



South African Reserve Bank
Prudential Authority

Draft Guidance Notice (Iterative Approach)

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Iterative Approach for determining the SCR using the technical provisions including the risk margin

A. Introduction

FSI 2.2 (Valuation of Technical Provisions) sets out the requirements for valuing technical provisions for the purposes of assessing regulatory financial soundness.

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 best estimate liability (BEL) to avoid the circularity problem explained in section B below.

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 stabilise, which may take several iterations.

Section B 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.

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.

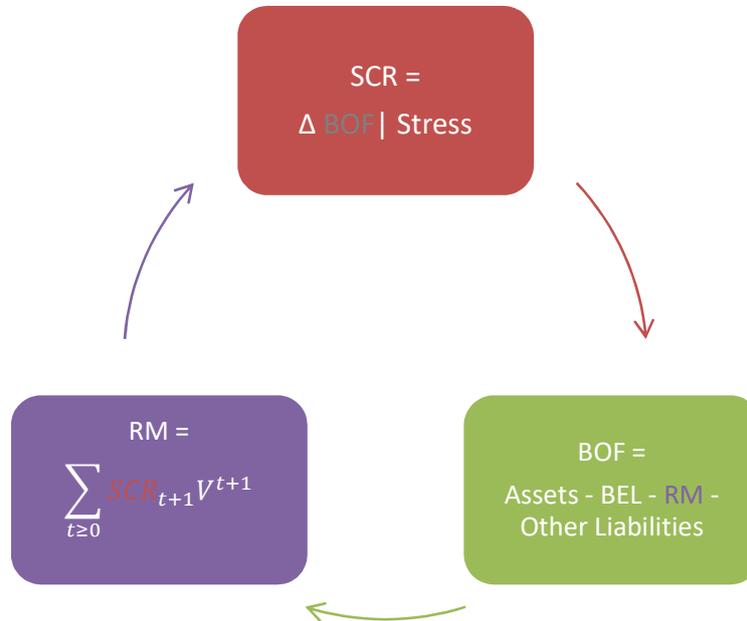
It should be noted that sections F to J should be considered for both the standard methodology and iterative approach methodology, as applicable.

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 1 (Framework for Financial Soundness of Insurers), 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 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 margin¹. 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).

¹ The risk margin includes all risks except avoidable market risk.

5. The challenge in the valuation of L is that it includes the risk margin, which is calculated using the SCR, which 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_i : $i \in \{1 \dots m\}$ 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 market risks alone.

For this purpose Stress_i 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_i** = 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 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 Stress_i in respect of each risk driver i using the run-off proxies. The SCR at time t should be more or less equal 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, $k \in \{1...m\}$ the following process is required:
- For all unavoidable risks i , $i \in \{1...m\}$, recalculate the deterministic projected values of the proxy for the SCR for risk i (within stress k): $P_{ki}(t)$ for all i and $t \geq 0$;
 - Use the proxies to estimate the $\text{Stress}'_{ki}(t)$ for all i and $t \geq 0$:

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

- The projected run-off of the SCR for each of the risks i within stress k has now been calculated;
 - Aggregate the $\text{Stress}'_{ki}(t)$ across risks $i \in \{1...m\}$ at each future time t to produce $\text{SCR}'_k(t)$;
 - 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
 - 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)

- 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 Stress_i are also good proxies for the run-off of the modified 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 can be extended to the calculation of the SCR² 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.
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.

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.

² The SCR is calculated for all risks (avoidable and unavoidable) but the risk margin added to the BEL will only include unavoidable risks.

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.

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 paragraph 12 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.