

Prudential Standard FSI 4.2

Life Underwriting Risk Capital Requirement

Objectives and Key Requirements of this Prudential Standard

This Standard sets out the details for calculating the capital requirement for underwriting risk related to life insurance obligations for insurers using the standardised formula to calculate the Solvency Capital Requirement (SCR).

The ultimate responsibility for the prudent management of the financial soundness of an insurer rests with its board of directors. The board of directors must ensure that the insurer has systems and controls in place to adequately calculate its life underwriting risk capital requirement according to the Financial Soundness Standards for Insurers.

The calculation of the capital requirement for life underwriting risk is based on specified stress scenarios applied to the following components of life underwriting risk:

- *Mortality risk;*
- *Longevity risk;*
- *Disability-morbidity risk;*
- *Lapse risk;*
- *Expense risk;*
- *Life catastrophe risk; and*
- *Retrenchment risk.*

The overall capital requirement for life underwriting risk is determined by aggregating the capital requirements of each individual risk component using a correlation matrix prescribed in this Standard.

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1. Application

- 1.1. This Standard applies to all life insurers licensed under the Insurance Act, 2017 (the Act), other than microinsurers, Lloyd's and branches of foreign reinsurers.
- 1.2. Unless otherwise indicated, all references to "insurer" in this Standard can be read as a reference to life insurers and life reinsurers. Similarly, a reference to "insurance" obligations/policies in this Standard can be read as a reference to "reinsurance" obligations/policies, unless otherwise specified.

2. Roles and Responsibilities

- 2.1. Ultimate responsibility for the prudent management of the financial soundness of an insurer rests with the insurer's board of directors. The board of directors must ensure the insurer meets the Solvency Capital Requirement (SCR) on a continuous basis, regardless of the approach taken to its computation. The board of directors must also ensure that the insurer has in place appropriate systems, procedures and controls to meet the principles and requirements of this Standard on an ongoing basis.
- 2.2. An insurer's head of actuarial function is responsible for expressing an opinion to the board of directors regarding the accuracy of the calculations and the appropriateness of the assumptions underlying the capital requirement for life underwriting risk.
- 2.3. An insurer's auditor, appointed under section 32 of the Act, must audit the financial soundness of an insurer in accordance with its legal and regulatory obligations. The auditor must report to the board of directors and Prudential Authority any matters identified during the performance of its responsibilities that may cause the insurer to be not financially sound.
- 2.4. The roles and responsibilities of the board of directors and the head of actuarial function are described in more detail in the Governance and Operational Standards for Insurers (GOI 3).

3. Commencement and Transition Provisions

- 3.1. This Standard commences on 1 July 2018.

Version Number	Commencement Date
1	1 July 2018

4. Scope and Key Elements of Life Underwriting Risk

- 4.1. Life underwriting risk is the risk arising from life insurance obligations, such as from poor claims experience, expense over-runs and policy lapses.

- 4.2. The life underwriting risk capital requirement takes into account the uncertainty related to an insurer's existing insurance obligations, as well as to the new business expected to be written over the coming 12 months.
- 4.3. The calculation of the life underwriting risk capital requirement under the standardised formula is based on the application of specified stress scenarios applied to each of the following components of life underwriting risk:
- a) Mortality risk;
 - b) Longevity risk;
 - c) Disability-morbidity risk;
 - d) Lapse risk;
 - e) Expense risk;
 - f) Life catastrophe risk; and
 - g) Retrenchment risk.
- 4.4. The overall capital requirement for life underwriting risk is determined by combining the capital requirements for each risk component above using the formula set out in section 4.9 below.
- 4.5. For life insurance obligations where the original contract boundary is less than one year, insurers must calculate some components of the life underwriting risk capital requirement using simplified calculations set out in the Attachments to this Standard. Where the result of the simplification exceeds the result from applying the specified stress scenario under the standard calculation, insurers must increase the total value of their post-shock liabilities by the additional amount of basic own funds caused by applying the simplification for the relevant risk component.¹
- 4.6. Where a simplification as set out in the Attachments to this Standard is used purely due to applying the principle of proportionality, insurers may opt to perform only the simplified calculation as opposed to performing both the simplified calculation and the corresponding standard calculation.
- 4.7. The scope of the life underwriting risk module includes all life insurance obligations included in the segments in Attachment 1, Part A of FSI 2.2 (Valuation of Technical Provisions). The capital requirement for annuities arising from non-life insurance policies should also be calculated using the life underwriting risk module. Employee benefit liabilities that are reflected on an insurer's balance sheet but do not form part of the technical provisions are not required to be included in the life underwriting risk module.
- 4.8. In calculating the capital requirements associated with each component of life underwriting risk, allowance may be made for the risk mitigating effect of eligible reinsurance contracts and other eligible risk mitigation instruments. The risk of impairment from counterparty default on such instruments, however, must be taken into account in the calculation of the capital requirement for the individual life underwriting risk components. The method for assessing the impairment for counterparty default risk on eligible risk mitigation instruments is set out in Attachment 2 of FSI 4 (Calculation of the SCR using the standardised formula).

¹ For example, if the change in basic own funds is equal to 100 for an obligation with an original contract boundary of less than one year, and the simplification yields a result of 110, the total value of the post-shock liabilities for the relevant risk component should be increased by 10.

Calculating the overall life underwriting risk capital requirement

- 4.9. The capital requirement for life underwriting risk (SCR_{Life}) must be calculated by combining the capital requirements for each life underwriting risk component using the following formula:

$$SCR_{Life} = \sqrt{\sum_{r,c} CorrLife_{r,c} \cdot Life_r \cdot Life_c}$$

Where:

$CorrLife_{r,c}$ = The entries of the correlation matrix $CorrLife$

$Life_r, Life_c$ = Capital requirements for the individual life underwriting risk components r and c according to the rows and columns of correlation matrix $CorrLife$

$CorrLife$ is defined as:

<i>CorrLife</i>	Mortality	Longevity	Disability	Lapse	Expense	Catastrophe	Retrenchment
Mortality	1						
Longevity	-0.25	1					
Disability	0.25	0	1				
Lapse	0	0.25	0	1			
Expense	0.25	0.25	0.5	0	1		
Catastrophe	0.25	0	0.25	0.25	0.25	1	
Retrenchment	0	0	0	0.25	0.25	0	1

5. Mortality Risk

- 5.1. Mortality risk is the risk of loss or adverse change in the value of insurance obligations resulting from changes in the level, trend, or volatility of mortality rates; where an increase in mortality rates leads to an increase in the applicable technical provisions for liabilities subject to mortality risk. Mortality risk arises where an insurer guarantees to make a payment in the event of death.
- 5.2. Insurers should calculate the capital requirement for mortality risk at the product type level.
- 5.3. The capital requirement for mortality risk ($Life_{mort}$) must be calculated as the change in the value of an insurer's basic own funds following a permanent increase in mortality rates, i.e.:

$$Life_{mort} = \Delta BOF | mortshock$$

Where:

ΔBOF	=	The change in the value of basic own funds
<i>mortshock</i>	=	A permanent 15% increase in mortality rates relative to best estimate assumptions ² for each age and each policy where the payment of benefits is contingent on mortality. Insurers should also apply this stress scenario to any policies that are indirectly affected by mortality risk, such as disability-morbidity insurance policies that include future premiums in the valuation that may not be realised in the event of the policyholder's death.

- 5.4. For insurance obligations providing benefits both in the case of death and survival, where the death and survival benefits are contingent on the life of the same insured person, the mortality stress may allow for the netting effect provided by the hedge between death and survival benefit components.³
- 5.5. In calculating the capital requirement for mortality risk, an insurer may assume that management actions can take place under the stress scenario, including changes to future bonus rates on policies with discretionary participation features. The type and extent of management actions that an insurer may assume in the stress must consider whether the stress is insurer-specific or industry-wide. Insurers should calculate the impact of the stress for different combinations of insurer-specific and industry wide events covering scenarios in a range from (25%:75%) to (75%:25%). The capital requirement for mortality risk should then be calculated as the mix that results in the highest capital requirement net of allowance for management action.
- 5.6. For insurance obligations with an original contract boundary of less than one year, the simplified method for calculating the mortality risk capital requirement set out in Attachment 1 must be undertaken.⁴

6. Longevity Risk

- 6.1. Longevity risk is the risk of loss or adverse change in the value of insurance obligations resulting from changes in the level, trend, or volatility of mortality rates; where a decrease in mortality rates leads to an increase in the applicable technical provisions for liabilities subject to longevity risk. Longevity risk arises where an insurer guarantees to make payments in the event of the survival of the policyholder for a specified term.
- 6.2. Insurers should calculate the capital requirement for longevity risk at the product type level.
- 6.3. The capital requirement for longevity risk ($Life_{long}$) must be calculated as the change in value of basic own funds following a permanent decrease in mortality rates and a permanent increase in the rate of future mortality improvements, i.e.:

² The best estimate mortality rates should include the best estimate assumptions for HIV/AIDS extra mortality.

³ Note that no floor applies at the policy level where the net result is less than zero.

⁴ Insurers may also apply the simplified calculation for insurance obligations with a contract boundary of greater than one year provided that the conditions set out in Attachment 1 are met.

$$Life_{long} = \Delta BOF | longevityshock$$

Where:

ΔBOF = The change in the value of basic own funds

longevityshock = A permanent 10% relative decrease in mortality rates relative to best estimate assumptions (i.e. mortality rates should be multiplied by 0.9) and a permanent absolute 1% increase in future mortality improvements relative to best estimate assumptions for each age and each policy, where the payment of benefits is contingent on longevity risk.

- 6.4. For insurance obligations providing benefits both in the case of death and survival, where the death and survival benefits are contingent on the life of the same insured person, the longevity stress may allow for the netting effect provided by the hedge between death and survival benefit components.⁵
- 6.5. In calculating the capital requirement for longevity risk, an insurer may assume that management actions can take place under the stress scenario, including changes to future bonus rates on policies with discretionary participation features. The type and extent of management actions that an insurer may assume in the stress must consider whether the stress is insurer-specific or industry-wide. Insurers should calculate the impact of the stress for different combinations of insurer-specific and industry wide events covering scenarios in a range from (25%:75%) to (75%:25%). The capital requirement for longevity risk should then be calculated as the mix that results in the highest capital requirement net of allowance for management action.
- 6.6. For insurance obligations with an original contract boundary of less than one year, the simplified method for calculating the longevity risk capital requirement set out in Attachment 2 must be undertaken.⁶

7. Disability-Morbidity Risk

- 7.1. Disability or morbidity risk is the risk of loss or adverse change in the value of insurance obligations resulting from changes in the level, trend or volatility of disability-morbidity rates.⁷ The capital requirement for disability-morbidity risk must also cover for the risk of changes to medical inflation relating to medical expense insurance obligations.
- 7.2. Insurers should calculate the capital requirement for disability or morbidity risk at the product type level.

⁵ Note that no floor applies at the policy level where the net result is less than zero.

⁶ Insurers may also apply the simplified calculation for insurance obligations with a contract boundary of greater than one year provided that the conditions set out in Attachment 2 are met.

⁷ Section 1 of the Act defines a “disability event”. Morbidity refers to the need for a defined surgical procedure or hospitalisation due to sickness, injury or infirmity.

- 7.3. The capital requirement for disability-morbidity risk must be assessed separately for the following two sub-classes of insurance obligations:⁸
- a) Medical expense insurance obligations; and
 - b) Income protection and lump sum disability-morbidity insurance obligations.
- 7.4. Medical expense insurance obligations refer to obligations which cover the provision of preventive or curative medical treatment or care due to illness, accident, disability, infirmity or other health factors (including financial compensation for such treatment or care). Examples of policies that should be included in medical expense insurance obligations include:
- a) Major medical expense business written by non-life insurers; and
 - b) Indemnity cover that forms part of workers compensation policies.
- 7.5. Income protection and lump sum disability-morbidity insurance obligations include all of the following types of insurance obligations:
- a) Disability insurance obligations – where the payment of benefits (either lump sum, multiple payments or by a fixed number of instalments) is contingent on disability risk;
 - b) Morbidity insurance obligations – where the payment of benefits (either lump sum, multiple payments or by a fixed number of instalments) is contingent on morbidity risk, and the experience of these policies is only dependent on morbidity rates; and
 - c) Variable payment morbidity insurance obligations – where the payment of benefits is contingent on morbidity risk as well as the duration of the morbidity.
- 7.6. The capital requirement for disability-morbidity risk ($Life_{dis}$) must be calculated by aggregating the capital requirements for medical expense insurance obligations and income protection and lump sum disability-morbidity insurance obligations, i.e.:

$$Life_{dis} = Dis_{me} + Dis_{il}$$

Where:

Dis_{me} = Capital requirement for disability-morbidity risk for medical expense insurance obligations, as calculated under section 7.8 below

Dis_{il} = Capital requirement for disability-morbidity risk for income protection and lump sum disability-morbidity insurance obligations, as calculated under section 7.11 below

- 7.7. In calculating the disability-morbidity risk capital requirement for each sub-class of insurance obligations (Dis_{me} and Dis_{il}), an insurer may assume that management actions can take place under the stress scenarios, including changes to future bonus rates on policies with discretionary participation features. The type and extent of management actions that an insurer may assume in the stresses must consider whether the stress is insurer-specific or industry-wide. Insurers should calculate the impact of the stresses for different combinations of insurer-specific and industry wide

⁸ Schedule 2 of the Act sets out the classes and sub-classes of insurance obligations. The relevant sub-classes for the purposes of determining the capital requirement for disability-morbidity risk are those which feature health and disability benefits.

events covering scenarios in a range from (25%:75%) to (75%:25%). The capital requirement for disability-morbidity risk should then be calculated as the mix that results in the highest capital requirement net of allowance for management action.

Medical expense insurance obligations

- 7.8. The capital requirement for medical expense insurance obligations (Dis_{me}) must be calculated as:

$$Dis_{me} = \max(Dis_{me_up}, Dis_{me_down})$$

Where:

ΔBOF = The change in the value of basic own funds

Dis_{me_up} = $\Delta BOF|claimshock_{up}$

Dis_{me_down} = $\Delta BOF|claimshock_{down}$

The $claimshock_{up}$ and $claimshock_{down}$ scenarios are defined in the table below:⁹

Scenario	Permanent absolute change in claims inflation assumptions ¹⁰	Permanent relative change in claims assumptions ¹¹
$claimshock_{up}$	+1%	+5%
$claimshock_{down}$	-1%	-5%

- 7.9. Both $claimshock_{up}$ and $claimshock_{down}$ scenarios should be assumed to occur immediately after the valuation date. Moreover, the calculation of the change to basic own funds from these scenarios should allow for any relevant adverse changes in policyholders' behaviour (e.g. option exercise rates).
- 7.10. The $claimshock_{down}$ scenario is only required for policies that include a premium adjustment mechanism which foresees an increase of premiums if claims are higher than expected, and a decrease of premiums if claims are lower than expected. Otherwise, insurers should assume that the result of the $claimshock_{down}$ scenario is zero.

⁹ The stresses applied relate to medical expense claims and claims inflation, rather than disability or morbidity probabilities, as a large part of the risk in medical expense insurance is independent from the actual health status of the insured person, and more related to expected annual medical expenses.

¹⁰ If the best estimate annual claims inflation assumption is $x\%$, then the claims inflation assumption that should be used in the $claimshock_{up}$ stress scenario should be $(x + 1)\%$, and the claims inflation assumption that should be used in the $claimshock_{down}$ stress scenario should be $(x - 1)\%$.

¹¹ If the best estimate annual claims rate assumption is $y\%$, then the claims rate assumption that should be used in the $claimshock_{up}$ stress scenario should be $y \cdot (1 + 5\%)$, and the claims rate assumption that should be used in the $claimshock_{down}$ stress scenario should be $y \cdot (1 - 5\%)$.

Income protection and lump sum disability-morbidity insurance obligations

7.11. The capital requirement for income protection and lump sum disability-morbidity insurance obligations (Dis_{il}) must be calculated as:

$$Dis_{il} = \Delta BOF | disshock_{il}$$

Where:

- | | | |
|-----------------|---|--|
| ΔBOF | = | The change in the value of basic own funds |
| $disshock_{il}$ | = | A combination of the following changes applied to each policy where the payment of benefits is contingent on disability or morbidity: <ul style="list-style-type: none">• A permanent increase of 25% in disability-morbidity rates relative to best estimate assumptions; and• Where applicable, a permanent decrease of 20% in disability-morbidity recovery rates relative to best estimate assumptions. |

7.12. For income protection and lump sum disability-morbidity insurance obligations with an original contract boundary of less than one year, the simplified method for calculating the capital requirement (Dis_{il}) set out in Attachment 3 must be undertaken.¹²

8. Lapse Risk

8.1. Lapse risk is the risk of loss or adverse change in the value of insurance obligations due to a change in the expected exercise rates of contractual options, including:

- Options that allow for the insurance cover to be fully or partly terminated, decreased, restricted or suspended;
- Options that allow for the full or partial establishment, renewal, increase, extension or resumption of insurance cover; and
- Options that allow for the non-payment of premiums.

8.2. Insurers should calculate the capital requirement for lapse risk at the homogenous group level. Homogenous groups should be defined at the level of granularity such that no further split of policies within the homogenous group would result in a significant change in the assessment of the lapse risk capital requirement. As a minimum, homogenous groups should be specified at the product type level.

8.3. The capital requirement for lapse risk must be calculated as the maximum loss in basic own funds that results from applying three separate stress scenarios:

- A prescribed “mass lapse” scenario;
- A permanent change in option exercise rates (“level stress” scenario); and
- A combination of the scenarios a) and b) above (“combined stress” scenario).

8.4. The capital requirement for lapse risk ($Life_{lapse}$) must be calculated as:

¹² Insurers may also apply the simplified calculation for income protection and lump sum disability-morbidity insurance obligations with a contract boundary of greater than one year provided that the conditions set out in Attachment 3 are met.

$$Life_{lapse} = \max(A, B, C)$$

Where:

A = The capital requirement under the mass lapse scenario, calculated as:

$$A = \sum_i Lapse_{mass,i}$$

for each homogenous group i . The calculation of $Lapse_{mass,i}$ is set out in section 8.5 below

B = The capital requirement under the level stress scenario, calculated as:

$$B = \sum_i Lapse_{level,i}$$

for each homogenous group i . The calculation of $Lapse_{level,i}$ is set out in section 8.6 below

C = The capital requirement under the combined stress scenario, calculated as:

$$C = \sqrt{\left(\sum_i Lapse_{mass,i}\right)^2 + \left(\sum_i Lapse_{level|mass,i}\right)^2}$$

for each homogenous group i . The calculation of $Lapse_{level|mass,i}$ is set out in sections 8.7 and 8.8 below

8.5. The capital requirement under the mass lapse scenario for homogeneous group i ($Lapse_{mass,i}$) must be calculated as:

$$Lapse_{mass,i} = \max(\Delta BOF | lapseshock_{mass}, 0)$$

Where:

ΔBOF = The change in the value of basic own funds

$lapseshock_{mass}$ = A combination of the following changes:

- An immediate lapse of 40% applied to each homogeneous group that does not incorporate group¹³ obligations where there is a positive surrender strain;¹⁴

¹³ Grouped individual policies where the terms and conditions permit this business to lapse or move to a different insurance provider as a block should be treated as group obligations. Where this is not the case, the insurance obligations should not be treated as group obligations for the purpose of assessing lapse risk. Note that the

Act does not permit future grouped individual business to contain terms and conditions that would allow the business to lapse or move as a block to another insurer.

¹⁴ After applying the relevant $lapseshock_{mass}$, the insurer should continue to apply its best estimate lapse assumptions to each homogeneous group.

- An immediate lapse of 70% applied to each homogeneous group that incorporates group obligations where there is a positive surrender strain; and¹⁵
- A requirement for total expenses (excluding variable acquisition costs and variable costs directly linked to assets under management) to remain constant for one year after the mass lapse event.

8.6. The capital requirement under the level stress scenario for homogeneous group i ($Lapse_{level,i}$) must be calculated as:

$$Lapse_{level,i} = \begin{cases} Lapse_{up,i} , & \text{if } \sum_i Lapse_{up,i} \geq \sum_i Lapse_{down,i} \\ Lapse_{down,i} , & \text{Otherwise} \end{cases}$$

Where:

$Lapse_{down,i}$ = The capital requirement for the risk of a permanent decrease in the rate of option exercise for homogeneous group i , calculated as:

$$Lapse_{down,i} = \max(\Delta BOF | lapseshock_{down}, 0)$$

$lapseshock_{down}$ = A reduction of 50% in the assumed option exercise rates in all future years for all homogeneous groups adversely affected by such risk. Where an option allows the full or partial establishment, renewal, increase, extension or resumption of insurance cover, the 50% reduction should be applied to the rate that the option is not exercised.

$Lapse_{up,i}$ = The capital requirement for the risk of a permanent increase in the rate of option exercise for homogeneous group i , calculated as:

$$Lapse_{up,i} = \max(\Delta BOF | lapseshock_{up}, 0)$$

$lapseshock_{up}$ = An increase of 50% in the assumed option exercise rates in all future years for all homogeneous groups adversely affected by such risk. Where an option allows the full or partial establishment, renewal, increase, extension or resumption of insurance cover, the 50% increase should be applied to the rate that the option is not exercised.

Where the post-stress option exercise rate under this scenario exceeds 100%, the rate should be capped at 100%.

¹⁵ Ibid.

- 8.7. For homogenous groups where the capital requirement under the prescribed mass lapse scenario is greater than zero (i.e. where $Lapse_{mass,i} > 0$), the calculation of $Lapse_{level|mass,i}$ for homogenous group i under the combined stress scenario must be calculated as:

$$Lapse_{level|mass,i} = Lapse_{level,i} \cdot (1 - 0.5 \cdot lapseshock_{mass})$$

Where:

$Lapse_{level,i}$ = The capital requirement under the level stress scenario for homogenous group i , as calculated under section 8.6 above

$lapseshock_{mass}$ = The mass lapse scenario percentage factors defined in section 8.5 above for the corresponding homogenous group i

- 8.8. For homogenous groups where the capital requirement under the mass lapse scenario is less than or equal to zero (i.e. where $Lapse_{mass,i} \leq 0$), the value of $Lapse_{level|mass,i}$ should be set to $Lapse_{level,i}$, as calculated under section 8.6 above.
- 8.9. In calculating the capital requirement for lapse risk, an insurer may assume that management actions can take place under the stress scenarios, including changes to future bonus rates on policies with discretionary participation features. Insurers must, however, exclude management actions that decrease per policy expenses under the $lapseshock_{mass}$ stress scenario over the coming 12 months. The type and extent of management actions that an insurer may assume in the stresses must consider whether the stress is insurer-specific or industry-wide. The capital requirement for lapse risk should be calculated by:
- a) Considering different combinations of insurer-specific and industry wide events covering scenarios in a range from (25%:75%) to (75%:25%) and using the mix that results in the highest capital requirement net of allowance for management action for the mass lapse scenario; and
 - b) Considering different combinations of insurer-specific and industry wide events covering scenarios in a range from (50%:50%) to (75%:25%) and using the mix that results in the highest capital requirement net of allowance for management action for the level stress and combined stress scenarios.
- 8.10. For insurance obligations with an original contract boundary of less than one year, the simplified method for calculating $Lapse_{down}$ and $Lapse_{up}$ (as defined in section 8.6 above) under the level stress and combined stress scenarios set out in Attachment 4 must be undertaken.¹⁶

9. Expense Risk

- 9.1. Expense risk refers to the risk of variations in the expenses incurred in servicing insurance obligations, including the risk from the growth in expenses over and above that of inflation.

¹⁶ Insurers may also apply the simplified calculation for insurance obligations with a contract boundary of greater than one year provided that the conditions set out in Attachment 4 are met.

- 9.2. Insurers should calculate the capital requirement for expense risk at the product type level.
- 9.3. Expense payments that are fixed at the valuation date are not required to be included in the calculation of the expense risk capital requirement.
- 9.4. The capital requirement for expense risk ($Life_{exp}$) must be calculated as:

$$Life_{exp} = \Delta BOF | expshock$$

Where:

- | | | |
|--------------|---|---|
| ΔBOF | = | The change in the value of basic own funds |
| $expshock$ | = | An increase of 10% in future expenses relative to best estimate assumptions, plus an increase of the greater of: <ul style="list-style-type: none"> • An absolute addition of 2% to the best estimate level of expense inflation; and • A 20% increase in the best estimate level of expense inflation. |

- 9.5. In calculating the capital requirement for expense risk, an insurer may assume that management actions can take place under the stress scenario, including changes to future bonus rates on policies with discretionary participation features. For policies with adjustable expense loadings, insurers should only take into account realistic management actions in relation to the loadings. The type and extent of management actions that an insurer may assume in the stress must consider whether the stress is insurer-specific or industry-wide. Insurers should calculate the impact of the stress for different combinations of insurer-specific and industry wide events covering scenarios in a range from (25%:75%) to (75%:25%). The capital requirement for expense risk should then be calculated as the mix that results in the highest capital requirement net of allowance for management action.
- 9.6. For insurance obligations with an original contract boundary of less than one year, the simplified method for calculating the expense risk capital requirement set out in Attachment 5 must be undertaken.¹⁷

10. Life Catastrophe Risk

- 10.1. Catastrophe risk for life insurance obligations is the risk of loss, or of adverse change in the value of insurance obligations, resulting from extreme or irregular events whose effects are not sufficiently captured by the other risk components of life underwriting risk. Examples of catastrophe risk in the context of life insurance include pandemic events or nuclear disasters. Life catastrophe risk is mainly associated with products where an insurer guarantees to make a payment when a policyholder dies, suffers disability or critical illness.
- 10.2. Insurers should calculate the capital requirement for life catastrophe risk for all insurance obligations where an increase in mortality or disability-morbidity rates, from an instantaneous or pandemic/epidemic event, leads to an increase in the applicable technical provisions related to those obligations.

¹⁷ Insurers may also apply the simplified calculation for insurance obligations with a contract boundary of greater than one year provided that the conditions set out in Attachment 5 are met.

- 10.3. Insurers should calculate the capital requirement for life catastrophe risk at the product type level.
- 10.4. The capital requirement for life catastrophe risk ($Life_{CAT}$) must be calculated by combining the capital requirements for mortality catastrophe risk and morbidity catastrophe risk using the following formula:

$$Life_{CAT} = \sqrt{\sum_{r,c} CorrCATLife_{r,c} \cdot CAT_r \cdot CAT_c}$$

Where:

$CorrCATLife_{r,c}$ = The entries of the correlation matrix $CorrCATLife$

CAT_r, CAT_c = Capital requirements for the sub-components of life catastrophe risk r and c according to the rows and columns of the correlation matrix $CorrCATLife$

The correlation matrix $CorrCATLife$ is defined as:

<i>CorrCATLife</i>	Mortality	Morbidity
Mortality	1	
Morbidity	0.25	1

- 10.5. The capital requirement for mortality catastrophe risk (CAT_{mort}) must be calculated as:

$$CAT_{mort} = \Delta BOF | MortCATshock$$

Where:

ΔBOF = The change in the value of basic own funds

$MortCATshock$ = An addition to the monthly mortality rate for each of the following 3 months, followed by a return to the best estimate mortality rate thereafter. The addition should be calculated as:

$$MortCATshock_{rate} = \frac{4 \cdot \min[\max(0.2 \cdot MortRate + 0.105, 0.125), 0.3]}{1,000}$$

where $MortRate$ is the underlying mortality rate per thousand per month for each life insured.¹⁸

- 10.6. The capital requirement for morbidity catastrophe risk (CAT_{morb}) must be calculated as:

$$CAT_{morb} = \Delta BOF | MorbCATshock$$

¹⁸ Where it is not practical to determine a mortality rate per life insured, then exposure weighted averaging may be done at a less granular level (although no less granular than the line of business segments defined in FSI 2.2 (Valuation of Technical Provisions)).

Where:

ΔBOF = The change in the value of basic own funds

$MorbCATshock$ = An addition to the monthly disability-morbidity rate for each of the following 3 months, followed by a return to the best estimate disability-morbidity rate thereafter. The addition should be calculated as:

$$MorbCATshock_{rate} = \frac{4 \cdot 70\% \cdot MorbRate}{1,000}$$

where $MorbRate$ is the underlying disability-morbidity rate per thousand per month for each life insured.¹⁹

- 10.7. In calculating the capital requirements for mortality and morbidity catastrophe risks, the effect of eligible risk mitigation instruments may be taken into account, based on the assumption that 10% of the mortality and morbidity stresses are from man-made or natural catastrophe events, and 90% of the stresses are from epidemic and pandemic causes.
- 10.8. In calculating the capital requirement for life catastrophe risk, an insurer may assume that management actions can take place under the stress scenarios, including changes to future bonus rates on policies with discretionary participation features. The type and extent of management actions that an insurer may assume in the stresses, must consider whether the stress is insurer-specific or industry-wide. For life catastrophe risk, insurers should assume that the stress scenarios result entirely from industry-wide events.
- 10.9. For insurance obligations with an original contract boundary of less than one year, the simplified method for calculating the life catastrophe risk capital requirement set out in Attachment 6 must be undertaken.²⁰

11. Retrenchment Risk

- 11.1. Retrenchment risk is the risk of loss or adverse changes in the value of insurance obligations resulting from changes in the level, trend or volatility of retrenchment inception rates.
- 11.2. Insurers should calculate the capital requirement for retrenchment risk at the product type level.
- 11.3. The capital requirement for retrenchment risk ($Life_{ret}$) must be calculated as:

$$Life_{ret} = \Delta BOF | retshock$$

Where:

ΔBOF = The change in the value of basic own funds

¹⁹ Where it is not practical to determine a disability-morbidity rate per life insured, then exposure weighted averaging may be done at a less granular level (although no less granular than the line of business segments defined in FSI 2.2 (Valuation of Technical Provisions)).

²⁰ Insurers may also apply the simplified calculation for insurance obligations with a contract boundary of greater than one year provided that the conditions set out in Attachment 6 are met.

retshock = A permanent 50% increase in retrenchment inception rates relative to best estimate assumptions for each age and each policy where the payment of benefits is contingent on retrenchment risk

- 11.4. In calculating the capital requirement for retrenchment risk, an insurer may assume that management actions can take place under the stress scenario, including changes to future bonus rates on policies with discretionary participation features. The type and extent of management actions that an insurer may assume in the stress must consider whether the stress is insurer-specific or industry-wide. Insurers should calculate the impact of the stress for different combinations of insurer-specific and industry wide events covering scenarios in a range from (25%:75%) to (75%:25%). The capital requirement for retrenchment risk should then be calculated as the mix that results in the highest capital requirement net of allowance for management action.
- 11.5. For insurance obligations with an original contract boundary of less than one year, the simplified method for calculating the retrenchment risk capital requirement set out in Attachment 7 must be undertaken.²¹

²¹ Insurers may also apply the simplified calculation for insurance obligations with a contract boundary of greater than one year provided that the conditions set out in Attachment 7 are met.

Attachment 1: Simplification for Mortality Risk

This Attachment sets out the conditions and methodology for applying the simplified method to calculate the capital requirement for mortality risk.

1. For insurance obligations with a contract boundary of greater than one year, the simplified method for calculating the mortality risk capital requirement may be used under the following conditions:
 - a) The simplification is proportionate to the nature, scale and complexity of the risk; and
 - b) The standard calculation of the mortality risk capital requirement is an undue burden for the insurer; or
 - c) For group or grouped individual policies, the technical provisions are calculated at an aggregate level and are not based on individual policyholder cash-flow projections.
2. For insurance obligations where the contract boundary is less than one year, the simplified calculation must be performed regardless of whether the conditions set out above are met.
3. The simplified calculation may be assessed net of an allowance for future management actions.
4. The capital requirement for mortality risk ($Life_{mort}$) based on the simplified method must be calculated as:

$$Life_{mort} = 0.15 \cdot CAR \cdot q \cdot n \cdot 1.1^{(n-1)/2}$$

Where:

- CAR = The total positive capital-at-risk in relation to each product type, calculated as:
- A) The amount the insurer would currently pay in the event of the death of the persons insured under the policy; **plus**
 - B) The expected present value of amounts not covered in point A) the insurer would pay in the future in the event of the immediate death of the persons insured under the policy; **less**
 - C) The best estimate liabilities of the corresponding obligations in points A) and B).

Each of the amounts above should be calculated net of amounts recoverable from eligible risk mitigation instruments.

Where the capital-at-risk calculated for a product type is negative, CAR should be set to zero.

- q = The insurer-specific expected average death rate (including the best estimate assumption for HIV/AIDS extra mortality) over the coming 12 months, weighted by the sum assured

n = The modified duration of the liability cash-flows, which must be set to no less than one year

Attachment 2: Simplification for Longevity Risk

This Attachment sets out the conditions and methodology for applying the simplified method to calculate the capital requirement for longevity risk.

1. For insurance obligations with a contract boundary of greater than one year, the simplified method for calculating the longevity risk capital requirement may be used under the following conditions:
 - a) The simplification is proportionate to the nature, scale and complexity of the risk; and
 - b) The standard calculation of the longevity risk capital requirement is an undue burden for the insurer.
2. For insurance obligations where the contract boundary is less than one year, the simplified calculation must be performed regardless of whether the conditions set out above are met.
3. The simplified calculation may be assessed net of an allowance for future management actions.
4. The capital requirement for longevity risk ($Life_{long}$) based on the simplified method must be calculated as:

$$Life_{long} = 0.25 \cdot BE_{long} \cdot q \cdot n \cdot 1.1^{(n-1)/2}$$

Where:

BE_{long}	=	The best estimate liability for policies subject to longevity risk
q	=	The insurer-specific expected average death rate (including the best estimate assumption for HIV/AIDS extra mortality) over the coming 12 months, weighted by the sum assured
n	=	The modified duration of the liability cash-flows, which must be set to no less than one year

Attachment 3: Simplification for Disability-Morbidity Risk

This Attachment sets out the conditions and methodology for applying the simplified method to calculate the capital requirement for disability-morbidity risk in relation to income protection and lump sum disability-morbidity insurance obligations.

1. For income protection and lump sum disability-morbidity insurance business with a contract boundary of greater than one year, the simplified calculation for the disability-morbidity risk capital requirement may be used under the following conditions:
 - a) The simplification is proportionate to the nature, scale and complexity of the risk; and
 - b) The standard calculation of the disability-morbidity risk capital requirement for income protection and lump sum disability-morbidity insurance obligations is an undue burden for the insurer; or
 - c) For group or grouped individual policies, the technical provisions are calculated at an aggregate level and are not based on individual policyholder cash-flow projections.
2. For income protection and lump sum disability-morbidity insurance obligations where the contract boundary is less than one year, the simplified calculation must be performed regardless of whether the conditions set out above are met.
3. The simplified calculation may be assessed net of an allowance for future management actions.
4. The capital requirement for income protection and lump sum disability-morbidity insurance obligations (Dis_{il}) based on the simplified method must be calculated as:

$$Dis_{il} = 0.25 \cdot CAR \cdot q \cdot n \cdot 1.1^{(n-1)/2} + 0.2 \cdot BE_t \cdot t \cdot n \cdot 1.1^{(n-1)/2}$$

Where:

- CAR = The total positive capital-at-risk in relation to each product type, calculated as:
- A) The amount the insurer would currently pay in the event of the disability or morbidity of the persons insured under the policy; **plus**
 - B) The expected present value of amounts not covered in point A) the insurer would pay in the future in the event of the immediate disability or morbidity of the persons insured under the policy; **less**
 - C) The best estimate liabilities of the corresponding obligations in points A) and B).

Each of the amounts above should be calculated net of amounts recoverable from eligible risk mitigation instruments.

Where the capital-at-risk calculated for a product type is negative, CAR should be set to zero.

- q = The insurer-specific expected average rate of

transition from healthy to sick or disabled over the coming 12 months, weighted by the sum assured or annual payment

n = The modified duration of the liability cash-flows, which must be set to no less than one year

BE_t = The best estimate liability for insurance obligations subject to termination or recovery risk

t = The insurer-specific expected average rate of transition from sick or disabled to healthy or dead over the coming 12 months, weighted by the sum assured or annual payment

Attachment 4: Simplification for Lapse Risk

This Attachment sets out the conditions and methodology for applying the simplified method to calculate $Lapse_{down}$ and $Lapse_{up}$ (as defined in section 8.6 in this Standard), when calculating capital requirements under the level stress and combined stress scenarios for lapse risk.

1. For insurance obligations with a contract boundary of greater than one year, the simplified method for calculating $Lapse_{down}$ and $Lapse_{up}$ may be used under the following conditions:
 - a) The simplification is proportionate to the nature, scale and complexity of the risk; and
 - b) The standard calculation of $Lapse_{down}$ and $Lapse_{up}$ is an undue burden for the insurer; or
 - c) For group or grouped individual policies, the technical provisions are calculated at an aggregate level and are not based on individual policyholder cash-flow projections.
2. For insurance obligations where the contract boundary is less than one year, the simplified calculation of $Lapse_{down}$ and $Lapse_{up}$ must be performed regardless of whether the conditions set out above are met.
3. The simplified calculation may be assessed net of an allowance for future management actions.
4. The simplified method for calculating $Lapse_{down}$ and $Lapse_{up}$ must be calculated as:

$$Lapse_{down} = 50\% \cdot l_{down} \cdot n_{down} \cdot S_{down}$$

$$Lapse_{up} = 50\% \cdot l_{up} \cdot n_{up} \cdot S_{up}$$

Where:

l_{down} = Estimate of the average rate of option exercise of the homogenous groups with a negative surrender strain

l_{up} = Estimate of the average rate of option exercise of the homogenous groups with a positive surrender strain

n_{down} = Average number of years (weighted by surrender strain) over which the homogenous groups with a negative surrender strain run-off, subject to a minimum of one year

n_{up} = Average number of years (weighted by surrender strain) over which the homogenous groups with a positive surrender strain run-off, subject to a minimum of one year

S_{down} = Sum of negative surrender strains

S_{up} = Sum of positive surrender strains

Attachment 5: Simplification for Expense Risk

This Attachment sets out the conditions and methodology for applying the simplified method to calculate the capital requirement for expense risk.

1. For insurance obligations with a contract boundary of greater than one year, the simplified method for calculating the expense risk capital requirement may be used under the following conditions:
 - a) The simplification is proportionate to the nature, scale and complexity of the risk; and
 - b) The standard calculation of the expense risk capital requirement is an undue burden for the insurer; or
 - c) For group or grouped individual policies, the technical provisions are calculated at an aggregate level and are not based on individual policyholder cash-flow projections.
2. For insurance obligations where the contract boundary is less than one year, the simplified calculation must be performed regardless of whether the conditions set out above are met.
3. The simplified calculation may be assessed net of an allowance for future management actions.
4. The capital requirement for expense risk ($Life_{exp}$) based on the simplified method must be calculated as:

$$Life_{exp} = 0.1 \cdot n \cdot E + \left(\frac{1}{k} \cdot ((1 + k)^n - 1) - \frac{1}{i} \cdot ((1 + i)^n - 1) \right) \cdot E$$

Where:

n	=	The modified duration of the liability cash-flows associated with life insurance obligations serviced during the past 12 months, which must be set to no less than one year
E	=	Amount of expenses incurred in servicing life insurance obligations during the past 12 months
k	=	The stressed inflation rate as calculated under section 9.4 of this Standard
i	=	Weighted average inflation rate included in the calculation of the best estimate of life insurance obligations serviced during the past 12 months, weighted by the present value of expenses included in the calculation of the best estimate for servicing all existing life insurance obligations

Attachment 6: Simplification for Life Catastrophe Risk

This Attachment sets out the conditions and methodology for applying the simplified method to calculating the mortality and morbidity catastrophe risk capital requirements.

1. The simplified calculation for the mortality and morbidity catastrophe risk capital requirements may be used under the following conditions:
 - a) The simplification is proportionate to the nature, scale and complexity of the risk; and
 - b) The standard calculation of the life catastrophe risk capital requirement is an undue burden for the insurer.
2. For insurance obligations where the contract boundary is less than one year, the simplified calculation must be performed regardless of whether the conditions set out above are met.
3. The simplified calculation may be assessed net of an allowance for future management actions.
4. The capital requirement for mortality catastrophe risk (CAT_{mort}) based on the simplified method must be calculated as:

$$CAT_{mort} = \sum_i MortCAT_{shock_{rate}} \cdot CAR_i \cdot \min(CB_i; 3)$$

Where:

The index i denotes each policy where the payment of benefits is contingent on mortality

$MortCAT_{shock_{rate}}$ is calculated as per section 10.5 of this Standard

CB_i	=	The outstanding duration until the contract boundary in months, which must be set to no less than one month
CAR_i	=	$SA_i + AB_i \cdot Annuity_factor - BE_i$
SA_i	=	The sum assured (net of eligible reinsurance) on death for each policy i where benefits are payable as a single lump sum
AB_i	=	The annualised amount of benefit (net of eligible reinsurance) payable on death for each policy i where benefits are not payable as a single lump sum
$Annuity_factor$	=	The average annuity factor for the expected duration over which benefits may be payable in the event of a claim
BE_i	=	Best estimate liability (net of eligible reinsurance) for each policy i

5. The capital requirement for morbidity catastrophe risk (CAT_{morb}) based on the simplified method must be calculated as:

$$CAT_{morb} = \sum_i MorbCAT\ shock_{rate} \cdot CAR_i \cdot \min(CB_i; 3)$$

Where:

The index i denotes each policy where the payment of benefits is contingent on disability or morbidity

$MorbCAT\ shock_{rate}$ is calculated as per section 10.6 in this Standard

CB_i	=	The outstanding duration until the contract boundary in months, which must be set to no less than one month
CAR_i	=	$SA_i + AB_i \cdot Annuity_factor - BE_i$
SA_i	=	The sum assured (net of eligible reinsurance) on sickness or disability for each policy i where benefits are payable as a single lump sum
AB_i	=	The annualised amount of benefit (net of eligible reinsurance) payable on sickness or disability for each policy i where benefits are not payable as a single lump sum
$Annuity_factor$	=	The average annuity factor for the expected duration over which benefits may be payable in the event of a claim
BE_i	=	Best estimate liability (net of eligible reinsurance) for each policy i

Attachment 7: Simplification for Retrenchment Risk

This Attachment sets out the conditions and methodology for applying the simplified method to calculate the capital requirement for retrenchment risk.

1. The simplified method for calculating the retrenchment risk capital requirement may be used under the following conditions:
 - a) The simplification is proportionate to the nature, scale and complexity of the risk; and
 - b) The standard calculation of the retrenchment risk capital requirement is an undue burden for the insurer.
2. The simplified calculation may be assessed net of an allowance for future management actions.
3. The capital requirement for retrenchment risk ($Life_{ret}$) based on the simplified method must be calculated as:

$$Life_{ret} = 0.5 \cdot CAR \cdot q \cdot n$$

Where:

- CAR = The total positive capital-at-risk in relation to each product type, calculated as:
- A) The amount the insurer would currently pay in the event of the persons insured being retrenched under the policy; **plus**
 - B) The expected present value of amounts not covered in point A) the insurer would pay in the future in the event of the persons insured being retrenched under the policy; **less**
 - C) The best estimate liabilities of the corresponding obligations in points A) and B).

Each of the amounts above should be calculated net of amounts recoverable from eligible risk mitigation instruments.

Where the capital-at-risk calculated for a product type is negative, CAR should be set to zero.

- q = The insurer-specific expected average retrenchment rate over the coming 12 months, weighted by the sum assured
- n = The modified duration of the liability cash-flows, which must be set to no less than one year