

## Guidance Note FSI GN 2.2

### Valuation of Technical Provisions

#### Objectives of this Guidance Note

*The FSI Guidance Notes aim to assist insurers in complying with the requirements outlined in the Financial Soundness Standards for Insurers. While the Standards have the force of law and are used to establish minimum requirements with which insurers must comply, the Guidance Notes provide guidance only and do not have the same level of enforceability as the Standards. Insurers are not obliged to adopt the guidance, and are free to demonstrate that the requirements of the Standards are otherwise met.*

*Guidance Note FSI GN 2.2 sets out practices and guidelines aimed to assist insurers with their compliance with the requirements of FSI 2.2 (Valuation of Technical Provisions). Not all practices or guidelines in this Guidance Note may be relevant to all insurers, and some aspects may need to be varied based on an insurer's individual circumstances and characteristics. Subject to the requirements of FSI 2.2 (Valuation of Technical Provisions), insurers have the flexibility to value their technical provisions in the way most suited to the nature, size, complexity and risk profile of their business.*

#### Table of contents

Chapter 1: Applying the Principle of Substance Over Form .....	2
Chapter 2: Determining Contract Boundaries .....	4
Chapter 3: Possible Simplifications for Calculating the Risk Margin.....	8
Chapter 4: Instances When Technical Provisions can be Calculated as a Whole .....	15
Chapter 5: Applying the Principle of Proportionality .....	17
Chapter 6: Possible Simplifications for Life Insurance .....	20
Chapter 7: Possible Simplifications for Non-life Insurance .....	23
Chapter 8: Possible Simplifications for Reinsurance Recoverables .....	28
Chapter 9: Expenses Used in Assumptions.....	32
Chapter 10: Iterative Approach for determining the SCR using the technical provisions including the risk margin .....	35

## Chapter 1: Applying the Principle of Substance Over Form

Section 5.3 of FSI 2.2 (Valuation of Technical Provisions) requires insurers to apply the “principle of substance over form” when segmenting between life and non-life insurance obligations in the valuation of technical provisions. Under this principle, segmentation must be based on the nature of the risks underlying the insurance obligation rather than the legal form of the insurance contract.

Part A of this Chapter sets out general guidance when applying the principle of substance over form, while Part B provides additional guidance in relation to annuities arising in non-life insurance.

### **A. General guidance**

1. When valuing technical provisions, a distinction between valuations based on life techniques and valuations based on non-life techniques is often used. This distinction between life and non-life techniques is aimed towards the nature of the liabilities (substance), which may not necessarily match the legal form (form) of the contract that originated the liability. Choosing between life and non-life actuarial techniques to value liabilities based on the nature of the risks associated with the liability is the essence of the principle of substance over form.
2. Traditional life actuarial techniques to calculate the best estimate often involve discounted cash-flow models, generally applied on a policy-by-policy basis, which explicitly take into account risk factors such as mortality, survival and changes in the health status of the insured. In contrast, traditional non-life actuarial techniques include a number of different approaches, such as methodologies based on:
  - a) The projection of run-off triangles;
  - b) Frequency/severity models, where the number of claims and the severity of each claim is assessed separately; and
  - c) The estimation of the expected loss ratio or other relevant ratios.
3. In the majority of cases, the form of an insurance policy will correspond to the substance. For certain policies, however, the use of non-life valuation techniques may be better suited to calculate the technical provisions for life insurance policies, and vice versa.

### **B. Guidance in relation to annuities arising from non-life insurance policies**

1. Where non-life insurance policies give rise to the payment of annuities, such liabilities should be valued using techniques commonly used in life insurance. Insurers should value the technical provisions related to the annuities separately from the technical provisions related to the remaining non-life obligations.
2. The valuation of the annuity component should use appropriate life insurance valuation techniques, and be consistent with the valuation of life insurance annuities with comparable technical features.
3. The remaining obligations in the insurer’s non-life business should be valued separately. Insurers may use, where appropriate, one of the following approaches to value the best estimate of provisions for claims outstanding for the remaining non-life obligations where annuities are valued separately:
  - a) Separate calculation of non-life liabilities – under this approach, the run-off triangle used as the basis for the valuation of the technical provisions would not include any cash-flows relating to the annuities. An additional estimate of the amount of annuities not yet reported, as well as amounts reported but not yet agreed, should be added.

- b) Allowance of agreed annuities as single lump-sum payments in the run-off triangle – similar to the first approach, a separate valuation of the best estimate would be required for annuities in payment and the remaining obligations. The run-off triangle used to value the technical provisions of the remaining obligations would not include any claims payments for annuities in payment. However, payments on claims before annuitisation<sup>1</sup> and payments at the time of annuitisation remain included in the run-off triangle. At the time of annuitisation, the best estimate of the annuity (valued separately according to life valuation techniques) would be shown as a single lump-sum payment in the run-off triangle, calculated as at the date of the annuitisation. Where the analysis is based on run-off triangles of incurred claims, the lump sum payment should reduce the case reserves at the date of annuitisation.

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<sup>1</sup> The term “annuitisation” denotes the point in time where the insurer becomes obligated to pay the annuity.

## Chapter 2: Determining Contract Boundaries

Section 8 of FSI 2.2 (Valuation of Technical Provisions) sets out requirements for insurers in determining the contract boundary. Part A of this Chapter provides general guidance regarding the concept of the contract boundary, Part B provides additional guidance for the assessment of contract boundaries for different types of insurance policies, and Part C provides additional guidance in relation to reinsurance contracts.

### **A. General guidance**

1. The contract boundary is set to ensure that all known material risks inherent in the policy are accurately reflected in the calculation of technical provisions and capital requirements. When the insurer has the unilateral right to review policy conditions to fully reflect future known material risks, the contract boundary should be set at this point as the insurer is not exposed to any material known risks beyond this point.
2. An insurer should take into account internal and external limitations on their ability to review policy conditions to fully reflect future risk, such as external regulations and the time required to implement system changes. The need to account for these considerations introduces a certain level of subjectivity in assessing contract boundaries, but an assessment purely based on legal grounds may result in arbitrary contract boundaries that do not relate to the risks taken.

### **B. Specific guidance for product types**

1. The following sets out further guidance on the assessment of contract boundaries for different types of insurance policies:
  - a) Linked investment policies:
    - i. A zero contract boundary should be used for linked investment policies. The valuation using a zero contract boundary should correspond to the number of units multiplied by the unit price as at the valuation date.
  - b) Investment policies with no financial guarantees:
    - i. The contract boundary should be the point where the insurer has the unilateral right to change policy conditions on a contract level<sup>2</sup> to fully reflect the risk inherent in the policy. This boundary should not be longer than the contractual end of the policy. At the contract boundary, allowance should be made for the full projected account balance to be paid to the policyholder.
    - ii. For open-ended contracts where the insurer does not have the unilateral right to change policy conditions or terminate the policy, a long contract boundary should be assumed with persistency assumptions dictating the run-off of the business.
  - c) Guaranteed annuity options that may be available under retirement annuities should not extend the contract boundary for retirement annuities. The best estimate liability of the retirement annuity contract should reflect the value of the embedded derivative during the term of the retirement annuity.

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<sup>2</sup> For group investment contracts with no financial guarantees, this point should be assessed at the scheme level rather than the contract level.

- d) Investment policies with financial guarantees:
- i. Where a policy has a financial guarantee, the contract boundary should be the greater of: i) the point where the insurer has the unilateral right to change policy conditions on a contract level<sup>3</sup> to fully reflect the risk inherent in the policy (this boundary should not be longer than the contractual end of the policy); and ii) the point where the financial guarantee ends.
  - ii. At the contract boundary, allowance should be made for the full projected account balance to be paid to the policyholder.
  - iii. For open-ended policies where the insurer does not have the unilateral right to change policy conditions or terminate the policy, a long contract boundary should be assumed with persistency assumptions dictating the run-off of the business.
- e) Individual life risk policy:
- i. The contract boundary should generally be the same as the contract term where the pricing of the premiums takes into account risks that relate to future periods. The insurer may have the ability to implement certain management actions, such as changing future premium rates after an initial guaranteed term. Allowance should be made for the management actions that the insurer could reasonably be expected to implement and allow appropriately for expected policyholder behaviour.
  - ii. If the insurer can only re-price on a portfolio level, the unilateral right to change policy conditions to fully reflect risk inherent in the specific policy is limited and therefore a longer contract boundary should apply. In order for a shorter boundary to apply, the insurer should have the right to set premium rates for existing policies that are the same as that for new policyholders with the same risk profile and should also have the right to re-underwrite the policies (on the same rules as applying for new policies).
  - iii. The contract boundary should not be longer than the contractual end of the policy.
- f) Grouped individual risk policies:<sup>4</sup>
- i. These policies should generally be assessed as group life assurance products where the contract boundary should be the next review date.
- g) Group life assurance:
- i. The contract boundary should be the point where the insurer has the unilateral right to change policy conditions on a scheme level to fully reflect the risk inherent in the policy. Where the premium rates are reviewed at a scheme level on an annual basis, the contract boundary should be the next review date (unless rates are guaranteed for a longer period).
- h) Non-life insurance policies:
- i. Policies should be valued until rates can next be reviewed. Policies that the insurer can re-price given one month's notice should have a contract boundary

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<sup>3</sup> For group investment contracts with financial guarantees, this point should be assessed at the scheme level rather than the contract level.

<sup>4</sup> This category specifically relates to group-scheme type business, such as credit life offerings, where individual contracts are issued to policyholders, and where underwriting and risk differentiation in pricing is limited.

of one month, and all cash-flows and obligations that relate to insurance cover within the contract boundary should belong to the contract.

- i) Non-life insurance loyalty schemes/bonuses:
  - i. For benefits that are contingent on certain events (such as loyalty or performance bonuses paid in the event policyholders remain in-force or claim-free for certain periods), the technical provisions for the loyalty benefits should be calculated separately from the technical provisions of the main benefit. The determination of the contract boundary should therefore also be made separately for these benefits. Where re-pricing and contract termination would apply to loyalty benefits in the same manner as the underlying policy, consistent boundary definitions should be used.

### **C. *Specific guidance in relation to reinsurance***

1. For direct writers of life and non-life insurance that use reinsurance as a risk mitigation instrument, the reinsurance recoverable should be calculated over a contract boundary consistent with that of the underlying insurance contract. Any profit commission, sliding scale commission or similar experience-related payments that the insurer expects to receive should be included in the projected reinsurance cash-flows, calculated on a basis consistent with that used to project the other cash-flows.
2. For reinsurers of life insurance business, the following considerations should be taken into account when determining contract boundaries:
  - a) The contract boundary should be the point where the reinsurer has the unilateral right to change policy conditions to fully reflect the risk inherent in the contract or to terminate the contract, unless the reinsurer can compel the insurer (policyholder) to pay the premiums for future obligations beyond this point.
  - b) The terms of a treaty may allow the reinsurer to increase rates at a review point, where the insurer has the option to either terminate or continue with the treaty under the new terms. If it is expected that the terms will remain unchanged, it is appropriate to use a contract boundary equal to the contract term as future premiums can be compelled. For a profitable treaty to the reinsurer, a contract boundary equal to the underlying contract term should be used; for an unprofitable treaty, the next premium review date should be used if it is the best estimate view of the reinsurer that rates will be increased. If it is the best estimate view of the reinsurer that rates will not be increased, then a contract boundary equal to the underlying contract terms should be used. The insurer should review this decision for each of the SCR shocks considered.
  - c) For reinsurance of group life business, the contract boundary should generally be the next renewal date. If the contract includes an automatic renewal clause, and the cancellation date has passed, then the contract boundary is the renewal date plus the period for which the new rate is being guaranteed.
  - d) Profit commission should be included using an economic view over the contract term.
3. For reinsurers of non-life insurance business, the following considerations should be taken into account when determining contract boundaries:
  - a) The contract boundary should be the point where the reinsurer has the unilateral right to change policy conditions on a contract level to fully reflect the risk inherent in the contract.
  - b) The contract must be recognised when the risk incepts, or when the reinsurer has committed to the risk if the contract is expected to be onerous.

- c) Contract boundaries of insurers and reinsurers for the same underlying contracts may be different due to differences in reinsurance contract and policy wordings.
- d) Profit commission should be included using an economic view over the contract term.

## Chapter 3: Possible Simplifications for Calculating the Risk Margin

Section 14.18 of FSI 2.2 (Valuation of Technical Provisions) permits insurers to apply a simplified method for calculating the risk margin, subject to the approach being proportionate to the nature, scale and complexity of the risks of the insurer's business. This Chapter provides additional guidance for insurers on possible approaches to calculate the risk margin using a simplified method. Part A sets out the general approaches available based on a hierarchy of possible approaches, while Parts B to E set out details regarding how each approach under the hierarchy may be implemented.

While the guidance in this Chapter is described in the context of insurers using the standardised formula to calculate their SCR, the application of simplified methods for cases where the SCR is calculated using an internal model should follow the same general principles.

### **A. *Hierarchy of simplifications***

1. If an insurer chooses to apply a simplified method for calculating the risk margin, the following hierarchy of approaches may be used to guide decisions regarding the scope of simplification applied:
  - a) Level 1 – approximate the individual risk categories or components within some or all of the modules used for the calculation of future SCRs.
  - b) Level 2 – approximate the whole SCR for each future year by, for example, using a proportional approach.
  - c) Level 3 – estimate all future SCRs “at once” by, for example, using an approximation based on the duration approach.
  - d) Level 4 – approximate the risk margin by calculating it as a percentage of the best estimate (applicable to non-life insurers only).
2. The hierarchy above involves a higher degree of simplification at each level (i.e. the Level 4 approach involves a higher degree of simplification than the Level 3 approaches), although several of the approaches may be used in conjunction for different lines of business. Insurers should adopt the approach that most appropriately captures the material characteristics of their risk profile, while satisfying the principle of proportionality.

### **B. *Simplifications for individual risk categories or components to calculate future SCRs (Level 1 of the hierarchy)***

1. This approach focuses on simplified methods to approximate future SCRs in relation to:
  - a) Underwriting risk (life and non-life);
  - b) Counterparty default risk with respect to ceded reinsurance; and
  - c) Unavoidable market risk.

#### ***Life underwriting risk***

2. The simplifications for calculating mortality, longevity, disability-morbidity, lapse, expense, catastrophe and retrenchment risks in the life underwriting risk module of the SCR calculations may carry over to the calculation of future SCRs. The Attachments to FSI 4.2 (Life Underwriting Risk Capital Requirement) set out the simplified methods for calculating these risks in further detail.



### **Non-life underwriting Risk**

3. The calculation of future SCRs related to premium and reserve risk may be simplified in the following circumstances:
- a) If the premium volume in year  $t$  is small compared to the reserve volume, then the premium volume for year  $t$  may be set to 0.
  - b) If the premium volume is zero, then the capital requirement for non-life underwriting risk in year  $t$  ( $SCR_{NL}(t)$ ) may be approximated by the formula:

$$SCR_{NL}(t) = 3 \cdot \sigma_{res} \cdot PCO_{net}(t)$$

Where:

$\sigma_{res}$	=	Aggregated standard deviation for reserve risk
$PCO_{net}(t)$	=	Best estimate provisions for claims outstanding net of eligible reinsurance in year $t$

4. As a further simplification, any insurer-specific parameters used for premium risk and reserve risk calculations may be assumed to remain unchanged for all future years, and the capital requirement for non-life catastrophe risk need only take into account insurance policies that exist at  $t = 0$ .

### **Counterparty default risk**

5. Under the standardised formula for calculating the SCR, counterparty default risk for eligible reinsurance ceded is assessed for the whole portfolio instead of separate segments. If the risk of default in a segment is deemed to be similar to the total default risk, or if the default risk in a segment is immaterial, then the risk charge may be estimated by applying reinsurers' share of best estimates to the level of the total capital charge for reinsurers' default risk in year 0. If the exposure to the default of the reinsurers does not vary considerably throughout the development years, the risk charge may be approximated by applying reinsurers' share of best estimates to the level of risk charge that is observed in year 0.

### **Unavoidable market risk**

6. Insurers should develop a practical approach when assessing the unavoidable market risk for the purposes of the risk margin calculation. The risk is required to be taken into account only when it is significant.
7. Unavoidable market risk may arise if there is an unavoidable mismatch between the cash-flows of the insurance liabilities and the financial instruments available to cover the liabilities. In particular, such a mismatch is unavoidable if the maturity of the available financial instruments is lower than the maturity of the insurance liabilities. If such a mismatch exists, it usually leads to a capital requirement for interest rate risk under the downward stress scenario under the standardised formula for calculating market risk capital requirements in FSI 4.1 (Market Risk Capital Requirement). The focus of the simplification is on this particular kind of market risk.

8. The contribution of the unavoidable market risk to the risk margin may be approximated as:

$$CoCM_{Mkt} \approx CoC \cdot UM_{RU}$$

Where:

$CoC$	=	cost-of-capital rate
$UM_{RU}$	=	Approximated sum of the present and future SCRs covering the unavoidable market risk, calculated as: $= \max[0.5 \cdot BE_{net}(0) \cdot (Dur_{mod} - n) / (Dur_{mod} - n + 1) \cdot \Delta r_n, 0]$
$BE_{net}(0)$	=	Best estimate net of eligible reinsurance as assessed at time $t = 0$ for the insurer's portfolio of insurance liabilities
$Dur_{mod}$	=	Modified duration of the insurer's insurance liabilities net of eligible reinsurance at $t = 0$
$n$	=	The longest duration of available risk-free financial instruments (or composition of instruments) to cover the insurance liabilities
$\Delta r_n$	=	The absolute of the decrease of the risk-free interest rate for maturity $n$ under the downward stress scenario of the interest rate risk module specified in FSI 4.1 (Market Risk Capital Requirement)

9. The calculations for unavoidable market risk should be carried out per currency.
10. The calculation method above for unavoidable market risk may also be applied in conjunction with a proportional or duration approach (see below), given that the necessary adjustments are made in the relevant formulas.
11. In cases where the longest duration of the risk-free financial instruments is low compared to the modified duration of the insurance liabilities, the unavoidable market risk may have a significant impact on the overall risk margin. In such cases, the insurer should consider replacing the approximation described with a more accurate simplification.

### **C. Simplifications using a proportional approach (Level 2 of the hierarchy)**

1. Simplifications under Level 2 of the hierarchy are generally premised on the assumption that the future SCRs are proportional to the best estimate technical provisions for the relevant year, whereby the proportionality factor is the ratio of the present SCR to the present best estimate technical provisions (as calculated by the reference insurer).
2. In order to simplify the calculation, projections of future SCRs may combine the calculations of the basic SCR and the SCR related to operational risk instead of making separate projections for these elements.
3. An approach to determining the overall SCR for each future year using a proportional approach is to calculate the SCR of the reference insurer in the following manner:

$$SCR_{RU}(t) = \left( \frac{SCR_{RU}(0)}{BE_{net}(0)} \right) \cdot BE_{net}(t)$$

Where:

$SCR_{RU}(0)$	=	The SCR as calculated at $t = 0$ for the reference insurer's portfolio of insurance obligations
$BE_{net}(0)$	=	The best estimate technical provisions net of eligible reinsurance as assessed at $t = 0$ for the reference insurer

$BE_{net}(t)$  = The best estimate technical provisions net of eligible reinsurance as assessed at time  $t$  for the reference insurer for  $t = 1, 2, 3, \dots$

4. This simplified method accounts for the maturity and the run-off pattern of the obligations net of eligible reinsurance. However, it assumes that certain risks associated with the insurance obligations remain unchanged over the years. In particular, it assumes that:
  - a) The composition of the risk components of underwriting risk remains the same over the years;
  - b) The average credit standing of reinsurers remains the same over the years;
  - c) The unavoidable market risk in relation to the net best estimate remains the same over the years; and
  - d) The proportion of reinsurers' share of the obligations remains the same over the years.
5. An insurer using this simplification should consider the extent to which the assumptions referred to above are fulfilled. If some or all of these assumptions do not hold, the insurer should adopt an alternative calculation method.
6. The calculation method set out above is only one example for implementing the proportional approach. An insurer may also be able to apply the simplification in a piecewise manner across years. For instance, if the business can be split into sub-lines having different maturities, then the whole run-off period of the obligations could be divided into periods of consecutive years when performing the calculation. An insurer may also choose to apply the simplification at a more granular level (e.g. for individual risk modules).
7. Insurers should also consider the manner in which the best estimate technical provisions (net of eligible reinsurance) has been calculated when using a proportional approach for simplification. Insurers should note that, even if the simplified approach for determining best estimates of eligible reinsurance recoverables leads a reasonable figure for the best estimate net of eligible reinsurance ( $BE_{net}(t)$ ) relative to the best estimate gross of eligible reinsurance ( $BE_{gross}(t)$ ) at time  $t = 0$ , such a result does not necessarily mean that all future estimates of the best estimate net of eligible reinsurance will be equally reliable. In such circumstances, insurers should consider possible adjustments to the method, or the use of an alternative approach.
8. With respect to operational risk, insurers should note that the capital charge for this risk at  $t = 0$  is basically a function of the best estimate technical provisions gross of eligible reinsurance, earned premiums gross of eligible reinsurance, and assets under management (for linked business). Insurers should assess the extent to which the simplification based on a proportional approach introduces a bias in the risk margin calculations.<sup>5</sup>

#### ***D. Simplifications using the duration approach (Level 3 of the hierarchy)***

1. A possible simplified method to calculate the risk margin under Level 3 of the hierarchy is to use the modified duration of the liabilities to calculate the present, and all future, SCRs in a single step. Under this approach, the calculation would be performed in the following manner:

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<sup>5</sup> The simplification assumes that the SCRs for the operational risk develop at the same rate with the best estimate technical provisions net of reinsurance. To the extent this assumption does not hold, bias may be introduced in the calculation.

$$CoCM = \left( \frac{CoC}{1 + r_1} \right) \cdot Dur_{mod}(0) \cdot SCR_{RU}(0)$$

Where:

$CoC$	=	The cost-of-capital rate
$r_1$	=	The risk-free interest rate at $t = 1$
$Dur_{mod}(0)$	=	The modified duration of the reference insurer net of eligible reinsurance at $t = 0$
$SCR_{RU}(0)$	=	The SCR as calculated at $t = 0$ for the reference insurer

2. Using the duration approach, the calculations of the basic SCR and the SCR related to operational risk will typically be combined.
3. Similar to the proportional approach, the duration approach is based on the following simplified assumptions:
  - a) The composition and the proportions of the risk categories and components do not change over the years;
  - b) The average credit standing of reinsurers remains the same over the years;
  - c) The modified duration is the same for obligations net and gross of eligible reinsurance; and
  - d) The unavoidable market risk in relation to the net best estimate remains the same over the years.
4. An insurer using this simplification should consider the extent to which the assumptions referred to above are fulfilled. If some or all of these assumptions do not hold, the insurer must carry out a qualitative assessment of the materiality of the deviations from the assumptions set out above. If the impact of the deviation is material compared to the risk margin as a whole, the insurer should adopt an alternative approach.

#### **E. Simplifications using percentages of the best estimate (Level 4 of the hierarchy)**

1. This simplification approach is only applicable to non-life insurers.
2. Using this method, the risk margin ( $CoCM$ ) should be calculated as a percentage of the best estimate technical provisions net of eligible reinsurance (at  $t = 0$ ) in the following manner:

$$CoCM = \alpha_{lob} \cdot BE_{net}(0)$$

Where:

$\alpha_{lob}$	=	A fixed percentage for the given line of business
$BE_{net}(0)$	=	The best estimate technical provisions net of eligible reinsurance as assessed at $t = 0$ for the insurer's portfolio of insurance obligations

3. As the fixed percentage  $\alpha_{lob}$  depends on the line of business, this method may only be applied if the insurer's business is restricted to one line of business or if the business outside of one line of business is not material.
4. A non-life insurer that chooses to use a simplified method based on percentages of the best estimate must perform the risk margin calculations using the percentages in the table below for the relevant line of business.

Level 1		Level 2		Level 3		$\alpha_{lob}$
1.	Motor	a.	Personal lines			6.9%
		b.	Commercial lines			7.5%
2.	Property	a.	Personal lines			5.4%
		b.	Commercial lines			9.1%
3.	Agriculture	a.	Personal lines	i.	Crop	13.5%
				ii.	Equipment	13.5%
				iii.	Other	13.5%
		b.	Commercial lines	i.	Crop	13.5%
				ii.	Equipment	13.5%
				iii.	Other	13.5%
4.	Engineering			i.	Liability	17.2%
				ii.	Other	9.5%
5.	Marine	a.	Personal lines	i.	Property	12.9%
				ii.	Liability	17.2%
		b.	Commercial lines	i.	Property	12.9%
				ii.	Liability	17.2%
6.	Aviation	a.	Personal lines	i.	Property	15.2%
				ii.	Liability	17.2%
		b.	Commercial lines	i.	Property	15.2%
				ii.	Liability	17.2%
7.	Transport	a.	Personal lines	i.	Property	14.7%
				ii.	Liability	17.2%
		b.	Commercial lines	i.	Property	14.7%
				ii.	Liability	17.2%
8.	Rail			i.	Property	14.7%
				ii.	Liability	17.2%
9.	Legal Expense	a.	Personal lines			30.1%
		b.	Commercial lines			30.1%
10.	Liability			i.	Directors and officers	17.2%
				ii.	Employer liability	17.2%
				iii.	Fidelity guarantee	17.2%
				iv.	Product liability	17.2%
				v.	Professional indemnity	17.2%
				vi.	Public liability	17.2%
				vii.	Other	17.2%
11.	Consumer Credit	a.	Personal lines			11.0%
		b.	Commercial lines			11.0%
12.	Trade Credit					11.0%
13.	Guarantee	a.	Personal lines			11.0%
		b.	Commercial lines			11.0%
14.	Accident And Health	a.	Personal lines	i.	Individual	14.5%
		b.	Commercial lines	i.	Individual	14.5%
				ii.	Group	14.5%
15.	Travel	a.	Personal lines	i.	Individual	12.1%
		b.	Commercial lines	i.	Individual	12.1%
				ii.	Group	12.1%

Level 1		Level 2		Level 3		$\alpha_{lob}$
16.	Miscellaneous	a.	Personal lines	i.	Warranty	32.6%
				ii.	Pet insurance	32.6%
				iii.	Other	32.6%
		b.	Commercial lines			32.6%
17.	Terrorism			i.	Motor	17.5%
				ii.	Property	17.5%
				iii.	Engineering	17.5%
				iv.	Other	17.5%
18.	Reinsurance <sup>6</sup>	a.	Proportional Treaty			Same as direct lines
		b.	Non-Proportional Treaty			27.8%
		c.	Other insurance risk mitigation Treaty			27.8%
		d.	Proportional Facultative			Same as direct lines
		e.	Non-Proportional Facultative			27.8%
		f.	Other insurance risk mitigation Facultative			27.8%

<sup>6</sup> Inwards reinsurance must be further segmented into each of the above lines and (sub-)lines of business based on the type of obligations being reinsured.

## Chapter 4: Instances When Technical Provisions can be Calculated as a Whole

Section 15 of FSI 2.2 (Valuation of Technical Provisions) sets out the criteria for when separate calculation of the best estimate and risk margin is not required. This Chapter provides additional guidance and examples on instances where technical provisions can be calculated as a whole.

1. The main instance where insurance obligations can be replicated reliably using financial instruments where a reliable market value is observable, and hence technical provisions can be calculated as a whole, is where the benefits of the insurance obligation:

- a) Consist of the delivery of a portfolio of financial instruments for which a reliable market value is observable; or
- b) Are based only on the market value of the portfolio at the time that the benefit is paid.

There are very limited other instances where the cash-flows associated with insurance obligations can be replicated reliably.

2. In particular, the following cash-flows associated with insurance obligations should not be regarded as being capable of reliable replication:

- a) Cash-flows that depend on the likelihood that policyholders will exercise contractual options, including lapses and surrenders;
- b) Cash-flows that depend on the level, trend, or volatility of mortality, sickness, disability or morbidity rates; and
- c) Expenses that will be incurred in servicing the insurance obligations.

3. The table below provides further guidance on the required treatment of certain types of insurance obligations and how technical provisions should be calculated:

Example obligation	Can the obligations be replicated reliably using financial instruments for which a reliable market value is observable?	Technical provisions should be calculated:
An insurer pays the market value of an equity portfolio, or delivers an equity portfolio at the payment date.	<u>Yes</u> , but only if a reliable market value for every asset within the equity portfolio is observable. There are, however, fixed expense cash-flows associated with this policy which should be excluded because they depend on factors internal to the insurer.	As a whole if the condition regarding reliable market values for every asset within the portfolio is met. Best estimate plus risk margin for the expense component of the cash-flows, and if the conditions above are not met.

Example obligation	Can the obligations be replicated reliably using financial instruments for which a reliable market value is observable?	Technical provisions should be calculated:
An insurer invests in assets replicating its future cash-flows provided by a third party (e.g. investment bank).	<u>No</u> : this example introduces counterparty default and concentration risks with regard to the issuer of the replicating asset.	Best estimate plus risk margin
Term-assurance policies and policies with discretionary participation features.	<u>No</u> : in these cases, the expected value, volatility and other features of the future cash-flows associated with the insurance obligations depend on the various life underwriting risk factors, as well as on the behaviour of the policyholder.	Best estimate plus risk margin
An insurer signs a contract with a reinsurer to replicate the insurer's future cash-flows.	<u>No</u> : a reinsurance contract is not a financial instrument. This example also introduces counterparty default and concentration risks with regard to the issuer of the replicating asset.	Best estimate plus risk margin
Linked policy	<u>Yes</u> : regarding to the number of units guaranteed. <u>No</u> : regarding expenses associated with managing the policy.	As a whole for the unit fund  Best estimate plus risk margin for the expense cash-flows



## Chapter 5: Applying the Principle of Proportionality

Section 17 of FSI 2.2 (Valuation of Technical Provisions) requires insurers to use actuarial and statistical techniques that are proportionate to the nature, scale and complexity of the underlying risks when valuing technical provisions. This Chapter provides general guidance for insurers in applying the principle of proportionality with respect to valuation of technical provisions.

1. As set out in FSI 2.2 (Valuation of Technical Provisions), the principle of proportionality requires that the insurer should be allowed to apply a valuation method that is:
  - a) Suitable to achieve the objective of deriving a market-consistent valuation; but
  - b) Not more sophisticated than is needed in order to reach this objective (proportionate to the nature, scale and complexity of the risks).
2. In the context of valuing technical provisions, an assessment of the way proportionality should be applied should involve:
  - a) Assessing the nature, scale and complexity of the underlying risks (step 1);
  - b) Assessing whether the valuation methodology is proportionate to the underlying risks, having regard to the degree of model error resulting from its application (step 2); and
  - c) Back-testing and validating the assessments carried out in steps 1 and 2 (step 3).

### ***Step 1: Assessing the nature, scale and complexity of risks***

3. Insurers should assess the nature, scale and complexity of the risks underlying their insurance obligations to identify where simplified methods are likely to be appropriate.
4. For the purpose of calculating technical provisions, the scope of risks to be assessed as part of this step should include all risks which materially affect the amount or timing of cash-flows required to settle the insurance obligations arising from the insurance policies in the portfolio to be valued.
5. The nature and complexity of risks are closely related. When assessing the nature and complexity of risks, additional information in relation to the circumstances of the particular portfolio may need to be analysed, such as:
  - a) The type of business from which the risks originate;
  - b) The degree of correlation between different risk types, especially in the tail of the risk distribution; and
  - c) Any risk mitigation instruments used, and their impact on the underlying risk profile.
6. Insurers should also identify factors which may indicate the presence of more complex or less predictable risks. These may include instances where:
  - a) The cash-flows are highly path dependent;
  - b) There are significant non-linear inter-dependencies between several drivers of uncertainty;
  - c) The cash-flows are materially affected by the potential future management actions;
  - d) Risks have a significant asymmetric impact on the value of cash-flows, in particular if policies include material embedded options and guarantees;
  - e) The value of options and guarantees is affected by the policyholder behaviour assumed in the model;

- f) Insurers use a complex risk mitigation instrument, such as a complex non-proportional reinsurance structure;
  - g) A variety of covers of different nature are bundled in the policies; or
  - h) The terms of the contracts are complex.
7. Assessing scale may involve distinguishing between small and large risks, or between material and non-material risks. Insurers may use a measurement of scale to identify risk components where the use of simplified methods would likely be appropriate, having also considered the nature and complexity of the risks.
  8. The three indicators – nature, scale and complexity – are strongly interrelated, and in assessing the risks, the focus should be on the combination of all three factors. The overall assessment of the nature, scale and complexity of risks should feed into the second step of the proportionality assessment, which focuses on whether a specific valuation methodology would be proportionate to the underlying risks.

### ***Step 2: Assessment of proportionality and model error***

9. In the context of valuing technical provisions, an assessment of the model error should focus on whether a given valuation technique would result in an estimate that materially diverges from the current transfer value.
10. Regardless of the method applied, it is important that insurers assess the model error implicit in the calculations. Such an assessment may be carried out by expert judgment or by other approaches such as:
  - a) Sensitivity analysis;
  - b) Comparison of the results with other methods;
  - c) Analysis of descriptive statistics; and
  - d) Back-testing.
11. Insurers are not required to quantify the degree of model error in quantitative terms, or to recalculate the value of its technical provisions using a more accurate method. Insurers should gain reasonable assurance, however, that the model error implied by the application of their chosen method is immaterial.
12. Where the intended use of a valuation technique is expected to lead to a material degree of model error, insurers should consider alternative appropriate techniques and apply them where practical.
13. In circumstances where insurers cannot apply a calculation method that reduces the uncertainty in the valuation, insurers should determine the best estimate of the technical provisions by applying the technique that minimises the level of model error. Insurers should document circumstances where there is a material degree of model error, and consider the implications of the increased level of uncertainty with regard to the reliability of the valuation and their overall financial soundness. In particular, insurers should assess whether the increased level of estimation uncertainty is adequately addressed in the determination of the SCR and the setting of the risk margin in the technical provisions.
14. Where the use of a valuation technique results in a material increase in the level of uncertainty associated with the best estimate liability, insurers should include a degree of conservatism in the assumptions and parameters used.

15. In the event that several valuation methods can be regarded as proportionate, insurers must select and apply the method which is most appropriate in relation to the underlying risks.

**Step 3: Back-testing**

16. Insurers should periodically check whether the best estimates calculated in past years remain appropriate in subsequent years. Where back-testing identifies systemic deviations between experience and the best estimate calculations, the first two steps of the proportionality assessment should be re-performed. If it is found that the previously chosen method is no longer appropriate, the insurer should undertake a more appropriate method for valuing its technical provisions. Such re-assessments should also be performed whenever the insurer's risk profile has significantly changed.
17. The scope and the frequency of back-testing should be proportionate to the materiality of assumptions and the size of the deviation.

## Chapter 6: Possible Simplifications for Life Insurance

Section 17 of FSI 2.2 (Valuation of Technical Provisions) requires that the techniques adopted by insurers must meet the principle of proportionality. In addition to the general guidance set out in Chapter 5 above, this Chapter sets out further guidance for life insurers on possible approaches to apply simplified methods for valuing the best estimate of life insurance obligations.

### **A. Underwriting risk**

1. Biometric risk factors are underwriting risks related to human life conditions such as mortality, longevity, disability and morbidity rates.
2. Possible simplifications for deriving biometric risk factors may include one or more of the following approaches:
  - a) Disregarding expected future changes in biometrical risk factors for short-term insurance policies;
  - b) Assuming that biometric risk factors are independent from any other variable;
  - c) Using cohort or period data to analyse biometric risk factors; and
  - d) Adjusting standard tables used for mortality, morbidity/disability rates by a suitable multiplier function.

### **B. Surrender option**

1. Possible simplifications for modelling surrender rates may include:
  - a) Assuming that surrenders occur independently of financial/economic factors;
  - b) Assuming that surrenders occur independently of biometric risk factors;
  - c) Assuming independence of surrender rates to future management actions;
  - d) Assuming that surrenders occur independently of insurer-specific information;
  - e) Using a table of surrender rates that are differentiated by factors such as age, time since policy inception, product type or other factors; and
  - f) Modelling the surrender as a hazard process either with a non-constant or constant intensity.
2. As policyholder behaviour may vary with changes in the economic environment, insurers should make appropriate adjustments (or choose alternative approaches) where simplified methods assume independence between the surrender time and the evolution of economic factors.
3. For policies with discretionary participation features, the surrender option and the minimum guarantees are dependent and should be modelled as such. Furthermore, management actions are likely to have a significant impact on the surrender options, and should be taken into account in the calculation methodology applied.

### **C. Options and guarantees**

1. For financial options and guarantees, simplifications may involve the use of Black-Scholes type valuation methods. The scope for applying such simplifications should be limited to those financial options and guarantees where the underlying assumptions of the Black-Scholes type valuation models are likely to hold.

2. For investment guarantees, possible simplifications for valuation may include:
  - a) Assuming non-path dependency in relation to management actions, regular premiums, and cost deductions;
  - b) Using representative deterministic assumptions of the possible outcomes when determining the intrinsic values of extra benefits;
  - c) Assuming deterministic scenarios for future premiums, mortality rates, expenses, surrender rates or other parameters; and
  - d) Applying simplified formulaic approaches for the time values if they are not considered to be material.
3. Possible simplifications for other types of options and guarantees may include:
  - a) Grouping guaranteed expense charges and/or guaranteed mortality charges with the investment guarantee, and approximating them as a single investment guarantee; and
  - b) Using the simplifications for investment guarantees noted above, in the absence of other valuation approaches, where appropriate.

**D. Future discretionary bonuses**

1. Possible simplifications for determining future bonuses associated with policies with discretionary participation features may include assuming that:
  - a) Economic conditions will follow a certain pattern that is not stochastic; and
  - b) The business mix of the insurer's portfolios will follow a certain pattern that is not stochastic.
2. Where appropriate, insurers may approximate the amount of available extra benefits for distribution to policyholders as the difference (or percentage of the difference) between the value of the assets currently held to back the insurance liabilities of these policies, and the technical provisions for these policies, without taking into account future discretionary bonuses. Where such an approximation is used, distribution of extra benefits to a particular line of business (and to each policy) must assume a constant distribution rate of extra benefits.

**E. Expenses and other charges**

1. Possible simplifications for expenses typically involve the use of simple models that utilise information from current and past expense loadings to project future expense loadings, including inflation.
2. Possible simplifications for other charges may include assuming:
  - a) That other charges are a constant share of extra benefits; or
  - b) A constant charge (in relative terms) from the policy fund.

**F. Other simplifications**

1. Given the wide range of assumptions and features that must be taken into account when valuing life insurance best estimates, there are other possible approaches to simplification. Such approaches may involve:
  - a) Assuming that future premiums are paid independently of the financial markets and insurers' specific information (for policies that allow for lapses or premium waivers);

- b) Assuming that cash-flows to or from the policyholder occur at the end of the year or in the middle of the year;
- c) Grouping assets with similar features or using representative assets or indices to undertake value projections;
- d) Assuming independence between returns for different asset classes; and
- e) Applying different projection periods for cash-flow projections.

## Chapter 7: Possible Simplifications for Non-life Insurance

Section 17 of FSI 2.2 (Valuation of Technical Provisions) requires that the techniques adopted by insurers must meet the principle of proportionality. In addition to the general guidance set out in Chapter 5 above, this Chapter sets out further guidance for non-life insurers on possible approaches to apply simplified methods for valuing the best estimate of non-life insurance obligations.

### A. *Outstanding reported claims provision*

1. There are two main simplification approaches for assessing the outstanding reported claims provision.
2. The first simplification approach calculates the best estimate of reported claims by considering the number of claims reported and the average cost of claims reported.<sup>7</sup> Under this approach, the best estimate of reported claims is calculated as:

$$\sum_i^n ((N_i \cdot A_i) - P_i)$$

Where:

$N_i$	=	Number of claims reported, incurred in year $i$
$A_i$	=	Average cost of claims closed in year $i$
$P_i$	=	Payments for claims incurred in year $i$

3. The first simplification approach is appropriate when the size of claims incurred in a year has a small variance, or the number of claims incurred in a year is large enough to allow the average cost to be representative. These conditions are unlikely to exist in case of claims that have a medium or long term of settlement since the claim is reported. Moreover, this approach may not be appropriate in situations where only few development years or occurrence years are available. In these cases, it is likely that the claims which are still open are more complex, with higher average of expected ultimate loss.
4. In circumstances where there is a lack of data for the valuation of technical provisions, insurers may need to use appropriate approximations, including case-by-case approaches. The second simplification approach for calculating the best estimate of reported claims is based on a case-by-case approach.
5. The second simplification approach is based on the simple sum of estimates of each claim reported at the valuation date. In estimating each individual provision for a single claim:
  - a) The calculation should use current and credible information, and realistic assumptions;
  - b) The estimate should take account of future inflation according to a reliable forecast of the time-pattern of the payments;
  - c) The future inflation rates should be market consistent and suitable for each line of business and for the portfolio of the insurer;
  - d) Individual valuations should be revised as information is improved; and
  - e) Where back testing evidences a systematic bias in the valuation, this should be offset with an appropriate adjustment according to the experience gained with claims settlement in previous years and expected future deviations.

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<sup>7</sup> Given the reliance on these factors, this simplification should only be considered when application of the approach does not deliver material model error in the estimate of frequency and severity of claims (and its combination).

6. Use of the second simplification approach should only be applied for small portfolios where the insurer has sufficient information, but the number of claims is too small to test patterns of regularity. This approach may also be allowable in the case of:
  - a) High-severity, low-frequency claims; and
  - b) New insurers or new lines of business, until such time as the insurer or line of business collates sufficient information to apply standard methods.
7. Given the judgement that is often involved with the second simplification approach, insurers that use this approach should develop written documentation on the:
  - a) Procedures applicable to assess the initial valuation of a claim when little is known about its features;
  - b) Method to include inflation, discounting and direct expenses;
  - c) Frequency of the valuations' review, which must be at least quarterly;
  - d) Procedure to take into account the changes in entity specific, legal, social, or economic environmental factors; and
  - e) Requirements in order to consider the claim to be closed.

#### **B. Incurred but not reported (IBNR) claims provision**

1. There are two main simplification approaches for assessing the IBNR claims provision.
2. The first simplification approach calculates the best estimate of IBNR claims by means of an estimation of the number of claims that would be expected to be reported in the following years and the cost of such claims.
3. Under the first simplification approach, the best estimate of the IBNR claims provision is calculated as:<sup>8</sup>

$$IBNR_{reserve\_year\_t} = C_t \cdot N_t$$

Where:

$C_t$	=	The average cost of IBNR claims, after taking into account inflation and discounting <sup>9</sup>
$N_t$	=	The number of IBNR claims at the end of the year $t$ where:
		$N_t = R_t \cdot \left[ \frac{\left( \frac{N_{t-1}}{p_1} \right) + \left( \frac{N_{t-2}}{p_2} \right) + N_{t-3}}{(R_{t-1} + R_{t-2} + R_{t-3})} \right]$
$R_t$	=	The claims reported in year $t$
$p_1$	=	The percentage of IBNR claims at the end of year $t-3$ that have been reported during the year $t-2$
$p_2$		The percentage of IBNR claims at the end of year $t-3$ that have been reported during the years $t-2$ and $t-1$

4. Use of the first simplification approach should be based on an appropriate number of years where reliable data are available.

<sup>8</sup> To simplify the calculation below, a three-year period of observation has been assumed.

<sup>9</sup> The average cost should be based on the historical average cost of claims reported in the relevant accident year.



5. The second simplification approach should apply only when it is not possible to reliably apply the first simplification approach. In the second simplification approach, the best estimate of IBNR claims is estimated as a percentage of the provision for reported outstanding claims.
6. The calculation under the second simplification approach is calculated using the following formula:

$$Provision_{IBNR_{lob}} = factor_{lob} \cdot PCO_{reported_{lob}}$$

Where:

$$\begin{aligned} factor_{lob} &= \text{Percentage factors specific for each line of business } lob, \text{ as determined by the insurer}^{10} \\ PCO_{reported_{lob}} &= \text{The provision for reported claims outstanding for line of business } lob \end{aligned}$$

### C. Claims settlement expenses

1. An estimate for the provision for claims settlement expenses may be simplified by using a percentage of the provisions for claims outstanding. That is, the provision for claims settlement expenses may be simplified by applying the following formula to each line of business:

$$Provision_{for\_Claims\_Settlement\_Expenses} = R \cdot [IBNR + 0.5 \cdot PCO_{reported_{lob}}]$$

Where:

$$\begin{aligned} R &= \frac{Expenses}{(Gross\ claims+subrogations)} \\ IBNR &= \text{Best estimate of the IBNR claims provision} \\ PCO_{reported_{lob}} &= \text{Best estimate of the provision for reported claims outstanding for line of business } lob \end{aligned}$$

The factor  $R$  should be calculated by taking the simple average of the ratio defined above over the past two reserving exercises.

2. This simplification approach may be appropriate when claims settlement expenses can reasonably be expected to be proportional to provisions as a whole and this proportion is stable over time, and the expenses are distributed uniformly over the lifetime of the claims portfolio as a whole.

### D. Premium provisions

1. There are two main simplification approaches for valuing the best estimate of the premium provisions when the insurer is not able to calculate a reliable estimate of the expected future claims and expenses derived from the business in-force.
2. The first simplification approach is based on the following formula, applied to each line of business:

$$Best\_Estimate\_Premium\_Provision = \frac{(UP + Adj)}{\left(1 + \frac{r_1}{3}\right)}$$

Where:

$$\begin{aligned} UP &= \text{Pro-rata of unearned premium over the life of the premium} \\ Adj &= \text{Adjustment for any expected insufficiency of the premium in respect future claims and expenses} \end{aligned}$$

<sup>10</sup> Insurers that apply this approach to simplifying the calculation of the IBNR claims provision must report the factors chosen for each line of business to the Prudential Authority.

$$r_1 = \text{Risk-free interest rate at one-year term}$$

3. The simplification approach is appropriate when premium provisions are expected to decrease at an even rate during the coming 12 months.
4. The second simplification approach derives a best estimate for premium provisions based on an estimate of the combined ratio in the line of business in question. In order to apply this approach, the following data inputs are required to arrive at the best estimate of the premium provisions (gross of eligible reinsurance):<sup>11</sup>
  - a) An estimate of the combined ratio for the line of business during the run-off period of the premium provisions;
  - b) The present value of future premiums for the underlying obligations (to the extent to which future premiums should be taken into account in the valuation of premium provisions under this Standard); and
  - c) Unearned Premium Reserve (UPR) for the underlying obligations.<sup>12</sup>
5. The combined ratio for an accident year should be defined as the ratio of expenses and incurred claims over earned premiums. The earned premiums should exclude prior year adjustments. The expenses should be those attributable to the premiums earned other than claims expenses. Incurred claims should exclude the run-off result.
6. Based on the data inputs noted above, the best estimate of premium provisions may be calculated as:

$$BE = CR \cdot UPR + (CR - 1) \cdot PVFP + AC \cdot PVFP$$

Where:

<i>BE</i>	=	Best estimate of premium provisions
<i>CR</i>	=	Estimate of the combined ratio for the line of business, excluding acquisition expenses
<i>UPR</i>	=	Unearned Premium Reserve (based on the total premium without deducting acquisition costs)
<i>PVFP</i>	=	Present value of future premiums
<i>AC</i>	=	Estimate of the acquisition expenses ratio for the line of business

7. Where an insurer lacks sufficient information to derive a reliable estimate of *CR* (e.g. a new line of business), and a market development pattern is available for the line of business being measured, an insurer may combine such pattern with the market expected loss. If such an approach is used, the insurer should:
  - a) Estimate the undiscounted total claims cost for the next future accident year by multiplying the ultimate claims ratio (based on undiscounted figures) by the undiscounted estimate of premiums that will be earned during the coming 12 months;
  - b) Use the market development pattern to split the total claims cost per development year;
  - c) Discount the claims costs using the rates applicable to each maturity; and

<sup>11</sup> The description and specifications of this approach are explained in respect of gross insurance business, although they may apply broadly (with appropriate adjustments) to the calculation of reinsurance recoverables corresponding to premium provisions.

<sup>12</sup> The UPR refers to premiums that have been paid for an unexpired risk period (i.e., the amount on the balance sheet representing that part of premiums written on unexpired policies to be allocated to the following financial year, or to subsequent financial years).

- d) Add the estimate for the present value of future expenses (based on the estimated expense ratio) and deduct the present value of future premiums.
8. Use of a market development pattern to calculate the best estimate of premium provisions is subject to the following conditions:
- a) The combined ratio should be expected to remain stable over the run-off period of the premium provisions;
  - b) A reliable estimate of the combined ratio can be made; and
  - c) The UPR is an adequate exposure measure for estimating future claims during the unexpired risk period (until the point in time where the next future premium is expected).

## Chapter 8: Possible Simplifications for Reinsurance Recoverables

Section 17 of FSI 2.2 (Valuation of Technical Provisions) requires that the techniques adopted by insurers must meet the principle of proportionality. In addition to the general guidance provided in Chapter 5 above, this Chapter sets out guidance for insurers on possible approaches to apply simplified methods for valuing the best estimate of recoverables from reinsurance contracts.

### **A. Life reinsurance**

1. For the calculation of the probability-weighted average cash-flows of the recoverables or net payments to the policyholder, the same simplifications applicable to valuing the best estimate of life insurance obligations may be applied (refer to Chapter 6 above). The result from the calculation should, however, be adjusted to take account of the expected losses due to counterparty default risk.

### **B. Non-life reinsurance**

1. The simplification approaches for non-life reinsurance are generally referred to as “Gross-to-Net techniques”, which are based on the assumption that the estimate of the technical provisions gross of eligible reinsurance is already available. Using such techniques, the value of recoverables is derived in a subsequent step as the excess of the gross over the net estimate.
2. The “Gross-to-Net” techniques are designed to calculate the value of net technical provisions in a direct manner, by converting best estimates of technical provisions gross of eligible reinsurance to best estimates of technical provisions net of eligible reinsurance.
3. The method to derive net valuations of technical provisions and the best estimate of recoverables should generally follow a three-step approach involving:
  - a) Deriving a valuation of technical provisions net of eligible reinsurance;
  - b) Determining reinsurance recoverables as the difference between gross and net valuations; and
  - c) Assessing whether the valuation of reinsurance recoverables is consistent with the principles of valuing technical provisions in general.
4. In order to derive a valuation of technical provisions net of eligible reinsurance, Gross-to-Net techniques may be applied to the following components of technical provisions gross of eligible reinsurance (for each line of business):

$PP_{gross}$  = The best estimate of premium provisions gross of eligible reinsurance

$PCO_{gross}$  = The best estimate of provisions for claims outstanding gross of eligible reinsurance

$RM$  = The risk margin

5. As an alternative to applying Gross-to-Net techniques, the best estimates net of eligible reinsurance may also be derived directly (e.g. on the basis of triangles with net of eligible reinsurance claims data).

6. Based on the results of the first step, the reinsurance recoverables ( $RR$ ) per line of business may be calculated as:<sup>13</sup>

$$RR = (PP_{gross} - PP_{net}) + (PCO_{gross} - PCO_{net})$$

Where:

$PP_{gross}$	=	The best estimate of premium provisions on a gross basis
$PP_{net}$	=	The best estimate of premium provisions net of eligible reinsurance
$PCO_{gross}$	=	The best estimate of provisions for claims outstanding on a gross basis
$PCO_{net}$	=	The best estimate of provisions for claims outstanding net of eligible reinsurance

7. The third step involves determining whether the reinsurance recoverables estimated using the above simplification is consistent with the principles for valuing recoverables set out in FSI 2.2 (Valuation of Technical Provisions). For example, insurers should assess whether issues regarding the time difference between direct payments and recoveries, and the expected losses due to counterparty risks, have been taken into account.
8. To achieve consistency with the required adjustment related to expected losses due to counterparty defaults, insurers should integrate an adjustment into the determination of net of eligible reinsurance valuation components. Such an adjustment would need to be treated separately and would not be covered by the Gross-to-Net techniques discussed in this Chapter.

### ***Scope of Gross-to-Net techniques***

9. Non-life insurers may apply Gross-to-Net techniques to either premium provisions or provisions for claims outstanding, or to a subset of lines of business or accident (underwriting) years. The use of such techniques must have regard to matters such as the complexity of the insurer's reinsurance programmes, the availability of relevant data and the importance of the portfolios in question.

### ***Degree of detail and corresponding principle and criteria***

10. Applying Gross-to-Net techniques to the overall portfolio of a non-life insurer would be unlikely to provide reliable and reasonably accurate approximations of the best estimate of technical provisions net of eligible reinsurance. Accordingly, non-life insurers should carry out the Gross-to-Net calculations at a sufficiently granular level. In order to achieve this level of granularity a suitable starting point would be:
- To distinguish between lines of business or other homogenous risk groups;
  - To distinguish between the premium provisions and provisions for claims outstanding (for a given line of business or homogenous risk group); and
  - With respect to the provisions for claims outstanding, to distinguish between the accident years not finally developed and – if the necessary data is available and of sufficient quality – to distinguish further between provisions for “reported but not settled” claims and IBNR claims.

<sup>13</sup> Note that this calculation implicitly assumes that the value of reinsurance recoverables does not need to be decomposed into best estimate and risk margin components.

11. Insurers should take into account the type of reinsurance cover and the important characteristics of the cover when applying gross-to-net techniques. A further refinement to the best estimate of technical provisions net of eligible reinsurance may be required based on the following considerations:
- a) Whereas increasing the granularity of Gross-to-Net techniques will generally lead to a more risk-sensitive measurement, it will also increase complexity, potentially leading to additional implementation costs for insurers. Therefore, following the principle of proportionality, a more granular approach should only be chosen where this is necessary regarding the nature, scale and complexity of the underlying risks (and in particular the corresponding reinsurance program);
  - b) For certain kinds of reinsurance cover (e.g. where the cover extends across several lines of business and it is difficult to allocate the effect of the reinsurance risk mitigation to individual lines of business), increasing the granularity of Gross-to-Net techniques between premium provisions and provisions for claims outstanding may not be sufficient to derive an adequate determination of provisions net of eligible reinsurance. In such cases, individual approaches tailored to the specific reinsurance cover may need to be used; and
  - c) As an alternative to applying gross-to-net techniques, insurers may apply a direct calculation of the technical provisions net of eligible reinsurance using triangular claims data on a net basis. However, such a technique would generally require adjustments of the underlying data triangle to take into account changes in the reinsurance program over time.

### ***Distinguishing between premium provisions and provisions for claims outstanding***

12. In relation to premium provisions, the relationship between the provisions on a gross basis and net basis can be represented by:

<sup>14</sup>

$$PP_{net,k} = GN_k(c_k) \cdot PP_{gross,k}$$

Where:

$PP_{net,k}$	=	The best estimate of premium provisions net of eligible reinsurance for line of business $k$
$GN_k(c_k)$	=	Gross-to-net factor for line of business $k$
$c_k$	=	Parameter-vector representing the relevant characteristics of the reinsurance program covering “covered but not incurred” claims related to line of business $k$ at the valuation date
$PP_{gross,k}$	=	The best estimate of premium provisions on a gross basis for line of business $k$

13. For lines of business where premiums, claims and technical provisions are related to the underwriting year (and not the accident year), the distinction between premium provisions and provisions for claims outstanding is less clear. For these business lines, the technical provisions related to the last underwriting year comprise both premiums provisions and provisions for claims outstanding,<sup>15</sup> and it would not be possible to apply Gross-to-Net techniques for these components of the technical provisions.

<sup>14</sup> For the sake of simplicity, it is assumed that the gross-to-net techniques described in this section are represented by a multiplicative factor to be applied on the gross provisions.

<sup>15</sup> If the line of business in question contains multi-year contracts, this will be the case for several of the latest underwriting years.

14. In relation to provisions for claims outstanding, separate gross-to-net techniques should be stipulated for each accident year not finally developed (for a given line of business). Accordingly, the relationship between the provisions on a gross and net basis for line of business (or homogeneous risk group)  $k$  and accident year  $i$ , can be represented in the following simplified manner:

$$PCO_{net,k,i} = GN_{k,i}(c_{k,i}) \cdot PCO_{gross,k,i}$$

Where:

$PCO_{net,k,i}$	=	The best estimate of provisions for claims outstanding net of eligible reinsurance for line of business $k$ and accident year $i$
$PCO_{gross,k,i}$	=	The best estimate of provisions for claims outstanding on a gross basis for line of business $k$ and accident year $i$
$GN_{k,i}(c_{k,i})$	=	Gross-to-net factor for line of business $k$ and accident year $i$
$c_{k,i}$	=	Parameter-vector representing the relevant characteristics of the reinsurance program for this combination of line of business $k$ and accident year $i$

***Distinguishing for accident years not finally developed (for provisions for claims outstanding)***

15. For provisions for claims outstanding, separate techniques for the individual development years or groups of development years is typically required because claims reported and settled at an early stage (after the end of the relevant accident year) may have a claims distribution that differs from the distribution of claims reported and/or settled at a later stage. Accordingly, the impact of a given reinsurance program (i.e. the ratio between expected claims payments on a net basis and expected claims on a gross basis) will differ between development years or groups of development years.

***Distinguishing further between provisions for “reported but not settled” and IBNR claims***

16. Insurers may choose to apply separate techniques for reported but not settled claims and IBNR claims in instances where they have more information regarding the reported but not settled claims (allowing the application of the gross-to-net technique on the gross best estimate for reported but not settled provisions to be undertaken in a more accurate manner).
17. Insurers may also choose to make a split between large and small claims. Such an approach may be used when the uncertainties related to expected claim amounts on a net basis for claims classified as large are small compared to the uncertainties related to the corresponding claim amounts on a gross basis.

## Chapter 9: Expenses Used in Assumptions

Attachment 2 of FSI 2.2 (Valuation of Technical Provisions) requires that expenses be included in the cash-flow projections. This Chapter sets out guidance for insurers about the different type of expenses and how they should be apportioned for use in the cash-flow projections.

### Direct versus indirect

1. The expenses of an insurance company can be divided into:
  - a) Direct expenses – expenses which are directly assignable to individual claims, policies or transactions; and
  - b) Indirect expenses (overheads) – the balance of the expenses that are not directly assignable to the functions described above. This includes once-off costs and costs associated with group-wide functions.
2. The allocation of indirect expenses to lines of business, homogeneous risk groups or other segments should be performed on an economic basis using realistic and objective principles.
3. For insurance groups where functions are performed by other entities in the group, the costs associated with these functions as they relate to the insurer should be included in the cash-flow projections of the insurer. Also, where an insurer comprises a large part of the group, group costs (such as boards of directors, investor relations, etc.) should be analysed and allocated to the insurer on an appropriate basis.
4. In order to ensure that the cost universe to be included in the cash-flow projections is complete, insurers are encouraged to reconcile the cost universe to the costs reflected in the IFRS annual financial statements of the insurer and also the group if applicable.

### The three-buckets approach

5. The direct and indirect expenses incurred by an insurer should be categorised into one of three expense categories, which is referred to as the three-buckets approach. The categories are:
  - a) Initial expenses – expenses incurred at the outset of the contract and would include commissions which are expected to be incurred;
  - b) On-going maintenance expenses (renewal) – expenses relating to the servicing obligations of the policyholder liabilities; and
  - c) Once-off expenses – this would include expenses that are once-off in nature such as once-off project costs.
6. The on-going maintenance expenses should be included in the cash-flow projection and include, where relevant:
  - a) Administrative expenses;
  - b) Investment management expenses, including expenses charged directly to the policyholder by the investment manager;
  - c) Claims management expenses; and
  - d) Acquisition expenses including commissions which are expected to be incurred in the future.



7. Once-off expenses, and particularly project costs, should be analysed to ensure that these are appropriately reflected in the cash-flow projections:
  - a) Once off and project costs that clearly relate to future initiatives that have no benefit to the existing in-force book need not be included;
  - b) Large project costs may be capitalised as intangible assets for IFRS purposes. In these cases it may be appropriate to include the future depreciation charges associated with these capitalised projects; and
  - c) Costs associated with all projects that will not be capitalised for IFRS purposes need to be taken into account in the cash-flow projections. These projects potentially could run over more than one financial year in which case an appropriate duration needs to be assigned to these costs in the cash-flow projections.
8. The insurer should be able to clearly motivate why they have classified expenses into any of the three buckets.
9. The technical provisions should include all on-going maintenance expenses as part of the best estimate expense assumption.
10. The approach when setting the best estimate expense assumption should be guided by the principle that the overarching objective of an insurer is to provide benefits to policyholders. Therefore any decision to exclude on-going maintenance expenses should be able to be justified by the insurer with this overarching objective in mind.

## Chapter 10: Iterative Approach for determining the SCR using the technical provisions including the risk margin

### **A. Introduction**

1. FSI 2.2 (Valuation of Technical Provisions) sets out the requirements for valuing technical provisions for the purposes of assessing regulatory financial soundness.
2. The standard method set out in paragraph 5.4 of FSI 4 (Calculation of the SCR using the Standardised Approach) requires insurers to calculate the Solvency Capital Requirement (SCR) and the risk margin using the technical provisions excluding the risk margin to avoid the circularity problem explained in section B below.
3. Insurers can apply to the Prudential Authority to calculate their SCR using the technical provisions including the risk margin. This calculation is referred to as the iterative approach to determine the SCR and the risk margin. Insurers that successfully apply to use the iterative approach will need to ensure that the SCR and risk margin converge, which may take several iterations.
4. Section C of this chapter, outlines an approach which insurers may follow when calculating the SCR and the risk margin using the iterative approach. The approach is not compulsory and insurers are allowed to use an alternative approach.
5. If an iterative approach is used to calculate the SCR and the risk margin, the insurer should be able to justify the approach, the methodology of the approach used, and the implicit and explicit assumptions used in the calculation of the SCR and the risk margin.
6. It should be noted that sections F to J should be considered for both the standard methodology and iterative approach methodology, as applicable.

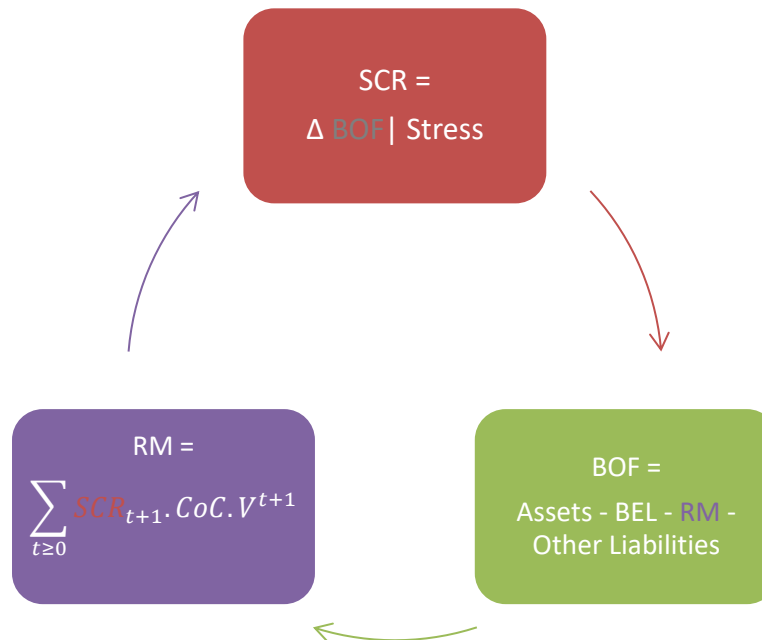
### **B. The Circularity Problem**

1. Described in the simplest manner, the SCR is calculated by measuring the change in basic own funds (BOF) under a number of pre-defined stress scenarios and aggregating the resultant individual capital requirements of each of these stress scenarios to produce the overall diversified SCR.
2. BOF is defined as the excess of assets (A) over liabilities (L), valued in accordance with the principles and requirements of FSI 2 (Valuation of Assets, Liabilities and Eligible Own Funds), adding back subordinated liabilities, and less any adjustments (deductions) as set out in FSI 2.3 (Determination of Eligible Own Funds).
3. L is further defined as the best estimate liability (BEL) plus risk margin plus Other Liabilities (i.e. Technical Provisions plus Other Liabilities). Technical Provisions are composed of the BEL value of the risk in respect of avoidable and unavoidable components, plus the risk margin<sup>16</sup>. Avoidable and unavoidable risks are further discussed in section D below.
4. Risk margin is calculated by reference to the cost of providing an amount of eligible own funds necessary to support insurance obligations over their lifetime (refer to section 14 of FSI 2.2).

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<sup>16</sup> The risk margin includes all material underwriting risks, operational risks and unavoidable market risks.

5. The challenge in the valuation of L is that it includes the risk margin, which is calculated using the unavoidable risk component of the SCR, and the total SCR (including both avoidable and unavoidable risk components) is based on the changes in L. This circularity is illustrated in the following diagram:



6. To solve this circularity, paragraph 5.4 of FSI 4 (Calculation of the SCR using the Standardised Approach) states that insurers should interpret technical provisions as excluding the risk margin for the purposes of the SCR standardised formula calculations.

### C. Methodology

1. Calculate Stress<sub>i</sub>:  $i \in \{1 \dots m\}$  where there are  $m$  unavoidable risk driver stresses required for the calculation of the SCR for risk margin purposes as fully described in FSI 4. Avoidable market risks (or avoidable portions of market risks) in this instance are specifically excluded as the risk margin is based on the cost-of-capital for unavoidable risks alone.

For this purpose Stress<sub>i</sub> is defined to be:

$$\text{Stress}_i(0) = (A_{\text{base}}(0) - \text{BEL}_{\text{base}}(0)) - (A_i(0) - \text{BEL}_i(0))$$

Where:

- **Stress<sub>i</sub>** = SCR for risk  $i$
- **A** = Market value of assets
- **BEL** = Best estimate liabilities
- **base** denotes base case before application of any stress
- **0** indicates calculation at balance sheet date or  $t_0$
- **i** is the index which indicates which of the  $m$  stresses is under consideration

- a) This is the standard methodology for determining the SCR as set out in FSI 4 in a simplified manner.
2. Choose proxies for each unavoidable risk driver stress  $i$ :
  - a) Insurers need to find suitable proxies for each of their unavoidable risks;

- b) A suitable proxy for risk  $i$  will behave in a similar way to  $\text{Stress}_i$  at the balance sheet date in response to changes in the risk drivers or variables which affect its value;
  - c) The proxy must fairly represent the expected run-off profile of that stress; and
  - d) The proxy should be deterministic to minimise the burden of the iterative approach calculation described below.
3. Project the best estimate of each proxy over the insurance book's period to run-off. The projection period for each risk will be determined individually to be appropriate to that risk as determined by the longest outstanding term (subject to the contract boundary) of an in-force policy exposed to that risk driver. The projection period is further discussed in Section G below.
  4. Project  $\text{Stress}_i$  in respect of each risk driver  $i$  using the run-off proxies. The estimated SCR at time  $t$  should be more or less equivalent to the actual SCR calculated for that risk for time  $t$  (for some  $t$  but for all  $i$ ).

$$\text{Stress}'_i(t) = (P_i(t) / P_i(0)) * \text{Stress}_i(0)$$

Where:

- a)  $P_i(t)$  is the projected best estimate value of proxy  $i$  at time  $t$
- b)  $\text{Stress}_i(0)$  is calculated as described in paragraph 1 above
- c) ' in the notation indicates that the quantity has been estimated using a run-off proxy

5. Aggregate the projected  $\text{Stress}'_i(t)$  at each future time  $t$  using the correlation matrix approach set out in FSI 4 to produce the capital vector  $\text{SCR}'(t)$   $t \geq 0$  (it is suggested for practical reasons that insurers use discrete values of  $t$ ).
6. As with the standard approach (set out in paragraph 14.6 of FSI 2.2), the risk margin is then calculated by aggregating the product of the capital vector and the cost-of-capital rate discounted to the balance sheet date ( $t_0$ ) using the risk-free term structure of interest rates. This sum is  $\text{RM}'_{\text{base}}(0)$ , which is the estimated risk margin at balance sheet date using proxies.
7. Recalculate the market consistent value of the assets and liabilities at  $t_0$  (technical provisions with new risk margins) given that each of the (unavoidable) stress events required for the standardised formula for SCR calculation have occurred (taken in turn one at a time). No further clarification is required about recalculation of the BEL post stress  $k$  where  $k \in \{1 \dots m\}$ . The re-estimation of the risk margin within stress  $k$  requires further explanation.
8. Estimate the risk margin  $\text{RM}'_k(0)$  which is the risk margin at  $t_0$  assuming stress  $k$  happened as set out in paragraphs 8 and 9. There are once again  $m$  unavoidable risks to consider within this scenario, indexed by  $i$  as before:

Let  $\text{Stress}'_{ki}(t)$  represent the SCR at time  $t$  for risk  $i$  after application of stress  $k$  to the base balance sheet

9. For each stress,  $k \in \{1 \dots m\}$  the following process is required:
  - a) For all unavoidable risks  $i$ ,  $i \in \{1 \dots m\}$ , recalculate the deterministic projected values of the proxy for the SCR for risk  $i$  (within stress  $k$ ):  $P_{ki}(t)$  for all  $i$  and  $t \geq 0$ ;
  - b) Use the proxies to estimate the  $\text{Stress}'_{ki}(t)$  for all  $i$  and  $t \geq 0$ :

$$\begin{aligned} \text{Stress}'_{ki}(t) &\approx (P_{ki}(t) / P_i(t)) * \text{Stress}'_i(t) \text{ for } t \geq 0 \\ &= (P_{ki}(t) / P_i(0)) * \text{Stress}_i(0) \text{ for } t \geq 0 \end{aligned}$$

- c) The projected run-off of the SCR for each of the risks  $i$  within stress  $k$  has now been calculated;
- d) Aggregate the  $\text{Stress}'_{ki}(t)$  across risks  $i \in \{1...m\}$  at each future time  $t$  to produce  $\text{SCR}'_k(t)$ .  $\text{SCR}'_k(t)$  is now the projected SCR based on unavoidable risks, given that stress  $k$  has occurred;
- e) Multiply  $\text{SCR}'_k(t)$  by the cost-of-capital rate and discount to the balance sheet date using the risk-free term structure of interest rates (as appropriate to stress  $k$ ). If interest rate risk is considered fully avoidable then the risk-free term structure of interest rates will always be identical to the base risk-free term structure of interest rates and the set of risks  $k \in \{1...m\}$  will not contain interest rate risk; and
- f) Now each  $k$  has an estimate of the risk margin in that scenario:  $\text{RM}'_k(0)$ .

10. Now repeat the first bullet point of paragraph 9 with the following amendment:

$$\text{Stress}'_i(0) = (A_{\text{base}}(0) - \text{BEL}_{\text{base}}(0) - \text{RM}'_{\text{base}}(0)) - (A_i(0) - \text{BEL}_i(0) - \text{RM}'_i(0))$$

Where:

- **$\text{RM}'_{\text{base}}(0)$**  is calculated in paragraph 6
- **$\text{RM}'_i(0)$**  is calculated in paragraph 9 above (replacing  $k$  with  $i$ )

- a) Aggregation using FSI 4 of these revised  $\text{Stress}'_i(0)$  produces a revised unavoidable risk SCR at  $t_0$ .

11. Recalculate the risk margin at  $t_0$ ,  $\text{RM}'_{\text{base}}(0)$ , using the proxy method for each of the risks  $i$  to project each of the stresses recalculated in paragraph 10 over the full run-off period.

A key assumption made in this paragraph is that the proxies  $P_i(t)$  which were originally determined to be adequate proxies for the run-off of the standard approach to each  $\text{Stress}_i$  are also good proxies for the run-off of the modified  $\text{Stress}'_i$  which are based on changes in technical provision, not the BEL in isolation.

12. Iterate the process as described in paragraphs 9 to 11 until the change in the SCR (paragraph 10) and risk margin (paragraph 11) from one iteration to the next produces no material change in the result. The only difference from one iteration to the next iteration is the new base position calculated in paragraphs 10 and 11.
13. This methodology should be extended to the calculation of the  $\text{SCR}^{17}$  to include the change in risk margin when calculating the stress amounts. The main difference would be the inclusion of avoidable risks, however avoidable risks need not be projected in paragraph 9 as they do not influence the risk margin calculated under the stress event  $k$  and hence do not affect the calculation of the revised stress amount in paragraph 10.

#### **D. Risks Omitted**

1. FSI 2.2 implies that only material unavoidable market risks, underwriting risks and operational risks need to be included in calculating the risk margin.
2. Where a risk is unavoidable and has been omitted from the iterative calculation, the materiality of this exclusion should be analysed.

<sup>17</sup> The SCR is calculated for all risks (avoidable and unavoidable) but the risk margin added to the BEL will only include unavoidable risks.

3. A practical assessment for the materiality of the exclusion would be to quantify the difference in the risk margin assuming the risk is avoidable versus assuming it is unavoidable. Other credible methods may also be used (e.g. sensitivity testing, etc.).

**E. Data**

1. Insurers should ensure that the iterative approach is developed for use on its entire book of insurance business. This refers to all lines of business that the insurer writes, subject to the principle of proportionality. Books of business that are in run-off and will run-off over the next 12 months may be excluded from the iterative approach.
2. In instances where it may be impossible to include all lines of business in the iterative approach, the insurer should be able to justify to the Prudential Authority why the iterative approach is not applied to other lines of business.
3. Insurers should ensure that the allocation of lines of business adhere to the principles set out in paragraphs 14.15-14.17 of FSI 2.2. In addition, the requirements of GOI 3 should be adhered to with reference to all data used and assumptions made when using the iterative approach.

**F. Proxies and proxy documentation**

1. It is recommended that the calculation method and the calculation of proxies be documented. This may include (but is not limited) to the following:
  - a) Any explicit and implicit assumptions used in the calculation;
  - b) Specific circumstances that allow for the proxy calculation methodology and assumptions to be changed;
  - c) Rationale for using a specific proxy for an unavoidable risk;
  - d) The mechanism the insurer has put in place to test the appropriateness of the proxies for each of the unavoidable risks;
  - e) Any adjustments that have been made to the run-off profile of the proxy; and
  - f) Materiality limit in place for the deviation between the full run-off of the unavoidable risk and that of the proxy used for the unavoidable risk, as well as the impact of the deviation on the overall risk margin of the insurer.
2. The insurer should compare the proxy chosen for the unavoidable risk to the full run-off of the same unavoidable risk.
3. The insurer should calculate and justify the materiality of the deviation between the full run-off of the unavoidable risk and that of the proxy used for the unavoidable risk, as well as the impact of the deviation on the overall risk margin of the insurer.

**G. The projection period**

1. The insurer should project the best estimate of each proxy over the insurance book's period to run-off.
2. The projection period for each risk will be determined individually to be appropriate to that risk as determined by the longest outstanding term (subject to applicable contract boundaries) of an in-force policy exposed to that risk driver.

3. Where the projection period is less than the full run-off of the business, the calculation used by the insurer regarding the future run-off period not considered should be specified. The calculation made regarding the last run-off year should also be specified.
4. The projection period can use monthly, annual or as a simplification, greater than annual intervals.
5. Where intervals greater than annual are used as a simplification, the insurer should ensure that the simplifications are appropriate and that the risk profile of the business is adequately captured. The methodology used to calculate the run-off between the calculation points should be appropriate and should be documented.

#### ***H. Convergence***

1. The insurer should ensure that the iterative process converges for both the risk margin and the SCR (as specified in section C paragraphs 12 and 13 above).
2. It is recommended that the insurer document the convergence criteria. This is the absolute Rand difference between the iterations below which the insurer assumes that the iterative process has converged or percentages of the SCR and risk margin at which point the insurer assumes that the iterative approach has converged.

#### ***I. Management actions***

1. Management actions may be considered under the iterative approach.
2. Consideration should be made as to whether or not any proxies which are used accurately reflect the projected SCR including the allowance of management actions post the stress event.
3. Management actions should adhere to the principles set out in FSI 4 paragraphs 5.8-5.9.

#### ***J. Monitoring***

1. It is recommended that the following qualitative and quantitative processes or changes be monitored regularly:
  - a) Data;
  - b) Methodology and calculation;
  - c) Assumptions;
  - d) Coding within the calculation;
  - e) Expert judgement;
  - f) Documentation;
  - g) Systems and IT; and
  - h) Methodology and calculation governance.