Guideline

Title	Life Insurance Capital Adequacy Test (2023) - Chapter 5 Market Risk
Category	Capital Adequacy Requirements
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Market risk arises from potential changes 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 in the LICAT includes interest rate, equity, real estate, and currency risks. 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 (q.v. Chapter 9).

Risks associated with segregated fund guarantees are covered in Chapter 7. Consequently, with the exception of the requirements for hedges in sections 5.2.3 and 5.2.4, an insurer's liabilities for segregated fund 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 of this chapter.

Sections 5.2, 5.3 and 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 due and accrued on assets subject to market risk is reported with, and receives the same factor as, the asset to which it relates.

A commitment to purchase a traded asset that is subject to market risk should 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 applicable credit conversion factor from section 4.4, the applicable market risk factor, and the amount of the commitment.

Assets and liabilities held in composite insurance subsidiaries are subject to the market risk requirements of this guideline.

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 potential changes in interest rates on the values of interest-sensitive assets and liabilities whose cash flows may be mismatched.

A projected cash flow methodology 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. Required capital for interest rate risk is calculated for each geographic region (Canada, the United States, the United Kingdom, Europe other than the United Kingdom, Japan, and other locations).

5.1.1 Initial scenario discount rates

Initial Scenario Discount Rates are defined in terms of risk-free interest rates plus a spread, with the sum grading to 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 United Kingdom, and Japan. The Initial Scenario

Discount Rates for other locations are the same as for the United States.

Risk-free interest rates are based on the following:

- Canada – the spot rates for Government of Canada bonds;
- The United States – the spot rates for applicable United States treasuries;
- The United Kingdom – the spot rates for United Kingdom sovereign benchmark bonds;
- Europe other than the United Kingdom – the spot rates for Government of Germany bonds; and
- 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 United Kingdom and for Japan are 2.8% and 1.0%, respectively.

The risk-free spot interest rates used in the initial scenario are determined as follows:

1. For cash flows from year 0 to year 20, the interest rate is the published risk-free spot rate;
2. For cash flows between years 20 and 70, the interest rate is linearly interpolated between the 20-year spot discount rate and the UIR;
3. For cash flows at year 70 and beyond, the interest rate is the UIR.

The spread is defined as follows:

1. From year 0 to year 20, the spread is 90% of the corresponding market average spread;
2. 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;
3. At year 70 and beyond, the spread is 80 basis points.

The market average spreads between years 0 and 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, should be used consistently from period to period, and should be disclosed in the LICAT memorandum. In order 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 entire investment-grade corporate bond universe in the jurisdiction that it covers (e.g., the rating distribution 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[1] index provider.

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

Step 1: Gather Par[2] Risk-Free Yields

Insurers would first collect par risk-free (semi-annual) yields. These yields are available from several sources, including but not limited to the following:

- *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 (for maturities of one-year or less): http://www.bankofcanada.ca/rates/interest-rates/t-bill-yields/selected-treasury-bill-yields-10-year-lookup/
  - Treasury bonds (for maturities greater than one-year): http://www.bankofcanada.ca/rates/interest-rates/lookup-bond-yields/

The series codes for the relevant maturities are:

Series Codes by Maturity Duration

Duration	Series
3 month	V39065
6 month	V39066
1 year	V39067
2 year	V39051
3 year	V39052
5 year	V39053
7 year	V39054
10 year	V39055

- *Yields for Canadian treasuries with maturities of over 10 years:* One source where these rates can be found is http://www.investing.com/rates-bonds/canada-20-year-bond-yield-historical-data. For example, the rate for December 31, 20xx can be found under the "Price" column for "Dec xx".
- *Yields for US treasuries*: One source where these yields can 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 LICAT geographic regions under the following curve codes:

Curve Codes and Names by Geographic Region

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 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”;
- Setting the curve date to the appropriate quarter end date;
- Retrieving the “Mid-YTM (yield-to-maturity)” by hovering over each maturity in the graphed curve or by exporting the data into Excel.

Although yields obtained above are tied to a specific currency, it is assumed that they are appropriate for use 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):

$$PV\ factor,\ t\ =\ \begin{cases} 1\ \Big/\ \left(1+\frac{1}{2}\ Yield\ par\ semi,\ t\right), & if\ t=\frac{1}{2} \\ 1\ \Big/\ \left(1+Yield\ zero\ coupon,\ t\right)^{t}, & if\ t>\frac{1}{2} \end{cases}$$

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

$$Yield\ zero\ coupon,\ t\ =\ 100\times\left(1+Yield\ par\ semi,\ t\ \frac{1}{2}\right)\Big/ PV\ last\ payment,\ t\ ^{\frac{1}{t}}-1$$

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

free spot rate curve.

Market spreads

Step 1: Select an Investment-Grade Corporate Bond Index

The following are examples of indices that could be found to meet the criteria for recognition as an investment-grade corporate bond index:

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 Corporate Bond Index
Europe other than UK	• S&P Eurozone Investment Grade Corporate Bond Index • Bloomberg EUR Investment Grade European Corporate Bond Index (Bloomberg curve code: BS78)

Step 2: Gather Par Investment-Grade Corporate Bond Yields

Similar to the process described above for gathering par risk-free yields, investment-grade corporate bond yields should be collected from the appropriate source for the relevant maturities (i.e. 3 months, 6 months, 1 year, 2 years, etc.). Insurers would use as many maturities as are available, and would only use fewer if constrained by the data source.

As an example, United States corporate bond par yields could be obtained in Bloomberg by:

- Entering "GC BS76";

- Setting the curve date to the appropriate quarter-end date;
- Retrieving the "Mid-YTM" by hovering over each maturity in the graphed 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 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 an 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 using Bloomberg's curve building tool and the following procedures:

- 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 fit 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 graphed curve or by exporting the data into Excel.

Other appropriate filters could apply 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 will distort the corporate bond curve. They would therefore 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 by which par yields could be extracted from an index. An 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). In accordance with this guideline, the methodology used would be consistent from period-to-period and disclosed in the LICAT memorandum.

Step 3: Convert Par Investment-Grade Corporate Bond Yields to Spot Rates

The formulas and considerations specified in Step 2 of *Risk-free spot rates* would be used to perform this conversion.

5.1.2 Stress scenarios

The present value of all asset and liability cash flows is determined under four prescribed stress scenarios by discounting them to time zero using stressed discount rates. 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 that determines required capital may vary by geographic region.

5.1.2.1 Stress scenario specifications

For each stress scenario, the annualized stressed discount rates are calculated as follows:

1. For discount rates prior to and including year 20, the initial scenario discount rates are adjusted by calculating:
    a. an adjustment to the 90-day discount rate (T or S),
    b. an adjustment to the 20-year discount rate (B or C), and
    c. adjustments for all periods in between, by applying linear interpolation to the coefficients used to calculate the adjustments a. and b. above.
2. Between years 20 and 70, stressed discount rates are determined by linearly interpolating between the adjusted 20-year discount rate and the adjusted ultimate discount rate, determined in the next step.
3. For year 70 and beyond, an adjustment (L) is made to the ultimate discount rate.

The four stress scenarios are described below, relative to the initial scenario:

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 r floored at 0.5%:

$$T \pm = 0.0049 \pm 0.139 \max(r_{0.25}, 0.005)$$

$$S \pm = 0.0039 \pm 0.111 \max r_{0.25}, 0.005$$

$$B \pm = 0.0028 \pm 0.102 \max(r_{20}, 0.005)$$

$$C \pm = 0.0023 \pm 0.007 \max r_{20}, 0.005$$

where $r_{0.25}$ is the current 90-day risk-free interest rate, r_{20} is the current 20-year risk-free interest, and all interest rates are expressed as decimals (for example five percent corresponds to 0.05).

The interpolated interest rate shocks under the four stress scenarios can be expressed as:

1. $-(0.139468 - 0.001873t)\max(r_t, 0.005) + (0.00492658 - 0.00010633t)$
2. $(0.112699 - 0.005997t)\max(r_t, 0.005) + (0.00394084 - 0.00008336t)$
3. $(0.139468 - 0.001873t)\max(r_t, 0.005) + (0.00492658 - 0.00010633t)$
4. $-(0.112699 - 0.005997t)\max(r_t, 0.005) + (0.00394084 - 0.00008336t)$

where r_t is the time t risk-free interest rate, and t is between 90 days and 20 years.

Initial and stress scenario interest 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 United Kingdom, and 20 basis points for Japan.

5.1.2.2 Determination of the most adverse scenario3

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 should be calculated as:

$$LSS = IRR_{\text{non-par gross}} + \sum_i \max\left(IRR_{i\ \text{par gross}} - C_{i\ \text{stress}}, IRR_{i\ \text{par npt gross}}, 0\right)$$

where:

- $IRR_{\text{non-par gross}}$ is the gross interest rate risk requirement for non-participating business within the region under the stress scenario, equal to the decrease (or the 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 (q.v. Chapter 9).
- $IRR_{i\ \text{par gross}}$ is the gross interest rate risk requirement for a participating block within the region under the stress scenario, equal to the decrease (or the 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.
- $IRR_{i\ \text{par npt gross}}$ is the gross interest rate risk requirement for any of a participating block's assets and liabilities whose interest rate risk is not passed through to policyholders (e.g. risk adjustments, contractual service margins, policy loans, amounts on deposit, guaranteed benefits/riders that are contractually excluded from pass through, equity in stock company participating account, non-stock company residual interest reported as equity), equal to the decrease (or negative of the increase) in the net present value these elements' cash flows from the initial scenario.
- If losses arising from interest rate risk are recoverable through dividend reductions, $C_{i\ \text{stress}}$ is 75% of the present value of restated dividend cash flows for the block used in the interest rate risk calculation (q.v. 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 $C_{i\ \text{stress}}$ is 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:

$$\max\left(LSS_{\text{Canada}}, 0\right) + \max\left(LSS_{\text{US}}, 0\right)$$

is greatest.

5.1.2.3 Interest rate risk requirements

Once an insurer has determined the most adverse scenario for each geographic region, the interest rate risk requirement for non-participating business within the region is equal to:

$$\text{IRR non-par} = \max(\text{IRR non-par gross}, 0)$$

under this scenario.

The interest rate risk requirement for each block of participating business within the region, before reflecting the effect of participating dividends, is:

$$\overline{\text{IRR i par}} = \frac{1}{6}\sum_{q=1}^{6} \text{IRR i par in quarter q}$$

which 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 $IRR_{i\ par}$ is defined by:

$$\text{IRR i par} = \max(\text{IRR i par gross}, 0)$$

under the most adverse scenario in that quarter.[4]

The interest rate risk requirement for the non-pass through portion of a block of participating business, which is used to calculate the par requirement floor (q.v. section 9.1.2) is

$$\overline{\text{IRR i par npt}} = \frac{1}{6}\sum_{q=1}^{6} \text{IRR i par npt in quarter q}$$

which represents the six-quarter rolling average of $IRR_{i\ \text{par npt}}$ taken over the current quarter and the previous five quarters. For each quarter, the quantity $IRR_{i\ \text{par npt}}$ is defined by:

$$\text{IRR i par npt} = \max(\text{IRR i par npt gross}, 0)$$

under the most adverse scenario in that quarter.

In calculating the averages above:

1. No averaging should be used for a new participating block in the first quarter that it is reported. For the second quarter, all averaged quantities for the block should be calculated using half of the sum of the first quarter and second quarter amounts. For the third quarter, the averages are one third of the sum of the first, second, and third quarter amounts. The averaging should continue in this manner until the block is reported for six quarters.
2. Any participating block that is divested should be excluded completely from the LICAT calculation, and should not have a requirement reported for it.
3. If an entire participating block is coinsured by a reinsurer, the cedant should treat the transaction as a divesture, and the reinsurer should treat the assumed block as a new participating block. If only a portion of a participating block is coinsured, then:
    a. the cedant should reflect the change in the components of the smoothing calculation as if the reinsurance arrangement has been in place for the previous five quarters, and
    b. the reinsurer should treat the assumed portion as a new participating block, provided it had not assumed any portion of the block previously.

Although the same scenario is used for Canada and the United States, the interest rate risk requirements for these regions are calculated separately, under the assumption that gains in one region do not offset losses in the other.

The interest rate risk requirement for each participating block is used in the calculation of the standalone requirement for the block (q.v. section 11.2) and the participating credit for the block (q.v. section 9.1.2). The quantities C_{stress} used to determine the most adverse scenario must be consistent with the quantities $C_{adverse}$ and K_{floor} used to determine the participating credit for a block in section 9.1.2.

Example: Interest Rate Risk

The most adverse stress scenario for interest rate risk is determined based on the gain or loss in a geographic region's non-par block under each scenario ($IRR_{\text{non-par gross}}$), the gain or loss in the region's par blocks ($IRR_{\text{par gross}}$ and $IRR_{\text{par npt gross}}$), and the amount of dividends available to pass through any interest rate losses in the par

block (C_{stress}). The quantities $IRR_{non\text{-}par\ gross}$, $IRR_{par\ gross}$, and $IRR_{par\ npt\ gross}$ are the gross capital requirements for the non-par and par blocks without any floors. They will consequently be positive if there is a loss in the block under a scenario, and negative if there is a gain in the block under a scenario.

The premises underlying the scenario loss measure *LSS* 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 should not be counted if they can be passed onto policyholders via 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 under each scenario, since the terms max ($IRR_{par\ gross} - C_{stress}$, $IRR_{par\ npt\ gross}$, 0) will be zero in all scenarios.

For example, if there is only one par block in a geographic region with no non-pass through elements, and the values of $IRR_{non\text{-}par\ gross}$, $IRR_{par\ gross}$ and C_{stress} under each scenario are as follows:

Scenario	$IRR_{non\text{-}par\ gross}$	$IRR_{par\ gross}$	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

then the most adverse stress scenario is scenario 2. Based on this scenario, the insurer will use a value of $IRR_{non\text{-}par}$ = 1,400 for the interest rate risk requirement in the calculation of $K_{non\text{-}par}$, a value of IRR_{par} = 0 for the current quarter's interest rate risk in the calculation of $\overline{IRR}_{par}$ (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 amount of par dividends available 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, if C_{stress}

under the scenarios changes as follows:

Scenario	$IRR_{\text{non-par gross}}$	$IRR_{\text{par gross}}$	C_{stress}	Scenario Loss Measure
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

then the most adverse stress scenario is scenario 3. Based on this scenario, the insurer will use a value of $IRR_{\text{non-par}} = 0$ for the interest rate risk requirement in the calculation of $K_{\text{non-par}}$, a value of $IRR_{\text{par}} = 2{,}500$ for the current quarter's interest rate risk in the calculation of $\overline{\text{IRR}}_{\text{par}}$ for the par block, and a value of $C_{\text{adverse}} = 80$ in the calculation of the credit for the par block. However, in this situation it will likely be to the insurer's advantage to treat the par block as non-participating for interest rate risk. If it does so, it will use an interest rate risk requirement of $IRR_{\text{non-par}} = 1{,}900$ in the calculation of $K_{\text{non-par}}$, and an interest rate risk requirement of $IRR_{\text{par}} = 0$ for the current quarter's interest rate risk in the calculation of $\overline{\text{IRR}}_{\text{par}}$ for the block, with C_{adverse} still equal to 80.

Note that if an insurer has dividends available but uses a value of 0 for C_{stress} in all scenarios to determine the most adverse stress scenario because it is unable to pass through interest rate risk, it should use 100% of the par interest rate risk requirement $\overline{\text{IRR}}_{\text{par}}$ in the calculation of K_{floor}.

5.1.3 Projection of cash flows[3]

Cash flows are determined at the reporting date, and are projected net of all reinsurance (i.e., if all or a portion of an insurance liability corresponds to an on-balance sheet reinsurance contract held, then the corresponding liability and asset are excluded from projected cash flows)[5], [6]. No reinvestment of any asset cash flows should be assumed. Projected cash flows should reflect neither the impact of Stage 1 and Stage 2 loss provisions reported under IFRS 9 (i.e., asset cash flows should not be reduced by any amount on account of these provisions), nor the impact of provisions for the risk of reinsurer non-performance under IFRS 17. Liability cash flows should correspond to IFRS fulfillment 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 should be changed to be consistent with the interest rate scenario.

For participating, adjustable, index-linked risk pass through (RPT) and non-interest sensitive products, the same liability cash flows are used for all interest scenarios. For participating products, restated dividend cash flows should be projected using the methodology described in section 5.1.3.3, and all other cash flows should be projected based on fulfillment cash flows. Adjustments to cash flows should not be made for anticipated reductions or increases in dividends that may result from increases or decreases in interest rates under each scenario. A reduction in required capital for the potential risk-mitigating effect of dividend reductions is calculated separately for participating and adjustable products (q.v. Chapter 9).

The treatment for specific asset and liability cash flows is described next.

5.1.3.1 Assets having fixed cash flows

The interest rate risk cash flows projected for an asset having fixed cash flows should not deviate from the underlying asset cash flows. A fixed cash flow is one that is contractually guaranteed for a definite amount, and not contingent on future market prices or interest rates. A cash flow is considered contractually guaranteed if it is payable regardless of the condition of the obligor (for example, it is not contingent on the obligor meeting its target level of profitability), and if failure to pay the guaranteed cash flow would be considered an event of default. All asset cash flows should 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 should be projected as part of liabilities. If a risk adjustment has no cash flows associated with it, then the risk adjustment should be projected as a cash flow at time zero, and should 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 should 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 LICAT Initial Scenario Discount Rates. In other words, the net present value of assets over liabilities discounted using Initial Scenario Discount Rates should be equal to the Participating Block Surplus. Participating Block Surplus includes mutual 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 assumed to be distributed in the form of paid-up additions, the same portion of restated dividends should be assumed to be distributed as paid-up additions[3].

In re-projecting the dividend scale, insurers should only include asset and liability cash flows whose returns are passed through to policyholders through dividends. For example, if investment returns on Participating Block Surplus, risk adjustments, policy loans, and amounts on deposit are not passed through to policyholders, these cash flows should be excluded. If the assets to be excluded are comingled with other par assets, the insurer should 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).

The restated dividend cash flows projected for the initial scenario remain unchanged under all stress scenarios.

Example: Participating liability dividend restatement

An insurer has a block of participating policies 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 policies, calculating a Participating Block Surplus of $445 in (B). Asset cash flows are projected according to LICAT assumptions under the initial scenario, producing an asset valuation different from what is on the financial statements (C). The surplus resulting from these cash flows and LICAT Initial Scenario Discount Rates is $338 (D), which is different from the financial statement surplus. Under LICAT, 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 LICAT Initial Scenario Discount Rates generate a total net present value (H) equal to the initially calculated Participating Block Surplus of $445 (B).

Year	Financial Statement Discount Rates	LICAT 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%

Time	Total Cash Flows for Participating Policies									
	(A)					(C)				
	Balance Sheet					LICAT (*Before* 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	
Time 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

Time	Total Net Present Value of Cash Flows									
	(B)					(D)				
	Balance Sheet					LICAT (*Before* 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	
Time 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

Time	Total Cash Flows for Participating Policies									
	(E)					(G)				
	LICAT (*Iterative* Adjustment to dividend scale) (8% dividend scale)					LICAT (*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	
Time 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

Time	Total Net Present Value of Cash Flows									
	(F)					(H)				
	LICAT (*Iterative* Adjustment to dividend scale) (8% dividend scale)					LICAT (*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	
Time 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 are treated in the same manner as assets having fixed cash flows. Projected cash flows under the initial and stress scenarios should include all expected dividends and proceeds at maturity.

5.1.3.5 Real estate

Insurers should include as a time zero cash flow the balance sheet value of the real estate less the present value of fixed cash flows calculated using Initial Scenario Discount Rates. Where no fixed cash flows are projected, the real estate's entire balance sheet value should be included as a cash flow at time zero. The cash flow amount at time zero remains the same under all interest rate scenarios.

Fixed cash flows on leases in force should be included in the period in which they are contractually expected to be received. No contract or lease renewals should be assumed. Prepaid rent should be treated as a time zero cash flow. The cash flows should 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 are included in the present value of lease cash flows.

5.1.3.6 Floating rate investments

The market value of a floating rate bond, note, or other investment should be reported as a cash flow at time zero.

5.1.3.7 Bonds and preferred shares with embedded options

The cash flows associated with a callable bond or preferred share under the initial and stress scenarios should be projected to the redemption date (i.e., one of the 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 should 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 callable and puttable, the cash flows under the initial and stress scenarios are projected to the date determined by the following algorithm: if the dates in chronological order on which the investment can be put or called are $t_1, \ldots, t_N$, and t_{N+1} is the investment's final maturity date, then for $1 \le i \le N+1$, the quantity PV_i is defined to be the present value at time zero of the investment's cash flows under the scenario if it is called, put, or matures at time t_i. The quantities W_i are solved backwards recursively from:

$$W_{N+1} = PV_{N+1}$$

$$W_i = \begin{cases} \min(PV_i, W_{i+1}) & \text{if } t_i \text{ is a call date} \\ \max(PV_i, W_{i+1}) & \text{if } t_i \text{ is a put date} \end{cases}$$

The cash flows for the investment under the scenario are projected to the earliest time t_i for which $W_1 = PV_i$. If the investment can be called or put over a continuous time period, the point t_i for the period should be defined as 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 shares may be assumed to

mature at any time after which there is no material difference among any of the scenario present values PV_i.

Example: Redeemable retractable preferred share

A Canadian perpetual preferred share with par value 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 90% of the market average spread at all maturities between 1 and 20 years is 80 bps. 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 that 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 exercisable first).

Since all options in years 10 and later are calls, the date to 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 realize 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 the scenarios are as follows:

	t_i	Initial scenario	Scenario1	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 the W_i are then:

	t_i	Initial scenario	Scenario1	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 at the end of year 7, in scenarios 1 and 4 it is valued assuming that it will be redeemed at the end of year 5, in scenario 2 it is valued assuming that it will be retracted at the end of year 5, and in scenario 3 it is valued assuming that it will be

retracted 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 NFI investments as they are treated separately within the interest rate risk requirement.

In order to approximate the non-interest sensitive component of NFI investment's dividend stream, 33% of the investment's value[7] is projected as cash flows occurring beyond time zero, while the remaining 67% of the investment's value is projected as a time zero cash flow. At all integer times $t \geq 1$, a cash flow of:

$$4.1 \times 0.89^{t} D_t \%$$

of the investment's value is projected as a cash flow occurring at time t, where D_t is the initial scenario discount factor from time t to time zero.

5.1.3.9 Pooled funds – index-linked risk pass-through products

If the index-linked product risk component is used (q.v. section 5.5), liability cash flows should 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 component is not used, the liability cash flows should be the same as those used in the financial statement valuation. If minimum interest guarantees do not apply, the account value should 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 should 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 policy is linked to a bond fund but does not vary directly with the fund's value, the cash flows of the fund should be projected so that the value of the fund changes appropriately in response to the

change in interest rates under each scenario.

For mutual or pooled funds holding assets that do not have fixed cash flows (e.g., equities and real estate), insurers should treat the funds according to the type of assets that the funds hold. For example, equity funds should be treated as specified in section 5.1.3.8, and real estate funds should 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 should be included as a cash flow at time zero.

5.1.3.11 Securitized assets

For securitized assets whose cash flows are fixed, insurers should project the underlying fixed cash flows. For securitized assets whose cash flows are not fixed, the balance sheet value should be projected as a cash flow at time zero.

5.1.3.12 Items included in Available Capital

Items that qualify for recognition in Available Capital under Chapter 2 should be excluded from the projection of liability cash flows. Such items include obligations 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 (qq.v. 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:

1. All cash flows to be paid or received under any fixed legs of the swap.
2. Cash flows at the maturity of the swap equal to the notional amounts of any fixed legs of the swap, unless these have already been projected in 1). If an insurer makes payments under a fixed leg of the swap, the notional amount should be projected as a cash outflow at maturity, and if the insurer receives payments, the notional amount should be projected as a cash inflow.
3. 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 should be projected as a cash outflow at

time zero, and if the insurer receives floating payments, the notional amount should be projected as a cash inflow.

5.1.3.14 Other interest rate derivatives

Interest rate derivatives other than swaps should 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 should 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 then asset cash flows are updated in each interest rate scenario.

5.1.3.16 Policy loans

Cash flows for policy loans with interest rates that are fixed or subject to guaranteed maximums should be projected using mortality and lapse assumptions that are consistent with those used in the valuation of the related policies. Policy loan amounts for variable rate policy loans that are not subject to guaranteed maximums should be projected as time zero cash flows.

5.1.3.17 Investment income taxes

Projected cash flows should 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 (e.g. for lapses) that vary with interest rates to project insurance cash flows for the financial statement valuation, the liability cash flows projected in the interest rate initial scenario and stress scenarios should reflect these assumptions (i.e., the assumptions that are set dynamically should vary in each

interest rate scenario to be consistent with the scenario).

5.1.3.19 Cash flows tied to inflation

Cash flows projected for expenses, and for benefit payments that are subject to cost-of-living adjustments should reflect the impact of inflation assumptions that vary consistently with each scenario. Inflation rates should bear the same relation to risk-free interest rates as assumed for the financial statement valuation. For example, if an insurer generates inflation rates dynamically for the financial statement valuation, the same generator should be used to derive 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 (q.v. section 5.2.3), including non-fixed income assets, should be the same as those of the replicated assets.

5.1.3.21 Other investment contracts

The projection of cash flows for liabilities that are classified as investment contracts in the financial statements and that are not covered in a previous section depends on whether the contract holder has an option to redeem the investment. If the contract is not redeemable, the insurer should project the same cash flows as those used for the financial statement valuation. If the contract is redeemable at the option the holder, the cash flows under the initial and stress scenarios should be projected 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 should be treated as a time zero cash flow.

5.1.3.22 Universal life

For most products, only contractual cash flows are projected, without assuming reinvestments. Universal life (UL) is an exception as the contract continues after the end of any interest guarantee period inside 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, policy charges and benefits and expenses. Reinvestment assumptions and credited rates should vary appropriately with the scenario that is being tested,

including the initial scenario.

Insurers should use Initial and stress Scenario Discount Rates (qq.v. sections 5.1.1 and 5.1.2) for discounting UL cash flows. The relation between the restated credited rates for LICAT purposes and the LICAT discount rates under each scenario should 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 should be included with the cash flows of other index-linked RPT products (q.v. section 5.5). If matching assets are not held, then the cash flows should be projected using assumptions that are consistent with those used in the financial statement valuation and then adjusted for the scenario being tested.

5.1.3.23 Interest rate guarantees

Where a non-participating contract has minimum interest rate guarantees (e.g. universal life), all guarantee payments should 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) is excluded from projected cash flows.

Costs of guarantees for participating products and adjustable products other than universal life should be excluded from projected cash flows.

5.1.3.24 Property and casualty insurance liabilities

If an insurer has a composite subsidiary that writes both life insurance and property and casualty (P&C) insurance, it should project cash flows for all interest rate sensitive P&C liabilities, as defined in the MCT Guideline, under all scenarios.

5.2 Equity risk

Equity risk is the risk of economic loss due to potential changes in the prices of equity investments and their derivatives. This includes both the systematic and specific components of equity price fluctuation.

5.2.1 Common equity

Required capital for all investments classified as common equities (including equity index securities, managed equity portfolios, income trusts, limited partnerships, and interests in joint ventures) is 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 (i.e., to 40% or 50%) if:

a. the equities are not listed on a recognized public exchange (e.g. private equity), and/or
b. the insurer's ownership interest in the equities constitutes a substantial investment[8] without control.

Factor	Common Equity
35%	Developed markets, listed and non-substantial
40%	Developed markets, non-listed and/or substantial
45%	Other markets, listed and non-substantial
50%	Other markets, non-listed and/or substantial

If an increased factor is used for an equity holding that is a substantial investment, the amount to which the factor is applied should be net of the amount of associated goodwill and intangible assets deducted from Gross Tier 1 capital in 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 preferred shares depends on their rating category, and is calculated by applying the factors shown in the table below to their market values:

Factor	Preferred Share Rating Category
3%	P1
5%	P2
10%	P3
20%	P4
Common equity risk factor	P5 and unrated

For investments in capital instruments issued by domestic 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 either:
    a. the issuer's senior unsecured issuer rating, or
    b. if the issuer does not have a senior unsecured issuer rating, the highest rating assigned to any of the issuer's outstanding unsecured debt obligations
2. The credit risk factor from 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 individual agency ratings, and to section 3.1.1 for requirements related to the use of ratings.

5.2.3 Assets replicated synthetically and derivatives

This section describes required capital 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. Insurers should 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.

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 under section 5.5.

Where an insurer has entered into transactions (including short equity positions and purchased put options) that:

1. are intended to hedge the insurer's segregated fund guarantee risk;
2. are not applied as offsets or hedges against other positions of the insurer to reduce required capital; and
3. have not been undertaken as part of an OSFI-approved hedging program,

required capital for the hedges may be reduced to a minimum of zero if the insurer is able to demonstrate, to the satisfaction of the Superintendent, that losses on the hedges under particular scenarios would be offset by decreases in its segregated fund guarantee liabilities. Insurers should contact OSFI for details on the calculation for determining the capital requirement for these hedges.

The requirements in this section are distinct from the requirements for counterparty credit risk arising from off-balance sheet transactions. Transactions referred to in this section remain subject to the requirements for potential replacement cost as described in section 3.1 and Chapter 4.

5.2.3.1 Short positions in equities

Required capital 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 Future, forwards and swaps

Required capital for a futures or forward position in any security or index is the same as that for the equivalent spot position, and is reported as if the position were current. Required capital for a swap is the same as that for the series of future or forward transactions that replicates the swap.

Examples: Futures and Swaps

1) An insurer has entered into a futures contract to purchase equity securities on a future date. The insurer reports 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 inception. The index of equities is currently worth $110. The insurer reports 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 following describes the methodology used to determine the required capital for both equity options that have been purchased and options that have been sold. This methodology may not be applied to equity options embedded in products sold to policyholders. The market risk required capital for policies containing an equity option component is calculated using the methodologies for index-linked RPT products (q.v. section 5.5) or segregated fund guarantees (q.v. Chapter 7), as appropriate.

Required capital for an option (or a combination of options in exactly 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 the financial statements. The first dimension of the matrix requires an insurer to evaluate the price of the option position over a range within the corresponding equity risk charge above and below the current value of the underlying stock or index, with at least seven observations (including the current observation) used to divide the range into equally spaced intervals. 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 this method and the precise manner in which the analysis is undertaken must be documented and made available to OSFI upon request[9].

As an alternative to constructing a scenario matrix for a purchased option, an insurer may deduct 100% of the carrying amount of the option from its Tier 1 Available Capital.

Example: Options on Equities

An insurer has sold a call option on a publicly listed Canadian stock, with the stock currently having a market value of $100 and volatility of 20%. The first dimension of the matrix ranges from $65 to $135, divided into six intervals of $11.66 each, and the second dimension assumes that volatility stays at 20%, increases to 25% (= 20% + 25% of 20%) or decreases to 15% (=20% - 25% of 20%). If the change in the value of the insurer's option position under the various market scenarios is as below, then the required capital for the option is $25.83.

Gain (loss) due to change in option value	*Stock Price* $65.00	$76.66	$88.33	(current) $100.00	$111.66	$123.33	$135.00
Volatility **15%**	$10.36	$9.65	$7.11	$1.86	($5.78)	($14.85)	($24.54)
(current) **20%**	$10.01	$8.59	$5.36	$0	($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 is 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 is classified as a debt exposure subject to a credit risk charge based on the rating and maturity of the note, and the residual amount is treated as an equity option.

Example: Equity-linked Notes

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 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 separate charges:

1. Bond component: 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 component: 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%, in which case the value of the option will decline by $1,118.92; this is the required capital for the option.
3. Counterparty credit risk (per Chapter 4): The exposure amount for the option is calculated under the current exposure method as:
    - Positive mark-to-market + Factor × Notional

      = $1,183.41 + 8% × $6,570

      = $1,709.01

Since the note has an A rating, the capital charge is 1% of the current exposure amount, or $17.09.

5.2.3.5 Convertible bonds

Required capital for a convertible bond is equal to the credit risk required capital 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 required capital for the embedded warrant is calculated using the scenario table method (q.v. 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 methodology assigns an explicit value to this component) or the change in value of the whole bond.

As a simplification, an 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

5.2.4.1 Offsetting long and short positions in equities

Equity positions backing indexed-linked policyholder liabilities for which a factor is calculated under section 5.5 may not be recognized as an offset to any other positions. Offsetting hedges of an equity position may only be recognized if the party providing the hedge is an eligible guarantor as defined in section 3.3.4.

Identical reference assets

Long and short positions in exactly the same underlying equity security or index may be considered to be offsetting so that an insurer is required to hold required capital only for the net position.

Closely correlated reference assets

Where underlying securities or indices in 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), insurers should apply the

correlation factor methodology described in section 5.5.2. The capital requirement for the combined position is equal to the capital factor F multiplied by the amount of the long position. If an 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.

5.2.4.2. Recognition of equity option hedges

Option hedges of an equity holding may only be recognized if the party providing the hedge is an eligible guarantor as defined in section 3.3.4. Option hedges of segregated fund guarantee risk may not be recognized in the segregated fund guarantee capital requirement without explicit approval from OSFI. The form and amount of any such recognition will be specified by OSFI at the time of approval. Option hedges of segregated fund guarantee risk that receive recognition in the segregated fund guarantee required capital cannot be applied towards other equity risks.

Identical reference assets

If an option's reference asset is exactly the same as that underlying an equity position held, an insurer may exclude the equity holding in calculating required capital for its equity exposures and instead consider the combined change in value of the equity position with the option in constructing the scenario table (q.v. 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 factor for offsetting long and short positions in the option's reference asset and the asset underlying the equity position is calculated as described in section 5.2.4.1. An insurer may then exclude the equity holding from its required capital for equity exposures and instead calculate the combined change in value of the equity position with the option in a scenario table (q.v. 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 required capital 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.

Example: Equity 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 indices 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 therefore constructs a scenario table in which the price of the main index ranges from 35% below to 35% above its current value, while the index underlying the call option ranges from 38% below to 32% above its current value, and the index underlying the put option ranges from 34% below to 36% above its current value. In the scenarios in the center 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.

The capital requirements for investment property that is leased, or holdings of property, plant and equipment that are leased, are 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, required capital is calculated for interest rate risk (section 5.1) and for credit risk (section 3.1.9.2). 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 as determined in section 5.1.3.5, 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.

5.3.2 Other property, plant and equipment

For owner-occupied property[10], required capital is calculated as the difference, if positive, between either:

1. the moving average market value immediately prior to conversion to IFRS net of subsequent depreciation, if the property was acquired before conversion to IFRS; or
2. the original acquisition cost net of subsequent depreciation, if the property was acquired after conversion to IFRS

and 70% of the property's fair value at the reporting date.

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 reporting date.

If the fair value of any property is not available then required capital is 30% of the property's balance sheet value. Required capital is determined on a property-by-property basis.

The capital charge for plant and equipment is 30% of the balance sheet value.

5.4 Mutual funds

The factor for investments in unleveraged mutual funds[11], exchange traded 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 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 mutual 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 or if the fund is in violation of the limits stated in the prospectus, 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[12] are treated as equity investments, and receive the equity risk factor corresponding to the fund under section 5.2.1.

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. All assets backing index-linked products must be segmented and included in the index-linked reporting form, and 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 policies, having the following characteristics:

1. Both assets and liabilities for these contracts are held in the general fund of the life insurer;
2. The policyholder is promised a particular return in the contract, based on an index, possibly subject to a floor. The following are examples of such returns:
    a. The same return as a specified public index. This includes, but is not limited to a public stock index, a bond index, or an index maintained by a financial institution.
    b. The same return as is earned by one of the insurer's segregated funds or mutual funds.
    c. The same return as is earned by another company's mutual funds; and
3. The insurer may invest in assets that are not the same as those that constitute the indices.

The following conditions must be adhered to:

1. All supporting assets are 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; and
4. Any transfers into or out of the asset subgroup are at market value.

5.5.2. Required capital

The factor F applicable to a particular subgroup of assets is given by:

$$F = 20 \times \left(C - B + B \times \left(2 - 2 A \right) \right)$$

where:

- A is the historical correlation between the returns credited to the policyholder funds and the returns on the subgroup's assets;
- B is the minimum of [standard deviation of asset returns, standard deviation of returns credited to policyholder funds]; and

- C is the maximum of [standard deviation of asset returns, standard deviation of returns credited to policyholder funds].

Note that a factor should be calculated for each asset subgroup.

The historical correlations and standard deviations should be calculated on a weekly basis, covering the previous 52-week period. The returns on asset subgroups should be measured as the increase in their market values net of policyholder cash flows.

The factor F for the previous 52 weeks is required to be calculated each quarter. The charge is then equal to the highest of the four factors calculated over the previous four quarters. This factor is applied to the fair value at quarter-end of the assets in the asset subgroup.

Instead of using policyholder funds in the calculations, an insurer may use cash surrender values or policy liabilities to measure the correlation. The basis used must be consistently applied in all periods.

Credit and market risk factors should be applied to:

1. Assets backing index-linked products that are not segmented into asset subgroups;
2. Assets backing index-linked products for which F cannot be calculated; and
3. Newly formed funds for the first three quarters. (Combined with the requirement to use the highest capital factor of the last four quarters' calculations, this implies that the requirement for newly formed funds will be that of the underlying assets for the first 18 months.)

As a simplification, insurers may choose to apply the common equity risk factor from section 5.2.1 corresponding to the assets listed above.

When a synthetic index investment strategy is used, there is some credit risk that is not borne directly by policyholders. This may include credit risk associated with fixed income securities and counterparty risk associated with derivatives that are purchased under the synthetic strategy. Insurers should hold credit risk required capital for these risks in addition to the index-linked requirements of this section.

For index-linked insurance policies that have a minimum death benefit guarantee, the requirement for segregated fund mortality guarantees should 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 greater of the sum of (i) the net open long positions or (ii) the net open short positions in each currency, plus the net open position in gold, whatever the sign[13]. A charge is then added for currency volatility, if applicable. The final step allocates the total currency risk requirement to participating and non-participating blocks in each geographic region.

5.6.1. Measuring the exposure in a single currency

The net open position for each individual currency (and gold) is calculated by summing:

1. 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 provisions for currency risk held within insurance contract liabilities. The net spot position is calculated net of all reinsurance (i.e., all reinsurance contracts held and all ceded insurance liabilities are excluded[14]);
2. the net forward position (i.e., all net amounts under forward foreign exchange transactions, including currency futures and the principal on currency swaps);
3. guarantees (and similar instruments) that are certain to be called and are likely to be irrecoverable;
4. net future income/expenses not yet accrued but already fully hedged by the insurer (q.v. section 5.6.5);
5. an offsetting short position[3] of up to 120% of the Base Solvency Buffer 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 Base Solvency Buffer for business denominated in a specific currency should 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
- all credits for within-risk diversification, between-risk diversification, and participating and adjustable products applicable to the aggregated requirements (q.v. chapters 9 and 11) taken into account;

6. 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
Others	400	200
Total	1,910	1,300

Currency	Solvency Buffer
USD	37.50
EUR	10.00
GBP	12.50
JPY	-
Others	15.00
Total	75.00

The *offset* is defined as a short position of up to 120% of the solvency buffer in each currency. In this example, the USD solvency buffer is 37.50, so the maximum permitted 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 permitted 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
Others	18.00
Total	73.00

The following structural positions and related hedges are excluded from the calculation of net open currency positions:

1. Assets that are fully deducted from the insurer's Available Capital (e.g. goodwill); and
2. Asset and liability positions corresponding to investments in foreign operations that are fully deducted from an insurer's Available Capital (q.v. section 2.1.2).

5.6.2. Treatment of options

If an insurer has purchased or sold options on a foreign currency, it should 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 the foreign currency, 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 in the case of immaterial operations to include some currency positions. 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 limits are added, regardless of sign, to the net open position in each currency.

5.6.4. Measurement of forward currency positions

Forward currency positions are 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, discounted using 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, accrued income and accrued expenses 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 should be consistent in their treatment of unearned interest, income and expenses and should 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 30% of the overall net open position, calculated as the sum of:

a. the greater of the sum of the net open short positions (absolute values) or the sum of the net open long position less offsets; and
b. the net open position in gold, whether long or short (i.e., 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 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, where (+) signifies an asset position and (-) signifies a liability position.

JPY	EUR	GBP	CHF	USD	GOLD
+50	+100	+150	-20	-180	-35
+300			-200		-35

In this example, the insurer has three currencies in which it has long positions, these being the Japanese Yen, the Euro and the British Pound, and two currencies in which it has a short position, the Swiss Franc and the United States Dollar. The middle line of the above chart shows the net open positions in each of the currencies. The sum of the long positions is +300 and the sum of the short positions is -200.

The foreign exchange 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. The

aggregated amount multiplied by 30% results in a capital charge of $100.50.

5.6.7. Allocation of the portfolio requirement

After the total currency risk solvency buffer has been calculated in aggregate, it is allocated by geographic region in proportion to the contribution of the region's net long currency positions or net short currency positions (whichever is used to determine the capital requirement) to the aggregate currency risk solvency buffer. Within a geographic region, the buffer is allocated between par and non-par blocks in proportion to the share of the liabilities in the region.

Example: Allocation of the Aggregate Currency Risk Solvency Buffer

Continuing the example from the previous section, the total capital requirement of $100.50 is allocated to Japan, Europe other than the United Kingdom, and the United Kingdom as follows:

Japan: 50 / 300 × $100.50 = $16.75

Europe other than the United Kingdom: 100 / 300 × $100.50 = $33.50

United Kingdom: 150 / 300 × $100.50 = $50.25

Since the aggregate requirement is determined from the long positions rather than the short positions, the short position in CHF does not lead to any additional allocation to Europe other than the United Kingdom, and none of the requirement is allocated to the United States.

If the United Kingdom has two participating blocks and a non-participating block for which liabilities are the following:

Non-participating: 800

Participating block 1: 300

Participating block 2: 400

then, of the requirement of $50.25 allocated to the United Kingdom, $26.80 is allocated to the non-participating block, $10.05 is allocated to the first participating block, and $13.40 is allocated to the second participating block.

5.6.8. Unregistered reinsurance

A separate component calculation should be performed for each set of liabilities that is backed by a distinct pool of assets under unregistered reinsurance arrangements. The defining characteristic of a pool is that any asset in the pool is available to pay any of the corresponding liabilities. Each calculation should 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 should be treated as an asset in the calculation of the open positions for the ceded business. If the ceded liabilities are payable to policyholders in a foreign currency, this currency should be used as the base currency in the component 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 minimus criteria

An insurer doing negligible business in foreign currency, and that does not take foreign exchange positions within its own investment portfolio, may be exempted from the requirement for currency risk provided that:

1. Its foreign currency business, defined as 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 total Available Capital; and
2. Its overall net open foreign exchange position does not exceed 2% of total Available Capital.

Appendix 5-A Rating Mappings

Preferred Share Ratings by Category

Preferred Share Rating Category	Preferred share rating						
	DBRS	Fitch	Moody's	S&P	KBRA	JCR	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-	Baa1 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 / Debt Ratings by Capital Instrument

Capital Instrument Other Than Common or Preferred Shares Rating Category	Senior unsecured issuer / debt rating						
	DBRS	Fitch	Moody's	S&P	KBRA	JCR	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-

1 A "reliable" index provider would, at a minimum, construct benchmarks that (1) use a transparent and objective process (2) are an accurate representation of the target market segment and (3) use a rebalancing approach that reflects market changes in a timely and orderly fashion.

2 "Par" in this context refers to yields for securities priced at par with the relevant maturities, and not to participating business.

3 An approximation may be used under section 1.4.5.

4 If the gross interest rate risk requirement for a participating block is positive under the most adverse scenario in a particular quarter, an insurer may optionally choose to treat the block as non-participating under this scenario. If the insurer does so then:

i. The gross interest rate risk requirement for the participating block (without any reduction for dividends) is added to the gross interest rate risk requirement for non-participating business before the non-participating requirement is floored at zero, and
ii. The interest rate risk requirement for the participating block used in the calculation of the standalone requirement and participating credit for the block is set to zero.

5 Liabilities corresponding to business ceded under funds withheld arrangements are excluded from liability cash flows, but liabilities due to reinsurers under funds withheld arrangements are included in liability cash flows. If business ceded under a modified coinsurance arrangement effectively transfers interest rate risk on an insurance liability and a pool of supporting assets to the reinsurer, both the liability and asset cash flows should be excluded from projected cash flows.

6 All cash flows corresponding to future business are excluded from the projection.

7 For hedged equity positions receiving credit under section 5.2.4, the delta equivalent value of the hedged position should be used as the investment value.

8 As defined in Section 10 of the *Insurance Companies Act*.

Insurers should demonstrate an understanding of the details of the valuation model used to construct the scenario matrix, and should objectively review and test the model on an ongoing basis, to the satisfaction of OSFI. Market prices, volatilities and other inputs to the valuation model must be subject to review by an

9 objective and qualified person that 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 the satisfaction of the Superintendent is required to deduct 100% of the carrying amount of the purchased option from its Tier 1 Available Capital.

10 If an insurer is leasing a portion of owner-occupied property to an external party, it may treat the lease in the same manner as a lease in force on an investment property.

11 If an insurer's balance sheet includes an unleveraged mutual fund entity reported on a consolidated basis and the investment in the entity is not deducted from Available Capital, the requirements of this section apply to the portion of the fund whose returns are retained for the insurer's own account. The requirements of this section do not apply to the portion of the fund for which the insurer can demonstrate, to the satisfaction of the Superintendent, that: (1) the mutual fund units are owned by policyholders or outside investors; (2) the insurer has a contractual obligation to pass through all returns; and (3) the insurer tracks and distinguishes these units from the units held for its own account. The portion of the fund not subject to the requirements of this section is instead subject to the requirements for index-linked products in section 5.5.

12 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 excluded from this definition.

13 Gold is treated as a foreign exchange position rather than a commodity because its volatility is more in line with foreign currencies.

14 Liabilities corresponding to business ceded under funds withheld arrangements are excluded, but liabilities due to reinsurers under funds withheld arrangements are included.