QUANTITATIVE IMPACT STUDY NO. 6
INSURANCE RISK – INSTRUCTIONS

Contents

Introduction

The purpose of this study is to gather information to evaluate a number of potential methods for determining the capital requirements for insurance risk.

QIS#6 for insurance risk is similar to QIS#5 issued in the fall of 2013, except for the following changes:

- the cash flows and interest rates are based on 2013 year-end

- overall clarifications are made including to the calculation of the solvency buffer, to the methodology for the mortality catastrophe risk, to the methodology for the lapse volatility risk and to the trend risk shocks for mortality, morbidity and lapse

- the removal of the tax timing difference cash flows

- a credit for global portfolio volume is applied to mortality level and volatility risk

- the morbidity level risk statistical fluctuation factors (SFFs) for disability is made consistent with the methodology of other SFFs

- the cross over logic is not used for the designation of lapse supported and sensitive business but is mandatory for the calculation of the level and trend solvency buffer

- the cap on the lapse rates after the level and trend shocks is 97.5% instead of 100%

The basic information required for this study is to be entered in the attached Excel workbook. In addition to supplying the requested information, we would appreciate receiving your written comments on the results of the QIS. A worksheet is included titled "Questions and Comments" for insurers to provide supplemental information and any comments or questions.

The instructions set out below provide explanations to assist insurers in completing the calculations and the Excel worksheets. For each risk category include all applicable products, similar to what is done for a Canadian Asset Liability Method (CALM) valuation. A high level summary of products and risks to be tested is included in Appendix I. This summary is for illustrative purposes and is not an exhaustive list.

Supplementary information on the analysis and development of the potential methods for determining the insurance risk solvency buffer from QIS#3 is available on the OSFI website and is expected to be updated for QIS#6 changes.

All information is to be calculated as of December 31, 2013, using year-end 2013 data. For insurers with a fiscal year end other than December 31, the insurer will use their fiscal year-end data. All amounts are in thousands of dollars. When it is not possible to use 2013 year-end data, the insurer may use more recent data and make approximations to determine the December 31, 2013 values. This should only be considered for some limited values and specified in the "Questions and Comments" worksheet.

Information is generally requested for Canada, United States, United Kingdom, Europe, Japan and other geographies (Other) based on where the business and capital are located. Discount

rates by geography are used in the present value calculations in the worksheets. For this QIS, any geography not specified (i.e. the "Other" category) will use United States discount rates. Likewise, business sold in a geography will use the discount rates of that geography even if the business is denominated in another currency. Discount rates used in the calculation are those described in the market risk instructions. Insurers wishing to discuss the discount rates should contact their regulator.

Summary Page

The "Summary Page" contains information on the solvency buffers for each of the components of insurance risk. These are automatically sourced from each of the worksheets. Information on how to calculate these amounts is provided below.

The existing Minimum Continuing Capital and Surplus Requirements (MCCSR) and total insurance risk Provisions for Adverse Deviations (PfADs) for mortality, longevity, morbidity, lapse and expense, split by non-participating and participating business, are included in the "Summary Page" of the general summary form. The components equal the amounts reported in the December 31, 2013 MCCSR return[1] and the year-end Report of the Appointed Actuary.

The credit for diversification is included in the "Summary Page" of the general summary form as it is calculated by geography in aggregate for all risks. The potential credit is described in the general instructions.

The credit for participating and adjustable products is included in the "Summary Page" of the general summary form as it will apply in aggregate to all risks. The potential credit is described in the general instructions.

Companies are also reminded to enter their company name at the top of the "Summary Page".

Projection of Liability Cash Flows

When IFRS 4/II for insurance contracts is introduced it is possible that the liability cash flows for capital purposes will be projected using assumptions that are consistent with IFRS. For purposes of the QIS, the best estimate liability cash flows should be calculated using the best estimate assumptions that are consistent with those used in the year-end valuation. For clarity, the best estimate liability cash flows will not include PfADs for insurance (e.g. mortality, morbidity and lapse) and expense risk. All best estimate liability cash flows are net of reinsurance[2] and can reflect future assumed recaptures as long as all the features of the recapture are appropriately reflected. The best estimate liability cash flows should be included separately by year using annual cash flows in the risk-specific worksheets. The total best estimate liability cash flows including the best estimate liability cash flows for investment contracts should also be entered in the worksheet "BELCF".

---

[1] For Branches of foreign companies, refer to the equivalent lines on the TAAM return, where applicable.   For provincial insurance companies, refer to the equivalent lines on the provincial return.

[2] Both registered and unregistered reinsurance as long as unregistered reinsurance is backed by security as per the MCCSR Guideline.

The best estimate liability cash flows and the shocked liability cash flows should be disclosed in three separate blocks for 1) non-participating non-adjustable and 2) non-participating adjustable and 3) participating as well as separately for each of the following product types as reflected in the risk-specific worksheets:

1) <u>Non-participating non-adjustable and 2) Non-participating adjustable</u>

- Non-participating individual life products split by death/life supported and lapse supported/sensitive as determined by testing

  o UL
  o All other non-participating products

- Group life

- Individual and group annuities

  o Registered annuities
  o Non-registered annuities

- Individual accident & sickness (A&S) split by lapse supported/sensitive as determined by testing

  o Active disability insurance (DI)
  o Disabled DI
  o Long term care (LTC)
  o Critical illness (CI)
  o Waiver of premium (WP)
  o Other individual A&S

- Group A&S

  o Active short term disability (STD)
  o Disabled STD
  o Active long term disability (LTD)
  o Disabled LTD
  o LTC
  o CI
  o Medical (including other group A&S)
  o Dental
  o Travel
  o Credit
  o WP

3) <u>Participating</u>

- Participating products split by death/life supported and lapse supported/sensitive as determined by testing

  o Individual life
  o Other participating products (e.g. annuities)

Describe the other group A&S business in the "Questions and Comments" worksheet.

Investment contracts under IFRS are not subject to the insurance risk solvency buffer shocks.

The total liability cash flows including PfADs (excluding C3) should reconcile to the liability cash flows reported in the market risk section of the QIS, excluding investment contracts. Disclose in the "Questions and Comments" worksheet if the total insurance risk liability cash flows including PfADs (excluding C3) does not reconcile to the market risk liability cash flows and the reasons why.

Business that is contractually adjustable at the sole discretion of management meets the definition of adjustable products. Adjustable products include UL policies and other products, e.g. T-100 with adjustable premiums that are contractually adjustable. UL is treated as adjustable only if the cost of insurance (COI), expense charges and/or the credited interest or fees are adjustable. Products with adjustable features not at the discretion of management, such as formula or index based adjustments, should be treated like non-adjustable business. It is possible for a product with formula or index based adjustments to have other contractually adjustable features at the sole discretion of management such as COI charges. Only the contractually adjustable features at the sole discretion of management may be treated as adjustable for the calculation of the credit, except as described below for adjustability subject to regulatory approval. Adjustability should not take into consideration amounts recovered through special policyholder arrangements that have been accounted for separately such as hold harmless agreements (HHA), amounts on deposit (AOD), claims fluctuation reserves (CFR).

Adjustable products that are adjustable at the discretion of management but are subject to regulatory approval are also considered adjustable but will be subject to a lower credit than other adjustable products that do not require regulatory approval.

The total best estimate liability cash flows should be consistent with those used for the CALM valuation for all products excluding segregated fund guarantees. QIS forward rates should be used as investment return assumptions for interest sensitive and participating dividend cash flows when the credited rate and product cash flow depend on the bond market rate. If they do not, use CALM credited rates. If this is not material, use CALM best estimate cash flows as an approximation. Approximations should be disclosed in the "Questions and Comments" worksheet.

Liability cash flows do not need to be projected beyond the term of the liability, i.e. group cash flows do not need to be projected beyond the renewal date, consistent with the CALM valuation (except for claim liabilities).

When there are no cash flows for active lives in the first year, the cash flows can be determined using an approximation. For example, the loss ratio multiplied by the first year premiums could be used as the cash flows. Other approximations may also be considered. Any approximation should be described in the "Questions and Comments" worksheet.

Group business that is individually underwritten should be treated as individual business, but disclosed in the group business cash flows for all relevant risks.

The best estimate liability cash flows and the shocked liability cash flows should be projected separately for Canada, United States, United Kingdom, Europe, Japan and Other for each of the liability categories above.

The cash flows should be on a pre-tax basis.

For mortality and expense risks, the shocked cash flows are to be separately disclosed for each of the following components of risks:

- Level
- Trend
- Volatility (process)
- Catastrophe

The cash flows should be projected for 100 years, where applicable. Any approximation should be explained in the "Questions and Comments" worksheet.

Cash flow templates including the QIS discount rates and discounting methodology are provided with the QIS Excel workbook "QIS5 Insurance Cash Flows" and should be submitted with the insurer's results. The cash flow worksheets with the present value of the best estimate liability and shocked cash flows (described above) are linked with the solvency buffer calculations, i.e. the inputs to the solvency buffer calculations are no longer required to be inputted directly in a separate Excel workbook "QIS5 Insurance Risk". Insurers need to ensure the links are maintained (i.e. not broken) in their submitted results.

Calculation of the Solvency Buffer

To determine the solvency buffers, use the same approach and methodology as the MCCSR guideline for the following:

- Segregated fund guarantee risk[3]

- Credit for special policyholder and reinsurance arrangements such as administrative services only (ASO), HHA, CFR, AOD and experience rating refunds (ERR) (updated to reflect the solvency buffer calculation as described below)

- Stop-loss arrangements

- Credit for unregistered reinsurance (deposits in excess of best estimate liabilities)

- Minimum death benefit guarantee on index linked risk pass through (RPT) products

Where the current MCCSR approach is used, the insurer should enter 100% of the capital requirements in the applicable worksheet and the worksheet will calculate the target level (125%).

---

[3] Use current approved internal models for target level requirements.

The credits for special policyholder and reinsurance arrangements and unregistered reinsurance should be updated to reflect the level of the calculated solvency buffer while keeping the MCCSR proportions. Insurers are asked to quantify the credits in the mortality and morbidity buffer worksheets. Calculation at the policy level can be done based on the policy cash flows before any diversification credit. The scaling factor applies to the net solvency buffer (gross solvency buffer minus PfADs).

Credit for unregistered reinsurance is described in the general instructions.

If the calculation of the solvency buffer results in reduced unrecognized future expected profit, this impact can be ignored in the amount of the solvency buffer (but only if these profits are not recognized in retained earnings and available capital). An option to ignore the reduced profits is to set the solvency buffer results at zero, pre- and post-shock (not the cash flows).

The solvency buffer component for each shock is to be positive. Unless otherwise specified, the direction of the shocks should be tested similar to how they are tested for PfADs under the CALM valuation and MCCSR purposes except best estimate cash flows and QIS discount rates must be used instead of CALM cash flows with PfADs and CALM discount rates.

Insurance risk shocks are applied to the best estimate assumptions.

The level of aggregation for each risk is consistent with the concepts in the "Aggregation and Diversification – Supplementary Information" paper. Each risk will be aggregated across entities within the same geography using the consolidated approach. Risks from different entities in the same geography should be treated as one consolidated entity. Multiple geographies in the category "Other" can be treated as if they were one geography for aggregation purposes.

Unless otherwise specified (i.e. for mortality volatility and catastrophe risk), the solvency buffers are calculated at the policy level, summarized by product and added across products by risk component within the same geography.

Unless otherwise specified, risk components are aggregated as the square root of the sum of the squares for volatility and catastrophe risk plus level and trend risk within the same geography.

For each insurance risk, the four risk components will be 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:

$$SB = \sqrt{SB_{vol}^2 + SB_{cat}^2} + SB_{level} + SB_{trend}$$

Mortality Risk

Mortality risk is the risk associated with the adverse variability in liability cash flows due to the incidence of death.

A mortality risk solvency buffer is not calculated for non-life products such as WP, CI and deferred annuities.

Accidental death and dismemberment (AD&D) products should be treated as life insurance.

Solvency buffers for mortality risk are included for level, trend, volatility (process) and catastrophe risks. Any mortality risk exposure associated with the general account liabilities should be included in the solvency buffer calculation.

The total mortality risk solvency buffer is calculated for each geography and is the sum of:
- (a) the square root of the sum of the squares of the volatility risk component and the catastrophe risk component and
- (b) the sum of the level and trend risk components

Global Portfolio Volume Credit

A credit is applied for portfolio volume to mortality level and volatility risk buffers. For each of level and volatility risks, the solvency buffer is calculated both by geography and aggregated across geographies (i.e. calculated as one geography). The credit for mortality risk is calculated as follows:

> [sum of mortality level and volatility risk solvency buffers by geography – mortality level and volatility risk solvency buffer aggregated across geographies] x 50%

The calculation of the global portfolio volume credit is in the "Within Risk Diversification" worksheet.

Designation of Life and Death Supported Business

The mortality risk solvency buffer must be calculated for life supported and death supported business. The insurer should group its policies into portfolios with similar products and characteristics and then determine if each individual portfolio is life supported or death supported. Level and trend risk components must be combined for this calculation.

The calculation requires taking the present value using QIS discount rates of - 15% level risk with +75% trend risk. Insurers should compare the results of the calculations to the present value using QIS discount rates of the best estimate cash flows. If the result of the calculation is greater than the present value of the best estimate cash flows, the business is designated as death supported otherwise the business is designated as life supported.

All individual life insurance with mortality risk needs to be allocated as either life supported (mortality risk) or death supported (longevity risk) for aggregation purposes.

Insurers may designate the business as life supported or death supported without performing the calculation only if separate testing, using best estimate cash flows and QIS discount rates, has been done to confirm the split or if the amount of death supported business is not material.

Level Risk

Level risk is calculated for all individual life insurance products that include a mortality risk. This includes individually underwritten group life insurance business.

<u>Life Supported</u>

The level risk for life supported business is based on a factor applied as a permanent increase in best estimate mortality rates for each age and policy for all policy durations (i.e. (1+factor) x best estimate mortality rates). Two shocks are calculated; one using a factor based on the characteristics of the portfolio (a), the other fixed (b):

   (a) +10% of the best estimate mortality cash flows and adding + 35% of the ratio of the calculated individual life volatility buffer to the next year's expected claims net of reinsurance

   (b) +25% of the best estimate mortality cash flows

Both (a) and (b) level risk results should be reported in the form. The lower amount of (a) and (b) should be used for the solvency buffer. The individual life volatility buffer should be calculated first to get the ratio in (a). The ratio is the same for all individual life insurance products but varies by geography.

Companies may approximate the ratio using data with up to one year lag[4] (e.g. for year-end 2016 requirements, use ratio calculated in the range of year-end 2015 to third quarter 2016). The approximation method should be consistent from year to year and be described in the "Questions and Comments" worksheet.

Within Mortality Risk Diversification Credit

As an additional calculation to quantify the impact of within mortality risk diversification, insurers are requested to provide the calculated solvency buffer from a 15% shock on best estimate mortality rates for each age and policy for all policy durations. To avoid double counting with mortality volatility risk, subtract from level risk the solvency buffer related to the 15% shock on the best estimate mortality rates for each age and policy for the first year following the valuation date for life supported products only.

The results of the calculated buffer by geography should be entered in the "Within Risk Diversification" worksheet.

---

[4] Insurers may use QIS#5 results for QIS#6.

Death Supported

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

The shocked level risk cash flows should be included in the worksheet titled "Mortality - Level Shock".

The solvency buffer for mortality level risk is the difference between the present value of the shocked cash flows and the present value of the best estimate cash flows for all years calculated separately for life and death supported business. To avoid double counting with mortality volatility risk, subtract from level risk the solvency buffer related to the level risk shock on the best estimate mortality rates for each age and policy for the first year following the valuation date. The solvency buffer is reduced by the first year only to give the result of the shock applied from the second year. If this is not material, insurers may approximate the results by subtracting the difference between the cash flows of the first year and the best estimate subject to the shock instead of taking the difference in present values. Approximations should be described in the "Questions and Comments" worksheet.

Trend Risk

Trend risk is calculated for all individual life insurance products that include a mortality risk.

Life Supported

The shock for life supported business trend risk is -75% of the best estimate mortality improvement assumption[5]. The shock applies per year of mortality improvements for 25 years with no mortality improvement thereafter. For clarity, the shocked cash flows for trend risk are the best estimate liability cash flows with 25% of the best estimate mortality improvement rates.

The shock does not apply if there is no assumption for future mortality improvement used.

Business outside of Canada should select appropriate mortality improvement assumptions consistent with CIA guidance. Mortality improvement assumptions for business outside of Canada should be disclosed in the "Comments and Questions" worksheet.

Death Supported

The shock for death supported business trend risk is +75% of the best estimate mortality improvement assumption[6]. The shock applies per year of mortality improvement forever. In other words, the shocked cash flows for trend risk are the best estimate liability cash flows with 175% of the best estimate mortality improvement assumption.

---

[5] The shock of 75% reflects the fact that there are CIA standards on mortality improvement.
[6] The shock of 75% reflects that fact that there are CIA standards on mortality improvement.

Business outside of Canada should select mortality improvement assumptions consistent with CIA guidance. Mortality improvement assumptions for business outside of Canada should be disclosed in the "Comments and Questions" worksheet.

The shocked trend risk cash flows should be included in the worksheet titled "Mortality - Trend Shock".

The solvency buffer for trend risk is the difference between the present value of the shocked cash flows and the present value of the best estimate cash flows for all years calculated separately for life and death supported business.

Life and Death Supported Diversification Credit

A diversification credit is calculated between life and death supported life insurance business (individually underwritten). The total mortality level and trend risk solvency buffers are calculated separately for life and death supported business (SB_L and SB_D respectively). The credit for life and death supported business diversification for mortality risk is calculated as follows:

> [the sum of the mortality level and trend risk solvency buffers for life and death supported business ($SB_L + SB_D$)] - [the mortality level and trend solvency buffer for all life policies assuming a -75% correlation between life and death supported business (SB)]

> Where:

$$SB = \sqrt{SB_L^2 + SB_D^2 - 1.5 \times SB_L \times SB_D}$$

The calculation of the credit is in the "Within Risk Diversification" worksheet.

Volatility (Process) Risk

Volatility risk is calculated for all individual and group life insurance products that include a mortality risk. It is tested in aggregate within a geography (i.e. life and death supported products) across all products and is floored at zero.

The volatility risk is equal to:

> 2.7 x A x E / F

where:

A is the standard deviation of the upcoming year's projected net death claims and is defined by:

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

where:

q is equal to the best estimate mortality for a particular policy

b is the net death benefit for the policy net of reinsurance.

The sum is taken over all policies. Also, the calculation must be 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 should be aggregated. If this aggregation cannot be performed for QIS purposes (e.g. due to system limitations) the impact should be approximated and accounted for in the total requirement.

E is the total net amount at risk for all policies

F is the total net face amount for all policies

The solvency buffer is the amount derived from the volatility risk calculated above.

Group insurance should keep the same approximation approach as the MCCSR, including the calculation of the "A" component.

The volatility risk solvency buffer is to be included in the worksheet titled "Mortality - Volatility Shock".

Within Mortality Risk Diversification Credit

As an additional calculation to quantify the impact of within mortality risk diversification, insurers are requested to provide the calculated solvency buffer from a 15% shock on best estimate mortality rates for each age and policy for the first year following the valuation date. This is calculated for all business where mortality volatility risk is calculated.

The results of the calculated buffer by geography should be entered in the "Within Risk Diversification" worksheet.

Catastrophe Risk

Catastrophe risk is calculated for all individual and group life insurance products that include mortality risk. It is tested in aggregate within a geography (i.e. life and death supported products) across all products and is floored at zero.

The shock for catastrophe risk varies by location of the policyholders at issue. The shock is an absolute increase in the number of deaths per thousand insured over the first year following the valuation date for:

Canada	1.0
United States	1.2
United Kingdom	1.2
Europe	1.5
Other	2.0

AD&D products should use 60% of the above assumptions for mortality catastrophe risk.

The shocked catastrophe risk cash flows should be included in the worksheet titled "Mortality - Catastrophe Shock".

The solvency buffer for catastrophe risk is the difference between the present value of the shocked cash flows and the present value of the best estimate cash flows for all years.

Longevity Risk

Longevity risk is the risk associated with the increase in liability cash flows due to increases in life expectancy.

Solvency buffers for longevity risk are included for level and trend risks.

The total longevity risk solvency buffer is calculated as the sum of level and trend risk components for each geography.

Level Risk

Level risk is calculated for all annuity products that include a longevity risk.

The shock for level risk is a permanent decrease in best estimate mortality rates for each age and policy for all policy durations as follows:

Non-registered annuity business – Canada	-20%
Registered annuity business – Canada	-10%
Annuity business (non-registered and registered) – all other geographies	-15%

A reasonable approximation can be used if the split between registered and non-registered business is not available. Approximations should be described in the "Questions and Comments" worksheet.

The shocked level risk cash flows should be included in the worksheet titled "Longevity - Level Shock".

The solvency buffer is the difference in the present value of the shocked cash flows and the present value of the best estimate cash flows for all years.

Trend Risk

Trend risk is calculated for all annuity products that include a longevity risk.

The shock for trend risk is +75% of the best estimate mortality improvement assumption. The shock applies per year of mortality improvement forever. For clarity, the shocked cash flows for trend risk are the best estimate liability cash flows with 175% of the best estimate mortality improvement assumption. As an example, if the best estimate improvement assumption is 3%,

then the shocked cash flows are based on an improvement assumption of 175% x 3% = 5.25%. The shock does not apply if there is no assumption for future mortality improvement used.

Business outside of Canada should select mortality improvement assumptions consistent with CIA guidance. Mortality improvement assumptions for business outside of Canada should be disclosed in the "Questions and Comments" worksheet.

The shocked trend risk cash flows should be included in the worksheet titled "Longevity – Trend Shock".

The solvency buffer is the difference between the present value of the shocked cash flows and the present value of the best estimate cash flows for all years.

Volatility and Catastrophe Risk

A shock for volatility and catastrophe risk for longevity risk is not included.

Morbidity Risk

Morbidity risk is the risk associated with the adverse variability in liability cash flows due to the incidence of policyholder disability or health claims (including critical illness), as well as recovery or termination rates.

Policyholder morbidity risk is included in many products, including:

- Individual DI – active and disabled lives
- Group STD and LTD – active and disabled lives
- Individual and group CI
- Individual and group LTC – active and disabled lives
- Group medical and dental (including other group A&S)
- Individual and group WP
- Individual and group travel
- Individual and group credit insurance
- Individual other A&S

Morbidity risk includes the impact of mortality risk on the above products.

Return of premium riders should be included with the cash flows of the underlying product. Changes in the return of premium rider liability should be taken into consideration in the calculation of the solvency buffer.

Group morbidity business that is individually underwritten should use the shocks for individual business.

Shocks applied to claims rates are different than shocks applied to incidence and termination rates. In the cases where the shocks are applied to claims rates, the insurer should disclose in the "Questions and Comments" whether morbidity risk is measured based on incidence and

termination rather than claims rates and provide estimates of the claims rate shocks transformed to incidence and termination rate shocks. The QIS solvency buffer should be based on the transformed shocks to be equivalent to the claims rates shocks and for consistency with industry results. Insurers using transformed shocks should contact OSFI for clarification.

Solvency buffers for morbidity risk are included for level, trend, volatility (process) and catastrophe risks.

The total morbidity risk solvency buffer is calculated for each geography and is the sum of:

(a) the square root of the sum of the squares of the volatility risk component and the catastrophe risk component and

(b) the sum of the level and trend risk components

Level Risk

Level risk is calculated for the following product types that include a morbidity risk:

- Based on incidence rates – all active lives with a guarantee coverage period exceeding 12 months, such as individual CI, individual active life DI and individual other A&S

- Based on termination or recovery rates – all disabled lives, such as LTD, DI and WP

- Based on claims rates – active and disabled lives for group STD, individual and group LTC

Incidence rates: The shock for level risk is a permanent increase in best estimate morbidity incidence rates for each age and policy for all policy durations. The level shock varies by product as follows:

Individual active DI	+25%
Individual active WP	+25%
Individual CI	+35%
Individual other A&S	+20%

Morbidity incidence rates shock for level risk only applies to individual business coverage exceeding 12 months.

Termination or recovery rates: The shock for level risks is a permanent decrease in best estimate morbidity termination or recovery rates for each age and policy for all policy durations. The level shock does not vary by product but is separated as follows:

Individual disabled DI	-25%
Group disabled LTD	-25%
Individual and group disabled WP	-25%

Morbidity termination or recovery rate shock for level risk only applies to current disabled lives. This implicitly recognizes the negative correlation between incidence and termination within the same group of disabled lives. The implicit shock for future disabled lives is that the best estimate termination or recovery rates apply to these lives instead of the better rates expected to be experienced by a cohort of disabled lives that became so with a much higher incidence rate (the shocked incidence rate) than the best estimate incidence rate.

Claims rates: The shock for level risk is a permanent increase in best estimate morbidity claims rates for each age and policy for all policy durations. The level shock varies by product as follows:

Group active and disabled STD	+25%
Individual active and disabled LTC	+30%
Group active and disabled LTC	+30%

Within Morbidity Risk Diversification Credit

An adjustment to the solvency buffer based on the characteristics of the portfolio is included in QIS#6 where sufficient experience and exposure exists. The solvency buffer for some morbidity level risk is reduced by a credit for diversification within morbidity risk using a modified MCCSR SFF approach for each geography as follows:

Disability

Where B = solvency buffer for level risk

$$SFF(B) = \begin{cases} 1, & if\ B \le \$42,000,000 \\ 0.9 + \dfrac{648}{\sqrt{B}}, & if\ B > \$42,000,000 \end{cases}$$

CI

Where FA = total face amount net of reinsurance

$$SFF(FA) = \begin{cases} 1, & if\ FA \le \$300,000,000 \\ 0.15 + \dfrac{14,722}{\sqrt{FA}}, & if\ FA > \$300,000,000 \end{cases}$$

LTC

Where B = solvency buffer for level risk

$$SFF(B) = \begin{cases} 1, & if\ B \le \$75,000,000 \\ 0.5 + \dfrac{4,330}{\sqrt{B}}, & if\ B > \$75,000,000 \end{cases}$$

For each SFF, the exposures are aggregated where level risk is calculated before applying the SFF. For example, all disability exposures are aggregated including individual active DI, individual active WP, individual disabled DI, group disabled LTD, individual and group disabled WP and group active and disabled STD. The calculation of the SFFs is included in the "Within Risk Diversification" worksheet.

The shocked level risk cash flows for incidence, termination and claims scenarios are to be included in the worksheets titled "Morbidity Incid & Claim - Level" and "Morbidity Termination - Level" respectively.

The solvency buffer for level risk is the difference in the present value of the shocked cash flows and the present value of best estimate cash flows for all years. The solvency buffer for Disability, CI and LTC level risk is adjusted by the SFF.

Trend Risk

Trend risk is calculated for the following product types that include a morbidity risk:

- All active lives with a long guarantee coverage period, such as individual CI, individual active life DI and individual other A&S

- All disabled lives, such as LTD, DI and WP

- All active and disabled lives for products based on claims rates such as group STD and individual and group LTC (where products are valued based on total claims instead of incidence and termination)

The shock for trend risk is -100% of the best estimate morbidity improvement assumption used[7]. The shock applies per year of morbidity improvements for all years. For clarity, the shocked cash flows for trend risk are the best estimate liability cash flows for all future durations with the best estimate morbidity improvement rates set to zero.

The shocked trend risk cash flows should be included in the worksheets titled "Morbidity Incid & Claim - Trend" and Morbidity Termination – Trend" respectively.

The solvency buffer for trend risk is the difference between the present value of the shocked cash flows and the present value of the best estimate cash flows for all years. If the insurer did not use a morbidity improvement assumption in the CALM valuation, the solvency buffer for trend risk will be zero.

Volatility (Process) Risk

Volatility risk is calculated on incidence rates for all active lives that include a morbidity risk. For some products, a total claims shock applies to active and disabled lives instead of a shock to incidence rates.

---

[7] The shock of 100% for morbidity trend risk reflects the fact that there are no CIA standards of practice on morbidity improvement.

The shock for volatility risk in the first year is in addition to the permanent shock for level risk applicable to the best estimate incidence rates as follows:

Individual active DI	+25%
Individual active WP	+25%
Individual CI	+50%
Individual other A&S	+30%

The shock for volatility risk in the first year only is applicable to the best estimate incidence rates as follows:

Group active LTD	+25%
Group active WP	+25%
Group CI	+50%

The shock for volatility risk in the first year is in addition to the permanent shock for level risk applicable to the best estimate total claims as follows:

Group active and disabled STD	+25%
Individual active and disabled LTC	+30%
Group active and disabled LTC	+30%

The shock for volatility risk in the first year only is applicable to the best estimate incidence rates as follows:

Group medical (including other group A&S)	+15%
Group dental	+20%
Travel insurance	+50%
Credit insurance	+50%

The shocks for volatility risk have already been adjusted to avoid double counting with level risk.

Within Morbidity Risk Diversification Credit

An adjustment to the solvency buffer based on the characteristics of the portfolio is included in the QIS. The solvency buffer for volatility risk is reduced by a credit for diversification within morbidity risk using a modified MCCSR SFF approach that varies by product and is calculated by geography based on the level of exposure as follows:

Disability

Where B = solvency buffer for volatility risk

$$SFF(B) = \begin{cases} 1 & , \text{ if B} \le \$6,000,000 \\ 0.7 + \frac{734}{\sqrt{B}}, & \text{ if B} > \$6,000,000 \end{cases}$$

CI

Where FA = total face amount net of reinsurance

$$SFF(FA) = \begin{cases} 1 & , \; if\; FA \le \$300,000,000 \\ 0.15 + \frac{14,722}{\sqrt{FA}}, & if\; FA > \$300,000,000 \end{cases}$$

LTC

Where B = solvency buffer for volatility risk

$$SFF(B) = \begin{cases} 1 & , \text{ if B} \le \$3,000,000 \\ 0.3 + \frac{1,212}{\sqrt{B}}, & \text{ if B} > \$3,000,000 \end{cases}$$

Travel

Where B = solvency buffer for volatility risk

$$SFF(B) = \begin{cases} 1 & , \text{ if B} \le \$5,000,000 \\ 0.2 + \frac{1,788}{\sqrt{B}}, & \text{ if B} > \$5,000,000 \end{cases}$$

Group Medical/Dental (including other group A&S)

Where B = solvency buffer for volatility risk

$$SFF(B) = \begin{cases} 1 & , \text{ if B} \le \$3,000,000 \\ 0.7 + \frac{519}{\sqrt{B}}, & \text{ if B} > \$3,000,000 \end{cases}$$

For each SFF, the exposures are aggregated where volatility risk is calculated before applying the SFF. For example, all disability exposures are aggregated including individual active DI, individual active WP, group active LTD, group active WP and group active and disabled STD. The calculation of the SFFs is included in the "Within Risk Diversification" worksheet.

The shocked volatility risk cash flows should be included in the worksheet titled "Morbidity Incid & Claim - Vol".

The solvency buffer for volatility risk is the difference between the present value of the shocked cash flows and the present value of best estimate cash flows for all years. The solvency buffer for volatility risk is adjusted by the SFF.

Catastrophe Risk

Catastrophe risk is calculated on incidence rates for all active lives that include a morbidity risk. For some products, a total claims shocks applies to active and disabled lives instead of a shock to incidence rates. A catastrophe shock does not apply on claims rates for products such as group medical and dental as well as individual and group travel and credit insurance.

The shocks for catastrophe risk on incidence rates are:

Individual active DI	+25%
Group active LTD	+25%
Individual and group active WP	+25%
Individual CI	+5%
Group CI	+5%
Other A&S (other than disability and CI)	+25%

The shocks for catastrophe risk on claims rates are:

Group active and disabled STD	+10%
Individual active and disabled LTC	+10%
Group active and disabled LTC	+10%

The shock is for one year only and is a multiple of the best estimate morbidity assumption (i.e. 125% or 110% of best estimate assumptions).

The shocked catastrophe risk cash flows should be included in the worksheet titled "Morbidity Incid & Claim - Cat".

The solvency buffer for catastrophe risk is the difference between the present value of the shocked cash flows and the present value of best estimate cash flows for all years.

Lapse Risk

Lapse risk is the risk associated with the variability in liability cash flows due to the incidence of policyholder lapses. Policyholder lapsation includes options to fully or partially terminate an insurance contract, or decrease or suspend/resume insurance coverage.

The shock for dynamic lapse assumptions should be consistent with non-dynamic lapse assumptions.

Lapse shocks are applied to individual business, including individually underwritten group business. Insurers are requested to disclose what type of group or savings business is impacted by lapse in the "Questions and Comments" worksheet.

Solvency buffers for lapse risk are included for level, trend, volatility (process) and catastrophe risks.

The total lapse risk solvency buffer is calculated for each geography and is the sum of:

(a) the square root of the sum of the squares of the volatility risk component and the catastrophe risk component and

(b) the sum of the level and trend risk components.

Designation of Lapse Supported and Sensitive Business

Lapse supported and lapse sensitive products are assumed to be negatively correlated (policyholders are assumed rational) for solvency purposes. The direction of the lapse shock should be tested to determine whether the business is lapse supported or lapse sensitive. The insurer should group its policies into portfolios with similar products and characteristics and then test each individual portfolio to determine if it is lapse supported or lapse sensitive. The cross-over logic should not be used for this purpose. The designation is done on a portfolio basis. The designation should be done both for level and trend risk and for volatility and catastrophe risk based on the respective shocks. Judgment may be applied to designate the business as lapse supported or lapse sensitive but the designation should be based on shocked cash flows and QIS discount rates (as opposed to CALM valuation cash flows and discount rates). Applied judgment should be described in the "Questions and Comments" worksheet.

Level and Trend Risk

Level and trend risk is calculated for all individual life insurance, individual active DI, individual critical illness, individual active life LTC and individual other A&S that include lapse risk.

The shock for the combined level and trend risks is a permanent +/-20% in best estimate lapse rates for each age and policy for all policy durations (i.e. use 120%/80% of best estimate lapse rates) and cross-over logic should be used. The level and trend shock does not vary by product but insurers are requested to provide the cash flows by product as follows:

- Lapse supported individual life insurance
- Lapse sensitive individual life insurance
- Lapse supported individual active DI
- Lapse sensitive individual active DI
- Lapse supported individual CI
- Lapse sensitive individual CI
- Lapse supported individual active LTC
- Lapse sensitive individual active LTC
- Lapse supported individual other A&S
- Lapse sensitive individual other A&S

For lapse supported products such as T-100 and Level COI UL where cross-over logic is used the shock will be positive or negative depending on the level of the reserve and the level of the cash surrender value (CSV), if any, such that it is a positive requirement as tested above.

Lapse rates are limited to 97.5% when the shock increases the lapse rates over 97.5%.

The shocked level and trend risk cash flows should be included in the worksheet titled "Lapse Supported - Level & Trend" and "Lapse Sensitive - Level & Trend" respectively.

The shocked cash flows should not include any lapse trend improvement assumptions as there is not sufficient evidence to support this for regulatory capital purposes.

The solvency buffer for level and trend risk is the difference between the present value of the shocked cash flows and the present value of best estimate cash flows for all years. The solvency buffer for lapse supported business is calculated separately from the solvency buffer for lapse sensitive business for aggregation purposes.

Volatility (Process) Risk

Volatility risk is calculated for all individual life insurance, individual active life DI, individual CI, individual active life LTC and individual other A&S that include lapse risk.

The shock for volatility risk is +/- 30% in the first year and is calculated independently of the +/- 20% permanent shock for level and trend risk. For clarity, the resulting buffer for the first year be the sum of the impact of a +/- 20% shock for level and trend risk and of a +/- 30% shock for volatility risk. The cross over logic is not to be used.

The shocks for volatility risk have already been adjusted to avoid double counting with level risk.

The shocked volatility risk cash flows should be included in the worksheet titled "Lapse Supported - Volatility" and "Lapse Sensitive - Volatility" respectively.

The solvency buffer for volatility risk is the difference between the present value of the shocked cash flows and the present value of best estimate cash flows for all years. In other words, the volatility solvency buffer is the difference between the present value of all future cash flows where a shock is applied in the first year only and the present value of all future best estimate cash flows. The shocked cash flows after the first year are simply the best estimate cash flows as affected by the first year shock.

The solvency buffer for lapse supported business is calculated separately from the solvency buffer for lapse sensitive business for aggregation purposes.

Catastrophe Risk

Catastrophe risk is calculated for all individual life insurance, individual active life DI, individual CI, individual active life LTC and individual other A&S that include lapse risk.

Catastrophe risk is tested separately for lapse sensitive and lapse supported products within each geography.

The shocks for catastrophe risk in the first year are:

- For lapse sensitive products, an additional 20% to the current lapse rate.

- For lapse supported products, reduce the current lapse rate to 0% in the first year.

The cross over logic is not to be used.

The shock for lapse sensitive products is for one year only and is in addition to the best estimate lapse assumption (i.e. for best estimate of 5%, total lapse is 5+20=25%). The shock for lapse supported products replaces the assumption with 0% in the first year.

The shocked catastrophe risk cash flows should be included in the worksheet titled "Lapse Supported - Catastrophe" and "Lapse Sensitive - Catastrophe".

The solvency buffer for catastrophe risk is the difference between the present value of the shocked cash flows and the present value of best estimate cash flows for all years. The solvency buffer should be floored at zero at the portfolio level if necessary.

Expense Risk

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

Consistent with a CALM valuation, all maintenance expenses (including non-commission premium and claim expenses) are shocked. Expenses may be shocked indirectly when claims are shocked and this will be recognized in the diversification credit for the aggregation of risks. Tax timing differences should not be reflected in the liability.

Solvency buffers for expense risk are included for level, trend, volatility (process) and catastrophe risks and are calculated for each geography in aggregate for all risk components.

Level, Trend, Volatility and Catastrophe Risk

Level, trend, volatility and catastrophe risk is calculated for all insurance products.

The shock for level, trend, volatility and catastrophe risk is an increase of 20% in the first year followed by a permanent increase of 10% after the first year on the best estimate expense assumptions including inflation (excluding commissions, premium taxes and investment income tax) for all policy durations.

The shocked level, trend, volatility and catastrophe risk cash flows should be included in the worksheet titled "Expense – Level&Trend&Vol&Cat".

The solvency buffer for level, trend, volatility and catastrophe risk is the difference between the present value of the shocked cash flows and the present value of best estimate cash flows for all years.

INSURANCE RISK – HIGH LEVEL PRODUCT AND RISK SUMMARY

Description	Examples	Risks
Active life with short guaranteed coverage period Group products	Life insurance CI Active life LTC Medical/dental Active life LTD Active life WP Other A&S Travel/credit	Mortality/expense Morbidity(incidence)/expense Morbidity(claim)/expense Morbidity(claim)/expense Morbidity(incidence)/expense Morbidity(incidence)/expense Morbidity(incidence)/expense Morbidity(claim)/expense
Active life with long guaranteed coverage period Individual products	Life insurance CI Active life LTC Active life DI Active life WP Other A&S Travel/credit	Mortality/lapse/expense Morbidity(incidence)/lapse/expense Morbidity(claim)/lapse/expense Morbidity(incidence)/lapse/expense Morbidity(incidence)/lapse/expense Morbidity(incidence)/lapse/expense Morbidity(claim)/lapse/expense
Disabled/retired life with short guaranteed claim period	STD	Morbidity(claim)/expense
Disabled/retired life with long guaranteed claim period Individual and group products	Annuity Disabled life LTC Disabled life LTD Disabled life DI Disabled life WP	Longevity/expense Morbidity(claim)/expense Morbidity(termination)/expense Morbidity(termination)/expense Morbidity(termination)/expense