 or better are the same as those in section 3.1.3 for short-term obligations having the same rating.

The credit risk factor for any resecuritization rated BBB or better, or S3 or better, is 200% of the risk factor applicable to an asset-backed security having the same rating and maturity as the resecuritization.

The credit risk factor for any securitization exposure that falls within the highest risk category under Chapter 6 (Securitization) of the Capital GL is 60%. This category includes securitizations carrying ratings for which a factor is not defined above, and all unrated securitizations, with the exception of unrated senior exposures that are eligible for the look-through approach in accordance with Chapter 6 (Securitization) of the Capital GL.

Refer to this same chapter of the Capital GL for additional capital requirements that may result from securitization exposures. The details of the calculations of additional capital requirements must be disclosed in the Capital Guideline Certification Report.

3.5 Repurchase, reverse repurchase and securities lending agreements

A securities repurchase is an agreement whereby a transferor agrees to sell securities at a specified price and repurchase the securities on a specified date and at a specified price. Since the transaction is regarded as a financing for accounting purposes, the securities remain on the balance sheet. Given that these securities are temporarily assigned to another party, the credit risk factor associated with this exposure must be the higher of:

- the factor for the securities to be repurchased;
- the factor for an exposure to the counterparty to the transaction, recognizing any eligible collateral (refer to section 3.2).

A reverse repurchase agreement is the opposite of a repurchase agreement, and involves the purchase and subsequent resale of a security. Reverse repos are treated as collateralized loans, reflecting the economic reality of the transaction. The risk is therefore to be measured as an exposure to the counterparty. If the asset temporarily acquired is a security that qualifies as eligible collateral per section 3.2, the exposure amount may be reduced accordingly.

In securities lending, insurers can act as principal to the transaction by lending their own securities or as agent by lending securities on behalf of clients. Where the insurer is acting as agent, the applicable capital requirement is the higher of:

- the capital requirement related to the securities lent; or
- the capital requirement for an exposure to the borrower of the securities. The exposure for the borrower may be reduced if the insurer holds eligible collateral, as

defined in section 3.2. Where the insurer lends securities through an agent and receives an explicit guarantee of the return of the securities, the insurer may treat the agent as the borrower, subject to the conditions in section 3.3.

Where the insurer, acting as agent, lends securities on behalf of a client under an agreement with a guarantee that the securities on loan will be returned or the insurer will reimburse the client for their current market value, the insurer must calculate the capital requirement as if it were acting as principal to the transaction. The required capital is that of an exposure to the borrower of the securities, where the exposure amount may be reduced if the insurer holds eligible collateral, as described in section 3.2.

The methodologies described above do not apply to repurchases or loans of securities backing the insurer's index-linked products, as described in section 5.5. If an insurer enters into a repurchase or loan agreement involving such assets, the capital requirements are equal to the requirements for the exposure to the counterparty or borrower (taking account of eligible collateral), plus the requirements applicable under section 5.5.

Appendix 3-A: Rating mappings

Long-Term Rating							
Rating Category	**DBRS**	**Fitch**	**Moody's**	**S&P**	**KBRA**	**JCRA**	**R&I**
AAA	AAA	AAA	Aaa	AAA	AAA	AAA	AAA
AA	AA(high) to AA(low)	AA+ to AA-	Aa1 to Aa3	AA+ to AA-	AA+ to AA-	AA+ to AA-	AA+ to AA-
A	A(high) to A(low)	A+ to A-	A1 to A3	A+ to A-	A+ to A-	A+ to A-	A+ to A-
BBB	BBB(high) to BBB(low)	BBB+ to BBB-	Baa1 to Baa3	BBB+ to BBB-	BBB+ to BBB-	BBB+ to BBB-	BBB+ to BBB-
BB	BB(high) to BB(low)	BB+ to BB-	Ba1 to Ba3	BB+ to BB-	BB+ to BB-	BB+ to BB-	BB+ to BB-
B	B(high) to B(low)	B+ to B-	B1 à B3	B+ to B-	B+ to B-	B+ to B-	B+ to B-
Lower than B	CCC or lower	Below B-	Below B3	Below B-	Below B-	Below B-	Below B-

Short-Term Rating							
Rating Category	**DBRS**	**Fitch**	**Moody's**	**S&P**	**KBRA**	**JCRA**	**R&I**
S1	R-1(high) to R-1(low)	F1+, F1	P-1	A-1+, A-1	K1+, K1	J-1	A-1
S2	R-2(high) to R-2(low)	F2	P-2	A-2	K2	J-2	A-2
S3	R-3	F3	P-3	A-3	K3	J-3	A-3
Other	Below R-3	Below F3	NP	Below A-3	Below K3	NJ	Below A-3

Chapter 4. Credit Risk - Off-Balance Sheet Activities

The term “off-balance sheet activities”, as used in this guideline, encompasses derivatives, guarantees, commitments and similar contractual arrangements whose full notional principal amount may not necessarily be reflected on the balance sheet. Such instruments are subject to a capital requirement under this chapter irrespective of whether or not they have been recorded on the balance sheet at fair value.

The major risk to insurers associated with off-balance sheet activities is default of the counterparty to a transaction (i.e., counterparty credit risk). The face amount of an off-balance sheet instrument does not always reflect the exposure to the credit risk in the instrument. To determine the potential credit exposure of off-balance sheet instruments, the insurer must use a credit equivalent amount. The method for determining the credit equivalent amounts of derivative instruments is covered in sections 4.1 and 4.2. To determine the approximate potential credit exposure associated with off-balance sheet activities not covered by sections 4.1 and 4.2, the nominal value of the instrument must be multiplied by a credit conversion factor to obtain the credit equivalent amount (refer to sections 4.3 and 4.4). The resulting credit equivalent amount is then assigned the appropriate counterparty credit risk factor (refer to section 3.1), or, as the case may be, the factor assigned to the collateral (refer to section 3.2) or to the guarantor (refer to section 3.3). A reduction in required capital for the potential risk-mitigating effect of dividend reductions or contractual adjustability is calculated separately for participating and adjustable products (refer to Chapter 9).

The insurer must also consult Chapter 6 (Securitization) of the Capital GL, which sets out the regulatory framework for securitization transactions, including transactions that give rise to off-balance sheet exposures.

4.1 Over-the-counter derivative contracts

The treatment of over-the-counter forwards, swaps, purchased options and similar derivatives contracts requires special attention because insurers are not exposed to credit risk for the full face value of their contracts (notional principal amount), but only to the potential cash flow replacement cost (on contracts showing a positive value) if the counterparty defaults. The credit equivalent amounts are calculated using the current exposure method and are assigned the asset default factor appropriate to the counterparty. Under section 3.1.4, an asset default factor of 0% applies to derivatives transactions with qualifying central counterparties.

The add-on applied in calculating the credit equivalent amount depends on the maturity of the contract and on the volatility of the rates and prices underlying that type of instrument. Options purchased over the counter are included with the same conversion factors as other instruments.

- Interest rate contracts include:
  - single currency interest rate swaps
  - basis swaps

- forward rate agreements and products with similar characteristics
- standardized interest rate futures
- interest rate options purchased.

- Exchange rate contracts include:
  - gold contracts[102]
  - cross-currency swaps
  - cross-currency interest rate swaps
  - forward foreign exchange contracts
  - standardized currency futures
  - currency options purchased.

- Equity contracts include:
  - standardized futures
  - forwards
  - swaps
  - purchased options
  - similar derivatives contracts based on individual equities or on equity indexes.

- Contracts on precious metals (e.g., silver, platinum and palladium), except gold contracts, include:
  - standardized futures
  - forwards
  - swaps
  - purchased options
  - similar derivatives contracts based on precious metals.

- Contracts on other commodities include:
  - standardized futures
  - forwards
  - swaps
  - purchased options

[102] Gold contracts are treated the same as exchange rate contracts for the purpose of calculating credit risk.

- ➢ similar derivatives contracts based on energy contracts, agricultural contracts, base metals (e.g., aluminium, copper, zinc)
- ➢ other non-precious metal commodity contracts.

An insurer must calculate the credit equivalent amount of these contracts using the current exposure method. Under this method, the insurer adds:

- the total replacement cost (obtained by "marking to market") of all its contracts with positive value;

and

- an amount for potential future credit exposure (the add-on), calculated by multiplying the notional principal by one the following factors:

Remaining Maturity	Interest Rate	Exchange Rate and Gold	Equity	Precious Metals (except gold)	Other Commodities
One year or less	0.0%	1.0%	6.0%	7.0%	10.0%
Over one year to five years	0.5%	5.0%	8.0%	7.0%	12.0%
Over five years	1.5%	7.5%	10.0%	8.0%	15.0%

The following additional considerations must be taken into account.

1. For contracts with multiple successive exchanges of principal, the factors are multiplied by the number of remaining payments in the contract.
2. For contracts that are structured to settle outstanding exposure following specified payment dates and where the terms are to be reset so that market value of the contract is zero on these specified dates, the residual maturity is considered to be the time until the next reset date. In the case of interest rate contracts with residual maturities of more than one year and that meet the above criteria, the add-on factor is subject to a floor of 0.5%.
3. Contracts not covered by any of the columns of the previous matrix are to be treated as "other commodities".
4. No add-on factor will be calculated for single currency floating/floating interest rate swaps since the credit exposure is evaluated solely on the basis of their mark-to-market value.
5. The add-ons are based on effective rather than apparent notional amounts. In the event that the effective notional amount is enhanced by the structure of the transaction, for example leverage, the insurer must use the effective notional amount when determining potential future exposure. For example, a stated notional amount of $1 million with payments calculated at two times the reference rate would have an effective notional amount of $2 million.

6. Add-ons for potential future credit exposure are to be calculated for all over-the-counter (OTC) contracts (with the exception of single currency floating/floating interest rate swaps), regardless of whether the replacement cost is positive or negative.
7. No add-on for potential future exposure is required for credit derivatives. The credit equivalent amount for a credit derivative is equal to the greater of its market value and zero.

4.2 Netting of derivative contracts

4.2.1 Conditions for netting

The insurer may net contracts subject to novation or any legally valid form of netting. Novation refers to a written bilateral contract between two counterparties under which any obligation to each other to deliver a given currency on a given date is automatically cancelled and replaced by an obligation to pay a single amount, which is the result of netting the amounts owed by the counterparties to each other under all the cancelled obligations.

Insurers who wish to net transactions under either novation or another form of bilateral netting will need to satisfy the AMF that the following conditions are met.

1. The insurer must have a netting contract or agreement with each counterparty that creates a single legal obligation covering all included transactions subject to netting. The result of such an arrangement is that the insurer only has one obligation for payment or one claim to receive funds based on the net sum of the positive and negative mark-to-market values of all the transactions with that counterparty in the event of default, bankruptcy, liquidation or similar circumstances.
2. The insurer must have written and reasoned legal opinions[103] to the effect that, in the event of any legal challenge, the relevant courts or administrative authorities would find the exposure under the netting agreement to be the net amount under:
   a. the laws of the jurisdiction where the counterparties are incorporated and the laws of any jurisdiction applicable to branches involved;
   b. the laws governing the individual transactions; and,
   c. the laws governing any contracts or agreements required for netting purposes.
3. The insurer has internal procedures to verify that, prior to recognizing a transaction as being subject to netting for capital purposes, the transaction is covered by legal opinions that meet the above criteria.
4. The insurer must have procedures in place to ensure that a review of the legal characteristics of netting arrangements for possible changes in law is undertaken to maintain the validity of such contracts.

103 The legal opinions must be generally recognized as such by the legal community in the firm's home country or by a memorandum of law that addresses all relevant issues in a reasoned manner.

5. The insurer maintains all required documentation and makes it available to the AMF upon request.

Any contract containing a walkaway clause will not be eligible to qualify for netting for the purpose of calculating capital requirements. A walkaway clause is a provision within the contract that permits a non-defaulting counterparty to make only limited payments, or no payments, to the defaulter.

4.2.2 Calculation of exposure

Credit exposure on bilaterally netted OTC forwards, swaps, purchased options and similar derivatives is calculated as the sum of the net mark-to-market replacement cost, if positive, plus a potential future credit exposure (add-on) based on the notional principal of each of the underlying contracts. However, for purposes of calculating potential future credit exposure of contracts subject to legally enforceable netting agreements in which the notional principal is equivalent to cash flows, notional principal is defined as the net receipts falling due on each value date in each currency.

The reason that these contracts are treated as a single contract is that offsetting contracts in the same currency maturing on the same date will reduce both the replacement cost and the potential future credit exposure. For multilateral netting schemes, current exposure (i.e., replacement cost) is a function of the loss allocation rules of the clearing house.

The calculation of the gross add-ons must be based on the legal cash flow obligations in all currencies. This is calculated by netting all receivable and payable amounts in the same currency for each value date. The netted cash flow obligations are converted to Canadian dollars using the current forward rates for each value date. Once converted, the amounts receivable for each value date are added together, and the gross add-on is calculated by multiplying the receivable amount by the appropriate add-on factor.

The potential future credit exposure for netted transactions (A_{Net}) is equal to the sum of:

- 40% of the add-on as presently calculated (A_{Gross});[104]

- 60% of A_{Gross} multiplied by NPR, where NPR is the level of net replacement cost divided by the level of positive replacement cost for transactions subject to legally enforceable netting agreements.

The calculation of NPR can be made on a counterparty-by-counterparty basis or on an aggregate portfolio basis for all transactions subject to legally enforceable netting agreements. In the first case (counterparty-by-counterparty basis), a separate NPR is calculated for each counterparty. In the second case (aggregate basis), one NPR is calculated and applied to all counterparties. The insurer must choose a method and use it consistently for each netting agreement and for each reporting period.

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104 A_{Gross} equals the sum of the potential future credit exposures (i.e., the notional principal amount of each transaction times the appropriate add-on factors from section 4.1) for all transactions subject to legally enforceable netting agreements.

4.2.2.1 Steps for determining the credit equivalent amount of netted contracts

Step 1 For each counterparty subject to bilateral netting, determine the add-ons and replacement costs of each transaction. A worksheet similar to the one below could be used for this purpose.

Counterparty					
Transaction	**Notional Principal Amount** (1)	**Add-on Factor (see 4.1)** (2)	**Potential Future Credit Exposure** (1) x (2) = (3)	**Positive Replacement Cost** (4)	**Negative Replacement Cost** (5)
1					
2					
etc.					
Total			A_{Gross}	R^+	R^-

Step 2 Calculate the net replacement cost for each counterparty. This cost is equal to the greater of zero or the sum of the positive and negative replacement costs ($R^+ + R^-$). Negative replacement costs for one counterparty cannot be used to offset positive replacement costs for another counterparty.

Step 3 Calculate the NPR. For an insurer using the method of one distinct NPR for each counterparty, the NPR equals the net replacement cost (from step 2) divided by the positive replacement cost (amount R^+ calculated in step 1).

For insurers using the aggregate method, the NPR is the result of the net replacement costs of all counterparties subject to bilateral netting divided by the sum of the positive replacement costs for all counterparties subject to bilateral netting.

Example: NPR Ratio Calculation

	Counterparty 1		Counterparty 2		Counterparty 3	
Transaction	**Notional Principal Amount**	**Mark to Market Value**	**Notional Principal Amount**	**Mark to Market Value**	**Notional Principal Amount**	**Mark to Market Value**
Transaction 1	100	10	50	8	30	-3
Transaction 2	100	-5	50	2	30	1
Positive replacement cost (R^+)		10		10		1
Net replacement cost (NR)		5		10		0
NPR (per counterparty)	0.5		1		0	
NPR (aggregate)	$\Sigma NR/\Sigma R^+ = 15/21 = 0.71$					

Step 4 Calculate A_{Net} for each counterparty subject to bilateral netting. However, the NPR applied will depend on whether the insurer is using the NPR counterparty-by-counterparty method or the NPR aggregate method. The insurer must choose which method it will use and then use it consistently for all netted transactions.

For netted contracts where the net replacement cost is > 0,
A_{Net} is equal to: $(0.4 \times A_{Gross}) + (0.6 \times NPR \times A_{Gross})$.

For netted contracts where the net replacement cost is zero,
A_{Net} is equal to: $(0.4 \times A_{Gross})$

Step 5 Calculate the credit equivalent amount for each counterparty by adding the net replacement cost (calculated in step 2) and A_{Net} (calculated in step 4).

Note: Contracts may include netting between different types of derivative instruments (e.g., interest rates, foreign exchange and equities). If this is the case, the insurer must allocate the net replacement cost to the types of derivative instruments by pro-rating the net replacement cost among those instrument types that have a gross positive replacement cost.

Example: Netting for Potential Future Credit Exposure with Contracts Subject to Novation

Assume an insurer has six contracts with the same counterparty and has a legally enforceable netting agreement with that counterparty:

Contract	Notional Principal Amount	Marked to Market
A	10	1
B	20	-2
C	10	-1
D	40	4
E	30	3
F	20	-2

Contracts A and B are subject to novation, as are contracts C and D. Under novation, the two contracts are replaced by one new contract. Therefore, to calculate the capital requirements, the insurer would replace contracts A and B for contract A+ and contracts C and D for contract C+, netting the notional amounts and calculating a new marked to market amount.

Contract	Notional Principal Amount	Marked to Market
A+	10	-1
C+	30	3
E	30	3
F	20	-2

Assume the add-on factor for all contracts is 5%. The potential future credit exposure is calculated for each contract. A_{Gross} is the sum of the potential future credit exposures:

Contract	Notional Principal Amount	Add-on Factor (5%)	Potential Credit Exposure	Positive Replacement Cost	Negative Replacement Cost
A+	10	0.05	0.5	0	-1
C+	30	0.05	1.5	3	0
E	30	0.05	1.5	3	0
F	20	0.05	1.0	0	-2
Total			**4.5**	**6**	**-3**

The net replacement cost is 3 (i.e., 6 - 3; the greater of zero or the sum of the positive and negative replacement costs).

The NPR is 0.5 (i.e., 3 / 6; the net replacement cost divided by the positive replacement cost).

A_{Net} is equal to (0.4 × 4.5) + (0.6 × 0.5 × 4.5) = 3.15.

The credit equivalent amount is 6.15 (i.e., 3 + 3.15; the net replacement cost plus A_{Net}).

4.3 Off-balance sheet instruments, other than derivatives

The definitions included in this section apply to off-balance sheet exposures other than derivatives covered in section 4.1.

4.3.1 Direct credit substitutes (100% conversion factor)

Direct credit substitutes include guarantees or equivalent instruments backing financial claims. With a direct credit substitute, the risk of loss to the insurer is directly dependent on the creditworthiness of the counterparty.

Examples of direct credit substitutes include:

- Guarantees given on behalf of customers to stand behind the financial obligations of the customer and to satisfy these obligations should the customer fail to do so; for example, guarantees of:
  - payment of existing indebtedness for services;
  - payment with respect to a purchase agreement;
  - lease, loan or mortgage payments;
  - payment of uncertified cheques;
  - remittance of (sales) tax to the government;

- ➢ payment of existing indebtedness for merchandise purchased;
- ➢ payment of an unfunded pension liability; and
- ➢ financial obligations undertaken through reinsurance;

- Standby letters of credit or other equivalent irrevocable obligations serving as financial guarantees, such as letters of credit supporting the issue of commercial paper.
- Risk participations in bankers' acceptances and financial letters of credit; risk participations constitute a guarantee by the participating insurer such that if the customer in question defaults, the insurer will indemnify the issuer for the full principal and interest attributable to them.
- Securities lending transactions, where the insurer is liable to its customer for any failure to recover the securities on loan.

4.3.2 Repurchase and reverse repurchase agreements (100% conversion factor)

A repurchase agreement is a transaction that involves the sale of a security or other asset with the simultaneous commitment by the seller that after a stated period of time, the seller will repurchase the asset from the original buyer at a pre-determined price. A reverse repurchase agreement consists of the purchase of a security or other asset with the simultaneous commitment by the buyer that after a stated period of time, the buyer will resell the asset to the original seller at a predetermined price. In any circumstance where these transactions are not reported on-balance sheet, they must be reported as an off-balance sheet exposure with a 100% credit conversion factor.

4.3.3 Forward asset purchases[105] (100% conversion factor)

These items refer to commitments to purchase a loan, security or other asset at a specified future date, usually on prearranged terms.

4.3.4 Forward/Forward deposits (100% conversion factor)

An agreement between two parties whereby one will pay and the other receive an agreed rate of interest on a deposit to be placed by one party with the other at some predetermined date in the future. Such deposits are distinct from future forward rate agreements in that, with forward/forwards, the deposit is actually placed.

4.3.5 Partly paid shares and securities (100% conversion factor)

These are transactions where only a part of the issue price or nominal face value of a security purchased has been subscribed and the issuer may call for the outstanding balance (or a further instalment) either on a date predetermined at the time of issue or at an unspecified future date.

[105] This does not include a spot transaction that is contracted to settle within the normal settlement period.

4.3.6 Transaction-related contingencies (50% conversion factor)

Transaction-related contingencies relate to the ongoing business activities of a counterparty, where the risk of loss to the insurer depends on the likelihood of a future event that is independent of the creditworthiness of the counterparty. Essentially, transaction-related contingencies are guarantees that support particular performance of non-financial or commercial contracts or undertakings rather than supporting customers' general financial obligations. Performance-related guarantees specifically exclude items relating to non-performance of financial obligations.

Performance-related and non-financial guarantees include items such as performance bonds, warranties and indemnities, and performance standby letters of credit. These guarantees represent obligations backing the performance of non-financial or commercial contracts or undertakings, including arrangements backing:

- subcontractors' and suppliers' performance;
- labour and materials contracts;
- delivery of merchandise, bids or tender bonds;
- guarantees of repayment of deposits or prepayments in cases of non-performance.

4.3.7 Trade-related contingencies (20% conversion factor)

These include short-term self-liquidating trade-related items such as commercial and documentary letters of credit issued by the insurer that are, or are to be, collateralized by the underlying shipment.

Letters of credit issued on behalf of a counterparty back-to-back with letters of credit of which the counterparty is a beneficiary ("back-to-back" letters) must be reported as documentary letters of credit.

Letters of credit advised by the insurer for which the insurer is acting as a reimbursement agent must not be considered a risk asset.

4.4 Commitments

Commitments are arrangements that obligate an insurer, at a counterparty's request, to:

- extend credit in the form of loans or participations in loans, lease financing receivables, mortgages, overdrafts, acceptances, letters of credit, guarantees or loan substitutes; or
- purchase loans, securities, accounts receivable, or other assets.

The risk in undertaking a commitment is that an insurer may be required to extend credit or purchase assets at worse-than-market terms. The presence of a form of consideration, such as a commitment fee, would normally indicate that an insurer is providing a potential financial benefit to a third party for which capital is required.

Commitments for which an insurer has an absolute right of refusal, has the unfettered right to set the loan interest rate at time of exercise, or for which the asset purchase price is fair market value are not subject to a capital requirement. Commitments exclude undrawn contract loans, i.e., the portion of a contract's cash surrender value that has not been taken in the form of a contract loan.

4.4.1 Maturity

Insurers must use original maturity (as defined below) to report commitments.

4.4.1.1 Original maturity

The original maturity of a commitment must be measured from the date when the commitment was accepted by the client, regardless of whether the commitment is revocable or irrevocable, conditional or unconditional, until the earliest date on which:

- the commitment is scheduled to expire, or
- the insurer can, at its option, unconditionally cancel the commitment.

A material adverse change clause is not considered to give sufficient protection for a commitment to be considered unconditionally cancellable.

Where the insurer commits to granting a facility at a future date (a forward commitment), the original maturity of the commitment is to be measured from the date the commitment is accepted until the final date on which it may be used.

4.4.1.2 Renegotiation of a commitment

If both parties agree, a commitment may be renegotiated before its term expires. If the renegotiation process involves a credit assessment of the customer consistent with the insurer's credit standards, and provides the insurer with the total discretion to renew or extend the commitment and to change any other terms and conditions of the commitment, then on the date of acceptance by the customer of the revised terms and conditions, the original commitment may be deemed to have matured and a new commitment begun. If new terms are not reached, the original commitment will remain in force until its original maturity date. This process must be clearly documented.

In syndicated and participated transactions, a participating insurer must be able to exercise its renegotiation rights independently of the other syndicate members.

Where these conditions are not all met, the original start date of the commitment must be used to determine maturity.

4.4.2 Credit conversion factors

The credit conversion factor applied to a commitment is dependent on its maturity. Longer maturity commitments are considered to be of higher risk because there is a longer period between credit reviews and less opportunity to withdraw the commitment if the credit quality of the drawer deteriorates.

The conversion factors to be applied to commitments can generally be categorized in the following categories.

50% conversion factor

- Commitments and forward commitments with an original maturity of over one year.
- Guaranteed issuance facilities and revolving underwriting facilities (refer to section 4.4.3.6).
- The undrawn portion of a commitment to provide a loan that will be used in a number of tranches, some under one year and some over one year.

20% conversion factor

- Commitments and forward commitments with an original maturity of one year or less.

0% conversion factor

- Commitments that are unconditionally cancellable at any time by the insurer without notice or that effectively provide for automatic cancellation due to deterioration in the borrower's creditworthiness. This implies that the insurer conducts a formal review of the facility at least annually, thus giving it an opportunity to take note of any perceived deterioration in credit quality. Retail commitments are unconditionally cancellable if the terms permit the insurer to cancel them to the full extent allowable under consumer protection and related legislation.

4.4.3 Specific types of commitments

4.4.3.1 Undated/Open-ended commitments

A 0% credit conversion factor is applied to undated or open-ended commitments that are unconditionally cancellable at any time without notice, which may include unused credit card lines, personal lines of credit, and overdraft protection for personal chequing accounts.

4.4.3.2 Evergreen commitments

Open-ended commitments that are cancellable by the insurer at any time subject to a notice period do not constitute unconditionally cancellable commitments and are converted at 50%. Long-term commitments must be cancellable without notice to be eligible for the 0% conversion factor.

4.4.3.3 Commitments drawn down in a number of tranches

A 50% credit conversion factor is applied to a commitment to provide a loan (or purchase an asset) to be drawn down in a number of tranches, some one year and under and some over one year. In these cases, the ability to renegotiate the terms of later tranches must be regarded as immaterial. Often these commitments are provided for development projects from which the insurer may find it difficult to withdraw without jeopardizing its investment.

Where the facility involves unrelated tranches, and where conversions are permitted between the over- and under-one-year tranches (i.e., where the borrower may make ongoing selections as to how much of the commitment is under one year and how much is over), then the entire commitment must be converted at 50%.

Where the facility involves unrelated tranches with no conversions permitted between the over- and under-one-year tranches, then each tranche may be converted separately, depending on its maturity.

4.4.3.4 Commitments for fluctuating amounts

For commitments that vary in amount over the life of the commitment, such as the financing of a business subject to seasonal variation in cash flow, the conversion factor must apply to the maximum unutilized amount that can be drawn under the remaining period of the facility.

4.4.3.5 Commitment to provide a loan with a maturity of over one year

A commitment to provide a loan that has a maturity of over one year but that must be drawn down within a period of less than one year may be treated as an under-one-year instrument, as long as any undrawn portion of the facility is automatically cancelled at the end of the drawdown period

However, if through any combination of drawdowns, repayments, and re-drawdowns, or other options, the client can access a line of credit past one year, with no opportunity for the insurer to unconditionally cancel the commitment within one year, the commitment is converted at 50%.

4.4.3.6 Guaranteed issuance facilities and revolving underwriting facilities

Guaranteed issuance facilities and revolving underwriting facilities are arrangements whereby a borrower may issue short-term notes, typically three to six months in maturity, up to a prescribed limit over an extended period, commonly by means of repeated offerings to a tender panel. If at any time the notes are not sold by the tender at an acceptable price, an underwriter (or group of underwriters) undertakes to buy them at a prescribed price.

4.4.3.7 Commitments for off-balance sheet transactions

Where there is a commitment to provide an off-balance sheet item, the insurer is to apply the lower of the two applicable credit conversion factors.

Chapter 5. Market Risk

Market risk arises from potential variations in rates or prices in various markets such as those for bonds, foreign currency, equities and commodities. Exposure to this risk stems from investment and other business activities that create on- and off-balance sheet positions. Market risk for CARLI purposes includes risks related to interest rates, equities, real estate and foreign exchange. A reduction in required capital for the potential risk-mitigating effect of dividend reductions or contractual adjustability is calculated separately for participating and adjustable products (refer to Chapter 9). A market risk factor of 0% is applied to assets of a securities portfolio guaranteed by the Caisse de dépôt et placement du Québec effective October 27, 2016, eliminating all market risk to the insurer at all times. The conditions of this guarantee must be the same as those discussed in Section 3.3.

Risks associated with segregated fund guarantees are covered in Chapter 7. Consequently, ~~with the exception of the requirement for hedges outlined in sections 5.2.3 and 5.2.4,~~ liabilities for these guarantees, assets backing these liabilities under the insurer's asset-liability management policy, assets held in segregated funds by an insurer's policyholders, and the corresponding segregated fund account value liabilities are not subject to the requirements in this chapter.

Sections 5.2 to 5.4 relate to market risks associated with particular assets. These sections do not apply to assets backing index-linked products that are included in the correlation factor calculation in section 5.5. Investment income accrued on assets subject to market risk must be reported with the assets to which it relates, and receive the same factor as these assets.

A commitment to purchase a traded asset that is exposed to market risk must be treated as a sold put option under section 5.2.3.3. The capital requirement for a commitment to purchase a non-traded asset is equal to the product of the value of the commitment, the applicable credit conversion factor from section 4.4, and the applicable market risk factor.

5.1 Interest rate risk

Interest rate risk is the risk of economic loss resulting from market changes in interest rates. The most significant aspect of this risk is the net effect of interest rate volatility on the mismatch between cash flows of interest-sensitive assets and liabilities.

A methodology based on projected cash flow is used to measure the economic impact of sudden interest rate shocks. Required capital for interest rate risk is calculated as the maximum loss under four different prescribed stress scenarios. For each scenario, the loss is defined as the decrease in the insurer's net position after revaluing asset and liability cash flows by changing the discount rates from those of the initial scenario to those of the stress scenario. The net position used to measure the loss in each scenario is equal to the difference between the present values of asset cash flows (including assets backing capital or surplus) and liability cash flows. The capital requirement for interest rate risk is calculated for each geographic region (refer to section 1.1.5).

The present value of the assets held by an investment subsidiary that is not deconsolidated under section 1.3 may be allocated to a different region than the region in which the subsidiary is incorporated, subject to the following criteria:

1. The investment subsidiary is a wholly owned subsidiary that can only hold securities.
2. The present value of all assets must be allocated to the same region.
3. The capital requirement for the region to which the present value is allocated is equal to the sum of:
   a. the capital requirement for the region after the present value is allocated to the region;
   b. 5% of the difference between:
      - the sum of the capital requirement for that region and the region in which the subsidiary is incorporated before the present value is allocated to the region;
      - the sum of the capital requirement for that region and the region in which the subsidiary is incorporated after the present value is allocated to that region.

Detailed information regarding the capital requirement calculation for the region to which the present value is allocated must be included in the Capital Guideline Certification Report.

5.1.1 Initial Scenario Discount Rates

Initial Scenario Discount Rates correspond to risk-free interest rates plus a spread, trending toward an ultimate interest rate (UIR) plus an ultimate spread. Initial Scenario Discount Rates are prescribed for Canada, the United States, the United Kingdom, Europe (other than the UK), and Japan. The Initial Scenario Discount Rates for other countries are the same as for the United States.

Risk-free interest rates are based on the following rates:

- Canada – the spot rates for Government of Canada bonds
- United States – the spot rates for United States treasuries
- United Kingdom – the spot rates for United Kingdom sovereign benchmark bonds
- Europe (other than the UK) – the spot rates for Government of Germany bonds
- Japan – the spot rates for Government of Japan bonds

The UIR for Canada, the United States, and the United Kingdom is a spot rate of 4.5%. The UIRs for Europe (other than the UK) and for Japan are 2.8% and 1.0%, respectively.

The risk-free spot interest rates used in the initial scenario are determined using the following method.

a) For cash flows from year 0 to year 20, the interest rates are the published risk-free spot rates.

b) For cash flows between years 20 and 70, the interest rates are obtained by the linear interpolation between the 20-year spot discount rate and the UIR.

c) For cash flows at year 70 and beyond, the interest rates are the UIR.

The spreads are determined using the following method.

a) From year 0 to year 20, the spread is 90% of the market average spread.

b) Between year 20 and year 70, the spread grades linearly from 90% of the 20-year market average spread to an ultimate spread of 80 basis points.

c) At year 70 and beyond, the ultimate spread is 80 basis points.

The market average spreads between year 0 and year 20 are determined using market spreads at the valuation date based on a recognized investment-grade corporate bond index chosen by the insurer. The index used must be published by a reliable information provider and must be used consistently from one period to the next. To be recognized, an investment-grade corporate bond index must meet the following criteria:

1. The index is composed only of corporate bonds with a rating of BBB or better;
2. The index contains a representative selection of the investment-grade corporate bonds in the jurisdiction that it covers (e.g., the rating and sector distribution is aligned with that of the broad investment grade corporate bond market in the jurisdiction); and
3. The index is produced by a reliable index provider.[106]

The Discount Rates of the initial scenario, including its components of risk-free interest rates and spreads, as well as the indexes used and the methodology for obtaining them, must be disclosed in the Capital Guideline Certification Report for each duration and for each region.

Determination of initial scenario discount rates

The following illustrates the calculation of risk-free spot rates and market spreads for both par and non-par blocks of business.

Risk-free spot rates

<u>Step 1: Obtain par risk-free yields</u>

[106] A reliable index provider would, at a minimum, construct benchmark indexes using a transparent and objective process; produce indexes that are a true representation of the target market segment; and use a rebalancing approach that reflects market changes in a timely and orderly fashion.

Insurers would first collect par risk-free (semi-annual) yields. These yields may be obtained from different sources, in particular:

- *Yields for Canadian treasuries with maturities of 10 years or less*: one source where these rates can be found is the Bank of Canada's website:

    - ➢ Treasury bills (maturities of one year or less): https://www.bankofcanada.ca/rates/interest-rates/t-bill-yields/selected-treasury-bill-yields-10-year-lookup/
    - ➢ Bonds (maturities greater that one year): https://www.bankofcanada.ca/rates/interest-rates/lookup-bond-yields/

    The series codes for the relevant maturities are:

Maturity	Series
3 months	V39065
6 months	V39066
1 year	V39067
2 years	V39051
3 years	V39052
5 years	V39053
7 years	V39054
10 years	V39055

- *Yields for Canadian treasuries with maturities of over 10 years*: one source where these rates may be found is https://ca.investing.com/rates-bonds/canada-20-year-bond-yield-historical-data. For example, the rate for December 31, 20xx may be found under the "Price" column.

- *Yields for US treasuries*: one source where these yields may be found is the United States' Department of the Treasury website: https://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yield.

- *Bloomberg*: Insurers with access to Bloomberg could obtain sovereign benchmark par bond yields which may be appropriate for the five CARLI geographic regions under the following curve codes:

Geographic region	Curve code	Curve name
Canada	I7	CAD Canada Sovereign Curve
United States	I25	US Treasury Actives Curve
United Kingdom	I22	GBP United Kingdom Sovereign Curve
Europe (other than the UK)	I16	EUR German Sovereign Curve
Japan	I18	JPY Japan Sovereign Curve

For example, Canadian sovereign par yields could be obtained by:

- Entering "GC I7".
- Selecting the appropriate quarter end date as the date of the curve.
- Retrieving the "Mid-YTM (yield-to-maturity)" by hovering over each maturity in the graphed curve or by exporting the data into Excel.

Although the yields obtained above are tied to a specific currency, it is assumed that they are appropriate for all business within a geographic region (e.g., Euro yields are used for all business within Europe).

Step 2: Convert par yields to spot rates

The following formulas would be used to convert par semi-annual yields to spot rates (zero coupon yields):

$$Yield_{zero\ coupon,t} = \begin{cases} (1+\frac{Yield_{par\ semi,t}}{2})^2 - 1, if\ t = \frac{1}{2} \\ \left[100\ \times (1+\frac{Yield_{par\ semi,t}}{2})/PV_{last\ payment,t}\right]^{\frac{1}{t}} - 1, if\ t \geq 1 \end{cases}$$

$$PV_{last\ payment,t} = 100\left(1 - \frac{Yield_{par\ semi,t}}{2}\sum_{n=1}^{t\times 2-1} PV_{n/2}\right)$$

$$PV_t = \frac{1}{(1+Yield_{zero\ coupon,t})^t}$$

Risk-free par yields that are not obtained directly can be inferred using linear interpolation (e.g. for durations 4, 6, etc.). The values of $Yield_{zero\ coupon,t}$ for t = 1, 2, ..., 20 as determined using the formulas above would constitute the risk-free spot curve.

Market spreads

Step 1: Select an investment-grade corporate bond index

The following table gives examples of indexes that are considered to meet the criteria for recognition as investment-grade corporate bond indexes:

Geographic region	Index
Canada	• FTSE TMX All Corporate Bond Index
United States	• Barclays USD Liquid Investment Grade Corporate Index • Bank of America Merrill Lynch US Corporate Bond Index • Citi Corporate Investment Grade Index • Bloomberg USD Investment Grade Corporate Bond Index (Bloomberg curve code BS76)
United Kingdom	• S&P UK Investment Grade Index
Europe (other than the UK)	• S&P Eurozone Investment Grade Corporate Bond Index • Bloomberg EUR Investment Grade European Corporate Bond Index (Bloomberg curve code: BS78)

Step 2: Obtain par investment-grade corporate bond yields

Similar to the process described above for obtaining par risk-free yields, investment-grade corporate bond yields must be obtained from the appropriate sources for the relevant maturities (i.e., 3 months, 6 months, 1 year, 2 years, etc.). The insurer would use all available maturities, and would only use fewer if constrained by the data source.

For example, United States par bond yields could be obtained in Bloomberg by:

- Entering "GC BS76".
- Selecting the appropriate quarter end date as the date of the curve.
- Retrieving the "Mid-YTM" by hovering over each maturity in the curve or by exporting the data into Excel.

There are a number of jurisdictions (e.g., Canada, United Kingdom and Japan) for which an insurer may not be able to find pre-constructed investment-grade corporate bond curves that provide all the necessary information. For these jurisdictions, an insurer could use a curve building tool to collect the required bond yields. More generally, an insurer could extract the data for each constituent of the index and construct the curve by applying appropriate filters and using an appropriate curve fitting model. For example, a Canadian investment-grade corporate bond curve could be constructed with Bloomberg's curve building tool using the following procedure:

- Enter "SRCH".

- Select “Asset Classes – Corporates”.
- Apply the following filters:
  - Security Status: Active
  - Country of Incorporation: Canada
  - Currency: Canadian Dollar
  - Maturity Type: Bullet or Callable or Puttable
  - Coupon Type: Fixed
  - Security Type: Exclude Inflation-Linked Note
  - BICS Classification: Exclude government
  - Bloomberg Composite Rating: Investment Grade
- Remove outliers (if appropriate).
- Click “Actions” and save the curve.
- Enter “CRV”.
- Click on “Fitted Curve”.
- Select “Bond Search”.
- Select the saved curve.
- Click “Construct Curve”.
- Select “Regression: N-S-S (Nelson-Siegel-Svensson)” to adjust the curve.
- Save the curve.
- Enter “GC” and the curve name from the previous screen.
- Specify the appropriate quarter-end date.
- Retrieve the “Mid-YTM” by hovering over each maturity in the curve or by exporting the data into Excel.

Other appropriate filters could be applied depending on the nature of the corporate bond market in a particular jurisdiction. For instance, inflation-linked corporate bonds are quite common in the United Kingdom and they distort the corporate bond curve. Therefore, they must be excluded.

Aside from Bloomberg, insurers who subscribe to a data feed from an index provider may receive the “Mid-YTM” at key maturities for the index as a whole. In some cases, individual bond data for all bonds in the index are provided. If so, an insurer would apply the appropriate filters (similar to the ones above) and use an appropriate curve fitting model.

There are many methods for extracting par yields from an index. The insurer would choose an appropriate method based on the data that it has available (for example, an insurer would use underlying bond data if available, and would only use summary data, such as

Mid-YTM for a subset of key maturities, if more detailed data were not readily available). The methodology used would be consistent from one period to the next.

Step 3: Convert par investment grade corporate bond yields to spot rates

The formulas and considerations specified in Step 2 for *Risk-free spot rates* would be used to perform this conversion.

5.1.2 Stress scenarios

The present value of asset and liability cash flows is determined under four prescribed stress scenarios by discounting them to time zero. The stress scenario used to determine required capital is the one that produces the lowest net present value (i.e., the difference between the present values of assets and liabilities) for the cash flows after taking account of recoveries through reductions in participating dividends. The stress scenario used to determine required capital may vary by geographic region.

5.1.2.1 Stress scenario specification

For each stress scenario, the annualized stressed discount rates are calculated as follows.

a) For discount rates up to year 20, the initial scenario discount rates are adjusted by calculating:
   i) an adjustment to the 90-day discount rate (T or S)
   ii) an adjustment to the 20-year discount rate (B or C)
   iii) adjustments for all years in between, by applying linear interpolation to the coefficients used to calculate the adjustments i). and ii). above.

b) Between years 20 and 70, the discount rates are determined by linear interpolation between the adjusted 20-year discount rate and the adjusted ultimate discount rate.

c) For year 70 and beyond, an adjustment (L) is made to the ultimate discount rate.

The four stress scenarios relative to the initial scenario are the following:

1. Decreased short-term interest rate (by adding shock T_-), decreased long-term interest rate (by adding shock B_-) and decreased UIR (by subtracting shock L)
2. Increased short-term interest rate (by adding shock S_+), increased or decreased long-term interest rate (by adding shock C_-) and decreased UIR (by subtracting shock L)
3. Increased short-term interest rate (by adding shock T_+), increased long-term interest rate (by adding shock B_+) and increased UIR (by adding shock L)
4. Decreased short-term interest rate (by adding shock S_-), increased long-term interest rate (by adding shock C_+) and increased UIR (by adding shock L)

The interest rate shocks (T, S, B and C) to be used are the following linear functions of the square roots of the current risk-free interest rates, floored at 0.5%:

$$T_{\pm} = 0.0049 \pm 0.139\sqrt{\max\,(r_{0.25}; 0.005)}$$

$$S_{\pm} = 0.0039 \pm 0.111\sqrt{\max\,(r_{0.25}; 0.005)}$$

$$B_{\pm} = 0.0028 \pm 0.102\sqrt{max\,(r_{20}; 0.005)}$$

$$C_{\pm} = 0.0023 \pm 0.007\sqrt{\max(r_{20}; 0.005)}$$

where:

- $r_{0.25}$ is the current 90-day risk-free interest rate
- r_{20} is the current 20-year risk-free interest rate
- r is expressed as a decimal (e.g., 0.05 for 5%).

The interpolated interest rate shocks under the four stress scenarios that are all added to the discount rate of the initial scenario may be expressed by the following formulas:

i) $-(0.139468 - 0.001873t)\sqrt{\max(r_t; 0.005)} + (0.00492658 - 0.00010633t)$

ii) $(0.112699 - 0.005997t)\sqrt{\max(r_t; 0.005)} + (0.00394084 - 0.00008336t)$

iii) $(0.139468 - 0.001873t)\sqrt{max(r_t; 0.005)} + (0.00492658 - 0.00010633t)$

iv) $-(0.112699 - 0.005997t)\sqrt{\max(r_t; 0.005)} + (0.00394084 - 0.00008336t)$

where:

r_t is the risk-free interest rate for maturity t , when t is between 90 days and 20 years.

Initial and stress scenario discount rates are not floored at zero, and no adjustments are made if an interest rate is negative.

The shock L applied to the UIR, which is a decrease in the first two scenarios and an increase in the last two scenarios, is 40 basis points for Canada, the United States, the United Kingdom, and other locations, 25 basis points for Europe (other than the UK), and 20 basis points for Japan.

The discount rates for each of the stress scenarios must be reported in the Capital Guideline Certification Report for each duration and for each region.

5.1.2.2 Determination of the most adverse scenario[107]

For the purpose of determining the most adverse stress scenario that is used to calculate required capital, an insurer's loss under a stress scenario (LSS) within each geographic region must be calculated using the following formula.

$$LSS = IRR_{non-par\ gross} + \sum_i max(IRR_{i\ par\ gross} - C_{i\ stress}\ ;\ IRR_{i\ par\ npt\ gross}\ ;\ 0)$$

where:

- $IRR_{non\ par\ gross}$ is the interest rate risk capital requirement for non-participating business within the geographic region under the stress scenario; it is equal to the decrease (or negative of the increase) in the net present value of the region's non-participating asset cash flows and liability cash flows from the initial scenario.
- The summation is taken over all participating blocks within the region (refer to Chapter 9).
- $IRR_{i\ par\ gross}$ is the interest rate risk capital requirement for a participating block within the region under the stress scenario; it is equal to the decrease (or negative of the increase) in the net present value of the block's entire participating asset cash flows and liability cash flows from the initial scenario. All of the block's assets and liabilities are included, irrespective of whether interest rate risk on the assets and liabilities is passed through to policyholders.
- $IRR_{i\ par\ npt\ gross}$ is the interest rate risk capital requirement for the assets and liabilities of a participating block for which the interest rate risk is not passed through to policyholders (e.g., Risk Adjustments, contractual service margins, contract loans, amounts on deposit, guaranteed benefits/riders that are contractually excluded from pass through, equity in stock company participating account, mutual company residual interest reported as equity); it is equal to the decrease (or negative of the increase) in the net present value of these elements' cash flows from the initial scenario.
- If losses arising from interest rate risk are recoverable through dividend reductions, $C_{i\ stress}$ is equal to 75% of the present value of restated dividend cash flows for the block used in the interest rate risk calculation (refer to section 5.1.3.3), discounted using the rates under the stress scenario. If losses arising from interest rate risk are not recoverable through dividend reductions, then $C_{i\ stress}$ is equal to zero.

The most adverse scenario used to calculate required capital for interest rate risk in geographic regions outside Canada and the United States is the scenario that produces the highest value of *LSS* as defined above. For Canada and the United States, the same adverse scenario is used to calculate required capital for interest rate risk in both regions, and is the scenario for which the value of the following is greatest:

$$\max(LSS_{Canada}\ ;\ 0) + \max(LSS_{United\ States}\ ;\ 0)$$

[107] An approximation may be used under section 1.4.5.

5.1.2.3 Interest rate risk capital requirement

Once an insurer has determined the most adverse scenario for each geographic region, the interest rate risk capital requirement for non-participating business within the region under this scenario is equal to:

$IRR_{\text{non-par}} = \max(IRR_{\text{non-par gross}}\ ;\ 0).$

The interest rate risk capital requirement for each block of participating business of a region, before reflecting the effect of participations is:

$\overline{IRR}_{i\ par} = \frac{1}{6}\sum_{q=1}^{6} IRR_{i\ par\ in\ quarter\ q}.$

This amount represents the six-quarter rolling average of $IRR_{i\ par}$ taken over the current quarter and the previous five quarters. For each quarter, the quantity $IRR_{i\ par}$ under the most adverse scenario in that quarter is defined by:
$IRR_{i\ \text{par}} = \max(IRR_{i\ \text{par gross}}\ ;\ 0).$[108]

.

The interest rate risk requirement for the non-pass through portion of a participating block, which is used to calculate the participating business requirement floor (refer to section 9.1.2) is:

$\overline{IRR}_{i\ par\ npt} = \frac{1}{6}\sum_{q=1}^{6} IRR_{i\ par\ npt\ in\ quarter\ q}.$

This amount represents the six-quarter rolling average of $IRR_{i\ par\ npt}$ taken over the current quarter and the previous five quarters. For each quarter, the quantity $IRR_{i\ par\ npt}$ under the most adverse scenario in that quarter is defined by:

$IRR_{i\ \text{par st}} = \max(IRR_{i\ \text{par st gross}}\ ; 0).$

In calculating the averages above, the following must be considered:

- No averaging must be used for a new participating block in the first quarter calculation. For the second quarter calculation, all averaged quantities for the block

108 If the interest rate risk capital requirement for a participating block is positive under the most adverse scenario for a specific quarter, the insurer may elect to treat the block as non-participating business under this scenario. If the insurer makes this election:

1. the interest rate risk capital requirement for the participating block (without taking account of any reductions in participations) is added to the interest rate risk capital requirement for non-participating business, prior to applying the zero floor to the capital requirement for non-participating business;
2. the interest rate risk capital requirement for the participating block used to calculate the individual capital requirement for the block and its credit for participating products is set at zero.

must be calculated using half (½) of the sum of the first two quarter amounts. For the third quarter calculation, the averages are one third (⅓) of the sum of the first three quarter amounts. The averaging must continue in this manner until data are obtained over six quarters.

- Any participating block that is divested by the insurer must be excluded completely from the CARLI calculations, and no capital requirement amount must be presented for this block.
- If an entire participating block is coinsured by a reinsurer, the cedant must treat the transaction as a divestiture of the block, and the reinsurer must treat the assumed block as a new participating block. If only a portion of a participating block is coinsured, then:
  - the cedant must reflect the change in the components of the averaging calculation as if the reinsurance contract had been in place for the previous five quarters; and
  - the reinsurer must treat the assumed portion as a new participating block, provided it had not assumed any other portion of the block previously.

Although the same scenario is used for Canada and the United States, the capital requirements for interest rate risk in these regions are calculated separately, under the assumption that gains in one region do not offset losses in the other.

The interest rate risk capital requirement for each participating block is used in the calculation of the standalone capital requirement for the block (refer to section 11.2) and its participating credit (refer to section 9.1.2). The amount $C_{i\ stress}$ used to determine the most adverse scenario must be consistent with the amounts $C_{i\ adverse}$ and $K_{i\ floor}$ used to determine the credit for a participating block in section 9.1.2.

Determination of the most adverse stress scenario and the capital requirement for interest rate risk on participating business must be clearly set out in the Capital Guideline Certification Report for each region.

Example: Interest rate risk

The most adverse stress scenario for interest rate risk is determined based on the gain or loss in a region's non-par block under each scenario ($IRR_{non\ par\ gross}$), the gain or loss in the region's par blocks ($IRR_{i\ par\ gross}$ and $IRR_{i\ par\ npt\ gross}$) and the amount of dividends available to pass through any interest rate losses in the par block ($C_{i\ stress}$). The amounts $IRR_{non\ par\ gross}$, $IRR_{i\ par\ gross}$ and $IRR_{i\ par\ npt\ gross}$ correspond to the gross capital requirements for the non-par and par blocks, before taking account of any floors. Consequently they will be positive in a scenario if there is a loss in the block, and negative if there is a gain in the block under a scenario.

The premises underlying the loss measure under the *LSS* scenario are that any gains in a par block will ultimately be passed on to policyholders (and hence cannot be used to offset non-par losses), and that losses in the par block under a scenario must not be counted if they can be passed on to policyholders via a reduction in dividends.

In the situation in which all interest rate risk is passed through to policyholders and an insurer has ample dividends available to absorb losses in its par blocks, the most adverse stress scenario will be determined solely by the gains or losses in the non-par block, since the term $max\left(IRR_{i\ par\ gross} - C_{i\ stress}\ ;\ IRR_{i\ par\ npt\ gross}\ ;\ 0\right)$ will be zero in all scenarios.

In the following example, the most adverse stress scenario is scenario 2 if there is only one par block in a geographic region with no non-pass through and if the values of $IRR_{non\ par\ gross}$, $IRR_{par\ gross}$ and C_{stress} under each scenario are as follows:

Scenario	$IRR_{non\ par\ gross}$	$IRR_{par\ gross}$	C_{stress}	LSS
1	800	800	5,000	800
2	1,400	-100	5,500	1,400
3	-600	2,500	4,000	-600
4	1,000	-700	3,000	1,000

Based on scenario 2, the insurer will use a value of $IRR_{non\ par}$ = 1,400 for the interest rate risk capital requirement in the calculation of $K_{non\ par}$, a value of IRR_{par} = 0 for the interest rate risk capital requirement for the current quarter in the calculation of $\overline{IRR_{\iota\ par}}$ (which is used to determine K, K_{floor} and $K_{reduced\ interest}$ for the par block), and a value of $C_{adverse}$ = 5,500 in the calculation of the credit for the par block.

If the available amount of par dividends is low or dividends cannot be used to pass through interest rate risk, then losses in the par block could affect the determination of the most adverse stress scenario. For example, the most adverse stress scenario becomes scenario 3 if C_{stress} under each of the scenarios changes as follows:

Scenario	$IRR_{non\ par\ gross}$	$IRR_{par\ gross}$	C_{stress}	LSS
1	800	800	90	1,510
2	1,400	-100	100	1,400
3	-600	2,500	80	1,820
4	1,000	-700	50	1,000

Based on scenario 3, the insurer will use a value of $IRR_{non\ par}$ = 0 for the interest rate risk capital requirement in the calculation of $K_{non\ par}$, a value of IRR_{par} = 2,500 for the interest rate risk capital requirement for the current quarter in the calculation of $\overline{IRR_{\iota\ par}}$ for the par block, and a value of $C_{adverse}$ = 80 in the calculation of the credit for the par block. In this situation, it will likely be to the insurer's advantage to treat the par block as non-participating for the interest rate risk. If it does so, it will use a value of $IRR_{non\ par}$ = 1,900 for the interest rate risk capital requirement in the calculation of $K_{non\ par}$ and a value of IRR_{par} = 0 for the interest rate risk capital requirement for the current quarter in the calculation of $\overline{IRR_{i\ par}}$ for the block, whereas $C_{adverse}$ will still be equal to 80.

Note that if an insurer has dividends available, but uses a value of 0 for C_{stress} for all scenarios to determine the most adverse stress scenario because it is unable to pass through interest rate risk, it must use 100% of the par interest rate risk requirement $IRR_{i\ par}$ in the calculation of K_{floor}.

5.1.3 Projection of cash flows[109]

Cash flows are determined at the balance sheet date. They are projected net of all reinsurance (i.e., if all or a portion of an insurance liability is covered by an on-balance sheet reinsurance contract held, then the liability cash flows are reduced by the cash flows from the reinsurance contract held and the cash flows from reinsurance contracts held are excluded from the asset cash flows).[110,111] No reinvestment of any asset cash flows must be assumed. Projected cash flows must not reflect the impact of Stage 1 and Stage 2 expected credit losses reported under IFRS 9 (i.e., asset cash flows must not be reduced by any amount on account of these expected losses), nor the impact of any expected losses for the risk of reinsurer non-performance under IFRS 17. Liability cash flows must correspond to IFRS fulfilment cash flows (incorporating Risk Adjustments but excluding contractual service margins). Projected asset and liability cash flows (except for liability cash flows associated with participating, adjustable and index-linked pass-through products) that are interest sensitive must be changed to be consistent with the interest rate scenario.

For participating, adjustable, index-linked and non-interest sensitive products, the same liability cash flows are used for all interest rate scenarios. For participating products, restated dividend cash flows must be projected using the methodology described in section 5.1.3.3, and all other cash flows must be projected based on fulfilment cash flows. Adjustments to cash flows must not be made for anticipated reductions or increases in dividends attributable to increases or decreases in interest rates under each scenario. A reduction in required capital for the potential risk-mitigating effect of dividend reductions or contractual adjustability is calculated separately for participating and adjustable products (refer to Chapter 9).

The treatment for specific asset and liability cash flows is described below.

109 An approximation may be used under section 1.4.5.

110 Liability cash flows exclude cash flows corresponding to liabilities ceded through funds withheld reinsurance contracts and liability cash flows assumed under funds withheld reinsurance contracts are included in liability cash flows. If a modified coinsurance contract effectively transfers the interest rate risk corresponding to an insurance liability and a portfolio of matching assets, the asset and liability cash flows must be excluded from the cash flow projection.

111 All cash flows corresponding to future business are excluded from the projection.

5.1.3.1 Assets having fixed cash flows

Interest rate risk cash flows projected for an asset having fixed cash flows must not deviate from the underlying asset cash flows. A fixed cash flow is one that is contractually guaranteed for a definite amount, and its value is not contingent on future market prices or interest rates. A cash flow is deemed to be contractually fixed if it is payable regardless of the condition of the payor (i.e., not contingent on the payor meeting a target profitability level), and if failure to make payment would be considered a case of default. All asset cash flows must be projected gross of investment expenses.

5.1.3.2 Risk adjustments

The interest rate risk cash flows projected for liabilities include all Risk Adjustments. If a Risk Adjustment corresponds to a series of cash flows (e.g., an adjustment calculated using margins on assumptions), then these cash flows must be projected as part of liabilities. If a Risk Adjustment has no cash flows associated with it, then the Risk Adjustment must be projected as a cash flow at time zero and must be revalued under the initial and stress scenarios so that the change in the value of the Risk Adjustment in response to movements in interest rates is appropriately captured.

5.1.3.3 Participating liability dividends

The dividend cash flows used in the initial scenario are different from those projected for the financial statement valuation. For the initial scenario, dividend cash flows projected for the financial statement valuation must be re-projected to produce restated dividend cash flows by making a level adjustment (e.g., determined using an iterative process) to the dividend scale so that the Participating Block Surplus is maintained under CARLI Initial Scenario Discount Rates. In other words, the net present value of assets over liabilities discounted using Initial Scenario Discount Rates must be equal to the Participating Block Surplus. The Participating Block Surplus includes mutual company participating surplus reported as residual interest in the LIFE return, as well as joint stock company participating surplus (which includes participating surplus reported as a liability in the financial statements, and contractual service margins).

If some portion of dividends projected for the financial statement valuation is presumed to be distributed in the form of paid-up additions, the same portion of restated dividends must be presumed to be distributed as paid-up additions.[112]

In re-projecting the dividend scale, the insurer must only include asset and liability cash flows whose returns are passed through to policyholders through modified dividends. For example, if investment returns on Participating Block Surplus, Risk Adjustments, contract loans, and amounts on deposit are not passed through to policyholders, these cash flows must be excluded. If the assets to be excluded are mingled with other assets, the insurer must remove them by assuming that they are supported by a proportionate share of the total (in practice, this could be a fixed percentage reduction of assets at each duration).

[112] An approximation may be used under section 1.4.5.

The restated dividend cash flows projected for the initial scenario must remain unchanged under all stress scenarios.

Example: Participating liability dividend restatement

An insurer has a block of participating products with underlying liability cash flows as illustrated in (A). The insurer uses financial statement discount rates to determine the total net present value of assets (including surplus assets from non-pass through and pass-through components) minus liabilities for the participating products, calculating a Participating Block Surplus of $445 in (B). Asset cash flows are projected using CARLI assumptions under the initial scenario, producing different asset valuation than what is on the financial statements (C). The surplus resulting from these cash flows and CARLI Initial Scenario Discount Rates is $338 (D), which is different from the financial statement surplus. Under CARLI, the insurer (using an iterative process (E), (F)) applies a level adjustment to the dividend scale so that the adjusted liability cash flows (G), discounted using the CARLI Initial Scenario Discount Rates, generate a total net present value (H) equal to the initially calculated Participating Block Surplus of $445 (B).

Year	Financial Statements Discount Rates	CARLI Initial Scenario Discount Rates
1	2.48%	1.48%
2	2.52%	1.52%
3	2.66%	1.66%
4	2.81%	1.81%
5	2.99%	1.99%

Duration	Total Cash Flows for Participating Products									
	(A)					(C)				
	Balance sheet					CARLI (<u>Before</u> Adjustment to 10% dividend scale)				
	Assets	Liabilities			Net (Participating Block Surplus)	Assets	Liabilities			Net (Participating Block Surplus)
		Non Div.	Div.	Total			Non Div.	Div.	Total	
Year 0		300	30	330		1,000	300	30	330	670
Year 1		400	40	440		850	400	40	440	410
Year 2		550	55	605		850	550	55	605	245
Year 3		800	80	880		760	800	80	880	-120
Year 4		900	90	990		675	900	90	990	-315
Year 5		1,000	100	1,100		480	1,000	100	1,100	-620
Total	4,700	3,950	395	4,345	355	4,615	3,950	395	4,345	270

Duration	Total Net Present Value of Cash Flows									
	(B)					(D)				
	Balance sheet					CARLI (<u>Before</u> Adjustment to 10% dividend scale)				
	Assets	Liabilities			Net (Participating Block Surplus)	Assets	Liabilities			Net (Participating Block Surplus)
		Non Div.	Div.	Total			Non Div.	Div.	Total	
Year 0		300	30	330		1,000	300	30	330	670
Year 1		395	40	435		844	397	40	437	407
Year 2		530	53	583		831	538	54	591	240
Year 3		749	75	824		729	768	77	845	-115
Year 4		817	82	899		634	845	85	930	-296
Year 5		876	88	964		439	915	92	1,007	-567
Total	4,479	3,667	367	4,034	**445**	4,477	3,763	376	4,139	338

Duration	Total Cash Flows for Participating Products									
	(E)					(G)				
	CARLI (Iterative adjustment to dividend scale) (8% dividend scale)					CARLI (After adjustment to dividend scale) (7.2% dividend scale)				
	Assets	Liabilities			Net (Participating Block Surplus)	Assets	Liabilities			Net (Participating Block Surplus)
		Non Div.	Div.	Total			Non Div.	Div.	Total	
Year 0	1,000	300	24	324	676	1,000	300	21	321	679
Year 1	850	400	32	432	418	850	400	29	429	421
Year 2	850	550	44	594	256	850	550	39	589	261
Year 3	760	800	64	864	-104	760	800	57	857	-97
Year 4	675	900	72	972	-297	675	900	64	964	-289
Year 5	480	1,000	80	1,080	-600	480	1,000	72	1,072	-592
Total	4,615	3,950	316	4,266	349	4,615	3,950	283	4,233	382

Duration	Total Net Present Value of Cash Flows									
	(F)					(H)				
	CARLI (Iterative Adjustment to dividend scale) (8% dividend scale)					CARLI (After adjustment to dividend scale) (7.2% dividend scale)				
	Assets	Liabilities			Net (Participating Block Surplus)	Assets	Liabilities			Net (Participating Block Surplus)
		Non Div.	Div.	Total			Non Div.	Div.	Total	
Year 0	1,000	300	24	324	676	1,000	300	21	321	679
Year 1	844	397	32	429	415	844	397	28	425	418
Year 2	831	538	43	581	250	831	538	38	576	255
Year 3	729	768	61	829	-100	729	768	55	823	-93
Year 4	634	845	68	913	-279	634	845	61	906	-272
Year 5	439	915	73	989	-549	439	915	66	981	-541
Total	4,477	3,763	301	4,064	413	4,477	3,763	269	4,033	**445**

5.1.3.4 Preferred shares and innovative instruments

Preferred shares and innovative instruments that do not constitute substantial investments (refer to section 1.5.2) are treated in the same manner as assets having fixed cash flows. Projected cash flows under the initial and stress scenarios must include all expected dividends and proceeds at maturity.

5.1.3.5 Real estate

Insurers must include at time zero the balance sheet surplus value of the real estate (including investments as a limited partner in limited partnerships for the purpose of property management, as if the insurer directly owned these properties held by such partnerships) on the balance sheet over the present value of fixed cash flows calculated using Initial Scenario Discount Rates. Where no fixed cash flows are projected, the total balance sheet value of the property must be included as a cash flow at time zero. The cash flow amount at time zero must be the same under all interest rate scenarios.

The insurer must include fixed cash flows on leases in the period during which they are contractually expected to be received. No contract or lease renewals are to be assumed. Prepaid rent must be treated as a time zero cash flow. The cash flows must exclude projected reimbursements for operating expenses that are paid by the lessor (e.g., property taxes and utilities). Cash flows from lease agreements with a rent-free period followed by a rent-paying period must be included in the present value of lease cash flows.

5.1.3.6 Floating rate instruments

The market value of floating rate bonds, notes, or other instruments must be reported as cash flow at time zero.

5.1.3.7 Bonds and preferred shares with embedded options

Under the initial and stress scenarios, cash flows associated with a redeemable or callable bond or preferred share must be projected to the redemption (or call) date, (i.e., one of the redemption or call dates or the maturity date) for which the present value of the cash flows, discounted at the scenario's rates, is lowest. For a puttable bond or preferred share, the cash flows under the initial and stress scenarios must be projected to the date for which the present value of the cash flows, discounted at the scenario's rates, is highest.

For a bond or preferred share that is both redeemable (or callable) and puttable, cash flows are projected under the initial and stress scenarios to the date determined by the following algorithm: if the dates in chronological order on which the investment can be redeemed, put or called are t_1 to t_N, and if t_{N+1} is the instrument's final maturity date, then for $1 \leq i \leq N + 1$, the quantity PV_t is defined to be the present value at time zero of the investment's cash flows under the scenario if it is called (or redeemed), put, or matures at time t. The quantities W_i are solved backwards recursively from:

$$W_{N+1} = PV_{N+1}$$

$$W_i = \begin{cases} \min(PV_i\,;\, W_{i+1}) & if\ t_i\ is\ a\ call\ or\ redemption\ date \\ \max(PV_i\,;\, W_{i+1}) & if\ t_i\ is\ a\ put\ date \end{cases}$$

For each scenario, the instrument's cash flows are projected up to the earliest time t_i for which $W_1 = PV_i$. If the instrument can be redeemed, called or put over a continuous time period, the point t_i is the time during the period at which PV_i takes its highest or lowest value respectively. For the purpose of projecting scenario cash flows for perpetual preferred shares that are callable and puttable, the insurer may assume that the shares mature at any time after which there is no material difference among any of the scenario present values PV_i.

Example: Redeemable (callable) and retractable (puttable) preferred shares

A Canadian perpetual preferred share with nominal value of 100 pays a 7% dividend at the end of each year. At the end of years 3, 5 and 8, the holder of the share is entitled to put the share back to the issuer for prices of 100, 102, and 99 respectively, while at the end of years 5 and 7, the issuer of the share is entitled to call the share for 103 and 100, respectively. At the end of year 10 and all year-ends thereafter, the issuer is entitled to call the share at par. All options are exercisable only after the annual dividend has been paid.

The current Canadian risk-free rate at all maturities between 1 and 20 years is 5%, and the market average spread at all maturities between 1 and 20 years is 80 bps (after application of a factor of 90%). Based on the put and call dates before year 10, the times t_i are defined as:

t_1	3
t_2	5
t_3	5
t_4	7
t_5	8

(Note: if a put and call are exercisable simultaneously, the strike price of the put must be lower than the strike price of the call. In such a case, the calculation will not be affected by which option is assumed to be exercised first.)

Since all options in years 10 and later are calls, the date at which the present value of payments is lowest can be treated as a maturity date. If the preferred share remains outstanding to year 10, the issuer will obtain the lowest present value of payments under the initial and stress scenarios if it redeems the share at the following year-ends:

	Initial scenario	**Scenario 1**	**Scenario 2**	**Scenario 3**	**Scenario 4**
Redemption time (N + 1):	10	10	10	23	20
Present value:	108.92	129.54	96.92	84.80	115.78

With t_6 taken to be the optimal calling time for the issuer after year 10, then the present values PV_i under each of the scenarios are as follows:

	t_i	Initial scenario	Scenario 1	Scenario 2	Scenario 3	Scenario 4
PV_1 (put)	3	103.22	110.51	96.67	94.31	108.21
PV_2 (put)	5	106.59	118.39	97.21	92.91	113.68
PV_3 (call)	5	107.35	119.23	97.89	93.56	114.49
PV_4 (call)	7	106.75	122.25	95.83	89.59	114.79
PV_5 (put)	8	106.87	124.05	95.51	88.27	115.09
PV_6 (call)	$N + 1$	108.92	129.54	96.92	84.80	115.78

The values of W_i are then:

	t_i	Initial scenario	Scenario 1	Scenario 2	Scenario 3	Scenario 4
W_1 (put)	3	106.75	119.23	97.21	94.31	114.49
W_2 (put)	5	106.75	119.23	97.21	92.91	114.49
W_3 (call)	5	106.75	119.23	95.83	88.27	114.49
W_4 (call)	7	106.75	122.25	95.83	88.27	114.79
W_5 (put)	8	108.92	129.54	96.92	88.27	115.78
W_6 (call)	$N + 1$	108.92	129.54	96.92	84.80	115.78

Consequently, in the initial scenario, the share is valued on the assumption that it will be redeemed (called) at the end of year 7, in scenarios 1 and 4 it is valued assuming that it will be redeemed (called) at the end of year 5, in scenario 2 it is valued assuming that it will be retracted (put) at the end of year 5, and in scenario 3 it is valued assuming that it will be retracted (put) at the end of year 3.

5.1.3.8 Non-fixed income investments

Non-fixed income (NFI) investments include any assets that do not have contractually guaranteed cash flows. Examples of such assets include equities and infrastructure investments without contractually fixed cash flows. However, real estate, preferred shares and innovative instruments are excluded from the definition of this section, as they are treated separately within the interest rate risk requirement.

In order to approximate the non-interest sensitive component of an NFI investment's dividend stream, 33% of the investment's value[113] is projected as cash flows occurring beyond time zero, while the remaining 67% of the investment's value is maintained as a time zero cash flow. At all integer times $t \geq 1$, a cash flow of the following proportion is projected as a cash flow for year t:

$$\frac{4.1 \times 0.89^t}{D_t}\%$$

where:

D_t is the initial scenario discount factor from time t to time zero.

5.1.3.9 Pooled funds – Index-linked products

If the index-linked product risk requirement is used (refer to section 5.5), liability cash flows must match asset cash flows in each scenario. However, minimum interest rate guarantees must be reflected if they are higher than the asset cash flows.

If the index-linked product risk requirement is not used, the liability cash flows must be the same as those used in the financial statement valuation. If minimum interest guarantees do not apply, the account value must be included as a cash flow at time zero. Cash flows from the portion of investment management fees used to cover investment expenses and other administration costs must be included in both asset and liability cash flows.

5.1.3.10 Pooled funds – Products without direct risk pass-through

Where the account value of a contract is linked to a bond fund but does not vary directly with the fund's value, the cash flows of the fund must be projected so that the value of the fund changes appropriately in response to the change in interest rates under each scenario.

For mutual funds or pooled funds holding assets without fixed cash flows (e.g., equities and real estate), insurers must treat the funds according to the type of assets that the funds hold. For example, equity funds must be treated as specified in section 5.1.3.8 and real estate funds must be treated as specified in section 5.1.3.5. If such treatment cannot be applied (e.g., if real estate lease cash flows are not known), the balance sheet value of the fund must be included as a cash flow at time zero.

5.1.3.11 Securitized assets

For securitized assets for which cash flows are fixed, insurers must project the underlying fixed cash flows. For securitized assets for which cash flows are not fixed, insurers must use the balance sheet value as a cash flow at time zero.

113 For hedged equity positions receiving a credit under section 5.2.4, the delta equivalent value of the hedged position must be used as the investment value.

5.1.3.12 Items included in Available Capital

Items that qualify for recognition in Available Capital under Chapter 2 must be excluded from the projection of liability cash flows. Such items include capital instruments that the insurer has issued itself (e.g., preferred shares and subordinated debt) that qualify as Available Capital, and liability accounts that are recognized in Available Capital (refer to sections 2.1.1 and 2.2.1).

5.1.3.13 Interest rate and currency swaps

The cash flows projected for interest rate and currency swaps consist of three components:

- All cash flows due to be paid or received under any fixed legs of the swap;
- Cash flows at the maturity of the swap calculated as notional amounts of any fixed legs of the swap, unless these have already been projected in the previous component. If an insurer makes payments on a fixed leg of the swap, the notional amount must be projected as a cash outflow at maturity, and if the insurer receives fixed payments, the notional amount must be projected as a cash inflow.
- Cash flows at time zero equal to the notional amounts of any floating legs of the swap. If an insurer makes payments under a floating leg of the swap, the notional amount must be projected as a cash outflow at time zero, and if the insurer receives floating payments, the notional amount must be projected as a cash inflow.

5.1.3.14 Other interest rate derivatives

Interest rate derivatives other than swaps must be included as an asset or liability cash flow at time zero in all scenarios. In each scenario, the time zero cash flow for the derivative is equal to the derivative's fair value under the scenario's risk-free interest rates. Stressed fair values must be calculated assuming no change in underlying interest rate volatility.

5.1.3.15 Reverse mortgages and collateral loans

Cash flows for reverse mortgages and collateral loans with fixed interest rates are projected using Best Estimate Assumptions (including mortality assumptions). If the assets have variable interest rates, then they are shown as time zero cash flows. If an insurer's model used for valuation in its financial statements is able to project variable interest assets accurately, asset cash flows can be updated in each interest rate scenario.

5.1.3.16 Contract loans

Cash flows for contract loans with interest rates that are fixed or subject to guaranteed maximums must be projected using mortality and lapse assumptions that are consistent with those used in the valuation of the related contracts. For variable rate contract loans that are not subject to guaranteed maximums, the loan amounts must be reported as time zero cash flows.

5.1.3.17 Investment income taxes

Projected cash flows must include cash flows arising from investment income taxes that are projected for purposes of the financial statement valuation.

5.1.3.18 Dynamic assumptions tied to interest rates

If an insurer uses dynamic assumptions that vary with interest rates (e.g., for lapses) to project insurance cash flows for the financial statement valuation, the liability cash flows projected in the interest rate initial scenario and stress scenarios must reflect these assumptions (i.e., the assumptions that are set dynamically for each interest rate scenario must vary to be consistent with the scenario).

5.1.3.19 Cash flows tied to inflation

Cash flows projected for expenses, and for benefit payments related to cost-of-living adjustments must take account of the impact of an inflation assumption that varies in accordance with each scenario. Inflation rates must maintain the same relation to risk-free interest rates as that used for the financial statement valuation. For example, if an insurer generates inflation rates dynamically for the financial statement valuation, the same generator must be used to produce inflation rates under the initial scenario and stress scenarios that are consistent with these scenarios.

5.1.3.20 Assets replicated synthetically

The cash flows projected for assets replicated synthetically (refer to section 5.2.3), including non-fixed income assets, must be the same as those of the replicated assets.

5.1.3.21 Other financial instruments

The projection of cash flows for liabilities that are classified as financial instruments in the financial statements and that are not covered in previous sections depends on whether the policyholder has an option to redeem. If the instrument is not redeemable, the insurer must project the same cash flows as those used for the financial statement valuation. If the instrument is redeemable at the option of the policyholder, the cash flows must be projected under the initial and stress scenarios to the redemption date for which the present value of the cash flows, discounted at the scenario's rates, is highest. In particular, the balance sheet value of deposit-type liabilities must be treated as a time zero cash flow.

5.1.3.22 Universal life insurance

For most products, only contractual cash flows are projected, and there must be no reinvestment assumptions. Universal life ~~(UL)~~ is an exception, as the contract continues after the end of any interest guarantee period in the investment account. It is therefore necessary to use a reinvestment assumption to generate credited rates under the initial and stress scenarios that are used to project cash flows for premiums, contract charges and benefits, and expenses. The reinvestment assumptions and credited rates must vary appropriately with the scenario that is being tested, including the initial scenario.

The insurer must use Initial and Stress Scenario Discount Rates (refer to sections 5.1.1 and 5.1.2) for discounting ~~UL~~ cash flows. The relation between the restated credited rates for CARLI purposes and the CARLI discount rates under each scenario must be consistent and maintain the same relationship as exists between actual credited rates and the discount rates for financial statement valuation purposes.

If the performance of a universal life contract inside-account benefit is tied to the performance of specific assets and these assets are held by the insurer, then the cash flows on these assets and liabilities must be included with the cash flows of other index-linked products (refer to section 5.5). If matching assets are not held, then the cash flows must be projected using assumptions that are consistent with those used for the financial statement valuation and then adjusted according to the scenario being tested.

5.1.3.23 Interest rate guarantees

Where a non-participating contract has minimum interest rate guarantees (e.g., a universal life insurance contract), all guarantee payments must be projected under the initial and stress scenarios. The market consistent value of guarantees in excess of projected guarantee payments (i.e., the time value of the guarantees) must be excluded from cash flows.

The cost of guarantees for participating products and adjustable products other than universal life insurance products must be excluded from projected cash flows.

5.2 Equity risk

Equity risk is the risk of economic loss due to potential changes in the prices of common shares and their derivatives. It includes both the systemic and specific components of equity price fluctuation.

5.2.1 Common shares

Required capital for all investments classified as common equities (including equity index securities, managed equity portfolios, income trusts, limited partnerships that are not for the purpose of managing property, and interests in joint ventures) must be calculated by applying a factor to the market value of the investment. The base factor is 35% for equities in developed markets, and 45% for equities in other markets. The base factor is increased by 5 percentage points (e.g., to 40% or 50%) if:

- the equities are not listed on a recognized public exchange (e.g., private equity);
- the insurer's ownership interest in the equities constitutes a substantial investment (refer to section 1.5.2) without control.

Common Shares	
35%	Investment in listed equities in developed markets that does not constitute a substantial investment

Common Shares	
40%	Investment in non-listed equities in developed markets or that constitutes a substantial investment
45%	Investment in listed equities in other markets that does not constitute a substantial investment
50%	Investment in non-listed equities in other markets or that constitutes a substantial investment

The factor for a substantial investment must apply to the value of the investment minus the amount of associated goodwill and other intangible assets deducted from Gross Tier 1 Capital in accordance with section 2.1.2.1.

Developed markets include countries listed as developed markets by at least two of the five following data providers: Dow Jones & Company, FTSE Group, MSCI Inc., Russell Investments and Standard and Poor's.

Substantial investments in mutual fund entities that do not leverage their equity by borrowing in debt markets, and that do not otherwise leverage their investments, do not receive equity risk factors for substantial investments. Instead, a capital charge on the assets of the mutual fund entity will apply based on the requirements of section 5.4. For example, the factors for substantial investments do not apply where the insurer has made a substantial investment in a mutual fund as part of a structured transaction that passes through the unaltered returns (i.e., no guarantee of performance) on the substantial investment to the mutual fund holder.

The treatment of offsetting long and short positions in identical or closely correlated equities is described in section 5.2.4.

5.2.2 Preferred shares

Required capital for a preferred share depends on its rating category. It is calculated by applying the appropriate factor shown in the table below to its market value.

Rating Category	Factor
P1	3%
P2	5%
P3	10%
P4	20%
P5 and unrated	Common equity risk factor

For investments in capital instruments issued by Canadian or foreign financial institutions, other than common or preferred shares, that qualify as capital according to the solvency standards of the financial institution's home jurisdiction (e.g., subordinated debt), the applicable factor is the higher of:

1. the preferred share factor associated with:
   a. the rating of senior unsecured issues, or
   b. if the issuer does not have a senior unsecured rating, the highest rating assigned to its outstanding unsecured debt obligations
2. the credit risk factor defined in section 3.1 associated with the capital instrument's rating and maturity.

Refer to Appendix 5-A for the correspondence between the rating categories used above and those of individual rating agencies. Section 3.1.1 sets out the requirements related to the use of ratings.

5.2.3 Assets replicated synthetically and derivatives

This section describes ~~the amount of~~ required capital ~~required~~ for transactions that increase an insurer's exposure to market risk and for which the full notional amount of the transaction may not be reported on the balance sheet, such as transactions undertaken through derivatives or reinsurance. The insurer must calculate required capital based on the full exposure amount and underlying risk assumed under these transactions, irrespective of whether they are recognized or how they are reported on the balance sheet.

~~This section applies to assets matching liabilities of segregated fund guarantees, with the exception of assets that clearly serve to hedge an insurer's segregated fund guarantee risk as part of an AMF-authorized hedging strategy (refer to section 7.2.8).~~ No additional capital is required under this section for hedges of index-linked liabilities that have been taken into account in the correlation factor calculation in accordance with section 5.5.

The requirements in this section are distinct from the requirements for counterparty default risk resulting from off-balance sheet items. Requirements for potential replacement costs described in section 3.1 and in Chapter 4 also apply to transactions described in this section.

5.2.3.1 Short positions in equities

R~~The~~ equired capital ~~required~~ for a short position in any equity security or index that does not wholly or partially offset a long equity position is the same as that for a long position of the same magnitude. Positions eligible for offset recognition and the corresponding treatment are described in section 5.2.4.

5.2.3.2 Futures and swaps

The capital requirement for a futures position in any security or index is the same as that for the equivalent spot position. It must be reported as if the position were current. The capital requirement for a swap is the same as that for the series of future contracts that replicates the swap.

Example: Futures and swaps

1) An insurer has entered into a futures contract to purchase equity securities on a future date. The insurer must report an equity exposure in an amount equal to the total current market value of the equities underlying the futures contract.

2) An insurer has entered into a one-year swap during which it will pay the total return (coupons and capital gains) on a 10-year Government bond, and receive the return on a notional index of equities that was worth $100 at the time of the transaction. The index of equities is currently worth $110. The insurer must report an equity risk exposure of $110 for the long position in the index, and liability cash flows in the interest rate risk calculation for the short position in the bond.

5.2.3.3 Options on equities

The methodology to be used to determine the capital requirement for equity options that have been purchased and options that have been sold is described below. This methodology must not be applied to equity options embedded in products sold to policyholders. The market risk capital requirement for contracts containing an equity option component must be calculated using the methodology for index-linked products (refer to section 5.5) or segregated fund guarantees (refer to Chapter 7) according to the product.

The required capital ~~required~~ for an option (or a combination of options in the same underlying equity) is determined by constructing a two-dimensional matrix of changes in the value of the option position under various market scenarios, using the same valuation model that is used for financial reporting purposes. The first dimension of the matrix requires an insurer to evaluate the price of the option position over a range covering the risk requirement of equities above and below the current value of the underlying stock or index, divided into equally spaced intervals with at least seven observations (including the current observation). The second dimension of the matrix entails a change in the volatility of the underlying stock or index equal to ±25% of its current volatility. Required capital for the option position is then equal to the largest decline in value calculated in the matrix. The application of the method and the detailed description of the analysis carried out must be disclosed in the Capital Guideline Certification Report.[114]

As an alternative to constructing a scenario matrix for a purchased option, the insurer may deduct the carrying amount of the option from Tier 1 Available Capital.

Example: Options on equities

[114] The insurer must be able to demonstrate a detailed understanding of the valuation model used to construct the scenario matrix. The model must be independently reviewed and tested on an ongoing basis to the AMF's satisfaction. Market prices, volatilities and other inputs to the valuation model must be subject to review by an objective and qualified person who is not close to or otherwise involved in the transactions or have related decision-making authority. An insurer that does not apply the matrix method to AMF's satisfaction is required to deduct 100% of the carrying amount of the purchased option from its Tier 1 Available Capital.

An insurer has sold a call option on a publicly listed Canadian stock. The stock now has a market value of $100 and volatility of 20%. The first dimension of the matrix must range from $65 to $135, divided into six intervals of $11.67 each, and the second dimension must assume that volatility stays at 20%, increases to 25% (= 20% + 25% x 20%) or decreases to 15% (=20% - 25% x 20%). If the change in the value of the insurer's option position under the various market scenarios is as in the table below, then the required capital for the option is $25.83.

Gain (loss) due to change in option value

	Stock price						
Volatility	**$65.00**	**$76.67**	**$88.33**	**$100.00 (current)**	**$111.67**	**$123.33**	**$135.00**
15%	$10.36	$9.65	$7.11	$1.86	($5.78)	($14.85)	($24.54)
20% (current)	$10.01	$8.59	$5.36	$0.00	($7.21)	($15.72)	($24.99)
25%	$9.37	$7.31	$3.58	($1.89)	($8.85)	($16.96)	($25.83)

5.2.3.4 Equity-linked notes

The balance sheet carrying amount of an equity- or index-linked note must be decomposed into the sum of a fixed-income amount (equivalent to the present value of the minimum guaranteed payments under the note), and an amount representing the value of the option embedded within the note. The fixed-income portion of the note must be classified as a debt exposure, with the required capital ~~required~~ based on the rating and the maturity of the note, and the residual amount must be treated as an equity option.

Example: Equity-Linked Note

An insurer purchases an A-rated equity-linked note from a Canadian bank for $10,000. The note promises to pay, in two years, the $10,000 purchase price of the note plus the purchase price times 65.7% of the percentage appreciation (if positive) of the S&P 500 index over the term of the note. The insurer uses the Black-Scholes option valuation model for financial reporting purposes. The implied volatility of the stock index is 25%, the yield curve is flat, the annual risk-free rate is 5%, and the issuing bank's annual borrowing rate is 6.5%. The total required capital for this note is ($88.17 + $1,118.92 + $17.09 =) $1,224.18, the sum of the following three requirements:

1. Bond requirement

   The value of the fixed-income component of the note is $\$10{,}000/(1.065)^2 = \$8{,}816.59$. The credit risk component, based on the note's two-year term and A rating, is 1% of this amount, or $88.17.

2. Option requirement

The value of the call option embedded within the note, taking into account the credit risk of the issuer, is the residual amount, namely $1,183.41. In the option scenario table, the greatest loss will occur if the value of the index declines by 35% at the same time as the index volatility declines to 18.75%. This represents a decline $1,118.92 in the value of the option, which is the capital requirement for the option.

3. Counterparty credit risk requirement (per Chapter 4)

The exposure amount for the option is calculated under the current risk assessment method as follows:

Positive mark-to-market + Factor × Notional

= $1,183.41 + 8% × $6,570

= $1,709.01

Since the note has an A rating, the capital requirement is 1% of the current exposure amount, or $17.09.

5.2.3.5 Convertible bonds

~~The~~ Required capital ~~required~~ for a convertible bond is equal to the sum of the credit risk requirement for the bond's fixed-income component plus the equity option requirement for the bond's embedded warrant. Required capital for the fixed-income component is equal to the bond's credit risk factor (based on its rating and maturity) multiplied by the present value of the minimum guaranteed payments under the bond. The capital ~~required~~ requirement for the embedded warrant must be calculated using the scenario table method (refer to section 5.2.3.3) for options on equities, where the gains and losses are based on either the change in value of the bond's warrant component (if the valuation method assigns an explicit value to this component) or the change in value of the whole bond.

As an alternative, the insurer may classify the entire balance sheet value of the convertible bond as an equity exposure and calculate required capital for the bond by applying the market risk factor for equities to the bond's value.

5.2.4 Recognition of equity hedges

Equity or option hedges ~~Hedgings~~ of ~~equity or option positions backing~~ equity positions may be recognized if they meet the conditions of this section. However, they may not be recognized if they are ~~:~~

backing index-linked product ~~policy~~holder liabilities for which a factor is calculated under section 5.5. ~~; or~~

- ~~used in the context of a hedging strategy for segregated fund guarantees when the insurer uses the method with the strategy recognition presented in section 7.2.8.~~

Also, such ~~offsetting~~ hedges may only be recognized if the party providing the hedge is an eligible guarantor as defined in section 3.3.4.

5.2.4.1 Offsetting long and short positions in equities

Identical reference assets

Long and short positions in the same underlying equity security or index may be considered as offsetting positions. In this case, a capital requirement amount must be held only for the net position.

Closely correlated reference assets

Where underlying securities or indexes associated with long and short positions of equal amounts are not exactly the same, but are closely correlated (e.g., a broad stock index and a large capitalization sub-index), the insurer must apply the correlation factor method described in section 5.5.2. The capital requirement for the combined position is equal to the multiplication of F by the amount of the long position. If the insurer has not held a short position over the entire period covered in the correlation factor calculation, but the security or index underlying the short position has quotations that have been published at least weekly for at least the past two years, the insurer may perform the calculation as if it had held the short position over the entire period. However, returns for actively managed short positions may not be inferred for periods in which the positions were not actually held, and mutual funds that are actively managed externally may not be recognized as an offsetting short position in an inexact hedging relationship.

As an alternative, the insurer may choose to apply the appropriate factor for the common shares according to section 5.2.1 to the total amount of the long position and to the total amount of the short position. The details of the calculation must be included in the Capital Guideline Certification Report.

5.2.4.2 Recognition of option hedges

Identical reference assets

If an option’s reference asset is exactly the same as that underlying an equity position held, the insurer may exclude the equity holding in calculating the required capital ~~required~~ for its equity exposures and instead consider the combined change in value of the equity position with the option in constructing the scenario table (refer to section 5.2.3.3).

Closely correlated reference assets

If an option’s reference asset is not exactly the same as that underlying an equity position, but is closely correlated with the equity, then the required capital factor for offsetting long and short positions in the option’s reference asset and the asset underlying the equity position must be calculated as described in section 5.2.4.1. The insurer may then exclude the equity holding from its capital requirement for equity exposures and instead calculate the combined change in value of the equity position with the option in constructing the scenario table (refer to section 5.2.3.3). However, the movement in the option's reference asset under each scenario must be assumed to be higher or lower (whichever produces a lower value for the option position) than the movement of the equity, by an amount equal to the capital requirement for directly offsetting positions. No additional adjustments need be made to the assumed changes in asset volatilities under the scenarios to account for asset mismatch. The details of the calculation must be included in the Capital Guideline Certification Report.

Example: Option Hedges

An insurer has a long position in a main equity index in a developed market, and also owns a call option and a put option on different indexes that are closely correlated with the main index. The highest factor *F* over the previous four quarters between the reference index of the call option and the main index, calculated per section 5.5.2, is 3%, and the highest factor *F* calculated over the previous four quarters between the reference index of the put option and the main index is 1%. The insurer would therefore construct a scenario table in which the price of the main index ranged from 35% below to 35% above its current value, while the index underlying the call option ranged from 38% below to 32% above its current value, and the index underlying the put option ranged from 34% below to 36% above its current value. In the scenarios in the centre column of the table, the main index will remain at its current value, while the index underlying the call option will be 3% lower than currently and the index underlying the put option will be 1% higher than currently.

Note that for short option positions, the direction of the adjustment to account for correlation will be opposite to that of a long option position. Thus, if the insurer had sold the call and put options instead of purchasing them, the index underlying the call would range from 32% below to 38% above its current value in the scenario table, and the index underlying the put would range from 36% below to 34% above its current value.

5.3 Real estate risk

Real estate market risk is the risk of economic loss due to changes in the amount and timing of cash flows from investment property, and holdings of other property, plant and equipment. This requirement also applies to investments as a limited partner in limited partnerships for the purpose of property management, as if the insurer directly owned the properties held by the limited partnership.

The capital requirement for investment property that is leased, or for holdings of other property, plant and equipment that are leased is determined in the same manner as the requirements for assets that are owned. The balance sheet value used for leased assets is the associated balance sheet value of the right of use asset, determined in accordance with relevant accounting standards.

5.3.1 Investment property

The carrying amount of investment property is divided into two components: leases in force and the residual value of the property. For leases in force, the capital requirement is calculated for credit risk (refer to section 3.1.9.2) and for interest rate risk (refer to section 5.1). The exposure amount used to determine the credit risk requirement is the present value of the contractual lease cash flows, including projected reimbursements for operating expenses paid by the lessor, discounted using the Initial Scenario Discount Rates specified in section 5.1.1. The residual value of the investment property is defined as its balance sheet value at the reporting date minus the present value of the fixed cash flows that are contractually expected to be received in accordance with section 5.1.3.5, but including prepaid rent cash flows. Required capital for the residual value of the property is calculated by applying a factor of 30% to this value.

The details of the calculations and factors used must be included in the Capital Guideline Certification Report.

5.3.2 Other property, plant and equipment

For owner-occupied property,[115] required capital[116] is calculated as the difference (if positive) between their value for CARLI purposes and 70% of their fair market value at the reporting date, where their value for CARLI purposes is as follows:

- the moving-average value immediately prior to conversion to IFRS net of subsequent depreciation (if reported) for properties acquired before conversion to IFRS; or
- the original acquisition cost net of subsequent depreciation (if reported) if the property was acquired after conversion to IFRS.

For all other property not having contractually guaranteed cash flows, including oil and gas properties, timberland, and agricultural properties, required capital is calculated as the difference (if positive) between the balance sheet value at the reporting date, and 70% of the property's fair value at the same date.

If the fair value of any property is not available, then required capital is 30% of the property's balance sheet value. The capital requirement must be calculated individually for each property.

The capital charge for plant and equipment is 30% of the balance sheet value.

[115] If the insurer leases a portion of a property it occupies to a third party, it may treat the lease in the same manner as a lease on an investment property.

[116] If, under IAS 16, an insurer elects to measure owner-occupied properties on a fair value basis, the properties must be treated as investment properties for CARLI purposes. Required capital for real estate risk must be calculated according to section 5.3.1 of the Guideline with zero value for the leases in force component.

The details of the calculation must be included in the Capital Guideline Certification Report.

5.4 Mutual funds

The factor for investments in unleveraged[117] mutual funds,[118] exchange traded index funds, segregated funds and real estate investment trusts is a weighted average of the market and credit risk factors for the assets that the fund is permitted to invest in. The weights and factors are calculated assuming that the fund first invests in the asset classes attracting the highest capital requirement, to the maximum extent permitted in its prospectus or Annual Information Form (where more current). It is then assumed that the fund continues allocating investments to asset classes in declining order of capital charge, to the maximum extent permitted, until a total allocation of 100% is reached. The factor for the mutual fund is then the sum of the products of the weights and risk factors for the assumed investment allocation.

Insurers may calculate credit and market risk factors for exchange-traded funds using the underlying exposures if the following conditions are met:

1. there is sufficient and frequent information provided to the insurer regarding the underlying exposures of the fund; and
2. such information is verified by an independent third party.

In the absence of specific limits to asset classes or if the fund is in violation of the limits stated in the prospectus or Annual Information Form, the entire fund is subject to the highest risk charge applicable to any security that the fund holds or is permitted to invest in.

Funds that employ leverage are treated as equity investments and receive the equity risk factor corresponding to the fund under section 5.2.1.

The details of the calculations and factors used must be disclosed in the Capital Guideline Certification Report.

[117] Leveraged funds are those that issue debt/preferred shares, or that use financial derivatives to amplify returns. Funds that employ an insignificant amount of leverage for operational purposes, in a manner not intended to amplify returns, may be considered as unleveraged funds.

[118] If the insurer's consolidated balance sheet includes an unleveraged mutual fund entity reported and the investment in the entity is not deducted from Available Capital, the requirements of this section apply to the portion of the fund for which returns are retained for the insurer's own account. The capital requirements of this section do not apply to the portion of funds for which the insurer can demonstrate to the AMF's satisfaction: (1) that the policyholders or external investors are the owners; (2) the existence of a contractual obligation to transfer all of the returns; and (3) that the insurer is able to track and distinguish these units from units held for its own account. The portion of funds to which the capital requirements of this section do not apply is subject to the risk requirements related to index-linked products in section 5.5.

5.5 Index-linked products risk

5.5.1 Scope of application

The credit risk factors in section 3.1 and market risk charges in sections 5.2 to 5.4 do not apply to assets backing index-linked products. These assets must be segmented and included in the appropriate page of the CARLI form. They receive factors based on the historical correlation between weekly asset and liability returns in section 5.5.2.

The correlation factor calculation may be used for index-linked products, such as universal life contracts, having the following characteristics.

- Both assets and liabilities for these contracts are held in the general fund of the insurer.
- The contract specifies a particular return to which the policyholder has a right. The return is based on an index, possibly subject to a floor. The following are examples of such returns:
    - ➢ the same return as a specified public index. This includes, but is not limited to, a public stock index, a bond index, an index maintained by a financial institution, etc.
    - ➢ the same return as is earned by one of the insurer's segregated funds or mutual funds;
    - ➢ the same return as is earned by another company's mutual funds.
- The insurer may invest in assets that are not the same as those that make up the indexes.

The following conditions must be met.

1. All assets backing index-linked products must be segmented into asset subgroups.
2. A separate asset subgroup is maintained for each index referred to in the products.
3. The returns (on a market basis) of each asset subgroup are tracked.
4. Any transfers into or out of the asset subgroup must be at market value.

5.5.2 Required capital

The factor *F* applicable to a particular subgroup of assets is obtained by this formula:

$$F = 20 \times (C - B + B \times \sqrt{2 - 2A}\,)$$

where:

- *A* represents the historical correlation between the returns credited to the policyholder funds and the returns on the subgroup's assets;

- *B* corresponds to the minimum between the standard deviation of asset returns and standard deviation of returns credited to policyholder funds;
- *C* corresponds to the maximum between the standard deviation of asset returns and standard deviation of returns credited to policyholder funds;

A factor must be calculated for each asset subgroup.

The historical correlations and standard deviations must be calculated on a weekly basis, covering the previous 52-week period. The returns on the asset subgroups are measured by the increase in their market value net of policyholder cash flows.

The factor *F* for the previous 52 weeks is required to be calculated each quarter. The capital requirement is equal to the product of applying the highest of the four factors calculated over the previous four quarters to the fair value at quarter end of the assets in the asset subgroup.

Instead of using policyholder funds in the calculations, the insurer may use cash surrender values or insurance contract liabilities to measure the correlation. The basis used must be consistently applied in all periods.

Credit risk and market risk factors must be applied to assets backing:

- index-linked products that are not segmented into asset subgroups;
- Index-linked products for which *F* cannot be calculated;
- newly formed funds for the first three quarters. Taking account of the requirement to use the highest quarterly factors calculated for the latest four quarters, this entails that the requirement corresponds to that of the underlying assets for the first 18 months of the newly formed funds.

As a simplification, the insurer may choose to apply the common equity factor from section 5.2.1, corresponding to the assets listed above.

Where a synthetic index investment strategy is used, there is some credit risk that is not directly borne by the policyholder. This may include credit risk associated with fixed income securities and counterparty risk associated with derivatives that are purchased under the synthetic strategy. The required capital for these credit risks must be held by the insurer, in addition to the index-linked requirements in this section.

For index-linked products that have a minimum death benefit guarantee, the requirement for segregated fund mortality guarantees must be applied. This requirement may be obtained using the methodology described in Chapter 7.

5.6 Currency risk

Currency risk is the risk of economic loss due to changes in the amount and timing of cash flows arising from changes in currency exchange rates. Three steps are required to calculate required capital for currency risk. The first is to measure the exposure in each currency position. The second is to calculate the required capital for the portfolio of positions in different currencies, which is 30% of the sum of the following amounts:

- the greater of (i) the sum of the net open long positions in each currency and (ii) the sum of the net open short positions in each currency;
- the net open position in gold,[119] whatever the sign.

A charge is then added for currency volatility, if applicable. In the final step, the total currency risk requirement is allocated to participating and non-participating blocks in each geographic region.

5.6.1 Measuring the exposure in a single currency

The net open position in each individual currency (including gold) is calculated by summing:

- the net spot position, defined as all asset items less all liability items denominated in the currency under consideration, including accrued interest and accrued expenses but excluding expected losses for currency risk held within insurance contract liabilities. The net spot position is calculated net of all reinsurance (i.e., all liability cash flows are net of cash flows from all reinsurance contracts held and all cash flows from reinsurance contracts held are excluded from asset cash flows);[120]
- the net forward position (i.e., all net amounts under forward foreign exchange transactions, including currency futures and the principal on currency swaps);
- guarantees (and similar instruments) that are certain to be called and are likely to be irrecoverable;
- future income and expenses not yet accrued but already fully hedged by the insurer (refer to section 5.6.5);
- an offsetting short position[121] of up to 120% of the individual capital requirement for assets and liabilities denominated in the currency under consideration. The percentage amount may be selected by the insurer and may vary by currency. The individual capital requirement for business denominated in a specific currency must be calculated by aggregating all requirements arising from assets and liabilities in the currency, with:
    - all requirements for currency risk excluded;
    - the requirement for insurance risk calculated net of all reinsurance; and

[119] Gold is treated as a foreign exchange position rather than a commodity because its volatility is more in line with that of foreign currencies.

[120] Liability cash flows are net of cash flows from liabilities ceded under funds withholding reinsurance contracts, and liabilities due to reinsurers under funds withholding reinsurance contracts are included in liability cash flows.

[121] An approximation may be used under section 1.4.5.

- ➢ taking account of all credits for within-risk diversification, between-risk diversification, and participating and adjustable products applicable to the aggregated requirements (refer to Chapters 9 and 11);
- any other item representing a profit or loss in foreign currencies.

Example: Currency Risk Offset

Suppose that a life insurer has the following asset and liability positions:

Currency	Value of Assets Denominated in Foreign Currency (CAD)	Value of Liabilities Denominated in Foreign Currency (CAD)
USD	1,000	500
EUR	210	200
GBP	300	400
JPY	0	0
Other currencies	400	200
Total	**1,910**	**1,300**

Currency	Individual capital requirement
USD	37.50
EUR	10.00
GBP	12.50
JPY	-
Other currencies	15.00
Total	**75.00**

The offset is defined as a short position of up to 120% of the individual capital requirement in each currency. In this example, the USD individual capital requirement is 37.50, so the maximum eligible offset is 120% x 37.50 = 45 for the USD exposure. A 10 offset for the EUR position is used (100% of 10) to reduce the net EUR exposure to zero. The GBP exposure is negative (short position), so no offset is calculated, as any offset would increase the GBP short position. For other currencies, the maximum eligible offset is

120% x 15 = 18. Note that any percentage up to 120% may be used by the insurer to produce the lowest net exposure in each currency.

Currency	Potential Offset
USD	45.00
EUR	10.00
GBP	0
JPY	0
Other currencies	18.00
Total	**73.00**

The following structural positions and related hedges are excluded from the calculation of net open currency positions:

- assets that are fully deducted from the insurer's Available Capital (e.g., goodwill);
- asset and liability positions corresponding to investments in foreign operations that are fully deducted from an insurer's Available Capital (refer to section 2.1.2).

5.6.2 Treatment of options

If an insurer has purchased or sold options on a foreign currency, it must perform the scenario table calculation described in section 5.2.3.3, where the changes in value measured are those of the net open position in the currency and the options combined, and where the range of values used for the currency in the table is 30% above and below its current value, instead of 35%. The magnitude of the net open position in the currency after adjusting for options is then equal to 3.33 times the largest decline in value that occurs in the middle row of the table. If this decline occurs in a column where the value of the currency decreases, then the position is treated as a long position, and if the decline occurs in a column where the value of the currency increases, then the position is treated as a short position.

If the largest decline in the entire scenario table is greater than the largest decline in the middle row, then the difference represents the required capital for volatility in foreign currencies, and this amount is added to the capital requirement for currency risk.

5.6.3 Treatment of immaterial operations

Currency risk is assessed on a consolidated basis. It may be technically impractical to include some currency positions in the case of immaterial operations. In such cases, the internal limit in each currency may be used as a proxy for the positions, provided there is adequate ex post monitoring of actual positions complying with such limits. In these circumstances, the amount of the limits must be added to the net open position in each currency, regardless of sign.

5.6.4 Measurement of forward currency positions

Forward currency positions must be valued at current spot market exchange rates. It is not appropriate to use forward exchange rates since they partly reflect current interest rate differentials. Insurers that base their normal management accounting on net present values are expected to use the net present values of each position, on the basis of current interest rates and translated at current spot rates for measuring their forward currency and gold positions.

5.6.5 Accrued and unearned interest, income and expenses

Accrued interest, income receivable and expenses payable are treated as a position if they are subject to currency fluctuations. Unearned but expected future interest, income or expenses may be included, provided the amounts are certain and have been fully hedged by forward foreign exchange contracts. Insurers must be consistent in their treatment of unearned interest, income and expenses and have written policies covering the treatment. The selection of positions that are only beneficial to reducing the overall position is not permitted.

5.6.6 Calculating required capital for the portfolio

The nominal amount (or net present value) of the net open position in each foreign currency and gold is converted at spot rates into Canadian dollars. Required capital is equal to 30% of the overall net open position, calculated as the sum of:

- the greater (in absolute values) of the sum of the net open short positions or the sum of the net open long position less offsets;
- the net open position (short or long) in gold, (regardless of sign).

Required capital is increased by the total of the volatility risk charges for each foreign currency, if any, to arrive at the final total required capital.

Example: Currency risk requirement for a portfolio

An insurer has the following net currency positions. These open positions have been converted at spot rates into Canadian dollars. The (+) sign signifies an asset position and the (-) sign signifies a liability position. These positions include the value of options for which the capital requirement for currency volatility is 10.

JPY	EUR	GBP	CHF	USD	GOLD
+50	+100	+150	-20	-180	-35
	+300		-200		-35

In this example, the insurer has long positions in three currencies (yen, euro and the British pound), short positions in two currencies (the Swiss Franc and the United States Dollar) and one short position in gold. The middle line of the above chart shows the net open positions in each of the currencies and in gold. The sum of the long positions on currencies is +300 and the sum of the short positions is -200.

The foreign exchange capital requirement is calculated using the higher of the summed absolute values of either the net long or short positions, and the absolute value for the position in gold. The factor used is 30%. In this example, the total long position (300) would be added to the gold position (35) to give an aggregate position of 335. This result is then multiplied by 30%, which gives a capital requirement of $100.50. Finally, the capital requirements for currency volatility of 10 is added to this amount, resulting in an aggregate capital requirement of $110.50.

5.6.7 Allocation of the capital requirement for a portfolio

After the aggregate currency risk capital requirement has been calculated, it is allocated by geographic region in proportion to the contribution of the region's net long or net short currency positions (whichever is used to determine the capital requirement) to the aggregate currency risk capital requirement. Within a geographic region, the capital requirement is allocated between par and non-par blocks in proportion to the share of the liabilities in the region.

Example: Allocation of aggregate currency risk capital requirement

Continuing the example from the previous section, the aggregate capital requirement of $110.50 is allocated to Japan, Europe (other than the UK) and the United Kingdom as follows:

- Japan: 50/300 × $110.50 = $18.42
- Europe (other than the UK): 100/300 × $110.50 = $36.83
- United Kingdom: 150/300 × $110.50 = $55.25

Since the aggregate requirement is determined from the long positions rather than the short positions, the short position in Swiss francs does not result in any additional allocation to Europe (other than the UK), and none of the capital requirement is allocated to the United States.

If the United Kingdom has a non-participating block and two participating blocks for which liabilities are the following:

- Non-participating: 800
- Participating block 1: 300
- Participating block 2: 400

then the $55.25 capital requirement allocated to the United Kingdom is reallocated as follows:

- Non-participating: $29.47
- Participating block 1: $11.05
- Participating block 2: $14.73

5.6.8 Unregistered reinsurance

A separate requirement calculation must be performed for each set of liabilities that is backed by a distinct pool of assets under unregistered reinsurance contracts. The defining characteristic of a pool is that any asset in the pool is available to pay any of the corresponding liabilities. Each calculation must take into consideration the ceded liabilities and the assets supporting the credit available under section 10.3.1, including any excess deposits. If some of the assets supporting the ceded liabilities are held by the ceding insurer (e.g., funds withheld coinsurance), the insurer's corresponding liability must be treated as an asset in the calculation of the open positions for the ceded business. If the ceded liabilities are denominated in a foreign currency, this currency must be used as the base currency in the requirement calculation (the Canadian dollar is then treated as a foreign currency).

The currency risk requirement for each set of ceded liabilities is added to the insurer's own requirement, without netting open positions between ceded business and the insurer's retained business, or between different sets of ceded business.

5.6.9 Foreign exchange de minimis criteria

An insurer doing negligeable business in foreign currency and that does not take foreign exchange positions for its own account may be exempted from currency risk requirements provided that:

- its foreign currency business (i.e., the greater of the sum of its gross long positions and the sum of its gross short positions in all foreign currencies) does not exceed 100% of its total Available Capital; and
- Its overall net open foreign exchange position does not exceed 2% of total Available Capital.

Any exemption must be justified in the Capital Guideline Certification Report.

Appendix 5-A: Rating mappings

Preferred Share Rating							
Rating Category	**DBRS**	**Fitch**	**Moody's**	**S&P**	**KBRA**	**JCRA**	**R&I**
P1	Pfd-1	AAA to AA-	Aaa to Aa3	P-1	AAA to AA-	AAA to AA-	AAA to AA-
P2	Pfd-2	A+ to A-	A1 to A3	P-2	A+ to A-	A+ to A-	A+ to A-
P3	Pfd-3	BBB+ to BBB-	Baa to Baa3	P-3	BBB+ to BBB-	BBB+ to BBB-	BBB+ to BBB-
P4	Pfd-4	BB+ to BB-	Ba1 to Ba3	P-4	BB+ to BB-	BB+ to BB-	BB+ to BB-
P5	Pfd-5 and D	Below BB-	Below Ba3	P-5	Below BB-	Below BB-	Below BB-

Senior Unsecured Issuer Rating							
Capital Instrument Other Than Common or Preferred Shares Rating Category	**DBRS**	**Fitch**	**Moody's**	**S&P**	**KBRA**	**JCRA**	**R&I**
P1	AAA to AA(low)	AAA to AA-	Aaa to Aa3	AAA to AA-	AAA to AA-	AAA to AA-	AAA to AA-
P2	A(high) to A(low)	A+ to A-	A1 to A3	A+ to A-	A+ to A-	A+ to A-	A+ to A-
P3	BBB(high) to BBB(low)	BBB+ to BBB-	Baa1 to Baa3	BBB+ to BBB-	BBB+ to BBB-	BBB+ to BBB-	BBB+ to BBB-
P4	BB(high) to BB(low)	BB+ to BB-	Ba1 to Ba3	BB+ to BB-	BB+ to BB-	BB+ to BB-	BB+ to BB-
P5	B(high) or lower	Below BB-	Below Ba3	Below BB-	Below BB-	Below BB-	Below BB-

Chapter 6. Insurance Risk

Insurance risk is the risk of loss arising from the obligation to pay out benefits and expenses on insurance and annuity contracts in excess of expected amounts. Insurance risk includes:

- mortality risk on life insurance;
- longevity risk on annuities;
- morbidity risk on disability insurance (DI), short-term disability (STD) and long-term disability (LTD), critical illness (CI), long-term care (LTC), waiver of premium benefits (WP), and accident & sickness insurance (A&S);
- lapse and policyholder behaviour risk;
- expense risk.

Required capital for insurance risk covers the risk that realized insurance experience may be worse than Best Estimate Assumptions (refer to section 1.4.4). Required capital considers adverse experience arising from the following components:

i) misestimation of the level of Best Estimate Assumptions (level risk);

ii) misestimation of the future trend of Best Estimate Assumptions (trend risk);

iii) volatility risk due to random fluctuations;

iv) catastrophe risk due to a one-time, large-scale event.

Capital requirements for insurance risk are determined using a projected cash flow methodology that measures the economic impact of a one-time or multi-year shock to best estimate mortality, morbidity, lapse and expense rate assumptions. If Best Estimate Assumptions consist of multiple sets of assumptions because estimated future cash flows comprise multiple cash flow projections, the shocks must be applied to each set of assumptions, without any changes to the probability weighting assigned to each cash flow projection in the estimate of future cash flows.

A capital requirement is calculated for level, trend, volatility and catastrophe risk components of each insurance risk. With the exception of the mortality volatility risk component, the capital requirement for each component is calculated as the difference between the present value of the shocked cash flows and the present value of Best Estimate Cash Flows. For each region (refer to section 1.1.5), the components are calculated at a contract level, summed by the product and added across products by risk component. The mortality volatility component is based on a prescribed formula and is calculated in aggregate for each product. For this component, the required capital amount for all products grouped together in the same region is equal to the square root of the sum of the squares of the required capital ~~required~~ for each product. Required capital components for participating and adjustable products are calculated as if the products were non-participating and non-adjustable.

Unless otherwise indicated, the four risk components for each type of insurance risk are aggregated as the square root of the sum of the squares of the volatility and catastrophe risk components, plus the level and trend risk components where:

$$RC_{risk} = \sqrt{(RC_{vol}^2 + RC_{cat}^2)} + RC_{level} + RC_{trend}$$

where:

- RC_{risk} is the total required capital for the particular insurance risk
- RC_{vol} is the required capital component for volatility risk
- RC_{cat} is the required capital component for catastrophe risk
- RC_{level} is the required capital component for level risk
- RC_{trend} is the required capital component for trend risk.

Each of the risk components is subject to a zero floor per geographic region. Required capital for volatility risk is calculated using formulas that cover one full year, while required capital for catastrophe risk is calculated using shocks that occur over the first year starting on the first day after the valuation date.

The aggregation of required capital for insurance risk is described in Chapter 11. Capital requirements are aggregated separately for non-participating business and for blocks of participating business (refer to Chapter 9).

The methodologies presented in this chapter do not apply to ~~segregated fund guarantee products, financial instruments or~~ insurance contracts for uninsured employee benefit plans under which the insurer bears no risk and has no liability for claims. These products must be excluded from the calculation of the insurance risk requirement. Insurance risks associated with segregated fund guarantees are covered in Chapter 7.

6.1 Projection of insurance liability cash flows

Cash flows used to determine required capital for insurance risk are calculated using Best Estimate Assumptions per section 1.4.4. Best Estimate Cash Flows and shocked cash flows are projected by region, for terms ending within the IFRS contract boundary (with the exception of specific group insurance cash flows[122]). The cash flows projected for insurance risk must exclude Risk Adjustments, contractual service margins, and time value of guarantees. The participating contract dividend scale must not reflect the impact of insurance risk shocks.

[122] All cash flows that correspond to future business are excluded from the projections.

All Best Estimate Cash Flows and shocked cash flows are projected net of registered reinsurance (refer to Chapter 10),[123] with the exception of stop-loss reinsurance contracts (refer to section 6.7.5).[124] Projected cash flows must not reflect the impact of any expected losses for the risk of reinsurer non-performance under IFRS 17. For the solvency buffers SB_1, SB_2 and SB_3 defined in section 6.7, cash flows are projected net of registered reinsurance without taking account of any additional elements specific to the calculation. Projected cash flows may reflect future planned reinsurance recaptures as long as all the features of the recapture are also considered.

Projected cash flows must include cash flows arising from investment income taxes that are projected under the IFRS valuation. For the purpose of calculating the insurance risk capital requirement, Best Estimate Cash Flows and shocked cash flows are discounted at prescribed rates that depend on the geographic region in which the liabilities are included, rather than the currency in which the liabilities are denominated. Cash flows, including participating product dividends, must not be restated to reflect the prescribed discount rates.

The spot discount rates are levelled as follows:

- 5.3% for Canada, the United States and the United Kingdom
- 3.6% for Europe, other than the United Kingdom
- 1.8% for Japan
- 5.3% for other countries.

In calculating required capital, group insurance business that is individually underwritten must be treated as individual business, except for products that offer a premium rate guarantee.

Liability cash flows for group insurance, with the exception of cash flows for incurred claims, are projected up to the end of the premium rate guarantee period,[125] which may extend beyond the IFRS contract boundary. Cash flows for incurred claims are projected to the last payment date. If the length of the guaranteed premium rate period is less than one year but active life liability cash flows are projected for a full year, the insurer may opt to project the cash flows for a full year and apply a reduction factor. Under this option, a

[123] Cash flows include those that correspond to liabilities assumed under modified coinsurance contracts, and exclude those that correspond to products ceded under modified coinsurance contracts that are deemed to be registered reinsurance.

[124] Cash flow projection may not be appropriate for business assumed under stop-loss reinsurance contracts. Before entering into a stop-loss reinsurance contract, an insurer must communicate with the AMF to ensure that the contract is appropriately captured within the insurer's Base Solvency Buffer.

[125] The guaranteed premium rate period must generally be consistent with the IFRS contract boundary. For group insurance contracts, if the IFRS contract boundary occurs before the expiration of the premium guarantee because of the insurer's right to terminate a contract early, the guaranteed coverage period used in calculating level and trend risks must be extended beyond the IFRS contract boundary to reflect the additional risk borne by the insurer on account of the premium guarantee. The IFRS contract boundary must be extended by at least one half of the length of time between the IFRS contract boundary and the end of the guaranteed premium rate period.

75% factor is applied to the death benefit amounts used to determine mortality volatility risk in section 6.2, and to the projected cash flows used to determine the requirements for all other mortality and morbidity risks in sections 6.2 and 6.4.

6.2 Mortality risk

Mortality risk is the risk associated with the variability in liability cash flows due to the incidence of death. Level, trend, volatility, and catastrophe risk components are calculated for all individual and group life insurance products that are exposed to mortality risk. Mortality risk required capital is calculated for accidental death and dismemberment ("AD&D") products and any mortality exposure supported by the general account. However, mortality risk required capital is not calculated for products that cover longevity and morbidity risk, such as deferred annuities, waiver of premium and critical illness.

In cases where an insurer does not use an explicit mortality rate assumption to determine its liabilities for a set of contracts, it must calculate adjusted net premiums for the contracts. Adjusted net premiums are defined to be the amount of premiums that have been received for the contracts plus the amount of premiums that will be received in the future (excluding for future contracts), adjusted by the expected benefits/premiums ratio for the contracts. Adjusted net premiums must cover a full year of premiums unless there is a guaranteed premium rate period greater than one year, in which case, the adjusted net premiums must cover premiums over the entire premium rate guarantee period. The expected benefits/premiums ratio must encompass all claims that have been incurred, including those that have not been reported. To calculate the level risk for these contracts, the percentage shocks specified for mortality rate assumptions must be applied to the contracts' adjusted net premiums. To calculate catastrophe risk, the shocks specified for mortality rate assumptions must be applied to insured benefit amounts. To calculate the volatility risk capital requirement, adjusted net premiums may be used in place of *C* in the approximation formulas in section 6.2.4.

Required capital for mortality risk is calculated for each geographic region using the following formula:

$$RC_{mortality} = \sqrt{(RC_{vol}^2 + RC_{cat}^2)} + RC_{level} + RC_{trend}$$

A diversification credit is given for level and trend components between individually underwritten life supported business and individually underwritten death supported business described below (refer to section 11.1.1).

All cash flow projections, benefit amounts and liability amounts used to determine required capital for mortality risk are calculated net of registered reinsurance (refer to section 10.1).

For purposes of mortality risk required capital, basic death benefits include supplementary term coverage, participating coverage arising out of dividends (paid-up additions and term additions), and increasing death benefits associated with universal life contracts (i.e., contracts where the death benefit is the face amount plus funds invested).

6.2.1 Designation of life and death supported business

Required capital for mortality risk is calculated separately for life supported and death supported business. All individual and group life insurance products with mortality risk must first be designated as either life supported or death supported for aggregation purposes.

The insurer must partition its contracts into sets of similar products and characteristics and then determine if each individual set is life supported or death supported using the test described below. Level and trend risk components must be combined for this test.

The test is done using the financial statement liabilities valuation rates or the discount rates described in section 6.1 to calculate the present value of cash flows[126] for each set, where a -15% level risk shock is applied to the Best Estimate Assumption for mortality rates and a +75% trend risk shock is applied to the Best Estimate Assumption for future mortality improvement. The insurer must compare the result of this calculation with the present value of Best Estimate Cash Flows, using the same discount rates. If the present value of the shocked cash flows is greater than the present value of the Best Estimate Cash Flows, the set is designated as death supported business; otherwise, the portfolio is designated as life supported.

6.2.2 Level risk

A level risk component is calculated for all individual and group life products that are exposed to mortality risk. The mortality level risk component is the difference between the present value of shocked cash flows and the present value of Best Estimate Cash Flows for all durations, determined separately for life supported business and death supported business.

To avoid double counting with mortality volatility risk, the level risk component is reduced by the component related to the increase in the Best Estimate Assumption for mortality in the first year following the reporting date. Required capital for the first year is calculated as the difference between the present value of Best Estimate Cash Flows with a level shock applied in the first year only and the present value of Best Estimate Cash Flows.

6.2.2.1 Life supported business

The level risk shock for life supported business is a permanent increase to the Best Estimate Assumption for mortality rates at each age. The increased mortality rates are calculated using the following formula:

$$(1 + \text{Factor}) \times \text{Best Estimate Mortality Rate}$$

In this formula, "Factor" refers to the lesser of:

126 An approximation may be used under section 1.4.5.

a) 11% plus 20% of the ratio of the calculated individual life volatility component to the following year's net expected claims[127], net of reinsurance; or

b) 25%.

The ratio in a) above is the same for all individual life insurance products within a single geographic region.[128]

6.2.2.2 Death supported business

The level risk shock for death supported business is a permanent decrease of 15% to the Best Estimate Assumption for mortality rates at each age for each contract at all contract durations (i.e., -15% for all years).

6.2.3 Trend risk

A trend risk component is calculated for all individual and group life products that are exposed to mortality risk. The mortality trend risk component is the difference between the present value of shocked cash flows and the present value of Best Estimate Cash Flows for all durations, determined separately for life supported business and death supported business.

6.2.3.1 Life supported business

The trend risk shock for life supported business is a permanent 75% decrease to the Best Estimate Assumption for future mortality improvement over 25 years, followed by no mortality improvement (i.e., a 100% decrease) thereafter.

6.2.3.2 Death supported business

The trend risk shock for death supported business is a permanent 75% increase to the Best Estimate Assumption for mortality rate improvement at all durations.

6.2.4 Volatility risk

A volatility risk component is calculated for all individual and group life products that are exposed to mortality risk. It is calculated in aggregate (i.e., life and death supported products) by geographic region across all products.

To calculate this component, the insurer must partition its book of business into sets of similar~~like~~ products. Basic death and AD&D products must not be included in the same group, nor must individual insurance products be included with group insurance products.

The volatility risk component is calculated using the following formula:

127 An approximation may be used under section 1.4.5.

128 The volatility component used in calculating the ratio is that for all participating and non-participating business within the region, which will be lower than the sum of the components for participating and non-participating business calculated separately.

$$\sqrt{\sum_{Basic\ death} RC^2} + \sqrt{\sum_{AD\&D} RC^2}$$

where:

- these sums are taken over all sets of basic death and AD&D products respectively
- *RC* is the volatility component for the set of products.

The formula for *RC* is:

$$RC = 2.7 \times A \times \left(1 - \frac{V}{F}\right)$$

where:

- *A* is the standard deviation of the upcoming year's projected net death benefits for the set of products (including benefits projected beyond the contract boundary for group insurance contracts) and is defined by the following formula:

  $$A = \sqrt{\sum q(1-q)f^2}$$

  where:

  - *q* is a particular contract's Best Estimate Assumption for mortality
  - *f* is the contract's death benefit~~face amount~~, net of registered reinsurance
  - The sum is taken over all contracts. The calculation must be based on benefits at the contract level, rather than benefits per insured. Multiple contracts covering the same insured may be treated as separate contracts, but distinct coverages of the same insured under a single contract must be aggregated. If this aggregation cannot be done due to systems limitations, the impact must still be approximated and accounted for in the mortality volatility risk requirement
- *V* is the total ~~amount of ~~Best Estimate Liability~~ies~~ for all contracts in the group, net of registered reinsurance
- *F* is the total face amount for all contracts in the group, net of registered reinsurance.

When there is insufficient data available to calculate *A* for a set of products but the net death benefit~~capital~~ amounts insured for each contract (or certificate for group insurance products) in the group is known, factor *A* for the set must be approximated as:

$$A \approx \sqrt{\frac{P \times \sum f^2}{F}}$$

where:

- *P* is the projected value of the upcoming year's total net death benefits for all contracts in the group (including death benefits projected to be paid after contract renewal dates)
- the sum is taken over all contracts (or certificates, for group products) in the group, and *f* is the net ~~face amount~~ death benefit for the contract or certificate
- *F* is the total face amount net of registered reinsurance for contracts in the group.

When there is insufficient data available to calculate *A* for a set of products and the net ~~face amounts~~death benefit are not known, insurers may approximate factor *A* for the group using a comparable group of the insurer's own products for which it is able to calculate the volatility risk component exactly. For the group for which the volatility risk component is being approximated, *A* may be calculated using the following approximation:

$$A \approx \frac{A_c \times \sqrt{N_c}}{P_c} \times \sqrt{P} \times \sqrt{max\left(\frac{F}{n}; \frac{P}{N}\right)}$$

where:

- A_c is the exact factor *A* calculated for the comparison group
- N_c and *N* are, respectively, the total numbers of deaths projected to occur over the upcoming year for all contracts in the comparison group and all contracts in the group for which *A* is being approximated
- P_c and *P* are, respectively, the projected values of the upcoming year's total net death benefits for all contracts in the comparison group and all contracts in the group for which *A* is being approximated
- *F* is the total face amount net of registered reinsurance for the contracts in the group for which *A* is being approximated
- *n* is the total number of lives covered under the contracts in the group for which *A* is being approximated.

The use of the above approximation is subject to the following conditions:

1. There must not be any basis from which to conclude that the distribution of net death benefit amounts of the comparison group, as measured by the ratio of the standard deviation to the mean, may with material likelihood be lower than that of the set for which *A* is being approximated. It may not be appropriate to base the approximation on an insurer's entire book of products of the same type. The insurer's actuary must

be able to explain, to the satisfaction of the AMF, why using the approximation based on the comparison set produces appropriate results.

2. Insurers must use comparison sets of individual products to approximate factors for sets of individual insurance products and comparison sets of group products to approximate factors for sets of group products. Insurers may use sets of basic death products to approximate factors for sets of AD&D products, but may not use sets of AD&D products to approximate factors for sets of basic death products.

3. For any set of products used as a comparison set, the number of covered lives in the comparison group must be greater than or equal to the total number of covered lives summed over all sets for which factors are approximated based on the comparison group.

4. If this approximation is used for sets of individual basic death products, the sets in aggregate must represent a material proportion relative to the insurer's entire book of business.

For groups of contracts consisting entirely of traditional employer-sponsored group insurance contracts, the insurer may use the above approximation without reliance on a set of comparable products by replacing the comparison set factor $A_c \times \sqrt{N_c}/P_c$ by 1.75 in the approximation. The factor of 1.75 may be used to approximate *A* for a group only if each group insurance contract in the group requires employees to remain actively working for the plan sponsor to continue coverage. In particular, such a set may not contain debtor, association, mass mailing or dependent coverages.

When there is insufficient data available to calculate *A* for a set of products and the standard deviation of the net death benefit~~face amount~~ amounts is not known, the following formula may also be used to approximate factor *A*:

$$A \approx \sqrt{P} \times \sqrt{c_{min} + c_{max} - \frac{c_{min} \times c_{max}}{F/n}}$$

where:

- *P* is the projected value of the upcoming year's total net death benefits for all contracts in the group (including benefits projected to occur after contract renewal dates);
- c_{min} is less than or equal to the lowest net death benefit~~face amount~~ of any single-life contract (or certificates) in the group;
- c_{max} is the highest net death benefit~~face amount~~ or retention limit of any single-life contract (or certificate) in the group;
- *F* is the total face amount net of registered reinsurance for the contracts in the group;
- *n* is the total number of lives covered under the contracts in the group.

The value of the average net face amount *F*/*n* used in the above formula must be exact, and cannot be based on an estimate. If an insurer cannot establish with certainty both the average net death benefit amount and a lower bound c_{min} on the net death benefit amounts, it must use the value $c_{min} = 0$ in the formula. Then the approximation used is:

$$A \approx \sqrt{P \times C_{max}}$$

The use of an approximation for calculating *A* and the one chosen must be clearly described in the Capital Guideline Certification Report.

6.2.5 Catastrophe risk

A catastrophe risk component is calculated for all individual and group life products that are exposed to mortality risk. It is calculated in aggregate (i.e., life and death supported products) by geographic region across all products.

The shock for catastrophe risk corresponds to an absolute increase in the number of deaths per thousand lives insured in the year following the reporting date (including benefits projected to occur after contract renewal dates for group insurance products). It varies according to the geographic region as follows:

Canada	1.0
U.S.	1.2
UK	1.2
Europe, other than the U.K.	1.5
Japan and other regions	2.0

For AD&D products, 20% of the above shocks for mortality catastrophe risk must be used.

The catastrophe risk component is the difference between the present value of the shocked cash flows and the present value of the Best Estimate Cash Flows, for all years.

6.3 Longevity risk

Longevity risk is the risk associated with the increase in liability cash flows due to increases in life expectancy caused by changes in the level and trend of mortality rates.

Required capital for longevity risk is calculated for each geographic region using the following formula:

$$RC_{longevity} = RC_{level} + RC_{trend}$$

6.3.1 Level risk

The longevity level risk component is calculated for all annuity products that are exposed to longevity risk. The level risk component is the difference between the present value of the shocked cash flows and the present value of the Best Estimate Cash Flows. The required shock is a permanent decrease in Best Estimate Assumptions for mortality rate at each age as follows:

Non-registered annuity business – Canada, the U.S. and the U.K.	-20%
Registered annuity business – Canada	-10%
Registered annuity business – the U.S. and the U.K.	-12%
Non-registered and registered annuity business – other regions	-15%

Registered annuities are those that are purchased using tax-qualified (i.e., pre-tax) retirement savings.

6.3.2 Trend risk

The longevity trend risk component is calculated for all annuity products that are exposed to longevity risk. The trend risk shock is a permanent increase of 75% in the Best Estimate Assumption for future mortality rate improvement. The shock applies to each year of mortality improvement for the duration of the contracts. To clarify, the shocked cash flows for trend risk are calculated using Best Estimate Cash Flows to which 175% of the Best Estimate Assumption for future mortality improvement is applied.

The longevity trend risk component is the difference between the present value of the shocked cash flows and the present value of the Best Estimate Cash Flows.

6.4 Morbidity risk

Morbidity risk is the risk associated with the variability in liability cash flows arising from the incidence of policyholder disability or health claims (including critical illness insurance), and from termination rates. The termination rate is defined as the proportion of disabled lives that cease to be disabled at the end of a year, regardless of whether this is the result of recovery or death.

Morbidity shocks have been established to include the impact of mortality risk.

Group insurance products that are underwritten individually are subject to shocks applicable to individual insurance products, instead of those applicable to group insurance products.

Return of premium riders must be included in the cash flows of the underlying products. Changes in the return of premium rider liability must be taken into consideration when calculating required capital.

In cases where an insurer does not use incidence and termination rate assumptions in the determination of its liabilities for a set of contracts, it must calculate adjusted net premiums for the contracts. Adjusted net premiums are defined to be the amount of premiums that have been received for these contracts plus the amount of premiums that will be received in the future (excluding for future contracts), adjusted by the expected benefits/premiums ratio. Adjusted net premiums must cover one full year of premiums unless there is a guaranteed premium rate period greater than one year, in which case the adjusted net premiums must cover the premiums for the entire premium rate guarantee period. The expected benefits/premiums ratio must encompass all claims that have been incurred, including those that have not been reported. To calculate level, volatility and catastrophe risks for the contracts, the percentage shocks specified for incidence and termination rate assumptions must be applied to the contracts' adjusted net premiums.

Morbidity risk required capital components are calculated for level, trend, volatility and catastrophe risks. Total required capital for morbidity risk is calculated separately for each geographic region using the following formula:

$$RC_{morbidity} = \sqrt{RC_{vol}^2 + RC_{cat}^2} + RC_{level} + RC_{trend}$$

6.4.1 Level risk

The level risk component is calculated for products that are exposed to morbidity risk. The exposure base to which the shock is applied varies according to status of the lives insured: active versus disabled.

For active lives, the shock for level risk applies to all products for which the guaranteed coverage period[129] exceeds 12 months. The shock is a permanent increase in Best Estimate Assumptions for morbidity incidence rates at each age.

For disabled lives, the shock for level risk is a permanent decrease in Best Estimate Assumptions for the morbidity termination rates at each age. Morbidity termination rate shocks for level risk apply to lives disabled at the balance sheet date. For claims incurred but not reported, if the approximation approach based on adjusted net premiums is not used, then a factor must be applied to the liabilities for claims incurred but not reported that is equal to the ratio of the morbidity termination level component (before morbidity risk credits specified in section 11.1.2) to the present value of Best Estimate Liability Cash Flows for each morbidity risk product category (e.g., DI – disabled, LTD – disabled, STD – disabled).

Morbidity termination rate assumptions must not be changed when applying incidence rate shocks. Morbidity termination rate shocks are applied to the total termination rate, which includes terminations due to recovery and due to death.

The factors for level risk shocks are as follows:

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[129] The guaranteed premium rate period should generally be consistent with the IFRS contract boundary. For group products, if the IFRS contract boundary occurs before the expiration of the premium guarantee because of the insurer's right to terminate a contract early, the guaranteed premium rate period used in calculating level and trend risks should be extended beyond the IFRS contract boundary to reflect the additional risk borne by the insurer on account of the premium guarantee. The contract boundary should be extended by at least half of the length of time between the IFRS contract boundary and the end of the guaranteed premium rate period.

Exposure Base	Product Type	Shock Factor
Incidence Rates	Active DI	+25%
	Active WP	+25%
	CI	+35%
	Active LTC	+30%
	Other A&S	+20%
Termination Rates	Disabled DI	-25%
	Disabled LTD	-25%
	Disabled STD	-25%
	Disabled WP	-30%
	Disabled LTC	-25%

The morbidity level risk component is equal to the difference between the present value of the shocked cash flows and the present value of the Best Estimate Cash Flows. The components for Disability, CI and LTC morbidity level risk may be reduced by a credit for within-risk diversification, which is determined using a statistical fluctuation factor (refer to section 11.1.2).

6.4.2 Trend risk

A trend risk component is calculated for products covering the following types of insured lives:

- active lives, for products with a guaranteed coverage period[130] of two years or more, such as individual CI, individual DI and other A&S products;

[130] The guaranteed premium rate period must generally be consistent with the IFRS contract boundary. For group insurance contracts, if the IFRS contract boundary occurs before the expiration of the premium guarantee because of the insurer's right to terminate a contract early, the guaranteed coverage period used in calculating level and trend risks must be extended beyond the IFRS contract boundary to reflect the additional risk borne by the insurer on account of the premium guarantee. The IFRS contract boundary must be extended by at least one half of the length of time between the IFRS contract boundary and the end of the guaranteed premium rate period.~~The guaranteed premium rate period must generally be consistent with the IFRS contract boundary. For group insurance contracts, if the IFRS contract boundary occurs before the expiration of the premium guarantee because of the insurer's right to terminate a contract early, the guaranteed coverage period used in calculating level and trend risks must be extended beyond the IFRS contract boundary to reflect the additional risk borne by the insurer on account of the premium guarantee. The IFRS contract boundary must be extended by at least one half of the length of time between the IFRS contract boundary and the end of the guaranteed premium rate period.~~

- disabled lives, for products that provide disability coverage, such as LTD, DI and WP.

If a Best Estimate Assumption for morbidity improvement is not used, the trend risk component is zero.

The shock for trend risk is a permanent 100% decrease in the Best Estimate Assumption for future morbidity improvement. The shocked cash flows for trend risk are calculated using Best Estimate Cash Flows and an annual morbidity improvement rate assumption of 0%.

The morbidity trend risk component is the difference between the present value of the shocked cash flows and the present value of the Best Estimate Cash Flows.

6.4.3 Volatility risk

The volatility risk component is calculated by applying a one-time shock to first year incidence rates for all active lives that are exposed to morbidity risk. The volatility risk shock applicable in the first year is calculated independently of the shock used for level risk (refer to section 6.4.1). Termination rate assumptions must not be changed as a result of the shocks applied to incidence rates.

The first-year [131] factors for volatility risk shocks are as follows:

Exposure Base	Product Type	Shock Factor
Incidence Rates	Individual active DI	+25%
	Individual active WP	+25%
	Individual CI	+50%
	Individual active LTC	+30%
	Individual health insurance	+15%
	Individual dental insurance	+20%
	Individual travel insurance	+30%
	Individual credit insurance	+30%
	Other A&S	+30%
	Group active STD and LTD	+25%
	Group active WP	+25%

[131] An approximation may be used under section 1.4.5.

Exposure Base	Product Type	Shock Factor
	Group CI	+50%
	Group active LTC	+30%
	Group health insurance	+15%
	Group dental insurance	+20%
	Group travel insurance	+50%
	Group credit insurance	+50%

The morbidity volatility risk component is the difference between the present value of the shocked cash flows and the present value of Best Estimate Cash Flows.

The components for disability, CI, LTC, travel and health and dental insurance (including other A&S) morbidity volatility risk may be reduced by a credit for within-risk diversification, which is determined using statistical fluctuation factors (refer to section 11.1.2).

6.4.4 Catastrophe risk

The catastrophe risk component is calculated by applying a one-time shock to first-year incidence rates[132] for all active lives that are exposed to morbidity risk. The shock is applied as a multiple of the Best Estimate Assumption for morbidity (i.e., (1 + shock factor) x Best Estimate Assumption). Catastrophe shocks are not applied to incidence rates for group medical or dental insurance, or to individual or group travel or credit insurance.

The factors for catastrophe risk shocks are as follows:

Exposure Base	Product Type	Shock Factor
Incidence Rates	Individual active DI	+25%
	Group active STD and LTD	+25%
	Individual and group active WP	+25%
	Individual CI	+5%
	Group CI	+5%
	Individual and group active LTC	+10%
	Other A&S (other than disability and CI)	+25%

132 An approximation may be used under section 1.4.5.

The morbidity catastrophe risk component is the difference between the present value of the shocked cash flows and the present value of the Best Estimate Cash Flows.

6.5 Lapse risk

Lapse risk is the risk associated with the variability in liability cash flows due to the incidence of policyholder lapses and other policyholder behaviour. Lapse risk includes risk arising from options that allow policyholders to fully or partially terminate an insurance contract, or to decrease or suspend/resume insurance coverage (e.g., the option to reduce premiums in universal life contracts).

Lapse risk required capital is calculated for all individual life insurance contracts, individual DI (active lives), individual CI, individual LTC (active lives), and other A&S insurance products that are exposed to lapse risk.

Lapse shocks are applied to individual insurance products, including individually underwritten group insurance products. Lapse risk requirements are calculated for level and trend risks combined as well as volatility and catastrophe risks. When a shock increases a lapse rate above 97.5%, the shocked lapse rate is capped at 97.5%. Shocked cash flows must not include any lapse trend improvement assumptions. If an insurer uses dynamic lapse assumptions that vary with interest rates, the Best Estimate Assumption must be the same as that used in the financial statement valuation and must not be adjusted to reflect prescribed discount rates (refer to section 6.1) used to calculate the capital requirement.

For aggregation purposes, requirements for lapse-supported business are calculated separately from requirements for lapse-sensitive business.

Lapse risk required capital is calculated separately for each geographic region using the following formula:

$$RC_{lapse} = \sqrt{RC_{vol}^2 + RC_{cat}^2} + RC_{level+trend}$$

6.5.1 Designation of lapse-supported and lapse-sensitive business[133]

For CARLI purposes, lapse supported and lapse sensitive products are assumed to be negatively correlated. The direction of the lapse shock must be tested to determine whether the business is lapse supported or lapse sensitive. The insurer must use the product partitions it has in place for setting its Best Estimate Assumptions for lapse (to generate sets of similar products with similar characteristics), and then test each individual set by simultaneously applying the level, trend and volatility shocks to determine if the set is lapse supported or lapse sensitive. For the purpose of the designation test, the shocks must be applied first as an increase in lapse rates (lapse sensitive) in all contract years, and then as a decrease in lapse rates (lapse supported) in all contract years. The designation is made by set based on the highest present value using either the financial

[133] An approximation may be used under section 1.4.5.

statement valuation discount rates or the discount rates specified in section 6.1 (note that the present value under each test may be lower than the Best Estimate present value net of registered reinsurance). Once the designation is set, it is used for the application of the appropriate shocks for catastrophe risk and the calculation of the requirements for lapse supported and lapse sensitive business in the diversification matrix.

6.5.2 Level and trend risks

A combined component is calculated for level and trend risks. The combined shock is a permanent ±30% change in Best Estimate Assumptions for the lapse rate at each age and duration. In applying the level and trend shocks, insurers must determine the direction of the shocks by comparing cash surrender values net of surrender charges with the Best Estimate Liabilities at each duration. At durations where net cash surrender values are higher than the Best Estimate Liabilities, the lapse rates are shocked upwards, and at all other durations they are shocked downwards. Best Estimate Liabilities at each duration may be calculated using either financial statement valuation discount rates or the discount rates specified in section 6.1.

The combined component for level and trend risk is the difference between the present value of the shocked cash flows and the present value of Best Estimate Cash Flows.

6.5.3 Volatility risk

The shock for volatility risk is ±30% in the first year[134] and is calculated independently of the shock used for level and trend risk (refer to section 6.5.2). The shock is +30% if the cash surrender value, net of surrender charges, is higher than the Best Estimate Liability on the valuation date, and -30% otherwise. The shocked cash flows after year one are the Best Estimate Cash Flows as affected by the shock in the first year.

The first year shock on lapse rates is the sum of the impacts of a ±30% shock for level and trend risk and a ±30% shock for volatility risk. Consequently, the lapse volatility shock may be quantified as:

> PV of cash flows (lapse rate shocked at ±60% in year one) – PV of cash flows (lapse rate shocked at ±30% in year one)[135]

Where ±60% represents the sum of volatility shock plus level and trend shocks for lapse risk and ±30% represents only the level and trend shocks.

The risk requirements for each set is floored at zero.

6.5.4 Catastrophe risk

The shocks for catastrophe risk are:

[134] An approximation may be used under section 1.4.5.

[135] An approximation may be used under section 1.4.5.

- for lapse-sensitive business, an absolute increase of 20 percentage points in the Best Estimate Assumption for lapse for the first year[136] only;
- for lapse-supported products, a 40% proportional reduction of the Best Estimate Assumption for lapse in the first year[137] only.

The catastrophe risk component for each portfolio cannot be negative.

The lapse catastrophe risk component is equal to the difference between the present value of the shocked cash flows and the present value of the Best Estimate Cash Flows.

6.6 Expense risk

Expense risk is the risk associated with the unfavourable variability of expenses incurred in servicing insurance or reinsurance contracts (e.g., the variability in expense liability cash flows due to the variation of the in force contracts, excess claims, cancellations and surrenders, new business decrease and other circumstances that could have an impact on unit expenses).

All estimated administration expenses (including non-commission premium and claim expenses) are included in the shocks. The shock must not be applied to expenses that are guaranteed by contracts with third parties.

Expense risk required capital is calculated in aggregate for level, trend, volatility and catastrophe risks for each geographic region.

6.6.1 Volatility, level, trend and catastrophe risks

The combined shock is a permanent shock on the Best Estimate Assumptions for expenses, including inflation,[138] for all insurance products.[139] The shock is an increase of 20% in the first year, followed by a permanent increase of 10% in all subsequent contract years. It is applied to administration expenses. Premium taxes and investment income tax are excluded.

Required capital for expense risk is equal to the difference between the present value of the shocked cash flows and the present value of Best Estimate Cash Flows.

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136 An approximation may be used under section 1.4.5.

137 An approximation may be used under section 1.4.5.

138 The Best Estimate Assumption for inflation is the same as that used in the financial statement valuation and must not be adjusted to reflect prescribed discount rates (refer to section 6.1) used to calculate the capital requirement.

139 An approximation may be used under section 1.4.5.

6.7 Credit for reinsurance contracts and special policyholder arrangements

6.7.1 Unregistered reinsurance

Under unregistered reinsurance contracts (refer to section 10.1.1), guarantee instruments provided by the reinsurer (refer to section 10.3) so they can be used to guarantee benefits under a specific reinsurance contract or set of contracts may be recognized as Eligible Deposits for the purpose of calculating the total CARLI Ratio and the Core CARLI Ratio (refer to section 1.1). Eligible Deposits that may be recognized are subject to the following limit:

$$min\left(\frac{AC+SA}{SB_2}\ ;\ 1.5\right)\times(SB_0-SB_1-R)$$

where:

- *AC* is the insurer's total Available Capital excluding Negative Liabilities ceded that are recognized in Tier 2 Capital under section 10.2.7
- *SA* is the insurer's Surplus Allowance
- SB_0 is the Base Solvency Buffer (refer to section 11.3) for the insurer's entire product portfolio calculated net of registered reinsurance only (i.e., without reduction for unregistered reinsurance)
- SB_1 is the Base Solvency Buffer,[140] calculated net of registered reinsurance, and excluding:
  - insurance risks reinsured under unregistered reinsurance contracts; and
  - the currency risk requirement related to these unregistered reinsurance contracts (refer to section 5.6.8)
- SB_2 is the Base Solvency Buffer calculated net of all reinsurance, and excluding all currency risk requirements related to unregistered reinsurance
- *R* is the amount of any retained risk positions (refer to section 10.4.2) under unregistered reinsurance contracts.

In the intermediate steps of the calculations of SB_0, SB_1 and SB_2, the quantity *A* (refer to section 11.2.2) excludes all of the requirements of section 10.3.3 for credit and market risks associated with guarantee instruments related to unregistered reinsurance and currency risk requirements specific to the calculation. The statistical fluctuation factors (refer to section 11.1) used in the calculations of SB_0, SB_1 and SB_2 will vary depending on which of these Base solvency buffers is being calculated. The amounts of required capital ~~required~~ for operational risk of~~is equal for~~ SB_0, SB_1 and SB_2 are all equal, and are~~it is~~ calculated as ~~set out~~specified in Chapter 8 without modification.

All amounts recognized in Eligible Deposits must be fully available under the terms of reinsurance contracts to cover any benefits arising from the risks for which an insurer is

[140] An approximation may be used under section 1.4.5.

taking credit. If a portion of a guarantee instrument is not available under the terms of a reinsurance contract to cover benefits arising from a risk that is included in the above limit, this portion may not be recognized in Eligible Deposits. For example, if the limit on Eligible Deposits is $500, but an unregistered reinsurance contract only covers benefits in excess of Best Estimate Liabilities up to an amount of $300, then amounts available above $300 may not be recognized in Eligible Deposits, even if the total amount covered under the reinsurance contract is above the Requisite Level defined in section 10.4.2.

6.7.2 Policyholder deposits

Policyholder Eligible Deposits,[141] excluding insurance contract liabilities and provisions for benefits payable, may be used to reduce the capital requirement for a contract's insurance risk. Such deposits must meet the following criteria.

1. They are made by policyholders.
2. They are available for claims settlement (e.g., provision for claims fluctuation and premium stabilization reserves, and accrued provision for experience refunds).
3. They are returnable, net of applications, to policyholders on contract termination.

When an insurer is able to recover excess benefits from a deposit for a particular contract on a first-dollar, 100% coinsurance basis, the amount by which the Base Solvency Buffer may be reduced is limited to the lower of the deposit amount, or the sum of the contract’s marginal capital requirements (as defined in section 2.1.2.9.2) for each of the insurance risks mitigated by the deposit, calculated net of all reinsurance. If the amount that the insurer is able to recover from a deposit is subject to a risk-sharing arrangement, the insurer may only take credit for the deposit if the two portions of the benefits assumed by the insurer and the policyholder under the arrangement do not decrease as total excess claims increase. If the insurer can take credit for the deposit under the terms of a risk-sharing arrangement, the amount by which the Base Solvency Buffer may be reduced is limited to the lower of the deposit amount, or the portion of the marginal capital requirements for the contract that would be allocated to the policyholder under the risk-sharing formula.

The use of a credit must be clearly described in the Capital Guideline Certification Report.

6.7.3 Adjustments for group insurance

The Base Solvency Buffer may be reduced if a group benefit included in the calculation of the insurance risk capital requirement carries one of the following risk-reduction features that provides for a full transfer of risk. The eligible risk-reduction features are:

- “guaranteed no risk”
- deficit repayment by the policyholder, with no obligation for contract renewal at term;

[141] Deposits made by agents or brokers meeting the same conditions as Eligible Deposits made by policyholders may also be recognized.

- a “hold harmless” agreement where the policyholder has a legally enforceable debt to the insurer.

The amount by which the Base Solvency Buffer may be reduced is equal to the result of a scaling factor multiplied by the sum of the marginal capital requirements for the contract (refer to section 2.1.2.9.2), calculated net of all reinsurance. The scaling factor to be used is 95% if the group insurance policyholder is a federal, provincial or territorial government in Canada, and 85% for all other policyholders.

Where a contract has one of the above risk-reduction features, but the maximum recoverable amount (as specified in the insurance contract) from the policyholder is subject to a limit, the credit for the risk-reduction feature must be calculated in the same manner as the credit for Eligible Deposits outlined in section 6.7.2, with the following modifications:

- use the maximum recoverable amount in place of the deposit amount in the calculation;
- the credit amount to be used is multiplied by 95% if the policyholder is a federal, provincial or territorial government in Canada, and by 85% for all other policyholders.

The use of adjustments must be described in the Capital Guideline Certification Report.

6.7.4 Reinsurance claims fluctuations reserves and similar arrangements

Provisions for claims fluctuations, deposits, or risk positions retained by a ceding insurer that serve to reduce the reinsurer’s risk under a reinsurance contract may be included in the Eligible Deposits of the reinsurer. These provisions for fluctuation of claims, deposits or risk positions that may be recognized are subject to the limit obtained by the following formula:

$$min\left(\frac{AC + SA}{SB_2}; 1.5\right) \times (SB_2 - SB_3 - d)$$

where:

- *AC, SA and* SB_2 are defined in section 6.7.1;
- SB_3 is the Base Solvency Buffer,[142] calculated net of all reinsurance and all currency risk requirements related to unregistered reinsurance, and additionally excluding the reinsurance contract for which the claims fluctuation reserve or other arrangement has been put in place;
- *d* is the amount of any reductions that have been made to the Base Solvency Buffer on account of policyholder deposits and group insurance adjustments (refer to sections 6.7.2 and 6.7.3) for the business assumed under the reinsurance contract.

142 An approximation may be used under section 1.4.5.

6.7.5 Credit for stop-loss arrangements

The ceding insurer may reduce its insurance capital requirement for risks it has reinsured under stop-loss reinsurance contracts (including catastrophe reinsurance). A credit is calculated separately for each component of the insurance risk capital requirement, before between-risk diversification. For each component, except mortality volatility risk, the credit is determined by calculating the increase in the value of the reinsurance contract held corresponding to a stop-loss reinsurance contract under the shocks specified for the component (i.e., the cash flows projected for the component do not include amounts recovered under the contract). For the mortality volatility risk component, the credit is measured by calculating the reduction in the variance of the upcoming year's net death benefits.

Any reduction in required capital for insurance risk is subject to prior AMF approval. To obtain such approval, the ceding insurer must demonstrate the validity of its valuation methodology for the stop-loss reinsurance contract held under the relevant insurance risk shocks. As a minimum requirement for approval, the valuation methodology must encompass more than deterministic valuation of a single set of cash flows.

If the reinsurer providing the stop-loss protection is subject to the requirements of this guideline, the ceding insurer must retain in its records the certification from the reinsurer's actuary that the reinsurer has included all reductions reported by the ceding insurer in its own CARLI insurance risk calculation. If the stop-loss reinsurance contract constitutes unregistered reinsurance under section 10.1, the treatment of Eligible Deposits placed to cover the ceded insurance risk capital requirement is the same as described in section 6.7.1.

The use of a credit must be clearly described in the Capital Guideline Certification Report.

Chapter 7. Segregated Fund Guarantee Risk

The capital requirement in this chapter is intended to measure risk associated with performance-related guarantees on segregated funds or products offering similar guarantees. The required capital~~ required~~ for this risk can be determined using the standard approach, including the simplified option, or using the internal model approach with recognition of the hedging strategy if the insurer has obtained prior AMF approval. ~~prescribed factors or using an internal model if the insurer has obtained prior AMF approval.~~

Use of the standard approach, including the simplified option, is described in sections 7.1 to 7.5. This approach consists of two parts:

1. restated liabilities, as determined under section 7.1, are recognized in the equity adjustment for CARLI purposes.
2. capital requirements for credit, market, insurance and operational risks that are included as part of the total capital requirements for these risks in the calculation of the Base Solvency Buffer. The capital requirements for credit, market and insurance risks are determined by applying various shocks to Restated Liabilities.

Use of the internal model approach with recognition of the hedging strategy is described in section 7.7. To use this approach, prior authorization must be obtained from the AMF. When the insurer has received authorization from the AMF to use this approach, it cannot use the standard approach, including the simplified option, without receiving a new authorization from the AMF.~~The use of prescribed factors is described in section 7.1. The insurer may choose between the two methods described, subject to the specified conditions.~~

~~To use an internal model, prior authorization must be obtained from the AMF. To this end, the insurer must meet the conditions outlined in section 7.2. There are three methods to measure the segregated fund guarantee risk with an internal model. Only one method recognizes dynamic hedging strategies (the “hedging strategies”) and it is presented in section 7.2.8. The other two methods are presented in section 7.2.7. When the insurer has received authorization from the AMF to use one of these methods, it cannot use another without receiving a new authorization.~~

An insurer that uses risk mitigation strategies other than hedging strategies, such as reinsurance contracts, must contact the AMF to determine the approach to be used.

7.1 Restated liabilities

Restated Liabilities are determined separately for each legal entity in each geographic region (refer to section 1.1.5). Restated Liabilities are calculated by modifying the discount rate and expected return assumptions that an insurer uses to calculate Best Estimate Liabilities (i.e., liabilities excluding Risk Adjustment and contractual service margin). The difference between Restated Liabilities and the Best Estimate Liabilities, after any applicable transition measures (refer to section 7.5), if positive, is added to the equity adjustment for CARLI purposes (refer to section 2.1.1).

The discount rates for guarantee payouts and the expected return rates for all asset classes under the risk neutral probability measure should be swap rates. These discount rates should not contain any spread above swap rates either on or after the valuation date. In addition, if other components of the model are calibrated using an interest rate assumption, then the interest rates used for calibration should be the same as the swap rates used for discounting, without any spread above these rates either on or after the valuation date.

7.2 Capital requirements

Segregated fund guarantees are subject to capital requirements for credit, market, insurance and operational risks. All capital requirements for segregated fund guarantees relative to the standard approach are included as part of the capital requirements for these risks in the calculation of the Base Solvency Buffer (refer to Chapter 11). In all cases where a capital requirement is determined by applying a shock to an assumption used to value liabilities, the requirement is equal to the difference between Restated Liabilities (rather than the liabilities reported in the financial statements) recalculated under the shock, and Restated Liabilities calculated before the shock.

7.2.1 Credit risk

The requirement for credit risk is equal to the amount by which Restated Liabilities increases when the starting values of bonds and other fixed-income assets within all segregated funds are reduced by the risk factors specified in Chapter 3. The credit risk capital requirement is calculated net of all reinsurance.

The factor is a weighted average of credit risk factors for the bonds and other fixed-income assets that the fund is permitted to invest in. The weights and factors are calculated assuming that the fund first invests in the asset class attracting the highest capital requirement, to the maximum extent permitted in its prospectus or Annual Information Form (where more current). It is then assumed that the fund continues allocating investments to asset classes in declining order of capital charge, to the maximum extent permitted, until a total allocation of 100% is reached. The factor for the fund is then the sum of the products of the weights and risk factors for the assumed investment allocation.

In the absence of specific limits to asset classes, the starting values of the bonds or other fixed income assets is subject to the highest risk factor applicable to any bond and other fixed-income asset that the fund holds or is permitted to invest in.

If an insurer cannot determine the asset classes in which the fund is permitted to invest in, it should reduce the starting value of the bonds or other fixed-income assets by the risk factor for a BBB-rated bond having a maturity of 10 years.

The credit risk capital requirements for segregated fund guarantees calculated in this section are included within the credit risk component in the calculation of requirement *A* in sections 11.2.2 and 11.2.3.

7.2.2 Market risk

Segregated fund guarantees are subject to capital requirements for equity risk.

The gross requirement for equity risk is equal to the amount by which Restated Liabilities increase when the value of equities, preferred shares and mutual funds within all segregated funds are shocked downwards and, simultaneously, implied equity volatilities are shocked by specified amounts. The capital requirement for equity risk is calculated net of all reinsurance.

Equity risk hedges may be applied to reduce the requirement (refer to section 7.3).

The downward shocks applied to the starting values of equities, preferred shares and mutual funds on the valuation date are the factor amounts for these assets as specified in sections 5.2 and 5.4.

Equity implied volatility shocks are applied by adding the percentage amounts specified in Appendix 7-A to the annualized current forward equity volatilities used to determine Restated Liabilities.

Linear interpolation should be used to derive the volatility shocks between the values specified in the table of Appendix 7-A.

Example: Calculation of equity implied volatility shocks

The following illustrates the calculation of the equity implied volatility shocks. The shocks are determined according to the table of Appendix 7-A using linear interpolation where appropriate.

The table below illustrates shocked volatility using hypothetical annualized current forward equity volatility at each month:

Annualized Current Forward Volatility (A)	**Months**	**Shock (B)**	Shocked Volatility (A + B)
5.0	1	+36.0	41.0
5.0	115	(5 x 18.2 + 31 x 30.9) ÷ 36 = +29.1	34.1
5.0	550	+20.0	25.0

Annualized Current Forward Volatility (A)	**Months**	**Shock (B)**	**Shocked Volatility (A + B)**
18.7	1	*0.3 x 23.0 + 0.7 x 22.0 =* +22.3	41.0
18.7	115	*(5 x (0.3 x 9.3 + 0.7 x 9.0) + 31 x (0.3 x 18.1 + 0.7 x 17.1)) ÷ 36 =* +16.2	34.9
18.7	550	+6.3	25.0

Annualized Current Forward Volatility (A)	Months	Shock (B)	Shocked Volatility (A + B)
54.0	1	-13.0	41.0
54.0	115	(5 x -4.7 + 31 x -3.4) ÷ 36 = -3.6	51.4
54.0	550	-29.0	25.0

For insurers that prefer to apply the volatility shocks on a spot basis instead of a forward basis, the percentage amounts specified in Appendix 7-B must be added to the annualized current spot equity volatilities used to determine Restated Liabilities. As with the forward basis, linear interpolation should be used to derive the volatility shocks between the values specified in the table of Appendix 7-B.

The equity risk capital requirements calculated in this section are included within the market risk component in the calculation of requirement *A* in sections 11.2.2 and 11.2.3.

7.2.3 Insurance risk

Segregated fund guarantees are subject to capital requirements for mortality risk, longevity risk, lapse risk and expense risk. Restated Liabilities and shocked Restated Liabilities are projected net of registered reinsurance.

7.2.3.1 Mortality and longevity risk

Segregated fund guarantee capital requirements for mortality and longevity risks are defined in sections 6.2 and 6.3. Mortality risk should be assumed to be a diversifiable risk within all calculations so that, even for a single contract, all mortality assumptions are reflected as proportional mortality and survival rates at each time step. All insurance risk components in this section are calculated as the difference between the present value of shocked cash flows and Restated Liabilities. The amount that should be used for the present value of shocked cash flows is Restated Liabilities with best estimate mortality or longevity assumptions shocked, and with all other assumptions used in the determination of Restated Liabilities unchanged. In particular, the discount rate curve used in the determination of shocked cash flows is the valuation swap curve rather than the rates specified in section 6.1.

Segregated fund guarantees are treated as basic death products. For each set of segregated fund guarantee products, the volatility risk required capital component is given by:

$$RC = 2.7 \times \sqrt{\sum q(1-q)(MAX(0, f-V))^2}$$

where:

- q is a particular contract's Best Estimate Assumption for mortality;

- *f* is the contract's face amount payable immediately in the event of death;

- *V* is the Restated Liability for the contract; and

- the summation is taken over all contracts in each set of segregated fund guarantee products.

The mortality and longevity risk capital requirements for segregated fund guarantees calculated under this section are included within the mortality risk components in the calculation of the within-risk diversification credit in section 11.1 and in the calculation of *I* in section 11.2.1. The longevity risk requirements for segregated fund guarantees calculated under this section are included in the longevity risk components of *I* in section 11.2.1.

7.2.3.2 Lapse risk

The lapse risk capital requirement for each contract that does not have guaranteed withdrawal benefits, or for each contract that does but is not in the withdrawal period, is equal to the amount by which Restated Liabilities increases when best estimate lapse rates are shocked up or down by 40% in each valuation set.

If best estimate lapse rates are determined dynamically, the best estimate lapse rates are shocked up or down by 30% in each valuation set. For the purposes of this requirement, dynamic lapse assumptions are those that change automatically with changes in the moneyness of the contract, or because of other factors.

The lapse risk capital requirement for each contract with guaranteed withdrawal benefits that is in the withdrawal period is equal to the amount by which Restated Liabilities increases when lapse rates during the withdrawal period are changed as follows:

1) For the first 10 years, lapse rates must be the lower of 1% per year or the best estimate lapse rate used in the determination of Restated Liabilities. However, if the account value falls to zero during the first 10 years, the lapse rate must be 0% per year as of that point in time.

2) Lapse rates after 10 years are 0% per year.

For each contract with guaranteed withdrawal benefits, there is an additional lapse risk requirement to account for the uncertainty in the withdrawal start date and amount. This requirement is equal to the increase in Restated Liabilities when withdrawal assumptions are changed as follows:

1) Withdrawals continue for all contracts for which withdrawals have commenced.

2) For Registered Retirement Income Funds for which withdrawals have not commenced, the income start date is set to the valuation date.

3) For all other contracts for which withdrawals have not commenced, the income start date is set to the date from the list below that maximizes the increase in Restated Liabilities for the contract:

   a. The best estimate income start date;
   b. Three years before the best estimate income start date;
   c. Three years after the best estimate income start date.

4) All withdrawals are for the maximum amount that the policyholder can withdraw without incurring penalties.

The lapse risk capital requirements for segregated fund guarantees calculated in this section are included within the lapse risk components in the calculation of *I* in section 11.2.1.

7.2.3.3 Expense risk

Segregated fund guarantee capital requirements for expense risk are calculated under section 6.6. These requirements are included within the expense risk components in the calculation of *I* in section 11.2.1.

7.2.4 Operational risk

Segregated fund guarantees are subject to capital requirements for operational risk (refer to section 8.2).

7.3 Recognition of market hedges

The requirements in section 7.2.2 may be reduced by market hedges.

To qualify for capital reduction for market hedges, an insurer's hedging program must be clearly defined and documented. The documentation should be available to the AMF on request and include at a minimum:

- Ongoing and no less frequently than annual review and approval of the hedging program by the board of directors (or, for a branch operation, by senior management);
- Hedging objectives;
- List and description of the blocks of businesses and types of guarantees that are covered by the hedging strategy, and a list of the financial instruments that can be used to hedge risks associated with segregated fund guarantees;
- Description and explanation of the risks being hedged and those not being hedged;
- Risk measures and risk limits, which must be approved by the insurer's risk management function;
- Reporting, oversight, and escalation processes (when risk limits are reached); and
- Performance measures and monitoring frequency.

Market hedges of segregated fund guarantees are subject to the requirements for potential replacement cost as described in Chapter 4.

7.3.1 Static hedging

The requirements in section 7.2.2 may be reduced by the increase in the insurer's segregated fund guarantee market hedges resulting from the simultaneous adverse shocks to the starting value of segregated funds and market implied volatility shocks in section 7.2.2.

If an asset underlying a hedge does not exactly match the assets in the mapped fund, the price shock applied to the asset underlying the hedge should be reduced using the methods described in sections 5.2.4.1 and 5.2.4.2 based on the correlation of weekly returns between the underlying asset and the mapped fund.

7.3.2 Dynamic hedging

Instead of applying the downward shock to the starting value of market hedges in 7.3.1, an insurer with a dynamic hedging program may calculate a separate reduction to the market risk requirements using a prescribed set of equity price scenarios. The separate reduction is limited to blocks of segregated fund guarantees that are dynamically hedged.

Specific conditions must be met and authorization from the AMF is required before an insurer can reduce the requirements in section 7.2.2 for dynamic hedging.

7.3.2.1 Qualitative conditions

In addition to the documents required under section 7.3, an insurer's dynamic hedging program must, at a minimum, include the following:

- Description of the risks associated with the dynamic hedging strategy (e.g., liquidity risk, counterparty risk, model risk), as well as a risk management strategy;
- Independent valuation of the hedging asset portfolio;
- A process flow chart that clearly shows the inputs collected and generated, as well as teams involved in the operation of the hedging program (including asset-liability management, valuation and trading functions);
- Description of the roles and responsibilities for all personnel and processes involved, including operation, risk management and risk oversight, as well as sign offs from each of the functions described;
- Description of the roles and responsibilities of the three lines of defence for the dynamic hedging program;
- Description of the process followed to approve the dynamic hedging strategy, including the frequency of strategy reviews; and
- Description of the process to review the dynamic hedging program for new products and/or to expand the program.

Insurers should include the items listed above in the Capital Guideline Certification Report.

7.3.2.2 Quantitative conditions

An insurer's dynamic hedging program must have been in place for at least three years before it may reduce the requirements in section 7.2.2.

In addition, in the past 12 quarters from the calculation date, for quarters that have changes in liabilities that are greater than 10% of the liabilities for the hedged cash flows as of the previous quarter end, the program's quarterly hedge effectiveness must be within [70%, 130%] in each geographic region where the program is employed. Quarterly hedge effectiveness is defined as:

$$Quarterly\ Hedge\ Effectiveness = \frac{Quarterly\ change\ in\ the\ value\ of\ the\ hedging\ portfolio}{Quarterly\ change\ in\ the\ value\ of\ the\ hedged\ liabilities}$$

where:

The value of the hedged liabilities is the liability calculated for segregated fund guarantees using only the hedged cash flows (including both hedged outflows and hedged inflows). Changes in the value of the hedged liabilities include all changes due to market movements, irrespective of whether the risks are hedged.

7.3.2.3 Dynamic hedging capital credit

The amount by which the equity risk requirements can be reduced to account for the dynamic hedging program is equal to the difference between equity risk requirements reflecting dynamic hedging and the downward price shock component of section 7.2.2, subject to the limitations in section 7.3.3.

Equity risk requirements reflecting dynamic hedging are calculated using the prescribed equity price scenarios set out in Appendix 7-C, where each scenario represents a series of 52 weekly (or 12 monthly) equity prices. For each scenario, the difference between changes in the value of Restated Liabilities for the hedged cash flows[143] and changes in the value of hedging assets (including cash flow incurred) is calculated after each time step and discounted to time zero using the swap curve. Equity risk requirements reflecting dynamic hedging is the average of the positive present values across the prescribed scenarios.

The dynamic hedging program's rebalancing rules and risk tolerance must be appropriately reflected at each time step of the calculation. In addition, the change in the value of hedging assets and the change in the value of Restated Liabilities for the hedged cash flows must only reflect variations in the price of equity, expected claim payments, expected maturities, and the erosion in value due to the passage of time. Values for other variables (e.g., implied volatilities) are the values at time zero and should not change in the projection.

Example: Calculation of equity risk requirements reflecting dynamic hedging

The following illustrates the calculation of the change in value of hedging assets and the change of Restated Liabilities for the hedged cash flows, from time 0 (opening position) to time 1 (after market movement).

[143] Hedged cash flows should include hedged cash inflows and hedged cash outflows (e.g., fees).

This calculation is repeated at each time step in each of the 20 scenarios. The average of positive present values across the 20 scenarios is then calculated to determine the equity risk requirements reflecting dynamic hedging.

		Hedged liability		Hedging asset	
		Value	Sensitivity	Value	Sensitivity
a)	Opening position (valuation date)	1000	100	0	100
b)	Step 1: Update valuation at time 1	1200	N.A	180	N.A
c)	Step 2: Update sensitivity at time 1	N.A	110	N.A	105
d)	Step 3: Perform rebalancing at time 1	N.A	N.A	0	5
e)	Position after rebalancing	1200	110	180	110
f)	Review cash flow incurred	5	N.A.	-2	N.A
g)	Change in this period [e) – a) + f)]	205	N.A.	178	N.A

h) Hedging (gains)/losses before discounting = 205 – 178 = 27
i) Hedging (gains)/losses discounted to time 0 = 27 x $(1+\text{swap rate})^{(-1/52)}$ = ≈ 27

Notes:
a): Valuation of the hedged liabilities are conducted using swap rates excluding illiquidity premiums.
e): Position after rebalancing will be the opening position for next period.
f): For liability cash flows, positive indicates payout to policyholders. For asset cash flows, positive indicates gain and negative indicates losses. Asset cash flows should include costs of entering into positions, such as transaction costs, and realized gains/losses from exiting positions.
i) Hedging (gains)/losses in each period should be discounted to time zero using swap rate curve.

7.3.3 Limit on recognition of hedges

For each block of segregated fund guarantees that is dynamically hedged, the requirements in section 7.2.2 can be reduced by up to 80% of the total amount calculated in sections 7.3.1 and 7.3.2 for the hedged cash flows only.

7.4 Simplified option

Insurers may calculate capital requirements for segregated fund guarantee risk per this section if the conditions in section 7.4.1 are met. The capital requirements calculated in this section are to be used in place of those included in sections 7.2 and 7.3. Total guaranteed value used for simplified option calculations are net of registered reinsurance.

7.4.1 Conditions

Insurers with a total guaranteed value of $100M or less may choose to calculate segregated fund guarantee capital requirements using the approach in section 7.4.2 instead of the approach described in sections 7.2 and 7.3.

An insurer will be required to notify the AMF in writing when first electing to use the simplified option. For qualifying insurers, alternating between the methodology described in section 7.2 and section 7.4 is only permitted every two years. After two years, if the total guaranteed value is greater than $100M, the insurer will be expected to use sections 7.2 and 7.3 to calculate its capital requirements. In addition, an insurer will be required to notify the AMF in writing when changing approaches.

Notwithstanding the conditions above, the AMF has the discretion to require an insurer to use sections 7.2 et 7.3. Factors the AMF may consider in using this discretion include, but are not necessarily limited to, high rate of portfolio growth, changes to the product portfolio, innovative or higher risk products.

7.4.2 Capital requirements

Capital requirements are calculated by applying a factor to the total guaranteed value by type of guarantee, net of registered reinsurance, according to the following table:

Type of guarantee	Factor
Guaranteed Minimum Withdrawal Benefit (GMWB)	15%
Guaranteed Minimum Maturity Benefit (GMMB)	10%
Guaranteed Minimum Death Benefit (GMDB)	10%

If guarantees cannot be separated (e.g., two guarantees are sold together), the higher factor should be applied to the combined guaranteed value.

Insurers should contact the AMF to determine the capital treatment for guarantee types for which factors have not been provided.

7.5 Transition measures

The following transition measures are applicable:

- A scalar of ω will be applied to the items listed in section 7.5.1. This scalar will be reassessed as this guideline evolves.

- At the discretion of the insurer and as a one-time election at transition, items listed in sections 7.5.1 and 7.5.2, after application of the scalar, can be smoothed by averaging them with up to four quarters (three previous quarters and the current quarter) beginning on or after January 1, 2025. This smoothing applies either to all items or to none, and its application will be reassessed by January 1, 2028. The election must be made within the first six months of the first financial year beginning on or after January 1, 2025, and cannot be changed thereafter.

7.5.1 Capital requirements

To cover risks not covered or undervalued, a scalar of ω applies to the following items under the standardized approach, including the simplified option:

- required capital for segregated fund guarantees (RC_{SFG}) as described in section 8.2.3;

- marginal capital requirements for credit, market and insurance risks in the amounts recoverable on surrender (refer to section 2.1.2.9).

The following table sets out the scalar ω:

Scalar	**Factor**
ω	110%

7.5.2 Impact on Restated Liabilities

The smoothing applies to the difference between Restated Liabilities and the Best Estimate Liabilities that is added to the equity adjustment for CARLI purposes (refer to section 2.1.1).

7.5.3 Capital requirements relative to the transition measures

The amount of required capital relative to the transition measures (*TM*), to be included in the calculation of the Base Solvency Buffer in section 11.3, is calculated by summing the following items:

- The impact of applying the scalar (TM_{SC})
- The impact of applying the smoothing measure (TM_{SM})

where:

$$t = current\ quarter$$
$$n = \max[\text{number of quarters since January 1, 2025; 4}]$$
$$TM_{SC} = (\omega^t - 1) \times CR_{SFG}^t$$
$$TM_{SM} = \frac{1}{n} \times \left(\sum_{i=1}^{n-1} \omega^{t-i} \times RC_{SFG}^{t-i} \right) - \frac{n-1}{n} \times \omega^t \times RC_{SFG}^t$$

7.6 Credit for ceded reinsurance

Refer to section 10.2 for the adjustments to available capital to account for ceded segregated fund guarantee liabilities arising from unregistered reinsurance.

Eligible deposits held for unregistered reinsurance as per section 10.3, for a period not less than the fund guarantee term remaining, may be recognized subject to the limit in section 6.7.1. For Canadian business, the deposits must be held in Canada, and the AMF must have given the insurer permission to recognize the deposits.

Appendix 7-A Equity implied volatility shocks on a forward basis

The following table shows the equity implied volatility shocks on a forward basis, with annualized current forward equity volatilities in the left-hand column and the month at which these shocks apply (1, 6, ..., 360, 1200) across the top.

Annualized current forward equity volatility	Months												
	1	6	12	24	36	48	60	84	120	144	180	360	1200
1	40.0	19.5	25.2	20.6	22.4	22.6	22.3	22.0	34.9	43.1	26.5	24.0	24.0
2	39.0	18.6	24.5	19.5	21.4	22.1	21.2	20.8	33.9	42.1	25.5	23.0	23.0
3	38.0	17.7	23.3	18.9	20.4	21.2	20.3	19.9	32.8	40.9	25.6	22.0	22.0
4	37.0	16.9	22.9	17.7	20.0	20.1	19.0	19.7	31.7	39.6	24.2	21.0	21.0
5	36.0	16.1	21.9	17.1	18.9	19.1	18.7	18.2	30.9	38.7	23.3	20.0	20.0
6	35.0	15.5	21.0	16.4	18.3	18.6	17.3	17.7	29.8	37.5	22.7	19.0	19.0
7	34.0	14.7	20.4	15.5	17.5	17.9	17.1	16.7	28.7	36.4	22.1	18.0	18.0
8	33.0	14.0	19.7	14.9	16.7	17.3	16.3	15.8	28.0	35.1	20.8	17.0	17.0
9	32.0	13.4	18.9	14.4	15.9	16.6	15.6	15.2	26.9	33.5	20.5	16.0	16.0
10	31.0	12.8	18.3	13.8	15.4	15.5	15.0	14.5	26.0	32.4	20.0	15.0	15.0
11	30.0	12.3	17.7	13.0	14.9	15.2	14.3	13.9	24.9	31.3	18.7	14.0	14.0
12	29.0	11.7	17.0	12.4	14.5	14.5	13.7	12.9	24.1	30.1	18.2	13.0	13.0
13	28.0	11.3	16.2	12.1	13.8	14.0	13.0	12.4	23.0	28.7	18.0	12.0	12.0
14	27.0	10.7	15.6	11.6	13.2	13.4	12.4	11.9	21.9	27.2	17.8	11.0	11.0
15	26.0	10.3	15.1	11.0	12.6	12.8	11.9	11.6	20.8	26.1	16.5	10.0	10.0
16	25.0	9.8	14.5	10.6	12.3	12.2	11.4	10.8	20.1	24.9	15.4	9.0	9.0
17	24.0	9.4	14.0	10.3	11.5	11.6	11.3	9.9	19.1	23.1	16.3	8.0	8.0
18	23.0	9.0	13.4	9.6	11.1	11.4	10.7	9.3	18.1	22.0	15.1	7.0	7.0
19	22.0	8.6	12.9	9.3	10.5	10.9	10.2	9.0	17.1	20.5	14.9	6.0	6.0
20	21.0	8.2	12.3	8.7	10.3	10.3	9.7	8.5	16.0	18.9	14.0	5.0	5.0
21	20.0	7.8	11.8	8.4	9.7	9.8	9.2	8.0	15.0	17.9	13.6	4.0	4.0
22	19.0	7.3	11.3	8.0	9.2	9.3	8.7	7.5	14.3	16.8	12.5	3.0	3.0
23	18.0	7.1	10.5	7.9	8.9	8.9	8.2	7.0	13.3	14.8	12.7	2.0	2.0
24	17.0	6.7	10.2	7.3	8.4	8.4	7.7	6.5	12.5	13.6	11.7	1.0	1.0
25	16.0	6.2	9.7	6.9	7.8	8.1	7.7	5.9	11.3	12.1	11.5	0.0	0.0
26	15.0	6.0	9.2	6.5	7.7	7.5	6.8	5.6	10.5	11.0	10.4	-1.0	-1.0
27	14.0	5.5	8.7	6.2	7.1	7.2	6.9	5.1	9.5	9.5	10.4	-2.0	-2.0
28	13.0	5.3	8.2	5.8	6.9	6.7	6.4	4.4	8.5	8.3	10.2	-3.0	-3.0
29	12.0	5.0	7.4	5.5	6.5	6.4	5.4	4.7	7.3	8.3	10.1	-4.0	-4.0

30	11.0	4.6	7.2	5.2	5.9	5.9	5.4	3.8	6.6	7.5	9.4	-5.0	-5.0
31	10.0	4.3	6.7	4.8	5.7	5.4	5.1	3.3	5.6	7.1	9.0	-6.0	-6.0
32	9.0	4.0	5.9	4.8	5.1	5.1	4.6	3.0	4.8	6.5	8.3	-7.0	-7.0
33	8.0	3.5	5.7	4.1	4.8	4.9	4.1	2.7	4.3	5.8	7.3	-8.0	-8.0
34	7.0	3.3	5.2	3.7	4.6	4.4	3.7	2.4	4.0	5.6	7.2	-9.0	-9.0
35	6.0	3.0	4.7	3.5	4.2	4.1	3.3	2.1	3.8	5.5	7.2	-10.0	-10.0
36	5.0	2.7	4.2	3.3	3.7	3.7	2.9	1.8	3.3	4.9	6.4	-11.0	-11.0
37	4.0	2.4	3.7	2.9	3.5	3.2	2.5	1.5	2.8	4.1	5.5	-12.0	-12.0
38	3.0	2.1	3.2	2.6	3.1	2.8	2.1	1.2	2.6	4.0	5.4	-13.0	-13.0
39	2.0	1.8	2.7	2.2	2.8	2.6	2.2	0.3	1.7	3.1	4.5	-14.0	-14.0
40	1.0	1.5	2.2	2.0	2.4	2.2	1.8	0.0	1.5	2.9	4.4	-15.0	-15.0
41	0.0	1.2	1.8	1.7	1.9	1.8	1.4	-0.4	1.1	2.7	4.2	-16.0	-16.0
42	-1.0	0.8	1.3	1.3	1.7	1.4	1.0	-0.7	0.9	2.5	4.1	-17.0	-17.0
43	-2.0	0.5	0.8	1.1	1.2	1.2	1.1	-1.2	0.2	1.7	3.1	-18.0	-18.0
44	-3.0	0.2	0.3	0.8	0.9	1.0	0.1	-1.2	0.0	1.3	2.5	-19.0	-19.0
45	-4.0	-0.1	-0.1	0.6	0.5	0.6	-0.3	-1.5	-0.2	1.1	2.4	-20.0	-20.0
46	-5.0	-0.4	-0.6	0.4	0.1	0.1	-0.1	-2.4	-0.9	0.7	2.2	-21.0	-21.0
47	-6.0	-0.7	-0.9	-0.2	0.0	-0.4	-0.4	-2.3	-1.1	0.2	1.5	-22.0	-22.0
48	-7.0	-1.0	-1.4	-0.5	-0.3	-0.4	-0.9	-2.9	-1.5	-0.1	1.3	-23.0	-23.0
49	-8.0	-1.2	-2.0	-0.6	-0.8	-0.8	-1.3	-3.3	-2.1	-0.9	0.3	-24.0	-24.0
50	-9.0	-1.6	-2.5	-0.9	-1.2	-1.2	-1.7	-3.1	-1.9	-0.7	0.5	-25.0	-25.0
51	-10.0	-1.9	-3.0	-1.0	-1.4	-1.5	-2.0	-3.8	-2.4	-1.1	0.3	-26.0	-26.0
52	-11.0	-2.2	-3.2	-1.5	-1.8	-1.9	-2.4	-4.0	-2.8	-1.6	-0.4	-27.0	-27.0
53	-12.0	-2.5	-3.7	-1.8	-2.3	-2.1	-2.3	-4.5	-3.2	-1.9	-0.7	-28.0	-28.0
54	-13.0	-2.7	-4.4	-1.8	-2.4	-2.6	-3.1	-4.7	-3.4	-2.2	-0.9	-29.0	-29.0
55	-14.0	-3.0	-4.6	-2.3	-2.8	-2.8	-3.0	-5.1	-3.9	-2.7	-1.6	-30.0	-30.0
56	-15.0	-3.4	-5.1	-2.7	-3.0	-3.3	-3.4	-5.5	-4.3	-3.0	-1.8	-31.0	-31.0
57	-16.0	-3.7	-5.6	-2.8	-3.2	-3.7	-3.7	-5.7	-4.6	-3.5	-2.5	-32.0	-32.0
58	-17.0	-3.9	-6.0	-3.2	-3.6	-3.8	-3.6	-6.5	-5.3	-4.0	-2.7	-33.0	-33.0
59	-18.0	-4.2	-6.5	-3.5	-3.9	-4.0	-4.5	-6.2	-5.0	-3.9	-2.7	-34.0	-34.0
60	-18.9	-4.6	-7.0	-3.6	-4.2	-4.6	-4.3	-7.0	-5.8	-4.6	-3.5	-35.0	-35.0
61	-19.9	-4.8	-7.4	-4.0	-4.4	-4.8	-5.2	-6.8	-6.0	-5.2	-4.5	-36.0	-36.0
62	-20.9	-5.1	-7.9	-4.3	-4.9	-5.0	-5.2	-7.5	-6.5	-5.4	-4.4	-37.0	-37.0
63	-21.9	-5.5	-8.3	-4.4	-5.1	-5.3	-5.4	-7.9	-6.8	-5.7	-4.7	-38.0	-38.0
64	-22.9	-5.7	-8.8	-4.7	-5.8	-5.6	-5.9	-8.0	-6.9	-5.8	-4.6	-39.0	-39.0
65	-23.9	-6.0	-9.2	-4.8	-5.9	-6.0	-6.2	-8.3	-7.3	-6.3	-5.3	-40.0	-40.0

66	-24.9	-6.3	-9.5	-5.3	-6.3	-6.4	-6.6	-8.7	-7.9	-7.1	-6.4	-41.0	-41.0
67	-25.9	-6.6	-10.1	-5.5	-6.6	-6.4	-7.0	-8.8	-8.0	-7.2	-6.4	-42.0	-42.0
68	-26.9	-6.9	-10.6	-5.6	-7.0	-6.9	-6.7	-9.4	-8.5	-7.6	-6.6	-43.0	-43.0
69	-27.9	-7.2	-10.9	-6.1	-7.2	-7.1	-7.7	-9.4	-8.5	-7.5	-6.6	-44.0	-44.0
70	-28.9	-7.4	-11.6	-6.2	-7.6	-7.6	-7.4	-9.9	-9.1	-8.2	-7.4	-45.0	-45.0
71	-29.9	-7.8	-11.8	-6.7	-7.8	-7.7	-7.9	-10.5	-9.5	-8.6	-7.6	-46.0	-46.0
72	-30.9	-8.0	-12.5	-6.7	-8.2	-8.2	-7.7	-11.1	-10.1	-9.0	-7.9	-47.0	-47.0
73	-31.9	-8.3	-12.7	-7.2	-8.3	-8.4	-8.5	-10.8	-10.1	-9.4	-8.8	-48.0	-48.0
74	-32.9	-8.5	-13.4	-7.2	-8.7	-8.9	-8.4	-11.6	-10.6	-9.7	-8.7	-49.0	-49.0
75	-33.9	-8.9	-13.9	-7.5	-9.0	-8.9	-8.8	-11.7	-10.7	-9.7	-8.7	-50.0	-50.0

Appendix 7-B Equity implied volatility shocks on a spot basis

The following table shows the equity implied volatility shocks on a spot basis, with annualized current spot equity volatilities in the left-hand column and the term at which these shocks apply (months 1, 6, ..., 360, 1200) across the top.

Annualized current spot equity volatility	**Months**												
	1	**6**	**12**	**24**	**36**	**48**	**60**	**84**	**120**	**144**	**180**	**360**	**1200**
1	40.0	29.3	26.3	24.4	23.5	23.3	23.1	23.0	23.7	27.6	28.9	27.1	25.0
2	39.0	28.3	25.4	23.5	22.5	22.4	22.2	22.0	22.7	26.6	27.9	26.1	24.0
3	38.0	27.4	24.4	22.6	21.6	21.5	21.3	21.1	21.8	25.6	27.0	25.4	23.1
4	37.0	26.4	23.6	21.7	20.8	20.7	20.4	20.3	21.0	24.7	26.0	24.3	22.0
5	36.0	25.5	22.7	20.9	20.0	19.8	19.6	19.4	20.1	23.8	25.1	23.4	21.1
6	35.0	24.7	21.9	20.1	19.2	19.1	18.8	18.6	19.3	22.9	24.2	22.6	20.1
7	34.0	23.8	21.1	19.3	18.4	18.3	18.1	17.9	18.5	22.0	23.3	21.7	19.2
8	33.0	22.9	20.3	18.6	17.7	17.6	17.4	17.1	17.8	21.2	22.4	20.7	18.2
9	32.0	22.1	19.5	17.9	17.0	16.9	16.7	16.4	17.1	20.3	21.5	19.9	17.2
10	31.0	21.3	18.8	17.2	16.4	16.2	16.0	15.7	16.4	19.5	20.7	19.2	16.3
11	30.0	20.5	18.1	16.5	15.7	15.6	15.4	15.1	15.7	18.7	19.8	18.1	15.3
12	29.0	19.7	17.4	15.8	15.1	15.0	14.8	14.4	15.0	17.9	19.0	17.4	14.4
13	28.0	19.0	16.7	15.2	14.5	14.4	14.2	13.8	14.4	17.1	18.2	16.7	13.5
14	27.0	18.2	16.0	14.6	13.9	13.8	13.6	13.2	13.8	16.3	17.4	16.0	12.6
15	26.0	17.5	15.4	14.0	13.3	13.2	13.0	12.7	13.2	15.6	16.6	15.0	11.6
16	25.0	16.7	14.7	13.4	12.8	12.7	12.5	12.1	12.6	14.9	15.8	14.1	10.6
17	24.0	16.0	14.1	12.9	12.3	12.1	12.0	11.5	12.1	14.1	15.1	13.7	9.8
18	23.0	15.3	13.5	12.3	11.7	11.6	11.5	11.0	11.5	13.4	14.3	12.7	8.9

19	22.0	14.6	12.9	11.8	11.2	11.1	11.0	10.5	11.0	12.7	13.6	12.1	8.0
20	21.0	13.9	12.3	11.2	10.7	10.6	10.5	10.0	10.5	12.0	12.8	11.2	7.0
21	20.0	13.2	11.7	10.7	10.2	10.1	10.0	9.5	9.9	11.3	12.1	10.5	6.1
22	19.0	12.5	11.1	10.2	9.7	9.6	9.5	9.0	9.4	10.7	11.4	9.7	5.2
23	18.0	11.9	10.5	9.7	9.3	9.2	9.1	8.5	9.0	10.0	10.7	9.1	4.3
24	17.0	11.2	10.0	9.2	8.8	8.7	8.6	8.0	8.5	9.4	10.0	8.3	3.4
25	16.0	10.5	9.4	8.7	8.3	8.2	8.2	7.6	8.0	8.7	9.3	7.6	2.5
26	15.0	9.9	8.9	8.2	7.9	7.8	7.7	7.1	7.5	8.1	8.6	6.8	1.6
27	14.0	9.2	8.3	7.7	7.4	7.3	7.3	6.7	7.1	7.5	8.0	6.2	0.7
28	13.0	8.6	7.8	7.2	7.0	6.9	6.9	6.2	6.6	6.8	7.3	5.6	-0.1
29	12.0	8.0	7.2	6.7	6.5	6.5	6.4	5.8	6.2	6.2	6.7	5.0	-1.0
30	11.0	7.3	6.7	6.3	6.1	6.0	6.0	5.3	5.8	5.6	6.0	4.3	-1.9
31	10.0	6.7	6.2	5.8	5.7	5.6	5.6	4.9	5.3	5.0	5.4	3.6	-2.8
32	9.0	6.1	5.6	5.4	5.3	5.2	5.2	4.5	4.9	4.4	4.7	2.8	-3.7
33	8.0	5.4	5.1	4.9	4.8	4.8	4.8	4.1	4.5	3.9	4.1	2.1	-4.6
34	7.0	4.8	4.6	4.4	4.4	4.4	4.4	3.7	4.1	3.3	3.5	1.5	-5.4
35	6.0	4.2	4.1	4.0	4.0	4.0	4.0	3.3	3.7	2.7	2.9	1.0	-6.3
36	5.0	3.6	3.6	3.6	3.6	3.6	3.6	2.9	3.3	2.1	2.2	0.2	-7.2
37	4.0	3.0	3.1	3.1	3.2	3.2	3.2	2.5	2.9	1.6	1.6	-0.6	-8.1
38	3.0	2.4	2.6	2.7	2.8	2.8	2.8	2.1	2.5	1.0	1.0	-1.2	-8.9
39	2.0	1.8	2.1	2.2	2.4	2.4	2.5	1.7	2.1	0.5	0.4	-1.9	-9.8
40	1.0	1.2	1.6	1.8	2.0	2.0	2.1	1.3	1.7	-0.1	-0.2	-2.5	-10.7
41	0.0	0.6	1.1	1.4	1.6	1.6	1.7	0.9	1.3	-0.6	-0.7	-3.0	-11.5
42	-1.0	0.0	0.6	0.9	1.2	1.2	1.3	0.5	0.9	-1.2	-1.3	-3.6	-12.3
43	-2.0	-0.6	0.1	0.5	0.8	0.8	1.0	0.2	0.5	-1.7	-1.9	-4.4	-13.2
44	-3.0	-1.2	-0.4	0.1	0.4	0.5	0.6	-0.2	0.2	-2.2	-2.5	-5.1	-14.1
45	-4.0	-1.8	-0.9	-0.3	0.0	0.1	0.2	-0.6	-0.2	-2.8	-3.1	-5.6	-15.0
46	-5.0	-2.4	-1.4	-0.7	-0.3	-0.3	-0.1	-1.0	-0.6	-3.3	-3.6	-6.1	-15.8
47	-6.0	-3.0	-1.8	-1.2	-0.7	-0.7	-0.5	-1.3	-0.9	-3.8	-4.2	-6.9	-16.7
48	-7.0	-3.6	-2.3	-1.6	-1.1	-1.0	-0.8	-1.7	-1.3	-4.3	-4.7	-7.4	-17.5
49	-8.0	-4.1	-2.8	-2.0	-1.5	-1.4	-1.2	-2.1	-1.7	-4.8	-5.3	-8.2	-18.4
50	-9.0	-4.7	-3.3	-2.4	-1.9	-1.8	-1.6	-2.4	-2.0	-5.4	-5.9	-8.7	-19.2
51	-10.0	-5.3	-3.8	-2.8	-2.2	-2.1	-1.9	-2.8	-2.4	-5.9	-6.4	-9.2	-20.0
52	-11.0	-5.9	-4.2	-3.2	-2.6	-2.5	-2.3	-3.2	-2.7	-6.4	-7.0	-9.9	-20.9
53	-12.0	-6.5	-4.7	-3.6	-3.0	-2.9	-2.6	-3.5	-3.1	-6.9	-7.5	-10.4	-21.7
54	-13.0	-7.0	-5.2	-4.0	-3.3	-3.2	-3.0	-3.9	-3.5	-7.4	-8.0	-11.0	-22.5

55	-14.0	-7.6	-5.6	-4.4	-3.7	-3.6	-3.3	-4.2	-3.8	-7.9	-8.6	-11.7	-23.4
56	-15.0	-8.2	-6.1	-4.9	-4.1	-4.0	-3.7	-4.6	-4.2	-8.4	-9.1	-12.2	-24.2
57	-16.0	-8.8	-6.6	-5.3	-4.4	-4.3	-4.0	-4.9	-4.5	-8.9	-9.7	-12.9	-25.1
58	-17.0	-9.3	-7.0	-5.7	-4.8	-4.7	-4.3	-5.3	-4.9	-9.4	-10.2	-13.5	-25.9
59	-18.0	-9.9	-7.5	-6.1	-5.2	-5.0	-4.7	-5.6	-5.2	-9.9	-10.7	-14.0	-26.7
60	-18.9	-10.5	-8.0	-6.5	-5.5	-5.4	-5.0	-6.0	-5.5	-10.3	-11.2	-14.6	-27.5
61	-19.9	-11.0	-8.4	-6.9	-5.9	-5.7	-5.4	-6.3	-5.9	-10.8	-11.8	-15.4	-28.4
62	-20.9	-11.6	-8.9	-7.3	-6.3	-6.1	-5.7	-6.7	-6.2	-11.3	-12.3	-15.9	-29.2
63	-21.9	-12.2	-9.4	-7.7	-6.6	-6.4	-6.0	-7.0	-6.6	-11.8	-12.8	-16.4	-30.0
64	-22.9	-12.7	-9.8	-8.0	-7.0	-6.8	-6.4	-7.4	-6.9	-12.3	-13.3	-16.9	-30.8
65	-23.9	-13.3	-10.3	-8.4	-7.3	-7.1	-6.7	-7.7	-7.2	-12.8	-13.9	-17.6	-31.7
66	-24.9	-13.9	-10.7	-8.8	-7.7	-7.5	-7.1	-8.1	-7.6	-13.2	-14.4	-18.3	-32.5
67	-25.9	-14.4	-11.2	-9.2	-8.1	-7.8	-7.4	-8.4	-7.9	-13.7	-14.9	-18.8	-33.3
68	-26.9	-15.0	-11.7	-9.6	-8.4	-8.2	-7.7	-8.7	-8.3	-14.2	-15.4	-19.4	-34.1
69	-27.9	-15.6	-12.1	-10.0	-8.8	-8.5	-8.1	-9.1	-8.6	-14.7	-15.9	-19.8	-34.9
70	-28.9	-16.1	-12.6	-10.4	-9.1	-8.9	-8.4	-9.4	-8.9	-15.1	-16.4	-20.5	-35.8
71	-29.9	-16.7	-13.0	-10.8	-9.5	-9.2	-8.7	-9.8	-9.3	-15.6	-16.9	-21.0	-36.6
72	-30.9	-17.2	-13.5	-11.2	-9.8	-9.6	-9.0	-10.1	-9.7	-16.1	-17.4	-21.6	-37.4
73	-31.9	-17.8	-13.9	-11.6	-10.2	-9.9	-9.4	-10.4	-10.0	-16.5	-17.9	-22.3	-38.2
74	-32.9	-18.3	-14.4	-12.0	-10.5	-10.3	-9.7	-10.8	-10.3	-17.0	-18.4	-22.7	-39.0
75	-33.9	-18.9	-14.9	-12.4	-10.9	-10.6	-10.0	-11.1	-10.6	-17.5	-18.9	-23.2	-39.8

Appendix 7-C Equity price scenarios

The following 20 scenarios are equity scenarios with a starting value of 100 and weekly steps over a one-year horizon.

	Scenarios 1 to 10									
Week	1	2	3	4	5	6	7	8	9	10
0	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000
1	98.7970	96.8683	99.3986	98.1888	100.9941	99.9861	101.1119	99.1786	101.6006	101.6903
2	97.3052	96.5186	92.8778	96.7853	98.4617	100.7745	98.2086	95.2892	97.7093	105.8101
3	97.1394	97.4251	93.9120	83.8656	97.5216	96.6010	97.8687	91.4380	97.5545	104.4836
4	94.4242	98.2079	93.3285	83.3706	97.9573	95.3301	99.2204	92.9601	96.9777	106.8300
5	95.2207	98.2644	93.2644	82.0308	97.3128	92.7091	98.0153	94.7481	96.6300	107.7423
6	96.3871	99.0042	93.4422	80.5850	97.3352	93.6007	98.8759	90.9911	96.4362	107.8391
7	94.4367	99.8657	92.5945	82.1358	100.5347	90.9215	99.7119	92.2636	96.9410	108.1354
8	93.6641	99.7570	96.1225	83.9099	96.2567	88.3318	98.5094	89.5542	94.8005	106.6145
9	94.2661	97.6913	97.5722	83.0715	94.8379	88.1819	101.6938	93.3412	97.0180	105.0775
10	94.6542	95.3841	96.2288	83.0872	94.1812	85.8473	98.1329	90.1725	96.7847	105.0137
11	92.3250	90.7800	95.0170	85.1775	93.7344	86.0981	98.4102	91.5068	93.8839	102.6084
12	93.3846	92.0924	93.1338	84.3054	94.4081	83.3136	97.7366	88.9052	91.8163	103.5422
13	87.8595	91.0979	92.8686	85.2758	94.7769	84.8910	100.5344	85.3718	90.5434	104.7303
14	84.1003	89.3071	92.6620	84.9788	98.1881	84.5886	101.3079	84.9085	89.2155	102.3614
15	84.9736	84.2546	94.3404	87.1509	100.5429	84.6679	100.6505	83.5131	87.8703	100.9246
16	83.0929	85.2126	94.0242	90.4514	101.0311	84.7077	98.7565	79.9113	88.7022	100.5428
17	81.7866	83.4540	95.9440	91.2319	101.4038	82.8723	98.3360	79.5966	93.1033	99.3282
18	81.9300	80.1818	95.2847	89.9735	101.9361	84.2472	98.7323	78.1680	91.0126	101.8168
19	84.1286	71.1607	90.3047	87.8903	103.0117	83.0786	98.2534	79.4997	90.0720	99.7325
20	83.1505	71.3327	92.5724	86.2805	101.2824	83.1230	93.7856	77.2098	92.0672	101.8461
21	83.5336	68.9453	88.2018	86.0172	101.3358	80.5688	95.6593	75.7004	90.3513	100.9568

22	80.3745	73.8789	86.8768	83.6347	101.2116	79.0808	92.7257	78.5419	89.9788	102.4787
23	84.2986	76.0352	85.9882	85.1649	98.3420	76.7123	95.6206	76.8864	90.2703	100.2106
24	82.5651	76.4562	84.7751	82.8855	99.0425	76.0666	93.1995	77.7610	93.5943	95.1277
25	82.0242	75.2415	84.6915	81.5497	99.6889	77.5243	91.1624	79.5425	91.8534	90.5325
26	79.0982	74.0352	84.2703	81.1228	101.5207	76.3769	91.5660	79.9211	90.3565	87.5902
27	78.0058	72.6670	88.4579	78.3252	100.2622	75.4253	87.6861	76.9846	87.9394	83.1495
28	75.7063	69.4887	85.8238	75.2961	98.6811	74.8627	89.2977	78.7657	86.5958	82.3845
29	72.6348	71.6235	84.6976	74.8067	96.6382	73.7156	92.3732	77.5871	84.9955	83.2128
30	74.5695	67.9354	79.4751	73.8603	99.6738	70.6003	89.9241	77.6140	87.8894	81.2557
31	72.3446	66.3290	76.1851	73.1402	99.7083	67.1256	87.9161	77.8994	70.8098	79.1764
32	66.0096	64.8758	76.8703	71.9930	97.3729	68.6955	85.1563	79.8995	67.8826	73.5773
33	68.6769	63.5391	79.2757	69.5167	81.2608	64.5944	83.5625	84.7773	68.0490	73.1151
34	68.0810	64.2522	78.5518	66.9905	76.4614	66.8182	80.4579	88.2504	68.7796	71.7078
35	69.3944	60.3566	73.8380	68.6280	72.6028	67.4251	80.4076	90.3618	69.0107	73.1234
36	67.3572	59.4799	76.9216	71.8486	73.7626	69.0519	80.2839	85.6648	69.3703	72.0355
37	64.0510	60.0263	75.3546	72.4319	74.1592	67.6117	79.4525	83.7070	68.5771	72.5236
38	61.7929	59.0163	76.6730	77.0349	73.5703	70.3256	80.4392	81.7698	69.7732	72.7998
39	60.7075	62.7510	70.4044	78.0264	71.5350	69.0774	78.7299	79.8591	71.5697	71.9689
40	61.6795	63.2192	69.1831	65.1049	69.5187	70.0646	75.4120	80.6697	67.2250	71.5301
41	63.3452	61.7718	71.6714	63.5372	72.3599	67.4499	75.6395	77.3654	69.6734	71.1541
42	62.2393	60.5148	70.0022	62.5647	70.7673	67.4582	72.9706	77.2469	69.1896	70.0658
43	58.6278	59.6287	68.6723	61.4283	67.5830	65.7134	73.9720	80.6451	69.3147	68.4741
44	57.5402	58.6160	64.5141	62.9287	68.7768	66.9007	72.0298	83.3764	70.2676	69.2260
45	57.1015	57.7187	67.0058	60.0613	69.9415	69.3632	67.4212	86.9800	70.4284	67.1138
46	54.5786	59.1123	65.5425	58.5752	71.7350	70.9283	68.7218	80.6092	72.6067	68.8950
47	53.5556	57.8515	62.3272	59.7072	67.8353	71.8586	64.9337	79.0385	74.5590	69.7921
48	51.5959	58.7823	61.8313	59.7655	68.6950	69.8328	61.9028	74.5982	76.2556	67.8927
49	49.2207	56.8663	62.0335	59.7395	66.9320	72.4179	59.3747	68.9382	66.8253	64.7807
50	50.7417	54.0780	55.7309	62.3448	66.4736	70.3473	60.3621	65.8870	66.6616	63.3644
51	49.6020	51.0973	56.8299	62.0824	65.5805	65.9308	61.0291	65.3869	64.2563	65.6700
52	49.7922	54.9144	57.5049	62.8909	64.0464	64.3109	64.4464	64.5551	64.9331	64.9677

	Scenarios 11 to 20									
Week	11	12	13	14	15	16	17	18	19	20
0	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000
1	99.8193	98.8483	99.5169	100.9373	94.3804	100.8456	100.3089	99.5799	102.4532	99.7172
2	103.1410	96.1216	98.5032	101.8912	91.8959	99.9980	101.2950	104.4412	106.3560	100.6899
3	101.9193	97.3152	98.3516	100.4256	92.6468	99.5759	101.1228	104.0596	105.3275	101.5106
4	102.9123	98.1760	99.3762	99.4196	96.2791	99.8008	101.1711	102.9396	103.3518	100.4775
5	103.3265	99.3251	96.7524	93.4987	98.1296	100.4458	102.0132	103.3459	101.9924	104.5266
6	104.5843	101.9380	100.7400	95.2509	95.1175	102.2959	106.1939	102.9457	101.6663	100.8956
7	100.6492	102.1271	104.2376	94.1282	98.4196	102.5104	108.5723	101.6172	103.8093	100.0915
8	103.0136	99.3691	106.4431	93.7279	100.6460	102.2253	111.5289	103.5657	105.7656	102.1681
9	103.4409	99.2216	107.8320	92.8193	100.7243	101.9858	115.2949	106.7555	110.5291	103.3073
10	106.3919	99.8077	110.9836	92.5373	102.1174	103.2716	112.8770	108.9608	109.4405	103.1487
11	108.8946	101.6865	107.5891	92.0913	103.8361	104.1746	113.8627	112.5068	111.7363	105.8819
12	109.7642	102.3973	110.5009	89.8371	101.9856	107.1210	112.8857	115.9297	115.8739	109.0137
13	111.1767	104.4874	111.0793	91.6727	101.4174	106.6319	114.5202	117.4139	115.1550	111.1470
14	113.4251	104.2640	110.7064	93.6239	101.0945	105.4803	113.3769	117.8885	117.6682	108.2874
15	116.8157	106.2459	114.5416	95.7000	101.0860	111.4305	110.4840	119.3207	118.3440	108.1152
16	114.7580	105.6422	111.8527	97.2413	104.7400	109.5663	112.3781	117.0403	122.1124	110.7738
17	112.8429	112.4222	114.5692	98.7439	105.3586	111.0616	111.6300	116.6243	122.7034	111.6617
18	114.0447	113.7530	115.5136	96.8947	104.3504	113.2845	112.9832	118.4505	121.9625	109.9677
19	113.9784	115.4403	119.4157	99.0011	102.5073	115.9892	112.2414	120.8933	121.2475	109.0435
20	117.4452	116.7474	120.6233	98.9680	103.5760	116.3123	113.9189	120.3777	126.7323	113.0643
21	116.8934	115.6908	123.3225	98.1570	103.8684	117.7135	116.4326	122.5269	130.0197	112.5751
22	118.6496	116.5949	126.0876	100.5612	104.6650	118.2001	117.9658	124.3952	134.9466	109.1979
23	121.2852	120.3267	124.9120	101.3898	102.1852	118.3388	119.3769	125.2153	134.2975	110.8196
24	125.1780	122.4705	127.7744	102.0190	102.2419	116.2995	118.9222	128.0933	133.6088	110.5085
25	125.1037	126.6231	129.9450	105.2140	101.5622	116.7142	119.9228	128.9108	134.6383	109.5566
26	122.9903	126.4665	129.5008	110.2034	102.8704	118.2586	120.3272	131.8682	131.6350	112.6493
27	120.1448	127.3241	127.6135	110.2456	103.9082	115.3976	120.1478	131.3456	134.1505	116.6650
28	120.2246	131.2065	133.5419	109.2452	104.9730	115.0159	124.0417	130.7958	132.7518	116.7153
29	121.7563	128.6313	137.8692	110.2568	104.1266	115.2281	127.4444	133.1579	137.3261	117.7116
30	121.5626	128.3567	137.5133	113.0814	105.9936	115.7926	126.8965	132.8335	140.1512	123.3293
31	124.1280	133.8420	140.3878	114.2768	110.0224	121.2967	129.2102	136.2383	136.7694	122.1553
32	128.2890	132.7650	139.0344	117.9987	114.6263	121.1933	130.6044	136.5756	141.1490	121.8156
33	126.5361	131.2195	139.6250	120.6027	116.7767	123.7318	134.1999	138.5765	139.0319	123.0198
34	127.7503	133.9258	137.8984	122.7177	123.7018	123.0120	134.7484	137.9556	139.6957	123.6781
35	132.5358	132.8261	139.2146	122.2183	122.3440	122.3781	141.2204	135.6231	138.6225	126.2487
36	131.8574	131.2339	142.1708	123.5596	127.7068	122.8727	143.8436	138.0567	140.3607	126.1084
37	132.2064	130.9742	145.0234	125.1558	130.2374	125.2381	147.1504	139.6670	140.4994	127.1148
38	142.3804	134.3285	149.8364	129.0597	131.9281	124.3225	145.3876	141.9373	140.4789	130.4430
39	145.6629	135.2274	152.0159	134.4235	134.6171	124.4586	144.1239	142.7403	142.2522	135.0435
40	143.3622	141.0192	149.7201	136.6954	135.7746	129.0378	145.3256	143.8363	144.1783	137.5642
41	144.8522	145.4935	146.7639	136.8990	137.9334	130.1878	141.3665	147.4859	142.5332	139.2955
42	148.3101	147.9550	141.6267	137.4609	136.5460	131.8880	143.5012	148.1760	144.3695	137.8910
43	150.8934	151.4552	141.7459	138.2781	133.0097	132.7997	149.4519	147.4183	145.8833	140.7833
44	152.2645	153.2625	140.4311	138.5792	134.5584	136.7119	148.8384	146.5922	145.7487	143.1024

45	157.5373	149.5493	141.1153	138.7607	138.1263	137.8327	151.1411	147.3789	145.8698	142.5222
46	156.5904	153.9292	142.0867	143.5561	139.0675	140.7774	149.8911	148.4625	147.6545	143.9919
47	162.6522	155.1763	150.4743	143.9188	143.2290	147.3402	148.3930	149.7465	147.6082	146.3043
48	166.4754	157.0955	151.3967	140.3653	142.9077	149.1436	147.0964	150.2476	150.2610	147.5793
49	167.5560	152.5763	151.3950	145.2022	143.2130	154.4110	145.1449	147.0667	151.3723	148.0131
50	171.6461	152.6757	155.6684	144.0289	142.4772	157.3700	142.3793	146.2929	152.7595	149.4244
51	173.3281	152.3267	156.5924	136.3546	146.2803	160.2804	142.0003	147.5529	150.8004	148.5162
52	170.1185	151.5859	155.2854	140.1332	148.7098	161.1152	143.1161	146.0948	150.1752	149.7502

The following 20 scenarios are equity scenarios with a starting value of 100 and monthly steps over a one-year horizon.

	Scenarios 1 to 10									
Month	1	2	3	4	5	6	7	8	9	10
0	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000
1	95.2207	98.2644	93.2644	82.0308	97.3128	92.7091	98.0153	94.7481	96.6300	107.7423
2	94.2661	97.6913	97.5722	83.0715	94.8379	88.1819	101.6938	93.3412	97.0180	105.0775
3	87.8595	91.0979	92.8686	85.2758	94.7769	84.8910	100.5344	85.3718	90.5434	104.7303
4	81.9300	80.1818	95.2847	89.9735	101.9361	84.2472	98.7323	78.1680	91.0126	101.8168
5	80.3745	73.8789	86.8768	83.6347	101.2116	79.0808	92.7257	78.5419	89.9788	102.4787
6	79.0982	74.0352	84.2703	81.1228	101.5207	76.3769	91.5660	79.9211	90.3565	87.5902
7	72.3446	66.3290	76.1851	73.1402	99.7083	67.1256	87.9161	77.8994	70.8098	79.1764
8	69.3944	60.3566	73.8380	68.6280	72.6028	67.4251	80.4076	90.3618	69.0107	73.1234
9	60.7075	62.7510	70.4044	78.0264	71.5350	69.0774	78.7299	79.8591	71.5697	71.9689
10	57.5402	58.6160	64.5141	62.9287	68.7768	66.9007	72.0298	83.3764	70.2676	69.2260
11	51.5959	58.7823	61.8313	59.7655	68.6950	69.8328	61.9028	74.5982	76.2556	67.8927
12	49.7922	54.9144	57.5049	62.8909	64.0464	64.3109	64.4464	64.5551	64.9331	64.9677

	Scenarios 11 to 20									
Month	11	12	13	14	15	16	17	18	19	20
0	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000
1	103.3265	99.3251	96.7524	93.4987	98.1296	100.4458	102.0132	103.3459	101.9924	104.5266
2	103.4409	99.2216	107.8320	92.8193	100.7243	101.9858	115.2949	106.7555	110.5291	103.3073
3	111.1767	104.4874	111.0793	91.6727	101.4174	106.6319	114.5202	117.4139	115.1550	111.1470
4	114.0447	113.7530	115.5136	96.8947	104.3504	113.2845	112.9832	118.4505	121.9625	109.9677
5	118.6496	116.5949	126.0876	100.5612	104.6650	118.2001	117.9658	124.3952	134.9466	109.1979
6	122.9903	126.4665	129.5008	110.2034	102.8704	118.2586	120.3272	131.8682	131.6350	112.6493
7	124.1280	133.8420	140.3878	114.2768	110.0224	121.2967	129.2102	136.2383	136.7694	122.1553
8	132.5358	132.8261	139.2146	122.2183	122.3440	122.3781	141.2204	135.6231	138.6225	126.2487
9	145.6629	135.2274	152.0159	134.4235	134.6171	124.4586	144.1239	142.7403	142.2522	135.0435
10	152.2645	153.2625	140.4311	138.5792	134.5584	136.7119	148.8384	146.5922	145.7487	143.1024
11	166.4754	157.0955	151.3967	140.3653	142.9077	149.1436	147.0964	150.2476	150.2610	147.5793
12	170.1185	151.5859	155.2854	140.1332	148.7098	161.1152	143.1161	146.0948	150.1752	149.7502

~~7.1 Use of Prescribed Factors to Determine the Requirement~~

~~An insurer that has not had its internal model approved in accordance with the conditions outlined in section 7.2 must determine its capital requirements using prescribed factors.~~

~~The insurer may choose between the two methods described in this section. In the first financial period when this section is applicable, the insurer is required to irrevocably elect the method it intends to use to calculate the capital requirement.~~

~~7.1.1 Global Method~~

~~7.1.1.1 Total Gross Capital Requirement (TGCR)~~

~~Capital factors are provided for a variety of standardized product forms for guaranteed minimum death benefit (GMDB) and guaranteed minimum maturity benefit (GMMB) commonly offered for segregated fund guarantees in Canada and the United States. Below is a general description of the product forms modeled. Details can be found in Table 4 (page 173).~~

~~GMDB forms modeled include the following:~~

- ~~***Return of premium (ROP):*** provides a death benefit guarantee equal to the higher of the account value or the premiums paid.~~

- ~~***5% annual roll-up (ROLL):*** provides a guaranteed benefit that increases 5% per annum compounded at each contract anniversary with the guarantee frozen at age 80.~~

- ~~***Maximum anniversary value/annual ratchet (MAV):*** automatic annual reset of guarantee at each contract anniversary with resets frozen at age 80.~~

- ~~***10-year rollover contract (GMDB_10):*** guarantee can be reset and term-to-maturity will also reset to 10 years. No resets are permitted in the 10 years prior to contract maturity.~~

~~GMMB forms modeled include:~~

- ~~**Fixed maturity date (FIXED):** guarantee is level and applies up to the fixed maturity date.~~

- ~~***10-year rollover maturity benefit (GMMB_10):*** guarantee can be reset and the remaining guarantee term is reset to 10 years. No resets are permitted in the 10 years prior to contract maturity.~~

- ~~**Guaranteed minimum surrender benefit after 10 years (GMSB_10):** guarantee applies 10 years after contract issue. If the 10-year guaranteed value is higher than the account value at surrender, a "top-up" benefit equal to the difference is paid.~~

~~It is expected that the CARLI methodology for TGCR will be applied on a contract-by-contract basis, i.e., individually. If the insurer adopts a cell-based approach, it will ensure that only materially similar contracts are grouped together. In other words, all contracts in a "cell" must display substantially similar characteristics for those attributes expected to affect risk-based capital (e.g., definition of guaranteed benefits, attained age, contract duration, years-to-maturity, market-to-guaranteed value, asset mix, etc.). The TGCR for the purpose of determining capital requirements for segregated funds using prescribed or authorized factors must not include deferred income taxes.~~

~~The portfolio TGCR is the sum of the TGCR calculations for each contract or cell. The result for any given contract or cell may be negative, zero or positive. However, the portfolio TGCR cannot be negative.~~

~~The TGCR for a given contract is equal to:~~

$$\cancel{TGCR = GV \times \hat{f}(\tilde{\theta}) - AV \times \hat{g}(\tilde{\theta})}$$

~~where:~~

- ~~GV = current guaranteed minimum benefit~~
- ~~AV = current account balance~~
- ~~$\hat{f}(\tilde{\theta})$ = benefit cost factor~~
- ~~$\hat{g}(\tilde{\theta})$ = margin offset factor~~
- ~~$\tilde{\theta}$ is a vector that defines the risk characteristics for the contract.~~

~~The factors $\hat{f}(\tilde{\theta})$ and $\hat{g}(\tilde{\theta})$ are described more fully in Step 4 (refer to section 7.1.1.6). The TGCR is calculated separately for each guaranteed minimum benefit (i.e., death, maturity and surrender).~~

~~The model assumptions for the TGCR factors are documented in section 7.1.1.2.~~

~~There are four (4) major steps in determining the TGCR for a given contract or cell:~~

~~Step 1 - Classify the asset exposure (refer to section 7.1.1.3);~~

~~Step 2 - Determine the risk attributes (refer to section 7.1.1.4);~~

~~Step 3 - Retrieve the appropriate nodes (refer to section 7.1.1.5);~~

~~Step 4 - Use the supplied functions to determine the capital requirement (refer to section 7.1.1.6).~~

~~The first step requires the insurer to categorize the asset value for the given contract or cell by mapping the entire exposure to one of the prescribed fund classes. TGCR factors are provided for each asset class.~~

~~The second step requires the insurer to determine (or derive) the appropriate attributes for the given contract or cell. The attributes needed to access the factor tables and calculate the required values are:~~

- ~~product form ("Guarantee Definition"), *P*;~~
- ~~guarantee level, *G*;~~
- ~~adjustment to guaranteed value upon partial withdrawal ("GMDB/GMMB Adjustment"), *A*;~~
- ~~fund class, *F*;~~
- ~~attained age of the insured, *X* (for GMDB only, use a 4-year setback for female lives);~~
- ~~contract maturity age, *M* (for GMDB only, use a 4-year setback for female lives);~~

- ~~time-to-next maturity date, *T*;~~
- ~~ratio of account value to guaranteed value, ϕ;~~
- ~~total "equivalent" account-based charges, *MER* ("management expense ratio");~~
- ~~reset utilization rate, *R* (where applicable);~~
- ~~"in-the-money" surrender rate, *S* (guaranteed surrender benefits only).~~

~~Other required contract values include:~~

- ~~total account value on which the guaranteed benefit is calculated, *AV*;~~
- ~~current GMDB, GMMB and GMSB;~~
- ~~total net spread available to fund guaranteed benefits ("margin offset"), α.~~

~~The next steps (retrieval of the appropriate nodes and the use of the supplied functions to determine the capital requirement) are explained in sections 7.1.1.5 and 7.1.1.6. An application has been developed to assist insurers in these efforts. If an insurer is unable to use the supplied software, it will be required to develop software of its own. In such a situation, the insurer should contact the AMF in writing for specific guidance on how to develop its own lookup and extraction routines. A calculation example demonstrating the application of the various requirement factors to a sample contract is provided in section 7.1.1.7.~~

~~In section 7.1.1, GMDB, GMMB, GMSB are generically denoted by *GV*. Similarly, *AV* generically denotes either Account Value or Market Value. The total "equivalent" account charges must include all amounts assessed against policyholder accounts, expressed as a level spread per annum (in basis points). This quantity is called the Management Expense Ratio (*MER*) and is defined as the average amount (in dollars) charged against policyholder funds in a given year divided by average account value. Normally, the *MER* would vary by fund class and be the sum of investment management fees, mortality and expense charges, guarantee fees, risk premiums, etc. The total spread available to fund the guaranteed benefits (i. e., GMDB, GMMB, GMSB costs) is called the "margin offset" (denoted by α) and must disregard spread-based costs and expenses (e. g., maintenance expenses, investment management fees, trailer commissions, amounts required to provide for amortization of deferred acquisition costs, etc.). The section on margin offset adjustment (refer to section 7.1.1.8) describes how to determine *MER* and α.~~

~~The GMDB/GMMB/GMSB definition for a given contract or cell may not exactly correspond to those provided. In some cases, it may be reasonable to use the factors and formulas for a different product form. In other cases, the insurer might determine the TGCR based on two different guarantee definitions and interpolate the results to obtain an appropriate value for the given contract or cell. However, if the contract form is sufficiently different from those provided and there is no practical or obvious way to obtain a reasonable result, the insurer must contact the AMF in writing.~~

~~The general formula for TGCR is the following:~~

$$TGCR = GV \times h(\circ) \times w(\circ) \times f(\circ) - \frac{\alpha}{100} \times AV \times g(\circ)$$

~~where:~~

- ~~*GV* = current guaranteed minimum benefit (dollars)~~
- ~~*AV* = current account value (dollars)~~
- $f(\circ) = f(\tilde{\theta})$ ~~= cost factor per \$1 of *GV*~~
- $g(\circ) = g(\tilde{\theta})$ ~~= margin offset factor per \$1 of *AV* (assuming 100 bps of available spread)~~
- $h(\circ) = h(\tilde{\theta})$ ~~= asset mix diversification factor~~
- $w(\circ) = w(\tilde{\theta})$ ~~= time diversification factor.~~

~~Thus,~~ $\tilde{\theta}$ ~~is used to generically represent the risk attribute set (e.g., product form, guaranteed level, asset class, attained age, etc.) for the contract, or some relevant subset thereof. Moreover,~~ α ~~is the net spread ("margin offset," in basis points per annum) available to fund the guaranteed benefits.~~

~~Where more than one guaranteed benefit is present in a product, unless the insurer has a justifiable alternative for allocating the total available spread between the various types of guarantees (e.g., explicitly defined risk charges), the split must be based on the proportionate gross guaranteed benefit costs. An example is provided in section 7.1.1.8 to illustrate this concept.~~

~~In practice,~~ $f(\circ)$, $g(\circ)$, $h(\circ)$ ~~and~~ $w(\circ)$ ~~are values interpolated from the factor grid. The use of the factor grid is discussed more fully in Step 4 (refer to section 7.1.1.6). The factor grid is a large pre-computed table developed using stochastic modeling for a wide array of combinations of the risk attribute set. The risk attribute set is defined by those contract and product characteristics that affect the risk profile of the business: product form (guarantee definition), fund class, attained age, *AV/GV* ratio, time-to-maturity, etc.~~

~~7.1.1.2 Assumptions for TGCR Methodology Published Factors~~

~~Each node in the factor grid is effectively the modeled result for a given "cell" assuming a \$100 single deposit.~~

~~Table 1: Model Assumptions and Product Characteristics~~

~~Account charges (*MER*)~~	~~Vary by fund class. See Table 2 in this section (page 164).~~
~~Base margin offset~~	~~100 basis points per annum.~~

~~GMDB description~~	▪ ~~ROP = return of premiums.~~ ▪ ~~ROLL = 5% compound roll-up, frozen at age 80.~~ ▪ ~~MAV = annual ratchet (maximum. anniversary value), frozen at age 80.~~ ▪ ~~GMDB_10 = 10-year rollover contract.~~
~~GMMB & GMSB descriptions~~	▪ ~~FIXED = fixed maturity date.~~ ▪ ~~GMSB_10 = 10-year guaranteed surrender benefit.~~ ▪ ~~GMMB_10 = 10-year rollover maturity benefit.~~
~~*GV* adjustment on withdrawal~~	~~"Pro-rata by market value" and "dollar-for-dollar" are tested separately.~~
~~Surrender charges~~	~~Ignored (i.e., zero).~~
~~Base contract lapse rate~~	~~6% per annum at all contract durations. See also "dynamic lapse multiplier".~~
~~Partial withdrawals~~	~~Flat 4% per annum at all contract durations (as a % of AV). No dynamics.~~
~~Rollover (renewal) rate~~	~~85% at the end of each 10-year term (GMDB_10 and GMMB_10 only).~~
~~Dynamic lapse multiplier~~	~~Actual lapse rate =~~ $\lambda \times$ ~~(Base contract lapse rate), where:~~ $\lambda = min\left[\lambda^{+} ; max\left[\lambda^{-} ; \left[a + b \times \left(\frac{GV}{AV}\right)\right] \times [c + d \times min(h ; T)]\right]\right]$ $\lambda^{+} = 1.6667$, $\lambda^{-} = 0.3333$, $a = -0.0952$, $b = 0.8010$, $c = 0.6279$, $d = 0.0654$, $h = 10$ ~~and~~ T = ~~time-to-next maturity~~
~~Mortality~~	~~100% of CIA 1986-92 table for men, age at last birthday, aggregate, ultimate.~~
~~Fixed expenses, annual fees~~	~~Ignored (i.e., zero).~~
~~Discount rate~~	~~5.5% annual effective (non-dynamic).~~
~~Elective reset of GV~~	~~Whenever the *AV/GV* ratio exceeds 115% (maximum 2 resets per annum). No resets are permitted in the 10 years prior to the final contract maturity date.~~
~~In-the-money surrender (GMSB_10 only)~~	~~Whenever the benefit is payable (i.e., 10 years after issue or last reset) and the *AV/GV* ratio is less than 85%.~~

~~*Notes on factor development*~~

- ~~The GMDB roll-up is compounded (not simple interest, not stepped at each anniversary) and is applied to the previous roll-up guaranteed value.~~

- ~~The Base contract lapse rate is the rate of contract termination (surrenders). Contract terminations (surrenders) are assumed to occur throughout the contract year (not only on anniversaries).~~

- ~~Partial withdrawals are assumed to occur at the end of each time period (quarterly).~~

- ~~Account charges (*MER*) represent the total amount (annualized, in basis points) assessed against policyholder funds (e.g., sum of investment management fees, mortality and expense charges, risk premiums, contract/administrative fees, etc.). They are assumed to occur throughout the contract year (not only on anniversaries).~~

- ~~For the GMDB_10 and GMMB_10 products, the contract rolls over at the end of each 10-year term for another 10 years. The guaranteed benefit resets to Z% of AV (after payment of any top-up maturity benefit for in-the-money maturity guarantees) where Z is typically 75 or 100.~~

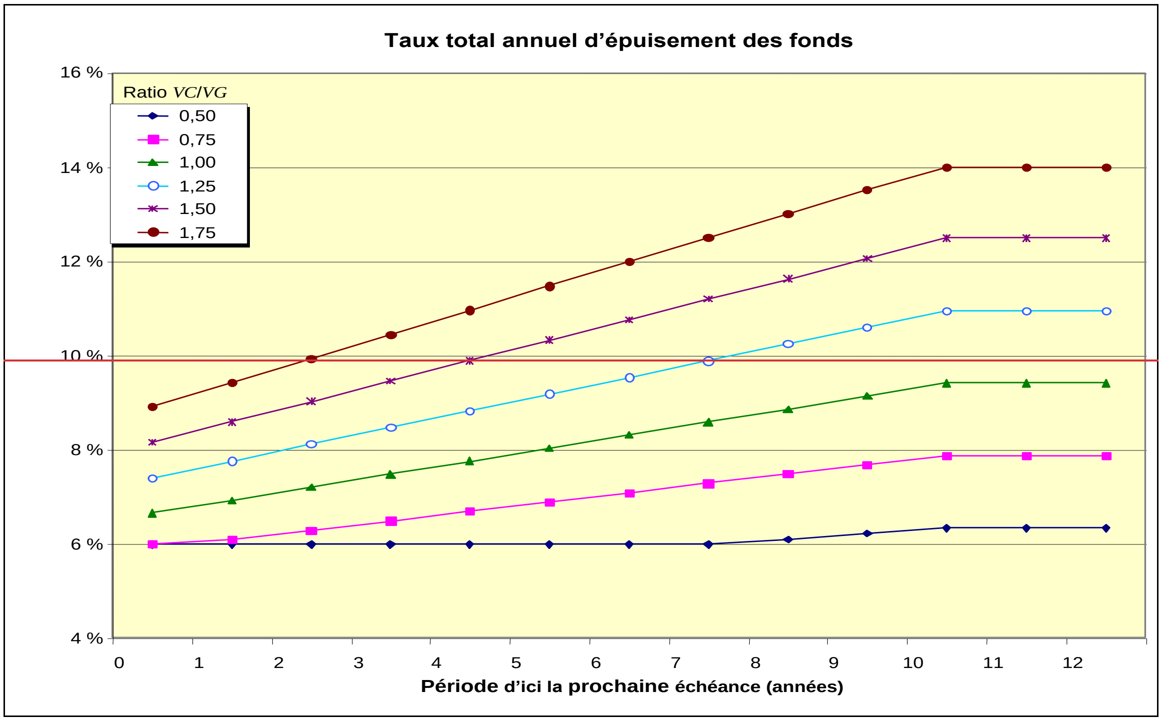
- ~~The guaranteed minimum surrender benefit (GMSB_10) applies 10 years after contract issue. If the 10-year guaranteed value is higher than the account value at surrender, a "top-up" benefit equal to the difference is paid.~~

~~Table 2: Account-Based Fund Charges (basis points per annum)~~

~~**Asset Class/Fund**~~	~~**Account charges (*MER*)**~~
~~Money market~~	~~110~~
~~Fixed income (bond)~~	~~200~~
~~Balanced~~	~~250~~
~~Low volatility equity~~	~~265~~
~~Diversified equity~~	~~265~~
~~Intermediate risk equity~~	~~280~~
~~Aggressive or exotic equity~~	~~295~~

~~The annualized total fund depletion rates (i.e., including the fixed 4% per annum partial withdrawal) are illustrated in Figure 1 for various *AV/GV* ratios and times to maturity.~~

~~**Figure 1: Fund Depletion Rates (Lapse + Partial Withdrawal) by *AV/GV* Ratio and Time-to-Maturity**~~



~~7.1.1.3 Step 1 - Classification of the Underlying Assets~~

~~The following criteria must be used to select the appropriate factors, parameters and formulas for the exposure represented by a specified guaranteed benefit. When available, the volatility of the long-term annualized total return for the fund(s) – or an appropriate benchmark – should conform to the limits presented. For this purpose, "long-term" is defined as twice the average projection period that would be applied to test the product in a stochastic model (generally, at least 25 years).~~

~~Where data for the fund or benchmark are too sparse or unreliable, the fund exposure should be moved to the next higher volatility class than otherwise indicated. In reviewing the asset classifications, care must be taken to reflect any additional volatility of returns added by the presence of currency risk, liquidity (bid-ask) effects, short selling and speculative positions.~~

~~All exposures/funds must be categorized into one of the following seven (7) asset classes:~~

~~1. Money market~~

~~2. Fixed income~~

~~3. Balanced~~

~~4. Low volatility equity~~

~~5. Diversified equity~~

~~6. Intermediate risk equity~~

~~7. Aggressive or exotic equity~~

~~***Money market/short-term.*** The fund is invested in money market instruments with an average remaining term-to-maturity of less than 365 days.~~

~~***Fixed income.*** The fund is invested primarily in investment grade fixed-income securities. Up to 25% of the funds within this class may be invested in diversified equities or high-yield bonds. The expected volatility of returns for this fund class will be lower than that of the Balanced fund class.~~

~~***Balanced*** This class is a combination of fixed-income securities with a larger equity component. The fixed-income proportion must exceed 25% of the portfolio. Additionally, the aggressive or “specialized” equity proportion must not exceed one-third (33.3%) of the total equities held. Should the fund violate either of these constraints, it must be categorized as an equity fund. These funds usually have a long-term volatility in the range of 8% - 13%.~~

~~***Low volatility equity*** This fund is comparable to the broad-based diversified equity class with the additional attributes noted below. Only funds that would otherwise be grouped in the Broad-based diversified equity are eligible for this fund. For foreign funds, volatility must take into account the impact of currency fluctuations.~~

~~The expected volatility of the fund should be less than 15.5% (annualized) and the aggressive/exotic equity portion of the fund should be less than 33.3% of the total equity holdings based on market value. Further, the overall asset holdings must satisfy at least one of the following conditions:~~

- ~~The fund permanently maintains a relatively large cash or fixed-income position (greater than 10% of the market value of assets) as part of its investment strategy.~~

- ~~The fund is “income” oriented and contains a significant (greater than 10% of the market value of assets) proportion of stocks paying material and regular dividends that are automatically reinvested in the fund.~~

~~***Diversified equity*** The fund is invested in a well-diversified mix of Canadian, U.S. and global equities. The global equity portion must consist of liquid securities in well-developed markets. Funds in this class have long-term volatility comparable to that of the TSX. The long-term volatility of these funds is typically expected to be between 13% and 19%.~~

~~***Intermediate risk equity*** This class of funds has a mix of characteristics from both the Diversified and Aggressive equity classes. The long-term volatility of these funds ranges from 19% to 25%.~~

~~***Aggressive, exotic equity*** This class comprises more volatile funds where risk can arise from: (a) underdeveloped markets; (b) uncertain markets; (c) high volatility of returns; (d) narrow focus (e. g., specific market sector), and other sources. In general, the fund (or market benchmark) either does not have sufficient history to allow for the calculation of a long-term expected volatility or the volatility is very high. This class must be used whenever the long-term expected annualized volatility is indeterminable or exceeds 25%.~~

~~***Selection of appropriate investment classes.*** The selection of an appropriate investment class must be done at the level for which the guarantee applies. For guarantees applying on a deposit-by-deposit basis, the fund selection is straightforward. However, where the guarantee applies across deposits or for an entire contract, the approach can be more complicated. In such instances, the approach is to identify for each contract where the grouped holdings fit within the classes listed and to classify the associated assets on this basis.~~

~~An individual process is then used to identify the "grouped" fund holdings, to assess the risk profile of the current fund holdings (possibly calculating the expected long-term volatility of the funds held with reference to the indicated market proxies) and to classify the entire asset exposure into one of the specified choices. Here, asset exposure refers to the underlying assets (segregated and/or general account investment options) on which the guarantee will be determined. For example, if the guarantee applies separately for each deposit year within the contract, then the classification process would be applied separately for the exposure of each deposit year.~~

~~In summary, mapping the benefit exposure (i.e., the asset exposure that applies to the calculation of the guaranteed minimum benefits) to one of the prescribed asset classes is a multi-step process:~~

1. ~~Map each separate and/or general account investment option to one of the prescribed asset classes. For some funds, this mapping will be obvious, but for others it will involve a review of the fund's investment policy, performance benchmarks, composition and expected long-term volatility.~~

2. ~~Combine the mapped exposure to determine the expected long-term volatility of current fund holdings. This will require a calculation based on the expected long-term volatilities for each fund and the correlations between the prescribed asset classes as indicated in Table 3 (page 168).~~

3. ~~Evaluate the asset composition and expected volatility (as calculated in Step 2) of current holdings to determine the single asset class that best represents the exposure, with due consideration to the constraints and guidelines presented earlier in this section.~~

~~In **Step 1**, the insurer must only use the fund's actual results (i.e., historical performance, inclusive of reinvestment) as a guide in determining the expected long-term volatility. Due to limited data and changes in investment objectives, style and/or management (e.g., fund mergers, revised investment policy, different fund managers, etc.), the insurer may need to give more weight to the expected long-term volatility of the fund's benchmark~~

~~performance. In general, the insurer must exercise caution and not be overly optimistic in assuming that future returns will be consistently less volatile than the underlying markets.~~

~~In **Step 2**, the insurer must calculate the "volatility of current fund holdings" (σ for the exposure being categorized) by the following formula, using the volatilities and correlations in Table 3.~~

$$\sigma = \sqrt{\sum_{i=1}^{n}\sum_{j=1}^{n} w_i w_j \rho_{ij} \sigma_i \sigma_j}$$

~~where:~~

- ~~$w_i = \frac{AV_i}{\sum_k AV_k}$ is the relative value of fund *i* expressed as a proportion of total contract value~~
- ~~ρ_{ij} is the correlation factor between asset classes *i* and *j*~~
- ~~σ_i is the volatility of asset class *i* (Table 3).~~

~~Table 3: Volatilities and Correlations for Prescribed Asset Classes~~

ANNUAL VOLATILITY		GENERAL ACCOUNT	MONEY MARKET	FIXED INCOME	BALANCED	LOW VOL EQUITY	DIVERSIFIED EQUITY	INTERM. EQUITY	AGGRESSIVE EQUITY
1%	GENERAL ACCOUNT	1	0.50	0.15	0	0	0	0	0
1%	MONEY MARKET	0.50	1	0.20	0	0	0	0	0
6%	FIXED INCOME	0.15	0.20	1	0.50	0.25	0.25	0.20	0.10
11%	BALANCED	0	0	0.50	1	0.80	0.95	0.75	0.65
15%	LOW VOL EQUITY	0	0	0.25	0.80	1	0.80	0.75	0.65
17%	DIVERSIFIED EQUITY	0	0	0.25	0.95	0.80	1	0.75	0.65
22%	INTERM EQUITY	0	0	0.20	0.75	0.75	0.75	1	0.70

~~ANNUAL VOLATILITY~~		~~GENERAL ACCOUNT~~	~~MONEY MARKET~~	~~FIXED INCOME~~	~~BALANCED~~	~~LOW VOL EQUITY~~	~~DIVERSIFIED EQUITY~~	~~INTERM. EQUITY~~	~~AGGRESSIVE EQUITY~~
~~26%~~	~~AGGRESSIVE EQUITY~~	~~0~~	~~0~~	~~0.10~~	~~0.65~~	~~0.65~~	~~0.65~~	~~0.70~~	~~1~~

~~Example: Fund Categorization~~

~~Suppose three funds (fixed income, diversified equity and aggressive equity) are offered to clients on a product with a contract level guarantee (i.e., across all funds held within the contract).~~

~~The current fund holdings (in dollars) for five sample contracts are shown in this table:~~

	~~**1**~~	~~**2**~~	~~**3**~~	~~**4**~~	~~**5**~~
~~MV Fund X (fixed income):~~	~~$5,000~~	~~$6,000~~	~~$8,000~~	~~-~~	~~$5,000~~
~~MV Fund Y (diversified equity):~~	~~$9,000~~	~~$5,000~~	~~$2,000~~	~~$5,000~~	~~-~~
~~MV Fund Z (aggressive equity):~~	~~$1,000~~	~~$4,000~~	~~-~~	~~$5,000~~	~~$5,000~~
~~Total market value:~~	~~$15,000~~	~~$15,000~~	~~$10,000~~	~~$10,000~~	~~$10,000~~
~~Total equity market value~~	~~$10,000~~	~~$9,000~~	~~$2,000~~	~~$10,000~~	~~$5,000~~
~~Fixed income % (*A*):~~	~~33%~~	~~40%~~	~~80%~~	~~0%~~	~~50%~~
~~Fixed Income test (*A*>75%):~~	~~No~~	~~No~~	~~Yes~~	~~No~~	~~No~~
~~Aggressive Equity % (*B*):~~	~~10%~~	~~44%~~	~~N/A~~	~~50%~~	~~100%~~
~~Balanced test (*A*>25% and *B*<33.3%):~~	~~Yes~~	~~No~~	~~N/A~~	~~No~~	~~No~~
~~Volatility of current fund holdings:~~	~~12.0%~~	~~12.1%~~	~~6.5%~~	~~19.6%~~	~~13.6%~~
~~Fund classification:~~	~~**Balanced**~~	~~**Diversified equity**~~	~~**Fixed income**~~	~~**Intermediate risk equity**~~	~~**Diversified equity**~~

~~The "Volatility of fund holdings" for contract #1 is calculated as $\sqrt{A+B} = 12.04\%$.~~

~~where:~~

$$A = \left(\frac{5}{15} \times 0.06\right)^2 + \left(\frac{9}{15} \times 0.17\right)^2 + \left(\frac{1}{15} \times 0.26\right)^2$$

$$= 1.1104\%$$

$$B = 2 \cdot \left(\frac{5}{15} \cdot \frac{9}{15}\right)(0.25 \times 0.06 \times 0.17) + 2 \cdot \left(\frac{5}{15} \cdot \frac{1}{15}\right)(0.10 \times 0.06 \times 0.26) + 2 \cdot \left(\frac{9}{15} \cdot \frac{1}{15}\right)(0.65 \times 0.17 \times 0.26)$$

$$= 0.3388\%$$

~~Importantly, the volatility would be understated if we assumed zero correlation (e.g., all market returns are independent) since *B* contributes materially to the final value.~~

~~7.1.1.4 Step 2 - Determination of Risk Attributes~~

~~The "Tabular" approach for the TGCR component creates a multidimensional grid by testing a very large number of combinations of contract attributes. The results are expressed as factors. The TGCR is calculated by consulting (using a "key") the large, pre-computed multidimensional tables and using multidimensional linear interpolation. The lookup "key" depends on the risk attributes for the contract and is defined as:~~

$$\tilde{\theta} = (P, G, A, F, X, M, T, \phi, \Delta, R, S)$$

~~where:~~

- ~~ϕ is the *AV/GV* ratio for the benefit exposure under consideration~~
- ~~Δ is the "*MER* Delta"~~
- ~~*R* is the utilization rate of the elective reset option (if applicable)~~
- ~~*S* is the "in-the-money" termination rate on GMSB_10 contracts.~~

~~The *MER* Delta is calculated based on the difference between the actual *MER* and that assumed in the factor testing (see Table 2, page 164), subject to a cap (floor) of 100 bps (-100 bps). See Table 4 for more details (page 173).~~

~~For GMDB, there are 4 × 2 × 2 × 7 × 4 × 4 × 5 × 7 × 3 × 2 = 376,320 "nodes" in the "basic factor" grid. Interpolation will only be permitted across the six (6) dimensions: Contract maturity age (*M*), Attained age (*X*), Time to next maturity (*T*), *AV/GV* Ratio (ϕ), *MER* Delta (Δ) and Reset utilization rate (*R*). The "in-the-money" termination rate is not used for GMDBs.~~

~~For GMMB, there are 3 × 2 × 2 × 7 × 1 × 7 × 5 × 7 × 3 × 2 × 2 = 246,960 "nodes" in the "basic factor" grid. Interpolation will only be permitted across the six (6) dimensions: Contract maturity age (*M*), Time to next maturity (*T*), *AV/GV* Ratio (ϕ), *MER* Delta (Δ), Reset utilization rate (*R*) and "In-the-money" termination rate (*S*). The "In-the-money" termination rate (*S*) only applies to the "GMSB_10" product form. Testing for guaranteed~~

~~minimum maturity and surrender benefits assume all lives attained age 55 at the calculation date.~~

~~Functions are available to assist the insurer in applying the TGCR methodology. More fully described in Step 4 (refer to section 7.1.1.6), these functions perform the necessary factor table lookups and associated multidimensional linear interpolations. If the insurer is unable to use the supplied functions, it will be required to develop its own. In such a case, the insurer should contact the AMF in writing for specific details.~~

~~The GMDB and GMMB/GMSB factors are respectively contained in the files "GMDBFactors_CTE95.csv" and "GMMBFactors_CTE95.csv". These are comma-separated value text files where each row represents the factors for a test contract as identified by its lookup key. Rows are terminated by new line and line feed characters. Factors are also provided at the CTE80 confidence level – the factor files are "GMDBFactors_CTE80.csv" and "GMMBFactors_CTE80.csv". For the determination of capital requirements, the "GMDBFactors_CTE95.csv" and "GMMBFactors_CTE95.csv" factors are to be used.~~

~~Each row in the factor tables consists of three entries, described further below.~~

~~1~~	~~2~~	~~3~~
~~Test case identifier (key)~~	~~Basic cost or diversification factor~~	~~Basic margin offset factor or zero (n/a)~~

~~An individual test case (i.e., a node on the multidimensional matrix of factors) can be uniquely identified by its key, which is the concatenation of the relevant individual contract attribute keys (or some subset thereof) prefixed by a leading "factor code." The factor codes are shown below:~~

~~**Factor code**~~	~~**Description**~~
~~1~~	~~Basic GMDB "cost" and "margin offset" factors~~
~~2~~	~~Basic GMMB and GMSB "cost" and "margin offset" factors~~
~~3~~	~~Asset mix diversification factors for GMDB options~~
~~4~~	~~Asset mix diversification factors for GMMB and GMSB options~~
~~5~~	~~Time diversification factors for GMDB options~~
~~6~~	~~Time diversification factors for GMMB and GMSB options~~

~~***Basic cost factor***. This is the term $f(\circ)$ in the formula for TGCR. The values in the factor grid represent CTE (95) (or CTE (80)) of the sample distribution for the present value of guaranteed minimum benefit cash flows (in excess of account value) in all future years (i.e., to the earlier of contract maturity and 30 years), normalized by current guaranteed value. The contract attribute keys for the cost factors are shown in Table 4 (page 173).~~

~~***Basic margin offset factor***. This is the term $g(\circ)$ in the formula for TGCR. The values in the factor grid represent CTE (95) (or CTE (80) of the sample distribution for the present value of margin offset cash flows in all future years (i.e., to the earlier of contract maturity and 30 years), normalized by current account balance. The basic margin offset factors assume $\hat{\alpha}$ = 100 basis points of "margin offset" (net spread available to fund the guaranteed benefits). The contract attribute keys for the margin offset factors are shown in Table 4 (page 173).~~

~~***Asset mix diversification factor***. This is the term $h(\circ)$ in the formula for TGCR. The term $h(\circ)$ =*h*(*P*,*G*,*R*,*S*) is an adjustment factor that reflects the benefits of fund diversification (asset mix) for the insurer (i.e., on the total portfolio level). Note that $h(\circ) \leq 1$ depends on product form "*P*," guarantee level "*G*," reset utilization rate "*R*" (where applicable) and "in-the-money" termination rate "*S*" (GMSB only). The lookup keys for the asset mix diversification factors are given in Table 5 (page 174).~~

~~The diversification factor (*DF*) must be set to 1 in the *GetCost* and *GetTGCR* functions (refer to page 179).~~

~~***Time diversification factor***. This is the term $w(\circ)$ in the formula for TGCR. The term $w(\circ)$ = *w*(*P*,*G*,*F*,*R*,*S*) is an adjustment factor that attempts to capture the benefits (i.e., net reduction in guaranteed benefit costs) of a dispersed maturity profile. This adjustment applies to maturity benefit factors only; it does not apply to death benefit factors. Note that w(∘) ≤ 1 also depends on fund class *F*. If the insurer does not satisfy the time diversification criteria, then $w(\circ) = 1$ (i.e., there is no time diversification benefit).~~

~~Although the structure permits otherwise, the time diversification factors for GMDB are set to 1. The lookup keys for the time diversification factors are given in Table 6 (page 175).~~

~~This factor is set either to 0 or 1 based on the results of a time diversification test.~~

~~To perform the test, the in-force maturity dates for each product/maturity guarantee form are grouped by "quarter-to-maturity" (i.e., 1, 2… *N*). For limited-term contracts that offer the client the opportunity to renew ("rollover"), the next maturity date must be used (not final contract maturity). Using current market value (at the calculation date), the current market value in each future 3-month time period is determined.~~

~~If the current market value in any given quarter exceeds 10% of the total, then the portfolio fails the test. If the current market value in each quarter is less than or equal to 10% of the total, the portfolio passes the test. If the portfolio fails the test, *DT* is set to 0 in the *GetCost* and *GetTGCR* functions (refer to page 179). Otherwise, DT is set to 1.~~

~~Table 4: Grid of Cost and Margin Offset Factors~~

~~Contract Attribute~~		~~Key: Possible Values & Description~~
~~Product definitions, *P*~~	~~GMDB~~	~~0: Return-of-premium~~ ~~1: Roll-up (5% per annum)~~ ~~2: Maximum anniversary value (MAV)~~ ~~3: 10-year rollover~~
	~~GMMB & GMSB~~	~~0: Fixed maturity date~~ ~~1: 10-year CSV (benefit paid on surrender)~~ ~~2: *Not used*~~ ~~3: 10-year rollover~~
~~Guarantee level (% of deposits), *G*~~		~~0: 75%~~ ~~1: 100%~~
~~GV adjustment upon partial withdrawal, *A*~~		~~0: Pro-rata by market value~~ ~~1: Dollar-for-dollar~~
~~Fund class, *F*~~		~~0: *Not used*~~ ~~1: Money market~~ ~~2: Fixed income (bond)~~ ~~3: Balanced~~ ~~4: Low volatility equity~~ ~~5: Diversified equity~~ ~~6: Intermediate risk equity~~ ~~7: Aggressive, exotic equity~~
~~Contract maturity age, *M* (years from valuation date)~~	~~GMDB~~	~~0: 5 years~~ ~~1: 15 years~~ ~~2: 25 years~~ ~~3: 30 years~~
	~~GMMB & GMSB~~	~~0: 1 year 4: 10 years~~ ~~1: 3 years 5: 20 years~~ ~~2: 5 years 6: 30 years~~ ~~3: 8 years~~
~~Attained age (last birthday), *X*~~	~~GMDB~~	~~0: 35 2: 65~~ ~~1: 55 3: 75~~
	~~GMMB & GMSB~~	~~0: 55~~
~~Time-to-next maturity date, *T* (years from valuation date)~~		~~0: 1 year 3: 8 years~~ ~~1: 3 years 4: 10+ years~~ ~~2: 5 years~~
~~Account value-to-guaranteed value ratio, ϕ~~		~~0: 0.25 4: 1.25~~ ~~1: 0.50 5: 1.50~~ ~~2: 0.75 6: 2.00~~ ~~3: 1.00~~
~~Annualized account charge differential from Table 2 assumptions on page 164 ("*MER* Delta"), Δ~~		~~0: −100 basis points~~ ~~1: 0 basis points~~ ~~2: +100 basis points~~
~~Reset utilization rate, *R*~~		~~0: 0% 1: 100%~~

~~Contract Attribute~~		~~Key: Possible Values & Description~~
~~"In-the-money" surrender rate (GMSB only), *S*~~		~~0: 0% 1: 100%~~

~~It is important to note that the lookup keys for the factor tables define certain values differently from the parameters (arguments) passed to the lookup/retrieval functions, as indicated in the following table. More details are provided in Step 4 (refer to section 7.1.1.6).~~

~~Contract Attribute~~	~~Key Interpretation~~	~~Function Arguments~~
~~Contract maturity age, *M*~~	~~Years from valuation date, i.e., "contract maturity age" less "attained age"~~	~~Actual contract maturity age~~
~~*AV*/*GV* ratio, ϕ~~	~~Ratio of current account balance (*AV*) to guaranteed value (*GV*)~~	~~*AV* and *GV* are provided separately~~
~~*MER* Delta, Δ~~	~~"actual *MER*" less "assumed *MER*", in basis points. Assumed *MERs* are shown in Table 2 (page 164)~~	~~*MER* (annualized, in basis points per annum) is passed directly~~

~~**Table 5: Grid of Asset Mix Diversification Factors**~~

~~Contract Attribute~~		~~Key: Possible Values & Description~~
~~Product definitions, *P*~~	~~**GMDB**~~	~~0: Return-of-premium~~ ~~1: Roll-up (5% per annum)~~ ~~2: Maximum anniversary value (MAV)~~ ~~3: 10-year rollover~~
	~~**GMMB & GMSB**~~	~~0: Fixed maturity date~~ ~~1: 10-year CSV (benefit paid on surrender)~~ ~~2: *Not used*~~ ~~3: 10-year rollover~~
~~Guarantee level (% of deposits), *G*~~		~~0: 75% 1: 100%~~
~~Reset utilization rate, *R*~~		~~0: 0% 1: 100%~~
~~"In-the-money" surrender rate (GMSB only), *S*~~		~~0: 0% 1: 100%~~

~~Table 6: Grid of Time Diversification Factors~~

~~Contract Attribute~~		~~Key: Possible Values & Description~~
~~Product definitions, *P*~~	~~**GMDB**~~	~~0: Return-of-premium~~ ~~1: Roll-up (5% per annum)~~ ~~2: Maximum anniversary value (MAV)~~ ~~3: 10-year rollover~~
	~~**GMMB & GMSB**~~	~~0: Fixed maturity date~~ ~~1: 10-year CSV (benefit paid on surrender)~~ ~~2: *Not used*~~ ~~3: 10-year rollover~~
~~Guarantee level (% of deposits), *G*~~		~~0: 75% 1: 100%~~
~~Fund class, *F*~~		~~0: *Not used*~~ ~~1: Money market~~ ~~2: Fixed income (bond)~~ ~~3: Balanced~~ ~~4: Low volatility equity~~ ~~5: Diversified equity~~ ~~6: Intermediate risk equity~~ ~~7: Aggressive, exotic equity~~
~~Reset utilization rate, *R*~~		~~0: 0% 1: 100%~~
~~"In-the-money" surrender rate (GMSB only), *S*~~		~~0: 0% 1: 100%~~

~~7.1.1.5 Step 3 - Retrieval of the Appropriate Nodes~~

~~Table 7 provides some sample lookup keys (assuming the annualized fund based charges equal the base assumption, hence $\Delta = 0$), while Table 8 shows the "basic cost" and "basic margin offset" values from the factor grid for some sample GMDB and GMMB contracts. All sample contracts in Table 8 use a 100% guarantee level, base *MERs* and no resets. As mentioned earlier, the base margin offset factors in the tables assume 100 basis points of available spread. The "margin offset factors" are therefore scaled by the ratio $\frac{\alpha}{100}$, where α = the actual margin offset (in basis points per annum) for the contract being valued. Hence, the margin factor for the 7th contract is exactly half the factor for node "11105214210" (the 4th sample contract in Table 8) i.e., $0.02093 = 0.5 \times 0.04187$.~~

~~Where more than one feature (i.e., guaranteed benefit) is present in a product, unless the insurer has a justifiable alternative for allocating the total available spread between the benefit types (e.g., explicitly defined risk charges), the split must be based on the proportionate gross guaranteed benefit costs. An example of this allocation is provided in section 7.1.1.7.~~

~~Table 7: Sample Lookup Keys~~

~~KEY~~	~~NODE TYPE~~	~~PRODUCT/ GV%~~	~~*GV* ADJUST.~~	~~FUND CLASS~~	~~ATT. AGE/ MAT. AGE.~~	~~NEXT MAT~~	~~*AV/GV*~~	~~RESET UTIL.%~~	~~ITM TERM%~~
~~10103214110~~	~~A~~	~~GMDB-ROP / 100%~~	~~Pro rata~~	~~Balanced~~	~~65 / 80~~	~~10+~~	~~50%~~	~~0%~~	~~N/A~~

200150444110	A	GMMB-fixed / 75%	$-for-$	Diversified equity	55 / 75	5	125%	100%	N/A
3311	B	GMDB_10 / 100%	N/A	N/A	N/A	N/A	N/A	100%	N/A
43100	B	GMDB_10 / 100%	N/A	N/A	N/A	N/A	N/A	0%	N/A
611411	C	GMSB_10 / 100%	N/A	Low volatility equity	N/A	N/A	N/A	100%	100%

A = basic cost and margin offset factors; B = asset mix diversification factors; C = time diversification factors.

Table 8: Sample Nodes on the Basic Factor Grids

KEY	PRODUCT	GV ADJUST.	FUND CLASS	ATT. AGE/ MAT. AGE	NEXT MAT	AV/GV	OFFSET	COST FACTOR	MARGIN FACTOR
10113124310	GMDB ROP	$-for-$	Balanced	55/80	10+	1.00	100	0.01802	0.05762
10113214310	GMDB ROP	$-for-$	Balanced	65 / 80	10+	1.00	100	0.03926	0.04747
10113302310	GMDB ROP	$-for-$	Balanced	75 / 80	5	1.00	100	0.04443	0.02653
11105214210	GMDB 5% rollup	Pro-rata	Diversified equity	65 / 80	10+	0.75	100	0.16780	0.04187
11105214310	GMDB 5% rollup	Pro-rata	Diversified equity	65 / 80	10+	1.00	100	0.13091	0.04066
11105214410	GMDB 5% rollup	Pro-rata	Diversified equity	65 / 80	10+	1.25	100	0.09925	0.03940
11105214210	GMDB 5% rollup	Pro-rata	Diversified equity	65 / 80	10+	0.75	50	0.16780	0.02093
231050513100	GMMB_10	Pro-rata	Diversified equity	55 / 75	3	1.00	100	0.32250	0.05609
231050523100	GMMB_10	Pro-rata	Diversified equity	55 / 75	5	1.00	100	0.25060	0.05505
231050533100	GMMB_10	Pro-rata	Diversified equity	55 / 75	8	1.00	100	0.16758	0.05545

7.1.1.6 Step 4 - Use of supplied functions to determine the capital requirement

Special functions have been supplied in the file "SegFundFactorCalc.dll" (C++ dynamic linked library) to retrieve the "cost," "margin offset" and "diversification" factors from the factor files and perform the multidimensional linear interpolation. Custom functions in a Microsoft® Visual Basic "add-in" are provided in the file "AMFCalcFacteurs.xla" so that the C++ routines can be called directly from Microsoft Excel through VBA. The function arguments are described in Table 9. Not all parameters apply to all functions (i.e., some are optional and/or not applicable). The keys for the input parameters are given in Table 4 (page 173).

Instructions for installing the application are given in section 7.1.1.7.

~~**Table 9: Input Parameters (Arguments) to Supplied Lookup/Retrieval Functions**~~

~~Input parameter – Variable name~~	~~Variable type~~	~~Description~~
~~*B* – BenefitType~~	~~Long integer~~	~~Benefit type code (1=GMDB, 2=GMMB/GMSB).~~
~~*P* – ProductCode~~	~~Long integer~~	~~Product definition code.~~
~~*G* – GuarCode~~	~~Long integer~~	~~Guarantee level code.~~
~~*A* – GVAdjustCode~~	~~Long integer~~	~~*GV* adjustment upon partial withdrawal.~~
~~*F* – FundCode~~	~~Long integer~~	~~Fund class code.~~
~~*M* – FinalMatAge~~	~~Floating point double~~	~~Contract maturity age of annuitant (in years).~~
~~*X* – AttainedAge~~	~~Floating point double~~	~~Attained age of annuitant (in years).~~
~~*T* – TimeToMat~~	~~Floating point double~~	~~Time to next maturity date (in years).~~
~~*AVGV* – MVGV~~	~~Floating point double~~	~~Ratio of account balance to guaranteed value (*AV/GV*).~~
~~*MER* – MER~~	~~Floating point double~~	~~Total equivalent account charges (annualized, in bps).~~
~~*R* – ResetUtil~~	~~Floating point double~~	~~Reset utilization rate (from 0 to 1).~~
~~*S* – SurrenderUtil~~	~~Floating point double~~	~~"In-the-money" termination rate (from 0 to 1).~~
~~*RC* – RiskCharge~~	~~Floating point double~~	~~Margin offset (annualized, in basis points).~~
~~*AV* – AccountValue~~	~~Floating point double~~	~~Current account balance, in dollars.~~
~~*GV* – GuarValue~~	~~Floating point double~~	~~Current guaranteed value, in dollars.~~
~~*DF* – FundDivAdj~~	~~Floating point double~~	~~The fraction of the asset mix diversification adjustment reflected in the adjusted cost factor (from 0 to 1).~~
~~*DT* – TimeDivAdj~~	~~Floating point double~~	~~The fraction of the time diversification adjustment reflected in the adjusted cost factor (from 0 to 1).~~

~~Refer to page 172 for instructions on setting the parameters for *DF* and *DT*.~~

~~Using the notation given earlier,~~

$$TGCR = GV \times h(\circ) \times w(\circ) \times basic\ cost\ factor - \frac{\alpha}{100} \times AV \times basic\ margin\ factor$$

$$= GV \times h(\circ) \times w(\circ) \times f(\tilde{\theta}) - \frac{\alpha}{100} \times AV \times g(\tilde{\theta})$$

$$= GV \times \hat{f}(\tilde{\theta}) - AV \times \hat{g}(\tilde{\theta})$$

~~$= \hat{F}(\tilde{\theta}) - AV \times \hat{G}(\tilde{\theta})$~~

~~The VBA functions are:~~

~~*Cout*(*B*; *P*; *G*; *A*; *F*; *M*; *X*; *T*; *AV*; *GV*; *MER*; *R*; *S*; *RC*; *DF*; *DT*)~~

~~Calculates the *adjusted dollar cost* $\hat{F}(\tilde{\theta})$, interpolating between nodes where necessary. *S* and *RC* are required arguments, but *RC* is ignored in the calculations (i.e., the margin offset does not affect the "cost" component). Also, *S* is ignored for GMDB calculations (i.e., *S* = 0 if *B* = 1). *DF* and *DT* are optional, but assumed to be zero if not supplied.~~

~~*Marge*(*B*; *P*; *G*; *A*; *F*; *M*; *X*; *T*; *AV*; *GV*; *MER*; *R*; *S*; *RC*; *DF*; *DT*)~~

~~Calculates the *adjusted dollar margin offset* $\hat{G}(\tilde{\theta})$, interpolating between nodes where necessary. *S* is required, but ignored for GMDB calculations (i.e., *S* = 0 if *B* = 1). *DF* and *DT* are optional, but ignored regardless (i.e., the diversification factors only apply to the "cost" component).~~

~~*TBFPR*(*B*; *P*; *G*; *A*; *F*; *M*; *X*; *T*; *AV*; *GV*; *MER*; *R*; *S*; *RC*; *DF*; *DT*)~~

~~Calculates the *adjusted dollar* TGCR = $\hat{F}(\tilde{\theta}) - \hat{G}(\tilde{\theta})$, interpolating between nodes where necessary. *S* is required, but ignored for GMDB calculations (i.e., *S* = 0 if *B* = 1). *DF* and *DT* are optional, but assumed to be zero if not supplied.~~

~~To retrieve the *basic cost factor* $f(\tilde{\theta})$, use the *Coût* function with *AV* = *AV*/*GV*, *GV* = 1 and *DF* = *DT* = 0. Similarly, the *basic margin factor* $g(\tilde{\theta})$ may be obtained by calling *Marge* with *GV* = *GV*/*AV*, *AV* = 1 and *RC* = 100.~~

~~For reference, the underlying C++ routines are listed below. These tools are also available as VBA functions where the name is prefixed with an "x" (e.g., xGetGMDBCostFactor).~~

~~*FacteurCoutPDMG*(*P*; *G*; *A*; *F*; *M*; *X*; *T*; *AVGV*; *MER*; *R*)~~

~~Calculates the GMDB *basic cost factor* $f(\tilde{\theta})$,interpolating between nodes where necessary.~~

~~*FacteurMargePDMG*(*P*; *G*; *A*; *F*; *M*; *X*; *T*; *AVGV*; *MER*; *R*; *RC*)~~

~~Calculates the GMDB *scaled margin offset factor* $\hat{g}(\tilde{\theta})$, interpolating between nodes where necessary. In this case, the basic (i.e., tabular) margin offset factor has already been scaled by the ratio $\frac{\alpha}{100}$ to account for the actual available spread. To extract the tabular factor $g(\tilde{\theta})$, use *RC* = 100.~~

~~*DiversificationFondsPDMG*(*P*; *G*; *R*)~~

~~Calculates the GMDB *asset mix diversification factor* $h(\tilde{\theta})$, interpolating between nodes where necessary.~~

~~*DiversificationChronoPDMG*(*P*; *G*; *F*; *R*)~~

~~Calculates the GMDB *time diversification factor* $w(\tilde{\theta})$, interpolating between nodes where necessary. Currently, $w(\tilde{\theta}) = 1$ for all nodes, so this function call is unnecessary for GMDB.~~

~~*FacteurCoutPEMG* (*P*; *G*; *A*; *F*; *M*; *X*; *T*; *AVGV*; *MER*; *R*; *S*)~~

~~Calculates the GMMB/GMSB *basic cost factor* $f(\tilde{\theta})$, interpolating between nodes where necessary.~~

~~*FacteurMargePEMG*(*P*; *G*; *A*; *F*; *M*; *X*; *T*; *AVGV*; *MER*; *R*; *S*; *RC*)~~

~~Calculates the GMMB/GMSB *scaled margin offset factor* $\hat{g}(\tilde{\theta})$, interpolating between nodes where necessary. In this case, the basic (i.e., tabular) margin offset factor has already been scaled by the ratio $\frac{\alpha}{100}$ to account for the actual available spread. To extract the tabular factor $g(\tilde{\theta})$, use *RC* = 100.~~

~~*DiversificationFondsPEMG*(*P*; *G*; *R*; *S*)~~

~~Calculates the GMMB/GMSB *asset mix diversification factor* $h(\tilde{\theta})$, interpolating between nodes where necessary.~~

~~*DiversificationChronoPEMG*(*P*; *G*; *F*; *R*; *S*)~~

~~Calculates the GMMB/GMSB *time diversification factor* $w(\tilde{\theta})$, interpolating between nodes where necessary.~~

~~7.1.1.7 Installing and Using the AMF Factor Calculation Routines~~

~~The files shown in Table 10 comprise the "AMF factor calculation" tools supplied by the AMF to assist the insurer in calculating the TGCR for GMDB, GMMB and GMSB options.~~

~~Table 10: AMF Factor Calculation Tools – Required Files~~

~~File name~~	~~Description~~
~~Setup.exe~~	~~Windows® setup program to unzip and install the calculation tools.~~
~~AMFCalcFacteurs.xla~~	~~Microsoft® Excel Visual Basic add-in. This functionality 'wraps' the C++ routines, allowing them to be called directly from Microsoft Excel® workbooks (i.e., can be invoked the same way as built-in Excel functions).~~
~~SegFundFactorCalc.dll~~	~~The C++ dynamic linked library that contains the lookup and interpolation functions as described in section 7.1.1.7.~~

~~File name~~	~~Description~~
~~GMDBFactors_CTE95.csv~~ ~~GMMBFactors_CTE95.csv~~	~~Comma-separated value (text format) files containing the factors and parameters described in Step 2 (refer to section 7.1.1.4). Each "row" in the file corresponds to a test contract as identified by the lookup keys shown in Table 4 (page 173). Each row consists of three (3) entries and is terminated by line break and line feed characters. See Step 2 (refer to section 7.1.1.4) for more details. Files including factors at the CTE (80) confidence level are also provided.~~

~~Initial installation of the AMF factor calculation routines~~

~~Run the setup utility and follow the instructions. This will unzip (decompress) the files and register the DLL file in the Windows program registry.~~

~~Using the AMF factor calculation routines~~

~~1. Open "AMFCalcFacteurs.xla" in Microsoft® Excel.~~

~~2. When the dialogue box appears, select the appropriate CTE confidence level for calculation (either CTE (95) or CTE (80)). This function controls which factor tables are read into memory. For a given workbook, only a single set of factor files can be accessed (i.e., either CTE (80) or CTE (95)).~~

~~Notes on VBA functions~~

- ~~The Microsoft® add-in must be loaded (in Excel) before the VBA functions can be called.~~
- ~~The factor files and the Microsoft® Excel add-in (*.xla) must reside in the same directory.~~
- ~~To view the VBA program, press "Alt-F11."~~
- ~~As with the built-in Excel functions, the Excel VBA function call must be preceded by a "+" or "=" character.~~

~~Example: Calculation Tool~~

~~Suppose a contract has the parameters as specified in the table below. Further, assume that the portfolio satisfies the criteria to apply the "time diversification" factors.~~

~~Parameter / Attribute~~	~~Value~~	~~Description / Notes~~
~~Account value (*AV*)~~	~~$90.00~~	~~Total account value at valuation date, in dollars.~~
~~Original deposit~~	~~$100.00~~	~~Original deposit, in dollars.~~

~~**Parameter / Attribute**~~	~~**Value**~~	~~**Description / Notes**~~
~~GMDB (*GV*)~~	~~$100.00~~	~~Current guaranteed death maturity benefit, in dollars.~~
~~GMMB (*GV*)~~	~~$100.00~~	~~Current guaranteed minimum maturity benefit, in dollars.~~
~~Guarantee level~~	~~100%~~	~~Initial guaranteed value as % of original deposit.~~
~~Gender~~	~~Female~~	~~Use 4-year age setback for *X* and *M* (GMDB only).~~
~~Actual attained age (*X*)~~	~~62~~	~~Attained age at the valuation date (in years).~~
~~Contract maturity age (*M*)~~	~~85~~	~~Contract maturity age (in years).~~
~~Time to next maturity (*T*), GMDB~~	~~23~~	~~Time to next maturity/rollover date (in years).~~
~~Time to next maturity (*T*), GMMB~~	~~3~~	~~Time to next maturity/rollover date (in years).~~
~~*GV* adjustment~~	~~Pro rata~~	~~*GV* adjusted pro rata by MV upon partial withdrawal.~~
~~Fund class~~	~~Diversified equity~~	~~Contract exposure mapped to diversified equity as per the Fund categorization instructions in Step 1 (refer to section 7.1.1.3).~~
~~*MER*~~	~~265~~	~~Total charge against policyholder funds (bps).~~
~~GMDB product code (*P*)~~	~~0~~	~~Product definition code as per lookup key in Table 4 (page 173).~~
~~GMMB product code (*P*)~~	~~3~~	~~Product definition code as per lookup key in Table 4 (page 173).~~
~~Guarantee level code (*G*)~~	~~1~~	~~Guarantee code as per key in Table 4 (page 173).~~
~~*GV* adjustment code (*A*)~~	~~0~~	~~*GV* adjustment upon partial withdrawal as per Table 4 (page 173).~~
~~Fund code (*F*)~~	~~5~~	~~Fund class code as per lookup key in Table 4 (page 173).~~
~~GMMB reset utilization (*R*)~~	~~0.35~~	~~Reset utilization rate (from 0 to 1).~~
~~"In-the-money" surrender (*S*)~~	~~0~~	~~"In-the-money" termination rate (from 0 to 1).~~
~~Total allocated spread (*RC*)~~	~~80~~	~~Total margin offset (bps p.a.) for GMDB & GMMB combined.~~
~~Asset mix diversification (*DF*)~~	~~1~~	~~Credit for asset mix diversification.~~
~~Time diversification (*DT*)~~	~~1~~	~~Credit for time diversification (GMMB).~~

~~Using the notation from section 7.1.1.1,~~

$$TGCR = GV \times h(\circ) \times w(\circ) \times basic\ cost\ factor - \frac{\alpha}{100} \times AV \times basic\ margin\ factor$$

$$= GV \times h(\circ) \times w(\circ) \times f(\tilde{\theta}) - \frac{\alpha}{100} \times AV \times g(\tilde{\theta})$$

$$= GV \times \hat{f}(\tilde{\theta}) - AV \times \hat{g}(\tilde{\theta})$$

$$= \hat{F}(\tilde{\theta}) - AV \times \hat{G}(\tilde{\theta})$$

$\hat{f}_{GMDB}(\tilde{\theta})$ = ~~*Cout*(1; 0; 1; 0; 5; 81; 58; 23; 0.9; 1; 265; 0; 0; 80; 1; 1)~~
= ~~0.04592~~

$\hat{f}_{GMMB}(\tilde{\theta})$ = ~~*Cout*(2; 3; 1; 0; 5; 85; 62; 3; 0.9; 1; 265; 0.35; 0; 80; 1; 1)~~
= ~~0.32849~~

~~In the absence of specific and well-defined risk charges for each guaranteed benefit, the total spread is allocated based on the claims cost, giving (in bps per annum):~~

$\alpha_{GMDB} = \frac{0.04592}{(0.04592+0.32849)} \times 80 = 0.12264 \times 80 = 9.81$ ~~basis points per annum available to fund the GMDB claims and~~ α_{GMMB} ~~= 80 – 9.81 = 70.19 bps per annum to fund GMMB payouts.~~

$\hat{F}_{GMDB}(\tilde{\theta})$ = ~~*Cout*(1; 0; 1; 0; 5; 81; 58; 23; 90; 100; 265; 0; 0; 9.81; 1; 1)~~
= ~~\$4.59 = 0.04592 × \$100~~

$\hat{F}_{GMMB}(\tilde{\theta})$ = ~~*Cout*(2; 3; 1; 0; 5; 85; 62; 3; 90; 100; 265; 0.35; 0; 70.19; 1; 1)~~
= ~~\$32.85 = 0.32849 × \$100~~

~~For reference, the *basic cost factors* (i.e., before diversification adjustments) are:~~

$f_{GMDB}(\tilde{\theta})$ = ~~*Cout*(1; 0; 1; 0; 5; 81; 58; 23; 0.9; 1; 265; 0; 0; 9.81)~~
= ~~0.04794~~

$\hat{f}_{GMMB}(\tilde{\theta})$ = ~~*Cout*(2; 3; 1; 0; 5; 85; 62; 3; 0.9; 1; 265; 0.35; 0; 70.19)~~
= ~~0.36461~~

$g_{GMDB}(\tilde{\theta})$ = ~~*Marge*(1; 0; 1; 0; 5; 81; 58; 23; 0.9; 1; 265; 0; 0; 100)~~
= ~~0.04697~~

$g_{GMMB}(\tilde{\theta})$ = ~~*Marge*(2; 3; 1; 0; 5; 85; 62; 3; 0.9; 1; 265; 0.35; 0; 100)~~
= ~~0.06890~~

$\hat{G}_{GMDB}(\tilde{\theta})$ = ~~*Marge*(1; 0; 1; 0; 5; 81; 58; 23; 90; 100; 265; 0; 0; 9.81)~~

~~$= \$0.41 = 0.04697 \times \$90 \times \left(\frac{9.81}{100}\right)$~~

~~$\hat{G}_{GMMB}(\tilde{\theta})$ = *Marge*(2; 3; 1; 0; 5; 85; 62; 3; 90; 100; 265; 0.35; 0; 70.19)~~
~~$= \$4.35 = 0.06890 \times \$90 \times \left(\frac{70.19}{100}\right)$~~

~~$TGCR_{GMDB}$ = *TBFPR*(1; 0; 1; 0; 5; 81; 58; 23; 90; 100; 265; 0; 0; 9.81; 1; 1)~~
~~= \$4.18~~
~~= \$4.59 - \$0.41~~

~~$TGCR_{GMMB}$ = *TBFPR*(2; 3; 1; 0; 5; 85; 62; 3; 90; 100; 265; 0.35; 0; 70.19; 1; 1)~~
~~= \$28.50~~
~~= \$32.85 - \$4.35~~

~~Finally, the TGCR for the contract is \$4.18 + \$28.50 = \$32.68.~~

~~The asset mix and time diversification factors may also be obtained through additional function calls by setting *DF* or *DT* to zero as required and solving for the other factor. For example, if we set *DF* = 1 and *DT* = 0, we obtain for the GMMB component:~~

~~0.34307 = Cout(2; 3; 1; 0; 5; 85; 62; 3; 0.9; 1; 265; 0.35; 0; 80; 1; 0).~~

~~However, with *DF* = 1 and *DT* = 1, we obtained $\hat{f}_{GMMB}(\tilde{\theta})$= 0.32849 (see above in this section). Hence, the GMMB time diversification factor is equal to 0.9575 = $\frac{0.32849}{0.34307}$.~~

~~7.1.1.8 Margin Offset Adjustment~~

~~The total equivalent account charge ("*MER*") is meant to capture all amounts that are deducted from policyholder funds, not only those that are commonly expressed as spread-based fees. The *MER* must include (but not be limited to) the following: investment management fees, mortality and expense charges, administration expenses, contract fees and risk premiums. It must be expressed as an equivalent annual basis point charge against account value. It may be necessary to estimate an equivalent *MER* if there are fees withdrawn from policyholder accounts that are not expressed as basis point charges against account value.~~

~~The margin offset, α, represents the total amount available to fund the guaranteed benefit claims and amortization of the unamortized surrender charge allowance after considering most other contract expenses (including overhead). The margin offset, expressed as an equivalent annual basis point charge against account value, must be deemed permanently available in all future scenarios. However, the margin offset must not include per contract charges (e.g., annual contract fees) since these are included in fixed expenses. It is often helpful to interpret the margin offset as $\alpha = MER - X$, where *X* is the sum of the following:~~

- ~~Investment management expenses and advisory fees~~
- ~~Commissions, bonuses (dividends) and overrides~~
- ~~Maintenance expenses~~

- ~~Amounts required to amortize unamortized acquisition costs (net of available surrender charges).~~

~~7.1.1.9 Determining the Capital Requirement~~

~~To determine the capital requirement, the TGCR must be separately calculated for these two sets of contracts:~~

~~**Set 1:** contracts written prior to January 1, 2011~~

~~**Set 2:** contracts written on or after January 1, 2011.~~

~~The TGCR for the totality of the segregated funds guarantee exposure (the total TGCR) corresponds to the sum of 115% of Set 1 TGCR and of 130% of Set 2 TGCR.~~

~~Net TGCR is obtained by subtracting the credit for reinsurance ceded from the total TGCR. Lastly, the capital requirement is obtained by subtracting the liabilities for net insurance contracts held from the net TGCR.~~

~~7.1.2 Expected Payment Date Method~~

~~To obtain the capital requirement, the calculations set out in the following steps must be done separately for these two sets of contracts:~~

~~**Set 1:** contracts written prior to January 1, 2011~~

~~**Set 2:** contracts written on or after January 1, 2011.~~

~~For all calculations, the values of CTE (95) calculated using the AMF software tool must be multiplied by 115% for the contracts in Set 1 and by 130% for the contracts in Set 2, respectively.~~

~~*Step 1: Partition of contracts into three groups*~~

~~Segregated fund guarantee contracts are partitioned into three groups based on time-to-maturity and annuitant age characteristics as of quarter-end:~~

~~Group~~	~~Characteristics~~
~~1~~	~~Contracts with time to maturity less than or equal to 1 year *or* annuitant age greater than or equal to 85.~~
~~2~~	~~Contracts with time to maturity greater than 1 year *and* annuitant age less than 85 but *not including* contracts with time to maturity greater than 5 years and annuitant age less than 80 years.~~
~~3~~	~~Contracts with time to maturity greater than 5 years *and* annuitant age less than 80 years.~~

~~*Step 2: Allocation of insurance contract liabilities for segregated fund guarantees to the three groups*~~

~~The insurance contract liabilities for segregated fund guarantees for the portfolio as a whole (determined in accordance with CIA *Standards of Practice*) are allocated to the three groups based on the CTE (80) requirements determined by the AMF software tool. In particular, if *L* represents the liabilities for net insurance contracts held for segregated fund guarantees for the portfolio as a whole (determined in accordance with CIA *Standards of Practice*), R_i represents the sum of the CTE (80) requirements for contracts in group *i* calculated using the AMF software tool, and *L* is positive, then the insurance contract liability allocated to group *i* is:~~

~~$$L_i = \alpha_i \times L$$~~

~~where:~~

~~$$\alpha_i = \frac{\max(R_i\,;\,0)}{\max(R_1\,;\,0) + \max(R_2\,;\,0) + \max(R_3\,;\,0)}$$~~

~~If $L \leq 0$, then the insurance contract liabilities allocated to each group is 0.~~

~~*Step 3: Calculation of capital requirement for contracts in group 1*~~

~~The capital requirement for contracts in group 1 is calculated as the difference between the TGCR for contracts in group 1 and L_1, the insurance contract liability allocated to group 1. The TGCR for contracts in group 1 is the sum of the contract-specific total gross capital required for group 1.~~

~~The contract-specific TGCR for group 1 is equal to:~~

~~CTE (95) + 50% × (CTE (95) – CTE (80))~~

~~where:~~

~~the CTE (80) and CTE (95) values are calculated using the AMF software tool.~~

~~*Step 4: Calculation of capital requirement for contracts in group 2*~~

~~The capital requirement for contracts in group 2 is calculated as the difference between the TGCR for contracts in group 2 and L_2, the insurance contract liability allocated to group 2. The TGCR for contracts in group 2 is the sum of the contract-specific total gross capital required for group 2. The contract-specific TGCR for group 2 is determined as CTE (95), where the CTE (95) values are calculated using the AMF software tool.~~

~~*Step 5: Calculation of capital requirement for contracts in group 3*~~

~~The capital requirement for contracts in group 3 is determined as the sum of:~~

- ~~95% of the previous quarter-end capital requirement amount for contracts classified as group 3 as at the previous quarter-end; and~~

- ~~5% of the excess of the current quarter CTE (95) amounts for group 3 over L_3,~~

~~subject to:~~

- ~~a floor of CTE (95) – 25% × (CTE (95) – CTE (80)) – L_3; and~~

- ~~a cap of CTE (95) – L_3.~~

~~Here CTE (80) and CTE (95) represent respectively the sums of the current quarter CTE (80) and CTE (95) amounts for group 3 determined using the AMF software tool.~~

~~*Step 6: Calculation of capital requirement for the portfolio as a whole*~~

~~The capital requirement for the portfolio as a whole is calculated as the sum of the required capital amounts of Set 1 determined in Steps 3, 4 and 5 and the required capital amounts of Set 2 determined in Steps 3, 4 and 5.~~

~~*Additional information*~~

~~An insurer using this method must disclose this in the Capital Guideline Certification Report and provide information on the required capital amounts according to the defined time-to-maturity and annuitant age groups.~~

~~The AMF expects insurers using this method to perform on an annual basis, or more frequently as necessary, forward projections of capital requirements, particularly when the time-to-maturity and annuitant age profiles of the insurer's contracts are such that a large number of contracts are expected to migrate from one of the defined groups to another.~~

~~7.2~~7.7 Internal Model

The AMF may authorize the use of an internal model[144] to calculate capital requirements for segregated fund guarantee risk, for Canadian business as well as for foreign business. An insurer seeking to use its internal model to calculate the segregated fund capital requirement must meet the requirements outlined below and obtain prior authorization from the AMF.

When an insurer submits an application to the AMF for authorization, it must be in a position to show that the model is fully documented and used. In addition, key internal model limitations must be reported and documented. Circumstances under which the internal model does or does not function effectively must also be documented.

A detailed description of the requirements is provided in the following sections. The requirements pertaining to the use of hedging strategies only apply to an insurer who has submitted an application to this effect.

For transition purposes, the AMF is permitting insurers using an internal model to apply the previous version of the guideline (effective January 1, 2024) to calculate capital requirements for segregated fund guarantee risk, for Canadian business as well as for foreign business. This transition is permitted only for the first two quarters of 2025, unless prior authorization was obtained from the AMF the subsequent quarters.

~~7.2.1~~7.7.1 Key phases leading to authorization

The authorization process for using an internal model consists of the following four distinct and consecutive phases:

1. formal application
2. implementation work for the purposes of calculating the capital requirement and parallel calculations
3. granting of the authorization
4. continuous monitoring.

To ensure the appropriateness of the process and to authorize the insurer to use its internal model to calculate capital requirements, the first three phases must be completed.

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[144] The expression "internal model" includes all the processes, methods, controls, models as well as computer and data collection systems used to assess the segregated fund~~s~~ risk. A model is a subcomponent of the internal model. For the purpose of this guideline, a model is defined as the assembly of the concepts representing in a simplified way an actual item so as to understand and forecast its behaviour with statistical, financial, economic, mathematical or other concepts. A model includes assumptions, data and algorithms.

~~7.2.1.1~~7.7.1.1 Phase 1: Formal application

In Phase 1, the insurer must submit to the AMF the formal application and various documents required for the authorization process.

Documents required

The formal application to the AMF must include the following documents:

1. a cover letter from the chief risk officer addressed to the AMF with the following information:
   a. the progress of the implementation work and a self-assessment of compliance with the requirements outlined in sections 7.7.2~~7.2.2~~ to 7.7.8~~7.2.8~~ (the "Requirements"), specifying the nature and extent of the work required to be completed;
   b. details of the information submitted to the Board of Directors (or a committee designated by it) concerning the work to implement the internal model;
2. a copy of the resolution:
   a. of a committee designated by the Board of Directors recommending that the Board of Directors approve the formal application to the AMF, as the case may be;
   b. of the Board of Directors approving that the formal application be submitted;
3. a description of the compliance self-assessment process, including each party's roles and responsibilities;
4. a self-assessment of compliance with the Requirements according to the four criteria;[145]
5. a statement from the chief risk officer to the effect that the compliance self-assessment is accurate;
6. a list of the work performed by the validation team and the internal audit, particularly the work that led to the opinions, the work with respect to operations, and the work with respect to internal operating controls as they pertain to the authorization process. At the request of the AMF, a description of the work may be required;
7. documentation in accordance with the Requirements;
8. compliance gaps for which the insurer intends to request an exemption from the AMF;
9. the implementation plan approved by the Board of Directors and a negative assurance opinion from internal audit with respect thereto, particularly as regards the ability to execute the implementation plan and the sufficiency of financial and human resources;

[145] These four criteria are: the formal framework, the operationalization of the formal framework, reporting, and the controls in place. The definitions of the four criteria are outlined in section 7.7.1.5~~7.2.1.5~~. Not all criteria may be relevant to certain measures of success.

10. a positive assurance opinion from internal audit with respect to all the documents required for the formal application, the adequacy of the compliance self-assessment and the design and effectiveness of the operational controls put in place.

On receipt of the information, the AMF will determine whether additional information is required from the insurer. The AMF will also contact the insurer for assurance that its implementation plan is consistent and realistic.

Self-assessment

The insurer must submit to the AMF a compliance self-assessment. The self-assessment must be based on the Requirements of the four criteria with which the measures of success will be associated.

Implementation plan

The insurer must submit its implementation plan to the AMF. At minimum, the plan must contain the following information:

1. the action plans containing the measures to close any gaps;
2. a detailed implementation schedule of the action plans for each gap identified, as required;
3. the financial resources allotted and the number and expertise of the human resources and their expertise;
4. the template that will be used to produce the quarterly compliance monitoring report.

The risk management function will be required to submit a quarterly report on the progress of the work in respect of the implementation plan until authorization is obtained.

The AMF will periodically monitor the progress of the work to achieve compliance with the Requirements. The AMF expects the insurer's work to progress according to the implementation plan submitted.

The insurer can complete the implementation work during Phase 1. In such a case, the requirements outlined in Part 2A apply to the work.

~~7.2.1.2~~7.7.1.2 Phase 2: Implementation Work and Parallel Calculations

Phase 2 has two parts: the implementation work and the parallel calculations. Both are described below.

Part 2A: Implementation work

In this part, the insurer must provide the AMF with a quarterly monitoring and compliance report including:

1. a quarterly update of the schedule;

2. a quarterly update of the compliance self-assessment;
3. a quarterly update of the documentation satisfying the Requirements;
4. the documents in connection with the authorization application sent to the Board of Directors (or a committee designated by it) during the quarter;
5. compliance gaps for which the insurer intends to request an exemption from the AMF;
6. the negative assurance opinion issued by internal audit with respect to the quarterly monitoring and compliance report;
7. the negative assurance opinion issued by the validation team with respect to the technical aspects of the internal model used for the Requirements.

Part 2B: Parallel calculations

In Part 2B, the AMF will review the validity of the capital requirement calculations. Quantitative compliance gaps must be resolved before the beginning of Part 2B. Non-quantitative compliance gaps may be addressed at the same time as the present part. Where applicable, the requirements outlined in Part 2A apply.

In Part 2B, the insurer must produce and provide the AMF with a report on the results of its capital requirement calculations for four consecutive quarters.

The AMF will review the work underway and decide whether the insurer can advance to the next phase.

~~7.2.1.3~~7.7.1.3 Phase 3: Granting of the authorization

During this phase, the AMF grants authorization provided the previous phases have been successfully completed and the Requirements have been satisfied.

An updated version of the formal application filed in Phase 1 must be submitted to the AMF at the end of the implementation work reflecting all the changes made since the initial filing. The following documents must be included with the updated application:

1. a compliance self-assessment;
2. an updated statement signed by the chief risk officer attesting to the adequacy of the compliance self-assessment;
3. a positive assurance opinion from the internal audit and the validation team covering:
    a. all the documents submitted to the AMF;
    b. the adequacy of the compliance self-assessment based on the four criteria, including the technical requirements described in these documents;
    c. the design and effectiveness of the internal operating controls put in place;
4. a copy of the resolution showing that the Board of Directors received all the information required to assume its responsibilities with respect to the internal model;

5. the compliance gaps for which the insurer requested an exemption from the AMF.

AMF authorization means the insurer must use its internal model to calculate its capital requirements.

~~7.2.1.4~~7.7.1.4 Phase 4: Continuous monitoring

This last phase begins when final authorization is granted. As of that date, the insurer must be continuously in compliance with the Requirements.

The insurer must also show that the processes and procedures put in place remain effective. To this end, the chief risk officer must submit to the AMF an annual statement of compliance containing the following information:

1. the compliance gaps for which the insurer requested an exemption from the AMF. A reassessment of these exemptions (e.g., on the basis of a change in the positions or in the portfolios) must be submitted annually along with justification for maintaining or removing the exemption;
2. changes made to the internal capital requirement calculation model;
3. the compliance self-assessment.

Internal audit must issue a negative assurance opinion on the first two points mentioned above. The validation team must issue a positive assurance opinion on the technical aspects of the internal model used with respect to the Requirements and on the second point. Internal audit must also submit to the AMF a positive assurance opinion annually with respect to the work performed during the year through its multi-annual review as to:

1. the adequacy of the compliance self-assessment based on the four criteria and the chief risk officer's statement of compliance with respect thereto;
2. the design and effectiveness of the internal operating controls put in place.

As part of its work for the year, internal audit must at least include the elements that have been modified since the previous review.

As well, the insurer must provide the AMF with a continuous monitoring report. The content of this report is defined in section 7.7.10~~7.2.10~~.

Changes

If changes are made to the internal model, the insurer must demonstrate to the AMF that it still respects the Requirements. The notion of material and non-material changes and the AMF's expectations with respect to these changes are outlined in section 7.7.9~~7.2.9~~.

Unresolved compliance gaps

Any unresolved compliance gaps (i.e., deemed non-material by the AMF) remaining after the date authorization is granted and for which the AMF did not grant an exemption must be eliminated within a time frame established by the AMF that does not exceed three years. During this time, a quarterly monitoring and compliance report must be submitted to the AMF. An annual statement from the chief risk officer documenting the progress of the work to eliminate the unresolved compliance gaps must be submitted to the AMF. As well, internal audit must issue, quarterly, a negative assurance opinion on the quarterly monitoring and compliance report and issue, annually, a negative assurance opinion on the chief risk officer's statement.

Internal audit must issue a positive assurance opinion on the compliance self-assessment once the compliance gaps are resolved.

~~7.2.1.5~~7.7.1.5 Definitions of the four criteria

The compliance self-assessment must be made on the basis of the four criteria below. The use of the criteria provides a framework for the self-assessment and ensures that all the Requirements are covered. Not all criteria may be relevant to certain measures of success. The self-assessment must be conducted only for the criteria that are relevant for each measure of success.

Formal framework

This criterion encompasses the formal framework put in place by the insurer and must include, particularly, the policies, methodologies, mandates and roles and responsibilities approved by the Board of Directors.

Operationalization of the formal framework

This criterion covers the means used to ensure the insurer operationalizes the formal framework. It refers to the systems, procedures and associated documents that support the effective operation of the formal framework.

Reporting

This criterion covers all the means used to communicate, particularly to the chief risk officer, senior management and the Board of Directors, the insurer's status in relation to the formal framework. These means can take the form of a status of a project or of compliance against a benchmark on an ongoing basis. Reporting must include formal mechanisms and be subject to monitoring by senior management and the Board of Directors.

Controls

This criterion addresses the controls put in place to ensure, among other things, that the formal framework is appropriately operationalized and that the source data and calculations are reliable.

~~7.2.2~~7.7.2 Documentation

The AMF expects the internal model documentation to be complete, consistent and up to date. The AMF expects the documentation (i.e., the documents drafted by the insurer, books, scientific papers, third-party documents, etc.) to be sufficient to allow an independent expert (internal or external) to replicate, if necessary, the results obtained and to assess the work performed concerning the internal model. Work performed by third parties does not relieve the insurer of its documentation obligations.

Any differences between the assumptions, stochastic models and modeling structure used in the valuation of insurance contract liabilities, the calculation of capital requirements, the hedging strategy and the pricing must be clearly identified and justified in the documentation.

The documentation must include the following elements:

1. A description of the segregated funds and products:
   a) a brief description of the products, the mathematical representation of the products in the internal model, and the divergence between the actual products sold and their mathematical representation;
   b) a description of the portfolio based on the material risk factors:
      - the guarantee;
      - the term before the maturity date of the guarantee;
      - the accumulation and withdrawal phase;
      - the ages of the insureds;
   c) the description of the segregated funds:
      - asset value;
      - management style;
      - investment policy;
      - allocation of assets under management with their respective benchmarks;
   d) a summary of the management fees and fees charged for the guarantee by product and segregated fund category;
   e) a description of the general fees, commissions, redemption fees and commission recapture scales.
2. A description of the internal model:
   a) a description of the assessment method used to calculate the Total gross capital requirement (“~~-~~TGCR”):
      - ~~bifurcated or global approach;~~
      - ~~global method or expected payment date method;~~
      - ~~with or without recognition of the hedging strategy;~~

- level of aggregation (product, year of issue, market segment, etc.);
- discount rate;

b) a description of the data used for the calculations and their source;

c) a description of the random number generator;

d) a description of the real world economic scenario generator:

- its scope (interest rates, bond indexes, stock market indexes, inflation, etc.);
- justification for generator selection;
- number of scenarios and projection frequency (time steps);
- determination of parameters and data used;
- mathematical description of models (e.g., an interest rate model, a model to generate stock market returns and a model to generate bond yields, etc.);
- a description of the data used;
- a detailed description of the calibration methods used for the econometric models;
- modeling of hedge assets;
- analysis of the basis risk for the method to replicate the funds for the funds with the highest exposure;

e) a description of the risk-neutral economic scenario generator used in the hedging strategy, if applicable;

- its scope (interest rates, bond indexes, stock market indexes, inflation, etc.);
- justification for generator selection;
- number of scenarios and projection frequency (time steps);
- determination of parameters and data used;
- mathematical description of sub-models used (e.g., an interest rate model and a model to generate stock market returns);
- a description of the data used;
- a detailed description of the calibration methods used for the econometric models;

f) a description and justification for the non-economic assumptions, particularly:

- the mortality rates and, if applicable, their rate of improvement;

- the lapse rates, including the functions for determining dynamic lapse rates;
- transfers between funds;
- asset rebalancing between and within funds;
- resets of guarantees;
- withdrawal start date for guaranteed withdrawal benefits;
- selection of payout option for guaranteed withdrawal benefits;
- periodic withdrawal amount;
- general expenses;

g) a description of the sensitivity testing for daily hedging transactions as well as for real-world projections in order to calculate hedging inefficiencies, if applicable;

h) the data compression method, if applicable;

i) details of the technologies and software used;

j) mathematical descriptions and references used (scientific papers, books, etc.) for the internal model;

k) a description of the modeling of financial instruments used for the hedging strategy;

l) a description of the fund replication methodology used in the model;

m) the rates used to discount the cash flows and justification for their use;

n) length of the selected forecast horizon.

3. Governance of the internal model:

a) a description of the roles and responsibilities of the main users and other parties;

b) the CVs of the main users and of members of the design and validation teams;

c) formal documentation of the risk appetite associated with segregated fund guarantees, risk tolerance levels, risk exposure limits and resulting monitoring mechanisms, if applicable;

d) practices with respect to data keeping and changes to the model that must include restricted access;

e) the data aggregation and report generation process required to establish the value of obligations with respect to segregated fund guarantees;

f) the measures put in place to ensure the objectivity and independence of the main users and other parties;

g) the succession mechanisms in place for key personnel.

4. Hedging strategy:

a) a description of the hedging strategy (e.g., delta-rho hedge, hedged products and unhedged products, hedging level, etc.);

b) the level of and justification for the selected rebalancing limits;

c) information concerning swap agreements with counterparties, particularly, a brief description of the agreement, the nominal value in effect by counterparty, and clauses allowing the counterparty to terminate the agreement;

d) a description of the financial instruments used in the hedge portfolio (futures, forwards, swaps, transactions between business lines within the insurer, if applicable, etc.);

e) a description of the daily hedging process including outsourced services;

f) the gains and losses reports along with a description of the efficiency metric associated with the hedging strategy, if applicable.

5. Sensitivity analysis:

The insurer must perform a sensitivity analysis minimally on:

a) the shock for numerical approximation of the Greek letters ("greeks"), if applicable;

b) the parameters for the fund replication method;

c) rebalancing limits;

d) the parameter for the choice of the payout option for guaranteed withdrawal benefits;

e) discount rate for hedging inefficiencies.

6. Stress test:

This section is complementary to the *Stress Testing Guideline* established by the AMF.

Several stress test scenarios must be performed by the insurer. Those scenarios must minimally include stock market and interest rate shocks. The scenarios must highlight the risk of segregated fund portfolios.[146] The insurer must minimally consider the following scenarios:

a) interest rates remain low for a long period of time;

b) stock market slump over a long period of time;

c) high volatility;

[146] For example, a stock market slump in the next three months might not highlight the risk of a product with a maturity concentration far in the future or for guaranteed withdrawal benefits not yet in payout phase.

d) drop in credit standing of the insurer (margin call/swaps);

e) lack of liquidity on the market;

f) additional deposits from policyholders.

A summary of the stress test analysis must be presented to senior management.

The AMF may, at its discretion, require the insurer to add specific elements to its documentation.

~~7.2.3~~7.7.3 Governance

An insurer that plans to use an internal model must demonstrate to the AMF that its governance, internal control mechanisms and internal model are sufficiently developed. This section sets out additional governance practices not considered in the *Governance Guideline*, the *Guideline Governing Integrity and Competence Criteria*, and the *Integrated Risk Management Guideline* established by the AMF.

Although the insurer is required to conform to the *Governance Guideline*, the *Guideline Governing Integrity and Competence Criteria* and the *Integrated Risk Management Guideline*, it is not required to produce a self-assessment covering these guidelines in order to obtain authorization to use an internal model.

~~7.2.3.1~~7.7.3.1 Roles and responsibilities of senior management and the board of directors

Senior management and the Board of Directors are responsible for ensuring compliance with the requirements for the use of an internal model.

Senior management and the Board of Directors must appoint persons responsible for:

1. approving a governance contract that ensures the separation of supervisory functions. This includes clear separation between the design[147] and the validation of the internal model.
2. ensuring sufficient human, financial and material resources to allow the supervisory functions to properly perform their duties;
3. ensuring the validation exercises are carried out at least once a year;
4. setting up mechanisms to ensure the conclusions of the validation and process review are sent to senior management and the Board of Directors;
5. ensuring the effectiveness of internal controls;
6. ensuring data-keeping requirements are satisfied (refer to section 7.7.5~~7.2.5 "Data Keeping"~~);

[147] Design includes development and implementation of the internal model.

7. ensuring the requirements of the use test are satisfied (refer to section 7.7.6~~7.2.6 "Use Test"~~);

8. ensuring the internal model is supported by complete, consistent and up-to-date documentation (refer to section 7.7.2~~7.2.2 "Documentation"~~);

9. approving use of the internal model for evaluating capital requirements and approving material changes thereto (refer to section 7.7.9~~7.2.9 "Changes and Monitoring"~~);

10. ensuring the hedging strategy is supported by adequate policies and procedures;

11. ensuring the hedging strategy is always operational in the event of employee departures or technology problems (e.g., IT breakdown);

12. ensuring the effectiveness of the hedging strategy is monitored;

13. ensuring the company has a business continuity plan in place.

~~7.2.3.2~~7.7.3.2 Additional roles and responsibilities of senior management

Senior management applies the policies approved by the Board of Directors. The company demonstrates transparency in the management of its financial activities by informing the Board of Directors and the AMF of situations with a material impact on the internal model and on the effectiveness of the hedging strategy.

The AMF also expects senior management to ensure:

1. that a reporting process is in place to make sure the conclusions and recommendations of the validation team and internal audit are considered by the decision-making bodies.[148] In particular, the validation team, through the chief risk officer, and internal audit must have an opportunity, at least once a year, to present their observations to the Board of Directors (or a committee designated by it);

2. that the activities of the design, validation and internal audit teams are not biased by any form of influence within the company. The internal model must be designed, validated and audited by parties that will not profit directly or indirectly from the results arising therefrom. In particular, the AMF expects the remuneration of the validation and audit team leads not to be tied to the internal model results. In addition, these teams must be independent of the teams responsible for pricing or for calculating insurance contract liabilities, in other words, the users of the internal model. The insurer must provide the AMF with documentation to this effect;

3. that the insurer's risk management policies include assignments for the development, implementation, continuous updating and application of practices designed to satisfy the requirements for use of the internal model.

148 The decision-making bodies are defined in the *Governance Guideline*.

~~7.2.3.3~~7.7.3.3 Design team

The design team handles the development and implementation of the internal model and may perform its own validation. However, its work must be reviewed by the validation team.

The design team must ensure the ~~“~~transparency~~”~~ of the internal model. “Transparency” refers to the ability of third parties, particularly the insurer’s external auditors or supervisory agencies, to observe and understand the objectives of the internal model. The work of the design team must be documented.

~~7.2.3.4~~7.7.3.4 Risk management function

The risk management function must be independent of the business lines; in other words, it must not be involved in generating profits (e.g., pricing or the calculation of insurance contract liabilities). In addition, it must be remunerated in a manner that is consistent with the function’s independence, particularly for the validation team.

The responsibilities of the risk management function with respect to the internal model are as follows:

1. Set up a validation team.

2. Define and implement a framework for internal model validation and use of professional judgment that takes into account:

   a) the business strategy;

   b) risk appetite, tolerance, limits and metrics used;

   c) the insurer’s overall risk profile;

   d) the definition of the materiality of a risk with respect to segregated fund guarantees and model risk (as defined in section 7.7.4~~7.2.4 “Validation and Internal Audit”~~).

3. Ensure that model risk sources are managed and that internal model outputs are sufficiently reliable and stable for senior management to be able to make informed decisions.

4. Make a recommendation as to whether the internal model should be used.

This function has ultimate responsibility for stress testing and for taking into consideration all material risks[149] associated with the insurer’s operations, including those related to the hedging strategy. It therefore has access to all of the insurer’s activities.

[149] As indicated in the Integrated Risk Management Guideline.

Due to its independence, the risk management function and the validation team cannot participate in the development or implementation of the internal model.[150]

~~7.2.3.5~~7.7.3.5 Internal audit function

While exercising utmost independence, the internal audit function provides the Board of Directors and senior management with assurance as to the quality and effectiveness of internal controls and the governance program. It considers all the activities relating to the internal model and evaluates interactions with the insurer's other activities. Its function is permanent and separate from the risk management function. The internal audit function must have a clear mandate and sufficient qualified resources.

The AMF expects internal audit to examine the effectiveness of internal control mechanisms designed to ensure compliance with the requirements for use of the internal model. To this end, the insurer must submit to the AMF a report containing at minimum:

1. a description of the scope of the audit performed;
2. an assessment of the operational effectiveness of the internal model;
3. an assessment of the operational effectiveness of the hedging strategy.

In anticipation of the authorization to use an internal model, internal audit activities must include, at minimum:

1. alignment of the audit program with the requirements of the internal model approach;
2. a detailed audit plan indicating the activities to be reviewed annually and at a predefined frequency to assess compliance with the requirements for use of the internal model;
3. a control and process review, performed on an ongoing basis and at least once a year;
4. a verification of the escalation process, which must be in place to facilitate the flow of information to senior management;
5. a description of the audit scope and an assessment of the design and effectiveness of internal control mechanisms designed to ensure compliance with all the requirements for use of the internal model;
6. a review of reports produced by the validation team and a review of the effectiveness of internal control mechanisms to ensure the independence of the validation team;
7. details of internal audit work to be sourced to another function that meets the same independence criteria;
8. an assessment of the adequacy of the resources and skills required to perform the audit and validation work;

150 As a special case, direct users who manipulate the outputs of the internal model are an exception and are not considered independent since they form part of the model risk (refer to section 7.7.4~~7.2.4 "Validation and Internal Audit"~~).

9. a presentation of their observations to the Board of Directors;

10. an assessment of the risk management and governance as they pertain to the internal model.

The audit committee must meet regularly with the risk management function. The purpose of these meeting is to ensure, based on the analyses provided by internal audit, that all risks are adequately covered.

~~7.2.3.6~~7.7.3.6 Deviation from the internal model

In the course of its operations, the insurer may deviate from the results of its internal model when making certain decisions involving, for example, pricing, hedging strategy or the calculation of insurance contract liabilities. When deviating from the results of its internal model, the insurer must ensure that:

1. adequate policies exist to define cases where deviation is permitted;
2. the deviation is appropriately justified and documented;
3. the deviation is not indicative of weakness in the internal model.

In particular, the AMF seeks to ensure that the internal model authorized for calculating capital requirements adequately quantifies the insurer's risks. The insurer must adopt corrective measures if it deviates from its internal model too often.

~~7.2.4~~7.7.4 Validation and internal audit

Given the importance of model risk, the insurer's compliance with the requirements outlined in this section will be an important factor in the AMF's decision to grant the insurer initial authorization to use its internal model and to apply it permanently thereafter. The AMF expects the internal model to be validated and the related processes reviewed.

The AMF expects the validation and internal audit teams to have the necessary expertise, resources and independence to assess the design and operation of the internal model and the quantification of its risks. A documented description of the skills of these teams must be submitted to the AMF.

Where the validation or internal audit team does not have the requisite technical expertise, the insurer must select other independent experts (internal or external). If the AMF deems it necessary, it can request external experts to perform all or part of the validation team's work.

The AMF expects the roles of the experts who make up the validation and internal audit teams to be specified and documented.

Model risk is defined as the possibility of negative consequences materializing or inappropriate decisions being made due to shortcomings or limitations in the model, improper implementation, the use of incorrect assumptions or data, or the selection of an inappropriate model.

An internal model developed by a third party does not relieve the validation and internal audit teams of their responsibilities. The insurer must have sufficient understanding of the internal model developed externally and have complete documentation in respect thereof. Since contracting important tasks to third parties entails additional risks, it is essential to ascertain that the insurer has adequate controls in place and to ensure the continuity of the tasks entrusted to third parties.

The relevance of the external data used and their consistency with internal data must be analyzed and documented. Finally, the conclusions drawn from the process validation and review must be reported to senior management and to the Board of Directors.

~~7.2.4.1~~7.7.4.1 Validation team

The insurer must take into account all important data and issues relating to the validation of the internal model.

In particular, the AMF expects the validation team to understand the risks associated with segregated fund guarantees. In addition, it must understand the hedging strategy and residual unhedged risks. The validation team must assess the development and implementation of the internal model.

Validation of internal model development

The validation team must analyze the internal model, the assumptions and their interactions.

To this end, the validation team must:

1. ensure the econometric models are properly calibrated and that any adjustment thereto is not made for the purpose of reducing the capital requirements;
2. ensure the econometric models behave as expected, particularly with respect to stylized facts (e.g., an interest rate model with inverted curves, a stock market model that generates effects similar to financial crises, stock market model with negative correlation between volatility and returns, etc.);
3. ensure the data history favours a broad range of market scenarios in order to establish correlations between benchmark indexes and yield spreads in relation to risk-free rates;
4. ensure robust econometric models (e.g., addition of new historical data must not materially affect results produced by the internal model);
5. demonstrate to the AMF that the insurer is not less conservative in the calculation of capital requirements than in other calculations performed in the course of their operations;
6. ensure the limitations of the internal model have been clearly identified and documented;
7. perform sensitivity analyses on the risks taken individually and in aggregate;

8. consider the magnitude of the risks in situations where the guarantee is significantly in-the-money (e.g., situation with a low market value to guarantee value ratio);
9. validate that the applications implemented are identical to the theoretical models;
10. determine any and all known limitations of the current validation process, if applicable. If such limitations are found, the validation team must document them;
11. document components not taken into account in the validation;
12. ensure approximations are adequate and do not unduly increase the instability of the internal model;
13. ascertain the reasonableness of using professional judgment and document the resulting conclusions;
14. perform unit tests to reproduce the calculations for material exposures;
15. validate data quality;
16. ensure, as far as practicable, that backtesting and benchmarking are adequately performed and that model risk is considered.

Validation and implementation of the internal model

The validation team must ensure proper implementation of the internal model developed. To this end, the validation team must:

1. ensure that no errors exist in the computer program code and its execution;
2. verify that all input data processing is complete.

Other validation elements

Lastly, the validation team must ensure that:

1. the technology infrastructure is adequate;
2. financial statement items and internal model results are consistent;
3. data keeping is adequate (refer to section 7.7.5~~7.2.5 “Data Keeping”~~);
4. the use test is satisfactory (refer to section 7.7.6~~7.2.6 “Use Test”~~);
5. the documentation satisfies the requirements (refer to section 7.7.2~~7.2.2 “Documentation”~~);
6. the quantitative requirements are respected (refer to sections ~~7.2.7 “Quantitative Requirements Without Recognition of a Hedging Strategy” and section~~ 7.7.8~~7.2.8 “Quantitative Requirements With Recognition of a Hedging Strategy”~~);
7. the changes are appropriate and made in a compliant manner (refer to section 7.7.9~~7.2.9 “Changes and Monitoring”~~).

In addition, any material risks detected by the validation team must be examined in greater detail during stress testing.

Also, the validation team must periodically monitor its own recommendations and conclusions.

~~7.2.4.2~~7.7.4.2 Internal audit

The insurer must ensure the adequacy of its processes and controls. Internal audit is responsible for reviewing processes relating to:

1. data keeping;
2. consistency between financial statement items and internal model results;[151]
3. the quality and performance of the technology infrastructure;
4. documentation for the internal model;
5. changes to the internal model;
6. the work of the validation team;
7. the disclosure of issues and the escalation process;
8. determining the resources authorized to make changes to the internal model;
9. the hedging strategy.

The internal audit team must also ensure that users:

1. have the necessary authorizations to use the internal model;
2. have the skills and experience to use the internal model;
3. understand model risk and the limitations of the internal model;
4. understand the insurer's risk tolerance and limits;
5. do not neglect to provide material information that affects decision-making processes by ensuring that processes and controls are in place for this purpose;
6. properly synthesize the information so that senior management can understand the insurer's current exposure to segregated fund guarantees;
7. can explain the variances between gains and losses and the internal model results;
8. do not make changes to the internal model or its inputs without authorization.

Internal audit must make sure the insurer satisfies the use test requirements. In addition, internal audit must periodically monitor its own recommendations and conclusions. It may, at its discretion or at the request of the AMF, perform certain technical validations.

[151] The process review must include the processes that draw a link between the internal model results and financial statement items so that the financial statements reflect internal model results. The objective is not to ensure a reconciliation with the balances or financial disclosure.

Internal controls associated with hedging strategy

Where an insurer follows a hedging strategy, the related day-to-day operations require effective control mechanisms.

Deficient controls could expose the insurer to internal fraud or errors that could result in heavy losses. Internal audit must therefore ensure that:

1. market participants are identified when they perform transactions and they have access in accordance with their position (i.e., related to security);
2. intraday trade confirmations between the insurer's and the counterparty's front offices are recorded and saved;
3. intraday trade confirmations between the insurer's and the counterparty's back offices are recorded and saved;
4. the back office can confirm transactions with each counterparty to validate their authenticity and accuracy;
5. the middle office effectively follows up on front office transactions for compliance with the rebalancing limits for hedge assets;
6. processes are in place for transactions with discrepancies;
7. clear definitions are established for major discrepancies and factors that trigger the escalation process;
8. the hierarchical structure of the front office and the impermeability among front-, middle- and back-office functions are adequate, particularly with respect to the independence of the back office;
9. the operation of the rebalancing limits is documented, if applicable.

Since the rebalancing limits underpin the hedging strategy, any deviation from the rebalancing dictated by the internal model must be adequately justified and documented (refer to section 7.7.3.6~~7.2.3.6~~). In addition, the consequences of delayed rebalancing, once the limit has been reached, on hedge performance must be documented.

~~7.2.4.3~~7.7.4.3 Documentation

The insurer must document the validation and internal audit review of the internal model processes to ensure all the parties tasked with the documentation review understand the scope, methodology and conclusions drawn from the process validation and review.

~~7.2.4.4~~7.7.4.4 Adjustments after the process validation and review

The insurer must adjust its internal model to reflect the conclusions drawn from the work of the validation and internal audit teams. The chief risk officer must be informed of material shortcomings. Corrective measures must be taken in a timely manner and documented.

The insurer must establish processes to periodically (at least annually) validate the internal model and review its processes. The validation and review of the related processes also depend on special situations or events.

A resolution procedure must be implemented to reconcile the opinions of the design, validation and internal audit teams.

~~7.2.5~~7.7.5 Data keeping

Data extracted from the insurer's database provide an important foundation for the establishment and use of the internal model. The data collected are used primarily as inputs for the projection of in-force business and to establish the assumptions used in projections.

In order to successfully implement the internal model, the insurer must address the challenges of data management and computer program execution. This section outlines the AMF's data-keeping requirements for insurers with an internal model for segregated fund guarantees.

The AMF expects the insurer to consider all the available data and key issues relating to the inputs used in its internal model and to have the data required to effectively support its processes for measuring and managing the risk associated with segregated fund guarantees.

Any data used in the assessment and management of the risk associated with segregated fund guarantees must be properly saved. The insurer must store aggregate historical data for all legal entities and geographic areas. These data must cover, in particular, new deposits, redemptions, inter-fund transfers, resets and payout options.

The term "data keeping" refers to the main components of the data management cycle: collection, processing, access, extraction, conservation and storage. The insurer is responsible for implementing a data-keeping framework and must document all the aforementioned components in accordance with the requirements of this section.

~~7.2.5.1~~7.7.5.1 Governance of the data-keeping process

Senior management must be involved in identifying, assessing and managing the risks associated with data keeping.

As such, the AMF expects senior management to:

1. implement a data management framework and ensure its processes are documented;
2. establish a corporate data management procedure and ensure appropriate means are deployed to obtain buy-in from the bodies responsible for these data (i.e., risk management, compliance, the head of the line of business, IT management) with a view to achieving this objective;

3. ensure the security, confidentiality, integrity and auditability of the data throughout the data management cycle, including minimum quality standards;
4. make sure the insurer has a technology infrastructure that allows timely access to the data both under routine and stressed conditions and that the data remain accessible in the event of a material change in the data architecture;
5. implement independent validation and verification programs for each data-keeping function;
6. make sure that adequate procedures are in place and that the responsibilities are defined to ensure compliance with the data management framework;[152]
7. ensure all the data required to assess segregated fund guarantees are available for this purpose.

In addition, the insurer's structure must not hinder risk-related data keeping either at the consolidated or at any other pertinent level within the company (e.g., non-consolidated or jurisdictions where the insurer conducts business). In other words, data-keeping processes must not be affected by the insurer's legal form or geographic location.

~~7.2.5.2~~7.7.5.2 Data collection

With respect to the assessment of capital requirements, "data collection" means selecting, validating and extracting the data elements required from various internal and external sources and uploading them to the appropriate operational databases or repositories.

The insurer must therefore:

1. document the definition, collection and grouping of the data by indicating their breakdown by product, data flow or other identifiers, as needed;
2. institute standards for data security, integrity, comprehensiveness, accuracy, auditability, relevance and availability;
3. identify deficiencies in the data, take the necessary corrective measures and, if applicable, document the manual or computerized solutions used to satisfy the data requirements;
4. introduce, as needed, standards, policies and procedures for data cleansing, matching, field validation, reformatting and disaggregation, if applicable;
5. implement a procedure for detecting and reporting errors between data series and system sources (upstream or external). This error detection and reporting procedure must be documented and accessible to the insurer's control functions. Periodic reports must be prepared for senior management, indicating the corrective measures taken for the errors reported.

[152] Refer to the Compliance Guideline.

~~7.2.5.3~~7.7.5.3 Data processing

The "data processing" part includes various tasks relating to data management, including breaking down the processing into multiple computerized or manual processes, data transmission, source authentication, validation, reconciliation, etc.

The insurer's data processing must:

1. ensure appropriate levels of initial validation and cleansing for each process as well as when reconciling with any related processes;
2. introduce appropriate procedures to control data changes, particularly, the origin of the change, the authorization, program changes, tests, parallel processing, approvals, data production and controls;
3. limit data manipulation to reduce operational risk. Data manipulation refers to both manual and automated manipulation. With regard to contract data, the AMF expects the majority of the data used to be derived directly from administrative systems and minimally from other sources;
4. establish a data processing procedure and infrastructure that covers the contract life cycle, including, among other things, deposits, redemptions, the payout trigger and option selection, resets, inter-fund transfers and error monitoring. These data are essential for, among other things, establishing or ascertaining the suitability of certain assumptions;
5. guarantee appropriate initial data validation and cleansing levels to avoid introducing bias. Any bias must be documented;
6. implement controls to ensure processing is carried out by authorized resources with adequate expertise;
7. ensure appropriate data backup and recovery in case of a disaster to mitigate data loss and to avoid compromising data integrity;
8. introduce adequate change control procedures for changes made during processing.

The insurer must develop procedures to establish tolerance limits and to assess the effect of missing or outdated information on its internal model.

~~7.2.5.4~~7.7.5.4 Data access and extraction

For the purposes of the internal model authorization process and the monitoring process, the AMF expects data pertaining to the insurer's activities to be available and to be continuously monitored for compliance.

To this end, the insurer must ensure that:

1. the design of the databases and/or data repositories and related extraction, consultation and recovery subprograms satisfy its specific data requirements;

2. access to data is unrestricted under routine and stressed conditions. Access must not be limited by any data-keeping outsourcing agreements with external service providers. Despite such agreements, the insurer must be able to provide any data or information within the prescribed time frame;
3. access controls and data dissemination are based on user roles and responsibilities and on industry best practices in terms of segregation of duties, the whole certified by the insurer's internal compliance and audit functions.

~~7.2.5.5~~7.7.5.5 Data storage, conservation and archiving

The "data storage, conservation and archiving" component allows the insurer to satisfy requests for data or information concerning the management of risks associated with segregated fund guarantees.

The insurer must:

1. establish documented policies and procedures for data storage, conservation and archiving;
2. keep backup copies of pertinent data banks, bases or files;
3. ensure the electronic versions of all the data and of any pertinent information are available and usable at all times;
4. have an appropriate disaster and recovery plan to ensure the continuity of the process in order to mitigate the risk of losing data or compromising their integrity.

~~7.2.6~~7.7.6 Use test

The use test is a process that allows the AMF to ensure the insurer makes appropriate use of its internal model to manage the risks associated with segregated fund guarantees. The use test must be applied on an insurer-wide and continuous basis. This test must be viewed as a complement to governance principles.

~~7.2.6.1~~7.7.6.1 Management and use test

The AMF expects the internal model to be used not only to calculate capital requirements but to form an integral part of the decision-making process and the risk management process for segregated fund guarantees on a continuous basis.

The link between the internal model and the insurer's decisions must be properly documented.

Where the insurer makes a decision with a material impact that would have been different had it been based solely on the internal model, it must justify and document its choice. In such a case, it may be advisable to review the internal model considering the variance between the decision and the model results.

Moreover, senior management is responsible for taking steps to ensure the internal model is used in the decision-making process, particularly with respect to:

1. periodic reporting to senior management and the Board of Directors;
2. strategic planning;
3. the assessment of the risk exposure associated with segregated fund guarantees (e.g., risk concentration, risk diversification);
4. the development of new products;
5. the assessment of risk appetite and limits;
6. the determination of insurance contract liabilities;
7. the business strategy risk assessment;
8. calculation and setting of the internal capital target (economic capital);
9. the hedging strategy;
10. pricing.

In addition, the insurer must identify and document all uses of the internal model likely to influence its operations.

~~7.2.6.2~~7.7.6.2 Uniform and consistent use

The internal model must be used uniformly across the company and its results must be consistent with the figures in the financial statements. The same Best Estimate Assumptions, choice of stochastic models and modeling structure must be used for the valuation of insurance contract liabilities, the calculation of capital requirements (other than the exceptions mentioned in section 7.7.8~~7.2.8~~), the hedging strategy and pricing. The insurer must provide the AMF with the list of any differences detected, and their justifications. The insurer must also demonstrate that based on their respective roles, the users of the internal model have adequate knowledge of the model, including such differences.

In addition, the insurer must have sufficient qualified staff familiar with the operation of the internal model. The insurer must demonstrate that the information technology associated with the internal model is used appropriately by its staff. Staff access to the internal model must be commensurate with their functions.

~~7.2.6.3~~7.7.6.3 Understanding the internal model

The AMF expects senior management, the Board of Directors and the chief risk officer to have an adequate understanding of the following elements of the internal model:

1. the objectives of the internal model and its use by the insurer;
2. the main risks associated with the internal model, its limitations and weaknesses;

3. the issues associated with the internal model under stressed and routine conditions concerning, among other things, capital requirements.

Consequently, the insurer must put mechanisms in place to allow for a clear understanding of the characteristics and behaviour of the internal model. These mechanisms include awareness-raising sessions, meetings and discussions between the Board of Directors, senior management, the risk management function and internal audit. The insurer must document these discussions and the content of the awareness-raising sessions. Such documentation must be provided to the AMF at its request. The AMF expects the following information to be presented at these meetings:

1. a summary description of the internal model's own risks, in particular the existence of modeling variances arising from the inability to replicate the segregated fund returns (basis risk) and the impact of approximations on the internal model (e.g., fund replication methodology, data compression method, gaps between real world and internal model,[153] number of scenarios, etc.);

2. a summary description of the risks not modeled by the internal model;

3. the impact of an increase in the proportion of funds invested whose returns are tied to the stock market and the impact of offering certain funds instead of others;

4. the elements of the hedging strategy that are important for its cost and effectiveness:
    a. the risks mitigated and those not mitigated by the hedging strategy;
    b. the effect of rebalancing limits on hedging efficiency;
    c. the liquidity risk associated with margin calls and collateral calls, particularly in favourable market conditions;
    d. the impact of a decrease in the credit standing of the insurer on derivatives transactions;
    e. the problems that can arise if the internal controls for hedging transactions are not effective.

The AMF expects the insurer's Board of Directors (or a committee designated by it) and senior management to have sufficient understanding of the management reports submitted to them. This understanding includes any reports submitted as part of the validation process.

In addition, the Board of Directors and senior management must have qualitative and quantitative information not only on the risks hedged by the risk mitigation strategies but also those that are not.

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153 For example, the internal model may use bonds while swaps may be used in the real world to hedge interest rate sensitivities, or stock market indexes may be used in the internal model while forward contracts may be used in reality to hedge stock market sensitivities.

~~7.2.7 Quantitative Requirements Without Recognition of a Hedging Strategy~~

~~The insurer may choose between the two methods described in this section. When an insurer submits its initial application to authorize the use of its internal model for the calculation of segregated fund capital requirements, it is required to irrevocably elect the method it intends to use to calculate the capital requirement.~~

~~Because the two methods presented below do not include the recognition of hedging strategies, an insurer with positions under such a strategy must take them into account in Chapters 3 to 5. For example, it is permitted to use the assets held under a hedging strategy to offset long positions in equities as stated in section 5.2.4.~~

~~7.2.7.1 Global Method~~

~~Under this method, the "TGCR" is calculated first. It is determined as the value of the obligations with respect to the guarantees offered on segregated funds and is calculated at CTE (95) using the internal model authorized by the AMF prior to its use.~~

~~CTE (95) is calculated as being the higher of:~~

- ~~the result obtained using explicit valuation margins for adverse deviations on the non-scenario-tested risk factors;~~
- ~~the result obtained without such margins.~~

~~Net TGCR is then obtained by subtracting the credit for reinsurance ceded from the TGCR. Finally, the capital requirement is obtained by subtracting the liabilities for net insurance contracts held from the net TGCR.~~

~~7.2.7.2 Expected Payment Date Method~~

~~Under this method, cash flows are grouped into 3 categories according to expected dates, and the following minimum confidence levels would apply:~~

- ~~due in 1 year or less, CTE (98);~~
- ~~due between 1 and 5 years, CTE (95);~~
- ~~due after 5 years, CTE (90).~~

~~The TGCR is to be determined in the following way under this method:~~

1. ~~A large number of stochastic investment return scenarios is generated (e.g., 5,000 or more).~~

2. ~~Segregated fund guarantee cash flows corresponding to these scenarios are determined based on the identified term of the liability.~~

3. ~~In each scenario, cash flows are grouped based on their maturity in the following time intervals:~~

- ~~1 year or less;~~
- ~~greater than 1 year and less than or equal to 5 years;~~
- ~~greater than 5 years.~~

~~4. For each scenario and each time interval, the present value of benefit payments less guarantee premium receipts is calculated.~~

~~5. The result is four distributions of present values based on the following cash flow periods:~~

- ~~1 year or less – distribution 5a;~~
- ~~greater than 1 year and less than or equal to 5 years – distribution 5b;~~
- ~~greater than 5 years – distribution 5c;~~
- ~~all periods combined (i.e., no grouping of cash flows) – distribution 5d.~~

~~6. The TGCR is the sum of:~~

- ~~the TGCR for cash flows 1 year or less (the quantity T_1 defined in Steps 8 through 12);~~
- ~~the TGCR for cash flows greater than 1 year and less than or equal to 5 years (the quantity T_2 defined in Steps 8 and 13);~~
- ~~the TGCR for cash flows greater than 5 years (the quantity T_3 defined in Steps 14 through 22).~~

~~7. The capital requirement is the TGCR calculated in Step 6 minus the lesser of:~~

- ~~the insurance contract liabilities for segregated fund guarantees reported on the balance sheet by the insurer and determined in accordance with the CIA *Standards of Practice* (denoted by L in the following steps);~~
- ~~the insurance contract liabilities for segregated fund guarantees based on a CTE (85) standard (the quantity L_u defined in Steps 8 and 9).~~

~~In symbols, the capital requirement is:~~

$$\cancel{T_1 + T_2 + T_3 - \min(L; L_u)}$$

~~or 0, if this amount is negative.~~

~~*Calculation of L_u, T_1 and T_2*~~

~~8. Based on the example illustrated in Step 1, the 5,000 scenarios are ordered according to the present value distribution for all cash flow periods combined (distribution 5d), i.e., without respect to cash flow bucketing. The resulting ordering~~

~~is labelled such that scenario 1 represents the greatest present value and scenario 5,000 the least present value.~~

~~9. *Calculation of* L_u: The average present value for distribution 5d (present value cash flows for all periods combined) corresponding to scenarios 1 through 750 is calculated and denoted L_u. If the calculated value is negative, a value of 0 is assigned to L_u. The quantity L_u represents the insurance contract liabilities for segregated fund guarantees based on a CTE (85) standard.~~

~~10. Scenarios 501 through 5000 are discarded.~~

~~11. Scenarios 1 through 500 are re-ordered according to the present value distribution for cash flows 1 year or less (distribution 5a). The resulting re-ordering is labelled such that scenario 1* has the greatest present value with respect to cash flows 1 year or less, and scenario 500* the least present value.~~

~~12. *Calculation of* T_1: The average of the present values for the distribution in 5a (present value cash flows 1 year or less) corresponding to scenarios 1* through 100* is calculated and denoted T_1. The quantity T_1 represents the TGCR cash flows 1 year or less. Note that T_1 could be negative.~~

~~13. *Calculation of* T_2: The average present value cash flows greater than 1 year and less than or equal to 5 years corresponding to scenarios 1 through 250 is calculated and denoted T_2. This calculation is based on scenarios 1 through 250 (i.e., the scenarios for the ordering based on all cash flows combined), not on scenarios 1* through 250*. The quantity T_2 represents the TGCR for cash flows greater than 1 year and less than or equal to 5 years. Note that T_2 could be negative.~~

~~*Calculation of* T_3~~

~~The TGCR for cash flows greater than 5 years is determined in the following way:~~

~~i) first, upper and lower bounds for the TGCR for this cash flow interval are determined as well as the TGCR based on a CTE (95) standard;~~

~~ii) then, capital requirements corresponding to the TGCR upper and lower bounds and the CTE (95) standard are determined assuming that these amounts are allocated to the three cash flow buckets in proportion to the corresponding TGCR floored at 0;~~

~~iii) following this, the capital requirement for the greater than 5 years cash flow interval is determined using a weighted average of the previous quarter's capital requirement for this cash flow interval and the current quarter amount based on a CTE (95) standard, subject to the upper and lower bounds on TGCR previously calculated;~~

~~iv) finally, the TGCR for the greater than 5 years cash flow interval is inferred from the capital requirement just calculated, based on the earlier assumption that capital requirements are allocated to the three cash flow intervals in proportion to the corresponding TGCR.~~

~~The detailed calculations are described in Steps 14 through 22 as follows:~~

~~*Calculation of upper and lower bounds for TGCR and TGCR based on CTE (95)*~~

~~14. Scenarios 1 through 500 are re-ordered according to the present value distribution for cash flows greater than 5 years (distribution 5c). The resulting re-ordering is labelled such that scenario 1*** has the greatest present value with respect to cash flows greater than 5 years and scenario 500*** the least present value.~~

~~15. *Calculation of upper bound* T_3^s: The average present value for distribution 5c (present value cash flows greater than 5 years) corresponding to scenarios 1*** through 250*** is calculated and denoted T_3^s. The quantity T_3^s represents an upper bound for the TGCR before flooring for cash flows greater than 5 years.~~

~~16. *Calculation of lower bound* T_3^i: The average present value for distribution 5c (present value cash flows greater than 5 years) corresponding to scenarios 1*** through 500*** is calculated and denoted T_3^i. The quantity T_3^i represents a lower bound for the TGCR before flooring for cash flows greater than 5 years.~~

~~17. *Calculation of CTE (95) proxy* $T_3^{(95)}$: The average present value cash flows greater than 5 years corresponding to scenarios 1 through 250 is calculated and denoted $T_3^{(95)}$. Note that scenarios 1 through 250 (i.e., the scenarios for the ordering based on all cash flows combined) are used here, not scenarios 1* through 250* or scenarios 1*** through 250***. The quantity $T_3^{(95)}$ represents the contribution to the TGCR of cash flows greater than 5 years when a TGCR standard of CTE (95) is used without cash flow partitioning.~~

~~*Calculation of corresponding capital requirements*~~

~~18. *Calculation of upper bound :* C_3^s~~

$$C_3^s = 0 \qquad \text{if } T_3^s \leq 0$$

$$C_3^s = \frac{T_3^s}{\max(T_1+T_2;0)+T_3^s} \times max\{T_1 + T_2 + T_3^s - \min(L;L_S);0\} \qquad \text{if } T_3^s > 0$$

~~The quantity C_3^s represents an upper bound on the current quarter capital requirement for cash flows greater than 5 years.~~

~~19. *Calculation of lower bound* C_3^i:~~

$$C_3^i = 0 \qquad \text{if } T_3^i \leq 0$$

$$C_3^i = \frac{T_3^i}{max(T_1+T_2;0)+T_3^i} \times max\{T_1 + T_2 + T_3^i - min(L;L_S);0\} \qquad \text{if } T_3^i > 0$$

~~The quantity C_3^i represents a lower bound on the current quarter capital requirement for cash flows greater than 5 years.~~

~~20. *Calculation of $C_3^{(95)}$:*~~

~~$C_3^{(95)} = 0$ if $T_3^{(95)} \leq 0$~~

~~$C_3^{(95)} = \frac{T_3^{(95)}}{max(T_1+T_2;0)+T_3^{(95)}} \times max\left\{T_1 + T_2 + T_3^{(95)} - min(L; L_S)\,; 0\right\}$ if $T_3^{(95)} > 0$~~

~~The quantity $C_3^{(95)}$ is the current quarter capital requirement for cash flows greater than 5 years to be used in the averaging formula.~~

~~*Calculation of capital requirement for cash flows greater than 5 years using the averaging formula*~~

~~21. *Calculation of* C₃: $C_3 = max\left\{C_3^i; \min\left(C_3^s; 95\% \times C_3^p + 5\% \times C_3^{(95)}\right)\right\}$, where C_3^p represents the previous quarter capital requirement for cash flows greater than 5 years. The quantity C_3 represents the current quarter capital requirement for cash flows greater than 5 years.~~

~~*Calculation of corresponding TGCR for cash flows greater than 5 years*~~

~~22. The TGCR for cash flows greater than 5 years is $T_3 = \max\left(T_3^i; \min(T^*; T_3^s)\right)$, where the quantity T^* is determined as follows: if $C_3 = 0$ then $T^* = 0$. Otherwise, if $C_3 > 0$ then T^* is the unique positive solution of the equation $C_3 = \frac{T^*}{max(T_1+T_2;0)+T^*} \times max\{T_1 + T_2 + T^* - min(L; L_S); 0\}$.~~

~~The quantity L_U defines a cap on the insurance contract liabilities for segregated fund guarantees that may be subtracted from the TGCR in the determination of the segregated fund guarantee capital requirement (refer to Step 7). The calculation of L_U described in Step 9 generates an insurance contract liability based on a CTE (85) and represents an interim measure. The calculation of L_U will be reviewed and may be modified in future reporting periods to become more closely aligned with the CIA *Standards of Practice* with regard to calculation of the insurance contract liability. Other aspects of this method may be reviewed and modified in the future.~~

~~**7.2.7.3 Calibration Criteria**~~

7.7.7 Calibration criteria

The criteria described in this section apply to segregated fund guarantee capital requirements~~ for contracts written on or after January 1, 2011. The existing calibration criteria in accordance with the CIA *Standards of Practice* apply to contracts written prior to January 1, 2011, until a new approach is developed and implemented~~.

Equity index calibration criteria

New minimum quantitative calibration criteria are mandated for the scenarios used to model the returns of the following total return equity indexes (henceforth referred to as "listed indexes"):

- TSX;
- Canadian small cap equity, mid cap equity and specialty equity;
- S&P 500;
- US small cap equity, mid cap equity and specialty equity;
- MSCI World Equity and MSCI EAFE

The actual investment return scenarios for each of the listed indexes used in the determination of TGCR must meet the criteria specified in the following table.

	Time Period	
	6 months	**1 year**
Left tail criteria:		
2.5th percentile of return not greater than	-25%	-35%
5th percentile of return not greater than	-18%	-26%
10th percentile of return not greater than	-10%	-15%
Right tail criteria:		
90th percentile of return not greater than	20%	30%
95th percentile of return not greater than	25%	38%
97.5th percentile of return not greater than	30%	45%

Furthermore, the arithmetic average of the actual investment return scenarios for each listed index over any one-year period (including the one-year period starting on the valuation date) cannot be greater than 10%. All of these criteria must be met for the scenarios of a listed index to be in accordance with the new minimum calibration criteria.

In addition to the criteria above, modeled scenarios of TSX total return indexes must continue to satisfy the most recently published CIA *Standards of Practice* calibration criteria. In addition to the criteria above, modeled scenarios of S&P 500 total return indexes must satisfy the calibration criteria of the *American Academy of Actuaries* for equities.[154]

[154] For example, as published in the June 2005 document entitled "Recommended Approach for Setting Regulatory Risk-Based Capital Requirements for Variable Annuities and Similar Products."

The scenarios used to model returns of an equity index that is not one of the listed indexes need not meet the same calibration criteria, but must still be consistent with the calibrated scenarios used to model the returns of the listed indexes.

<u>Correlation</u>: The scenarios used to model returns for different equity indexes must be positively correlated with one another. Unless it can be justified otherwise, the correlation between the returns generated for any two equity indexes (whether or not they are listed) must be at least 70%. If scenarios are generated using a model that distinguishes between positive and negative trend market phases (e.g., the regime-switching log-normal model with two regimes) then, unless it can be justified otherwise, the scenarios must be such that there is a very high probability that different equity indexes will be in the same market phase at the same time, and a very low probability that different equity indexes will be in different phases at the same time.

Bond index calibration criteria

New minimum quantitative calibration criteria are mandated for the scenarios used to model total return bond indexes that track the performance of Canadian government, US government, or investment grade corporate bonds. The actual investment return scenarios for each such index used in the determination of TGCR must have the specified characteristics.

<u>Left tail criteria</u>

Upper bounds are placed on the 2.5th, 5th and 10th percentiles of the one-year total returns of the indicated bond indexes. For p = 2.5, 5 and 10, the p^{th} percentile of the total return over one year cannot be greater than

$$r - max\left(D - \frac{1}{2}; 0\right) \times \left(a_p + b_p \times \sqrt{r}\right) - d_p$$

where:

- r is the effective per annum yield, at the time of valuation, on a D-year zero-coupon government bond in the currency of the bond index;
- D is the duration, measured in years, of the bond index at the time of valuation;
- a_p and b_p are parameters related to the associated p^{th} percentile increase in interest rates (the values of a_p and b_p are described below);
- d_p is the reduction in the return at percentile p due to credit default and downgrade losses associated with the particular bond index (the values of d_p are described below).

The values of a_p for a particular percentile depend on the average term to maturity of the bond index. For terms to maturity of 1, 3, 5 and 10 years, the values of a_p are given in the following table:

Percentile	**Remaining Maturity**			
	1 year	**3 years**	**5 years**	**10 years**
	a_p	a_p	a_p	a_p
2.5^{th}	2.00%	1.60%	1.20%	0.80%
5^{th}	1.70%	1.35%	1.00%	0.70%
10^{th}	1.30%	1.05%	0.80%	0.50%

The values of b_p are given in the following table:

Percentile	b_p
2.5^{th}	5.00%
5^{th}	4.20%
10^{th}	3.30%

The value of d_p for all government bond indexes is 0. The values of d_p for other credit classes are given in the following tables:

$d_{2.5}$	**Remaining Maturity**			
	1 year	**3 years**	**5 years**	**10 years**
AAA / AA	0.10%	0.50%	0.75%	1.30%
A	0.30%	0.80%	1.20%	2.00%
BBB	0.80%	2.00%	2.80%	4.00%

d_5	**Remaining Maturity**			
	1 year	**3 years**	**5 years**	**10 years**
AAA / AA	0.06%	0.30%	0.55%	1.00%
A	0.20%	0.55%	0.85%	1.50%
BBB	0.50%	1.40%	2.00%	3.00%

d_{10}	Remaining Maturity			
	1 year	**3 years**	**5 years**	**10 years**
AAA / AA	0.03%	0.15%	0.30%	0.65%
A	0.10%	0.30%	0.50%	1.00%
BBB	0.30%	0.85%	1.30%	2.00%

For terms to maturity between 1 and 10 years, the values of a_p and d_p are determined by linear interpolation between the nearest terms to maturity in the above tables. For terms to maturity greater than 10 years, the values of a_p and d_p for the 10-year term to maturity are to be used. For terms to maturity less than 1 year, the values of a_p and d_p for the 1-year term to maturity are to be used. For indexes containing bonds in multiple credit classes, d_p for the index must be calculated as the notional-weighted average of d_p taken over each of the bonds in the index.

Average return criterion

An upper bound is placed on the expected compounded average total return of each of the indicated bond indexes. The arithmetic average of the scenario-specific compounded average returns calculated over the D-year period beginning on the valuation date may not be greater than:

$$r + s,$$

where:

The parameters D and r are defined above
and s represents the average credit risk premium.

The value of s is given in the following table:

Credit class	*s*
Government	0.00%
AA or higher	0.85%
A	1.10%
BBB	1.45%

Criteria for other bond indexes

The scenarios used to model returns of a bond index that does not track the performance of Canadian government, US government, or investment grade corporate bonds need not meet the same calibration criteria, but must still be consistent with the calibrated scenarios used to model the returns of these indexes, and must be conservatively determined.

Correlation

The scenarios used to model returns for different bond indexes must be positively correlated with one another. Unless it can be justified otherwise, the correlation between the returns generated for an equity index and a bond index in the same currency must be no more than 40%.

The insurer must take into consideration the limited historical experience with very low interest rate environments when setting assumptions for bond fund models and ensure that its internal model appropriately captures the risks associated with very low interest rate environments. An insurer's implementation of the new calibration criteria must not result in less conservative modeling or the use of less conservative scenario sets for bond indexes than is currently the case.

Criteria for individual segregated funds

If weighted averages of modeled indexes are used to calculate the return scenarios for an individual segregated fund (before fee deductions), all of the index return scenarios on which the segregated fund return scenarios are based must meet the above calibration criteria. Insurers that do not model segregated fund investment returns (before fee deductions) using weighted averages of index returns must contact the AMF in writing for information on how to calibrate the segregated fund return scenarios.

~~**7.2.7.4 Calculation of the Total Capital Requirement**~~

~~The capital requirement for contracts subject to section 7.2.7.3 (i.e., for contracts written on or after January 1, 2011) will be calculated separately from the capital requirement for all other segregated fund guarantee contracts.~~

~~The capital requirement for the segregated fund guarantee exposure as a whole will be the sum of the capital requirements for all contracts subject to section 7.2.7.3 and the capital requirements for all other contracts. For both of these business groups, any negative capital requirement must be floored at zero before the sum is calculated.~~

~~**7.2.7.5 Transitional Rules**~~

~~Transitional rules apply when calculating capital requirements using any internal model that has been newly authorized for use. During the initial year of use, the insurer must maintain a capital requirement equal to the sum of 50% of the amount as determined through the use of the internal model, and 50% of the capital requirements determined with the prescribed factors. Subsequently, the insurer may constitute the total capital requirement using its internal model, starting at the end of the fiscal year following the first anniversary of model's use.~~

~~7.2.8~~7.7.8 Quantitative requirements with recognition of the hedging strategy

~~Under this method, the "TGCR" is calculated first.~~Under the internal model approach with recognition of the hedging strategy, the TGCR is calculated first. The TGCR is the value of the obligations with respect to the guarantees offered on segregated funds and is calculated at CTE (95) to which the basis risk is added and a diversification credit is subtracted, calculated using the internal model previously authorized by the AMF. The required capital ~~required~~ will be the difference between the TGCR and the insurance contract Best Estimate Liabilities ~~liabilities (including contractual service margins and Risk Adjustments)~~ for segregated fund guarantees carried on the insurer's balance sheet. The capital requirement may~~is~~ then be adjusted to amortize the impact of the current period if the insurer opted for the smoothing option (refer to section 7.7.8.8).

The first part of the calculation involves generating a large number of stochastic real-world scenarios. The number of scenarios must be sufficient so that any change in scenario does not materially change the capital requirements. For each scenario, the insurer must forecast all the cash flows associated with the guarantees offered (i.e., payments under the guarantee, expenses, commissions, total management expense ratios, etc.). Where the insurer selects the approach in this section, all its segregated funds with guarantees must be included in the forecast and assessed in the same manner whether or not a hedging strategy is used in their regard.

An insurer that has a hedging strategy must recognize it under this approach. The strategy modeling must be as faithful as possible to the manner in which the strategy is actually applied. ~~Since the hedging strategy is modeled to calculate the capital requirements, the balance sheet assets under this strategy must not be factored into the calculation in section 5.2.3. However, these assets are subject to the requirements associated with credit risk, discussed in Chapters 3 and 4.~~

When calculating the TGCR using this approach, certain considerations must be respected concerning the assumptions and modeling. These considerations are presented in greater detail in the following sections.

~~7.2.8.1~~7.7.8.1 Basis of valuation

The calculation of the value of obligations ~~with Risk Adjustments~~ and hedging inefficiency is subject to the following conditions:

1. The entire portfolio of contracts with segregated fund guarantees must be modeled. Thus, contracts subject to a hedging strategy as well as those that are not must be included in the calculations.
2. The assumptions used for the calculations must be ~~the same as those used to calculate the insurance contract liabilities and include Risk Adjustments~~ the Best Estimate Assumptions, except for the assumptions or margins ~~described~~ prescribed in in sections 7.7.8.3 and 7.7.8.4~~section 7.2.8~~.
3. All the calculations must be made using a lifetime CTE (95) as the~~a~~ risk measure.
4. With respect to modeling the hedging strategy, use of the stochastic-on-stochastic

method must be founded on the following first principles:

Under the stochastic-on-stochastic method, the effect of the dynamic hedging program is calculated using explicit modeling of the hedge positions which are determined based on the explicitly modelled risk-neutral liability.[155] In a stochastic-on-stochastic valuation, risk-neutral stochastic data (inner loop) is modeled along real-world stochastic paths (outer loop). The risk-neutral liability to be hedged depends on the purpose of the hedging program.

Explicit hedge positions are determined at each node on the real-world paths by determining the sensitivity of the liability to various market moves (i.e., the Greeks), using risk-neutral (stochastic) valuations. Having established the hedge positions required at each node, the hedge payoffs at the following time-step are determined by applying the hedge positions to the real-world outer loop. This step is repeated for each node in the real-world outer loop to determine the cash flows of the hedge. This method explicitly determines the hedge positions/cash flows and allows for an explicit estimation of unhedged risks.

5. The prescribed actuarial assumptions described in section 7.7.8.4~~7.2.8.4~~ apply in the outer loops according to real-world scenarios, both for hedged and unhedged products.

6. The calculation assumptions for inner~~l~~ loops used to calculate the risk-neutral liability and the greeks must be the same as those formally used to calculate the risk-neutral liability and the greeks on a daily basis for hedging purposes.

~~7.2.8.2~~7.7.8.2 Hedging strategy

The insurer must use the same hedging strategy as the one in effect on the valuation date. Among other things, if rebalancing limits dictate when the insurer rebalances its hedging portfolio, such rebalancing limits must be reflected in the modeling. The modeling must not underestimate the impact of actual rebalancing transactions on risks, particularly as regards the frequency of rebalancing risk-neutral liabilities and hedge assets.

The hedging strategy cannot be modeled if it contains elements that could affect maintenance of the actual hedging strategy or a part thereof in the long term. For example, with respect to swaps, it might contain clauses allowing the counterparty to terminate the agreement in the event of a decrease in the credit standing of the insurer below a certain level.

~~7.2.8.3~~7.7.8.3 Economic assumptions

Real-world market projections are subject to the calibration criteria outlined in section 7.7.7~~7.2.7.3~~. These criteria apply to all contracts, without exception. In addition, stock market models with mean reversion are not permitted for the purposes of this guideline.

155 The risk-neutral liability represents the value of the financial option calculated for the purposes of the hedging strategy.

With respect to the cash flow discount rates, these must be consistent with the insurer's investments in terms of the underlying assets that back the segregated funds' TGCR. In addition, the reinvestment rates of these assets must vary according to the scenario for which the cash flows are discounted. For products with a hedging strategy, the discount rates of the underlying assets that back the segregated funds' TGCR can only be used for discounting margins and hedging inefficiencies. For risk-neutral liabilities of the guarantee, the discount rates must be consistent with the hedging strategy.

~~7.2.8.4~~7.7.8.4 Non-economic assumptions

Certain margins and assumptions are ~~defined~~ prescribed by the AMF. All assumptions and margins not specified by the AMF must be those used in the valuation of insurance contract liabilities and include the corresponding Risk Adjustments. ~~If the insurer uses only a single aggregate Risk Adjustment rather than assumption-based Risk Adjustments, the insurer must replace the aggregate Risk Adjustment in the TGCR calculation with a Risk Adjustment that covers only those assumptions that are not defined in this section.~~

Lapse[156]

A prescribed margin of 40% is applied to the Best Estimate Assumption for lapse rates. However, if the Best Estimate Assumption is determined dynamically, the prescribed margin to be applied is 30%. The direction of the lapse margin must be applied to create an adverse impact for the insurer. Lapse margins must be re-evaluated for each term in the projection and for each contract, not globally.
~~A 40% margin is applied to the Best Estimate Assumption in replacement of the Risk Adjustment used in the calculation of insurance contract liabilities. The lapse margin must be applied to create an adverse impact for the insurer. For example, if increasing the lapse rate by 40% is more favourable than reducing it by 40%, the insurer must reduce the lapse rate assumption by 40%. Lapse margins must be re-evaluated for each term in the projection and for each contract, not globally. The direction of the margin usually varies based on the level of parity (moneyness) of the guarantee.~~

The final assumption, including the ~~40% margin~~prescribed margin, must be adjusted as follows for some products:

- Products with guaranteed withdrawal benefits

  Lapses before the withdrawal period must be those of the insurer including the prescribed margin. The insurer's Best Estimate Assumption including the prescribed margin is used at the beginning of the withdrawal period and converges linearly to a lapse rate of 1% 10 years after the start of the withdrawal period. The rate remains at 1% for the next 5 years, after which it becomes zero. If the client's surrender value becomes nil during the withdrawal period, the lapse rate should be set to zero as of that point in time.~~40% margin while lapses during the withdrawal period must be modified. The insurer's Best Estimate Assumption including the 40% margin is used~~

[156] Lapses, in the context of segregated funds, refer to total or partial surrenders as well as additional lapses for contract renewals. Shocks are therefore expected to be applied to these situations.

~~at the beginning of the withdrawal period and moves on a straight line basis to reach a lapse rate of 0.5% 10 years after the start of the withdrawal period. The 0.5% rate is then maintained for the next 5 years, after which it becomes zero. If the client's surrender value becomes nil during the withdrawal period, the lapse rate must be zero as of that point in time.~~

Furthermore, t~~T~~he amount used in the assumption for the client's periodic withdrawal during the withdrawal period must be the maximum guaranteed withdrawal set out in the ~~policy~~contract.

- Products with maturity guarantee

The lapse rate must be set to zero if the moneyness ratio (market value/guaranteed value ratio) is lower than the floors set out below by years to maturity. For fractions of years, the rates must be obtained by linear interpolation.

~~A zero lapse rate must be used when the moneyness ratio (market value/guaranteed value ratio) falls below a given value at a given point in time before the maturity date. The best estimate lapse rate assumption including the 40% margin continue to apply otherwise, including when the moneyness ratio moves above the floor.~~

~~The moneyness ratio below which the lapse rates must be zero are presented in the following table. For parts of years, the rates must be obtained by linear interpolation.~~

Years to Maturity	Moneyness Ratio
0	100%
1	80%
2	70%
3	60%
4	50%
5	40%

Designation of life supported and death supported business

The insurer must partition its contracts into sets of similar products with similar characteristics and then determine if each individual set is life supported or death supported using the test described in section 6.2.1, using the best estimate risk-neutral liability cash flows in the financial statements.

Mortality

This section applies to sets designated as life supported. The following prescribed margins are applied:

- A permanent increase of 16% to the Best Estimate Assumption for mortality rates.
- A margin corresponding to the shock described in section 6.2.3.1.

~~A 16% margin is applied to the Best Estimate Assumption in replacement of the Risk Adjustment used in the calculation of insurance contract liabilities. The mortality margin must be applied to the increase or decrease so that it creates an adverse impact for the insurer. The direction of the margin must create an adverse impact for the insurer, for each product or with greater granularity, i.e., not globally for all segregated funds.~~

Longevity ~~for guaranteed withdrawal benefits only~~

This section applies to sets designated as death supported. The following prescribed margins are applied:

- A permanent decrease to the Best Estimate Assumption for mortality rates as follows:

Type of product	Related margin
Non-registered – Canada, United States and United Kingdom	20%
Registered – Canada	10%
Registered – United States and United Kingdom	12%
Non-registered and registered – other regions	15%

- A margin corresponding to the shock described in section 6.2.3.2.

~~The mortality improvement assumption (best estimate and Risk Adjustment) is replaced for all future years by an assumption equal to 300% of the base annual mortality improvement rates.~~

Expenses

The following prescribed margins are applied:

- A 20% increase to the Best Estimate Assumption for transaction fees for assets used in the hedging strategy (e.g., swaps and futures).

A margin corresponding to the combined shock described in section 6.6.

-

~~A 20% margin is applied to the Best Estimate Assumption for transaction fees for assets used in the hedging strategy (e.g., swaps and futures).~~

~~A 15% margin is applied to the Best Estimate Assumption for administration expenses in lieu of the Risk Adjustment used in the calculation of insurance contract liabilities.~~

~~7.2.8.5~~7.7.8.5 Basis risk

A separate calculation is made to quantify the basis risk related to the replication of the funds in a hedging strategy. Consequently, if the insurer implicitly models this element when calculating its insurance contract liabilities, it must be removed when calculating capital requirements. The following calculation applies only to insurers following a hedging strategy and the funds hedged under the strategy.

The formula for the risk factor (RF) will be $RF = 20 \times B \times \sqrt{2 - 2A}$

where:

- A represents the historical correlation between segregated fund returns and hedge asset returns;
- B represents the standard deviation of segregated fund returns.

The historical correlations must be calculated on a weekly basis and cover the ~~previous~~ 52 weeks prior to the valuation date. The returns of the two asset subgroups are measured by the increase in their market value, net of cash flows resulting from policyholder deposits or hedge portfolio rebalancing.

Insurers often use assets based on market indexes for hedging; segregated funds are not indexes. In this case, insurers use a certain index weighting to represent the segregated funds. With respect to the hedging assets, they are weighted by the *delta* of each index. Data must therefore be adjusted such that the weighting among the indexes is the same in the hedging assets used to perform the calculations under the current section and the weighting expected for the segregated funds.

In addition, the insurer may be slightly under- or over-hedged depending on its position within the rebalancing limits. In such a case, the data must be adjusted by a multiplier so as to assume the insurer is fully hedged at the beginning of each week.

The standard deviation of weekly segregated fund returns must be determined based on the volatility assumptions used in the hedging strategy and be based on the actual distribution between the various segregated funds on the ~~calculation~~ valuation date.

To obtain the capital requirements for the basis risk (*BR*), RF is then applied to the sum of the market positions required by the hedging program at the end of the fiscal year (i.e., the total *delta*, including both equity and bond funds).

The calculation can be separated by type of guarantee if the hedging program is managed in this manner. The insurer could therefore separately calculate maturity guarantees, lifetime income guarantees, death guarantees and guarantees with different levels (e.g., 100% guarantee versus 75% guarantee), and then add up the capital requirements for each group to obtain a total amount.

The calculation details with respect to basis risk must be presented in the Capital Guidelines Certification Report.

~~7.2.8.6~~7.7.8.6 Diversification credit

A diversification benefit results when the aggregation of risks produces results that are less than the total of the individual risk elements. For CARLI purposes, it may be reflected in a diversification credit.

The segregated fund capital requirement for insurance and market risks before diversification is calculated on the basis of a CTE (95) using the insurer's forecast model and the prescribed economic and non-economic assumptions ~~as outlined~~ in sections 7.7.8.3~~7.2.8.3~~ and 7.7.8.4~~7.2.8.4~~, to which the basis risk component (*BR*) is added, in accordance with the formula described in section 7.7.8.5~~7.2.8.5~~. To determine the CTE (95), the values of the obligations in the scenarios are sorted to determine the 5% with the highest value. The scenarios corresponding to the value of these obligations are then used to separately calculate each component's capital risk requirement (i.e., it is therefore not necessary to repeat the calculations for all the scenarios; only those that served to determine the CTE (95) before diversification will be used). The capital requirement for the following risks must be calculated with the internal model: lapse (*A*), mortality (*M*), longevity (*L*), expenses (*D*), and market (*I*).

The required capital for each risk is determined by recalculating the obligation value with the internal model after substituting the prescribed assumptions and margins, as applicable, with the insurer's Best Estimate Assumption~~the insurer's assumption including Risk Adjustments for the assumption with prescribed margin~~. The substitution is ~~made~~ done ~~on a~~ cumulatively~~ basis~~.

Calculation steps using the internal model

1. Calculate the total capital requirement using all the assumptions and margins prescribed ~~outlined~~ in sections 7.7.8.3~~7.2.8.3~~ and 7.7.8.4~~7.2.8.4~~ (economic and non-economic).
2. Identify the scenarios that make up the CTE (95) and that will serve for calculations 3 to 6 below.
3. Redo the calculation in Step 1, replacing the lapse assumption with the Best Estimate Assumption~~the assumption (including Risk Adjustment)~~ used by the insurer~~ in calculating its insurance contract liabilities~~.
4. Redo the calculation in Step 3, replacing the mortality and mortality improvement assumptions for life supported business with the Best Estimate Assumptions ~~mortality assumption with the assumption (including Risk Adjustment)~~ used by the insurer~~ in calculating its insurance contract liabilities~~.
5. Redo the calculation in Step 4, replacing the mortality and mortality improvement assumptions for death supported business with the Best Estimate Assumptions~~mortality improvement assumption with the assumption (including Risk Adjustment)~~ used by the insurer~~ in calculating its insurance contract liabilities~~.

~~6.~~ Redo the calculation in Step 5, replacing the assumption for expenses with the Best Estimate Assumption~~assumptions for expenses with the assumptions (including Risk Adjustment)~~ used by the insurer~~ in calculating its insurance contract liabilities~~.

6.

Calculating required capital for each risk

- *BR* is the amount resulting from the calculation based on section 7.7.8.5~~7.2.8.5~~.
- *A* is the difference between the value of the obligations calculated in Steps 1 and 3.
- *M* is the difference between the value of the obligations calculated in Steps 3 and 4.
- *L* is the difference between the value of the obligations calculated in Steps 4 and 5.
- *D* is the difference between the value of the obligations calculated in Steps 5 and 6.
- *I* is the difference between the value of the obligations calculated in Step 6 and the insurance contract Best Estimate Liabilities for segregated fund guarantees reported ~~liabilities (including contractual service margins and Risk Adjustments)~~ in the financial statements.

The capital requirement for insurance and market risks after diversification (*IMR*) is calculated using the following formula:

$$IMR = \sqrt{\sum_{i,j=1}^{5} \rho_{ij} \times RC_i \times RC_j}$$

where:

- RC_i is required capital for the risk *i*;
- The capital requirements for market risk and basis risk are combined into one component for calculation purposes;
- ρ_{ij} is the correlation factor between risks *i* and *j*, as defined in the following correlation matrix:

i* \ *j	**Market + Basis Risk**	**Lapse**	**Mortality**	**Longevity**	**Expenses**
Market + Basis Risk	1				
Lapse	0.25	1			
Mortality	0	0	1		
Longevity	0	0	-0.25	1	
Expenses	0	0	0	0	1

However, the *IMR* value cannot be lower than the highest RC_i value for all *i* risks in the matrix.

The diversification credit *DC* is calculated using the following formula:

$$DC = \sum_{i=1}^{5} RC_i - IMR$$

The diversification credit is limited to 30% of the value of $\sum_{i=1}^{5} \mathrm{RC}_i$.

~~7.2.8.7~~7.7.8.7 Capital requirement

The capital requirement (SFGim) for segregated fund risks under the internal model approach ~~The capital requirement before adjustment (RC_{gross}) for segregated fund risks~~ is calculated as follows:

$$SFG_{im} = (A + M + L + D + I + BR - DC)$$
$$\cancel{RC_{gross} = (A + M + L + D + I + BR - DC)/1.25}$$

However, SFG_{im} ~~RC_{gross}~~ cannot be negative.

SFG_{im} must also be adjusted to reflect smoothing if the insurer elects to use this option (described in section 7.7.8.8).

7.7.8.8 Smoothing

At the discretion of the insurer and as a one-time election at transition, the capital requirement defined in section 7.7.8.7 can be smoothed by averaging it with up to four quarters (three previous quarters and the current quarter) beginning on or after January 1, 2025. This smoothing applies either to all items or to none, and its application will be reassessed by January 1, 2028. The election must be made within the first six months[157] of the first financial year beginning on or after January 1, 2025, and cannot be changed thereafter.

~~7.2.8.8~~7.7.8.9 Capital Requirement After Adjustment

The capital requirement for the segregated funds risks calculated in this section can be adjusted to amortize the impact of the current period. The amount that can be amortized corresponds to the difference between the capital requirement before adjustment for the current quarter and that for the previous quarter. The impact will be amortized over 7 quarters, with 1/7 of the impact reflected per quarter starting in the current quarter.

[157] If, as permitted in section 7.7, the insurer chooses to apply the previous version of the guideline, which took effect January 1, 2024, for the first two quarters of 2025, the election must be made within the first nine months of the first financial year beginning on or after January 1, 2025.

Example: Amortization of the Impact of the Current Period

Quarter	Capital Requirement Before Adjustment (RC_{gross})	Variation in RC_{gross}	Capital Requirement After Adjustment
0	100		100
1	121	21	103 = 100 + (21) x 1/7
2	149	28	110 = 103 + (21+28) x 1/7
3	128	(21)	114 = 110 + (21+28-21) x 1/7
4	86	(42)	112 = 114 + (21+28-21-42) x 1/7
5	72	(14)	108 = 112 + (21+28-21-42-14) x 1/7
6	65	(7)	103 = 108 + (21+28-21-42-14-7) x 1/7
7	44	(21)	95 = 103 + (21+28-21-42-14-7-21) x 1/7
8	51	7	85 = 95 + (28-21-42-14-7-21+7) x 1/7

Details of the adjustment amount must be reported in the Capital Guideline Certification Report.

~~7.2.8.9~~7.7.8.10 Uncertainty associated with parameters in the internal model

Estimating parameters is subject to uncertainty or sources of data errors. The insurer must determine, document and present the uncertainties and sources of errors associated with risk quantification.

For each source of error, the insurer must determine whether the degree of conservatism is adequate. The margins of conservatism must not be used to correct the internal model. Moreover, the AMF expects the adjustments made to the quantification of parameters to lead to an increase in capital requirements, particularly to satisfy the calibration criteria. When material estimation errors occur, the insurer must not simply add margins of conservatism but must also inform the AMF.

~~7.2.8.10~~7.7.8.11 Approximations and simplifications

The AMF expects the insurer to pay attention to approximations and simplifications. The AMF would like to ensure that these approximations and simplifications do not compromise the integrity and reliability of the capital requirement calculation results. When approximations and simplifications are used, the AMF expect them to generate conservatism in the internal model.

The insurer must ensure that the approximations and simplifications are reasonable in relation to:

1. the calculation of sensitivities (greeks) and cross-greeks in day-to-day hedging transactions and in real-world projections to evaluate hedging inefficiencies;
2. the interpolation and extrapolation methods used in the yield curves of real-world and risk-neutral projections;
3. the sufficiency of the number of points on the swap curve for the interpolations;
4. the frequency of portfolio rebalancing associated with the hedging strategy in the projections compared with reality;
5. projection horizon;
6. currency risk;
7. the data compression methods.

With respect to the data compression methods used, the insurer must show that the compressed extract has values similar to the complete extract; in particular:

1. risk-neutral liabilities;
2. hedged and unhedged greeks;
3. some cash flows or their present value (e.g., revenues, benefits, etc.);
4. the value of funds and their guaranteed value.

~~7.2.9~~7.7.9 Changes and monitoring

Where an insurer has obtained authorization to use an internal model approach, it must provide the AMF with a detailed report on the status of the internal model whenever material or non-material changes occur.

All changes must be disclosed and documented. The insurer must not group changes that would have opposite effects so as to consider them a single non-material change.

The insurer must establish a procedure to manage changes to the internal model, which will be reviewed by the AMF.

The changes must be made on a copy of the internal model so as to maintain a separation between the internal model on which the changes are made and the internal model used in the insurer’s operations.

The AMF recommends that the insurer plan appropriately when making changes to its internal model. It should contact the AMF at the beginning of the process if it anticipates material changes.

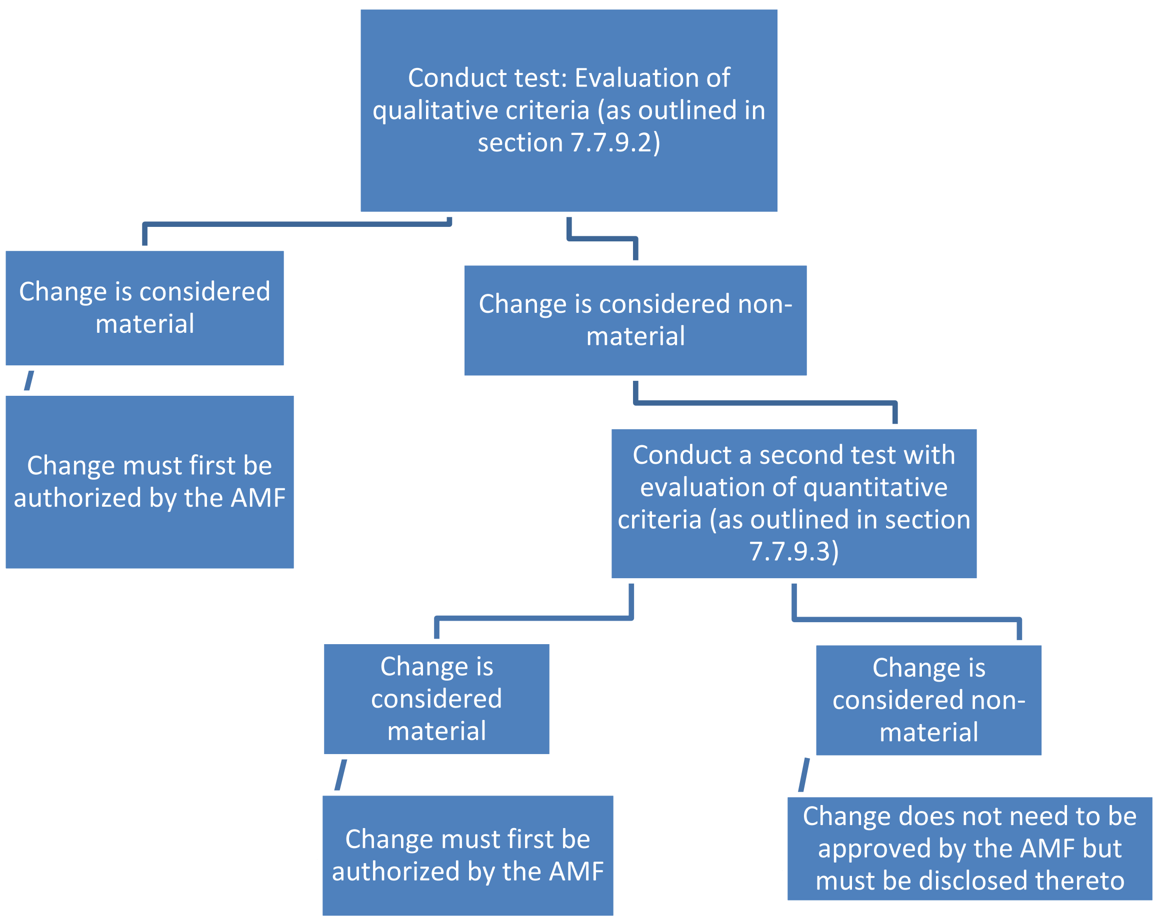
~~7.2.9.1~~7.7.9.1 Relative importance of changes

The procedure to manage changes to the internal model must contain a definition of the relative importance of changes compliant with section 7.7.9~~7.2.9~~. This definition will make it possible to frame the notion of material and non-material changes as outlined in this section. In order to properly assess relative importance, the insurer must apply a combination of qualitative and quantitative criteria to the changes.

The qualitative criteria must, at minimum, consider the criteria outlined in section 7.7.9.2~~7.2.9.2~~. To quantitatively assess relative importance, the insurer must examine the changes based on the internal definition of relative importance in the change procedure, which must, at minimum, contain the requirements of section 7.7.9.3~~7.2.9.3~~.

The qualitative criteria must be considered as an initial test. If a change cannot be classified as material after the first test, the change must be subjected to the second test involving quantitative criteria.

The following diagram illustrates the change classification steps.



~~7.2.9.2~~7.7.9.2 Qualitative criteria for material changes

Before its implementation, a change to the internal model that affects the following elements must be disclosed to the AMF to allow it to determine whether the change must be considered material at this stage:

- governance: This includes the roles and responsibilities of the parties involved or responsible for the internal model, including senior management and members of the Board of Directors;
- internal audit and validation policies with respect to the internal model;
- the procedure to manage the changes to the internal model;
- theoretical foundations and methodology of the internal model;[158]
- the internal model's scope of use and risks modeled;[159]
- the data, their sources, nature and history;[160]
- adaptation of the internal model after changes were made to the hedging strategy;
- the technology platform;[161]
- ~~switching from the global method to the expected payment date method or to the method with recognition of hedges and vice-versa;~~
- other aspects of the internal model deemed important by the insurer or by the AMF, and the accumulation of non-material changes.[162]

The insurer must provide justification for the change. The requirements concerning material changes outlined in section 7.7.9.4~~7.2.9.4~~ apply if the change is deemed material by the AMF. If the change is deemed non-material by the AMF, it must be subject to the quantitative criteria set out in section 7.7.9.3~~7.2.9.3~~.

~~7.2.9.3~~7.7.9.3 Quantitative criteria for material changes

This ~~sub~~section outlines the quantitative criteria for determining whether a change must be considered material or non-material. The capital requirement for segregated fund

[158] For example, changing the stock market return generator by switching from a regime switching lognormal model to a single regime model or changing the dynamic lapse formula would constitute material changes.

[159] For example, adding new products would constitute a material change.

[160] For example, a change in the source of the data, such as the implementation of a new administrative system or a change in the start day of the history used to determine some assumptions, constitutes a material change. The addition of a recent new year of experience, the update of an assumption based on a moving average and the update of macroeconomic parameters (such as interest rate curve or discount rate) do not constitute material changes under the qualitative criteria.

[161] For example, migration of a model included in the internal model to the use of an external model or a change in the technology platform supporting the internal model.

[162] The combination of several non-material changes can have a material impact on insurers. As such, if for a given period, several non-material changes were to take place, the AMF could require that the changes be treated as material changes.

guarantees is SFG_{im} as defined in section 7.7.8.7. ~~The unadjusted segregated fund capital requirement is the capital requirement set out in section 7.2.7.1, C_3^s defined in section 7.2.7.2 or RC_{gross} defined in section 7.2.8.7, depending on the method used.~~

A change is material if:

1. it results in a decrease of 1% or more in the insurer's total capital requirement; or
2. it results in a decrease of 10% or more in the capital requirement ~~before adjustment~~ for segregated fund~~s~~ guarantees in the current environment or in an environment simulating an immediate 25% drop in the stock market.

These two ratios must be calculated as follows:

- the numerator: the difference between the capital requirement (total or segregated fund guarantee capital requirement) ~~before adjustment for segregated funds~~ before and after the change;
- the denominator: the capital requirement (total or segregated fund guarantee capital requirement~~unadjusted for segregated funds~~) ~~before the change~~.

In addition, capital requirements used in calculating the above ratios must be calculated at the same date.

The update of macroeconomic parameters (such as interest rate curve or discount rate) do not constitute material changes under the qualitative criteria where this update is the result of changes that are not under the control of the insurer (e.g., update of initial rates in the IRC model, change in the discount rate where this is the swap rates curve, etc.). However, such an update constitutes a change that must be reported in the change history required under section 7.7.9.5~~7.2.9.5~~.

~~7.2.9.4~~7.7.9.4 Tracking changes

Depending on the nature of the changes, the insurer must report the status of the situation to senior management and to the AMF. The AMF expects the insurer to keep a history of the changes.

Non-material changes

An additional quantitative test must be performed for changes deemed non-material according to sections 7.7.9.2~~7.2.9.2~~ and 7.7.9.3~~7.2.9.3~~. As such, any change that leads to a decrease of more than 5% in the capital requirement ~~before adjustment~~ for segregated fund~~s~~ guarantees must be disclosed to the AMF within a reasonable time frame before its implementation. The ratio must be calculated in accordance with the instructions in section 7.7.9.3~~7.2.9.3~~.

All other non-material changes must be disclosed to the insurer's senior management and to the AMF at least once per fiscal year or when requested by the AMF.

Material changes

Authorization from the AMF is required prior to the implementation of any material change for the calculation of capital requirement under this guideline. For the use of the internal model for purposes other than this calculation, the insurer may use the modified internal model during the AMF authorization process. However, it is important to disclose this to the AMF as soon as possible and to apply for authorization.

Senior management must approve any application to the AMF for authorization. The insurer must disclose to the Board of Directors and senior management the type and reason for any material change. Any changes made to the internal model and to the validation process must have been validated by the validation team.

The insurer must continue using the existing internal model to calculate the capital requirement until the AMF authorizes the proposed material changes. The AMF may, at its discretion, consider that the proposed material changes are likely to have too great an impact and ask the insurer to submit a new application for authorization to use the internal model.

The application for authorization of changes submitted to the AMF must contain, at minimum, the following elements:

1. an application for authorization letter signed by senior management;
2. a positive opinion from the validation team with respect to the changes;
3. a use test (i.e., demonstration of compliance with the requirements outlined in section 7.7.6~~7.2.6~~);
4. the proposed effective date of the changes for the purpose of disclosure of the CARLI Ratios to the public or to the AMF;
5. a document describing the proposed changes and summarizing the conclusions of the validation team and control results;
6. a documented impact study (i.e., sensitivity analysis, ex post control, impact on the capital requirement, impact on the CARLI Ratios, etc.) must be submitted to the AMF;
7. identification of the most important changes affecting the documentation provided to the AMF, both in terms of new documents and those that change the accompanying documents initially provided;
8. the name of the change contact or coordinator;
9. any other relevant document.

The insurer must demonstrate the nature of the proposed changes and why they must be considered as such. The insurer's key control functions (e.g., risk management and senior management) must not have received unfavourable opinions from the parties involved in the change process.

The insurer must describe all the organizational changes arising from the proposed changes to the internal model or related thereto.

~~7.2.9.5~~7.7.9.5 Change history

The insurer must document the changes made to the internal model and in particular, indicate the changes made since the last disclosure of the CARLI Ratios to the AMF or to the public.

The following data must be used for tracking purposes:

1. the date of the change;
2. the portfolio affected;
3. the size of the portfolio affected;
4. the anticipated and actual effect[163] on capital requirements and on CARLI Ratios;
5. the type of change or event;
6. justification for the change.

The insurer is responsible for documenting and updating the change history. Such documentation must be provided to the AMF at its request and under the conditions set out in section 7.7.9~~7.2.9~~. In addition, the documentation must indicate the personnel responsible for the changes.

~~7.2.10~~7.7.10 Continuous monitoring

Detailed periodic monitoring reports must be provided to the insurer's senior management and to the AMF at each disclosure of the CARLI Ratios to the public or to the AMF. These reports must contain, at minimum:

1. changes in the CARLI Ratios associated with segregated funds, variations in the capital requirements, and an explanation for these changes;[164]
2. details of the hedging strategy's performance over the previous nine quarters (gains and losses with explanations, efficiency metric, etc.);
3. sensitivity tests of CARLI Ratios, capital requirements and net earnings in the event of a stock market decline of at least 25%;
4. exceptions to the insurer's policies (e.g., deviations from these policies, situations where the limits in the risk appetite and tolerance policy can be exceeded, etc.);

[163] The anticipated effect is the expected and calculated (or estimated) impact during a test prior to implementing a change. The actual effect is the impact calculated after the change has been implemented.

[164] The AMF expects to receive qualitative explanations on the general causes of the changes (such as sales increases, rise/fall of equity markets, movement in the interest rate curve, etc.). The insurer could support its explanations with certain data, if needed.

5. concentration analyses of the most important counterparties associated with the hedging strategy.

The information related to points 2 and 5 is only required where the insurer uses the method with recognition of hedges. A summary of this report must be sent to the Board of Directors.

If deemed necessary, the AMF may request that additional information be included in all the periodic monitoring reports.

The AMF expects the insurer to remain abreast of new analysis techniques and changing industry practices and to adopt them if they improve estimation accuracy.

The insurer must have and maintain an up-to-date list of the different models used within the internal model and their objectives.

If the insurer does not satisfy the requirements of this guideline on a continuous basis, the AMF may require that it hold additional capital.

The insurer must re-evaluate the parameters of the internal model:

- at least once per fiscal year;
- following market events or specific events that materially affect the internal model;
- at the AMF's request.

~~7.3 Modes of Calculation~~

~~7.3.1 Page 70.100 of the *Formulaire ESCAP* ("CARLI form") (by fund class)~~

~~The columns on page 70.100 of the CARLI form must be filled in as follows:~~

~~Column 01: *Valeur garantie* (guaranteed value)~~

~~This is the amount guaranteed in all segregated funds. If the funds are subject to guarantees of different amounts, for example 100% on death and 75% on maturity, report the larger amount here.~~

~~Column 02: *Valeur marchande* (*market value*)~~

~~This is the market value of the segregated funds.~~

~~Column 03: *TBCR* (TGCR)~~

~~Details of the calculation based on prescribed factors is set out in section 7.1 (lines 010 to 070 of the CARLI form). However, if the insurer uses an internal model, the result will be carried forward to line 080 of the CARLI form.~~

~~If the insurer uses the method according to section 7.2.7.2 or the method under section 7.2.8, the TGCR represents respectively 100% of the required capital or 100% of the required capital after adjustment using the internal model (refer to section 7.2.8.8) to which liabilities for net insurance contracts held recorded in column 7 are added.~~

~~Column 04: *Crédit pour cession en réassurance* (credit for reinsurance ceded)~~

~~This is determined according to the approach agreed to with the AMF.~~

~~Column 05: *TBCR net* (net TGCR)~~

~~This is determined as:~~

~~TGCR – Credit for reinsurance ceded~~

~~Column 07: *Passifs des contrats d'assurance nets détenus* (liabilities for net insurance contracts held)~~

~~This is the amount of insurance contract liabilities (including contractual service margins and Risk Adjustments) recorded on the balance sheet for risks associated with segregated fund contracts with a guarantee risk (net of registered reinsurance).~~

~~Column 08: *Capital requis* (capital requirement)~~

~~This is determined as:~~

~~(Net TGCR – Liabilities for net insurance contract held) × 1.25~~

~~The formula to determine the capital requirement includes a factor of 1.25 to bring its amount up to the intervention target level.~~

~~The following transition rules apply to the capital requirement determined from the internal model using the method in section 7.2.7:~~

- ~~In the first year the model is used, capital requirements are calculated as follows: 50% of the prescribed factor capital requirements + 50% of the internal model capital requirements.~~

- ~~Thereafter, they will represent 100% of the internal model capital requirements.~~

~~Note: The segregated fund risk capital requirement (line 920) must not be less than zero.~~

~~7.3.2 Page 70.200 of the *Formulaire ESCAP* ("CARLI form") (by region of operations)~~

~~The columns on page 70.200 of the CARLI form must be filled in as follows:~~

~~Column 01: *Valeur garantie* (guaranteed value)~~

~~This is the amount guaranteed in all segregated funds. If the funds are subject to guarantees of different amounts, for example 100% on death and 75% on maturity, report the larger amount here.~~

~~Column 02: *Valeur marchande* (market value)~~

~~This is the market value of the segregated funds.~~

~~Column 03: *TBCR* (TGCR)~~

~~If the insurer uses the method according to section 7.2.7.2 or the method under section 7.2.8, the TGCR represents respectively 100% of the required capital or 100% of the required capital after adjustment using the internal model (refer to section 7.2.8.8) to which are added liabilities for net insurance contracts held recorded in column 7.~~

~~Column 04: *Crédit pour cession en réassurance* (credit for reinsurance ceded)~~

~~This is determined according to the approach agreed to with the AMF.~~

~~Column 05: *TBCR net* (net TGCR)~~

~~This is determined as:~~

~~TGCR – Credit for reinsurance ceded~~

~~Column 07: *Passifs des contrats d'assurance nets détenus* (liabilities for net insurance contracts held)~~

~~This is the amount of net insurance contract liabilities (including contractual service margins and Risk Adjustments) recorded on the balance sheet for risks associated with segregated fund contracts with a guarantee risk (net of registered reinsurance).~~

~~Column 08: *Capital requis* (capital requirement)~~

~~This is determined as:~~

~~(Net TGCR – Liabilities for net insurance contracts held) × 1.25~~

~~The formula to determine the capital requirement includes a factor of 1.25 to bring its amount up to the intervention target level.~~

~~The following transition rules apply to the capital requirement determined from the internal model using the method in section 7.2.7:~~

- ~~In the first year the model is used, capital requirements are calculated as follows: 50% of the prescribed factor capital requirements + 50% of the internal model capital requirements.~~
- ~~Thereafter, they will represent 100% of the internal model capital requirements.~~

~~Note: The amount entered in cell 7020090920 must be identical to that entered in cell 7010090920 on page 70.100.~~

Chapter 8. Operational Risk

Operational risk is the risk of loss resulting from inadequate or failed processes, people or systems or from external events. This definition includes legal risk,[165] but excludes strategic and reputational risk.

8.1 Operational risk formula

Required capital for operational risk is the sum of :

- business volume required capital;
- capital requirements associated with a large increase in business volume; and
- general required capital.

8.2 Operational risk exposures and factors

This section outlines exposures and factors used to calculate required capital for operational risk.

8.2.1 Business volume capital requirement

The business volume capital requirement is determined by applying the following factors to premiums received in the past 12 months, and to account values or liabilities for deposit-type products:

Exposure	Factor
Direct premiums received	2.50%
Assumed reinsurance premiums received	1.75%
Investment products and annuities:	
Account values of segregated funds with guarantees~~ – contracts not covered by an AMF-authorized hedging strategy (refer to section 7.2.8)~~	0.40%
~~Account values of segregated funds with guarantees – contracts covered by an AMF-authorized hedging strategy~~	~~0.80%~~
Liabilities for annuities in payout period, and annuity liability equivalents for longevity risk transfer arrangements	0.15%
Account values for universal life insurance contracts	0.10%

165 Legal risk includes, among others, exposure to fines, penalties, or damages resulting from supervisory actions, as well as private settlements.

Exposure	Factor
Account values of mutual funds, GICs, other investment-type products and segregated funds without guarantees, and liabilities for annuities in accumulation	0.10%

Direct premiums received and assumed reinsurance premiums received relate to insurance contracts issued. While direct premiums received are attributable to premiums received from individual policyholders, assumed reinsurance premiums received are collected for contracts assumed from other insurers. Direct premiums received for individual and group life insurance contracts include universal life premiums, but exclude annuity and longevity risk transfer premiums, mutual fund deposits, GICs, segregated fund deposits and premium equivalents for administrative service only/investment management services.

In determining the assumed reinsurance premiums received to which the 1.75% risk factor applies, coinsurance premiums may be calculated net of reinsurance allocations such as acquisition costs, premium taxes and administration expenses. For funds withheld coinsurance and modified coinsurance contracts, the 1.75% factor applies to the portion of the gross accruing receivable or gross modified coinsurance receivable corresponding to premiums net of reinsurance allocations (i.e., the premium amount must be the same as the amount for regular coinsurance).

The account and liability values to which the factors for investment products and annuities are applied and are calculated before the reduction for reinsurance (where applicable), including the Risk Adjustment but excluding contractual service margins. The liability value for business assumed under modified coinsurance contracts is the value of the pro forma liability for the business had it been assumed under regular coinsurance.

Longevity risk transfer arrangements that assume longevity risk have the same capital requirements as the underlying annuity business. The annuity liability equivalent for a swap is the current gross value of the floating leg of the swap, without deductions or offsets.

Business of deconsolidated subsidiaries under section 1.3 is excluded from operational risk requirements related to volume of business.

8.2.2 Capital requirements associated with a large increase in business volume

Capital requirements associated with a large increase in business volume are calculated by geographic region (refer to section 1.1.5). The factors in section 8.2.1 are applied to the amounts by which the year-over-year increases in direct premiums received, assumed reinsurance premiums received, and account values or liabilities for investment products and annuities[166] exceed a threshold of 20%.

[166] The calculation of the increase for investment products and annuities must only take into account gross sales for the year.

The year-over-year increase for direct premiums received is defined as the total amount of direct premiums received in the past 12 months that exceed 120% of the direct premiums received for the same period in the previous year. It is calculated separately for each of the following products:

- Individual Life (including Universal Life);
- Group Life (including Universal Life);
- Other insurance products (excluding annuities).

Example: Increase in direct premiums received

If, as a result of rapid business growth, direct premiums received increase by 50% from 100 in Y1 to 150 in Y2, the amount of premiums in Y2 in excess of 120% of the premiums in Y1 (30) is subject to an additional capital requirement of 0.75 (30 x 2.50%).

The year-over-year increase for assumed reinsurance premiums received is defined as the total amount of reinsurance premiums assumed in the past 12 months that exceed 120% of the premiums assumed for the same period in the previous year, for all products combined.

For investment products and annuities, the year-over-year increase is calculated separately for each of the following:

- account values for segregated funds with guarantees;
- liabilities for annuities in payout period, and annuity liability equivalents for longevity risk transfer arrangements;
- account values for universal life insurance contracts;
- account values of mutual funds, GICs, other investment products and segregated funds without guarantees, and liabilities for annuities in accumulation.

To adjust for the effect of exchange rate fluctuations over the calculation period, current and prior period premiums received, account values and liabilities denominated in foreign currencies must be converted into Canadian dollars at the exchange rates in effect at the CARLI filing date. Accordingly, the amounts used to calculate significant increases in business volume may not correspond to the amounts reported in prior period financial statements, and premiums received cannot correspond to amounts reported in the current period financial statements.

In the case of an acquisition of another entity or an acquisition of a block of business (e.g., through assumption reinsurance), the premiums received, account values, liabilities and equivalents for any prior reporting period (before the acquisition) are the sum of the corresponding amounts of the two separate entities or blocks of business, i.e., the sum of these amounts for the acquiring insurer and for the acquired insurer or block of business. Following an acquisition, the acquiring insurer must reclassify premiums based on the merged company's categorization, using approximations as necessary, to follow categories used in the LIFE return.

Example: Business acquisition

Assume that insurer A has direct premiums received of 100 for the 12-month period ending December 31, Y1. In Y2, it acquires insurer B, which has direct premiums received of 50 during Y1. The merged insurer reports a total of 225 in direct premiums received for the 12-month period ending December 31, Y2. The capital requirements for operational risk associated with a significant increase in business volume is calculated as:

2.50% × [225 – ((100 + 50) × 1.20)] = 2.50% × 45 = 1.13

8.2.3 General capital requirement

General capital requirement has two components. The first component consists of three items [167]~~is calculated as follows~~:

- a 5.75% factor applied to the total required capital for credit, market, and insurance risk components, calculated net of all reinsurance and net of credits for participating products, adjustable products, policyholder deposits, adjustments for group insurance, and diversification; plus
- a 4.5% factor ~~is~~ applied to the required capital for segregated fund guarantees (RC_{SFG}), i.e. the sum of the requirements for credit, market and insurance risks in sections 7.2 and 7.3 calculated net of diversification for the standardized approach, the requirements of section 7.4.2 for the simplified option, or the amount SFG_{im} defined in section 7.7.8.7 for the internal model approach; plus.
- a 4.5% factor applied to the amount TM defined in section 7.5.3.~~.~~

The second component is calculated as a 2.5% factor applied to premiums paid for reinsurance contracts held to compensate for the understatement of the first component arising from its calculation net of reinsurance. For ceded annuity business, the amount that must be used as the premium paid for reinsurance contracts held equivalent is the annual amount of annuity payments ceded to the reinsurer. For risks reinsured under longevity risk transfer arrangements, the amount that must be used as the equivalent of the premium paid for reinsurance contracts held is the gross amount of annuity payments ceded (for swaps, this amount is the gross annual payment under the floating leg of the swap without deductions or offsets). For coinsurance contracts, the 2.5% risk factor applies to premiums paid, net of reinsurance allocations such as acquisition costs, premium taxes and administrative expenses.

[167] Diversification credits should be allocated to the first two items based on the proportion of total undiversified required capital arising from segregated fund guarantee risk and the proportion arising from non-segregated fund guarantee risk.

Indicator	Factor
Required capital for credit, market and insurance risks	5.75%
Required capital for segregated fund guarantees (RC$_{SFG}$) et MT	4.5%
Premiums paid for reinsurance contracts held	2.5%

Chapter 9. Participating and Adjustable Products

Capital requirements for participating and adjustable products are calculated according to the previous chapters as if the products were non-participating and non-adjustable. However, participating and adjustable products allow insurers to share risk with policyholders through discretionary benefits. Therefore, insurers may include credits for participating products and for contractually adjustable products in the calculation of the Base Solvency Buffer, if certain conditions are met.

The insurer must calculate the credit for participating products by geographic region (refer to section 1.1.5). However, if not all the participating products within a given region are homogeneous with respect to the risks passed through to policyholders via reductions in dividends, the insurer will need to partition its participating business within the region into separate blocks that are homogeneous with respect to risks passed through to policyholders.[168] A partitioned block may contain assets and liabilities whose risks are not passed through to policyholders (e.g., Risk Adjustments, contract loans and amounts on deposit). A standalone capital requirement net of par credit must be calculated for each participating block.

A credit for adjustable products must be calculated for each adjustable product within the same region.

A non-trivial reduction in dividends or significant adjustments made to adjustable features may result in adverse impacts due to lapses, anti-selection, unit expense increases or legal action undertaken by policyholders. Such adverse impacts must not be reflected in cash flows when calculating the credit for participating and adjustable products.

9.1 Participating product credit

9.1.1 Credit criteria for participating products

A participating product credit may be used to reduce the capital requirement for a block of participating products provided that the experience with respect to specified risk elements is incorporated into the annual dividend adjustment process in a consistent manner from year to year. A par credit may be taken for the block only if the following three criteria are met.

1. The insurer's participating dividend policy must be publicly disclosed. It must make clear that policyholder dividends are not guaranteed and will be adjusted to reflect actual experience. The insurer must publicly disclose the elements of actual experience that are incorporated in the annual dividend adjustment process (e.g., investment income, asset defaults, mortality, lapses and expenses) and how these risks are passed through to the policyholders.

[168] Assets and liabilities for which the risks are not passed through to policyholders and that are amalgamated and related to several blocks of participating business in a single region must be allocated proportionally to specific participating blocks of business.

2. The insurer must regularly (at least once a year) review the dividend scale in relation to the actual experience of the participating account (i.e., including all blocks of business). It must be able to demonstrate to the satisfaction of the AMF which individual elements of actual experience, in excess of the amounts anticipated in the current dividend scale, have been passed through to policyholders in the annual dividend adjustment. It must also be able to demonstrate that shortfalls in actual overall experience, to the extent that they are not fully absorbed by any additional positive dividend stabilization reserves or other similar experience levelling mechanisms, are recovered[169] on a present value basis through level or declining reductions in the dividend scale.[170] The dividend scale reductions required to effect recovery must be made within two years from when the shortfall occurs.

   A dividend stabilization reserve ("DSR") or similar experience-levelling mechanism ceases to be available to absorb experience shortfalls when it has been reduced to zero or has become negative. Negative DSRs, if material, are considered to be experience shortfalls that must be recovered through dividend reductions, and are subject to the same requirements as for recovery of other experience shortfalls (i.e., dividend reductions to effect recovery of a material negative DSR must be made within two years from when the negative reserve becomes material). To determine whether a negative DSR must be recovered, its materiality must be assessed taking into consideration the insurer's internal par management policies and the AMF's guidelines. In addition, regardless of their materiality, negative DSRs must be deducted from gross Tier 1 Capital (refer to section 2.1.2.10).

   In applying the above requirements, an insurer may elect to use either DSRs resulting from actual experience within each participating block of business or the total DSR reported on the financial statements for each participating block. Once this choice has been made, the insurer must apply it consistently throughout this guideline and in each subsequent quarter. It must also apply it consistently for all participating blocks of business.

3. The insurer must be able to demonstrate to the AMF that it follows the dividend policy and practices referred to above.

The actuary must explain in the Capital Guideline Certification Report how he has verified that the eligible participating products comply with the preceding criteria. Documentation supporting these explanations must be kept and be made available to the AMF upon request.

9.1.2 Calculation of the par credit for a block

The par credit for a qualifying block of par business takes into account the present value of restated dividend cash flows. The par credit for a qualifying block of par business (CP_i)

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[169] The recovery of shortfalls must be demonstrated based on reductions in the dividend scale compared with what would have been paid taking into account only those risk elements that are passed through to policyholders. A reduction in the dividend scale will be allowed as a pass through to policyholders only if approved by a resolution of the insurer's Board of Directors.

[170] Reductions in the dividend scale must be level or must represent a significant initial or accelerated recovery of surpluses. For products that do not include periodic dividends, reductions on terminal dividends are considered to be level reductions in the dividend scale.

that is used to calculate the Base Solvency Buffer (refer to section 11.3) is obtained using the following formula:[171]

$$CP_i = min\left[K_i - K_{\substack{i\,reduced\\interest}} + \left(1 - \frac{\overline{IRR}_{i\,par}}{max(\bar{C}_{i\,adverse}\,;\,\overline{IRR}_{i\,par})}\right)C_{i\,initial}\,;K_i - K_{i\,floor}\right]$$

where:

- $C_{i\ initial}$ is 75% of the present value of restated dividend cash flows for the block used in the interest rate risk calculation (refer to section 5.1.3.3), where these flows are discounted using the Initial Scenario Discount Rates in section 5.1.1;
- $\bar{C}_{i\,adverse}$ is defined by:

  $$\bar{C}_{i\,adverse} = \frac{1}{6}\sum_{q=1}^{6} C_{i\,adverse\,in\,quarter\,q}$$

  This amount represents the six-quarter rolling average of $C_{i\ adverse}$, taken over the current quarter and the previous five quarters. For each quarter, the quantity $C_{i\ adverse}$ is equal to 75% of the present value of restated dividend cash flows for the block used in the interest rate risk calculation, discounted using the rates under the most adverse scenario that determines the requirement for interest rate risk in that quarter.[172]
- $\overline{IRR}_{i\,par}$ is the interest rate risk requirement (refer to section 5.1.2.3) for the block;
- K_i is the adjusted diversified requirement *K* for the block (refer to section 11.2);
- $K_{i\ reduced\ interest}$ is the adjusted diversified requirement *K* for all risks in the block, but with the capital requirement for interest rate risk reduced. This amount is calculated by setting the block's interest rate risk capital requirement to max ($\overline{IRR}_{i\,par} - \bar{C}_{i\,adverse}$; 0) and leaving all other risk requirements unchanged;
- $K_{i\ floor}$ is the minimum adjusted diversified requirement for the block. This amount is calculated by aggregating the following elements in the calculation of *K*:[173]

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171 Where a participating block spans more than one geographic region, the following adjustments must be made to the par credit formula:

- All *K* terms are the sum of the adjusted diversified requirements taken over all applicable geographic regions;
- $\overline{IRR}_{i\,par}$ is the interest rate risk capital requirement only for the geographic region in which dividends are payable; and
- The term $K_{i\ reduced\ interest}$ is reduced only for the required capital ~~required~~ for the interest rate risk for the geographic region in which dividends are payable.

172 For a new participating block, no averaging must be used for the first quarter calculation. For the second quarterly calculation, $\bar{C}_{i\,adverse}$ for the block must be calculated using one half (½) of the sum of $C_{i\ adverse}$ for the first two quarters. For the third quarter calculation, the average must be calculated using one third (⅓) of the sum of $C_{i\ adverse}$ for the first three quarters. The averaging must continue until the data are obtained for six quarters.

173 For insurance risks, the percentage factors below are applied to the intermediate amounts IR_i and LT_i used to calculate *K*.

i) 100% of the capital requirements for all risks in the block that cannot be passed through to policyholders by making adjustments to the dividend scale;[174]

ii) 5% of the interest rate risk capital requirement for the block, if interest rate risk can be passed through to policyholders by making adjustments to the dividend scale;

iii) 30% of the capital requirements for all other risks in the block that can be passed through to policyholders by making adjustments to the dividend scale.

For a block that has assets and liabilities for which interest rate risk is passed through to policyholders, and other assets and liabilities for which interest rate risk is not passed through to policyholders, the combined amount for i) and ii) above that must be used for the interest rate risk requirement in calculating $K_{i\ floor}$ is:

$$100\% \times \overline{IRR}_{i\ par\ npt} + 5\% \times \max\left(\overline{IRR}_{i\ par} - \overline{IRR}_{i\ par\ npt}; 0\right)$$

where $IRR_{i\ par\ npt}$ is defined in section 5.1.2.3.

Example: Participating product credit

Suppose that a participating block of business has the following amounts and that the interest rate risk capital requirement has remained the same for the previous five quarters:

Insurance Risk	Capital Requirement (IR_i)	Level and Trend Risk Components (LT_i)	$IR_i - 0.5 \times LT_i$
Mortality	750,000	300,000	600,000
Longevity	0	0	0
Morbidity – incidence	0	0	0
Morbidity – termination	0	0	0
Lapse – lapse-sensitive business	500,000	200,000	400,000
Lapse – lapse-supported business	0	0	0

174 This capital requirement includes requirements for credit and market risks related to all assets whose returns are not passed through to policyholders. If the block contains assets/liabilities whose risks are not passed through to policyholders, and these assets/liabilities are commingled with assets/liabilities whose risks are passed through to policyholders, then the capital requirements for credit and market risks, other than interest rate risk, for the assets/liabilities whose risks are not passed through must be determined using proportional allocation.

Insurance Risk	Capital Requirement (IR_i)	Level and Trend Risk Components (LT_i)	$IR_i - 0.5 \times LT_i$
Lapse – lapse-sensitive SFG	0	0	0
Lapse – lapse-supported SFG	0	0	0
Expenses	50,000	0	50,000
Total	**1,300,000**	**500,000**	

Other Risks	Capital Requirement
Credit risk	300,000
Interest rate risk (*IRR*)	400,000
Other market risks	250,000

Suppose further that the present value of restated dividends for the block under the initial scenario for the current quarter and the previous five quarters is 800,000, and that this value increases to 1,200,000 under the adverse scenario that determines the capital requirement for interest rate risk. The value $C_{initial}$ for the block is therefore (75% × 800,000 =) 600,000 and the value of $\bar{C}_{adverse}$ ~~is~~ is (75% × 1,200,000 =) 900,000. Finally, suppose that all risks associated with the block except mortality risk are passed through to policyholders through dividend adjustments.

The requirement *K* for this block is equal to 1,913,436 (the intermediate amounts in the calculation are *I* = 832,166, *D* = 1,544,525 and *U* = 2,250,000; refer to section 11.2.4 for an example that presents the steps in the calculation of *K*). Since $\overline{IRR} < \bar{C}_{adverse}$ is for the block, the requirement $K_{reduced\ interest}$ is the requirement *K* for the block recalculated using an interest rate risk capital requirement of 0, and is equal to 1,565,813 (*I* = 832,166, *D* = 1,205,277 and *U* = 1,850,000). The potential credit as a function of the dividend absorption capacity is therefore:

$$1{,}913{,}436 - 1{,}565{,}932 + \left(1 - \frac{400{,}000}{900{,}000}\right) \times 600{,}000 = 680{,}956$$

Since all risks except for mortality risk are passed through to policyholders, the requirement K_{floor} for the block is calculated using 100% of the capital requirement for mortality risk, 5% of the capital requirement for interest rate risk, and 30% of the capital requirement for other risks.

Other Risks	Capital Requirement
Credit risk	90,000
Interest rate risk ($\overline{IRR}$)	20,000
Other market risks	75,000

Insurance Risk	Capital Requirement (IR_i)	Level and Trend Risk Components (LT_i)	$IR_i - 0.5 \times LT_i$
Mortality	750,000	300,000	600,000
Longevity	0	0	0
Morbidity incidence	0	0	0
Morbidity termination	0	0	0
Lapse – lapse-sensitive business	150,000	60,000	120,000
Lapse – lapse-supported business	0	0	0
Lapse – lapse-sensitive SFG	0	0	0
Lapse – lapse-supported SFG	0	0	0
Expenses	15,000	0	15,000
Total	**915,000**	**360,000**	

The value of K_{floor} is therefore 972,406 (I = 649,173, D = 758,780 and U = 1,100,000) and the maximum credit as a function of the requirements above the CARLI floors is therefore:

$$1{,}913{,}436 - 972{,}406 = 941{,}030$$

The par credit *CP* for the block is equal to the lower of the two amounts, which is 680,956.

9.2 Credit for contractually adjustable products

9.2.1 Credit criteria for adjustable products

Contractually adjustable products qualify for a credit if all of the following conditions are met.

1. Contractual adjustability is at the sole discretion of the insurer and it must be exercised during the contract duration.
2. All adjustable features associated with the products (e.g., premiums, fees and insured amounts) have been explicitly disclosed in the contract.
3. The insurer must regularly (at least once a year) review the products' results and consider their potential impact on adjustments. Although the review and corresponding adjustments may be for the most part forward-looking, the insurer must be able to demonstrate to the satisfaction of the AMF which individual elements of the actual results are considered in the review process.
4. The adjustability is reasonably flexible, and the insurer must have tested the reasonable flexibility of the adjustable features in pricing the product or thereafter. The test should demonstrate that the insurer is able to recuperate at least half of any unexpected insurance risk losses (defined as the product's marginal capital requirement for insurance risks minus its Surplus Allowance related to insurance risks) by comparing the insurance contract liabilities with and without future adjustments. Tests of adjustability must not take into consideration amounts recoverable through arrangements that receive separate credit for the insurance risk capital requirement, such as hold harmless agreements, deposits made by policyholders or claims fluctuation reserves.
5. If an insurer takes credit for an adjustable feature, the insurer must have a documented internal policy on how it makes adjustments and the key considerations in making adjustments, including the losses or shortfalls in actual overall results. Any credit taken by the insurer must be calculated consistently with the manner stated in the internal policy and must reflect policies that, if followed, would reduce or restrict the adjustability otherwise permitted in the contract|.
6. The insurer must be able to demonstrate to the AMF that it follows the adjustment policy and practices referred to above.

A product that is only adjustable up to a certain age or has a one-time adjustment may be considered adjustable provided that it meets all the preceding conditions. The insurer may not take a credit for an adjustment that is no longer available (e.g., used up or expired), or that the insurer would not exercise, according to its policy or past practices, in the event of adverse results or loss.

A product that is adjustable at the discretion of the insurer, but subject to third-party approval, is eligible. However, the credit for such a product will be lower than other qualifying adjustable products that do not require such approval.

A product with a solvency maintenance clause (e.g., certain non-participating products issued by fraternal benefit societies) may be eligible provided it meets all other criteria.

A product with features that are not adjustable at the discretion of the insurer (such as formula- or index-based adjustments) is treated as a non-adjustable product.[175]

The actuary must explain in the Capital Guideline Certification Report how he has verified that the qualifying adjustable products comply with the preceding criteria. Documentation supporting these explanations must be kept and be made available to the AMF upon request.

9.2.2 Calculation of credit for adjustable products

The gross credit (C_j) for adjustable products is calculated for the following two categories of qualifying products that generate contractually adjustable liability cash flows.

1. Products adjustable at the sole discretion of the insurer and that do not require third-party approval.
2. Products adjustable at the sole discretion of the insurer and that do require third-party approval.

The gross adjustable product credit is equal to the difference between non-adjusted cash flows and adjusted cash flows discounted using the Initial Scenario Discount Rates described in section 5.1.1. For each adjustable feature of a contract, the adjusted cash flows are based on the maximum possible adjustment for the contract within the contract boundary, up to a limit. The limit for each adjustable feature is set depending on whether adjustments to the feature require third-party approval or not.

For products with adjustable features that do not require third-party approval, the increase or decrease for each feature recognized in the adjusted cash flows is capped at 50% of the feature's current level, applied linearly over a period of five years (i.e., 10% per year).[176] For products with adjustable features that do require third-party approval, the increase or decrease for each feature recognized in adjusted cash flows is capped at 30% of the current level, applied linearly over a period of five years after a waiting period of two years (i.e., adjustments of 6% per year are applied after a waiting period of two years).[177]

[175] However, it is possible that a product with a formula-based or an index-based adjustment may have other contractually adjustable features that are at the sole discretion of the insurer, such as cost of insurance coverage. In such cases, only those features that are contractually adjustable at the sole discretion of the insurer are treated as adjustable for the calculation of the credit.

[176] The insurer may instead cap the adjustment at 25% of the feature's current level and apply it after one year.

[177] The insurer may instead cap the adjustment at 10% of the feature's current level and apply it after one year.

Once the gross adjustable credit (C_j) for a product has been calculated, the adjustable credit (CA_j) for the product used to calculate the Base Solvency Buffer (refer to section 11.3) is obtained using the following formula:[178]

$$CA_j = \min\left[C_j\ ;\ 0.7 \times \left(K_{non\ par} - K_{\substack{non\ par, excluding\ the \\ adjustable\ product\ j}}\right)\right]$$

where:

- $K_{non\ par}$ is the adjusted diversified requirement K (refer to section 11.2.4) calculated for the non-participating block;
- $K_{non\ par\ excluding\ adjustable\ product\ j}$ is the adjusted diversified requirement[179] K calculated for the non-participating block, but recalculated excluding the qualifying adjustable product's requirements for all insurance risks.

Example: Credit for contractually adjustable products

This example builds on the example presented at the end of section 11.2.4 where the requirement $K_{non\ par}$ for a non-participating block of business within a geographic region is determined to be 1,982,800~~1,494,864~~. If this block contains an adjustable product, it is necessary to calculate the gross adjustable credit (C) and to recalculate the block's insurance risk capital requirement excluding the insurance risks for adjustable products to determine the credit for adjustable products. Suppose that the gross credit for adjustable products is equal to 250,000, and that the following table presents this block's recalculated capital requirement for insurance risk after removal of adjustable product insurance risks from the non-participating block.

178 In cases where an adjustable block spans more than one geographic region, both K terms in the credit formula for adjustable products must be replaced with the sum of the adjusted diversified requirements of all applicable regions.

179 An approximation may be used under section 1.4.5.

Insurance Risk	Capital Requirement (*IR*ᵢ), Excluding the Adjustable Product	Level and Trend Risk Components (*LT*ᵢ), Excluding the Adjustable Product	$IR_i - 0.5 \times LT_i$
Mortality	800,000	500,000	550,000
Longevity	3,000	3,000	1,500
Morbidity – incidence	50,000	10,000	45,000
Morbidity – termination	2,500	1,000	2,000
Lapse – lapse-sensitive business	200,000	90,000	155,000
Lapse – lapse-supported business	100,000	40,000	80,000
Lapse – lapse-sensitive SFG	200,000	0	200,000
Lapse – lapse-supported SFG	400,000	0	400,000
Expenses	7,500	0	7,500
Total	**1,7~~1~~63,000**	**644,000**	

The recalculation of the amounts *I*, *D*, *U* and *K* for the block is then performed as follows:

$$I = \sqrt{\sum_{i,j=1}^{9\cancel{7}} \rho_{ij} \times (IR_i - 0.5 \times LT_i) \times (IR_j - 0.5 \times lT_j)}$$ = 820,668~~633,756~~

$A = 200{,}000 + 75{,}000$ = 275,000 (unchanged value)

$D = \sqrt{A^2 + AI + I^2}$ = 987,322~~807,189~~

$U = \sum_{i=1}^{9\cancel{7}} IR_i + A$ = 1,7~~1~~63,000 + 275,000 = 2~~1~~,0~~4~~38,000

LT = 644,000

$$K_{\substack{non-par,\\ excluding\\ adjustable\\ product}} = \frac{4}{5}U + \frac{1}{10}LT + max\left(\frac{14\,U - 7\,LT - 62\,D}{60} + \frac{2D^2}{2U - LT}; 0\right)$$

= 1,694,800~~1,224,935~~

The adjustable credit for the product is then:

$$CA = \min[250{,}000; 0.7 \times (1{,}962{,}800\cancel{1{,}494{,}864} - 1{,}694{,}800\cancel{1{,}224{,}935})] = 187{,}600\cancel{188{,}950}$$

9.3 Contractually adjustable participating products

Where a participating product also has an adjustable feature to transfer losses or reflect adverse results from all risks, the insurer may take simultaneous credit for both the participating product and the adjustable features, as specified below. For an insurer to take this credit, the product must meet all the criteria for participating products specified in section 9.1.1 and all the criteria for adjustable products specified in section 9.2.1. In addition, the insurer must have sole discretion to exercise the adjustable feature without third-party approval to recover losses or reflect adverse results that occur for any reason (i.e., adjustability must not be limited to specific risks). If the participating product has an adjustable feature that is not able to transfer losses or reflect adverse results from all risks, the insurer cannot take the credit described in this section. For such products, the insurer has the option to apply either the credit for participating products, or the credit for adjustable products, but not both.

If a product is eligible for both credits, the credit for adjustable products must be recalculated using the methodology for participating products specified section 9.1. The revised credit for adjustable products is obtained using the following formula:

$$CA = min\left[K - K_{\substack{reduced\\interest}} + \left(1 - \frac{\overline{IRR}}{max(\bar{C}_{adverse}; \overline{IRR})}\right)C_{initial};\ K - K_{floor\ adj}\right]$$

where

- K, $K_{reduced\ interest}$ and $\overline{IRR}$ have the same definitions as in section 9.1.2;
- $C_{initial}$ is the gross credit for adjustable products defined in section 9.2.2;
- $\bar{C}_{adverse}$ is the six-quarter rolling average, calculated over the current quarter and the previous five quarters, of gross credits for adjustable products modified so that in each quarter it is discounted using the rate under the most adverse scenario that determines the capital requirement for interest rate risk in that quarter, instead of the initial scenario;[180]
- $K_{floor\ adj}$ is calculated by aggregating the following elements in the calculation of K:
  - 30% of required capital for all insurance risks for the block;
  - 100% of required capital for all other risks for the block.

The aggregate credit for the product is then equal to:

[180] For a new participating block, no averaging must be used for the first quarter calculation. For the second quarterly calculation, $\bar{C}_{i\ adverse}$ for the block must be calculated using one half (½) of the sum of $C_{i\ adverse}$ for the first two quarters. For the third quarter calculation, the average must be calculated using one third (⅓) of the sum of $C_{i\ adverse}$ for the first three quarters. The averaging must continue until the data are obtained for six quarters.

$$\min(CP + CA; K - K_{floor\ global})$$

where

- CP is the participating credit for the product;
- CA is the recalculated adjustable credit for the product;
- K is the adjusted diversified requirement for the block;
- $K_{floor\ global}$ is calculated by aggregating the following elements in the calculation of K:
  - 5% of the interest rate risk capital requirement for the block;
  - 30% of the capital requirement for all other risks for the block.

Chapter 10. Credit for Reinsurance

This chapter describes the treatment of reinsurance in the determination of the CARLI Ratios, collateral requirements for unregistered reinsurance, and the conditions necessary for an insurer to take credit for reinsurance.

For calculating reinsurance credits on segregated fund guarantee capital requirements under the standard approach, including the simplified option, (refer to sections 7.1 to 7.5), Restated Liabilities should be used in lieu of Best Estimate Liabilities.

10.1 Definitions

10.1.1 Registered and unregistered reinsurance

In this guideline, the terms "registered reinsurance" and "unregistered reinsurance" refer to Appendix A of the *Reinsurance Risk Management Guideline* issued by the AMF. The terms "registered reinsurer" and "unregistered reinsurer" refer respectively to a reinsurer with regard to its registered and unregistered reinsurance contracts.

10.1.2 Ceded liabilities

In this chapter, "ceded" liabilities refer to liabilities that are covered by a reinsurance contract. For the purpose of calculating the requirements in the following sections, ceded liabilities must be determined on the same basis as direct liabilities recorded on the balance sheet. In particular, the value of the ceded liability for any contract must be calculated using the same underlying contract cash flow assumptions and discount rates that are used to value the direct liability. ~~Ceded liabilities must be measured without any reduction for the risk of non-performance by the reinsurer.~~

10.2 Adjustments to available capital for unregistered reinsurance

Insurers must adjust Available Capital to account for ceded liabilities arising from unregistered reinsurance. All of the adjustments in this section are calculated in respect of ceded liabilities related to:

- existing business; and
- future business assumed through reinsurance contracts written and retroceded through unregistered reinsurance.

10.2.1 Requirement for aggregate positive liabilities ceded

For every unregistered reinsurer, the insurer must include, within its deductions (refer to section 2.1.2.10), the higher of zero or the aggregate Best Estimate Liability ceded to the unregistered reinsurer. This requirement may be reduced to a minimum of zero through application of any credit available in respect of the unregistered reinsurer (refer to section 10.3).

10.2.2 Requirement for offsetting contract liabilities ceded

The amount of offsetting contract liabilities ceded to an unregistered reinsurer is the sum of:

- the amount of negative Best Estimate Liabilities ceded to the reinsurer, calculated on a contract-by-contract basis without any reductions; and
- the lower of zero or the aggregated Best Estimate Liability ceded to the reinsurer.

For every reinsurer, the amount of offsetting contract liabilities ceded must be deducted from Tier 1 Capital (as a Negative Liability) and included in Tier 2 Capital. This requirement may be reduced to a minimum of zero through application of any credit available in respect of the unregistered reinsurer (refer to section 10.3).

Example: Offsetting contract liabilities ceded

A Canadian insurer cedes contract liabilities whose aggregate best estimate value is negative $700 to an unregistered reinsurer, where the ceded liabilities contain $800 in negative Best Estimate Liabilities calculated contract by contract.

The requirement under section 10.2.1 for aggregate positive liabilities ceded is zero.

The requirement under section 10.2.2 for offset contract liabilities ceded is $100, which is calculated as follows:

1. $800 for negative liabilities ceded, calculated contract by contract, plus
2. negative $700 for aggregate Best Estimate Liabilities.

10.2.3 Differences between reinsurance contracts held and direct liabilities

For every unregistered reinsurer, an insurer must calculate the following amount:

- all reinsurance contract held assets and other obligations of the unregistered reinsurer appearing in the LIFE return, excluding any contractual service margins included in these assets; less
- all reinsurance contract held liabilities due to the unregistered reinsurer appearing in the LIFE return, excluding any contractual service margins included in these liabilities; less
- the Best Estimate Liability and Risk Adjustment for all business ceded to the unregistered reinsurer.

If the above amount is positive, the insurer must include it within its deductions (refer to section 2.1.2.10) and may not reduce the amount through the application of credit for unregistered reinsurance. If the amount is negative, it may be taken as a credit under section 10.3.1.

Example: Differences between reinsurance contracts held and direct liabilities

1) An insurer cedes business having a Best Estimate Liability of $300 and a Risk Adjustment of $50 to an unregistered reinsurer. However, the insurer is reporting $365 in reinsurance contract held assets (net of contractual service margins) due from the reinsurer on its LIFE return balance sheet because it has paid $15 in claims to its policyholders that the reinsurer has not yet reimbursed. The insurer must therefore add $15 to its deductions.

2) An insurer cedes business with a negative Best Estimate Liability of $800 and a Risk Adjustment of $200 to an unregistered reinsurer. Instead of reporting a reinsurance contract held liability, the insurer reports no liability owed to or asset owed by the reinsurer because the compensation it is to receive for the negative cession is deferred. In this example, the insurer must add $600 to its deductions.

10.2.4 Requirement for negative liabilities ceded with recourse

Where the total value of Best Estimate Liabilities that an insurer has ceded to an unregistered reinsurer is negative, the insurer must deduct from Tier 1 Capital and add to Tier 2 Capital all amounts that:

1. may become payable in the future with respect to negative contract liabilities ceded to an unregistered reinsurer that have not been transferred permanently (e.g., ceded negative liabilities for which the reinsurer, in the event of surrender or other eventuality, has the right to demand payment from the insurer or to cancel any liabilities owed to the insurer); and
2. are neither reported as liabilities nor captured as deductions in sections 10.2.2 and 10.2.3.

Example: Negative liabilities ceded with recourse

1) A Canadian insurer cedes business with a Best Estimate Liability of negative $100 and offsetting contract liabilities of $600 to an unregistered reinsurer. The reinsurer has the right to any portion of the $600 related to the lapse of ceded negative liabilities against payments owed on the positive liabilities. If the insurer has not applied any credit for reinsurance to the requirements in section 10.2.2, it is not required to deduct an amount under this section as the negative liabilities have already been deducted from Tier 1 Capital and added to Tier 2 Capital under section 10.2.2. However, if the insurer has applied a credit amount to the requirements in section 10.2.2, then it must deduct this amount from Tier 1 Capital and add it to Tier 2 Capital. In other words, the insurer loses the ability to cover the section 10.2.2 requirement with collateral if the negative contract liabilities are ceded with recourse.

2) Continuing example 2) from section 10.2.3, suppose that the reinsurer has the right to withhold up to $600 of future payments that form part of the $0 net reinsurance asset if the negative contract liabilities ceded lapse. No deduction is required under this section, as the $600 has already been deducted under section 10.2.3.

10.2.5 Adjustment for the effect of income taxes

The adjustment for the effect of income taxes on business ceded to an unregistered reinsurer is defined as follows:

$$\frac{OL + \min\left(D; \max(-AL - RA, 0)\right)}{NR} \times T$$

where

- *OL* is the requirement in section 10.2.2 for offsetting contract liabilities ceded to the reinsurer, before the application of any credit available;
- *D* is the total amount added to deductions for the reinsurer under sections 10.2.3 and 10.2.4;
- *AL* is the aggregate Best Estimate Liability ceded to the reinsurer;
- *RA* is the Risk Adjustment for all business ceded to the reinsurer;
- *NR* is the amount of negative Best Estimate Liabilities ceded to the reinsurer, calculated on a contract-by-contract basis without any reductions;
- *T* is the tax adjustment for the negative liabilities ceded to the reinsurer and is equal to 30% of the negative Best Estimate Liabilities ceded, calculated on a contract-by-contract basis, arising from:
  - ➢ active lives for individually underwritten Canadian health insurance products;
  - ➢ individually underwritten Canadian life insurance products.

The insurer may reclassify the above adjustment from Tier 2 Capital to Tier 1 Capital.

10.2.6 Adjustment for amount recoverable on surrender

Subject to the limits below, an insurer may reclassify amounts recoverable on surrender for contract-by-contract negative liabilities ceded to an unregistered reinsurer from Tier 2 Capital to Tier 1 Capital. The maximum adjustment for amounts recoverable on surrender is limited to:

- 90% of the amount of Eligible Deposits available for the reinsurer, plus
- any unused portion of the corresponding limit in section 2.1.2.9 that is allocated to the unregistered reinsurer.

The amounts recoverable on surrender for a contract are those listed in section 2.1.2.9 as calculated for the contract's ceded risks. The amount recoverable on surrender that may be recognized for a contract is limited to 70% of the contract's negative Best Estimate Liability ceded if it arises from business specified in the adjustment for income taxes in section 10.2.5, and 90% of the contract's negative Best Estimate Liability ceded if it arises from any other business.

10.2.7 Aggregate negative liabilities ceded

For aggregate negative liabilities ceded to an unregistered reinsurer without recourse (refer to section 10.2.4), an insurer may include in Tier 2 Capital the value of the aggregate negative Best Estimate Liability ceded to the unregistered reinsurer up to a limit of:

- the amount added to deductions for the reinsurer under section 10.2.3, plus
- the Eligible Deposits limit for the reinsurer under section 6.7.1, less
- the amount of Eligible Deposits available in respect of the reinsurer.

10.3 Funds held and guarantee instruments

This section describes the conditions under which the deductions from Available Capital may be reduced under section 10.2. It replaces the rules that would otherwise apply under sections 3.2 and 3.3. In the case of reinsurance contracts covering contracts issued outside Canada, all of the requirements covered in this section apply, except that the guarantee instruments may also be held in the countries where the contracts are issued.

10.3.1 Credit available

An insurer is given credit, for each unregistered reinsurer, equal to the sum of:

- Any excess of direct liabilities over the corresponding reinsurance contracts held and other obligations of the reinsurer, as calculated under section 10.2.3;
- The value of the guarantee instruments[181] enabling the insurer to secure the fulfilment of its obligations in Quebec.

In order for a ceding insurer to obtain credit under the first point above for funds held under withheld reinsurance contract, the contract must not contain any contractual provision that would require payment of funds withheld to the reinsurer before the end of the contract term (e.g., an acceleration clause). Furthermore, the ceding insurer may not provide non-contractual or implicit support, or otherwise create or sustain an expectation that any funds withheld could be paid to the reinsurer before the end of the reinsurance term.

The funds held and guarantee instruments (the “guarantees”) must be available for as long as the reinsurer will have obligations under the reinsurance contracts for which the ceding insurer is taking credit. Where contract stipulations regarding the guarantees may vary during the period, credit may only be taken if the ceding insurer maintains the exclusive option to retain the guarantees and the cost of that option, if any, is fully recognized and explicitly accounted for at inception of the contract.

Example: Guarantees for unregistered reinsurance

[181] The AMF may, if it deems appropriate, require the insurer to provide the necessary documents or to observe certain formalities in order to obtain the credit. Insurers are advised to consult the AMF’s website before any request to see if instructions have been issued in this regard.

1) An insurer has entered into an unregistered coinsurance contract with a term of 30 years. However, the unregistered reinsurer is contractually obligated to provide guarantees in Canada for only 5 years and there is no mechanism in place to provide additional guarantees after the 5-year term ends. As a result, the ceding insurer cannot take credit for the guarantees provided under this contract.

2) Suppose that the reinsurance contract is the same as in 1), with the exception that the ceding insurer has the option to maintain the guarantees after 5 years at an annual cost equal to the Canadian 1-year treasury bill rate plus 3%. Under this contract, the insurer may take credit for the guarantees provided that the present value of total costs of the guarantees for years 6 to 30 is considered as a reduction of the reinsurance contract held, is covered by an additional liability maintained by the insurer, or is excluded from Tier 1 Capital.

In aggregate, the amount of credit given for letters of credit is limited to the sum of 30% of the gross requirement for the positive aggregate amount of liabilities ceded to unregistered reinsurers (refer to section 10.2.1) and 30% of the gross requirement for offsetting contract liabilities ceded to unregistered reinsurers (refer to section 10.2.2).

The assets used to obtain credit for a specific unregistered reinsurer may not be obligations of the unregistered reinsurer itself or any of its affiliates. This means that:

1. to the extent that the ceding insurer reports as assets in its LIFE return the obligations of one or more affiliates of an unregistered reinsurer, it is precluded from taking credit for the surplus of direct liabilities over obligations of the reinsurer;[182]
2. the assets held with regard to guarantee instruments may not be used to obtain credit if they are obligations of the unregistered reinsurer or one of its affiliates;
3. a letter of credit is not acceptable if it has been issued by the unregistered reinsurer or one of its affiliates.

10.3.2 Application to requirements for ceded liabilities

The credit available in respect of an unregistered reinsurer must first be applied to the requirement for aggregate positive liabilities ceded to the reinsurer (refer to section 10.2.1) until it is reduced to zero. At the choice of the ceding insurer, any remaining credit available may be allocated to either:

- the requirement for offsetting contract liabilities ceded to the reinsurer (refer to section 10.2.2) until it is reduced to zero; or
- Eligible Deposits in respect of business ceded to the reinsurer, subject to the conditions in section 10.4 and the limit in section 6.7.1.

[182] If there is more than one affiliated unregistered reinsurer and the reinsurer reports, in its LIFE return, assets that are obligations of affiliates of unregistered reinsurers, then the total credit for the excess of direct liabilities over obligations of affiliated unregistered reinsurers must be reduced in aggregate, to a minimum of zero, by the reported amount of such assets. If the reduction required is less than the total credit calculated for the affiliated reinsurers, the reduction may be allocated to reinsurers in any manner such that the credit for each reinsurer is not reduced below zero.

Example: Adjustments and credit for liabilities ceded

A Canadian insurer cedes contract liabilities with an aggregate best estimate value of $400 and a Risk Adjustment of $200 to an unregistered reinsurer. The reinsurance contract held asset net of contractual service margin is equal to $600. This ceded business contains a total of $1,000 of negative contract-by-contract Best Estimate Liabilities, all of which are ceded without recourse and $900 of which is eligible for a 30% tax adjustment. The contract-by-contract negative liabilities have a total of $300 in offsets available for amounts recoverable on surrender. The limit in section 2.1.2.9 on amounts recoverable on surrender that can be recognized, before taking into account the cession to the unregistered reinsurer, is $1,000, and the insurer has $850 of amounts recoverable on its retained business. The total credit available for the reinsurer from section 10.3.1 is $1,400, and the section 6.7.1 Eligible Deposit limit for the ceded business is $1,200.

The requirement under section 10.2.1 for aggregate positive liabilities ceded is $400, which is the aggregate Best Estimate Liability ceded. This requirement is covered with $400 of the credit, available leaving $1,000 to allocate to offsetting contract liabilities and Eligible Deposits.

The requirement under section 10.2.2 for offsetting contract liabilities ceded is $1,000, calculated as:

- $1,000 for negative liabilities ceded calculated contract by contract, plus
- $0, as the aggregate best estimate cession is positive.

and may be reduced to a minimum of zero, depending on how the insurer allocates its remaining credit available.

Under section 10.2.3, there is no deduction or credit, as the reinsurance contract held asset is equal to the Best Estimate Liability plus Risk Adjustment ceded.

Under section 10.2.5, the amount reclassified from Tier 2 Capital to Tier 1 Capital is $270, equal to 30% of the $900 of Contract-by-Contract Negative Liabilities that are eligible for the tax adjustment, while max(– *AL* – *RA*, 0) is zero and both *OL* and *NR* are equal to $1,000.

The amount reclassified from Tier 2 Capital to Tier 1 Capital under section 10.2.6, as well as the offset to the deductions for Negative Liabilities in section 2.1.2.9, both depend on how the insurer allocates the remaining $1,000 between offsetting contract liabilities and Eligible Deposits. If the insurer allocates all of the $1,000 to offsetting contract liabilities, then:

- There will be no deduction from Tier 1 Capital for the ceded offsetting contract liabilities.

- The insurer will be able to use all of the $850 of amounts recoverable on surrender as an offset to the deduction for Negative Liabilities for its retained business in section 2.1.2.9.
- Since the insurer will have no Eligible Deposit for the reinsurer, the limit on amounts recoverable that it can recognize for its ceded business in section 10.2.6 will be $150, which is the left-over portion of the limit for retained business and is lower than the $300 of amounts recoverable available.

The total impact of allocating the credit this way will be to increase the numerator of the insurer's Core CARLI Ratio by $1,000, without affecting the numerator of the Total CARLI Ratio. On the other hand, if the insurer allocates all of the $1,000 to Eligible Deposits, then:

- The Eligible Deposits will increase the numerator of the Core CARLI Ratio by $700 and the numerator of the Total CARLI Ratio by $1,000.
- There will be a $1,000 deduction from Tier 1 Capital on account of the ceded offsetting contract liabilities.
- None of the $850 of amounts recoverable on surrender will be available as an offset to the deduction for Negative Liabilities for the insurer's retained business in section 2.1.2.9, as the offsetting contract deduction will have reduced the limit on amounts recoverable to zero.
- The insurer will be able to use all of the $300 of amounts recoverable on surrender for its ceded business in section 10.2.6, as it is below the limit of $900 (equal to 90% of the amount of Eligible Deposits available for the reinsurer).

The total impact of allocating the credit this way will be to increase the numerator of the Total CARLI Ratio by $1,000, without affecting the numerator of the Core CARLI Ratio. The insurer is able to decide whether to use the $1,000 credit as an effective Tier 1 Capital-to-Tier 2 Capital reclassification (using the first allocation), as an effective component of Tier 2 Capital (using the second allocation), or to achieve an intermediate result.

10.3.3 Credit and market risk requirements

Consistent with the substitution capital treatment used for collateral and guarantees, insurers must include in required capital the capital requirements for credit risk (as determined under Chapter 3) and market risk (as determined under sections 5.2 to 5.4) for all assets held with regard to guarantee instruments used to obtain credit for ceded liability capital requirements relating to unregistered reinsurance or that are included in Eligible Deposits. A separate calculation is also required for currency risk (refer to section 5.6.8). Assets held with regard to guarantee instruments that are not used to obtain credit for ceded liability capital requirements relating to unregistered reinsurance or that are not included in Eligible Deposits are excluded from all capital requirement calculations. Among those assets held with regard to guarantee instruments, the ceding insurer may designate which assets (or portions thereof) serve to obtain the credit or which are included in Eligible Deposits and to which the requirements must be applied.

10.4 Calculation of capital requirements or eligible deposits

10.4.1 Necessary conditions for credit

In order for a ceding insurer to obtain a reduction in its Base Solvency Buffer on account of a registered reinsurance contract or to make an addition to Eligible Deposits with regard to an unregistered reinsurance contract, the contract must conform to all of the principles contained in the *Reinsurance Risk Management Guideline.* The contract must also meet all of the conditions necessary for effective risk transfer specified in this section. The ceding insurer must be able to demonstrate that the change in its risk exposure resulting from the contract is commensurate with the amount of reduction in its Base Solvency Buffer, or with the amount recognized in Eligible Deposits.[183]

Risk transfer must be effective in all circumstances where the ceding insurer relies on the transfer to reduce the capital requirement. In assessing a contract, the ceding insurer must take into account any contract terms whose fulfilment is outside the ceding insurer's direct control, and that would reduce the effectiveness of risk transfer. Such terms include, among others, those which:

1. would allow the reinsurer to unilaterally cancel the contract (other than for non-payment of reinsurance premiums due under the contract);
2. would increase the effective cost of the transaction to the ceding insurer in response to an increased likelihood of the reinsurer incurring a loss under the contract;
3. would obligate the ceding insurer to modify the risks transferred for the purpose of reducing the likelihood of the reinsurer incurring a loss under the contract;
4. would allow for the termination of the contract due to an increased likelihood of the reinsurer incurring a loss;
5. could prevent the reinsurer from being obligated to pay out any amounts due under the contract in a timely manner;
6. could allow for early maturity of the contract.

The ceding insurer must also take into account circumstances under which the benefit of the risk transfer could be undermined. For example, this may occur if the ceding insurer provides support (including non-contractual support) to the contract with the intention of reducing potential or actual losses for the reinsurer.

In determining whether there is effective risk transfer, the reinsurance contract must be considered as a whole. Where the contract consists of several contracts, the entire set of contracts, including contracts between third parties, must be considered. The ceding insurer must also consider the entire legal relationship between itself and the reinsurer.

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[183] Without limiting the requirement of ceding insurers to comply with the risk transfer principle with respect to all reinsurance transactions, the AMF may, if it is unclear how much risk the ceding insurer bears post-reinsurance and if the AMF determines it is appropriate to provide greater certainty, provide further guidance (including quantitative requirements) to implement this principle with respect to any reinsurance contract. Insurers are encouraged to contact the AMF in writing to discuss reinsurance contracts where the risk transfer measures may be unclear or for which implementation guidance may be required.

No reduction of the Base Solvency Buffer or recognition of Eligible Deposits is allowed for reinsurance contracts that have a high material basis risk with respect to the reinsured business (e.g., if payments under the contract are made according to an external indicator instead of actual benefits). Reinsurance contracts held arising from contracts that could include basis risk may be subject to an insurance risk capital requirement in addition to the capital requirement for credit risk.

In assessing the effectiveness of the risk transfer, the economic substance of the contract must take precedence over the legal form and accounting treatment

10.4.2 Retained risk positions

If a coinsurance contract does not cover all benefits up to the sum of ceded insurance contract Best Estimate Liabilities plus the marginal insurance risk requirement for the ceded business (the "Requisite Level"), then the ceding insurer must increase its required capital or reduce the recognized limit in Eligible Deposits. In particular, any coinsurance contract containing a provision under which the reinsurer is required to cover only benefits in excess of a certain amount will require an adjustment, regardless of the accounting treatment. These provisions include but are not limited to the following:

- experience rating refunds;
- claims fluctuation reserves and reinsurance claims fluctuation reserves;
- variable risk transfer mechanisms other than the above provisions, whereby the amount of reinsured benefits depends on prior results.

If a registered coinsurance contract does not cover all benefits up to the Requisite Level, the ceding insurer must add to its capital requirement the total amount of benefits up to this level for which it remains at risk. If an unregistered coinsurance contract does not cover all benefits up to the Requisite Level, then $SB_0 - SB_1$ used to calculate the limit on Eligible Deposits for the coinsurance contract (refer to section 6.7.1) must be reduced by the total amount of benefits up to the Requisite Level for which the ceding insurer remains at risk.

Reinsurance contracts, other than coinsurance, that provide tranched protection or under which the ceding insurer otherwise retains a risk position, are treated as stop-loss reinsurance and are subject to the conditions specified in section 6.7.5.

The amount of the risk position that a ceding insurer retains under a reinsurance contract must be recalculated, according to the contract, at each reporting date.

10.4.3 Registered reinsurance

All capital requirements for which it is possible to obtain credit for reinsurance may be calculated net of registered reinsurance. For example, cash flows for insurance contract liabilities ceded under registered reinsurance must be excluded from the cash flows for insurance contract liabilities used to calculate all CARLI insurance risk components.

The 2.5% credit risk requirement for registered reinsurance contracts held may be reduced in accordance with the criteria in this section using the substitution approach described in section 3.3~~10.3.3~~ if the asset is secured by collateral meeting the conditions specified in the introduction to section 3.2 and in section 3.2.1,[184] or by a guarantee (including a letter of credit) meeting the conditions specified in section 3.3.

If an insurer cedes business under a funds withheld coinsurance or modified coinsurance contract that constitutes registered reinsurance, it is possible that the asset risks covered in Chapter 3 and sections 5.2 to 5.4 are transferred to the reinsurer. For example, such a transfer could exist if the contractual rate of accrual of the withheld funds liability or modified coinsurance adjustment is not defined, but instead depends on the returns on a portfolio of assets held by the ceding insurer.

If a registered modified coinsurance contract transfers asset risks associated with on-balance sheet assets to the reinsurer, the contract must meet all of the requirements of section 3.3 in order for the ceding insurer to take credit (e.g., the reinsurance must provide protection at least as strong as a guarantee, and the reinsurer cannot be an affiliate of the ceding insurer). If the insurer is eligible to take credit for the transferred asset risks, the capital treatment follows the substitution approach. The substitution credit risk factor is the factor corresponding to the reinsurer's claims-paying ability rating (rather than 2.5%), with a maturity the longer of:

- the maturity of the asset covered; or
- the frequency with which the reinsurer settles losses arising on the assets whose risks it has assumed.

For assets covered under the risk transfer that are subject to market risk factors, the substitution factor must be the reinsurer's credit risk factor corresponding to a 10-year maturity. If the term of the reinsurance contract is shorter than the maturity of a covered fixed-income asset, then the maturity mismatch adjustment described in section 3.3.7 must be applied.

Example: Credit and market risk requirements for business ceded under a funds withheld contract or modified coinsurance contract

1) Under a funds withheld reinsurance contract with an unaffiliated reinsurer that has an AA claims-paying ability rating, the amount that is contractually accrued on the funds withheld liability is equal to the return on the following portfolio of on-balance sheet assets, none of which are obligations of the reinsurer or any of its affiliates:

[184] The conditions for eligible financial collateral in section 3.2.1 that must be complied with for registered reinsurance are those applicable for capital markets transactions rather than for secured lending. If collateral is denominated in a currency other than that of the reinsurance contract, its market value must be reduced by 30%.

Asset	Value	Factor
AA-rated bond, 2-year maturity	$20	0.50%
A-rated bond, 3-year maturity	$20	1.50%
BBB-rated bond, 2-year maturity	$20	2.75%
BBB-rated bond, 5-year maturity	$20	4.00%
Common shares	$20	35%

The reinsurance contract only provides for payment of the accumulated reinsurance contract held asset, if any, to the ceding insurer at the end of the contract in 20 years. If the reinsurance meets all of the requirements of section 3.3 (including that the reinsurer is an eligible guarantor per section 3.3.4), the substitution factor for all of the above assets is the lower of the original asset factor or the factor for a 20-year obligation of an AA-rated counterparty, which is 1.75%. The asset risk requirement for the above assets is therefore reduced from $8.75 to $1.45, based on the following substitution asset factors:

Asset	Value	Factor
AA-rated bond, 2-year maturity	$20	0.50%
A-rated bond, 3-year maturity	$20	1.50%
BBB-rated bond, 2-year maturity	$20	1.75%
BBB-rated bond, 5-year maturity	$20	1.75%
Common shares	$20	1.75%

2) If, in the previous example, the reinsurance contract is instead a modified coinsurance contract under which the return on the asset portfolio is included in the modified coinsurance adjustment, and a net payment is made at the end of each quarter so that the reinsurance contract held asset is maintained at zero, then the credit and market risk requirements for the asset portfolio are reduced to $0.95, based on the following substitution asset factors:

Asset	Value	Factor
AA-rated bond, 2-year maturity	$20	0.50%
A-rated bond, 3-year maturity	$20	0.75%
BBB-rated bond, 2-year maturity	$20	0.50%
BBB-rated bond, 5-year maturity	$20	1.25%

Asset	Value	Factor
Common shares	$20	1.75%

10.4.4 Unregistered reinsurance

Guarantee instruments that are used to obtain credit for unregistered reinsurance or for insurance risk capital requirements are subject to additional capital requirements for credit and market risks (section 10.3.3).

If an unregistered reinsurance contract transfers the risks associated with the insurer's on-balance sheet assets to the reinsurer, the ceding insurer does not receive any credit for these requirements, as the credit risk factor assigned to the unregistered reinsurer is effectively 100% and therefore does not lead to a credit under the substitution approach.

10.5 Adjustment to available capital for stop-loss arrangements

A ceding insurer may reduce its Gross Tier 1 capital deduction with respect to negative liabilities for lapse risk it has reinsured under a registered stop-loss reinsurance contract (refer to~~see~~ section 10.1). The reduction and the capital requirement for this reinsurance contract are subject to approval by the AMF.

The aggregate reduction amount for all such contracts is limited to 5% of Net Tier 1 capital, prior to reduction for these contracts.

These conditions must be satisfied to qualify for the reduction:

1) The reinsurance contract must conform to all of the principles contained in the *Reinsurance Risk Management* Guideline and must meet all of the conditions necessary for effective risk transfer in section 10.4.1.

2) The reinsurer (or reinsurers, in aggregate, if applicable) must fully reflect the equivalent Available Capital deduction that the ceding insurer would have included in its calculations of the CARLI Ratios.

3) The ceding insurer must retain in its records a certification by the reinsurer's actuary that the reinsurer has included the relevant reductions claimed by the ceding insurer in its own calculations of the CARLI Ratios.

The required capital for credit risk is calculated using factors in section 3.1.7. The exposure should be the maximum payout by the reinsurers, in aggregate, under the reinsurance contracts, subject to AMF confirmation.

If the stop-loss contract constitutes unregistered reinsurance under section 10.1, the ceding insurer must contact the AMF in writing to determine the applicable capital treatment.

Chapter 11. Aggregation and Diversification of Risks

Risk aggregation is the approach used to calculate the total of each and all risk elements. A diversification credit or benefit results when the aggregation of risks produces results that are less than the total of the individual risk elements. The term “region” is defined in section 1.1.5.

11.1 Within-risk diversification

Diversification credits are applied to specific components of the mortality and morbidity requirements in Chapter 6. The credit in section 11.1.1 is calculated net of registered reinsurance. In the calculation of the Base Solvency Buffer used to determine the CARLI Ratios, the statistical fluctuation factors in section 11.1.2 are calculated net of registered reinsurance. For the solvency buffers SB_1, SB_2 and SB_3 defined in section 6.7, statistical fluctuation factors are projected net of registered reinsurance without taking account of any additional elements specific to the calculation. Since the requirements for participating business are calculated on a standalone basis, (refer to section 9.1.2), no credit for within-risk diversification is given between similar risks in participating and non-participating business.

11.1.1 Mortality level and trend risk – Credit for diversification between life supported and death supported business

A diversification credit is calculated between individually underwritten life supported and individually underwritten death supported business. This credit is the difference between the sum of the individual mortality level risk and mortality trend risk components for life supported and death supported business (refer to sections 6.2.2 and 6.2.3) and the aggregate component for mortality level and mortality trend risk. The credit is calculated using the following formula:

$$\text{Diversification credit} = RC_L + RC_D - RC_{aggregate}$$

where:

- RC_L is the sum of the ~~individual risk~~capital requirements for the mortality level risk and mortality trend risk components for individually underwritten life supported business, as determined in sections 6.2.2 and 6.2.3, respectively, and section 7.2.3.1~~for mortality level risk and trend risk respectively under sections 6.2.2 and 6.2.3 for life supported business~~;
- RC_D is the sum of the ~~individual risk~~capital requirements for the mortality level risk and mortality trend risk components for individually underwritten death supported business, as determined in sections 6.2.2 and 6.2.3, respectively, and section 7.2.3.1~~for mortality level risk and trend risk respectively under sections 6.2.2 and 6.2.3 for death supported business~~;
- $RC_{aggregate}$ is the aggregate component for mortality level risk and mortality trend risk components (after diversification) for all life supported and death supported business, calculated using the formula below.

The aggregate component for mortality level risk and mortality trend ~~mortality~~ risk components assumes a correlation factor of -75% between life and death supported business and is calculated as follows:

$$RC_{aggregate} = \sqrt{RC_L^2 + RC_D^2 - 1.5 \times RC_L \times RC_D}$$

11.1.2 Morbidity risk credits

The capital requirements for morbidity risk determined in section 6.4 for certain products are reduced by multiplying the requirement by a statistical fluctuation factor (SFF). For each SFF, exposures are aggregated by product within each geographic region before the SFF is applied. For example, all disability exposures within a geographic region are aggregated (individual active DI, individual active WP, individual disabled DI, group disabled LTD, individual and group disabled WP and group active and disabled STD) before the SFF is applied.

11.1.2.1 Credit for level risk

The formulas to calculate morbidity SFFs for level risk are presented below.

Disability

$$SFF(RC) = \begin{cases} 1\,, if\ RC \leq \$42{,}000{,}000 \\ 0.9 + \dfrac{648}{\sqrt{RC}}, if\ RC > \$42{,}000{,}000 \end{cases}$$

where R*C* is the capital requirement for level risk.

Critical illness

$$SFF(FA) = \begin{cases} 1\,, if\ FA \leq \$300{,}000{,}000 \\ 0.15 + \dfrac{14{,}722}{\sqrt{FA}}, if\ FA > \$300{,}000{,}000 \end{cases}$$

where *FA* is the total face amount.

Long-term care

$$\mathrm{SFF(RC)} = \begin{cases} 1\,, \mathrm{if\ RC} \leq \$75{,}000{,}000 \\ 0.5 + \dfrac{4{,}330}{\sqrt{\mathrm{RC}}}, \mathrm{if\ RC} > \$75{,}000{,}000 \end{cases}$$

where *RC* is the capital requirement for level risk.

11.1.2.2 Credit for volatility risk

The formulas to calculate morbidity SFFs for volatility risk are presented below.

Disability

$$SFF(RC) = \begin{cases} 1\,, if\ RC \leq \$6{,}000{,}000 \\ 0.7 + \dfrac{734}{\sqrt{RC}}, if\ RC > \$6{,}000{,}000 \end{cases}$$

where *RC* is the capital requirement for volatility risk.

Critical illness

$$SFF(FA) = \begin{cases} 1\,, if\ FA \leq \$300{,}000{,}000 \\ 0.15 + \dfrac{14{,}722}{\sqrt{FA}}, if\ FA > \$300{,}000{,}000 \end{cases}$$

where *FA* is the total face amount.

Long-term care

$$SFF(RC) = \begin{cases} 1\,, if\ RC \leq \$3{,}000{,}000 \\ 0.3 + \dfrac{1{,}212}{\sqrt{RC}}, if\ RC > \$3{,}000{,}000 \end{cases}$$

where *RC* is the capital requirement for volatility risk.

Travel and credit insurance

$$SFF(RC) = \begin{cases} 1\,, if\ RC \leq \$5{,}000{,}000 \\ 0.2 + \dfrac{1{,}788}{\sqrt{RC}}, if\ RC > \$5{,}000{,}000 \end{cases}$$

where *RC* is the capital requirement for volatility risk.

Medical/Dental Insurance (including other A&S products)

$$SFF(RC) = \begin{cases} 1\,, if\ RC \leq \$3{,}000{,}000 \\ 0.7 + \dfrac{519}{\sqrt{RC}}, if\ RC > \$3{,}000{,}000 \end{cases}$$

where *RC* is the capital requirement for volatility risk.

11.1.3 Mortality and morbidity risks – Portfolio volume credit

A diversification credit is given across geographic regions for the level risk component of the mortality and morbidity requirements. For each of the mortality, morbidity incidence, and morbidity termination requirements for a block of business within a region, the component for level risk may be reduced using the following formula:

$$0.5 \times (L_0 - L_1)$$

where:

- L_0 is the level risk component for the block calculated using the volatility risk component and statistical fluctuation factors for its region;
- L_1 is the level risk component for the block calculated using the volatility risk component and statistical fluctuation factors for the aggregated portfolios of all regions.

L_0 and L_1 are calculated net of all reinsurance.

11.2 Between-risk diversification

After calculating each separate risk requirement, they are aggregated by region in three stages. First, a post-diversification requirement is calculated for insurance risk (*I*). Then, an unadjusted diversified requirement for all risks (*D*) is calculated by aggregating the net requirement for insurance risk with the requirements for credit risk and market risk. This unadjusted diversified requirement is compared against the undiversified requirement (U) which is equal to the sum of individual risk components. The adjusted diversified requirement (*K*) is calculated based on *D* and *U*.

If the insurer wishes to take credit for participating or adjustable products (refer to Chapter 9), or for unregistered reinsurance or reinsurance claims fluctuation reserves (refer to section 6.7), it must calculate the quantities *I*, *D*, *U* and *K* for one or more subsets of the insurer's product portfolio.

11.2.1 Insurance risk requirement (*I*)

The insurance risk requirement (*I*) is calculated by aggregating the capital requirement for the insurance risks[185] of the same region using a correlation matrix. The formula for *I* is as follows:

$$I = \sqrt{\sum_{i,j=1}^{9\cancel{7}} \rho_{ij} \times (IR_i - 0.5 \times LT_i) \times (IR_j - 0.5 \times LT_j)}$$

[185] Components of insurance risk include the segregated fund guarantee insurance risk components specified in section 7.2.3.

where:

- IR_i is the required capital for insurance risk i, before credit for participating and adjustable products;
- LT_i is the sum of the level and trend components for insurance risk i ($LT_{9\cancel{7}}$, the level and trend component for expense risk, and $LT_{7\text{-}8}$, the lapse supported and lapse sensitive segregated fund guarantee risk components, are ~~is~~ assumed to be zero);
- ρ_{ij} is the correlation factor between insurance risks *i* and *j*, as defined in the following correlation matrix:

i \ *j*	**Mort.**	**Long.**	**Morb. – incid.**	**Morb. – term.**	**Lapse – sens.**	**Lapse – supp.**	**Lapse – sens. SFG**	**Lapse – supp. SFG**	**Exp.**
Mortality	1								
Longevity	-0.25	1							
Morbidity – incidence	0.5	-0.25	1						
Morbidity – termination	-0.25	0.5	0.25	1					
Lapse – lapse-sensitive business	0.25	0.25	0.5	0.5	1				
Lapse – lapse-supported business	0	-0.25	0	-0.25	-0.5	1			
Lapse – lapse-sensitive SFG	0.25	0.25	0.5	0.5	1	-0.5	1		
Lapse – lapse-supported SFG	0	-0.25	0	-0.25	-0.5	1	-0.25	1	
Expenses	0.5	0.25	0.5	0.5	0.5	-0.25	0.5	-0.25	1

However, the *I* cannot be lower than the highest value of the expression $IR_i - 0.5 \times LT_i$ for all insurance *i* risks in the matrix.

11.2.2 Diversified risk requirement (*D*)

The unadjusted diversified requirement (*D*) for all risks is calculated by aggregating the sum of requirements for a region's credit risks and market risks with the insurance risk requirement for the same region. The correlation between the two classes of risks is deemed to be 50%. Consequently, the formula for *D* is the following:

$$D = \sqrt{A^2 + AI + I^2}$$

where:

- A is the sum of the requirements for credit risk (for both on- and off-balance sheet items) and market risk;
- *I* is the insurance risk requirement defined in the previous section.

11.2.3 Undiversified risk requirement (*U*)

The undiversified risk requirement (*U*) is calculated for each geographic region using the following formula:

$$U = \sum_{i=1}^{9\cancel{7}} IR_i + A$$

where:

IR_i and *A* are defined respectively in sections 11.2.1 and 11.2.2.

11.2.4 Adjusted diversified requirement (*K*)

After the diversified risk requirements (*D*) and undiversified risk requirements (*U*) have been computed, the adjusted diversified requirement (*K*) for insurance, credit and market risk is calculated as:

$$K = \frac{4}{5}\,U + \frac{1}{10}\,LT + max\left(\frac{14\,U - 7\,LT - 62\,D}{60} + \frac{2D^2}{2U - \,LT}; 0\right)$$

where:

$$LT = \sum_{i=1}^{9\cancel{7}} LT_i$$

Example: Calculation of the adjusted diversified requirement

Suppose that the insurance risk capital requirements for a non-participating block of business of a geographic region, including the corresponding components of level and trend risks, are as follows:

Insurance Risk	**Capital Requirement (IR_i)**	**Level and Trend Risk Components (LT_i)**
Mortality	1,000,000	700,000
Longevity	3,000	3,000
Morbidity – incidence	50,000	10,000
Morbidity – termination	2,500	1,000
Lapse – lapse-sensitive business	300,000	150,000
Lapse – lapse-supported business	100,000	40,000
Lapse – lapse-sensitive SFG	200,000	0
Lapse – lapse-supported SFG	400,000	0
Expenses	10,000	0
Total	**2,065,500~~1,465,500~~**	**904,000**

Suppose also that the block's capital requirements for other risks are as follows:

Risk	**Capital Requirement**
Credit risk	200,000
Market risk	75,000

To calculate the total requirement *K* for the block, the amounts $\boldsymbol{IR_i - 0.5 \times LT_i}$ for each insurance risk must first be calculated. The amounts obtained are as follows:

Insurance Risk	$\boldsymbol{IR_i - 0.5 \times LT_i}$
Mortality	650,000
Longevity	1,500
Morbidity – incidence	45,000

Insurance Risk	$IR_i - 0.5 \times LT_i$
Morbidity – termination	2,000
Lapse – lapse-sensitive business	225,000
Lapse – lapse-supported business	80,000
Lapse – lapse-sensitive SFG	200,000
Lapse – lapse-supported SFG	400,000
Expenses	10,000

The requirement for insurance risk *I* is calculated by aggregating the above components using the correlation matrix specified in section 11.2.1 and the following formula:

$I = \sqrt{\sum_{i,j=1}^{9\cancel{7}} \rho_{ij \times (IR_i - 0.5 \times LT_i) \times (IR_j - 0.5 \times LT_j)}}$ = 930,693~~764,421~~

Since the highest value of the amount $\boldsymbol{IR_i - 0.5 \times LT_i}$ is 650,000, the value of *I* is not increased to account for this minimum.

The value of *A* is obtained by summing the capital requirement amounts for credit and market risk, as follows:

$A = 200{,}000 + 75{,}000$ = 275,000

after which it is possible to calculate the diversified risk requirement *D* using the following formula:

$D = \sqrt{A^2 + AI + I^2}$ = 1,094,420~~932,834~~

The undiversified risk requirement *U* is obtained using the following formula:

$U = \sum_{i=1}^{9\cancel{7}} IR_i + A$ = 2,065,500 + 275,000 = 2,340,500
~~1,465,500 + 275,000 = 1,740,500~~

The final amount required to calculate *K* is *LT*, obtained using the following formula:

$LT = \sum_{i=1}^{9\cancel{7}} LT_i$ = 904,000

Using the known values of *D*, *U* and *LT*, the final adjusted diversified requirement *K* is calculated as:

$$K = \frac{4}{5}\,U + \frac{1}{10}\,LT + max\left(\frac{14\,U - 7\,LT - 62\,D}{60} + \frac{2D^2}{2U - \;LT};0\right)$$

= 1,962,800~~1,494,864~~

11.3 Base solvency buffer

The Base Solvency Buffer is obtained by the following formula:

$$\gamma \times \left(\sum_{region} K_{non\,par} + \sum_{i}(K_{par\,i} - CP_i) - \sum_{j} CA_j - CG + SFGim + SFGso\cancel{SFG} + OR + TM\right)$$

where:

- γ is the factor defined in section 1.1.5;
- $K_{non\ par}$ is the requirement K calculated for the non-participating block in each geographic region.
- The second sum comprises all qualifying participating blocks, and the third sum comprises all qualifying adjustable products.
- $K_{par\ i}$ is the standalone adjusted diversified requirement *K* for qualifying block *i*.
- CP_i is the par credit for participating block *i*, calculated under section 9.1.2.
- CA_j is the adjustable credit for adjustable product *j*, calculated under section 9.2.2.
- *CG* is the total of all credits for policyholder deposits and group insurance under sections 6.7.2 and 6.7.3.
- SFG_{im} is the capital requirement for segregated fund guarantee risk under the internal model approach (refer to section 7.7.8.7).
- SFG_{so} is the capital requirement for segregated fund guarantee risk under the simplified option (refer to section 7.4).
- ~~*SFG* is the capital requirement for segregated fund guarantee risk.~~
- *OR* is the capital requirement for operational risk.
- *TM* is the amount of required capital for the transition measures relative to the standard approach, including the simplified option, as described in section 7.5.3.