Guideline

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Table of Contents

6.1. Projection of insurance liability cash flows

6.2. Mortality risk

- 6.2.1. Designation of life and death supported business
- 6.2.2. Level risk
- 6.2.3. Trend risk
- 6.2.4. Volatility risk
- 6.2.5. Catastrophe risk

6.3. Longevity risk

- 6.3.1. Level risk
- 6.3.2. Trend risk

6.4. Morbidity risk

- 6.4.1. Level risk
- 6.4.2. Trend risk
- 6.4.3. Volatility risk
- 6.4.4. Catastrophe risk

6.5. Lapse risk

- 6.5.1. Designation of lapse supported and lapse sensitive business[5]
- 6.5.2. Level and trend risk
- 6.5.3. Volatility risk
- 6.5.4. Catastrophe risk

6.6. Expense risk

- 6.6.1. Level, trend, volatility and catastrophe risk

6.7 Property and casualty risk

6.8 Credit for reinsurance and special policyholder arrangements

- 6.8.1 Unregistered reinsurance
- 6.8.2 Policyholder deposits
- 6.8.3 Adjustments for group business
- 6.8.4 Reinsurance claims fluctuation reserves and similar arrangements
- 6.8.5 Stop loss arrangements

Insurance risk is the risk of loss arising from the obligation to pay out benefits and expenses on insurance policies and annuities in excess of expected amounts. Insurance risk includes:

1. Mortality risk on life insurance;
2. Longevity risk on annuities;
3. Morbidity risk on disability insurance (DI), long-term disability (LTD), short-term disability (STD), critical illness (CI), long-term care (LTC), accident & sickness insurance (A&S), and waiver of premium benefits (WP);
4. Lapse and policyholder behaviour risk, and
5. Expense risk.

Required capital for insurance risk covers the risk that realized insurance experience may be worse than Best Estimate Assumptions (q.v. section 1.4.4). Required capital considers adverse experience arising from:

i. misestimation of the level of Best Estimate Assumptions (level risk);

ii. misestimation of the future trend of Best Estimate Assumptions (trend risk);

iii. volatility risk due to random fluctuations, and

iv. catastrophe risk due to a one-time, large-scale event.

Capital requirements for insurance risk are determined using a projected cash flow methodology that measures the economic impact of a one-time or multi-year shock to Best Estimate Assumptions for mortality, morbidity, lapse and expense rates. If Best Estimate Assumptions consist of multiple sets of assumptions because an insurer's estimate of future cash flows comprises multiple cash flow projections, the shocks are applied to each set of assumptions, without any changes to the probability weighting assigned to each cash flow projection in the estimate of future cash flows.

A capital requirement is calculated for level, trend, volatility and catastrophe risk components of each insurance risk. The capital requirement for each component is calculated as the difference between the present value of shocked cash flows and the present value of Best Estimate Cash Flows. The components are calculated at the policy level, summed by product and added across products by risk component within a geographic region (Canada, the United States, the United Kingdom, Europe other than the United Kingdom, Japan, and other locations). Required capital components for participating and adjustable products are calculated as if the products were non-participating and non-adjustable.

Unless otherwise indicated, the four risk components for each type of insurance risk are aggregated as the square root of the sum of the squares of the volatility and catastrophe risk components, plus the level and trend risk components:

$$RC = \sqrt{RC\ vol\ 2 + RC\ cat\ 2} + RC\ level + RC\ trend$$

where:

- RC is total required capital for the insurance risk
- RC_{vol} is the required capital component for volatility risk
- RC_{cat} is the required capital component for catastrophe risk

- RC_{level} is the required capital component for level risk
- RC_{trend} is the required capital component for trend risk

Required capital is calculated by geographic region, and is floored at zero within each region.

Required capital for volatility risk is calculated using formulas that cover one full year, while required capital for catastrophe risk is calculated using shocks that occur over the first year starting on the first day after the valuation date.

Aggregation of the insurance risk components is specified in Chapter 11. Risks are aggregated separately for non-participating business and for blocks of participating business (q.v. Chapter 9).

The methodologies specified in this chapter do not apply to segregated fund guarantee products, investment contracts, or "Administrative Services Only" insurance contracts where an insurer bears no risk and has no liability for claims. These products should be excluded completely from the calculation of the insurance risk requirement.

6.1. Projection of insurance liability cash flows

Cash flows used to determine required capital for insurance risk are calculated using Best Estimate Assumptions per section 1.4.4. Best Estimate Cash Flows and shocked cash flows are projected by geographic region, and (with the exception of specific group insurance cash flows) for terms ending at the IFRS contract boundary[1]. The cash flows projected for insurance risk should exclude risk adjustments, contractual service margins, and time value of guarantees. The participating policy dividend scale should not reflect the impact of the insurance risk shocks.

All Best Estimate Cash Flows and shocked cash flows are projected net of registered reinsurance (q.v. Chapter 10)[2] with the exception of stop loss treaties (q.v. section 6.8.5)[3]. Projected cash flows should not reflect the impact of provisions for the risk of reinsurer non-performance under IFRS 17. For the solvency buffers *SB1* , *SB2* and *SB3* defined in section 6.8, cash flows are projected net of registered reinsurance and additional elements specific to the calculation. Projected cash flows may reflect future planned recaptures as long as all the features of the recapture are also incorporated.

Projected cash flows should include cash flows arising from investment income taxes that are projected under the IFRS valuation. For the purpose of calculating the insurance risk components, Best Estimate Cash Flows and shocked cash flows are discounted at prescribed rates that depend on the geographic region in which the underlying liabilities are included, rather than the currency in which the liability is denominated. Cash flows, including participating policy dividends, should not be restated to reflect the prescribed discount rates.

The spot discount rates are level, and are:

- 5.3% for Canada, the United States and the United Kingdom,
- 3.6% for Europe other than the United Kingdom,
- 1.8% for Japan, and
- 5.3% for other locations.

In calculating required capital, group insurance business that is individually underwritten is treated as individual business, unless the business provides a premium rate guarantee.

Liability cash flows for group insurance, with the exception of cash flows for incurred claims, are projected up to the end of the guaranteed premium rate period[4], which may extend beyond the IFRS contract boundary. Cash flows for incurred claims are projected to the last payment date. If the length of the guaranteed premium rate period is less than one year, but active life liability cash flows are projected for a full year, the insurer may opt to project the cash flows for a full year and apply a reduction factor. Under this option, a 75% factor is applied to the death benefit amounts used to determine mortality volatility risk in section 6.2, and to the projected cash flows used to determine the requirements for all other mortality and morbidity risks in sections 6.2 and 6.4.

6.2. Mortality risk

Mortality risk is the risk associated with the variability in liability cash flows due to the incidence of death. Level, trend, volatility and catastrophe risk components are calculated for all individual and group life insurance products that are exposed to mortality risk. Mortality risk required capital is calculated for accidental death and dismemberment products and any mortality exposure supported by the general account. However, mortality risk required capital is not calculated for products that cover longevity and morbidity risk, such as waiver of premium,

critical illness and deferred annuities.

In cases where an insurer does not use an explicit mortality rate assumption in the determination of its liabilities for a set of policies, it should calculate adjusted net premiums for the policies. Adjusted net premiums are defined to be the amount of premiums for the policies that have been received plus the amount of premiums that will be received in the future (excluding future contracts), adjusted by the policies' expected claims loss ratio. Adjusted net premiums should cover one full year of premiums unless there is a guaranteed premium rate period greater than one year, in which case the adjusted net premiums should cover premiums over the entire premium rate guarantee period. The expected claims loss ratio should encompass all claims that have been incurred, including those that have not been reported. To calculate level risk for the policies, the percentage shocks specified for mortality rate assumptions should be applied to the policies' adjusted net premiums. To calculate catastrophe risk, the shocks specified for mortality rate assumptions should be applied to the policy face amounts. To calculate the volatility risk requirement, adjusted net premiums may be used in place of within the approximation formulas in section 6.2.4.

Required capital for mortality risk is calculated for each geographic region using the following formula:

$$RC\ mortality\ =\ RC\ vol\ 2\ +\ RC\ cat\ 2\ +\ RC\ level\ +\ RC\ trend$$

A diversification credit is given for level and trend components between individually underwritten life supported and individually underwritten death supported business (q.v. section 11.1.1).

All cash flow projections, benefit amounts and reserve amounts used to determine required capital for mortality risk are calculated net of registered reinsurance (q.v. section 10.1).

For purposes of mortality risk required capital, basic death benefits include supplementary term coverage, participating coverage arising out of dividends (paid-up additions and term additions), and increasing death benefits associated with universal life policies (i.e., policies where the death benefit is the face amount plus funds invested).

6.2.1. Designation of life and death supported business

Required capital for mortality risk is calculated separately for life supported and death supported business. All individual and group life insurance products with mortality risk are designated as either life supported or death

supported for aggregation purposes.

The insurer should partition its policies into sets with similar products and characteristics and then determine if each individual set is life supported or death supported. Level and trend risk components must be combined for this calculation.

The present value of cash flows[5] for each set is calculated using a -15% mortality level shock applied to the Best Estimate Assumptions for mortality rates and a +75% mortality trend shock applied to the Best Estimate Assumptions for mortality improvement, discounted using either financial statement liability discount rates, or the discount rates specified in section 6.1. The result of this calculation is compared to the present value of Best Estimate Cash Flows using the same discount rates. If the present value of the shocked cash flows is greater than the present value of the Best Estimate Cash Flows, the set is designated as death supported business; otherwise, the set is designated as life supported.

6.2.2. Level risk

A level risk component is calculated for all individual and group life insurance products that are exposed to mortality risk.

The mortality level risk component is the difference between the present value of shocked cash flows and the present value of Best Estimate Cash Flows, determined separately for life and death supported business.

In order to avoid double counting with mortality volatility risk, the level risk component is reduced by the component related to the increase in the Best Estimate Assumption for mortality rate in the first year following the reporting date. Required capital for the first year is calculated as the difference between the present value of Best Estimate Cash Flows with a level shock in the first year only, and the present value of Best Estimate Cash Flows.

6.2.2.1 Life supported business

The level risk shock for life supported business is a permanent increase to the Best Estimate Assumptions for mortality rate at each age. The increased mortality rates are calculated as:

$$(1 + \text{Factor}) \times \text{Best Estimate Mortality Rate}$$

where Factor is the lesser of:

a. 11% plus 20% of the ratio of the calculated individual life volatility component to the following year's net expected claims[5]; or
b. 25%.

The ratio in a) above is the same for all individual life insurance products within a single geographic region[6].

6.2.2.2 Death supported business

The level risk shock for death supported business is a permanent 15% decrease in Best Estimate Assumptions for mortality rates for each age and policy for all policy durations (i.e., -15% for all years).

6.2.3. Trend risk

A trend risk component is calculated for all individual and group life insurance products that are exposed to mortality risk. The trend risk component is the difference between the present value of the shocked cash flows and the present value of Best Estimate Cash Flows at all years, determined separately for life and death supported business.

6.2.3.1 Life supported business

The trend risk shock for life supported business is a permanent 75% decrease to the Best Estimate Assumption for mortality improvement for 25 years, followed by no mortality improvement (i.e., a 100% decrease) thereafter.

6.2.3.2 Death supported business

The trend risk shock for death supported business is a permanent 75% increase in the Best Estimate Assumption for mortality improvement at all policy durations.

6.2.4. Volatility risk

A volatility risk component is calculated for all individual and group life insurance products that are exposed to mortality risk. It is calculated in aggregate (i.e., life and death supported products) by geographic region across all

products.

In order to compute the mortality requirement, an insurer should partition its book of business into sets of like products. Basic death and AD&D products may not be included in the same set, nor may individual and group insurance products.

The volatility risk component is:

$$\sum \text{RC}_{\text{Basic Death}} + \sum \text{RC}_{\text{AD\&D}}$$

where the sums are taken over all sets of basic death and AD&D products respectively, and RC is the volatility risk required capital component for the set of products. The formula for RC is given by:

$$\text{RC} = 2.7 \times A \times \left(1 - \frac{V}{F}\right)$$

where:

- A is the standard deviation of the upcoming year's projected net death claims for the set (including claims projected to occur beyond the contract boundary for group insurance policies), defined by:

$$A = \sum q(1-q)b^2$$

where:

- q is a particular policy's Best Estimate Assumption for mortality; and
- b is the death benefit for the policy, net of registered reinsurance.

and the sum is taken over all policies. The calculation is based on claims at the policy level, rather than claims per life insured. Multiple policies on the same life may be treated as separate policies, but distinct coverages of the same life under a single policy must be aggregated. If this aggregation is not done due to systems limitations, the impact should still be approximated and accounted for in the mortality volatility risk requirement.

- V is the total Best Estimate Liability for all policies in the set net of registered reinsurance; and
- F is the total face amount for all policies in the set net of registered reinsurance.

When there is insufficient data available to calculate A for a set of products and the standard deviation of the net death benefit amounts for all policies or (for group insurance products) certificates in the set is known, factor A for the set should be approximated as:

$$A \approx C \times \sum b^2 F$$

where:

- C is the projected value of the upcoming year's total net death claims for all policies in the set (including claims projected to occur after policy renewal dates);
- The sum is taken over all policies or (for group insurance products) certificates in the set, and b is the net death benefit amount for the policy or certificate; and
- F is the total face amount net of registered reinsurance for the policies in the set.

When there is insufficient data available to calculate A for a set of products and the standard deviation of the net death benefit amounts is not known, the insurer may approximate factor A for the set using a comparable set of its own products for which it is able to calculate the volatility component exactly. For the set whose volatility component is being approximated, A may be approximated as:

$$A \approx A_c \times \frac{N}{N_c} \times \frac{C_c}{C} \times \max\left(\frac{F}{n}, \frac{C}{N}\right)$$

where:

- A_c is the exact factor A calculated for the comparison set;
- N_c and N are the total numbers of deaths projected to occur over the upcoming year for all policies in the comparison set and all policies in the set for which A is being approximated, respectively;
- C_c and C are the projected values of the upcoming year's total net death claims for all policies in the comparison set and all policies in the set for which A is being approximated, respectively;
- F is the total face amount net of registered reinsurance for the policies in the set for which A is being approximated; and
- n is the total number of lives covered under the policies in the set for which A is being approximated.

The use of the above approximation is subject to the following conditions:

1. There is no basis from which to conclude that the dispersion of the distribution of net death benefit amounts, as measured by the ratio of the standard deviation to the mean, of the comparison set may with material likelihood be lower than that of the set for which A is being approximated. It may not be appropriate to base the approximation on an insurer's entire book of products of the same type. An insurer's Appointed Actuary should be able to explain, to the satisfaction of OSFI, why using the approximation based on the comparison set produces appropriate results.
2. Insurers should use comparison sets of individual products to approximate factors for sets of individual products, and comparison sets of group insurance products to approximate factors for sets of group insurance products. Insurers may use sets of basic death products to approximate factors for sets of AD&D products, but may not use sets of AD&D products to approximate factors for sets of basic death products.
3. For any particular set of products used as a comparison set, the number of covered lives in the comparison set must be greater than or equal to the total number of covered lives summed over all sets for which factors are approximated based on the comparison set.
4. If this approximation is used for sets of individual basic death products, the sets in aggregate must not be material relative to the insurer's entire book of business.

For sets of products consisting entirely of traditional employer-sponsored group insurance policies, insurers may use the above approximation without reliance on a set of comparable products, with the comparison set factor $A_c \times N_c / C_c$ replaced by 1.75 in the approximation. The factor of 1.75 may be used to approximate A for a set only if each policy in the set requires employees to remain actively working for the plan sponsor in order to continue coverage. In particular, such a set may not contain debtor, association, mass mailing or dependent coverages.

When there is insufficient data available to calculate A for a set of products and the standard deviation of the net death benefit amounts is not known, companies may also approximate factor A for the set using the formula:

$$A \approx C \times \frac{b_{min} + b_{max}}{2} \times F/n$$

where:

- C is the projected value of the upcoming year's total net death claims for all policies in the set (including claims projected to occur after policy renewal dates);
- b_{min} is less than or equal to the lowest single-life net death benefit amount of any policy or certificate in the set;
- b_{max} is the highest single-life net death benefit amount or retention limit of any policy or certificate in the set;
- F is the total face amount net of registered reinsurance for the policies in the set; and
- n is the total number of lives covered under the policies in the set.

The value of the average net death benefit amount F/n used in the above formula must be exact, and may not be based on an estimate. If an insurer cannot establish with certainty both the average net death benefit amount and a lower bound b_{min} on the net death benefit amounts, it should use the value b_{min} = 0 in the formula so that the approximation used is:

$$A \approx C \times b \text{ max}$$

6.2.5. Catastrophe risk

A catastrophe risk component is calculated for all individual and group life insurance products that are exposed to mortality risk. It is tested in aggregate (i.e., life and death supported products) by geographic region across all products.

The shock for catastrophe risk is an absolute increase in the number of deaths per thousand lives insured in the year following the reporting date (including claims projected to occur after policy renewal dates for group insurance policies), and varies by geographic region as follows:

Catastrophe Risk Shock Factors by Geographic Region

Geographic Region	Shock Factor
Canada	1.0
United States	1.2
United Kingdom	1.2
Europe other than the United Kingdom	1.5
Japan and Other	2.0

For AD&D products, 20% of the above shocks for mortality catastrophe risk are used.

The catastrophe risk component is the difference between the present value of the shocked cash flows and the present value of the Best Estimate Cash Flows.

6.3. Longevity risk

Longevity risk is the risk associated with the increase in liability cash flows due to increases in life expectancy caused by changes in the level and trend of mortality rates.

The following formula is used to calculate longevity risk required capital for each geographic region:

$$RC\ \text{longevity} = RC\ \text{level} + RC\ \text{trend}$$

6.3.1. Level risk

The longevity level risk component is calculated for all annuity products that are exposed to longevity risk. The level risk component is the difference between the present value of the shocked cash flows and the present value of the Best Estimate Cash Flows. The required shock is a permanent decrease in Best Estimate Assumptions for mortality rate at each age as follows:

Longevity Level Risk Shock Factors by Annuity Business

Annuity Business	Shock Factor
Non-registered annuity business – Canada, United States and United Kingdom	-20%
Registered annuity business – Canada	-10%
Registered annuity business – United States and United Kingdom	-12%
Non-registered and registered annuity business – geographic regions other than Canada, United States and United Kingdom	-15%

Registered annuities are those that are purchased using tax-qualified (i.e. pre-tax) retirement savings.

6.3.2. Trend risk

The longevity trend risk component is calculated for all annuity products that are exposed to longevity risk. The required shock for trend risk is a 75% increase in the Best Estimate Assumption for mortality improvement. The shock applies per year of mortality improvement forever. That is, the shocked cash flows for trend risk are calculated using Best Estimate Cash Flows with 175% of the Best Estimate Assumption for mortality improvement.

The longevity trend risk component is the difference between the present value of the shocked cash flows and the present value of the Best Estimate Cash Flows.

6.4. Morbidity risk

Morbidity risk is the risk associated with the variability in liability cash flows arising from the incidence of policyholder disability or health claims (including critical illness), and from termination rates. The termination rate is defined as the proportion of disabled lives that cease to be disabled over one year as the result of either recovery or death.

Group morbidity business that is individually underwritten is subject to the same shocks as individual business.

Return of premium riders are included in the cash flows of the underlying products. Changes in the return of premium rider liability are taken into consideration when calculating required capital.

In cases where an insurer does not use incidence and termination rate assumptions in the determination of its liabilities for a set of policies, it should calculate the adjusted net premiums for the policies. Adjusted net premiums are defined to be the amount of premiums for the policies that have been received plus the amount of premiums that will be received in the future (excluding future contracts), adjusted by the expected claims loss ratio. Adjusted net premiums should cover one full year of premiums unless there is a guaranteed premium rate period greater than one year, in which case the adjusted net premiums should cover premiums over the entire premium rate guarantee period. The expected claims loss ratio should encompass all claims that have been incurred, including those that have not been reported. To calculate level, volatility and catastrophe risks for the policies, the percentage shocks specified for incidence and termination rate assumptions should be applied to the policies' adjusted net premiums.

Morbidity risk required capital components are calculated for level, trend, volatility and catastrophe risks. Total required capital for morbidity risk is calculated separately by geographic region using the following formula:

$$RC\ \text{morbidity} = RC\ \text{vol}\ 2 + RC\ \text{cat}\ 2 + RC\ \text{level} + RC\ \text{trend}$$

6.4.1. Level risk

The level risk component is calculated for products that are exposed to morbidity risk. The exposure base to which the shock is applied varies according to status of the policyholder: active versus disabled.

For active lives, the shock for level risk applies to all products for which the guaranteed premium rate period[4] exceeds 12 months. The shock is a permanent increase in Best Estimate Assumptions for morbidity incidence rate at each age.

For disabled lives, the shock for level risk is a permanent decrease in Best Estimate Assumptions for the morbidity termination rate at each age. Morbidity termination rate shocks for level risk apply to currently disabled lives. For IBNR claims, if the approximation approach based on adjusted net premiums is not used, then a factor should be applied to the IBNR reserve that is equal to the ratio of the morbidity termination level solvency buffer (before

morbidity risk credits specified in section 11.1.2) to the present value of Best Estimate Cash Flows for each morbidity product category (e.g. Disabled DI, Disabled LTD, Disabled STD).

Termination rates should not be changed when applying incidence rate shocks. Termination rate shocks are applied to the total termination rate, which includes terminations due to recovery and due to death.

The factors for level risk shocks are as follows:

Level Risk Shock Factors by Exposure Base and Product Type

Exposure Base	Product Type	Shock Factor
Incidence Rates	Active DI	+25%
	Active WP	+25%
	CI	+35%
	Active LTC	+30%
	Other A&S	+20%
Termination Rates	Disabled DI	-25%
	Disabled LTD	-25%
	Disabled STD	-25%
	Disabled WP	-30%
	Disabled LTC	-25%

The morbidity level risk component is the difference between the present value of the shocked cash flows and the present value of Best Estimate Cash Flows. The components for Disability, CI and LTC morbidity level risk may be reduced by a credit for within-risk diversification, which is determined using a statistical fluctuation factor (q.v. section 11.1.2).

6.4.2. Trend risk

A trend risk component is calculated for:

1. Products with a guaranteed premium rate period[4] for active lives of two years or more, such as individual CI, individual active life DI and other A&S; and
2. Products that provide benefits to disabled lives, such as LTD, DI and WP.

If a Best Estimate Assumption for morbidity improvement is not used, the risk charge for trend risk is zero.

The shock for trend risk is a permanent 100% decrease in the Best Estimate Assumption for morbidity improvement. The shocked cash flows for trend risk are calculated using Best Estimate Cash Flows and an annual morbidity improvement rate assumption of 0%.

The morbidity trend risk component is the difference between the present value of the shocked cash flows and the present value of the Best Estimate Cash Flows.

6.4.3. Volatility risk

The volatility risk component is calculated as a one-time shock to first-year incidence rates for all active lives that are exposed to morbidity risk. The volatility risk shock in the first year is calculated independently of the shock used for level risk (section 6.4.1). Termination rate assumptions should not change as a result of the shocks to incidence rates.

The first-year[5] factors for the volatility risk shocks are listed below:

Volatility Risk Shock Factors by Exposure Base and Product Type

Exposure Base	Product Type	Shock Factor
Incidence Rates	Individual active DI	+25%
	Individual active WP	+25%
	Individual CI	+50%
	Individual active LTC	+30%
	Individual medical	+15%
	Individual dental	+20%
	Individual travel	+30%
	Individual credit insurance	+30%
	Other A&S	+30%
	Group active STD and LTD	+25%
	Group active WP	+25%
	Group CI	+50%
	Group active LTC	+30%
	Group medical	+15%
	Group dental	+20%
	Group travel	+50%
	Group credit insurance	+50%

The morbidity volatility risk component is the difference between the present value of the shocked cash flows and the present value of Best Estimate Cash Flows.

The components for Disability, CI, LTC, Travel and Medical and Dental (including other A&S) morbidity volatility risk may be reduced by a credit for within-risk diversification, which is determined using statistical fluctuation factors

(q.v. section 11.1.2).

6.4.4. Catastrophe risk

The catastrophe risk component is calculated as a one-time shock to first year[5] incidence rates for all active lives that are exposed to morbidity risk. The shock is applied as a multiple of the Best Estimate Assumption for morbidity (i.e., (1 + shock factor) × Best Estimate Assumption). Catastrophe shocks are not applied to incidence rates for group medical or dental insurance, or to individual or group travel or credit insurance.

The factors for catastrophe risk shocks are listed below:

Catastrophe Risk Shock Factors by Exposure Base and Product Type

Exposure Base	Product Type	Shock Factor
Incidence Rates	Individual active DI	+25%
	Group active STD and LTD	+25%
	Individual and group active WP	+25%
	Individual CI	+5%
	Group CI	+5%
	Individual and group active LTC	+10%
	Other A&S (other than disability and CI)	+25%

The morbidity catastrophe risk component is the difference between the present value of the shocked cash flows and the present value of Best Estimate Cash Flows.

6.5. Lapse risk

Lapse risk is the risk associated with the variability in liability cash flows due to the incidence of policyholder lapses and other policyholder behaviour. Lapse risk includes risk arising from options that allow policyholders to fully or partially terminate an insurance contract, or to decrease or suspend/resume insurance coverage (e.g. the option to reduce premiums in universal life contracts).

Lapse risk required capital is calculated for all individual life insurance, individual active DI, individual critical illness, individual active life LTC and other A&S policies that are exposed to lapse risk.

Lapse shocks are applied to individual business, including individually underwritten group business. Lapse risk components are calculated for level and trend risks combined as well as volatility and catastrophe risks. If any shock increases a lapse rate above 97.5%, the shocked lapse rate is capped at 97.5%. Shocked cash flows that are projected should not include any lapse trend improvement assumptions. If an insurer uses dynamic lapse assumptions that vary with interest rates, the Best Estimate Assumption should be the same as that assumed in the financial statement valuation and should not be adjusted to reflect prescribed discount rates (q.v. section 6.1) used to calculate the capital requirement.

For aggregation purposes, components are calculated separately for lapse-supported and lapse-sensitive business.

Lapse risk required capital is calculated separately for each geographic region using the following formula:

$$RC_{lapse} = RC_{vol}^2 + RC_{cat}^2 + RC_{level+trend}$$

6.5.1. Designation of lapse supported and lapse sensitive business[5]

Lapse supported and lapse sensitive products are assumed to be negatively correlated for LICAT purposes. The direction of the lapse shock should be tested to determine whether the business is lapse supported or lapse sensitive. An insurer should use the product partitions it has in place for setting its Best Estimate Assumptions for lapses (which should result in sets with similar products and characteristics), and then test each individual set by applying the level, trend and volatility shocks combined to determine if the set is lapse supported or lapse sensitive. For the purpose of the designation test the shocks should be applied first as an increase in lapse rates (lapse sensitive) in all policy years, and then as a decrease in lapse rates (lapse supported) in all policy years. The designation is made by set based on the largest present value using either financial statement valuation discount rates, or the discount rates specified in section 6.1 (note that the present value under each test may be lower than the best estimate present value net of registered reinsurance). Once the designation is set, it is used for the application of the appropriate shocks for catastrophe risk and the calculation of the lapse supported and lapse sensitive components of the diversification matrix.

6.5.2. Level and trend risk

A combined component is calculated for level and trend risk. The combined shock is a permanent ±30% change in Best Estimate Assumptions for the lapse rate at each age and duration. In applying the level and trend shocks insurers should determine the direction of the shocks by comparing cash surrender values net of surrender charges with Best Estimate Liabilities at each duration. At durations where net cash surrender values are higher than Best Estimate Liabilities, lapse rates are shocked upwards, and at all other durations they are shocked downwards. Best Estimate Liabilities at each duration may be calculated using either financial statement valuation discount rates, or the discount rates specified in section 6.1.

The combined component for lapse level and trend risk is the difference between the present value of the shocked cash flows and the present value of Best Estimate Cash Flows.

6.5.3. Volatility risk

The shock for volatility risk is ±30% in the first year[5] and is calculated independently of the shock used for level and trend risk (section 6.5.2). The shock is +30% if the cash surrender value, net of surrender charges, is higher than the Best Estimate Liability at the valuation date, and –30% otherwise. The shocked cash flows after year one are the Best Estimate Cash Flows as affected by the shock in the first year.

The first year shock on lapse rates is the sum of the impacts of a ±30% shock for level and trend risk and a ±30% shock for volatility risk, so that the lapse volatility shock may be quantified as:

PV of cash flows (lapses shocked ±60% in first year) – PV of cash flows (lapses shocked ±30% in first year)[5],

where 60% represents lapse volatility shock plus level and trend shocks and 30% represents only the level and trend shocks.

The risk charge for any set is floored at zero.

6.5.4. Catastrophe risk

The shocks for catastrophe risk are:

1. For lapse sensitive products, an absolute increase of 20 percentage points in the Best Estimate Assumption for lapse for the first year[5] only; and
2. For lapse supported products, a 40% proportional reduction of the Best Estimate Assumption for lapse in the first year[5] only.

The catastrophe risk component for any set cannot be negative.

The lapse catastrophe risk component is the difference between the present value of shocked cash flows and the present value of Best Estimate Cash Flows.

6.6. Expense risk

Expense risk is the risk associated with the unfavourable variability of expenses incurred in servicing insurance or reinsurance contracts (e.g., the variability in expense liability cash flows due to the variation of the in force policies, excess claims, lapses and surrenders, new business decrease and other circumstances that could have an impact on unit expenses).

All maintenance expenses that are estimated (including non-commission premium and claim expenses) are included in the shocks. Expenses that are contractually guaranteed by third parties are excluded from the shocks.

Expense risk required capital is calculated in aggregate for level, trend, volatility and catastrophe risks for each geographic region.

6.6.1. Level, trend, volatility and catastrophe risk

The combined shock is a permanent shock on the Best Estimate Assumptions for expenses including inflation[7] for all insurance products[5]. The shock is an increase of 20% in the first year followed by a permanent increase of 10% in all subsequent policy years. Expense shocks are applied to maintenance expenses. Premium taxes and investment income tax are excluded.

Required capital for expense risk is the difference between the present value of the shocked cash flows and the present value of Best Estimate Cash Flows.

6.7 Property and casualty risk

If an insurer has a composite subsidiary that writes both life insurance and property and casualty (P&C) insurance, it is required to calculate the subsidiary's capital requirements for life insurance risks using the LICAT guideline, and the requirements for P&C insurance risks using the MCT Guideline. The MCT insurance risk requirements used within the LICAT insurance risk calculation are at the MCT target level, and are not divided by 1.5. The subsidiary's requirements for both life and P&C risks are included in the calculation of the aggregate insurance risk requirement (q.v. section 11.2.1). Where the MCT Guideline does not address insurance risk requirements relating to a specific P&C insurance risk, insurers should contact OSFI in order to determine the capital requirement.

6.8 Credit for reinsurance and special policyholder arrangements

6.8.1 Unregistered reinsurance

Under unregistered reinsurance arrangements (q.v. section 10.1.2), collateral and letters of credit placed by the reinsurer (q.v. section 10.3) that can be applied against losses under a specific reinsurance agreement or a collection of agreements may be recognized as Eligible Deposits for the purpose of calculating the Total Ratio and Core Ratio (q.v. section 1.1). The limit on Eligible Deposits that may be recognized is:

$$\min\left(AC + SA - SB_2,\ 1.5 \times \left(SB_0 - SB_1\right) - RL\right)$$

where:

1. AC is the insurer's total Available Capital or Available Margin excluding ceded negative reserves reocgnized in tier 2 under section 10.2.7
2. SA is the insurer's Surplus Allowance
3. SB_0 is the Base Solvency Buffer (q.v. section 11.3) for the insurer's entire book of business calculated net of registered reinsurance only
4. SB_1 is the Base Solvency Buffer[5] calculated net of:
    a. registered reinsurance,
    b. the insurance risks reinsured under the agreements, and

c. the currency risk requirement related to the agreements (q.v. section 5.6.8)

5. SB_2 is the Base Solvency Buffer calculated net of all reinsurance, and all currency risk requirements related to unregistered reinsurance
6. RL is the amount of any retained loss positions (q.v. section 10.4.2) under the agreements

In the intermediate steps of the calculations of SB_0, SB_1 and SB_2, the quantity A (q.v. section 11.2.2) excludes all of the requirements of section 10.3.3 for credit and market risks related to unregistered reinsurance collateral, and the currency risk requirements specific to the calculation. The statistical fluctuation factors (q.v. section 11.1) used in the calculations of SB_0, SB_1 and SB_2 will vary depending on which of these solvency buffers is being calculated. The operational risk components of SB_0, SB_1 and SB_2 are all equal, and are calculated as specified in chapter 8 without modification.

All amounts recognized in Eligible Deposits must be contractually fully available to cover any losses arising from the risks for which an insurer is taking credit. If a portion of deposited collateral and letters of credit is not contractually available to cover losses arising from a risk that is included in the above limit, this portion may not be recognized in Eligible Deposits. For example, if the limit on Eligible Deposits is $500, but an unregistered reinsurance agreement only covers losses in excess of Best Estimate Liabilities up to $300, then any available amounts above $300 may not be recognized in Eligible Deposits, even if the total amount covered under the reinsurance agreement is above the Requisite Level in section 10.4.2.

6.8.2 Policyholder deposits

Qualifying policyholder deposits, excluding actuarial and claim liabilities and any provisions for refunds due, may be used to reduce the insurance risk requirement[8] for a policy. Such deposits must be:

1. made by policyholders,
2. available for claims payment (e.g., claims fluctuation and premium stabilization reserves, and accrued provision for experience refunds), and
3. returnable, net of applications, to policyholders on policy termination.

When an insurer is able to recover excess losses from a deposit for a particular policy on a first-dollar, 100% coinsurance basis, the amount by which required capital may be reduced is the lower of the deposit amount, or the sum of the marginal policy requirements (as defined in section 2.1.2.9.2) for each of the insurance risks mitigated by the deposit, calculated net of all reinsurance. If the amount that the insurer is able to recover from a deposit is subject to a risk-sharing arrangement, the insurer may only take credit for the deposit if the dollar amounts of both the losses borne by the insurer and by the policyholder under the arrangement do not decrease as total excess claims increase. If a risk-sharing arrangement is eligible for credit, the amount by which required capital may be reduced is the lower of the deposit amount, or the portion of the marginal policy requirements for the policy that would be allocated to the policyholder under the risk-sharing formula.

6.8.3 Adjustments for group business

Required capital may be reduced if a group benefit included in the calculation of the insurance risk requirement carries one of the following risk-reduction features that provides for a full transfer of risk:

1. "guaranteed no risk",
2. deficit repayment by policyholders, or
3. a "hold harmless" agreement where the policyholder has a legally enforceable debt to the insurer.

The amount by which required capital may be reduced is equal to a scaling factor multiplied by the sum of the marginal policy requirements for the policy (q.v. section 2.1.2.9.2) calculated net of all reinsurance. The scaling factor to be used is 95% if the group policyholder is the Canadian Government or a provincial or territorial government in Canada, and 85% for all other policyholders.

Where a policy has one of the above risk-reduction features, but the maximum recoverable amount (as specified in the insurance contract) from the policyholder is subject to a limit, the credit for the risk-reduction feature is calculated in the same manner as the credit for qualifying deposits in section 6.8.2, with the following modifications:

1. the maximum recoverable amount is used in place of the deposit amount in the calculation, and
2. the credit amount is multiplied by 95% if the group policyholder is the Canadian Government or a provincial or territorial government in Canada, and by 85% for all other policyholders.

6.8.4 Reinsurance claims fluctuation reserves and similar arrangements

Claims fluctuation reserves, deposits, or loss positions retained by a ceding insurer that serve to reduce the assuming insurer's risk under a reinsurance agreement may be included in the Eligible Deposits of the assuming insurer. The limit on such reserves, deposits or loss positions that are eligible for recognition is:

$$\min\left(AC + SA_{SB_2}, 1.5 \times SB_2 - SB_3 - d\right)$$

where:

- AC, SA and SB_2 are as defined in section 6.8.1
- SB_3 is the Base Solvency Buffer[5] calculated net of all reinsurance and all currency risk requirements related to unregistered reinsurance, and additionally excluding the reinsurance agreement for which the claims fluctuation reserve or other arrangement is in place
- d is the amount of any reductions that have been made to the Base Solvency Buffer on account of policyholder deposits and group business adjustments (qq.v. sections 6.8.2 and 6.8.3) for the business assumed under the reinsurance agreement.

6.8.5 Stop loss arrangements

A ceding insurer may reduce its insurance capital requirement for risks it has reinsured under stop loss treaties (including catastrophe covers). A credit is calculated separately for each component of the insurance risk requirement, before between-risk diversification. For all components except mortality volatility risk, the credit is measured as the increase in the value of the reinsurance contract held corresponding to a stop loss treaty under the shocks specified for the component (the cash flows projected for the component do not include amounts recovered under the treaty). For mortality volatility risk, the credit is measured by calculating the reduction in the variance of the upcoming year's net death claims.

Any reduction in required capital for insurance risk is subject to the prior approval of the Superintendent. To obtain such approval, it is necessary for the ceding insurer to demonstrate the validity of its valuation methodology for the stop loss reinsurance contract held under the relevant insurance risk shocks. As a minimum requirement for

approval, the valuation methodology must encompass more than deterministic valuation of a single set of cash flows.

If the assuming insurer providing the stop loss protection is subject to the requirements of this guideline, the ceding insurer should retain in its records the assuming insurer's actuary's certification that the assuming company has included all reductions claimed by the ceding insurer in its own LICAT insurance risk calculation. If the stop-loss arrangement constitutes unregistered reinsurance under section 10.1, the treatment of Eligible Deposits placed to cover the ceded insurance risk requirement is the same as in section 6.8.1.

1 All cash flows corresponding to future business are excluded from the projections.

2 Cash flows include those corresponding to liabilities assumed under modified coinsurance arrangements, and exclude those corresponding to business ceded under registered modified coinsurance arrangements.

3 Cash flow projection may not be appropriate for business assumed under stop loss arrangements. Given the potential impact of OSFI finding that a treaty is not appropriately captured within the solvency buffer calculation, an insurer writing stop loss insurance is encouraged to seek a confirmation from OSFI prior to entering into such a transaction.

4 The guaranteed premium rate period should generally be consistent with the IFRS contract boundary. For group insurance products, if the IFRS contract boundary occurs before the expiration of the premium guarantee because of the insurer's right to terminate a policy early, the guaranteed premium rate period used in calculating level and trend risks should be extended beyond the IFRS contract boundary to reflect the additional risk borne by the insurer on account of the premium guarantee. The contract boundary should be extended by at least half of the length of time between the IFRS contract boundary and the end of the guaranteed premium rate period.

5 An approximation may be used under section 1.4.5.

6 The volatility component used in the ratio is that for participating and non-participating business within the region combined, which is lower than the sum of the components for participating and non-participating business calculated separately.

7 The Best Estimate Assumption for inflation is the same as that assumed in the financial statement valuation and should not be adjusted to reflect prescribed discount rates (q.v. section 6.1) used to calculate the capital requirement.

8 Deposits made by agents or brokers meeting the same conditions as qualifying deposits made by policyholders may also be recognized.