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Technical specifications for QIS 5

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It does not purport to represent or pre-judge the formal proposals of the Commission

SECTION 1 – VALUATION

V.1. Assets and Other Liabilities

V.1. The reporting date to be used by all participants should be **end December 2009**

V.1.1. Introduction

1.1. Aim

V.2. Most of the market participants and supervisory authorities expressed their support for the methodologies and for the general approach proposed in QIS 4, namely that Solvency II should be based on an economic valuation of assets and liabilities. There was a broad support for the general design and the methodologies of the proposed approach (market consistent valuation already used for a number of other purposes – i.e. internal model, European Embedded Value, risk management).

V.3. CEIOPS is aware that, based on the findings of the QIS 4, a consistent development of the Solvency II valuation approach aligned as far as possible with the international accounting developments (IFRS) is needed.

V.1.2. Valuation approach

V.4. The primary objective for valuation as set out in Article 75 of the Level 1 text requires an economic, market-consistent approach to the valuation of assets and liabilities. According to the risk-based approach of Solvency II, when valuing balance sheet items on an economic basis, undertakings should consider the risks that arise from holding a balance sheet item, using assumptions that market participants would use in valuing the asset or the liability.

V.5. According to this approach, insurance and reinsurance undertakings value assets and liabilities as follows:

i. Assets shall be valued at the amount for which they could be exchanged between knowledgeable willing parties in an arm's length transaction;

ii. Liabilities shall be valued at the amount for which they could be transferred, or settled, between knowledgeable willing parties in an arm's length transaction.

When valuing financial liabilities under point (b) no subsequent adjustment to take account of the change in own credit standing of the insurance or reinsurance undertaking shall be made

V.6. Valuation of all assets and liabilities, other than technical provisions shall be carried out, unless otherwise stated in conformity with International Accounting Standards as endorsed by the European Commission. They are therefore considered a suitable proxy to the extent they reflect the economic valuation principles of Solvency II. Therefore also underlying principles (definition of assets and liabilities, recognition and derecognition criteria) stipulated in the IFRS-system are considered adequate, unless stated otherwise and shall therefore be applied to the Solvency II balance sheet.

V.7. It must be clear that for the creation of the Solvency II balance sheet for the purpose of the QIS5 only economic values in the sense of the Level 1 text in combination with the additional guidance here specified qualify.

V.8. Especially in those cases where the proposed valuation approach under IFRS doesn't result in economic values according to the framework directive additional guidance will be presented in a comprehensive overview of IFRS and Solvency II valuation principles as presented in section 5 5 onwards.

V.9. Furthermore valuation shall consider the individual balance sheet item. The assessment whether an item is considered separable and sellable under Solvency II shall be made during valuation. The "Going Concern" principle and the principle that no valuation discrimination is created between those insurance and reinsurance undertakings that have grown through acquisition and those who have grown organically are considered underlying assumptions.

V.10. The concept of materiality shall be used as stipulated in CEIOPS Advice to the EC on the Valuation of Assets and Liabilities (CEIOPS-DOC-31/09):

"*Omissions or misstatements of items are material if they could, by their size or nature, individually or collectively; influence the economic decisions of users taken on the basis of the Solvency II financial reports." Materiality depends on the size and nature of the omission or misstatement judged in the surrounding circumstances. The size, nature or potential size of the item, or a combination of those, could be the determining factor."*

V.11. Figures not providing for an economic value can only be used within the Solvency II balance sheet under exceptional situations where the balance sheet item is not significant to reflect the financial position or performance of an (re)insurance undertaking or the quantitative difference between the use of accounting and Solvency II valuation rules is not material taking into account the concept stipulated in V.10.

V.12. On this basis, the following hierarchy of high level principles for valuation of assets and liabilities under QIS 5:

i. Undertakings must use a mark to market approach in order to measure the economic value of assets and liabilities, based on readily available prices in orderly transactions that are sourced independently (quoted market prices in active markets). This is considered the default approach.

ii. Where marking to market is not possible, mark to model techniques shall be used (any valuation technique which has to be benchmarked, extrapolated or otherwise calculated as far as possible from a market input). Undertakings will maximise the use of relevant observable inputs and minimise the use of unobservable inputs. Nevertheless the main objective remains, to determine the amount at which the assets and liabilities could be exchanged between knowledgeable willing parties in an arm´s length transaction (an economic value acc. to Art. 75 of the framework directive).

V.1.3. Guidance for V.13 – marking to market and marking to model

V.13. Regarding the application of fair value measurement undertakings might take into account Guidance issued by the IASB (e.g. definition of active markets, characteristics of inactive markets), when following the principles and definitions stipulated, as long as no deviation from the "economic valuation" principle results out of the application of this guidance.

V.14. It is understood that, when marking to market or marking to model, undertakings will verify market prices or model inputs for accuracy and relevance and have in place appropriate processes for collecting and treating information and for considering valuation adjustments.

V.15. It is considered necessary that for assets for which there are no homogenous markets, for situations where different valuation models are possible and in specific cases where very complex instruments and valuation techniques are being used, external independent value verification (e.g. performance of an ordinary audit) has to be performed, to ascertain a certain reliability of valuation.

V.16. CEIOPS has provided tentative views on the extent to which IFRS figures could be used as a reasonable proxy for economic valuations under Solvency II.

V.17. These views are developed in the tables included below in this section (see V.1.5: IFRS solvency adjustment for valuation of assets and other liabilities under QIS 5). In these tables, CEIOPS has identified items where IFRS valuation rules might be considered consistent with economic valuation, and where IFRS not being considered consistent, adjustments to IFRS are needed which are intended to bring the IFRS treatment closer to an economic valuation approach. CEIOPS wishes to underline that this analysis should in no way be considered as setting interpretations of IFRS. Furthermore, this analysis does not pre-empt future conclusions that CEIOPS might reach on the need for solvency adjustments under IFRS. These will be drawn, amongst others, from the results of QIS 5, industry comments, and further studies by CEIOPS.

V.18. As starting point for the valuation under Solvency II accounting values that have not been determined in accordance with IFRS could be used, provided that either they represent an economic valuation or they are adjusted accordingly. Undertakings have to be aware that the treatment stipulated within the international accounting standards, as endorsed by the European Commission in accordance with Regulation (EC) No 1606/2002 in combination with the guidance issued by CEIOPS represents the basis for deciding which adjustments shall be necessary to arrive at an economic valuation according to Article 75 of the framework directive. Undertakings shall disclose the rationale for using accounting figures not based on IFRS (when they provide for an economic valuation in line with the Level 1 text and the corresponding guidance), how the values were calculated and which difference in value is the consequence.

V.1.4. Requirements for the QIS 5 valuation process

V.19. Undertakings shall have a clear picture and reconcile the differences from the usage of figures for QIS 5 and figures for general purpose accounting. Especially undertakings shall be aware of the way those figures were derived and which level of reliability (e.g. nature of inputs, external verification of figures) can be attributed to them. If in the process of performing the QIS 5 undertakings identify other adjustments necessary for an economic valuation, those have to be documented and explained.

V.20. CEIOPS expects undertakings to:

i. Identify assets and liabilities marked to market and assets and liabilities marked to model;

ii. Assess assets and liabilities where an existing market value was not considered appropriate for the purpose of an economic valuation, so that a valuation model was used and disclose the impact.

iii. Give where relevant, the characteristics of the models used and the nature of input used when marking to model shall be transparently documented and disclosed;

iv. Assess differences between economic values obtained and accounting figures (in aggregate, by category of assets and liabilities);

V.21. As part of QIS 5 outputs, undertakings should highlight any particular problem areas in the application of IFRS valuation requirements for Solvency II purposes, and in particular bring to supervisors' attention any material effects on capital figures/calculations.

V.1.5. IFRS Solvency adjustments for valuation of assets and other liabilities under QIS 5

Balance Sheet Item, Applicable IFRS, (Definition/treatment), Solvency II, SEG

Balance sheet item	Applicable IFRS	Current approach under IFRS		Recommended Treatment and solvency adjustments for QIS 5
		Definition	Treatment	
ASSETS				
INTANGIBLE ASSETS				
Goodwill on acquisition	IFRS 3, IFRS 4 Insurance DP Phase II	Goodwill acquired in a business combination represents a payment made by the acquirer in anticipation of future economic benefits from assets that are not capable of being individually identified and separately recognised. Insurance Contracts acquired in a business combination	**Initial Measurement:** at its cost, being the excess of the cost of the business combination over the acquirer's interest in the net fair value of the identifiable assets, liabilities and contingent liabilities recognised in accordance with paragraph 36. **Subsequent Measurement:** at cost less any impairment loss. If the acquirer's interest exceeds the cost of the business combination, the acquirer shall reassess identification and measurement done and recognise immediately in	Goodwill is not considered an identifiable and separable asset in the market place. Furthermore the consequence of inclusion of goodwill would be that two undertakings with similar tangible assets and liabilities could have different basic own funds because one of them has grown through business combinations and the other through organic growth without any business combination. It would be inappropriate if both undertakings were treated differently for regulatory purposes. The economic value of goodwill for solvency purposes is nil. Nevertheless in order to quantify the issue, participants are requested, for information only to provide, when possible, the treatment under IFRS 3 and IFRS 4.

			profit or loss any excess remaining after that reassessment	
Intangible Assets	IAS 38	An intangible assets needs to fullfill the criteria of identifiability and control as stipulated in the standard. An Intangible asset is identifiable if it is separable (deviation from Goodwill) or if it arises from contractual or other legal rights. The control criteria is fullfilled if an entity has the power to obtain the future economic benefits flowing from the	**Recognised:** - it is probable that the expected future economic benefits will flow to the entity; and - the cost of the assets can be measured reliably. Initial Measurement: at cost Subsequent Measurement: Cost Model or Revaluation Model (Fair Value)	The IFRS on Intangible assets is considered to be a good proxy if and only if the intangible assets can be recognised and measured at fair value as per the requirements set out in that standard. The intangibles must be separable and there shall be an evidence of exchange transactions for the same or similar assets, indicating it is saleable in the market place. If a fair value measurement of an intangible asset is not possible, or when its value is only observable on a business combination as per the applicable international standard, such assets shall be valued at nil for solvency purposes.

		underlying resource and to restrict the access of others to those benefits. Fair Value Measurement is not possible when it is not separable or it is separable but there is no history or evidence of exchange transactions for the same or similar assets.		
TANGIBLE ASSETS				
Property plant and Equipment	IAS 16	Tangible items that: **(a)** are held for use in the production or supply of goods or services; and **(b)** are expected to be used during more than one period. Recognised if, and only if: **(a)** it is probable that future economic benefits associated with the item will flow to the entity; and **(b)** the cost of the item can be measured	**Initial Measurment:** at cost **Subsequent Measurment:** - cost model : cost less any depreciation and impairment loss; -revaluation model; fair value at date of revaluation less any subsequent accumulated depreciation or impairment	Property, plant and equipment that are not measured at economic values shall be re-measured at fair value for solvency purposes. The revaluation model under the IFRS on Property, Plant and Equipment could be considered as a reasonable proxy for solvency purposes.. If a different valuation basis is used full explanation must be provided

		reliably		
Inventories	IAS 2	Assets that are: (a) held for sale in the ordinary course of business; (b) in the process of production for such sale; or (c) in the form of materials or supplies to be consumed in the production process or in the rendering of services.	At the lower of cost and net realisable value	Consistently with the valuation principle set out in Article 75 of the level 1 text, Inventories shall be valued at the net realisable value.
Finance Leases	IAS 17	Classification of leases is based on the extent to which risks and rewards incidental to ownership of a leased asset lie with the lessor or the lessee.	Initially at the lower of fair value or the present value of the minimum lease payment	Consistently with the valuation principle set out in Article 75 of the level 1 text, Financial Leases shall be valued at fair value.
INVESTMENTS				

Investment Property	IAS 40	IAS 40.5 Property held to earn rentals or for capital appreciation or both.	Initially at cost; then either fair value model or cost model	Investment properties that are measured at cost in general purpose financial statements shall be re-measured at fair value for solvency purposes. The fair value model under the IFRS on Investment Property is considered a good proxy.
Participations in subsidiaries, associates and joint ventures	Ias 27 and IAS 28	Definition in IAS 27, IAS 28 and IAS 31	According to IAS 27,IAS 28 and IAS 31	- Holdings in related undertakings within the meaning od Article 212 of the Framework directive shall be valued using quoted market prices in active markets. - In the case of a subsidiary undertaking where the requirements set for a market consistent valuation are not satisfied an adjusted equity method shall be applied. - All other undertakings (not subsidiaries) shall wherever possible use an adjusted equity method. As a last option mark to model can be used, based on maximizing observable market inputs and avoiding entity specific inputs. The adjusted equity method shall require undertakings to value its holding in a related undertaking based on the participating undertakings share of the excess of assets over liabilities of the related undertaking . When calculating the excess of assets over liabilities of the related undertaking, the participating undertaking must value the related undertakings assets and liabilities in accordance with Article 75 and, where applicable, Articles 76 to 86 of the Framework Directive.

Financial assets under IAS 39	IAS 39	See IAS 39	Either at cost, at fair value with valuation adjustments through other comprehensive income or at fair value with valuation adjustment through profit and loss account-	Financial assets as defined in the relevant IAS/IFRS on Financial Instruments shall be measured at fair value for solvency purposes even when they are measured at cost in an IFRS balance sheet.
OTHER ASSETS				
Non-Current Assets held for sale or discontinued operations	IFRS 5	Assets whose carrying amount will be recovered principally through a sale transaction	Lower of carrying amount and fair value less costs to sell	Consistently with the valuation principle set out in Article 75 of the level 1 text, Non-Current Assets held for sale or discontinued operations shall be valued at fair value less cost to sell.
Deferred Tax Assets	IAS 12	Deferred tax assets are the amounts of income taxes recoverable in future periods in respect of: (a) deductible temporary differences; (b) the carry forward of unused tax losses; and (c) the carry forward of unused tax credits.	A deferred tax asset can be recognized only insofar as it is probable that taxable profit will be available against which a deductible temporary difference can be utilised when there are sufficient taxable temporary differences relating to the same taxation authority and the same taxable entity which are expected to reverse:	Deferred Taxes, other than the carry forward of unused tax credits and the carry forward of unused tax losses, shall be calculated based on the difference between the values ascribed to assets and liabilities in accordance with Article 75 of the Framework Directive and the values ascribed to the same assets and liabilities for tax purposes. The carry forward of unused tax credits and the carry forward of unused tax losses shall be calculated in conformity with international accounting standards as endorsed by the EC. The (re)insurance undertaking shall be able to demonstrate to the supervisory authority that future taxable profits are probable and that the realisation of that deferred tax asset is probable within a reasonable timeframe.

Current Tax Assets	IAS 12	Income taxes include all domestic and foreign taxes based on taxable profits and withholding taxes payable by a group entity	Current tax assets are measured at the amount expected to be recovered	Consistently with the valuation principle set out in Article 75 of the level 1 text, Current Tax Assets shall be valued at the amount expected to be recovered.
Cash and cash equivalents	IAS 7, IAS 39	Cash comprises cash on hand and demand deposits	Not less than the amount payable on demand, discounted from the first date that the amount could be required to be paid.	Consistently with the valuation principle set out in Article 75 of the level 1 text, Cash and Cash equivalent shall be valued at an amount not less than the amount payable on demand.
LIABILITIES				
Provisions	IAS 37	A provision is a liability of uncertain timing or amount.A provision should be recognised when, and only when:(a) an entity has a present obligation(legal or constructive) as a result ofa past event;(b) it is probable (ie more likely thannot) that an outflow of resources willbe required to settle the obligation;and(c) a	The amount recognised is the bestestimate of the expenditure required to settle the present obligation at the balance sheet date.The best estimate is the amount anentity would rationally pay to settlethe obligation or to transfer it to at hird party at the balance sheetdate.	Consistently with the valuation principle set out in Article 75 of the level 1 text, Provisions shall be valued at the amount recognised is the best estimate of the expenditure required to settle the present obligation at the balance sheet date.

		reliable estimate can be madeof the amount of the obligation.		
Financial Liabilities	IAS 39	Only recognized when an entity becomes a party to the contractual provisions of the instrument	Either at Fair Value or at amortized cost.	Financial liabilities shall be valued in conformity with international accounting standards as endorsed by the EC upon initial recognition for solvency purpose. Subsequent valuation has to be consistent with the requirements of Article 75 of the framework directive, therefore no subsequent adjustments to take account of the change in own credit standing shall take place. However adjustments for changes in the risk free rate have to be accounted for subsequently.

Contingent Liabilities	IAS 37	A contingent liability is either: (a) a possible obligation that arises from past events and whose existence will be confirmed only by the occurrence or non occurrence of one or more uncertain future events not wholly within the control of the entity; or • (b) a present obligation that arises from past events but is not recognised because: (i) it is not probable that an outflow of resources embodying economic benefits will be required to settle the obligation; or (ii) the amount of the obligation cannot be measured with sufficient reliability.	Shall not be recognized under IFRS. Nevertheless contingent liabilities shall be disclosed and continuously assessed under the requirements set in IAS 37.	Insurance and reinsurance undertakings shall recognise as a liability contingent liabilities, as defined in international accounting standards, as endorsed by the Commission in Accordance with Regulation (EC) No 1606/2002, that are material. Valuation shall be based on the probability-weighted average of future cash flows required to settle the contingent liability over their lifetime of that contingent liability, discounted at the relevant risk-free interest rate term structure.

Deferred Tax liabilities	IAS 12	Income taxes include all domestic and foreign taxes based on taxable profits and withholding taxes payable by a group entity.	A deferred tax liability shall be recognised for all taxable temporary differences, except to the extent that the deferred tax liability arises from: (a) the initial recognition of goodwill; (b) the initial recognition of an asset or liability in a transaction which at the time of the transaction, affects neither accounting profit nor taxable profit(loss).	Deferred Taxes , other than the carry forward of unused tax credits and the carry forward of unused tax losses, shall be calculated based on the difference between the values ascribed to assets and liabilities in accordance with Article 75 of the Framework Directive and the values ascribed to the same assets and liabilities for tax purposes. The carry forward of unused tax credits and the carry forward of unused tax losses shall be calculated in conformity with international accounting standards as endorsed by the EC.
Current Tax liabilities	IAS 12	Income taxes include all domestic and foreign taxes based on taxable profits and withholding taxes payable by a group entity.	Unpaid tax for current and prior periods is recognised as a liability. Current tax liabilities are measured at the amount expected to be paid.	Consistently with the valuation principle set out in Article 75 of the level 1 text, Current Tax liabilities shall be valued at the amount expected to be paid.

Employe Benefits + Termination Benefits	IAS 19	As defined in IAS 19	As defined in IAS 19	Considering the complex task of preparing separate valuation rules on pension liabilities and from a cost benefit perspective, CEIOPS recommends the application of the applicable IFRS on post-employment benefits. CEIOPS considers that elimination of smoothing (corridor) is required to prohibit undertakings coming out with different results based on the treatment selected for actuarial gains and losses. CEIOPS believes that undertakings shall not be prevented from using their internal economic models for post-employment benefits calculation, provided the models are based on Solvency II valuation principles applied to insurance liabilities, taking into account the specificities of post employment benefits. When using an Internal Model for the valuation of items following under IAS 19 documentation shall be provided by the undertaking.

V.1.6. Questionnaire on Valuation issues

QV.1. Insurance and reinsurance undertakings shall undertake an external, independent valuation or verification of the value of the following assets and liabilities at least every three years or more frequently if there is a significant change in market conditions, of the value of the following assets and liabilities:

- Assets and liabilities valued using marks to model; and
- Property.

The external, independent value verification can consist in either the performance of a new valuation by the external, independent party from the (re)insurance undertaking, or the review (and validation) by that party of the valuations performed internally by the undertaking.

Please give information regarding external, independent valuation or verification currently performed on these items (who, when and deliverables) and difficulties anticipated to comply with this requirement

QV.2. Regarding the concept of materiality as stipulated in TS.I.B.4 in the technical specification, please quantify the level of materiality used while valuing assets and liabilities? Which information, regarding which items was regarded as immaterial? Please state also the rational and quantify the (accumulated) effects on the final QIS 5 balance sheet?

QV.3. Insurance and reinsurance undertakings shall document policies and procedures for the process of valuation, including the description and definition of the roles and responsibilities of the personnel involved in valuation and the relevant models and sources of information to be used.

Where mark to model is used, insurance and reinsurance undertakings shall:

a. Identify the assets and liabilities to which that valuation approach applies;
b. Justify the use of that valuation approach for the items in (a)
c. Document the assumptions underlying that valuation approach; and
d. Submit an assessment of the valuation uncertainty of the items
e. Regularly compare the adequacy of the valuation of the items (a) against experience.

Besides, insurance and reinsurance undertakings shall:

a. Devote sufficient resources, both in terms of quality and quantity, to develop, calibrate, approve and review valuation approaches;
b. Establish internal control processes including:
   i. an independent review and verification on a periodic basis of the valuation approaches inputs and outputs and suitability with respect to valuation of the items a; and
   ii. a clear description of the sign-off process including accountability and the process in place to resolve any challenge from any independent source.

iii. an internal review of compliance with the policies and procedures referred to in the first paragraph.

Please give information about each of these measures in your undertaking (what has been done) and the results of these measures in relation to this QIS (which assets and liabilities are valued with a mark to model approach, why, under which assumptions …). Please indicate the items where compliance is not yet reached or is considered difficult?

QV.4. CEIOPS expects to receive additional information on the following areas per balance sheet position:

- Information on assets and liabilities shall be provided where an existing market value was not considered appropriate for the purpose of an economic valuation, so that valuation models were used. Undertakings shall provide the impact of the usage of models in comparison to market values.
- Where an economic valuation in line with the framework directive is based on accounting figures that have not been determined in accordance with IFRS, please disclose the rationale for using the figure, describe how the value was calculated and disclose the difference to an IFRS-based figure that arises thereon.
- Full Reconciliation from accounting values used in the statuary accounts and Solvency II economic values has to be provided.

QV.5. The QIS 5 requires recognition into the balance sheet of the contingent liabilities which correspond to a present obligation, are material and can be measured with sufficient reliability. Please provide clear rational for the inclusion and description of the contingent liabilities included in the balance sheet? For those, for which no reliable measurement was possible and therefore were not included in the balance sheet, please provide a clear description and rational for the exclusion.

QV.6. Intangible assets valued higher than nil must be separable and there shall be an evidence of transactions for the same or similar assets, indicating it is saleable in the market place, please provide input on the valuation basis used and on the compliance with the requirements set in the international standards of accounting as endorsed by the EC?

QV.7. Please provide explanation to which extent the calculation of deferred tax assets is consistent with the requirements set out in the Technical Specifications ((re)insurance undertakings shall be able to demonstrate to the supervisory authority that future taxable profits are probable and that the realisation of that deferred tax asset is probable within a reasonable timeframe).Please provide details and highlight when deviation from the proposed treatment of deferred taxes occurs.

QV.8. Please indicate the methodology used to determine the initial recognition of financial liabilities (including own credit risk) as well as the impact of the adjustment on the fair value (spread and amount) on the subsequent measurement (no adjustment for own credit risk) for each separate financial liability?

QV.9. When using an internal model for the calculations of benefit obligations falling in the scope of IAS 19 please provide documentation on the model and provide the rational why the internal model used provides for an economic valuation? Please provide explanation on the expected impact compared to the IFRS approach?

QV.10. Participants are invited to describe any difficulties they experience in following the technical specifications on valuation (especially the approaches chosen in the areas of participations, liabilities and intangible assets). Where an alternative approach was used this should be noted and an explanation should be given. Do you have any suggestions of how to solve those problems?

QV.11. Which were the major difficulties encountered during the valuation process for the QIS 5? Do you have any suggestions about how to solve these problems? Are there any particular views, which you wish to express, which are not yet covered by other questions?

V.2. Technical Provisions

The reporting date to be used by all participants should be **end December 2009**.

V.2.1. Best estimate

V.2.1.1. Segmentation

2.1.1 General principles

TP.1.1. The Level 1 text requires that (re)insurance obligations are segmented as a minimum by line of business in order to calculate technical provisions.

TP.1.2. (Re)insurance obligations shall be segmented according to the line of business that best reflects the nature of the underlying risks.

TP.1.3. Insurance and reinsurance undertakings should further segment prescribed lines of business into more homogenous risk groups according to the risk profile of the obligations.

TP.1.4. These specifications refer only to the minimum level of segmentation that undertakings need to consider when calculating their technical provisions.

TP.1.5. The purpose of segmentation of (re)insurance obligations is to achieve an accurate valuation of technical provisions.

TP.1.6. For example, in order to ensure that appropriate assumptions are used, it is important that the assumptions are based on homogenous data to avoid introducing distortions which might arise from combining dissimilar business.

TP.1.7. Therefore, in general, business is managed in more granular homogeneous risk groups than the proposed minimum segmentation.

TP.1.8. In order to ensure a robust and consistent approach for the calculation of technical provisions, (re)insurance undertakings should not necessarily be required to use the same segmentation for other components of the Solvency II framework, such as SCR, MCR or statutory reporting. The segmentation used for different purposes should depend upon what is best for that purposes.

TP.1.9. Undertakings in different Member States and even undertakings in the same Member State offer insurance products covering different sets of risks. Therefore it is appropriate for each undertaking to define the homogenous risk group and the level of granularity most appropriate for their business and in the manner needed to derive appropriate assumptions for the calculation of the best estimate.

TP.1.10. The principle of substance over form should be followed in determining how contracts with risks from different lines of business should be treated. In other words, the segmentation should reflect the nature of the risks underlying the contract (substance), rather than the legal form of the contract (form).

TP.1.11. Therefore, these specifications do not follow the legal classes of non-life and life insurance activities used for the authorisation of insurance business (as mentioned in Annex I and II of the Level 1 text) or other accounting classifications.

TP.1.12. The segmentation should be applied to both components of the technical provisions (best estimate and risk margin).

TP.1.13. However, for the purposes of calculating the risk margin, (re)insurance undertakings should also consider the manner in which obligations may be transferred to a reference undertaking, in line with principles underlying the calculation of the risk margin. This may result in a more granular segmentation for the calculation of technical provisions than the minimum lines of business prescribed.

2.1.2 Segmentation of non-life insurance obligations.

TP.1.14. The lines of business (LoB) for non-life obligations shall be defined as follows:

Accident
This line of business includes obligations caused by accident or misadventure but excludes obligations considered as workers compensation insurance;

Sickness
This line of business includes obligations caused by illness, but excludes obligations considered as workers compensation insurance;

Workers' compensation
This line of business includes obligations covered with workers' compensation insurance which insures accident at work, industrial injury and occupational diseases;

Motor vehicle liability - Motor third party liability
This line of business includes obligations which cover all liabilities arising out of the use of motor vehicles operating on the land including carrier's liability;

Motor, other classes
This line of business includes obligations which cover all damage to or loss of land motor vehicles, land vehicles other than motor vehicles and railway rolling stock;

Marine, aviation and transport
This line of business includes obligations which cover all damage or loss to river, canal, lake and sea vessels, aircraft, and damage to or loss of goods in transit or baggage irrespective of the form of transport. This line of business also includes all liabilities arising out of use of aircraft, ships, vessels or boats on the sea, lakes, rivers or canals including carrier's liability irrespective of the form of transport.

Fire and other damage
This line of business includes obligations which cover all damage to or loss of property other than motor, marine aviation and transport due to fire, explosion, natural forces including storm, hail or frost, nuclear energy, land subsidence and any event such as theft;

General liability - Third party liability
This line of business includes obligations which cover all liabilities other than those included in motor vehicle liability and marine, aviation and transport;

Credit and suretyship
This line of business includes obligations which cover insolvency, export credit, instalment credit, mortgages, agricultural credit and direct and indirect suretyship;

Legal expenses
This line of business includes obligations which cover legal expenses and cost of litigation;

Assistance

This line of business includes obligations which cover assistance for persons who get into difficulties while travelling, while away from home or while away from their habitual residence;

Miscellaneous non-life insurance
This line of business includes obligations which cover employment risk, insufficiency of income, bad weather, loss of benefits, continuing general expenses, unforeseen trading expenses, loss of market value, loss of rent or revenue, indirect trading losses other than those mentioned before, other financial loss (not-trading) as well as any other risk of non-life insurance business not covered by the lines of business mentioned before.

TP.1.15. With regard to accepted proportional reinsurance business, non-life obligations shall be segmented as a minimum according to the segmentation for non-life insurance obligations described above.

TP.1.16. With regard to accepted non-proportional reinsurance business, non-life obligations shall be segmented as a minimum into:

- Property business;
- Casualty business;
- Marine, aviation and transport businessthin this legal framework it is necessary to define

TP.1.17. The segmentation should be applied both to gross premium provisions and gross claims provisions.

TP.1.18. The future cash-flows for existing policies of non-life business are usually determined using aggregated figures and development patterns. Statistically significant homogenous groupings are needed to determine the cumulative development patterns.

2.1.3 Segmentation of life insurance obligations.

TP.1.19. Life insurance and reinsurance business shall be segmented into 16 lines of business as follows:

1. Contracts with profit participation clauses
2. Contract where policyholder bears the investment risk
3. Other contracts without profit participations clauses
4. Accepted reinsurance

which should be further segmented into:

a. Contracts where the main risk driver is death;
b. Contract where the main risk driver is survival;
c. Contracts where the main risk driver is disability/morbidity risk;
d. Savings contracts, i.e. contracts that resemble financial products providing no or negligible insurance protection relative to the aggregated risk profile.

TP.1.20. Life insurance obligations shall be allocated to the line of business that best reflects the technical nature of the underlying risks. It shall be possible to assign a homogeneous group of life insurance obligations to a given line of business at inception on the basis of the major risk driver for that group.

TP.1.21. The major risk driver can be determined by considering the contribution of each risk to the best estimate of the liabilities for that homogeneous group of risks, where it is feasible, or by applying any other criteria the undertaking justifies as more appropriate.

TP.1.22. The insurance liabilities for life business are typically calculated by performing policy by policy[1] calculations that project future individual cash-flows arising from lapses, deaths, sickness, etc. Having appropriate assumptions for these events are therefore a key determinant of life insurance liabilities.

TP.1.23. There could be circumstances where, for a particular line of profit-sharing business (participating business), the insurance liabilities can in a first step not be calculated in isolation from those of the rest of the business. For example, an undertaking may have management rules such that bonus rates on one line of business can be reduced to recoup guaranteed costs on another line of business and/or where bonus rates depend on the overall solvency position of the undertaking. However, even in this case it should be possible to assign to each line of business a technical provision.

2.1.4 Segmentation of health insurance obligations

TP.1.24. Health insurance obligations shall be segmented into:

- Health insurance obligations pursued on a similar technical basis to that of life insurance (**SLT Health**); or
- Health insurance obligations not pursued on a similar technical basis to that of life insurance (**Non-SLT Health**).

TP.1.25. SLT health obligations should be further segmented, as a minimum, according to the segmentation for life insurance obligations described above.

TP.1.26. Non-SLT health obligations should be further segmented, as a minimum, according to the segmentation for non-life insurance obligations described above (accident, sickness, workers compensation).

2.1.5 Unbundling insurance obligations

TP.1.27. Where a contract covers risks across non-life and life (re)insurance, these contracts should be unbundled into their life and non-life parts.

TP.1.28. Where a contract covers risks across different lines of business, these contracts should be unbundled into the appropriate lines of business.

TP.1.29. A contract covering life (re)insurance business should always be unbundled according to the top-level segmentation defined above.

TP.1.30. With regard to the second level of segmentation, unbundling should be applied to life (re)insurance contracts where those contracts:

Cover a combination of risks relating to different lines of business; and

Could be constructed as stand-alone contracts covering each of the different risks.

[1] Calculation based on model points is an alternative approach.

TP.1.31. For example, consider a contract which pays a benefit both in the event of sickness and death. This contract could be constructed as a contract which pays a benefit on sickness together with a separate contract which pays a benefit on death. This contract should therefore be unbundled. However, if the contract paid only one benefit on the earlier of sickness or death it would not be possible to unbundle the contract.

TP.1.32. Notwithstanding the above, unbundling may not be required where only one of the risks covered by a contract is material. In this case, the contract may be allocated according to the major risk driver.

TP.1.33. The principle of substance over form should also be applied in order to determine how each of the unbundled components of a given contract should be allocated to different lines of business.

TP.1.34. Unbundling of insurance obligations is of major importance to achieve an appropriate and suitable segmentation for the assessment of technical provisions.

2.1.6 Cross-border activities

TP.1.35. In the case of cross-border activities, (re)insurance undertakings shall first segment their (re)insurance obligations by country and then according to the requirements of these specifications.

V.2.1.2. Methodologies to calculate the best estimate

2.2.1 Definitions of terms

TP.1.36. **Market consistency**: consistent with information provided by the financial markets and generally available data on underwriting risks (Article 76.3 Level 1 text).

TP.1.37. **Undertaking specific**: Specific to the undertaking and thus with potential to differ from that of other market participants holding an obligation that is identical in all respects.

TP.1.38. **Portfolio specific**: Depending on the characteristics of the insurance portfolio, i.e. that the characteristic would apply irrespective of which undertaking holds the liability.

TP.1.39. **Realistic**: Aiming at identifying scenarios or parameters as they are or will be in the future, without distorting the situations and by neither underestimating nor overestimating the value of the parameters.

TP.1.40. **Stochastic asset model**: A stochastic asset model is a tool for producing meaningful future projections of market parameters. It is based on detailed studies of how markets behave, looking at statistic properties of various market and non market factors. The model estimates correlated probability distributions of potential outcomes by allowing for random variation in one or more inputs over time. It then produces economic scenario files (ESF's), economic scenario generator (ESG) files, which are inputs for stochastic asset-liability modelling.

TP.1.41. **Deep, liquid and transparent financial market**: See the definition in the subsection regarding circumstances in which technical provisions shall be calculated as a whole.

TP.1.42. **Validation techniques**: The tools and processes used by the (re)insurance undertaking to ensure valuation methods, assumptions and results of the best estimate calculation are appropriate and relevant.

TP.1.43. **Up-to-date (or current) information**: Recent or the latest available information which reflects the situation at the valuation date.

TP.1.44. **Credible information**: Information for which it can be reasonably believed that they are not manipulated nor distorted in any other way so that they could be used for valuation purposes

TP.1.45. **Methodology**: The term valuation methodology (or methodology) is understood as a set of principles, rules or procedures for carrying out a valuation of technical provisions. A valuation methodology would include all stages of a valuation process, such as gathering and selecting the data, determining the assumptions, selecting an appropriate model for quantifying the technical provisions, assessing appropriateness of estimations and documentations and controls.

TP.1.46. **Method(s)**: The term valuation method(s) or method(s) is used to denote a procedure or technique which is applied for calculating technical provisions.

TP.1.47. **Projection horizon**: The length of the time used in the projection of cash-flows starting from the date the valuation refers to.

TP.1.48. **Homogenous risk group**: Homogenous risk group is a set of (re)insurance obligations which are managed together and which have similar risk characteristics in terms of, for example, underwriting policy, claims settlement patterns, risk profile of policyholders, likely policyholder behaviour, product features (including guarantees), future management actions and expense structure. The risks in each group should be sufficiently similar and the group sufficiently large that a meaningful statistical analysis of the risks can be done. The classification is undertaking specific.

TP.1.49. **Model points**: One of the important inputs of most life actuarial model is information about policies/policyholders. Examples of such data items include age of policyholder, original term of policy, outstanding term of policy, amount of benefit on maturity, amount of benefit on surrender etc. Information about similar policies can be grouped into single representative data vector known as model point.

TP.1.50. **Going concern**: The assumption that undertaking is going to continue in operation for the foreseeable future and that it has neither the intention nor the necessity of liquidation.

TP.1.51. **Best estimate:** The technical provisions shall be equal to the sum of a best estimate and a risk margin, except in circumstances where they shall be calculated as a whole. The best estimate is calculated gross, without deduction of the amounts recoverable from reinsurance contracts and special purpose vehicles. Where best estimate is mentioned without further detail, it is the gross best estimate. (See the section on Definition of "best estimate" and allowance for uncertainty).

2.2.2 Valuation process

TP.1.52. The valuation of the technical provisions is a process that includes:

- collection and analysis of data;
- selection of the appropriate actuarial and statistical methodologies for the calculation of technical provisions;
- determination of assumptions for valuation of technical provisions;
- modelling, parameterisation the model and running the model (quantification of technical provisions);
- assessment and appropriateness of estimations;
- controls;
- and documentation.

TP.1.53. Valuation of the technical provisions requires the analysis of the underlying liabilities and the collection of qualitative and quantitative information. Therefore the value of technical provisions should not rely solely on models. It should rely on a variety of techniques including the application of judgement based on sound reasoning and business logic.

TP.1.54. The valuation of technical provisions includes different stages, such as the collection and analysis of the data, disclosing the nature and complexity of the insurance risk and identifying main risk drivers underlying the insurance obligations.

TP.1.55. Based on these:

a) The appropriate actuarial and statistical methodologies for the calculation of the best estimate could be selected (see section on the methodologies).

b) And the assumptions needed for valuation of technical provisions could be determined (see section on the assumptions).

TP.1.56. The appropriateness of the value of the technical provision should be assessed. The whole process of validation shall be carried out according to the section on validation.

TP.1.57. The valuation process should be carried out by a person who has knowledge of actuarial and financial mathematics, commensurate with the nature, scale and complexity of the risks inherent in the business of the insurance and reinsurance undertakings, and who are able to demonstrate their relevant experience with applicable professional and other standards.

TP.1.58. All steps in the process of valuation of technical provisions referred to in paragraph TP.1.52 should be documented and results of experience analysis should be shared where appropriate with persons from other business areas such as underwriting, pricing, and claims. Views of these persons should be captured and included in the feedback loop where necessary. The whole process of valuation should also be revised and verified by person who has adequate knowledge and skills and is independent of the process of valuation.

2.2.3 Appropriate methodologies for the calculation of the best estimate

2.2.3.1 Definition of "best estimate" and allowance for uncertainty

TP.1.59. The best estimate shall correspond to the probability weighted average of future cash-flows taking account of the time value of money, using the relevant risk-free interest rate term structure.

TP.1.60. Therefore, the best estimate calculation shall allow for the uncertainty in the future cash-flows used for the calculation of the best estimate. Allowance for uncertainty refers to the consideration of the variability of the cash flows necessary to ensure that the best estimate represents the mean of the cash flows. Allowance for uncertainty does not suggest that additional margins should be included within the best estimate.

TP.1.61. The expected value is the average of the outcomes of all possible scenarios, weighted according to their respective probabilities. Although, in principle, all possible scenarios are considered, it may not be necessary, or even possible, to explicitly incorporate all possible scenarios in the valuation of the liability, nor to develop explicit probability distributions in all cases, depending on the type of risks involved and the materiality of the expected financial effect of the scenarios under consideration.

TP.1.62. According the proportionality principle, (re)insurance undertaking shall consider how far the assumptions underlying the valuation approach are likely to differ from the ideal reflected in these specifications.

TP.1.63. Causes of uncertainty in the cash-flows that shall be taken into consideration in the application of the valuation technique, may include the following:

a) Fluctuation in the timing, frequency and severity of claim events.

b) Fluctuation in the period taken to settle claims and/or expenses.

c) Fluctuation in the amount of expenses.

d) Changes in the value of an index/market values used to determine claim amounts.

e) Changes in both entity and portfolio-specific factors such as legal, social, or economic environmental factors, where relevant. For example, in some countries, this may include changes as a result of legislation such as Ogden rates, periodical payments, taxation or cost of care.

f) Uncertainty in policyholder behaviour.

g) The exercise of discretionary future management actions by the (re)insurance undertaking (to the extent they may depend on the above-mentioned causes of uncertainty and also on entity specific factors). The allowance of these future management actions should be subject to the requirements set out in these specifications.

h) Path dependency, where the cash-flows depend not only on circumstances such as economic conditions on the cash-flow date, but also on those circumstances at previous dates.

A cash-flow having no economic path dependency can be valued by, for example, using an assumed value of the equity market at a future point in time. However, a cash-flow with path-dependency would need additional assumptions as to how the level of the equity market evolved (the equity market's path) over time in order to be valued.

i) Interdependency between two or more causes of uncertainty.

Some risk-drivers may be heavily influenced by or even determined by several other risk-drivers (interdependence). For example, a fall in market values may influence the (re)insurance undertaking's exercise of discretion in future participation, which in turn affects policyholder behaviour. Another example would be a change in the legal environment or the onset of a recession which could increase the frequency or severity of non-life claims.

2.2.3.2 General types of techniques and choice of the appropriate technique for the calculation of "best estimate"

TP.1.64. The responsibility for the choice of adequate techniques for the calculation of the best estimate liability rests with the (re)insurance undertaking subject to the requirements set out in the Level 1 text as well as other relevant legal provisions[2]. In making this choice the undertaking shall consider the techniques that better reflect the objective of the valuation (prudent, reliable and objective).

TP.1.65. The valuation of the best estimate shall meet the following requirements:

a) The (re)insurance undertaking shall be able to demonstrate the appropriateness, including the robustness of the techniques and assumptions used, having regard to the nature, scale and complexity of risks. In order to meet this requirement, a (re)insurance undertaking shall be able to provide sound rationale for the choice of one technique over other relevant techniques. This also applies to simplified techniques.

b) The (re)insurance undertaking shall assess the degree of judgement (See the section on expert judgment) required in each method and to what extent the undertaking is able to carry out such judgement in an objective and verifiable manner according the requirements set out in these specifications.

Regardless of the technique, judgement is required in making additions or adjustments to the estimates to allow for circumstances not included in the history that need to be incorporated into best estimates (for example binary events). In all the methods

[2] This does not preclude that the supervisor should be able to require, stating the reasons, the reassessment of the technical provisions which may involve the use of an alternative technique, if this reassessment or the use of a different technique is believed to better reflect the objective of the valuation (prudent, reliable and objective).

judgement (See the section on expert judgment) is an additional element in satisfying Article 76 of the Level 1 text.

c) The (re)insurance undertaking shall be able to demonstrate that the valuation technique and the underlying assumptions are realistic and reflect the uncertain nature of the cash-flows.

d) The valuation technique shall be chosen on the basis of the nature of the liability being valued and from the identification of risks which materially affect the underlying cash-flows.

e) The assumptions underlying the valuation technique shall be validated and reviewed by the (re)insurance undertaking.

f) The valuation technique and its results shall be capable of being audited.

g) If policy data is grouped, the (re)insurance undertaking shall demonstrate that the grouping process appropriately creates homogeneous risk groups that allow for the risk characteristics of the individual policies. This applies to either claims or policy data.

h) Having regard to the above (i.e. having ensured that the valuation technique is appropriate and robust given the nature, scale and complexity of the risk), (re)insurance undertakings shall ensure that their capabilities (e.g. actuarial expertise, IT systems) are commensurate with the actuarial and statistical techniques used.

TP.1.66. When selecting the valuation technique, (re)insurance undertakings shall consider the following factors and the material impact on the value of the liability and be able to show that they have been adequately allowed for, subject to proportionality principle:

a) Whether the cash-flows are materially path dependent.

b) Existence of material non-linear inter-dependencies between several drivers of uncertainty.

c) Whether the cash-flows are materially affected by the potential future management actions (see section on future management actions).

d) Presence of risks that have a material asymmetric impact on the value of the cash-flows, in particular if contracts include material embedded options and guarantees or if there are complex reinsurance contracts in place.

e) Whether the value of options and guarantees is affected by the policyholder behaviour assumed in the model.

f) The availability of relevant data taking into account the requirements on data quality set out in these specifications.

TP.1.67. Valuation techniques considered to be appropriate actuarial and statistical methodologies to calculate the best estimate as required by Article 86(a) include: simulation, deterministic and analytical techniques (based on the distribution of future of cash-flows) or a combination thereof.

a) Both deterministic and simulation models are parameterised by the historic data available, as are most actuarial techniques. Regardless of whether a deterministic or simulation model is used, the resulting mean estimates will therefore be based on development similar to that seen in the history and not contain "all possible future outcomes".

b) The mean of both the application of the simulation and deterministic method may well be the same under both methods (not least because deterministic results are often used to calibrate simulation methods) and meaning that the best estimate for Solvency II purposes will be the same for either method (before any judgment is applied).

a) Simulation

TP.1.68. Rather than considering all possible future scenarios, (re)insurance undertakings can choose a suitably large number of scenarios which are representative of all possible future ones. This approach is referred to as a "simulation technique".

TP.1.69. For certain life insurance liabilities, in particular the future discretionary benefits relating to participating contracts or other contracts with embedded options and guarantees, simulation may lead to a more appropriate and robust valuation of the best estimate liability. In such circumstances simulation techniques would normally be required.

TP.1.70. The undertaking shall consider the following features when deciding to apply a simulation approach:

a) The computing time and power required for a simulation technique (which usually is greater than for a closed form). This is particularly relevant in the case of stochastic projection of cash-flows which is calculated using a simulation technique as this in theory requires nested stochastic calculations.

b) Where simulation techniques are used, economic scenario files3 are usually a key assumption. Such scenario files could be produced by market consistent asset models which must in turn be calibrated appropriately. This calibration relies both on expert judgement and the availability of market data. The application of more sophisticated techniques is limited to cases where sufficiently robust knowledge/data is available.

The underlying asset liability model (ALM) will be a vital component of the technique. The asset liability model will apply a holistic approach which captures all the guarantees and other costs within the portfolio together in order to capture the interactions between different items of cash-flows. This is particularly important when the liability cash-flows depend on the assets held and (re)insurance undertaking's use of discretion.

c) Owing to the greater computing time and power, simulation techniques in life (re)insurance are often applied to model points rather than policy by policy. The computing constraint can lead to the necessary grouping of contracts which introduces additional approximation error and may neglect important risk characteristics of the portfolio. The (re)insurance undertaking shall measure the potential for additional error and review the grouping accordingly to ensure that important risk characteristics of the portfolio are not neglected.

d) When the number of risk factors is high, a holistic approach treating all the variables stochastically may not be feasible (because the number of required simulations would be excessively high or data restrictions may prevent the use of stochastic approaches for all risk factors) and so some simplifications may have to be embedded in the model. Such

[3] An economic scenario file is an output of a stochastic asset model. A stochastic asset model is a tool for producing meaningful future projections of market parameters. It is based on detailed studies of how markets behave, looking at averages, variations and correlations. The model estimate probability distributions of potential outcomes by allowing for random variation in one or more inputs over time.

limitations of the model shall be recognised as well as its potential for influencing the final results.

e) The (re)insurance undertaking will also need to separate systematic influences from random influences and reflect them accordingly within the valuation technique.

f) The use of simulation techniques means that the valuation results are based on (typically) many thousands of scenarios each with its own assumption set. The additional dimension in the assumption set adds considerably to the complexity of the simulation approach and thus increases the complexity, even may impede in practice, of internal/external audit of its processes and results.

g) The model as well as the underlying assumptions may become increasingly difficult to understand due to complexity incorporated by the simulation technique. This may also lead to higher potential for human or IT errors during the implementation phase.

h) The choice of technique will need to balance any expected loss of accuracy with a range of financial and non-financial costs and benefits.

TP.1.71. The following areas should be taken into account when considering the use of simulation techniques:

a) Management actions: The (re)insurance undertaking shall apply management actions according the specifications given at this respect.

b) Setting assumptions: The model may require a large number of parameters which a more limited number of (external) people have the experience to calibrate. For example, a market consistent scenario file, or a list of scenarios generated by a catastrophe modeller. Although assumptions are based on past experience and current conditions as far as possible, judgement shall be used for some assumptions, meeting the requirements set out in these specifications.

c) Validation: Due to the additional dimension in the assumption set, it is insufficient to check the result obtained is accurate through a combination of summary statistics, spot checks and rough estimates (as may be the case for some deterministic/analytical approaches). The use of simulation approaches therefore means that the results require different techniques/tools to audit.

d) Interpretation: With all approaches, interpretation of the results may require a clear understanding of the assumptions underlying the technique where this materially affects the overall results. With a simulation approach, particular attention shall be paid to the behaviour of the asset-liability model in extreme scenarios (where this materially affects the conclusions that can be drawn from the model).

TP.1.72. Examples of simulation techniques:

a) Monte-Carlo simulations: the value of the liabilities is calculated in a large number of scenarios where one or more assumptions are changed in each scenario. By simulating the behaviour of the random variable(s) in a very large number of scenarios, the model produces a distribution of possible outcomes. The mean of the distribution of scenarios may be considered a "probability weighted average".

   - For example, the nature of the financial options and guarantees embedded in some life (re)insurance contracts, particularly those with profit sharing features, is such that a set of deterministic best estimate assumptions may not be sufficient to produce a best estimate liability. The application of closed form analytical solutions to value the options and guarantees may also be limited, if it is difficult to find market hedges that replicate the cash-flows under the contract, for example to reflect the use of management actions or the effects of path dependency. A deterministic or an analytical technique may therefore not be suitable for valuing such contracts, and a simulation technique may be needed.

- Stochastic variation in non-market assumptions such as lapses and option take-up rates can have a material influence on the valuation of options and guarantees. One possible approach used is to assume that they are 100% correlated with interest rates/market value which allows the insurer to include the relationship within the liability models without an additional stochastic variable.

b) Bootstrapping: one of the most extended uses of bootstrap within actuarial work is associated with estimation of claims provisions. Starting from a model that explains how losses are paid, it consists of resampling residuals from that model and obtaining a large sample of estimated provisions required to pay future outstanding losses.

c) Simulating losses above a certain threshold and up to a certain limit is also a frequently used technique by (re)insurers to calculate an estimated expected loss in respect of a given excess of loss programme.

d) Bayesian approaches, where explicit prior assumptions are blended with observations resulting in an estimate for the ultimate claim.

b) Analytical techniques

TP.1.73. The (re)insurance undertaking may be able to use a valuation technique based on closed form solutions. Such techniques are referred to as analytical techniques and are based on the distribution of future of cash-flows.

TP.1.74. For the estimation of non-life best estimate liabilities as well as life insurance liabilities that not need simulation techniques, deterministic and analytical techniques can be more appropriate.

TP.1.75. Examples of analytical techniques:

a) Stochastic variation in non-market assumptions (such as mortality).

b) The time value of options and guarantees may be captured by reference to the market costs of hedging the option or guarantee; if the market price is not directly observable, it may be approximated using option pricing techniques, for example closed form solutions such as the Black-Scholes formula.

c) Techniques which use an assumption that future claim amounts follow a given mathematical distribution (e.g. Bayesian). These techniques calculate an undiscounted probability weighted average set of cash-flows without explicitly considering each potential scenario. An example may be the Mack method, also known as the distribution free chain ladder.

c) Deterministic techniques

TP.1.76. The (re)insurance undertaking may also be able to use a technique where the projection of the cash-flows is based on a fixed set of assumptions. The uncertainty is captured in some other way for example through the derivation of the assumptions. This is referred to below as a “deterministic approach”.

TP.1.77. For the estimation of non-life best estimate liabilities as well as life insurance liabilities that not need simulation techniques, deterministic and analytical techniques can be more appropriate.

a) At the current point in time, stochastic reserving techniques, especially in non-life insurance, are not considered as necessary valuation techniques to calculate best estimate values. The application of deterministic techniques and judgement can be far more important than the mechanical application of simulation methods.

TP.1.78. (Re)insurance undertakings may consider deterministic techniques appropriate in circumstances such as:

a) Where an alternative technique may require the calibration of parameters for which only inadequate data is available.

b) Where the nature of the liability is complex but the complexity does not materially affect the result or the complexity cannot be captured better by other techniques.

c) Where the nature of the liability is sufficiently simple or for other reasons of nature such that best estimate assumptions result in a best estimate liability and this can be demonstrated.

TP.1.79. Examples of deterministic techniques:

a) Actuarial methods such as Chain ladder, Bornhuetter-Ferguson, average cost per claim method, etc…

b) Stress and scenario testing; for example, adjusting data for inflation and allowing inflation to vary, thus producing sensitivities around this parameter.

c) Influential observations or outliers have been allowed for appropriately, for example via case by case reserving.

d) Systematic as well as other random features are being captured through sensitivity testing, diagnostics or other techniques (this could be stochastic).

e) Where a calculation relies on assumptions of an even spread of risk over the policy year and this is not the case (e.g. seasonality such as due to weather or hurricane season) the proportions shall be adjusted.

f) The use of relevant assumptions or other external/portfolio specific data as an input to the calculation when there is lack of data or as a benchmark for comparison.

g) Embedded options may be captured by considering different scenarios chosen to capture, as far as possible, the full range of future scenarios. An appropriate average or worst-case technique could be used to derive an initial estimate of the value of options embedded in the life insurance portfolio. A deterministic-to-stochastic adjustment could then be applied. This adjustment may be derived from any standardized method including flat benchmarked percentages.

d) Combination of techniques

TP.1.80. A (re)insurance undertaking may use a combination of approaches when calculating the best estimate. For example:

a) The (re)insurance undertaking may use a valuation technique which fails to include one or more causes of uncertainty. The excluded/additional cause of uncertainty could then be valued accurately as a separate set of cash-flows or measured through the use of validation tools and appropriate adjustments made.

b) The (re)insurance undertaking may identify that much of the cause of uncertainty arises from one or more risk (e.g. investment returns) with the remaining risks making a much smaller contribution to the uncertainty (e.g. mortality experience). In this example, the (re)insurance undertaking may choose to use a valuation technique which combines a simulation approach for investment returns with either a deterministic or analytical approach for mortality experience provided the loss of accuracy is sufficiently small.

e) Special case of pure unit-linked contracts

TP.1.81. Pure unit-linked contract, i.e. a pure financial savings product, linked to the performance of a particular portfolio, with no financial guarantees attached, but which pays the market value of the units at the earlier of maturity, death or surrender. The underlying portfolio (used as reference to set out the amount to be paid in case of maturity, death or surrender), is composed of assets not traded on a deep, liquid and transparent market.

TP.1.82. The calculation of technical provisions for these type of contracts will require modeling the assets set out as reference according the three building block scheme (discounted projected cash flows), considering that non traded assets need in any case a mark to model (which in most of cases implies stochastic modeling, at least to incorporate the non trade feature passed on to policyholders).

TP.1.83. Where the proportionality principle is applicable, the guarantees of these contracts exclusively dependent on the value of the non-traded assets might be valued in a simplified manner, directly allowing for the valuation derived from an appropriate mark-to-model approach of the assets used as reference.

2.2.4 Cash-flow projections

TP.1.84. According to Article 77(2) the best estimate shall correspond to the probability-weighted average of future cash-flows taking into account the time value of money. Expected present value of future cash-flows (i.e. the best estimate) should be the average of the discounted cash flows and not the discounted average of probability weighted cash-flows.

TP.1.85. The best estimate should be calculated gross, without deduction of the amounts recoverable from reinsurance contracts and special purpose vehicles.

a) Reinsurance and Special Purpose Vehicles' recoverables shall be calculated separately. Therefore in these technical specifications all the future cash-flows should be understood as gross, as the fulfilment of insurance obligations.

b) In the case of co-insurance the cash-flows of each co-insurer should be calculated as their proportion of the expected cash-flows without deduction of the amounts recoverable from reinsurance and special purpose vehicles.

TP.1.86. Cash-flow projections should reflect expected realistic future demographic, legal, medical, technological, social or economical developments.

TP.1.87. Appropriate assumptions for future inflation should be built into the cash-flow projection. Care should be taken to identify the type of inflation to which particular cash-flows are exposed (i.e. consumer price index, salary inflation).

2.2.4.1 Future premiums and connected cash flows to consider in the valuation process

Recognition and derecognition of (re)insurance contracts for solvency purposes

TP.1.88. The calculation of the best estimate should only include future cash-flows associated with existing insurance and reinsurance contracts, being these all the cash in- and out-flows required to settle the insurance and reinsurance obligations over the lifetime thereof.

TP.1.89. A reinsurance or insurance contract should be initially recognized by insurance or reinsurance undertakings as an existing contract when the undertaking becomes a party of the contract. In particular, tacit renewals which have already taken place at the reporting date should lead to the recognition of the renewed contract.

TP.1.90. A contract should be derecognized as an existing contract when, and only when, the obligation specified in the contract is discharged or cancelled or expires.

The boundary of an existing (re)insurance contract

TP.1.91. For the purpose of recognising which insurance and reinsurance obligations arise in relation to a contract, the boundaries of an insurance or reinsurance contract should be defined in the following manner:

TP.1.92. Where the insurance or reinsurance undertaking has a unilateral right to cancel the contract, a unilateral right to reject the premium or an unlimited ability to amend the premium or the benefits at some point in the future, any obligations which relate to insurance or reinsurance cover provided by the insurance or reinsurance undertaking beyond that point do not belong to the contract.

TP.1.93. Where the undertaking's unilateral right to cancel the contract or to unilaterally reject the premium or its unlimited ability to amend the premium or the benefits relates only to a part of the contract, the same principle as defined above should be applied to this part.

TP.1.94. All other obligations relating to the terms and conditions of the contract belong to the contract.

TP.1.95.

TP.1.96.

TP.1.97.

TP.1.98.

TP.1.99.

TP.1.100.

TP.1.101. .

TP.1.102. Some specific examples are described below. The criteria shown in the table should be understood in reference to the example provided, but in no case a sensu contrario:

Contract	Boundary of existing contract
1 year contract. No further right available to the policyholder issued by the undertaking.	1 year
1 year contract. At the end of the year the policyholder has the unilateral right to renew the contract for further X years on the same terms and conditions as the initial contract. The undertaking cannot cancel the contract or reject the premium.	X+1 years
5 year contract, but insurer has unilateral right to cancel contract after 1 year	1 year
Term assurance with an annual recurring single premium. Undertaking retains option to freely re-underwrite at each renewal date.	1 year
Insurer has an unrestricted right to reject the premium.	At the point the insurer has this right
X year contract with annual premium payment. Insurer retains the option to freely amend the premium or the benefits or conditions each year.	1 year contract
Portfolio of renewable 1 year non-life contracts where the premium for each contract is determined by applying a bonus/malus discount factor to a basic premium. The discount factor depends only on the claims experience of the policyholder and the calculation mechanism is fixed. The basic premium is the same for all contracts and the undertaking has an unlimited ability to change for the whole of the portfolio.	1 year
1 year contract with revision clauses for X future renewals indicating for example that premiums may increase in line with inflation. The undertaking cannot otherwise amend the premium; it cannot cancel the contract, amend the benefits or the conditions of the contract	X+1 years

<u>Technical features to consider in the allowance for future premiums in the calculation of best estimates.</u>

TP.1.103. Where future premiums are allowed for in the calculation of best estimates, the undertaking shall apply the framework defined in Articles 76 to 85 of the Level 1 text, and these specifications.

TP.1.104. As a consequence, the valuation of renewal options and similar options shall take into account the following criteria

a) The recognition of future premiums should reflect the economic reality of the insurance or reinsurance undertaking.

b) According to Article 77(2) of the Framework Directive, once the renewal option is recognised, in the cash-flow projection used in the calculation of the best estimate the undertaking shall take account of all the cash in- and out-flows required to settle the insurance and reinsurance obligations over the lifetime thereof of the renewals considered. Among other cash flows, the undertaking shall assess the following ones:

   - cash inflows due to expected future premiums,

   - cash outflows due to claims derived from the aforementioned premiums,

   - cash outflows due to any type of cost or expense,

c) Only cash in- and out-flows related to the insurance and reinsurance obligations of the existing contract or the guarantee or option should be allowed for. For the sake of clarity, cash-in or cash-out flows related to any new business not captured within the contract boundary, as above defined, should not be included. The undertaking must therefore be able to demonstrate that any 'interim' cash flows relate to the existing contract or the guarantee or option according the previous subsection.

d) There are other cash flows that do not belong to the boundary of the direct insurance contract, but in case of allowance for future premiums, the undertaking should consider when globally assessing its solvency. Among others, the undertaking shall consider the following cash flows, although not as part of the calculation of technical provisions of direct insurance contract:

   - cash outflows due to premiums ceded to reinsurance, linked to the future premiums expect in direct business,

   - cash inflows corresponding expected recoverables,

e) The likelihood that policyholders will exercise options giving rise to future premiums should be assessed in accordance with Article 79 of the Framework Directive, and these specifications in respect of the valuation of options and guarantees.

   As a consequence, undertakings should carry out a realistic assessment of, for example, the renewal rates expected during the periods where future premiums are considered. This assessment shall be based on current and credible information and be chosen with an assessment of actual experiences and anticipated future experiences. The assumptions on the option exercise rates shall take account, either explicitly or implicitly, of the impact that future changes in financial and non-financial conditions may have on the exercise of those options (e.g. impact of competition, economic cycle, the policy and solvency position of the undertaking, development of reinsurance prices and coverage...).

   Where the renewal conditions of the contract are worse for existing contracts than those conditions applied to new clients, the expected lapse rates shall reflect adequately the impact of this situation.

Where the renewal conditions of the contract are worse than the conditions applied to the policyholder under the current period of coverage, the undertaking shall assess the lapse rates including specifically the expected reaction of policyholders to an explicit explanation of those worse conditions.

f) Where the valuation of technical provisions allows for future premiums, the undertaking should pay special attention to the uncertainty inherent to the assumptions used in the best estimates calculations, providing furthermore adequate empirical evidence of the reliability of such assumptions (e.g. pricing policies, changes in reinsurance availability, expected claims in each of the future periods considered,...).

According to Article 77(2) best estimates should not include additional margins for uncertainty which would be taken into account in the risk margin and in the SCR. Allowance for uncertainty refers to the consideration of the variability of the cash flows necessary to ensure that the best estimate represents the mean of the cash flows. Allowance for uncertainty does not suggest that additional margins should be included within the best estimate.

g) Due the high degree of uncertainty that may be inherent in the assumptions used in the allowance for future premiums derived from renewal and other similar options, the undertaking shall carry out an specific assessment of the effects of such allowance in order to verify that technical provisions are calculated meeting simultaneously the three principles of prudence, reliability and objectivity according to Article 76(4) of the level 1 text. Prudence does not mean that additional margins should be included within the best estimate. Prudence in the context of future premiums applies where the uncertainty of the assumptions is high and there is no sufficiently decisive technical reason to choose among different alternatives.

h) For the purposes of QIS5, undertakings shall provide separate information of the impact that the allowance of future premiums due renewal options and other similar options have on the valuation of technical provisions in the cases described in these specifications.

2.2.4.2 Time horizon

TP.1.105. The projection horizon used in the calculation of best estimate should cover the full lifetime of all the cash in- and out-flows required to settle the obligations related to existing insurance and reinsurance contracts on the date of the valuation.

TP.1.106. The determination of the lifetime of insurance and reinsurance obligations shall be based on up-to-date and credible information and realistic assumptions about when the existing insurance and reinsurance obligations will be discharged or cancelled or expired.

2.2.4.3 Gross cash in-flows

TP.1.107. To determine the best estimate the following non-exhaustive list of cash in-flows should be included:

- Future premiums; and
- Receivables for salvage and subrogation.

TP.1.108. The cash in-flows should not take into account investment returns (i.e. interests earned, dividends…).

2.2.4.4 Gross cash out-flows

TP.1.109. The cash out-flows could be divided between benefits to the policyholders or beneficiaries, expenses that will be incurred in servicing insurance and reinsurance obligations, and other cash-flow items such as taxation payments which are charged to policyholders.

a) Benefits

TP.1.110. The benefit cash out-flows (non-exhaustive list) should include:

- Claims payments,
- Maturity benefits,
- Death benefits,
- Disability benefits,
- Surrender benefits,
- Annuity payments,
- Profit sharing bonuses.

b) Expenses

TP.1.111. In determining the best estimate, the undertaking shall take into account all cash-flows arising from expenses that will be incurred in servicing all obligations related to existing insurance and reinsurance contracts over the lifetime thereof. This should include (non-exhaustive list):

- administrative expenses,
- investment management expenses,
- claims management expenses / handling expenses,
- Acquisition expenses including commissions which are expected to be incurred in the future.

TP.1.112. Expenses include both allocated and unallocated expenses.

- Allocated expenses are directly assignable to individual claims, policies or transactions.
- Unallocated (or overhead) expenses comprise all other expenses which the insurer incurs in settling its obligations.
    - Such overhead expenses would include, for example, expenses which are related to general management and service departments which are not directly involved in new business or policy maintenance activities and which are insensitive to either the volume of new business or the level of in-force business.
    - Overhead expenses shall be allocated according to professional judgment and realistic assumptions.
    - The allocation of overhead expenses to lines of business, homogeneous risk groups or any other segments of the best estimate should be done on an economic basis following realistic and objective principles. The principles and

their application should be documented and the undertaking should be able to explain changes in the principles or their application over time.

TP.1.113. For non-life insurance obligations, the undertaking will further need to allocate expenses between premium provisions and claims provisions where such allocation is appropriate. This split could be changed only if the new split will better fit the current situation.

- For premium provisions, the valuation of the best estimate could take into account the following non-exhaustive list of expenses:
    - administrative expenses including commissions connected with ongoing administration of the in-force policies,
    - claims administration expenses connected with future claims events stemming from in-force policies.
- For claims provisions, the valuation of best estimate could take into account the following non-exhaustive list of expenses:
    - claims administration expenses connected with unsettled claims that have occurred before the valuation date.

TP.1.114. To the extent that future premiums from existing insurance and reinsurance contracts are taken into account in the valuation of the best estimate, expenses relating to these future premiums should be taken into consideration. For the valuation of technical provisions undertakings should make assumptions with respect to future expenses arising from commitments made on or prior to valuation date.

TP.1.115. Undertaking should consider their own analysis of expenses and any relevant market data. Expense assumptions should include an allowance for the expected future cost increase. These should take into account the types of cost involved. The allowance for inflation should be consistent with the economic assumptions made.

TP.1.116. For the assessment of the future expenses, undertakings should take into account all the expenses that are directly related to the ongoing administration of obligations related to existing insurance and reinsurance contracts, together with a share of the relevant overhead expenses. The share of overheads should be assessed on the basis that the undertaking continues to write further new business.

TP.1.117. Any assumptions about the expected cost reduction should be realistic, objective and based on verifiable data/information.

TP.1.118. Due to the fact that the insurance and reinsurance obligations could be transferred to another undertaking, the expenses that should be taken into account are those which are directly related to the ongoing administration and management of (re)insurance contracts and those which are related to overhead expenses which should be assessed on the assumption that the undertaking continues to write further new business.

TP.1.119. An approach based on the “going concern” assumption is consistent with the concept of the transfer of the portfolio to a reference undertaking.

TP.1.120.

c) ***Other gross cash-flow items***

TP.1.121. Undertakings should also consider other cash-flow items such as taxation payments which are charged to policyholders;

TP.1.122. Different taxation regimes exist across Member States giving rise to a broad variety of tax rules in relation to insurance contracts. The assessment of the expected cash-flows underlying the technical provisions should take into account any taxation payments which are charged to policyholders, or which would be required to be made to settle the insurance obligations. All other tax payments should be taken into account under other balance sheet items.

TP.1.123. When valuing the best estimate, the recognition of taxation in relation to insurance contracts and compulsory contributions charged to the policyholders excluding contributions which were already included in companies' expense assumptions (i.e. levis paid by insurance companies to industry protection schemes) should be consistent with the amount and timing of the taxable profits and losses that are expected to be incurred in the future.

TP.1.124. The following tax payments should be included in the best estimate: transaction-based taxes (such as premium taxes, value added taxes and goods and services taxes) and levies (such as fire service levies and guarantee fund assessments) that arise directly from existing insurance contracts, or that can be attributed to the contracts on a reasonable and consistent basis.

TP.1.125. In cases where changes to taxation requirements are substantially enacted, the pending adjustments should be reflected.

2.2.4.5 Different cash-flow features

TP.1.126. When valuing potential future cash-flows, the following features of existing insurance and reinsurance contracts need to be take into account:

- Any contractual Options and financial guarantees included in the existing insurance and reinsurance policies;
- The policyholders' behaviour could materially change the economic nature of the risk covered under the terms of the contract
- Future management actions may be reflected in the projected cash-flows;
- Future discretionary bonuses, which are expected to be made, whether or not those payments are contractually guaranteed, unless those payments fall under Article 91(2) of the Level 1 text (i.e. surplus funds)

TP.1.127. The calculation of technical provisions should be segmented according to aforementioned QIS specifications on segmentation.

2.2.4.6 Life insurance obligations

TP.1.128. As a starting point, the cash-flow projection should be based on a policy-by-policy approach, but reasonable actuarial methods and approximations may be used.

TP.1.129. In particular, to reduce undue burden on the undertaking the projection of future cash-flows based on suitable model points can be permitted if the following conditions are met:

a) The grouping of policies and their representation by model points is acceptable provided that it can be demonstrated by the undertaking that the grouping does not misrepresent the underlying risk and does not significantly misstate the costs.

b) The grouping of policies should not distort the valuation of technical provisions, by for example, forming groups containing life policies with guarantees that are "in the money" and life policies with guarantees that are "out of the money".

c) Sufficient validation should be performed by the undertaking to be reasonably sure that the grouping of life policies has not resulted in the loss of any significant attributes of the portfolio being valued. Special attention should be given to the amount of guaranteed benefits and any possible restrictions (legislative or otherwise) for an undertaking to treat different groups of policyholders fairly (e.g. no or restricted subvention between homogeneous groups).

d) The projection on a policy-by-policy basis would be an undue burden on the undertaking compared to the projection based on suitable model points.

TP.1.130. In certain specific circumstances, the best estimate element of technical provisions may be negative (e.g. for some individual contracts). This is acceptable and undertakings should not set to zero the value of the best estimate with respect to those individual contracts.

TP.1.131. No implicit or explicit surrender value floor should be assumed for the amount of the market consistent value of liabilities for a contract. This means that if the sum of a best estimate and a risk margin of a contract is lower than the surrender value of that contract there is no need to increase the value of insurance liabilities to the surrender value of the contract.

2.2.4.7 Non-life insurance obligations

TP.1.132. The valuation of the best estimate for provisions for claims outstanding and for premium provisions should be carried out separately.

TP.1.133. With respect to the best estimate for premium provisions, the cash-flow projections relate to claim events occurring after the valuation date and during the remaining in-force period (coverage period) of the policies held by the undertaking (existing policies). The cash-flow projections should comprise all future claim payments and claims administration expenses arising from these events, cash-flows arising from the ongoing administration of the in-force policies and expected future premiums stemming from existing policies.

TP.1.134. The best estimate of premium provisions from existing insurance and reinsurance contracts should be given as the expected present value of future in- and out-going cash-flows, being a combination of, inter alia:

- cash-flows from future premiums;
- cash-flows resulting from future claims events;
- cash-flows arising from allocated and unallocated claims administration expenses;
- cash-flows arising from ongoing administration of the in-force policies.

There is no need that the listed items should be calculated separately.

TP.1.135. Premium provisions should be calculated in accordance with the general provisions for the determination of technical provisions as set out in Articles 76 to 79 of the Level 1 text. Such a valuation recognise the possibility that cash in-flow could exceed cash out-flow i.e. would take account of expected profit (premiums exceeding costs) during remaining periods on risk. In such circumstances the best estimate may be negative. This is acceptable and undertakings are not required to set to zero the value of the best estimate. The valuation would take account of the time value of money where risks in the remaining period would give rise to claims settlements into the future.

TP.1.136. Additionally, the valuation of premium provisions should take account of future policyholder behaviour such as likelihood of policy lapse during the remaining period.

TP.1.137. With respect to the best estimate for provisions for claims outstanding, the cash-flow projections relate to claim events having occurred before or at the valuation date – whether the claims arising from these events have been reported or not (i.e. all incurred but not settled claims). The cash-flow projections should comprise all future claim payments as well as claims administration expenses arising from these events.

TP.1.138. Where non-life insurance policies give rise to the payment of annuities, the approach laid down inte the following section on substance over form should be followed. Consistent with this, for premium provisions, its assessment should include an appropriate calculation of annuity obligations if a material amount of incurred claims is expected to give rise to the payment of annuities.

TP.1.139. Where the calculation produces negative best estimates per line of business or homogeneous risk group, the undertaking shall disclose these amounts.

2.2.4.8 Health obligations

TP.1.140. Health insurance obligations are defined as all types of insurance compensating or reimbursing losses (e.g. loss of income) caused by illness, accident or disability (income insurance), or medical expenses due to illness, accident or disability (medical insurance).

TP.1.141. Health insurance obligations:

- pursued on a similar technical basis to that of life insurance (SLT Health) should be valued in accordance with sub-section "Life insurance obligations"; and

- health insurance obligations not pursued on a similar technical basis to that of life insurance (Non-SLT Health) should be valued in accordance with sub-section "Non-life insurance obligations".

2.2.4.9 Principle of substance over form

TP.1.142. When discussing valuation techniques for calculating technical provisions, it is common to refer to a distinction between a valuation based on life techniques and a valuation based on non-life techniques. The distinctions between life and non-life techniques are aimed towards the nature of the liabilities (substance), which may not necessarily match the legal form (form) of the contract that originated the liability. The choice between life or non-life actuarial methodologies should be based on the nature of the liabilities being valued and from the identification of risks which materially affect the underlying cash-flows. This is the essence of the principle of substance over form.

TP.1.143. Such distinction is applicable for liabilities which are materially exposed to underwriting risk. Products of a strong financial risk and little to none insurance risk are out of the scope.

TP.1.144. Traditional life actuarial techniques to calculate the best estimate can be described as techniques that based on discounted cash-flow models, generally applied on a policy-by-policy basis, which take into account in an explicit manner risk factors such as mortality, survival and changes in the health status of the insured person(s).

TP.1.145. On the other hand, traditional non-life actuarial techniques include a number of different approaches. For example some of the most common being:

- Methodologies based on the projection of run-off triangles, usually constructed on an aggregate basis;

- Frequency/severity models, where the number of claims and the severity of each claim is assessed separately;

- Methodologies based on the estimation of the expected loss ratio or other relevant ratios;

- Combinations of the previous methodologies;

TP.1.146. There is one key difference between life and non-life actuarial methodologies: life actuarial methodologies consider explicitly the probabilities of death, survival, disability and/or morbidity of the insured person(s) as key parameters in the model, while non-life actuarial methodologies do not.

TP.1.147. The choice between life or non-life actuarial methodologies should be based on expert judgement of the nature of the liabilities valued and on the identification of risks which materially affect the underlying cash-flows. This is the essence of the principle of substance over form. The legal classification of life and non-life contracts is a separate subject.

TP.1.148. In practice, in the majority of cases the form will correspond to the substance. However, for example for certain supplementary covers included in life contracts (e.g. accident) may be better suited for an estimation based on non-life actuarial methodologies.

TP.1.149. The following provides additional guidance for the treatment of annuities arising in non-life insurance. The application of the principle of substance over form implies that such liabilities should be valued using methodologies usually applicable to the valuation of life technical provisions, Specifically, guidance is provided in relation to:

- the recognition and segmentation of insurance obligations for the purpose of calculating technical provisions (i.e. the allocation of obligations to the individual lines of business);
- the valuation of technical provisions for such annuities; and
- possible methods for the valuation of technical provisions for the remaining non-life obligations

TP.1.150. The treatment proposed in these specifications for annuities should be extended to other types of liabilities stemming from non-life and health insurance whose nature is deemed similar to life liabilities (such as life assistance benefits), taking into consideration the principle mentioned in the previous paragraph.

<u>Allocation to the individual lines of business</u>

TP.1.151. Where non-life and health insurance policies give rise to the payment of annuities, following the principle of substance over form, such liabilities should be valued using techniques commonly used to value life insurance obligations. Such liabilities should be assigned to the relevant line of business for life insurance obligations.

<u>Valuation of technical provisions for annuities arising from non-life and health insurance</u>

TP.1.152. Participants shall value the technical provisions related to such annuities separately from the technical provisions related to the remaining non-life and health obligations.

TP.1.153. For this purpose, participants are expected to separately carry out the valuation of annuities arising from non-life insurance and health insurance based on their technical nature, i.e. applying appropriate life insurance valuation techniques and consistent with the valuation of life insurance annuities with comparable technical features.

Valuation of technical provisions for the remaining non-life and health insurance obligations

TP.1.154. The remaining obligations in the insurer's non-life and health business (which are similar in nature to non-life insurance obligations) have to be valued separately from the relevant block of annuities. This is especially important in regard to the type and definition of run-off claims data on which the valuation of these remaining obligations is based.

TP.1.155. For QIS5 purposes, undertakings may use, where appropriate, one of the following approaches to determine the best estimate of claims provisions for the remaining non-life or health obligations in a given non-life or health insurance line of business (LOB) where annuities are valued separately. Participants are invited to identify which approach was used and why was it considered more appropriate.

Separate calculation of non-life liabilities

TP.1.156. Under this approach, the run-off triangle which is used as a basis for the determination of the technical provisions of a non-life or health LOB shall not include any cash-flows relating to the liabilities separately valued according to life principles (annuities).

TP.1.157. The total best estimate of claims provisions would be given by the sum of the result of the application of an appropriate actuarial reserving method to the run-off triangle referred in the previous number and the amount of the best estimate calculated separately for the block of annuities.

Allowance of agreed annuities as single lump-sum payments in the run-off triangle

TP.1.158. This approach also foresees a separate calculation of the best estimate, where the split is between annuities in payment and the remaining obligations.

TP.1.159. Under this approach, the run-off triangle which is used as a basis for the determination of the technical provisions of the remaining non-life or health obligations in a LOB does not include any cash-flows relating to the liabilities (annuities in payment) valued separately according to life principles. This means that claims payments for annuities in payment are excluded from the run-off triangle.

TP.1.160. However, payments on claims before annuitisation[4] and payments at the time of annuitisation remain included in the run-off triangle. At the time of annuitisation, the present value of claims of the annuity (i.e. the best estimate valued separately according to life principles) is shown as a single "lump-sum" payment in the run-off triangle, calculated as at the date of the annuitisation.

TP.1.161. Where the analysis is based on run-off triangles of incurred claims, the "lump sum payment" representing the present value of claims of the annuity (as above) should be removed from case reserves at the date of annuitisation.

TP.1.162. On basis of run-off triangles adjusted as described above, the participant may apply an appropriate actuarial reserving method to derive a best estimate of the claims provision of the

[4] The term "annuitisation" denotes the point in time where the undertaking becomes obligated to pay the annuity.

portfolio. Due to the construction of the run-off triangle, this best estimate would not include the best estimate related to the annuities in payment which would be valued separately using life principles (i.e. there would be no "double counting" in relation to the separate life insurance valuation).

TP.1.163. The total best estimate for the claims provision and the annuity obligations is thus given by the sum of the result of the application of an appropriate actuarial reserving method to the run-off triangle above described and the amount of the best estimate calculated separately for the block of annuities.

2.2.4.10 Obligations in different currencies

TP.1.164. The probability-weighted average cash-flows should take into account the time value of money. The time value of money of future cash-flows in different currencies is calculated using risk-free term structure for relevant currency. Therefore the best estimate should be calculated separately for obligations of different currencies.

2.2.5 Valuation of options and guarantees embedded in insurance contracts

TP.1.165. Insurers are required to identify all contractual options and financial guarantees embedded in their contracts.

2.2.5.1 Definition of contractual options and financial guarantees

TP.1.166. A contractual option is defined as a right to change the benefits[5], to be taken at the choice of its holder (generally the policyholder), on terms that are established in advance. Thus, in order to trigger an option, a deliberate decision of its holder is necessary.

TP.1.167. Some (non-exhaustive) examples of contractual options which are pre-determined in contract and do not require again the consent of the parties to renew or modify the contract include the following:

- Surrender value option, where the policyholder has the right to fully or partially surrender the policy and receive a pre-defined lump sum amount;
- Paid-up policy option, where the policyholder has the right to stop paying premiums and change the policy to a paid-up status;
- Annuity conversion option, where the policyholder has the right to convert a lump survival benefit into an annuity at a pre-defined minimum rate of conversion;
- Policy conversion option, where the policyholder has the right to convert from one policy to another at pre-specific terms and conditions;
- Extended coverage option, where the policyholder has the right to extend the coverage period at the expiry of the original contract without producing further evidence of health.

TP.1.168. A financial guarantee is present when there is the possibility to pass losses to the insurer or to receive additional benefits[6] as a result of the evolution of financial variables (solely or in conjunction with non-financial variables) (e.g. investment return of the underlying asset portfolio, performance of indices, etc.). In the case of guarantees, the trigger is generally

[5] This should be interpreted as also including the potential for reduction of the level of premiums that would be charged in the future.
[6] This should be interpreted as also including the potential for reduction of the level of premiums that would be charged in the future.

automatic (the mechanism would be set in the policy's terms and conditions) and thus not dependent of a deliberate decision of the policyholder / beneficiary. In financial terms, a guarantee is linked to option valuation.

TP.1.169. The following is a non-exhaustive list of examples of common financial guarantees embedded in life insurance contracts:

- Guaranteed invested capital;
- Guaranteed minimum investment return;
- Profit sharing (i.e. future discretionary benefits).

TP.1.170. There are also non-financial guarantees, where the benefits provided would be driven by the evolution of non-financial variables, such as reinstatement premiums in reinsurance, experience adjustments to future premiums following a favourable underwriting history (e.g. guaranteed no-claims discount). Although Article 79 only refers explicitly to financial guarantees, the calculation of technical provisions should also, by definition, take into account the value of any non-financial guarantees.

2.2.5.2 Valuation requirements

TP.1.171. For each type of contractual option insurers are required to identify the risk drivers which have the potential to materially affect (directly or indirectly) the frequency of option take-up rates considering a sufficiently large range of scenarios, including adverse ones.

TP.1.172. Embedded options and guarantees are important components of technical provisions which need to be continuously monitored by the insurer.

TP.1.173. The best estimate of contractual options and financial guarantees must capture the uncertainty of cash-flows, taking into account the likelihood and severity of outcomes from multiple scenarios combining the relevant risk drivers.

TP.1.174. The best estimate of contractual options and financial guarantees should reflect both the intrinsic value and the time value.

TP.1.175. The best estimate of contractual options and financial guarantees may be valued by using one or more of the following three methodologies:

- a stochastic approach using for instance a market-consistent asset model (includes both closed form and stochastic simulation approaches);
- a series of deterministic projections with attributed probabilities; and
- a deterministic valuation based on expected cash-flows in cases where this delivers a market-consistent valuation of the technical provision, including the cost of options and guarantees.

TP.1.176. For the purposes of valuing the best estimate of contractual options and financial guarantees, a stochastic simulation approach would consist of an appropriate market-consistent asset model for projections of asset prices and returns (such as equity prices, fixed interest rate and property returns), together with a dynamic model incorporating the corresponding value of liabilities (incorporating the stochastic nature of any relevant non-financial risk drivers) and the impact of any foreseeable actions to be taken by management.

TP.1.177. For the purposes of the deterministic approach, a range of scenarios or outcomes appropriate to both valuing the options or guarantees and the underlying asset mix, together with the associated probability of occurrence should be set. These probabilities of occurrence should be weighted towards adverse scenarios to reflect market pricing for risk. The series of deterministic projections should be numerous enough to capture a wide range of possible outcomes (and, in particular, it should include very adverse yet possible scenarios) and take into account the probability of each outcome's likelihood (which may, in practice, need to incorporate judgement). The costs will be understated if only relatively benign or limited economic scenarios are considered.

TP.1.178. When the valuation of the best estimate of contractual options and financial guarantees is not being done on a policy-by-policy basis, the segmentation considered should not distort the valuation of technical provisions by, for example, forming groups containing policies which are "in the money" and policies which are "out of the money".

TP.1.179. Regarding contractual options, the assumptions on policyholder behaviour should be appropriately founded in statistical and empirical evidence, to the extent that it is deemed representative of the future expected behaviour. However, when assessing the experience of policyholders' behaviour appropriate attention based on expert judgements should be given to the fact that when an option is out of or barely in the money, the behaviour of policyholders should not be considered to be a reliable indication of likely policyholders' behaviour when the options are heavily in-the-money.

TP.1.180. Appropriate consideration should also be given to an increasing future awareness of policy options as well as policyholders' possible reactions to a changed financial position of an undertaking. In general, policyholders' behaviour should not be assumed to be independent of financial markets, a firm's treatment of customers or publicly available information unless proper evidence to support the assumption can be observed.

TP.1.181. Where relevant, non-financial guarantees should be treated like financial guarantees.

2.2.6 Policyholders' behaviour

TP.1.182. Undertakings are required to identify policyholders' behaviour.

TP.1.183. Policyholders' behaviour which could change the expected future cash-flows of the contract if exercised in line with options contained in the policy should be taken into account in the cash-flow projection. The projection should allow for the probability that policyholders exercise the option, including surrender rates and paid-up rates.

TP.1.184. Expectations should be founded on appropriate statistical analysis and based on expert judgement. This may depend on financial conditions at the time when the option crystallises, which will affect the value of the option. Non-financial conditions should also be considered - for example, deterioration in health could be expected to have an impact on take-up rates of guaranteed insurability options.

TP.1.185. When credible and relevant discontinuance experience is available undertakings should make use of it. Where a discretionary surrender value is paid on discontinuance, the estimates should allow for the payment the undertaking would reasonably make in the scenario under consideration.

TP.1.186. When assessing past policyholders behaviour, appropriate attention should be given to whether the option is out of or barely in the money or is in the money.

TP.1.187. When identifying policyholders' behaviour appropriate consideration should also be given for an increasing future awareness of policy options.

TP.1.188. In general policyholders' behaviour should not be assumed to be independent of financial markets, an undertaking's treatment of customers or publicly available information unless proper evidence to support the assumption can be observed.

TP.1.189. Policyholders' option to surrender is often dependent on financial markets and undertaking-specific information, in particular the financial position of the undertaking.

TP.1.190. Policyholders' option to lapse and also in certain cases to surrender are mainly dependent on the change of policyholders' status such as the ability to further pay the premium, employment, divorce, etc.

TP.1.191. Policyholder' options to exercise other contractual options are based on the risk drivers which have the potential to materially affect the level of moneyness.

TP.1.192. It is important to consider whether the presence of policyholder options could materially change the economic nature of the risk covered under the terms of the contract if exercised, i.e. where they have an option enabling this. In such circumstances the cash-flows projection should take account of the proportion of policyholders that is expected to take up the options.

2.2.7 Management actions

TP.1.193. The methods and techniques for the estimation of future cash-flows, and hence the assessment of the provisions for insurance liabilities, could take account of potential future actions by the management of (re)insurance undertakings, if and only if they can demonstrate that the requirements set out in these specifications are satisfied. In any case Articles 83 to 84 of the Level 1 text should remain applicable, where the effect of considering the future management actions is material.

a) The following list, that is non-exhaustive, describes the main future management actions at present:

- changes in asset allocation, as management of gains/losses for different asset classes in order to gain the target segregated fund return; management of cash balance and equity backing ratio with the aim of maintaining a defined target asset mix in the projection period; management of liquidity according to the asset mix and duration strategy; actions to maintain a stable allocation of the portfolio assets in term of duration and product type, actions for the dynamic rebalancing of the assets portfolio according to movements in liabilities and changes in market conditions;
- changes in bonus rates or product changes, for example on profit sharing policies to mitigate market risks;
- changes in expense charge, for example related to guarantee charge, or related to an increased charging on unit-linked or index-linked business

b) The impact of future management actions is most relevant where a simulation approach is applied to determine the future potential cash-flows, from which a probability-weighted average can then be derived. However analytical or deterministic approaches could take account of future management actions.

TP.1.194. (Re) insurance undertakings have the primary responsibility of verifying whether their future management actions are objective, realistic and verifiable, as these criteria are defined in these specifications. If these criteria cannot be demonstrated by the (re)insurance undertaking, the management action should not be taken into account. The assessment of the undertaking in respect of its future management actions shall be subject to supervisory review according articles 83 and 84 of the Level 1 text.

TP.1.195. The assumptions used to project the cash-flows should reflect the actions that management would reasonably expect to carry out in the circumstances of each scenario over the duration of the projection.

a) For the standard calculation of the SCR of some modules or sub-modules, it is necessary to reassess the value of the technical provisions following specified adverse events. For this purposes, the approach taken for the recalculation of the best estimate should be consistent with the approach taken in the initial valuation of the best estimate (i.e. used for the assessment of the technical provisions in the prudential balance sheet).

b) Therefore (re)insurance undertakings are allowed to take account of the relevant future management actions when assessing the liabilities that are considered as input of the calculations of the SCR.

c) Nevertheless, (re)insurance undertakings cannot take account in other steps of the process of calculation of the SCR of any actions that might be taken during the course of the adverse scenario, as explained in the QIS5 specifications regarding financial risk mitigating techniques.

d) Obviously, where the SCR is calculated using a factor-based approach it is not possible to take account of future management actions in such calculation.

TP.1.196. Allowance should be made for the time taken to implement actions. In considering the reasonableness of projected future management actions, (re)insurance undertakings should consider their obligations to policyholders, e.g. through policy wordings, marketing literature.

2.2.7.1 Criteria to be demonstrated in order to take into account a management action

A) Objectivity

TP.1.197. Objectivity means that for the purpose of the calculation of the best estimate the (re)insurance undertaking should define what future management actions will be taken and when each would be taken. This will need to cover all scenarios which are relevant for the valuation of the best estimate.

TP.1.198.

TP.1.199. For the reinsurance undertaking, the liability will depend on the future management actions taken by the cedant undertaking as well. In this case, the reinsurer's technical provisions could be larger than the insurer's for the same block of business. Moreover, the reinsurer may consider the future management actions of the cedant insurer as "policyholder's behaviour", provided the assumptions in this respect meet the requirements generally set out for the rest of assumptions used in the calculation of the technical provisions.

B) Realism

TP.1.200. Realism should be interpreted as meaning that the (re)insurance undertaking considers it both possible and also realistic that it will carry out such actions in the circumstances being considered (i.e. market conditions for sales or purchases of assets, any commitments given to customers and/or supervisors about how the business will be managed,...).

TP.1.201. Realism requires the actions to be those that the undertaking could reasonably be expected to take and be able to take in a range of foreseeable market conditions.

TP.1.202. Realism should also be interpreted as meaning that assumed future management actions should be consistent with the (re)insurance undertaking's current principles and practices to run the business unless there is sufficient current evidence that the insurer will change its practice and has taken the necessary steps to implement this change.

TP.1.203. It should not be assumed that (re)insurance undertakings would take future management actions if this is contrary to their obligations to policyholders. An insurer should consider its policy wordings, marketing literature, or other statements when considering its obligations to policyholders. This assessment should also take account of any relevant legal or regulatory constraints around the management action.

TP.1.204. Any consequential effect on policyholder behaviour or on the costs of running the company should be taken into account.

TP.1.205. For a given scenario the assumed future management actions should reflect the trade-off between the degree of competitiveness aimed at by the undertaking and the risk of dynamic lapses. This trade-off should be consistent with corporate planning.

TP.1.206. Future management actions in different scenarios shall be internally consistent when calculating the best estimate. Furthermore, extreme scenarios shall consider the effect of future management actions consistently with the recalculation for the SCR. In particular, the future management actions shall also consider that in some scenarios such actions may be not applied due to practical impediments.

a) For example, where the (re)insurance undertaking has a policy of applying the same treatment to two sets of policies or a policy of increasing the allowance for profit sharing if experience is better than anticipated, this should be reflected within the best estimate calculation.

b) Participants should use reasonable assumptions in incorporating management actions into projections of cash-flows such that the effects of the management actions are not overstated.

c) Management actions should be calculated using the same methods and assumptions in a risk neutral valuation as in a real world valuation. That is to say that for a given scenario, each valuation should have identical management actions. The risk neutral valuation and real world valuation may either use a different set of scenarios or place different weights on the same scenarios.

TP.1.207. The (re)insurance undertaking should also estimate the time taken to implement actions, for any costs associated with these actions and for any likely changes to policyholder behaviour following those future management actions. The cash-flows included in the technical provisions should reflect this accordingly.

C) Verifiability

TP.1.208. Verifiability should be interpreted as meaning that there should be sufficient evidence to demonstrate that the future management actions are objective and realistic.

TP.1.209. In particular, the assumptions should be verifiable from:

- If available, from public indications that it would expect to take (or not take) the action in the type of circumstance being considered.

- Through the comparison of assumed future managements actions and management actions actually taken by the (re)insurance undertaking in previous years; the (re)insurance undertaking should document and be able to explain any relevant deviations.

- Through the comparison of future management actions taken into account in the current and in the past valuations; the (re)insurance undertaking should document and be able to explain any significant change in the accounted future management actions.

- Through the quantification of the effect of future management actions either individually or in aggregate.

TP.1.210. The level of justification required for a given management action may depend on the impact of that management action. For example stronger justification may be required for future management actions considered in the extreme scenarios or where the management action changes more significantly the value of the best estimate. The effect of management actions assumed in the determination of technical provisions has to be publicly disclosed.

TP.1.211. The applied principles and practices should normally also be maintained in time unless there is sufficient evidence about the necessity of their updating.

2.2.8 Distribution of discretionary benefits

TP.1.212. When calculating technical provisions, participants should take account of all payments to policyholders and beneficiaries, including future discretionary bonuses, which they expect to make, whether or not these payments are contractually guaranteed, unless those payments fall under Article 91(2) of the Level 1 text (surplus funds).

2.2.8.1 Valuation of future discretionary benefits

TP.1.213. Future cash-flows also need to be split into guaranteed and discretionary benefits because, as stated in Article 108 of the Level 1 text, the loss absorbing capacity of technical provisions is limited by the technical provisions relating to the future discretionary benefits. The risk mitigation effect provided by future discretionary benefits shall be no higher than the sum of technical provisions and deferred taxes relating to those future discretionary benefits. To distinguish between guaranteed and discretionary benefits the following distinction is proposed:

- “Guaranteed benefit”: This represents the value of future cash-flows which does not take into account any future declaration of future discretionary bonuses. The cash-flows take into account only those liabilities to policyholders or beneficiaries to which they are entitled at the valuation date. Guaranteed benefits at the valuation date are those benefits that cannot be reduced whatever the future state of the world.

- “Conditional discretionary benefit”: This is a liability based on declaration of future benefits influenced by legal or contractual declarations and performance of the undertaking/fund. “Discretionary participation features” are defined as additional benefits that are contractually based on:

  a) the performance of a specified pool of contracts or a specified type of contract or a single contract

b) realised and/or unrealised investment return on a specified pool of assets held by the issuer; or

c) the profit or loss of the company, fund or other entity that issues the contract.

- "Pure discretionary benefit": This represents the liability based on the declaration of future benefits which are at the discretion of the management. "Discretionary participation features" are defined as additional benefits whose amount or timing is contractually at the discretion of the issuer.

TP.1.214. Discretionary benefits correspond to the sum of the "conditional discretionary benefit" and "pure discretionary benefit" items. The definitions of "conditional discretionary benefit" and "pure discretionary benefit" should not be understood as requirement that they should be valued separately. Only a distinction between guaranteed benefits and discretionary benefits should be required.

TP.1.215. For the purpose of determining the loss absorbing capacity of the technical provisions the value of the loss absorbing capacity should never be bigger than the sum of the "conditional discretionary benefit" and the "pure discretionary benefit". Due to the fact that "conditional discretionary benefit" is based on legal or contractual obligations, the volume/amount of risk mitigation effect should be based on proper valuation of different stress scenarios.

TP.1.216. For the valuation of liabilities it is not so important to distinguish the value of technical provisions for the guaranteed and discretionary part. The distinction between the guaranteed and discretionary part of technical provisions is important only from in view of the comparability between different undertakings.

TP.1.217. Due to the large influence of management discretion in the valuation of technical provision for with-profits business the assessment of technical provisions should based on detailed documentation of the mechanism for distributing discretionary benefits.

TP.1.218. Mechanisms for distribution discretionary benefits should encompass a significant amount of the spectrum of principles and practices that an undertaking has adopted to run the with-profit business. Furthermore, the mechanism would also be strongly related to the financial position of the undertaking, which is often set as a primary restriction for the distribution of discretionary benefits.

TP.1.219. Some key issues (not necessary mutually exclusive) in the mechanism for distributing discretionary benefits are the following (should in most cases be set for a homogenous group of policyholders even if not explicitly stated):

- What constitutes a homogenous group of policyholders and what are the key drivers for the grouping?

- How is a profit divided between owners of the undertaking and the policyholders and furthermore between different policyholders?

- How is a deficit divided between owners of the undertaking and the policyholders and furthermore between different policyholders?

- How will the mechanism for discretionary benefits be affected by a large profit or loss?

- How will policyholders be affected by profits and losses from other activities?

- What is the target return level set by the firm's owners on their invested capital?

- What are the key drivers affecting the level of discretionary benefits?

- What is an expected level (inclusive any distribution of excess capital, unrealised gains etc.) of discretionary benefits?

- How are the discretionary benefits made available for policyholders and what are the key drivers affecting for example the split between reversionary and terminal discretionary benefits, conditionality, changes in smoothing practise, level of discretionary by the undertaking, etc.

- How will the experience from current and previous years affect the level of discretionary benefits?

- When is an undertaking's solvency position so weak that declaring discretionary benefits is considered by the undertaking to be jeopardizing a firm-owner's or/and policyholders' interest?

- What other restrictions are in place for determining the level of discretionary benefits?

- What is an undertaking's investment strategy?

- What is the asset mix driving the investment return?

- What is the smoothing mechanism if used and what is the interplay with a large profit or loss?

- What kind of restrictions are in place in smoothing extra benefits?

- Under what circumstances would one expect significant changes in the crediting mechanism for discretionary benefits?

- To what extent is the crediting mechanism for discretionary benefits sensitive to policyholders' actions?

TP.1.220. There are cases where the valuation of discretionary benefits depends intrinsically on the assets held by the firm. The assets assumed in such circumstances should be the assets held by the undertaking at the valuation date. The assets assumed in such circumstances may be chosen accordingly to one or several combinations of the following principles:

- the actual assets held to back a specific liability (assuming a segmented investment portfolio);

- the assets considered most reasonable to back the specific liability and that attribute future investment returns to that fund;

- a proportion of the assets allocated in accordance with the cover of technical provisions; or

- a proportion of the assets allocated in accordance with the general investment portfolio.

TP.1.221. Future changes in the asset allocation should be taken into account if the requirements on management actions are met. If the future discretionary benefits depend on a sub-portfolio of the undertaking assets, only the relevant sub-portfolio should be taken into account.

TP.1.222. The terms of the contract usually stipulate how the future profits are determined and what share the policyholders are entitled to.

TP.1.223. Where a risk neutral approach is used, the valuation of discretionary benefits, including any projections or assumptions on future returns of the firm's asset portfolio, should be consistent with the choice of the risk-free interest rate curve used for discounting. The set of assumptions on returns of future investments underlying the valuation of discretionary benefits shall be consistent with the principle that they shall not exceed the level given by the forward rates derived from the risk-free interest rates. Where other approach is used, the returns of the future investments shall be also considered in a consistent manner with the assumptions underlying the approach.

2.2.9 Recoverables from reinsurance contracts and special purpose vehicles

TP.1.224. The best estimate shall be calculated gross, without deduction of amounts recoverable from reinsurance contracts and special purpose vehicles.

TP.1.225. The amounts recoverable from reinsurance contracts and special purpose vehicles should be shown separately, on the asset side of undertakings' balance sheet as "recoverables from reinsurance contracts and special purpose vehicles".

TP.1.226. The calculation of amounts recoverable from special purpose vehicles should be done separately. Moreover, the calculation of recoverable from finite reinsurance[7] should be done separately.

TP.1.227. The amounts recoverable from reinsurance contracts and special purpose vehicles for non-life insurance obligations shall be calculated separately for "premium provisions" and "claims provisions". The claims provision part of the recoverable should comprise the compensation payments for the claims accounted for in the gross claims provision excluding debt the cessionary owes to the ceded undertaking and is not held as a part of the gross technical provisions at the ceded undertaking. All other payments should be considered in the premium provision part of the recoverable.

TP.1.228. For the calculation of amounts recoverable from reinsurance contracts and special purpose vehicles the same principle as for the calculation of best estimate of the technical provisions should be applied.

TP.1.229. There is no need to calculate a risk margin for amounts recoverable from reinsurance contracts and special purpose vehicles because the single net calculation of the risk margin should be performed, rather than two separate calculations (i.e. one for the risk margin of the technical provisions and one for the risk margin of recoverables from reinsurance contracts and special purpose vehicles). Where undertakings calculate a risk margin using an internal model, they can either perform one single net calculation or two separate calculations.

TP.1.230. Where for certain types of reinsurance and special purpose vehicles, the timing of recoveries and that for direct payments of undertaking markedly diverge, this should be taken into account in the projection of cash-flows. Where such timing is sufficiently similar to that for direct payments, the undertaking shall have the possibility of using the timing of direct payments.

TP.1.231. Some special purpose vehicles do not compensate directly the claims made on the undertaking. Instead payments are made according to certain external indicators, for example an earthquake index or general population mortality. In this case the estimation of future

[7] See Article 210 of Level 1 text for a definition.

recoverables should consider the basis risk of these arrangements. A compensation for past and future policyholder claims should only be taken into account to the extent it can be verified in a deliberate, reliable and objective manner.

TP.1.232. The amounts recoverable from existing reinsurance contracts and special purpose vehicles should be adjusted in order to take account of expected losses due to counterparty default, whether this arises from insolvency, dispute or another reason. Further specifications on how to adjust amounts recoverable from reinsurance contracts and special purpose vehicles, can be found in the item of these specifications devoted to counterparty default adjustments to recoverable from reinsurance contract and SPV's.

TP.1.233. The amounts recoverable from reinsurance contracts and special purpose vehicles should be calculated:

- As default method, as a probability-weighted average of future cash-flows, taking account of the time value of money, which shall be adjusted to take account of expected losses due to default of the counterparty.

- As a simplification: As mentioned in these specifications it is possible to assess amounts recoverable from reinsurance contract and special purpose vehicles in an indirect manner as the difference between the best estimate and net best estimate, taking into account adjustments for the expected losses due to the default of the counterparty provided that it is expected that the simplification method will deliver sufficient similar amount than the default method

In both cases the adjustment for the expected losses due to the default of the counterparty needs to be calculated separately.

TP.1.234. For the probability-weighted average of future cash-flows of recoverables from existing reinsurance contracts and special purpose vehicles the following cash in- and out-flows should be taken into account:

<u>Cash in-flows should include at least:</u>

- recoverables from reinsurance contracts and special purpose vehicles for claims payments or benefits and recoverable for related expenses; and
- revenues from reinsurance commission and from shares in profit from technical sources relevant to individual reinsurance contracts.

<u>Cash out-flows should include at least:</u>

- future premiums for reinsurance contracts and special purpose vehicles,
- if relevant, shares in profit due to the reinsurance contract.

TP.1.235. Expenses which the undertaking incurs in relation to the management and administration of reinsurance and special purpose vehicle contracts should be allowed for in the best estimate, calculated gross, without deduction of the amounts recoverable from reinsurance contracts and special purpose vehicles. But no allowance for expenses relate to the internal processes should be made in the recoverables.

TP.1.236. Undertakings shall distinguish between events that relate to market risk and events that relate to underwriting risk. Only payments made in relation to compensation of insurance events shall be accounted for in the recoverables. All payments that relate to market risk and do not compensate insurance events should not be accounted as amounts recoverable from reinsurance contracts and special purpose vehicles.

TP.1.237. Where a deposit has been made for the above mentioned cash-flows, the corresponding assets and liabilities should be shown separately in the balance sheet. The recoverable should be adjusted accordingly to avoid a double counting of assets or liabilities.

TP.1.238. Debtors and creditors that relate to settled claims of policyholders or beneficiaries should not be included in the recoverable.

TP.1.239. The net best estimate which takes into account adjustments for the expected losses due to default of the counterparty is given by the best estimate which takes into account the deduction of amounts recoverable from reinsurance contracts and special purpose vehicles adjusted for expected losses due to default of the counterparty. Hence, the net best estimate corresponds to the probability-weighted average of all future cash-flows including cash-flows related to recoverable from reinsurance contracts and special purpose vehicles, taking account of the time value of money, using the relevant risk-free interest rate, and the adjustment for the expected losses due to the default of the counterparty.

2.2.10 Assumptions underlying the calculation of the technical provisions

TP.1.240. Data comprises numerical, census or classification information but no qualitative information. Assumptions are not regarded as data but it is noted that the use of data is an important basis in the development of assumptions.

TP.1.241. Among others the reliability of the amount of best estimate of technical provisions relies on the quality of the assumptions made. The degree of realism of the assumptions relies especially, but not only, on the quality of data used. This section will set out the principles which should govern the quality of the assumptions. (See specifications on quality of the data).

2.2.10.1 High level classification of assumptions

TP.1.242. Based on Level 1 text, two classes of assumptions can be identified:

a) Assumptions consistent with information provided by financial markets;

b) Assumptions consistent with generally available data on insurance and reinsurance technical risks.

2.2.10.2 Principles for setting the assumptions

TP.1.243. The following general principles shall be taken into account in determining the appropriateness of a realistic assumption:

a) In order to comply with the requirements of the Level 1 text, assumptions should be set in a realistic manner.

b) Assumptions shall be derived consistently from year to year without arbitrary changes. The changes of assumptions from one period to another should be traced, explained and documented. The impact of all changes of assumptions from one period to another on the value of technical provisions should be quantified, traced, explained and documented.

c) Expert judgement may be taken into account under the conditions set out in section 3.11 of these Technical specifications (see below)

d) Assumptions shall be adequately documented including the suitability of data sources, the derivation of the assumptions and any limitations in the results.

e) The materiality of the assumption shall be taken into account in determining the level of supporting documentation required.

f) The data on which assumptions are based should be credible for the purpose used and meet the standards with respect to the appropriateness, completeness and accuracy of data (as defined by Article 86 (f)).

g) Where assumptions are based on external data such as industry or market data, the external data source should satisfy the following criteria:

i. Both the external data and the documentation of any assumptions or methodologies underlying the external data should be available to the insurer so that the external data source may be validated. In particular, it should be possible to assess the relevance of the data given the characteristics of the underlying insurance portfolio. Undertakings should be able to demonstrate that external data of the underwriting risk is more suitable in order to better reflect the risk profile thereof.

ii. Where relevant, the external data should be produced sufficiently frequently to permit an analysis of the data, for example to identify any trends in the underlying data, the variation of the data over time and the variation of the data between different observations. Depending on the results of the analysis, an adjustment to the data may be required.

iii. Assumptions or data supplied by external providers should be validated using appropriate validation methods as described in the subsection regarding validation.

TP.1.244. Consideration shall be given to both the explicit and implicit assumptions required throughout the different stages of the best estimate calculation. These stages may include following stages: data, analysis, modelling and validation.

Data assumptions

TP.1.245. Assumptions are being set at the stage of the data collection in order to improve the quality and completeness of the information and the judgement underlying the actuarial or statistical valuation.

TP.1.246. For example, firms may have a portfolio with historical data but supplement this with a study on the firm's underwriting/claims handling practices and/or information taken from an external benchmark. Alternatively, the insurer may consider a study on how longevity experience or medical expenses could evolve in the future. Both of these examples would make the assumption setting process more complete.

Analysis assumptions

TP.1.247. Assumptions are being set during the stage of analysis in order to improve the relevance and credibility of past experience as well as to highlight key features within the data to inform how experience may evolve in the future.

TP.1.248. For example, insurers may assume that any differences in the past claims experience on two motor portfolios can be attributed to a small number of fixed factors or that the insurer's past mortality experience should be similar to a fixed proportion of a standard table.

Modeling assumptions

TP.1.249. Assumptions are being set during the projection or modelling process, allowing for the projection of past experience into the future. These assumptions represent a model input or justify the use of a specific technique, distribution or define the interaction between variables in the model. Assumptions that are being set during the modelling stage should appropriately reflect the nature of the cash-flows and the potential sources of uncertainty.

TP.1.250. For example, the insurer may assume that a gamma distribution adequately explains the future claims experience and/or assume that future expense/claims inflation will be a fixed percentage above retail price inflation.

TP.1.251. Future management actions may be considered as a specific example of modelling assumptions.

Validation of the assumptions

TP.1.252. During the validation process, undertakings may need to compare assumptions against other possible alternatives, in order to test the sensitivity of the result and so endorse the adequacy of the assumptions chosen.

2.2.10.3 Assumptions consistent with information provided by financial markets

TP.1.253. Assumptions consistent with information about or provided by financial markets include (non exhaustive list):

- relevant risk-free interest rate term structure,
- currency exchange rates,
- market inflation rates (consumer price index or sector inflation) and
- economic scenario files (ESF).

TP.1.254. As a general principle, the information should allow for the estimation of reliable assumptions when it is observed in deep, liquid and transparent markets.

TP.1.255. Nevertheless, information observed in other type of markets may be used provided, to the extent possible, that appropriate tests or adjustments can be applied to guarantee its reliability.

TP.1.256. The assumptions underlying the risk free rate are being covered in section 1.3.

TP.1.257. Where an assumption (e.g. an economic scenario file) is produced by a market consistent asset model, that model shall be calibrated appropriately.

Assumptions underlying the asset model: Implied or historical volatility

TP.1.258. With regard to the volatility assumptions that are being used to calibrate the asset model, there are two possible approaches. Both approaches have advantages and disadvantages:

a) The assumptions about the volatility of a market price may be based on an analysis of its historic volatility; or

b) Volatility assumptions may be derived from the price of financial instruments where the price of the instrument depends on assumptions regarding future volatility (implied volatility) in a context of deep, liquid and transparent financial market.

TP.1.259. The use of historical volatilities has the following advantages:

a) Experience shows that implied volatilities may misestimate the real volatility. In these cases implied volatilities may not lead to a realistic best estimate.

b) Furthermore, implied volatilities tend to be higher than the real volatility in times of crises and lower than real volatility in times of economic well being. Therefore, the value of the financial options and guarantees included in the technical provisions may be underestimated before a crisis and overestimated during the crisis. This mechanism has a pro-cyclical effect. Historical volatilities may be more stable as they are based on long time horizons.

c) The derivation of implied volatilities is based on financial models such as the Black-Scholes model which relates market prices to volatility. These models may not be an accurate reflection of reality, particularly in extreme market conditions.

TP.1.260. The use of implied volatilities has the following advantages:

a) Implied volatilities are based on current information derived from financial markets.

b) Historical volatilities may not be relevant to current market conditions.

c) Where an insurer is holding a hedging instrument for which there is a price, using historical rather than implied volatilities will lead to unnecessary balance sheet volatility.

d) The derivation of implied volatilities based on financial models such as the Black-Scholes is consistent with the way in which market participants analyse the prices of traded financial instruments and price over-the-counter financial instruments

and following disadvantages:

e) Implied volatility on equity and interest rate are not available for each horizon of cash-flows projection (in practice less than 10 years are potentially available).

f) Implied volatilities are only available on OTC transactions (i.e. the information is not publicly available). Each trading desk develops its own implied volatility curve regarding the specific market data used. Thus implied volatilities for the same horizon are not harmonised between undertakings.

g) Implied volatilities for equity is based on the Black-Scholes model which underestimate the tail of distributions as it is based on normal distribution.

h) Implied volatilities could be affected by undertakings using the market to hedge their risks and could be distorted.

TP.1.261. Implied volatilities seem to be more appropriate for the purpose of a market consistent valuation. However there may be circumstances in which it is appropriate to use historical volatilities. For example, in some cases, it may not be possible to calibrate volatility assumptions to market data. In such cases the calibration should be based on historical analysis of the volatility.

TP.1.262. Independent from the choice for either of the volatility assumptions, the risk relating to changes in the volatilities should be addressed either implicitly or explicitly in the SCR.

Assumptions underlying the asset model: principles

TP.1.263. Where an assumption is produced by a market consistent asset model (e.g. an economic scenario file), to the extent permitted by market conditions, that model shall satisfy the following criteria:

a) The asset model shall try to reproduce asset prices for the most significant liabilities by nature and term that can be directly verified by the market.

b) The asset model shall be arbitrage free.

TP.1.264. The following principles shall be taken into account in determining the appropriate calibration of a market consistent asset model:

a) The asset model shall be calibrated to reflect the nature and term of the liabilities, in particular of those liabilities giving rise to significant guarantee and option costs.

b) The asset model shall be calibrated to the current risk-free term structure used to discount the cash flows.

c) The asset model shall be calibrated to a properly calibrated volatility measure.

TP.1.265. In principle, the calibration process should use market prices only from financial markets that are deep, liquid and transparent. If the derivation of a parameter is not possible by means of prices from deep, liquid and transparent markets, other market prices may be used. In this case, particular attention should be paid to any distortions of the market prices. Corrections for the distortions should be made in a deliberate, objective and reliable manner.

TP.1.266. A financial market is deep, liquid and transparent, if it meets the requirements specified in the subsection of these specifications regarding circumstances in which technical provisions shall be calculated as a whole.

TP.1.267. It may not be possible to calibrate to current market data, for example if no market exists, if markets are insufficiently deep and liquid or if there is insufficient reliable market data. The insurer should be capable of demonstrating that the calibration of models where markets are not deep and liquid is appropriate and in line with all the relevant criteria set out in the Level 1 text.

TP.1.268. The calibration of the above mentioned assets models may also be based on adequate actuarial and statistical analysis of economic variables provided they produce market consistent results. For example:

a) To inform the appropriate correlations between different asset returns.

b) To determine probabilities of transitions between rating classes and default of corporate bonds.

c) To determine property volatilities. As there is virtually no market in property derivatives, it is difficult to derive property implied volatility. Thus the volatility of a property index may often be used instead of property implied volatility.

2.2.10.4 Assumptions consistent with generally available data on insurance and reinsurance technical risks

TP.1.269. Generally available data refers to a combination of:

- Internal data
- External data sources such as industry or market data.[8]

TP.1.270. Internal data refers to all data which is available from internal sources. Internal data may be either:

- Undertaking-specific data:
- Portfolio-specific data:

TP.1.271. Recital 55 stipulates: […] the amount of technical provisions should reflect the characteristics of the underlying insurance portfolio. Undertaking-specific information should therefore only be used in their calculation insofar as that information enables insurance and reinsurance undertakings to better reflect the characteristics of the underlying insurance portfolio, such as information regarding claims management and expenses.

TP.1.272. All relevant available data whether external or internal data, should be taken into account in order to arrive at the assumption which best reflects the characteristics of the underlying insurance portfolio. In the case of using external data, only that which the undertaking can reasonably be expected to have access too should be considered.

The extent to which internal data is taken into account should be based on:

- The availability, quality and relevance of external data.
- The amount and quality of internal data.

TP.1.273. Assumptions should be based solely on external data only if there is no relevant source of internal information which could provide reliable input to the assumption setting process. Similarly assumptions should be based solely on internal data only if there is no relevant source of external data. Where internal and external data are available the most appropriate data, whether internal, external or a blend of both should be used having regard to the judgment and expertise of those using the data and the models to be employed.

TP.1.274. The following general principles shall be taken into account in determining the appropriateness of an assumption:

a) Assumptions shall be derived consistently:

b) Across homogeneous risk groups and lines of business.

[8] See CEIOPS-DOC-55/09 report on the use of insurance market data in the valuation of the technical provisions, November 2009, http://www.ceiops.eu/media/files/publications/reports/CEIOPS-Groupe-Consultatif-Coord.Group-Report-on-insurance-market-data.pdf.

c) With the undertaking's knowledge of the business and practices for managing the business.

d) Assumptions shall be based on credible information which is relevant to the cash-flows.

e) Undertakings shall consider whether assumptions adequately reflect the uncertainty underlying the cash-flows.

f) Assumptions shall make appropriate allowance for possible trends or future changes in both undertaking and portfolio specific factors as well as legal, social, economic or environmental factors.

TP.1.275. Assumptions should be easy to comprehend by third parties, well documented and reasons for them should be given sufficiently, considering the internal / external data or qualitative information used as a basis.

2.2.11 Expert judgement

TP.1.276. In certain circumstances expert judgement may be necessary when calculating the best estimate. This section develops the requirements to apply to expert judgement in the context of the implementing measure set out in Article 86(a), subject to the principle of proportionality.

2.2.11.1 Scope of expert judgement.

TP.1.277. Expert judgement may apply both in respect of the data used in the calculation of the best estimates, or in respect of the assumptions underlying the calculations, or eventually regarding the method applied to base the calculations. Examples of cases where expert judgement may be applied are (non-exhaustive list):

- in selecting the data to use, correcting its errors and deciding the treatment of outliers or extreme events,
- in adjusting the data to reflect current or future conditions, and adjusting external data to reflect the undertaking's features or the characteristics of the relevant portfolio,
- in selecting the time period of the data
- in selecting realistic assumptions
- in selecting the valuation technique or choosing the most appropriate alternatives existing in each methodology
- in incorporating appropriately to the calculations the environment under which the undertakings have to run its business

2.2.11.2 General conditions about the application of expert judgement.

- Expert judgement should be compatible with the full compliance of these specifications regarding technical provisions. In particular, the use of expert judgement should not be considered to replace appropriate collection, process and analysis of data according to the subsection on data quality standards.

- Expert judgement should not be applied in isolation, unless there is no reliable alternative, for example because of a scarcity of relevant data.

- Where expert judgement is applied in isolation or applied to an assumption which has a significant impact on the best estimate, undertakings shall be prudent in the selection alternatives considered as similar (i.e. undertakings shall be particularly careful in the selection of alternatives considered as similar and to give appropriate weight to potential adverse outcomes).

- Expert judgement shall only be applied by experts with the relevant knowledge, understanding and comprehension of the subject, and with adequate experience. Furthermore, rules on governance shall apply where relevant.

2.2.11.3 Documentation on the use of expert judgement.

- Expert judgement should be justified, explained and validated.

- According the proportionality principle, the process leading to the use of expert judgement should be documented in such a manner that the documentation makes possible the accountability and verification of the expert judgement. Generally speaking, the documentation will reflect the process of expert judgement, in particular:

  i the inputs on which expert judgement is based

  ii the objectives and decisional criteria used,

  iii any material limitation and the steps taken, if any, to mitigate the effect of such limitations

  iv the validation and back-testing envisaged or carried out for the expert judgement

2.2.11.4 Test of the expert judgement.

- Expert judgement should be back-tested with the additional experience gained or any emergent information,

- where possible, should be compared to external information and appropriately tested with sufficiently similar judgments, either internally (provided they are independent from the original expert) or externally (provided there is no commercial link that may endanger the unbiased opinion of the external expert),

- should be accompanied with a sensitivity analysis carried out on parameters or any other significant element derived by expert judgement.

TP.1.278. Users of the result of expert judgement should receive clear and comprehensive information of the existence of expert judgement, any relevant information of its content, degree of reliance and limitations (including appropriate sensitivity analysis).

2.2.12 Assessment of the appropriateness of the valuation: validation process

TP.1.279. Validation techniques are the tools and processes used by the (re)insurance undertaking to ensure valuation methods, assumptions and results of the best estimate calculation are appropriate and relevant. These methods can be quantitative as well as qualitative.

TP.1.280. In line with actuarial best practice (Re)insurance undertakings shall use validation techniques throughout the calculation of the best estimate in order to:

a) Validate the amounts of technical provisions. This means to validate such amounts are adequate to meet (re)insurance obligations.

b) Ensure the applicability and relevance of the methods and assumptions applied and the appropriateness of the level of technical provisions. This means to obtain evidence that all risks and elements which affect the value of the best estimate are appropriately and adequately taken into account.

   Obtaining such evidence may require both a qualitative assessment (e.g. listing the risks involved) and a quantitative assessment (when considering whether the risk has been adequately captured and modelled). Where the undertaking applies simplified methods according to the proportionality principle, this quantitative assessment does not require the use of non-simplified methods.

   The undertaking shall consider policy terms and general conditions, as those external factors (e.g. economic conditions) which may affect the value of the best estimate.

c) Ensure that the actuarial methods and statistical methodologies are appropriate to the nature, scale and complexity of the risks supported by insurance and reinsurance undertakings. The application of proportionality to validation shall follow the same steps and requirements generally defined to apply proportionality principle in respect technical provisions.

d) Compare the best estimate and the assumptions underlying the calculations regularly against experience.

2.2.12.1 Validation methods

TP.1.281. Validation methods will assist (re)insurance undertakings throughout the best estimate calculation by:

a) Encouraging understanding of how the cash-flows may emerge in the future and tracing any flaws in the calculation process.

b) Justifying the applicability and relevance of methods used in the estimation of the level of the best estimate.

c) Validating the appropriateness, completeness and accuracy of the assumptions and modelling used in the calculation of the best estimate.

TP.1.282. Validation is a process that should be run in parallel to the best estimate calculation. Therefore, validation should not be considered as an ex-post or final check.

2.2.12.2 Selection of validation methods

TP.1.283. The methods used for validation may be quantitative as well as qualitative.

TP.1.284. In line with actuarial best practice, each (re)insurance undertaking shall consider which validation methods and techniques are most appropriate.

2.2.12.3 Application of validation methods

TP.1.285. The validation shall be carried out at least once a year, and in any case where there are indications of substantial changes. The extent of the validation should be proportionate to the nature and purpose of the best estimate calculation.

TP.1.286. Significant changes in the external environment as well as changes to assumptions or goodness of fit of probability distributions may necessitate additional ad hoc checks on the validity of the calculation.

TP.1.287. The validation of the best estimate result shall be carried out at a sufficiently fine granularity to detect insufficiencies in the reserving of sub-portfolios of insurance obligations. For life insurance obligations, the validation should at least be made at the level of product types. For all other insurance or reinsurance obligations, the validation should be made at least at the level of homogeneous risk groups.

TP.1.288. Furthermore, the validation should be carried out separately for best estimate and reinsurance recoverable, and in non-life insurance for premium provisions and claims provisions.

TP.1.289. All relevant and material assumptions and parameters shall be appropriately validated. To the extent that it is statistically feasible, the validation should be carried out for each assumption separately.

The validation of parameters and assumptions aims to demonstrate that they are a reasonable reflection of the conditions expected in the future. For this purpose, appropriate use of real data may serve as starting basis to assess future expectances. This starting basis may need appropriate corrections to reflect future trends or expected uncertainty.

For some parameters and assumptions different methods could be used. Validation process should explain the reason to select particular assumptions or parameters in respect other possible alternatives, in particular why the selected parameters and assumptions are expected to provide the best reflection of future expectances.

The validation processes shall include appropriate documentation and should be overseen by the expert who fulfils requirements specified for providing expert judgment in order to insure that this will be done correctly.

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2.2.12.5 Examples of other validation methods

TP.1.297. Below is a non-exhaustive list of possible validation methods, that (re)insurance undertakings could use to validate their best estimate:

Examples of methods, which can help identify emerging features and trends in the historical data:

TP.1.298. Percentiles and analysis of residuals can be used to detect influential observations, outliers or clustering of claims.

TP.1.299. Ratios can be used to detect the drivers or causes for certain patterns. For example, we may have noticed an increase in claims. What is driving this - severity or frequency? For example, average cost per claim ratios or adjustments for inflation may give an indication of what the main drivers are.

TP.1.300. Analysis of settled vs. reported or paid over incurred claims ratios, can be used to justify the level of the best estimate.

TP.1.301. Graphs can be used to validate the use of a pattern. For example, the accident year patterns may be plotted against the final selected patterns. If there are any significant deviations, it may be necessary to investigate what is driving this deviation and make some adjustments which should be appropriately documented and justified.

TP.1.302. Identifying the existence of any biases or other distorting effects within data which are not representative of future experience. For example, a company may have recently merged with another. As a result, a specific line of business may produce a distribution of reserves which is significantly skewed in comparison to the distribution prior to the merger. This may suggest the need to separate both portfolios, even if they are within the same line of business

Examples of methods and techniques can help validate underlying assumptions:

Stress and scenario testing

TP.1.303. Stress and scenario testing is one of the quantitative tools used in a validation process by the insurance companies in order to:

- Understand any non-linearity between different assumptions;
- Ensure the estimation is robust and weaknesses/uncertainty has been addressed;
- Get further insight into the tail of the loss distribution.

Sensitivity analysis

TP.1.304. Sensitivity analysis can be used to assess the extent to which results are sensitive to the underlying assumptions and models. This can be performed by introducing small changes to parameters or additional data points.

TP.1.305. When an undertaking does not have sufficient relevant and reliable data to be able to analyse its own historical claim development it may use a relevant market or portfolio development pattern as a suitable benchmark. These benchmarks may also be used for comparison, to demonstrate the appropriateness and relevance of specific assumptions.

TP.1.306. Investigate the potential change in coverage, higher deductibles, or other external factors that could invalidate the underlying assumption that past development will be repeated in the future.

The following methods and techniques can be used to test the quality of fit and/or appropriateness of the valuation model:

TP.1.307. Produce several sets of estimators (curves of distribution of the estimators) and assess how well they describe the data. There are several ways undertakings can do this before they calculate the best estimate of the provisions. For example, they can plot age to age factors against the estimators. From this they will be able to assess which curve fits best.

TP.1.308. Test different curves and extrapolate a tail factor if necessary.

TP.1.309. Statistical diagnostics techniques such as goodness of fit tests, including analysis of residuals, sum of squares, Akaike information criterion[9] and non parametric smoothing, etc...

Some of the tools or procedures that can be used in the validation of the outputs of models are:

TP.1.310. Analysis of movement – this is a comparison of actual surplus over the year with the expected surplus. The analysis can be grouped according to the drivers of surplus such as initial adjustments (impact of changes to model, methodology and data as well as any corrections made), new business effect (this will occur when the best estimate liability of the new business is not the same as the assets backing the new business), economic and insurance variances (impact of difference between best estimate assumption and experience), capital injections and any unexplained movements.

TP.1.311. The following process can be used to undertake an analysis of movement:

i. Re-run the model used to calculate position at the beginning of this period.

ii. Re-run model allowing for any initial adjustments (the difference two runs is impact of opening adjustments)

iii. Re-run model updated for changes in non-economic assumption, the difference between subsequent runs is the impact of assumption change.

iv. Roll forward model allowing for actual non-economic parameters, the difference between the last two runs is insurance variance.

v. Roll forward model allowing for actual economic parameters, the difference between the last two runs is economic variance.

vi. Re-run model updated for new business volumes, the difference between the last two runs is the impact of new business.

vii. The difference between the results of last run and the previous run is unexplained movements. The undertaking should be able to demonstrate understanding of the causes of any deviation from expected experience and the underlying drivers of this deviation.

TP.1.312. Parallel testing – this involves using simple but independent calculations to check the reasonableness of an output. An example of this is using a closed form formula such as Black-Scholes to calculate the cost of guarantee and compare it to the cost of guarantee produced by the model. Another example is independently calculating the value of simple liabilities (such as asset shares) and comparing it with that calculated by the model.

TP.1.313. Cash-flow checks – this involves (re)insurance undertaking checks on sample cash-flows for reasonableness.

TP.1.314. The assumptions used to estimate best estimate liabilities can be grouped into economic and non-economic (insurance) assumptions. Economic assumptions can be in the form of an Economic Scenario Generator (ESG) file or a set of deterministic scenarios.

[9] Akaike's information criterion is a measure of the goodness of fit of an estimated statistical model. It offers a relative measure of the information lost when a given model is used to describe reality and can be said to describe the tradeoffs between bias and variance in model construction, or loosely speaking that of precision and complexity of the model.

Some of the tools or procedures that can be used in the validation of non-economic assumptions and deterministic economic assumptions are:

TP.1.315. Experience investigation – this may be included in back-testing.

TP.1.316. Investigation of experience variance identified as part of the analysis of movement.

TP.1.317. Where available, the undertaking can compare its assumptions with that of industry and identify if it is an outlier in any assumption. The undertaking should satisfy itself that there are specific features of its business or a valid reason why its assumptions should be significantly different.

Some of the tools or procedures that can be used in the validation of ESGs are:

TP.1.318. Martingale test – in a market consistent ESG the expected return on all assets is the risk free rate. The martingale test verifies this.

TP.1.319. Reproduce the risk free yield curve – the risk free yield curve at the calibration date is compared to the average risk free yield curve calculated from the ESG scenarios.

TP.1.320. Reproduce calibration parameters – market data such as equity and swaption implied volatility used to calibrate the ESG is compared to the equity and swaption implied volatility estimated from the ESG scenarios.

TP.1.321. Checks on whether the ESG scenarios correctly prices or values out of sample assets or parameters. An example of this is that the implied volatility normally used to calibrate equities are derived from at-the-money equity options, checks can be undertaken to test how accurately the calibrated model prices out-of-the money equity options.

TP.1.322. Adequacy of the number of scenarios – This can be checked be comparing the sampling error or confidence interval of a relevant model output (such as cost of guarantees) produced by using different sample sets of ESG files and assessing whether the confidence interval or sampling error is stable. The adequacy of number of scenario can also be checked by comparing the sampling error against a chosen hurdle.

V.2.1.3. Discount rates

2.3.1 Currencies where the relevant risk-free interest rate term structures are provided in the spreadsheet included in the QIS5 package

2.3.1.1 Application of risk-free interest rate curve

TP.1.323. For liabilities expressed in any of the EEA currencies, Japanese yen, Swiss franc, Turkish lira or USA dollar, these specifications provide to participants with three complete risk-free interest rate term structures. One of the curves includes a 100% illiquidity premium, a second one 50% illiquidity premium and the last one does not allow for such premium[10]. Below participants will find appropriate specifications to identify the liabilities that should be discounted with each curve.

TP.1.324. For a given currency and valuation date, each insurance and reinsurance undertaking should use the same relevant risk-free interest rate term structures (without prejudice of the allowance, where relevant, for the illiquidity premium).

TP.1.325. Investment expenses shall be allowed for in the cash-flows underlying the calculation of technical provisions and not in the risk-free interest rates used to discount technical provisions.

TP.1.326. For the purposes of QIS5, participants shall identify the liabilities that may be discounted with the risk-free interest rate term structures that includes a 100% illiquidity premium by assessing that they meet all of the following criteria:

1. the benefits of the contracts are retirement benefits in the form of annuities, and the only underwriting risks connected to the contracts are longevity risk and expense risk;

2. the contracts do not pay discretionary benefits

3. the insurance or reinsurance undertaking does not bear any risk in case of any form of surrender

4. the contracts are single premium policies, the premium has already been paid and no incoming cash-flows are allowed for in the technical provisions of the contracts;

5. they do not fall under the following paragraph

The assessment of these requirements shall be carried out at the level of each contract, receiving all the cash flows of a contract the same treatment.

TP.1.327. For the purposes of QIS5, participants shall identify the liabilities that shall be discounted with the risk-free interest rate term structures that does not includes any illiquidity premium as the following ones::

- the contract is less than one year

TP.1.328. All liabilities not falling under one of the two previous paragraphs shall be discounted with the risk-free interest rate term structures with a 50% illiquidity premium

2.3.1.2 Extrapolation

[10] In the draft QIS5 Technical Specifications, only two of the three curves are provided . Each of these curves is provided both on annual and monthly basis. All curves expand to 135 years term.

TP.1.329. For the specification of the relevant risk-free interest rate term structures macroeconomic extrapolation techniques are used to derive the extrapolation beyond the last available data point. This requires specification of the following:

- Determination of the ultimate forward rate
- Interpolation method between the last observable liquid forward rate and the unconditional forward rate

Specification of the ultimate forward rate (UFR)

TP.1.330. The UFR is specified as the sum of the following two-components:

- the expected long-term inflation
- the expected real rate of interest

TP.1.331. For QIS5 the following UFR are used:

Category	**Currencies**	**UFR (%)**
1	JPY, CHF	3.2
2	Euro, SEK, NOK, DKK, GBP, USD, PLN, RON, HUF, ISK	4.2
3	TRY	5.2

Interpolation method between the last observable liquid forward rate and the unconditional forward rate

TP.1.332. In QIS5 two techniques are used to interpolate between the estimated forward rates and the unconditional ultimate forward rate: the linear extrapolation technique and the Smith-Wilson technique.[11]

2.3.2 Currencies where the relevant risk-free interest rate term structure is not provided.

TP.1.333. Where for a certain currency the risk-free interest rate term structures are not provided, insurance and reinsurance undertakings should determine the relevant term structure according the four steps described below, and following the same principles applied to calculate the risk-free interest rate term structures in the case of those currencies whose risk-free interest rate term structure is provided in these specifications.

Step 1. Calculation of the non-extrapolated part of the curve, prior to adjustment.

TP.1.334. The interest rates of this part of the curve will be based on data observed in financial markets, according to the following principles:

[11] For QIS5 purposes, the maturity at which the forward rate curve reaches the UFR is 90 years.

1. The relevant risk-free interest rate term structure should be determined on the basis of market data relevant for the valuation date.

2. The relevant risk-free interest rate term structure should ideally meet the following criteria ("risk-free rate criteria"):

(a) No credit risk: the rates should be free of credit risk. Swap rates may be used as starting basis for this purposes, (although as reflected in the step 2, they should be adequately adjusted to reflect that these rates are not credit risk-free and to remove any bias –see principle f below).

If swap rates are available, but they do not meet the criteria set out in these specifications, then the undertaking may use data based on government bonds trades in the relevant currency. Those data shall be adjusted for their deficiencies relating to these criteria (e.g. to fit rates based on government bond data with the risk-free criteria).

If neither swaps nor government bonds are available or cannot be adjusted to meet the risk-free rate criteria for practical or theoretical reasons, other financial instruments can be used to derive the risk-free interest rates. These instruments should be as similar to swaps as possible. Their rates should be adjusted for credit risk and any other deviations from the criteria with the objective to approximate swap rates which meet the risk-free criteria.

(b) Where the instruments used (swap, government or any other) do meet the risk-free rate criteria (or can be adjusted to meet them) for some maturities but not for all maturities, they should be used to derive the relevant risk-free rate for these maturities only. Different financial instruments may be used to derive the relevant risk-free rates for different maturities.

(c) Realism: it should be possible for all undertakings to earn the rates in practice in a risk-free manner. Technical provisions should not be discounted with rates that create hidden losses which would materialise during the run-off period of the liabilities.

(d) Reliability: The data basis and the method chosen to determine the term structure should be robust. It should result in a reliable and accurate estimate. This criterion should in particular apply in times of market crisis or turbulence.

(e) High liquidity: the rates should be based on financial instruments for which a reliable market value is observable. A reliable market value is observable from deep, liquid and transparent markets (as these features are defined in the item regarding calculation of technical provisions as a whole).

For most term structures, there is sufficient liquidity up to a certain maturity. Beyond this point the term structure needs to be extrapolated when necessary (see step 4).

(f) No technical bias: Supply and demand distortions should be filtered in the determination of the relevant discount rates for the cash flows considered in the calculation of technical provisions.

(g) Proportionality. The principle of proportionality may not allow for simplified or approximate derivations of the risk-free rate term structure.

Step 2. Adjustment of the non-extrapolated part of the curve.

TP.1.335. According to the principles set out above, the interest rate term structure derived in step 1 should be adequately adjusted to reflect that these rates are not credit risk-free and to remove any bias.

TP.1.336. Only where the undertakings lacks sufficient basis to assess robustly the magnitude of the aforementioned adjustment, it shall be quantified by using the adjustment applied for the interest rate term structure relevant for euro, multiplied by the proportion existing among the interest rates in the relevant currency and the euro, using for this proportion the longest term available meeting the requirements set out in step 1 that exists for the relevant currency. The portion shall never be lower than 1.

Step 3. Calculation of the illiquidity premium.

TP.1.337. Only for those currencies where these specifications do not provide risk-free interest rate term structures, the participant will assess the liquidity premium existing at the date relevant for the valuation. For this purpose, undertakings will base on the long-termed illiquid financial assets maturing in that currency, and according to the methodology described in the CRO Forum/CFO Forum calibration paper on the risk free interest rates.

TP.1.338. Liabilities expressed in the relevant currency may be discounted with the interest rate term structures that allow for a portion of the illiquidity premium under the same requirements set out above in respect of those currencies whose interest rate term structures are provided in these specifications.

TP.1.339. Only for those currencies where these specifications do not provide risk-free interest rate term structures and where it is not possible to apply in a robust manner the methodology to derive the illiquidity premium (e.g. due to the lack of appropriate or adequate long-termed illiquid assets, or lack of reliable prices or data, or the principles aforementioned on the illiquidity premium are not meet), no illiquidity premium will apply.

Step 4. Extrapolation of the interest rate term structure

TP.1.340. As part of QIS5 package, participants will find a spreadsheet delivering in an automatic manner the extrapolated part of the interest rate term structures. The following inputs are required:

i) The observed points to use to derive the non-extrapolated part of the curve (with and without liquidity premium).

ii) The size of the illiquidity premium.

iii) The ultimate forward rate, which should be derived according the methodology provided in the calibration paper included in QIS5 package.

iv) The term where the extrapolation should meet the targeted UFR (or a sufficiently nearby value). Unless sufficient evidence provided by the undertaking, this term will be 90 years for all currencies.

TP.1.341. Practicalities not solved in the spreadsheet provided shall be solved consistently with the following principles:

1. All relevant observed market data points should be used.

2. For each currency, the extrapolated part of the basic risk free interest rate term structure shall be based on forward rates converging smoothly from one or a set of data points in relation to

the longest maturities observed in a liquid market to an unconditional ultimate long term forward rate.

3. The principles applied when extrapolating the basic risk free interest rate term structure shall be the same for all currencies, in particular as regards the determination of the data points in relation to the longest maturities observed in a liquid market and the mechanism to ensure a smooth convergence to the unconditional long term forward rate. .

4. For each relevant currency, the unconditional ultimate long term forward shall be stable over time and only change due to fundamental changes in long term expectations. The principles used to determine the macro-economic long-term forward rate should be explicitly communicated.

TP.1.342. For the sake of efficiency and comparability, undertakings deriving the interest rate term structures for each relevant currency, will inform immediately CEIOPS of the complete structures they have derived, which will be uploaded in CEIOPS' website. In case of discrepancies, they will be solved as soon as possible with an active dialogue among all parties involved, in order to ascertain that the same interest rate structures are used for all currency by all participants.

V.2.1.4. Transitional provisions on the discount rate

TP.1.343. Transitional provisions are necessary in the case of discount rates to ensure a smooth transition to Solvency II and avoid market disruption. QIS5 will test the impact on the basis that Solvency II is fully implemented and also what the position would be on initial implementation i.e. with the benefit of grandfathering. For this purpose the QIS5 participants are asked to complete the attached questionnaire in respect of each liability for which a grandfathering treatment is adopted. The quantitative results plus the feedback on the questionnaire will then form a basis for assessing the need for grandfathering and detailing the grandfathering criteria. The grandfathering criteria set out below aim to make grandfathering practicable for the purposes of QIS 5 only and are not indicative of the content of the final transitional provisions.

TP.1.344. Technical provisions currently discounted at the interest rate referred to in Article 20.B.a.ii of Directive 2002/83/EC may be discounted at this level for contracts which are eligible to a 100% illiquidity premium as foreseen above.

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TP.1.345. Participants should describe each contract where transitional provisions are used.

TP.1.346. For each contract where transitional provisions are used, participants shall provide the interest rate used as a discount rate.

TP.1.347. For each contract where transitional provisions are used, participants shall provide the best estimate calculation without applying any transitional measure on discount rate.

TP.1.348. Are there contracts other than those already identified in these Technical Specifications that participants would see as eligible for transitional provisions on the discount rate? Which ones? Why?

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V.2.1.5. Calculation of technical provisions as a whole

2.5.1 General approach

TP.1.402. From a legal perspective, the general rule set out in the Level 1 text is that the technical provisions should be calculated as the sum of two explicit components which are being the best estimate plus an appropriate risk margin. Both components should be valued separately.

TP.1.403. The calculation of technical provisions 'as a whole' (Article 77(4)) is only admissible under the following three *sine qua non* circumstances:

- The future cash-flows associated with insurance or reinsurance obligations can be replicated reliably;
- This replication shall be provided by financial instruments; and
- Those financial instruments shall have reliable market values which are observable.

TP.1.404. Within this legal framework it is necessary to define

- what is meant by 'to replicate reliably the future cash-flows associated with insurance or reinsurance obligations'; and
- when a market value is 'observable' and when it is 'reliable'

TP.1.405. According to the Level 1 text, for the purposes of calculating technical provisions as a whole the replication can only be referred to '*cash-flows associated with insurance or reinsurance obligations'*.

TP.1.406. In order *'to replicate reliably the future cash-flows associated with insurance or reinsurance obligations'* the cash-flows of the financial instruments should provide the same performance, including the uncertainty in amount and timing of these payments, in relation to all risks underlying the cash-flows associated with the insurance and reinsurance obligations in all possible scenarios. (i.e. the cash-flows of the financial instruments must not provide only the same expected amount as the cash-flows associated with insurance or reinsurance obligations, but also the same patterns of variability).

TP.1.407. In order to respect the requirement set out in Article 77(2), first subparagraph[12], of the Level 1 text, for the purposes of the replication, the future cash-flows of the financial instruments shall be risk adjusted to derive the risk-free cash-flow.

TP.1.408. **Dynamic perspective**. In the Solvency II framework, the calculation of technical provisions plays a wider role than in the previous legal system. The calculation of technical provisions is required not only to aggregate the total of insurance liabilities, and then to derive the total of basic own funds of the undertaking, but it is also a core element to assess the solvency capital requirement, as a consequence of the use of scenario-approaches on the prudential balance sheet in a good number of modules and submodules (in the case of life insurance, almost all the modules and submodules require the recalculation of technical provisions).

TP.1.409. As a consequence of this dynamic approach the calculation of technical provisions shall be done under different sets of assumptions, so as to provide legal and technical consistency.

[12] The best estimate shall correspond to the probability-weighted average of future cash-flows, taking account of the time value of money (expected present value of future cash-flows), using the relevant risk-free interest rate term structure.

TP.1.410. **Market consistency.** The expression *'financial instruments for which reliable market values is observable'* should be understood as financial instruments quoted in in *'deep, liquid and transparent markets'* on permanent basis, which requires to meet all the following requirements:

- a deep market is a market in which a large number of assets can be transacted without affecting the price of the financial instruments used in the replications,
- A liquid market is a market where assets can be easily converted through an act of buying or selling without causing a significant movement in the price ,
- A transparent market is a market in which current trade and price information is readily available to the public[13],

TP.1.411. The properties specified above are expected to be permanent. Where a market meeting continually the two first conditions, exceptionally ceases to satisfy any of them at some point in time, such market will not lose its quality of deep, liquid and transparent if it is reasonably expected to return to meet the condition in a short term. The prices produced during the period where the market does not satisfy any of the two first conditions cannot be considered as reliable for the purposes of this advice.

TP.1.412. Where under the same contract a number of future cash-flows exist, which meet all the conditions mentioned before in order to calculate the technical provision as a whole and other future cash-flows which do not meet some of those conditions, both sets of cash-flows should be unbundled.

For the first set of cash-flows, no separate calculation of the best estimate and the risk margin shall be required but a separate calculation shall be required for the second set of cash-flows.

If the proposed unbundling is not feasible, for instance when there is significant interdependency between the two sets of cash flows, separate calculations of the best estimate and the risk margin shall be required for the whole contract.

2.5.2 Concrete applications

TP.1.413. The main case where Article 77(4), second paragraph, of the Level 1 text is met is where the benefit cash-flows of the insurance or reinsurance obligation, according to the clauses of the contract, consist in the delivery of a portfolio of financial instruments for which a reliable market value is observable or are based only on the market value of the portfolio at the time that the benefit is paid.

TP.1.414. Residually, there could be very limited other cases where cash-flows of (re)insurance obligations can be replicated reliably. An example of such cases could be where there is a fixed benefit and the policyholder cannot lapse the contract.

TP.1.415. In the light of all the aforementioned considerations and the strict approach adopted by the Level 1 text in Article 77(4), *'future cash-flows associated with insurance or reinsurance obligations'* shall not be considered to reliably replicated where:

~~a)~~ a.- one or several features of the future cash-flow (its expected value, its volatility or any other feature) depend on risks whose specific pattern in the undertaking cannot be found in instruments actively traded in financial markets [14]

[13] The undertaking that is valuing the Technical Provision should be included within the scope of 'public'.

b) b.- one or several features of the future cash-flow (its expected value, its volatility or any other feature) depend on the behaviour of the policyholder (unless such behaviour does not affect the value of the obligation);

c) c.- one or several features of the future cash-flow depend to any extent on the development of factors internal to the undertakings, such as expenses or acquisition costs; or

d) d.- one or several features of the future cash-flow depend on the development of factors external to the undertaking for which there are no financial instruments for which reliable market values are observable.

2.5.3 Examples

Example	Have requirements in Article 77(4), 2nd para. of Level 1 text been met?	Technical provisions shall be calculated:
The insurance undertaking shall pay the market value of an equity portfolio or shall deliver an equity portfolio (matching an index or not) at the payment date.	Yes, but only under one condition: • a reliable market value for every asset within the portfolio is observable. However there are, for example, fixed expense cash-flows associated with this contract which shall be excluded because they depend on the development of magnitudes internal to the undertaking.	• as a whole (if the condition is met). This also applies when the contract pays the market value of the units at the earlier of maturity, death or surrender. • BE + RM (if not and for the expense cash-flows)
An insurance undertaking investing in assets replicating his future cash-flows provided by a third party (e.g. investment bank).	No: (see paragraphs 4.8, 4.11 and 4.14) This case introduces counterparty and concentration risks with regard to the issuer of the replicating asset. Furthermore, in respect of cash-flows associated with insurance obligations it is necessary to consider 4.14.	BE + RM
Term-assurance contracts and with-profits contracts.	No: In these cases the expected value, the volatility and other features of the future cash-flows associated with insurance obligations depend on the biometric development as well as on the behaviour of the policyholder.	BE + RM

[14] Today no reliable market exists for the replication of the characteristics of biometric-dependent cash-flows, the way replication is defined in this advice.

An insurance undertaking signs a contract with a reinsurer to replicate his future cash-flows.	No: a reinsurance contract is not a financial instrument as referred in paragraph 4.11. See also comments to the third example.	BE + RM
Pure Unit-linked contract (without any additional guarantees)[15]	YES: regarding to the number of units guaranteed, and No: expense cash-flows associated with the fact that the contract will be managed till it ends.	For the calculation of the technical provision, these two aspects of the contract must be unbundled: As a whole BE + RM (for the expenses)[16]

[15] Unit-linked contract is « a contract, under which benefits are determined based on the fair value of units of a mutual fund. The benefit reflects the fair value of a specific number of units, which is either contractually determined as a fixed number, or derived from other events under the contract, e.g. premium payments associated with a specific additional number of units based on the fair value of the units at the time of premium payment. » (CEA-Groupe Consultatif Solvency II Glossary)

[16] The annual expense loading is generally fixed in percentage of the value of technical provisions at a certain date. The amount guaranteed to the policyholder is the market value of a number of units reduced by the expense loading.
The loading is generally at such a level that it covers more than the expenses incurred, thus including future profits. The best estimate of such an obligation would be negative. However, in a stressed situation, the market value of the unit can fall so low that the expense loading is no longer sufficient to cover the expenses incurred. Therefore, a capital requirement and a risk margin need to be calculated.

V.2.2. Risk margin

TP.2.1. This chapter covers the following aspects of the risk margin calculations:

- The general aspects and methodology for calculating the risk margin in accordance with the Cost-of-Capital approach.
- The Cost-of-Capital rate to be applied in the risk margin calculations.
- The level of granularity regarding the risk margin calculations.
- An overview of simplifications that may be applied in the risk margin calculations at the end of the financial year.

TP.2.2. Simplifications that may be applied in the risk margin calculations on a quarterly basis are not included in these specifications since QIS5 refers to the balance sheet as at 31 December 2009.

V.2.2.1 General aspects of methodology

TP.2.3. The technical details of the calculation of the risk margin shall be carried out on a best effort basis, although respecting the assumptions regarding the reference undertaking assumed to take over and meet the insurance and reinsurance obligations of an insurance or reinsurance undertaking. See the “Final CEIOPS’ Advice for Level 2 Implementing Measures on Solvency II: Technical Provisions – Article 86 (d). Calculation of the Risk Margin (former CP 42)” and especially sub-section 3.1.3.1 (para 3.25–3.71) of this advice. However , with regard to the diversification allowed in the risk margin, undertakings should deviate from CEIOPS' advice as follows:

TP.2.4. The risk margin calculation should be based on the assumption that the whole insurance and reinsurance portfolio is transferred to an empty reference undertaking. Consequently, the calculation of the risk margin should take the diversification between lines of business into account.

TP.2.5. The calculation shall be based on the assumption that the reference undertaking at time $t = 0$ (when the transfer takes place) will capitalise itself to the required level of eligible own funds, i.e.

$$EOF_{RU}(0) = SCR_{RU}(0),$$

where

$EOF_{RU}(0)$ = the amount of eligible own funds raised by the reference undertaking at time t = 0 (when the transfer takes place); and

$SCR_{RU}(0)$ = the SCR at time $t = 0$ as calculated for the reference undertaking.

The cost of providing this amount of eligible own funds equals the Cost-of-Capital rate times the amount.

TP.2.6. The assessment referred to in the previous paragraph applies to the eligible own funds to be provided by the reference undertaking in all future years, in order “to support the insurance and reinsurance obligations over the lifetime thereof” (Article 76(5)).

TP.2.7. The transfer of (re)insurance obligations is assumed to take place immediately (cf. Article 76(3)). Hence, the method for calculating the overall risk margin (*CoCM*) can in general terms be expressed in the following manner:

$$CoCM = CoC \cdot \sum_{t\geq 0} EOF_{RU}(t)/(1+r_{t+1})^{t+1} = CoC \cdot \sum_{t\geq 0} SCR_{RU}(t)/(1+r_{t+1})^{t+1},$$

where

$CoCM$ = the risk margin,

$SCR_{RU}(t)$ = the SCR for year t as calculated for the reference undertaking,

r_t = the risk-free rate for maturity t; and

CoC = the Cost-of-Capital rate.

TP.2.8. The general rules for calculating the risk margin referred to above apply to all undertakings irrespective of whether the calculation of the SCR of the (original) undertaking is based on the standard formula or an internal model.

TP.2.9. If the undertaking calculates its SCR by using the standard formula, all SCRs to be used in the risk margin calculation (i.e. all $SCR_{RU}(t)$ for $t \geq 0$) should be calculated as follows:

$$SCR_{RU}(t) = BSCR_{RU}(t) + SCR_{RU,op}(t) - Adj_{RU}(t),$$

where

$BSCR_{RU}(t)$ = the Basic SCR and year t as calculated for the reference undertaking,

$SCR_{RU,op}(t)$ = the partial SCR regarding operational risk and year t as calculated for the reference undertaking; and

$Adj_{RU}(t)$ = the adjustment for the loss absorbing capacity of technical provisions and year t as calculated for the reference undertaking.

TP.2.10.

TP.2.11. It should be ensured that the assumptions made regarding loss absorbing capacity of technical provisions to be taken into account in the SCR-calculations per line of business, are consistent with the assumptions made for the overall portfolio of the original undertaking (i.e. the undertaking participating in the QIS5 exercise).

TP.2.12. The Basic SCRs ($BSCR_{RU}(t)$ for all $t \geq 0$) should be calculated by using the relevant SCR-modules and sub-modules.

TP.2.13. Moreover, the calculation of the Basic SCRs (as referred to in the previous paragraph) should be based on the correlation assumptions laid down in Annex IV of the Level 1 text. However, with respect to market risk and counterparty default risk, respectively, only the unavoidable market risk and the counterparty default risk with respect to ceded reinsurance should be taken into consideration in these calculations.

TP.2.14. With respect to non-life insurance the risk margin should be attached to the overall best estimate, that is with no split between risk margins for premiums provisions and for provisions for claims outstanding (including IBNR provisions).

V.2.2.2 The Cost-of-Capital rate

TP.2.15. The Cost-of-Capital rate is the annual rate to be applied to the capital requirement in each period. Because the assets covering the capital requirement themselves are assumed to be held in marketable securities, this rate does not account for the total return but merely for the spread over and above the risk free rate.

TP.2.16. The Cost-of-Capital rate has been calibrated in a manner that is consistent with the assumptions made for the reference undertaking. In practice this means that the Cost-of-Capital rate should be consistent with the Value-at-Risk-assumption corresponding to a confidence level of 99.5 per cent over the stipulated one-year time horizon as laid down for the calculation of the Solvency Capital Requirement (SCR). The Cost-of-Capital rate does not depend on the actual solvency position of the original undertaking.

TP.2.17. The risk margin should guarantee that sufficient technical provisions for a transfer are available in all scenarios. Hence, the Cost-of-Capital rate has to be a long-term average rate, reflecting both periods of stability and periods of stress.

TP.2.18. Based on the information currently available ***a Cost-of-Capital rate of 6 per cent*** is assumed to reflect the cost of holding an amount of eligible own funds for an insurance or reinsurance undertaking being capitalised corresponding to a confidence level of 99.5 per cent Value-at-Risk over a one year time horizon.

TP.2.19. The methodology applied in these specification aims to guarantee that there will be sufficient technical provisions even in case of a partial transfer of some of the lines of business of the undertaking's portfolio. For this purpose:

– the calculations carried out in the context of the risk margin should start on the SCR, furthermore using in the Basic SCR the relevant SCR-modules and sub-modules, and the correlation assumptions laid down in Annex IV of the Level 1 text. However, with respect to market risk and counterparty default risk, respectively, only the unavoidable market risk and the counterparty default risk with respect to ceded reinsurance should be taken into consideration in these calculations.

– the loss absorbing capacity of technical provisions is taken into account,

– the loss absorbing capacity of deferred taxes is not allowed for,

– the risk margin is defined (and should be calculated) net of reinsurance only.

V.2.2.3 Level of granularity in the risk margin calculations

TP.2.20. The risk margin should be calculated per line of business. A straight forward way to determine the margin per line of business is as follows: First, the risk margin is calculated for the whole business of the undertaking, allowing for diversification between lines of business. In a second step the margin is allocated to the lines of business.

TP.2.21. The risk margin per line of business should take the diversification between lines of business into account. The sum of the risk margin per line of business should be equal to the risk margin for the whole business. The allocation of the risk margin to the lines of business shall be done according to the contribution of the lines of business to the overall SCR during the lifetime of the business.

TP.2.22. The contribution of a line of business can be analysed by calculating the SCR under the assumption that the undertaking's other business does not exist. Where the relative sizes of the SCRs per line of business do not materially change over the lifetime of the business, undertakings may apply the following simplified approach for the allocation:

$$COCM_{lob} = \frac{SCR_{RU,lob}(0)}{\sum_{lob} SCR_{RU,lob}(0)} \cdot COCM ,$$

where

$COCM_{lob}$ = risk margin allocated to line of business lob

$SCR_{RU,lob}(0)$ = SCR of the reference undertaking for line of business lob at t=0

$COCM$ = risk margin for the whole business

TP.2.23.

TP.2.24.

TP.2.25.

V.2.2.4 Simplifications for the calculation of the risk margin of the whole business

TP.2.26. If a full projection of all future SCRs is necessary in order to capture the participating undertaking's risk profile the undertaking is expected to carry out these calculations.

TP.2.27. Participating undertakings should consider whether or not it would be appropriate to apply a simplified valuation technique for the risk margin. As an integral part of this assessment, the undertakings should consider what kind of simplified methods would be most appropriate for the business. The chosen method should be proportionate to the nature, scale and complexity of the risks of the business in question.

TP.2.28. When an undertaking has decided to use a simplified method, it should consider whether the method could be used for the projections of the overall SCR or if the relevant (sub-)risks should be projected separately. In this context, the undertaking should also consider whether it should carry out the simplified projections of future SCRs individually for each future year or if it is possible to calculate all future SCRs in one step.

2.4.1 A hierarchy of simplifications

TP.2.29. Based on the general principles and criteria referred to above, the following hierarchy should be used as a decision basis regarding the choice of (simplified) methods for projecting future SCRs:

1. make a full calculation of all future SCRs[17] without using simplifications;

   (2) approximate the individual risks or sub-risks within some or all modules and sub-modules to be used for the calculation of future SCRs;

   (3) approximate the whole SCR for each future year, e.g. by using a proportional approach; and

[17] Note that, where all future SCRs have been projected, it should be straightforward to calculate the risk margin according to the general formula set out in CEIOPS-DOC-36-09 on the calculation of the risk margin in technical provisions (former CP 42), November 2009, http://www.ceiops.eu/media/files/consultations/consultationpapers/CP42/CEIOPS-L2-Final-Advice-on-TP-Risk-Margin.pdf.

(4) estimate all future SCRs “at once”, e.g. by using an approximation based on the duration approach.

2. (5) approximate the risk margin by calculating it as a percentage of the best estimate.

TP.2.30. In this hierarchy the calculations to be carried out are in general getting simpler step by step. In order to be able to use the simplifications given on each step appropriate eligibility criteria, based on quality and materiality considerations, have to be fulfilled.

TP.2.31. When using this approach, it is not required that the aspired complexity of the calculations should go beyond what is necessary in order to capture the undertaking’s risk profile. In any case, this approach should be applied consistently with the framework set out when defining the proportionality principle and the necessity of assessing risks properly.

Remark: It should be noted that the distinction between the levels in the hierarchy sketched above is not always clear-cut. This is e.g. the case for the distinction between the simplifications on level no. 2 and level no. 3. An example may be a proportional method (based on the development of the best estimate technical provisions) applied for an individual module or sub-module relevant for the calculation of future SCRs for the reference undertaking. Such simplifications can be seen as belonging to either level no. 2 or level no. 3.

2.4.2 Specific simplifications

TP.2.32. The simplifications referred to in this section are described in the context of the standard formula. The application of simplifications for cases where the SCR is calculated with internal models should follow the general approach proposed in this paper with an appropriate case-by-case assessment.

TP.2.33. With respect to the simplifications allowing for all future SCRs to be estimated “at once” (the duration approach), it will be natural to combine the calculations of the Basic SCR and the SCR related to operational risk.

TP.2.34. Accordingly, in order to simplify the projections to be made if level no. 3 of the hierarchy is applied, a practical solution could be to allow projections of the future SCRs in one step, instead of making separate projections for the basic SCR, the capital charge for operational risk and the loss absorbing capacity of technical provisions, respectively.

TP.2.35. In order to avoid circularity issues the best estimate technical provisions (and not the sum of the best estimate and the risk margin) should be applied when calculating the present and future SCRs for operational risk.

TP.2.36. Finally, the simplifications allowed for when calculating the SCR should in general carry over to the calculation of the risk margin.

Simplifications for the overall SCR for each future year (level 3 of the hierarchy)

TP.2.37. Simplifications classified as belonging to level no. 3 of the hierarchical structure sketched in these specifications are in general based on an assumption that the future SCRs are proportional to the best estimate technical provisions for the relevant year – the proportionality factor being the ratio of the present SCR to the present best estimate technical provisions (as calculated by the reference undertaking).

TP.2.38. According to (a representative example of) the proportional method, the reference undertaking’s SCR year t is fixed in the following manner:

$$SCR_{RU}(t) = (SCR_{RU}(0)/BE_{Net}(0))\cdot BE_{Net}(t), \quad t = 1, 2, 3, \ldots ,$$

where

$SCR_{RU}(0)$ = the SCR as calculated at time $t = 0$ for the reference undertaking's portfolio of (re)insurance obligations;

$BE_{Net}(0)$ = the best estimate technical provisions net of reinsurance as assessed at time $t = 0$ for the undertaking's portfolio of (re)insurance obligations; and

$BE_{Net}(t)$ = the best estimate technical provisions net of reinsurance as assessed at time t for the undertaking's portfolio of (re)insurance obligations.

TP.2.39. This simplification takes into account the maturity and the run-off pattern of the obligations net of reinsurance. However, the assumptions on which the risk profile linked to the obligations is considered unchanged over the years, are indicatively the following:

- the composition of the sub-risks in underwriting risk is the same (all underwriting risks),
- the average credit standing of reinsurers and SPVs is the same (counterparty default risk),
- the unavoidable market risk in relation to the net best estimate is the same (market risk),
- the proportion of reinsurers' and SPVs' share of the obligations is the same (operational risk),
- the loss absorbing capacity of the technical provisions in relation to the net best estimate is the same (adjustment).

TP.2.40. An undertaking that intends to use this simplification, should consider to what extent the assumptions referred to above are fulfilled. If some or all of these assumptions do not hold, the undertaking should carry out a qualitative assessment of how material the deviation from the assumptions is. If the impact of the deviation is not material compared to the risk margin as a whole, then the simplification can be used. Otherwise the undertaking is encouraged to use a more sophisticated calculation or method.

TP.2.41. The undertaking may also be able to apply the simplification in a piecewise manner across the 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 where a proportional calculation method could be used.

TP.2.42. When using the simplification described in the previous paragraphs some considerations should be given also regarding the manner in which the best estimate technical provisions net of reinsurance has been calculated. In this context it should be noted that even if the applied gross-to-net techniques may lead to a reasonable figure for the best estimate net of reinsurance ($BE_{Net}(t)$) as compared to the best estimate gross of reinsurance ($BE_{Gross}(t)$) at time $t = 0$, this does not necessarily mean that all future estimates of the best estimate net of reinsurance will be equally reliable. In such cases the simplified method sketched above may be biased.

TP.2.43. With respect to operational risk it should be noticed that the capital charge for this risk at $t = 0$ is basically a function of the best estimate technical provisions gross of reinsurance and earned premiums gross of reinsurance, as well as annual expenses (for unit-linked business only). As a consequence it should be assessed to what extent the simplification based on the proportional method which assumes that the SCRs for the operational risk develop pari passu with the best estimate technical provisions net of reinsurance may introduce a bias in the risk margin calculations.

TP.2.44. A similar comment concerns the scenario-based adjustments for the loss absorbing capacity of technical provisions to be taken into account when projecting the future SCRs, since it is likely to be (very) difficult to develop reliable scenarios to be applied to these projections. Accordingly, it may in practise be difficult to find other workable solutions than allowing also this component to develop in line with the best estimate technical provisions net of reinsurance. The participating undertaking should, however, make some assessments of the potential bias caused by this simplification.

TP.2.45. A simplification as the one sketched in the previous paragraphs may be applied also at a more granular level, i.e. for individual modules and/or sub-modules. However, it should be noted that the number of calculations to be carried out will in general be proportional with the number of modules and/or sub-modules for which this simplification is applied. Moreover, it should be considered whether a more granular calculation as indicated above will lead to a more accurate estimate of the future SCRs to be used in the calculation of the risk margin.

Estimation of all future SCRs “at once” (level 4 of the hierarchy):

TP.2.46. A representative example of a simplification belonging to level no. 4 of the hierarchical structure referred to in these specifications is using information regarding the modified duration of the liabilities in order to calculate the present and all future SCRs in one single step.

TP.2.47. In order to provide specifications structured and readable in a rather straightforward manner, the details and formulas of this approach are described in Annex A to this section.

A simple method based on percentages of the best estimate (level 5 of the hierarchy)

TP.2.48. According to this simplification the risk margin (*CoCM*) should be calculated as a percentage of the best estimate technical provisions net of reinsurance (at $t = 0$), that is

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

where

$BE_{Net}(0)$ = the best estimate technical provisions net of reinsurance as assessed at time $t = 0$ for the undertaking’s portfolio of (re)insurance obligations; and

α_{lob} = a fixed percentage for the given line of business.

TP.2.49. As the fixed percentage α_{lob} depends on the line of business, the method can only be applied if the undertaking's business is restricted to one line of business or if the business outside of one line of business is not material.

TP.2.50.

TP.2.51.

TP.2.52. A participating non-life insurance undertaking intending to use the simple method based on percentages of the best estimate, should base the risk margin calculations on the following percentages for the lines of business:

Lines of business	Per cent of the BE
Direct insurance and accepted proportional reinsurance:	
Accident	12.0 %
Sickness	8.5 %
Workers' compensation	10.0 %
Motor vehicle liability	8.0 %
Motor, other classes	4.0 %
Marine, aviation and transport	7.5 %
Fire and other damage	5.5 %
General liability – Third party liability	10.0 %
Credit and suretyship	9.5 %
Legal expenses	6.0 %
Assistance	7.5 %
Miscellaneous non-life insurance	15.0 %
Accepted non-proportional reinsurance:	
Property business	7.0 %
Casualty business	17.0 %
Marine, aviation and transport business	8.5 %

[Figures for QIS5 based on table 69 of the QIS4 report, Annex of selected tables, pages A-74 to A-76, see http://www.ceiops.eu/media/files/consultations/QIS/CEIOPS-SEC-82-08%20QIS4%20Report%20Table%20Annex.pdf]

Simplifications for individual modules and sub-modules

TP.2.53. A more sophisticated approach to the simplifications would be to focus on the individual modules or sub-modules in order to approximate the individual risks and/or sub-risks covered by the relevant modules.

TP.2.54. In practise, this would require that the participating undertaking look closer at the risks and sub-risks being relevant for the following modules:

- underwriting risk (life, health and non-life, respectively),
- counterparty default risk with respect to ceded reinsurance and SPVs, and
- unavoidable market risk,

in order to investigate to what extent the calculations could be simplified or approximated.

TP.2.55. In the following paragraphs some proposals for such simplifications are put forward and the main aspects of the simplifications are briefly explained.

Life Underwriting Risk

TP.2.56. The simplifications allowed for in these specifications regarding the SCR-calculations in respect of mortality, longevity and disability risk – and which carry over to the Cost-of-Capital calculations – are summarised in Annex C. For a more detailed description it is referred to the relevant section of these specifications (see also CEIOPS' advice regarding Level 2 implementing measures for simplified calculations in the SCR standard formula - former CP 77). Moreover, these specifications contain descriptions of simplifications regarding expense risk, revision risk and catastrophe risk that may be applied in the context of the SCR-module for life underwriting risk.

Health Underwriting Risk

TP.2.57. The structure of the health underwriting risk module has been substantially changed compared to the version described in the QIS4 Technical Specifications, As a consequence the simplifications used in the context of health underwriting risk in the QIS4 exercise are no longer valid.

TP.2.58. The simplifications applied in the life underwriting module can in general be applied also in the sub-module for SLT health underwriting risk, i.e. for health insurance obligations pursued on a similar basis as life insurance. However, some adjustment should be made regarding revision risk (inflation risk should be included), while no simplifications are proposed for health catastrophe risk.

TP.2.59. With respect to the sub-module for non-SLT health underwriting risk, the simplifications introduced for the non-life underwriting risk (if any) should be used.

Non-life Underwriting Risk

TP.2.60. Within the context of simplifications for individual modules and sub-modules, there seems to be no obvious manner in which the formula (per se) applied for calculating the capital charges for premium and reserve risk can be simplified.

TP.2.61. However, the calculation of the future SCRs related to premium and reserve risk will be somewhat simplified due to the fact that renewals and future business are not taken into account:

- If the premium volume in year t is small compared to the reserve volume, then the premium volume for year t can be set to 0. An example may be business comprising no multiple-year contracts, where the premium volume can be set to 0 for all future years t where $t \geq 1$.

- If the premium volume is zero, then the capital charge for non-life underwriting can be approximated by the formula:

  $3 \cdot \sigma_{(res,mod)} \cdot PCO_{Net}(t)$,

  where $\sigma_{(res,mod)}$ represents the aggregated standard deviation for reserve risk and $PCO_{Net}(t)$ the best estimate provision for claims outstanding net of reinsurance in year t.

TP.2.62. As a further simplification it can be assumed that the undertaking-specific estimate of the standard deviation for premium risk and reserve risk remain unchanged throughout the years.

TP.2.63. Also the underwriting risk charge for catastrophe risk should be taken into account only with respect to the insurance contracts that exist at $t = 0$.

Counterparty Default Risk

TP.2.64. The counterparty default risk charge with respect to reinsurance ceded can be calculated directly from the definition for each segment and each year. If the exposure to the default of the reinsurers does not vary considerably throughout the development years, the risk charge can be approximated by applying reinsurers' share of best estimates to the level of risk charge that is observed in year 0.

TP.2.65. According to the standard formula counterparty default risk for 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 of negligible importance then the risk charge can be arrived at by applying reinsurers' share of best estimates to the level of the total capital charge for reinsurers' default risk in year 0.

Unavoidable Market Risk

TP.2.66. The main case of unavoidable market risk 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 scenario. The focus of the simplification is on this particular kind of market risk.

TP.2.67. The contribution of the unavoidable market risk to the risk margin may be approximated as follows:

$$CoCM_{Mkt} \approx CoC \cdot UM_{RU,,\geq 0}$$

where CoC is the Cost-of-Capital rate, while the approximated sum of the present and future SCRs covering the unavoidable market risk ($UM_{RU,\geq 0}$) is calculated as follows:

$$UM_{RU,\geq 0} = max\{0.5 \cdot BE_{Net}(0) \cdot (Dur_{mod} – n)\ (Dur_{mod} – n+1) \cdot \Delta r_n;\ 0\}$$

where

$BE_{Net}(0)$ = the best estimate net of reinsurance as assessed at time $t = 0$ for the undertaking's portfolio of (re)insurance liabilities;

Dur_{mod} = the modified duration of the undertaking's (re)insurance liabilities net of reinsurance at $t = 0$;

n = the longest duration of available risk-free financial instruments (or composition of instruments) to cover the (re)insurance liabilities; and

Δr_n = the absolute decrease of the risk-free interest rate for maturity n under the downward stress scenario of the interest rate risk sub-module.

TP.2.68. The calculations should be carried out per currency.

TP.2.69. The calculation method sketched may also be applied in the context of a proportional method (level 3 of the hierarchy) or a duration method (level 4 of the hierarchy) – given that the necessary adjustments are made in the relevant formulas.

TP.2.70. It should be noted that 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 huge impact on the overall risk margin. In such cases the participating undertaking may find it worthwhile to replace the rather crude approximation described in the previous paragraphs with a more accurate simplification, e.g. by taking into account the fact that the best estimate (of technical provisions) to be applied in the calculation of unavoidable market risk in general will decrease over time. Moreover, the calculations may be carried out in a manner that reflects the risk-reducing effect of technical provisions (e.g. future bonuses).

V.2.3. Reinsurance recoverables

V.2.3.1 Adjustment due to expected default

2.3.1.1 Definition of the adjustment

TP.3.1. Article 81 of the Level 1 text stipulates that recoverables from reinsurance contracts or special purpose vehicles shall take account of expected losses due to default of the counterparty. It further requires that the adjustment is based on a market consistent assessment of the probability of default of the counterparty and the average loss resulting from this default (loss-given-default).

TP.3.2. The adjustment for counterparty default should approximate the losses-given default of the counterparty, weighted with the probability of default of the counterparty. The loss-given default is the expected present value of the change in cash-flows underlying the recoverables, resulting from a default of the counterparty at a certain point in time.

TP.3.3. For example, let the recoverables towards a counterparty correspond to deterministic payments of C_1, C_2, C_3 in one, two and three years respectively. Let PD_t be the probability that the counterparty defaults during year t. Furthermore, we assume that the counterparty will only be able to make 40% of the further payments in case of default (i.e. its recovery rate is 40%). For the sake of simplicity, this example does not consider the time value of money. (However, its allowance, which is a requirement of the level 1 text, does not change the fundamental conclusions of the example) Then the losses-given-default are as follows:

Default during year	Loss-given-default
1	$-60\%\cdot(C_1 + C_2 + C_3)$
2	$-60\%\cdot(C_2 + C_3)$
3	$-60\%\cdot C_3$

For instance, in year two the value of the recoverables is equal to $C_2 + C_3$. If the counterparty defaults in year two the value of the recoverables changes from $C_2 + C_3$ to $40\%\cdot(C_2 + C_3)$. As 60% of the recoveries are lost, the loss-given-default is $-60\%\cdot(C_2 + C_3)$.

TP.3.4. The adjustment for counterparty default in this example is the following sum:

$$
\begin{aligned}
Adj_{CD} = \quad & PD_1\cdot(-60\%\cdot(C_1 + C_2 + C_3)) \\
& + PD_2\cdot(-60\%\cdot(C_2 + C_3)) \\
& + PD_3\cdot(-60\%\cdot C_3).
\end{aligned}
$$

2.3.1.2 Probability of default (PD)

TP.3.5. The determination of the adjustment for counterparty default should take into account possible default events during the whole run-off period of the recoverables.

TP.3.6. In particular, if the run-off period of the recoverables is longer than one year, then it is not sufficient to multiply the expected loss in case of immediate default of the counterparty with the probability of default over the following year in order to determine the adjustment. In the above example, this approach would lead to an adjustment of

$$PD_1 \cdot (-60\% \cdot (C_1 + C_2 + C_3)).$$

TP.3.7. Such an approach is not appropriate because it ignores the risk that the counterparty may – after surviving the first year – default at a later stage during the run-off of the recoverables.

TP.3.8. The assessment of the probability of default and the loss-given-default of the counterparty should be based upon current, reliable and credible information. Among the possible sources of information are: credit spreads, rating judgements, information relating to the supervisory solvency assessment, and the financial reporting of the counterparty. The applied methods should guarantee market consistency. The undertaking should not rely on information of a third party without assessing that the information is current, reliable and credible.

TP.3.9. In particular, the assessment of the probability of default should be based on methods that guarantee the market consistency of the estimates of PD.

TP.3.10. Some criteria to assess the reliability of the information might be, e.g., neutrality, prudency and completeness in all material aspects.

TP.3.11. The undertaking may consider for this purpose methods generally accepted and applied in financial markets (i.e., based on CDS markets), provided the financial information used in the calculations is sufficiently reliable and relevant for the purposes of the adjustment of the recoverables from reinsurance.

TP.3.12. In the case of reinsurance recoverables from a SPV, when the undertaking has no reliable source to estimate its probability of default, (i.e. there is a lack of rating) the following rules shall apply:

- SPV authorized under EU regulations: the probability of default shall be calculated according to the average rating of assets and derivatives held by the SPV in guarantee of the recoverable.

- Other SPV where they are recognized as equivalent to those authorized under CP36: Same treatment as in the case referred above.

- Others SPV: They shall be considered as unrated.

TP.3.13. Where possible in a reliable, objective and prudent manner, point-in-time estimates of the probability of default should be used for the calculation of the adjustment. In this case, the assessment should take the possible time-dependence of the probability of default into account. If point-in-time estimates are not possible to calculate in a reliable, objective and prudent manner or their application would not be proportionate, through-the-cycle estimates of the probability of default might be used.

TP.3.14. A usual assumption about probabilities of default is that they are not constant over time. In this regard it is possible to distinguish between point-in-time estimates which try to determine the current default probability and through-the-cycle estimates which try to determine a long-time average of the default probability.

TP.3.15. In many cases only through-the-cycle estimates may be available. For example, the credit ratings of rating agencies are usually based on through-the-cycle assessments. Moreover, the sophisticated analysis of the time dependence of the probability of default may be disproportionate in most cases. Hence, through-the-cycle estimates might be used if point-in-time estimates cannot be derived in a reliable, objective and prudent manner or their application would not be in line with the proportionality principle. If through-the-cycle estimates are applied, it can usually be assumed that the probability of default does not change during the run-off of the recoverables.

TP.3.16. The assessment of the probability of default should take into account the fact that the cumulative probability increases with the time horizon of the assessment.

TP.3.17. For example, the probability that the counterparty defaults during the next two years is higher than the probability of default during the next year.

TP.3.18. Often, only the probability of default estimate PD during the following year is known. For example, if this probability is expected to be constant over time, then the probability PD_t that the counterparty defaults during year t can be calculated as

$PD_t = PD \cdot (1 - PD)^{t-1}$.

TP.3.19. This does not preclude the use of simplifications where the effect of them is not material at this aspect (see item D below).

2.3.1.3 Recovery rate (RR)

TP.3.20. The recovery rate is the share of the debts that the counterparty will still be able to honour in case of default

TP.3.21. If no reliable estimate of the recovery rate of a counterparty is available, no rate higher than 50% should be used.

TP.3.22. The degree of judgement that can be used in the estimation of the recovery rate should be restricted, especially where owing to a low number of defaults, little empirical data about this figure in relation to reinsurers is available, and hence, estimations of recovery rates are unlikely to be reliable.

TP.3.23. If the loss-given-default is restricted by mitigating instruments, for example collaterals or letters of credit, then this should be taken into account in the assessment. However, the Level 1 text requires considering the adjustment for the expected default losses of these mitigating instruments, i.e. the credit risk of the instruments as well as any other risk connected to them should also be allowed for. This allowance may be omitted where the impact is not material. To assess this materiality it is necessary to take into account the *relevant features, such as the period of effect of the risk mitigating instrument.*

TP.3.24. *See as reference the QIS5 specifications regarding allowance of financial mitigation techniques either in the standard SCR or for internal model approval*

2.3.1.4 Simplifications

TP.3.25. Article 81 of the Level 1 text stipulates that recoverables from reinsurance contracts or special purpose vehicles shall take account of expected losses due to default of the counterparty. This should be done in two steps. Firstly, the recoverables are calculated without an allowance for counterparty default. Secondly, an adjustment for counterparty default is applied to the result of the first step.

TP.3.26. In many cases, in particular if the counterparty is of good credit quality, the adjustment for counterparty default will be rather small compared to the reinsurance recoverables. In these cases, the following simplified calculation can be applied provided the undertaking meets the general framework to apply simplifications in respect technical provisions:

$$Adj_{CD} = -\max\left((1-RR)\cdot BE_{\mathrm{Re}\,c}\cdot Dur_{\mathrm{mod}}\cdot\frac{PD}{1-PD};0\right),$$

where

Adj_{CD}	=	Adjustment for counterparty default
RR	=	Recovery rate of the counterparty
BE_{Rec}	=	Best estimate of recoverables taking not account of expected loss due to default of the counterparty
Dur_{mod}	=	Modified duration of the recoverables
PD	=	Probability of default of the counterparty for the time horizon of one year

TP.3.27. The simplification should only be applied if the adjustment can be expected to be smaller than 5 per cent and there are no indications that the simplification formula leads to a significant underestimation.

TP.3.28. Since the simplification above described depends to a certain extent on the values estimated for the parameters RR and PD, for the sake of harmonization and comparability, the following table provides default values for these parameters, values which would apply those undertakings with insufficient resources to derive reliably RR and PD according a market consistent methodology.

	Recovery rate	Probability of default(1)	Adjustment of best estimate of reinsurance recoverables and SPVs, acoording the duration of expected cash flows. Expressed as a percentage of the best estimate. ((1-RR) * PD / (1 – PD) * Dur)				
			1 year	2 year	3 year	4 year	5 year
AAA	50%	0,05%	0,03%	0,05%	0,08%	0,10%	0,13%
AA	45%	0,10%	0,06%	0,11%	0,17%	0,22%	0,28%
A	40%	0,20%	0,12%	0,24%	0,36%	0,48%	0,60%
BBB	35%	0,50%	0,33%	0,65%	0,98%	1,31%	1,63%
BB	20%	2,00%	1,63%	3,27%	4,90%	Non applicable	
Others	10%	10.0%	Simplification non applicable according 5 per cent				

			threshold set out in these specificayions

(1) Simplification non applicable according the 5 per cent threshold.

TP.3.29. Premium provisions of annual insurance contracts may be considered as having a duration equivalent to that of the claims provision corresponding the claims occurred during the last year, plus one year.

2.3.1.5 Granularity of calculations

TP.3.30. The adjustment for counterparty default should be calculated separately at least for each line of business and each counterparty in order to be able to allocate the credit risk to the segments and be able to identify risk concentrations. For the same reason, the adjustment should be calculated separately for non-life premium provision and non-life claims provisions.

TP.3.31. In order to assess the credit risk that is related to the recoverables it is not sufficient to calculate only the overall amount of the adjustment.

TP.3.32. However, if the probability of default and the recovery rates of several counterparties coincide and if it is an undue burden to calculate the adjustment for counterparty default separately for each, the adjustment in relation to these counterparties might be calculated together.

TP.3.33. If the number of counterparties is high and the expected loss is small, it should be possible to calculate the adjustment for all counterparties of equal credit characteristics (probability of default and recovery rate) at once.

TP.3.34. Cases where the differentiation of recoverables among the involved reinsurers is not immediate or easily workable.

TP.3.35. In the reinsurance market, there are cases where the differentiation of recoverables among the involved reinsurers is not immediate or easily workable. Nevertheless, the adjustment of reinsurance recoverables is necessary and required by the Level 1 text. As reflected above ‘If the number of counterparties is high, the separate calculation may be an undue burden, in particular, if the expected loss is small. In this case, it should be possible to calculate the adjustment for all counterparties of equal credit characteristics (probability of default and recovery rate) at once.’

TP.3.36. For the sake of clarity, this would require:

- identification of counterparties of equal credit characteristics and determination of appropriate probability of defaults and recovery rates,
- aggregation of the recoverable cashflows from these counterparties without an allowance for counterparty default,
- adjustment to these reinsurance recoverables for counterparty default

V.2.4. Proportionality

V.2.4.1 Introduction

TP.4.1. This section aims at providing QIS5 Specifications with regard how an assessment of proportionality should be carried out in the context of a valuation of technical provisions.to ensure that actuarial and statistical methodologies are proportionate to the nature, scale and complexity of the risks, as requested in Article 85(h) of the Solvency II text (herein "Level 1 text").

V.2.4.2 Requirements for application of proportionality principle

4.2.1 Selection of valuation methodology

TP.4.2. The principle of proportionality requires that the (re)insurance undertaking should be allowed to choose and apply a valuation method which is

- suitable to achieve the objective of deriving a market-consistent valuation according to the Solvency II principles (compatible with the Solvency II valuation principles); but

- not more sophisticated than is needed in order to reach this objective (proportionate to the nature, scale and complexity of the risks).

TP.4.3. This does however not mean that an application of the principle of proportionality is restricted to small and medium-sized undertakings, nor does it mean that size is the only relevant factor when the principle is considered. Instead, the individual risk profile should be the primary guide in assessing the need to apply the proportionality principle.

4.2.2 Estimation uncertainty and its link to proportionality

TP.4.4. Due to the uncertainty of future events, any "modelling" of future cash flows (implicitly or explicitly contained in the valuation methodology) flows will necessarily be imperfect, leading to a certain degree of inaccuracy and imprecision in the measurement. Where simplified approaches are used to value technical provisions, this could potentially introduce additional uncertainty (or model error) [18]. With regard to the principle of proportionality, it is important to assess the model error that results from the use of a given valuation technique.

4.2.3 Simplified methods

TP.4.5. The term "simplified method" would refer to a situation where a specific valuation technique has been simplified in line with the proportionality principle. In a loose sense, the term "simplified method" (or "simplification") could also be used to refer to a valuation method which is considered to be simpler than a "commonly used" benchmark or reference method.[19]

4.2.3 Approximations

TP.4.6. Where approximation techniques are applied these would typically be based on a fixed set of assumptions and would tend to be less complex than techniques which carry out explicit cash flow projections based on undertaking-specific data. Approximations may therefore often be

[18] In this context, uncertainty does not refer to the randomness of future outcomes (sometimes referred to as *volatility risk* or *process risk*), but to the fact that the nature of this randomness is itself unknown. The uncertainty of the risk in terms of volatility risk or process risk is an inherent quality of the risk (independent of the valuation method applied) and is assessed as part of the nature of the risk.

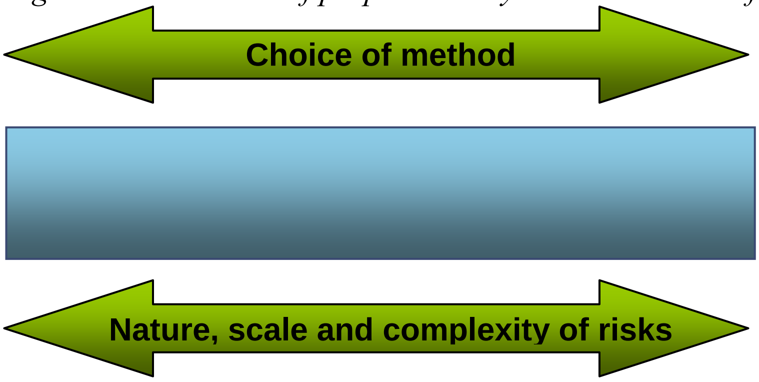
[19] It is considered that the term "simplified methods" is used in this sense in the wording of Article 85(h).

regarded as a specific kind of simplified methods (where the simplification is due to a lack of data). The use of expert judgement plays a key role in this context.

4.2.4 Role of simplified methods in the valuation framework

TP.4.7. The principle of proportionality applies generally when a valuation methodology is chosen, allowing (re)insurance undertakings the flexibility to select a technique which is proportionate to the nature, scale and complexity of the underlying risks:

Figure 1: Assessment of proportionality in the valuation of technical provisions



V.2.4.3 Proportionality assessment – a three step process

TP.4.8. It would be appropriate for such an assessment to include the following three steps:

Step 1: Assess nature, scale and complexity of underlying risks

Step 2: Check whether valuation methodology is proportionate to risks as assessed in step 1, having regard to the degree of model error resulting from its application

Step 3: Back test and validate the assessment carried out in steps 1 and 2

TP.4.9. However – due to the restricted time frame – Step 3 is omitted for the porpose of the QIS 5 exercise.

4.3.1 Step 1: Assess nature, scale and complexity of risks

TP.4.10. In this step, the (re)insurance undertaking should assess the nature, scale and complexity of the risks underlying the insurance obligations. This is intended to provide a basis for checking the appropriateness of specific valuation methods carried out in step two and shall serve as a guide to identify where simplified methods are likely to be appropriate.

Which risks?

TP.4.11. The scope of risks which shall be included in the analysis will depend on the purpose and context of the assessment. For the purpose of calculating technical provisions, the assessment should include all risks which materially affect (directly or indirectly) the amount or timing of cash flows required to settle the insurance and reinsurance obligations arising from the insurance contracts in the portfolio to be valued. Whereas this will generally include all insured risks, it may also include others such as inflation.

Nature and complexity

TP.4.12. Nature and complexity of risks are closely related, and for the purposes of an assessment of proportionality could best be characterised together. Indeed, complexity could be seen as an integral part of the nature of risks, which is a broader concept.[20]

TP.4.13. In mathematical terms, the nature of the risks underlying the insurance contracts could be described by the probability distribution of the future cash flows arising from the contracts. This encompasses the following characteristics:

- the degree of homogeneity of the risks;
- the variety of different sub-risks or risk components of which the risk is comprised;
- the way in which these sub-risks are interrelated with one another;
- the level of certainty i.e. the extent to which future cash flows can be predicted;[21]
- the nature of the occurrence or crystallisation of the risk in terms of frequency and severity;

TP.4.14. the type of the development of claims payments over time;

- the extent of potential policyholder loss, especially in the tail of the claims distribution.

TP.4.15. The first three bullet points in the previous paragraph are in particular related to the complexity of risks generated by the contracts, which in general terms can be described as the quality of being intricate (i.e. of being "entwined" in such a way that it is difficult to separate them) and compounded (i.e. comprising a number of different sub-risks or characteristics).

TP.4.16. For example, in non-life insurance travel insurance business typically has relatively stable and narrow ranges for expected future claims, so would tend to be rather predictable. In contrast, credit insurance business would often be "fat tailed", i.e. there would be the risk of occasional large (outlier) losses occurring, leading to a higher degree of complexity and uncertainty of the risks. Another example in non-life insurance is catastrophe (re)insurance covering losses from hurricanes where there is very considerable uncertainty over expected losses, i.e. how many hurricanes occur, how severe they are and whether they hit heavily insured areas.

TP.4.17. In life insurance, the nature and complexity of the risks would for example be impacted by the financial options and guarantees embedded into the contracts (such as surrender or other take-up options), particularly those with profit sharing features.

TP.4.18. When assessing the nature and complexity of the insured risks, additional information in relation to the circumstances of the particular portfolio should be taken into account. This could include:

- the type of business from which the risks originate (e.g. direct business or reinsurance business);
- the degree of correlation between different risk types, especially in the tail of the risk distribution.

[20] I.e. whether or not a risk is complex can be seen as a property of the risk which is part of its nature.

[21] Note that this only refers to the randomness (volatility) of the future cash flows. Uncertainty which is related to the measurement of the risk (model error and parameter error) is not an intrinsic property of the risk, but dependent on the valuation methodology applied, and will be considered in step 2 of the proportionality assessment process.

- any risk mitigation instruments (such as reinsurance or derivatives) applied, and their impact on the underlying risk profile.

TP.4.19. The undertaking should also seek to identify factors which would indicate the presence of more complex and/or less predictable risks. This would be the case, for example, where:

- the cash-flows are highly path dependent; or
- there are significant non-linear inter-dependencies between several drivers of uncertainty; or
- the cash-flows are materially affected by the potential future management actions; or
- risks have a significant asymmetric impact on the value of the cash-flows, in particular if contracts include material embedded options and guarantees or if there are complex reinsurance contracts in place; or
- the value of options and guarantees is affected by the policyholder behaviour assumed in the model; or
- the undertaking uses a complex risk mitigation instrument, for example a complex non-proportional reinsurance structure; or
- a variety of covers of different nature is bundled in the contracts; or
- the terms of the contracts are complex (e.g. in terms of franchises, participations, or the in- and exclusion criteria of cover).

TP.4.20. The degree of complexity and/or uncertainty of the risks are/is associated with the level of calculation sophistication and/or level of expertise needed to carry out the valuation. In general, the more complex the risk, the more difficult it will be to model and predict the future cash flows required to settle the obligations arising from the insured portfolio. For example, where losses are the result of interaction of a number of different factors, the degree of complexity of the modelling would be expected to also increase.

Scale

TP.4.21. Assigning a scale introduces a distinction between “small” and “large” risks. The undertaking may use a measurement of scale to identify sub-risks where the use of simplified methods would likely to be appropriate, provided this is also commensurate with the nature and complexity of the risks.

TP.4.22. For example, where the undertaking assesses that the impact of inflation risk on the overall risk profile of the portfolio is small, it may consider that an explicit recognition of inflation scenarios would not be necessary. A scale criterion may also be used, for example, where the portfolio to be measured is segmented into different sub-portfolios. In such a case, the relative scale of the individual sub-portfolios in relation to the overall portfolio could be considered.

TP.4.23. Related to this, a measurement of scale may also be used to introduce a distinction between material and non-material risks. Introducing materiality in this context would provide a threshold or cut-off point below which it would be regarded as justifiable to omit (or not explicitly recognise) certain risks.[22]

TP.4.24. To measure the scale of risks, further than introducing an absolute quantification of the risks the undertaking will also need to establish a benchmark or reference volume which leads to a relative rather than an absolute assessment. In this way, risks may be considered “small” or “large” relative to the established benchmark. Such a benchmark may be defined, for example, in terms of a volume measure such as premiums or technical provisions that serves as an approximation for the risk exposure.

TP.4.25. To determine an appropriate benchmark for a relative measurement of scale, it is important to specify at which level the assessment is carried out: a risk which is small with regard to the business of the undertaking as a whole may still have a significant impact within a smaller segment, e.g. a certain line of business. For the calculation of technical provisions, Article 70 of the Level 1 text stipulates in this regard that the starting point for this valuation is defined by the level of homogeneous risk group (HRG). However, other levels are also relevant; for example, the calculation of the standard formula SCR necessitates a specification of the value of technical provisions per LOB.

TP.4.26. The following four different levels may usefully be distinguished in the context of a calculation of technical provisions:

- the individual homogeneous risk group (HRG);
- the individual line of business (LOB);[23]
- the business of the undertaking as a whole and
- the group to which the undertaking belongs, where relevant.

TP.4.27. Depending on the purpose and context of the valuation, the benchmark established to measure “scale” should relate to one of these four levels. For example, where it is the purpose to calculate the technical provision for a given LOB, the benchmark should relate to same level (e.g. in terms of the size of the overall best estimate in the LOB).

TP.4.28. In particular, where the calculation of technical provisions is carried out in the context of a solo assessment, it would not be appropriate to consider a group-related benchmark.

Combination of the three indicators and overall assessment

TP.4.29. 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. This overall assessment of proportionality would ideally be more qualitative than quantitative, and cannot be reduced to a simple formulaic aggregation of isolated assessments of each of the indicators.

TP.4.30. In terms of nature and complexity, the assessment should seek to identify the main qualities and characteristics of the risks[24], and should lead to an evaluation of the degree of their complexity and predictability.[25] In combination with the “scale” criterion, the undertaking may use such an assessment as a “filter” to decide whether the use of simplified methods would be likely to be appropriate. For this purpose, it may be helpful to broadly categorise the risks according to the two dimensions “scale” and “complexity/predictability”:

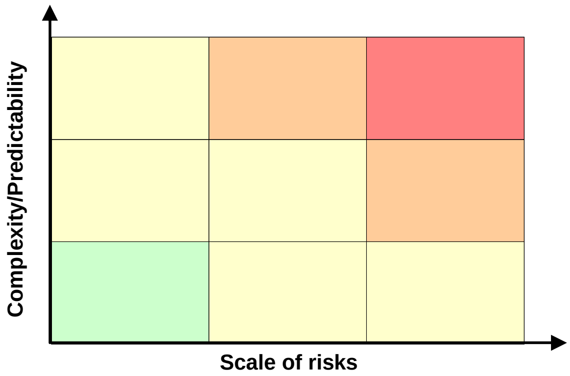
Figure 3: Risk matrix for proportionality assessment

[22] We note that materiality is also important where the uncertainty (or degree of model error) in the measurement is concerned. This will be considered in step 2 of the proportionality assessment process, cf. section TP.4.31.

[23] Potentially comprising several homogeneous risk groups.

[24] Cf. para. TP.4.13.

[25] Cf. para. TP.4.19.



TP.4.31. An assessment of nature, scale and complexity may thus provide a useful basis for the second step of the proportionality process where it is decided whether a specific valuation methodology would be proportionate to the underlying risks.

4.3.2 Step 2: Quantitative assessment of the model error

TP.4.32. For the best estimate, this means that a given valuation technique should be seen as proportionate if the resulting estimate is not expected to diverge materially from the "true" best estimate which is given by the mean of the underlying risk distribution, i.e. if the model error implied by the measurement is immaterial. More generally, a given valuation technique for the technical provision should be regarded as proportionate if the resulting estimate is not expected to diverge materially from the current transfer value specified in the Level 1 text.[26]

TP.4.33. Where in the valuation process several valuation methods turn out to be proportionate, the undertaking would be expected to select and apply the method which is most appropriate in relation to the underlying risks.

Materiality in the context of a valuation of technical provisions

TP.4.34. In order to clarify the meaning of materiality undertakings will use the definition of materiality used in International Accounting Standards (IAS)[27]:

"Information is material if its omission or misstatement could influence the economic decisions of users taken on the basis of the financial statements. Materiality depends on the size of the item or error judged in the particular circumstances of its omission or misstatement. Thus, materiality provides a threshold or cut-off point rather than being a primary qualitative characteristic which information must have if it is to be useful".

TP.4.35. When determining how to address materiality, the undertaking should have regard to the purpose of the work and its intended users. For a valuation of technical provisions – and more generally for a qualitative or quantitative assessment of risk for solvency purposes – this should include the supervisory authority which uses the information when performing the SRP.

Assessment of the estimation uncertainty in the valuation

TP.4.36. Regardless of what methods shall be applied for the valuation of technical provisions, it is important that an assessment of their appropriateness should in general include an assessment of the model error implicit to the calculations.

TP.4.37. Such an assessment may be carried out, for example, by:

26 Cf. Article 76(2) of the Framework Level 1 text.

27 Materiality is defined in the glossary of the International Accounting Standards Board's "Framework for the Preparation and Presentation of Financial Statements"

- Sensitivity analysis in the framework of the applied model: this means to vary the parameters and/or the data thereby observing the range where a best estimate might be located.

- Comparison with the results of other methods: applying different methods gives insight in potential model errors. These methods would not necessarily need to be more complex.

- Descriptive statistics: in some cases the applied model allows the derivation of descriptive statistics on the estimation error contained in the estimation.[28] Such information may assist in quantitatively describing the sources of uncertainty.

- Back-testing: comparing the results of the estimation against experience may help to identify systemic deviations which are due to deficiencies in the modelling.[29]

TP.4.38. The undertaking is not required to quantify the degree of model error in precise quantitative terms, or to re-calculate the value of its technical provisions using a more accurate method in order to demonstrate that the difference between the result of the chosen method and the result of a more accurate method is immaterial. Instead, it would be sufficient for the undertaking to demonstrate that there is reasonable assurance that the model error implied by the application of the chosen method (and hence the difference between those two amounts) is immaterial.

Approach in cases where model error is expected to be material

TP.4.39. Where the intended use of a valuation technique is expected to lead to a material degree of model error, the undertaking should consider which alternative techniques would be available to him. Where practicable, another more appropriate valuation method should be applied.

TP.4.40. In some circumstances, however, it may be unavoidable for the undertaking to apply a valuation method which leads to an increased level of estimation uncertainty in the valuation. This would be the case where the undertaking, to carry out the valuation, would need to make assumptions which are uncertain or conjectural and which cannot be validated. For example, this could be the case where there are deficiencies in the data, so that there is only insufficient pertinent past experience data available to derive or validate assumptions.

TP.4.41. Under these circumstances, it would be acceptable for the undertaking to determine the best estimate of the technical provision applying a technique which carries an increased level of estimation uncertainty or model error. The undertaking should document that this is the case and consider the implications of the increased level of uncertainty with regard to the reliability of the valuation and its overall solvency position.

TP.4.42. In particular the undertaking 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 provision.

TP.4.43. Where the use of a valuation technique results in a material increase in the level of uncertainty associated with the best estimate liability, the insurer should include a degree of caution in the exercise of the judgements needed in setting the assumptions and parameters underlying the best estimate valuation. However, this exercise of caution should not lead to a

[28] Of course, this would not include the uncertainty arising from a misspecification of the model itself.
[29] Cf. also the third step of the proportionality assessment process.

deliberate overstatement of the best estimate provision. To avoid a double-counting of risks, the valuation of the best estimate should be free of bias and should not contain any additional margin of prudence.

V.2.4.4

TP.4.44.
TP.4.45.

TP.4.46.
TP.4.47.

TP.4.48.

TP.4.49.
TP.4.50.
TP.4.51.

V.2.4.5 Life insurance specific. Best estimates

TP.4.52. Simplifications proposed in these specifications only will be applicable under the framework contained above to define the proportionality principle regarding technical provisions

Biometric risk factors

TP.4.53. Biometric risk factors are underwriting risks covering any of the risks related to human life conditions, e.g.:

- mortality/longevity rate,
- morbidity rate,
- disability rate.

TP.4.54. The list of possible simplifications for obtaining biometric risk factors which does not include all simplifications allowed and which could be used in combination includes:

- neglect the expected future changes in biometrical risk factors30;
- assume that biometric risk factors are independency from any other variable (i.e. mortality is independent of future changes of morbidity status of policyholder);
- use cohort or period data to analyze biometric risk factors;
- apply current tables in use adjusted by suitable multiplier function. The construction of reliable mortality, morbidity/ disability tables and the modelling of trends could be based on current (industry standard or other) tables in use adjusted by suitable multiplier function. Industry-wide and other public data and forecasts should provide useful benchmarks for suitable multiplier functions.

Surrender option

TP.4.55. Besides the rational or irrational behaviour of policyholders, the experience of surrenders tend to suggests that rational reasons for movements in surrender rates are:

- quality of sales advice and whether any misselling may occur leading to earlier surrenders in excess of later surrenders;
- the economic cycle affecting policyholders' ability to pay further premiums;
- the personal circumstances of policyholders and whether they can afford premiums

TP.4.56. A non-exhaustive list of possible simplifications for modelling surrender rates, which could be used in combination includes:

- assume that surrenders occur independently of financial/ economic factors,
- assume that surrenders occur independently of biometric factors,
- assume independency in relation to management actions,

[30] For example, this simplification could be applied to short term contracts.

- assume that surrenders occur independently of the undertaking specific information,
- use a table of surrender rates that are differentiated by factors such as age, time since policy inception, product type,...,
- model the surrender as a harzard process either with a non-constant or constant intensity.

TP.4.57. Some of these simplifications convert the hazard process in deterministic function which implies independency between the surrender time and the evaluation of economic factors, which are obvious not a realistic assumptions since policyholder behaviour is not static and is expected to vary as a result of changing economic environment.

TP.4.58. Other possible surrender models[31] where the surrender rate SR_t for a policy at time t also depend on economic variables include the following:

- Lemay's model $SR_t = a \cdot \alpha + b \cdot \frac{FV_t}{GV_t}$
- Arctangent model $SR_t = a + b \cdot \arctan(m\Delta_t - n)$
- Parabolic model $SR_t = a + b \cdot sign(\Delta_t) \cdot \Delta_t^2$
- Modified parabolic model $SR_t = a + b \cdot sign(\Delta_t) \cdot \Delta_t \cdot k + c^{(CR_{t-1} - CR_t)}$
- Exponential model $SR_t = a + b \cdot e^{m \cdot \frac{CR_t}{MR_t}}$
- New York State Law 126 $SR_t = a + b \cdot sign(\Delta_t) \cdot \Delta_t \cdot k - c \cdot (\frac{FV_t - CSV_t}{FV_t})$

where a,b,c,m,n,j,k are coefficients, α denotes underlying (possible time dependent) base laps rate, FV denotes the fund/account value of the policy, GV denotes the guaranteed value of the policy, Δ equals reference market rate less crediting rate less surrender charge, CR denotes the credit rate, MR denotes the reference market rate, CSV denotes the cash surrender value and

$sign(x) = 1$ if $x \geq 0$ and

$sign(x) = -1$ if $x < 0$.

TP.4.59. Undertakings could also assume that mortality is independent of the financial market. A questionable but practical simplification is to assume stochastic independency between surrender rate and financial markets and between surrender rate and mortality rate.

TP.4.60. For with profit contracts the surrender option and the minimum guarantees are clearly dependent. Furthermore, management actions will also have a significant impact on the surrender options that might not easily be captured in a closed formula.

Financial options and guarantees

TP.4.61. The possible simplification for financial options and guarantees is to approximate them by assuming a Black-Scholes type of environment, although its scope should be carefully limited to those cases where the underlying assumptions of such model are tested. Additionally, even stochastic modelling may require some simplifications when facing extremely complex features. This latter may be developed as part of level 3 guidance.

[31] Models giving surrender rates above 100 % are not relevant.

Investment guarantees

TP.4.62. The non-exhaustive list of possible simplifications for calculating the values of investment guarantees includes:

- assume non-path dependency in relation to management actions, regular premiums, cost deductions (e.g., management charges,...),
- use representative deterministic assumptions of the possible outcomes for determining the intrinsic values of extra benefits,
- assume deterministic scenarios for future premiums (when applicable), mortality rates, expenses, surrender rates, ...,
- apply formulaic simplified approach for the time values if they are not considered to be material.

Other options and guarantees

TP.4.63. The possible simplification for other options and guarantees are:

- ignore options and guarantees which are not material,
- group for instance guaranteed expense charge and/or guaranteed mortality charge with investment guarantee and approximate them as one single investment guarantee,
- use the process outlined in the previous paragraph in the absence of other valuation approaches if appropriate.

Distribution of future discretionary benefits

TP.4.64. Possible simplification for determining the future bonuses may include where appropriate:

- assume that economic conditions will follow a certain pattern, not necessarily stochastic, appropriately assessed
- assume that the business mix of undertaking's portfolio will follow a certain pattern, not necessarily stochastic, appropriately assessed

TP.4.65. The undertakings could use all or some of the simplifications proposed in previous paragraph to determine amounts of future discretionary bonuses or approximate the amount of available extra benefits for distribution to policyholders as the difference or appropriate percentage of the difference of the value of the assets currently held to back insurance liabilities of these contracts and the technical provisions for these contract without taking into account future discretionary bonuses.

TP.4.66. The possible simplification for distribution of extra benefits to particular line of business (to each policy) is to assume a constant distribution rate of extra benefits.

Expenses and other charges

A) Expenses

TP.4.67. The possible simplification for expenses is to use an assumption built on simple models using information from current and past expense loadings to project future expense loadings, including inflation.

B) Other charges

TP.4.68. The possible simplification for other charges is to assume that:

- other charges are a constant share of extra benefits or
- a constant charge (in relative terms) from the policy fund.

Other issues

TP.4.69. Having in mind the wide range of assumptions and features taken into account to calculate life insurance best estimates, there are other areas not mentioned previously, where it might be possible to find methods meeting the requirements set out in these specifications to apply simplifications.

TP.4.70. As an example, other possible simplification is to assume that:

- the projection period is one year and that
- cash-flows to the policyholders occur either at the end of the year or in the middle of the year.

TP.4.71. Another possible simplification for the payments of the premiums which also include lapses and premium waiver (e.g. premiums waiver in case of disability of the insured person) is to assume that future premiums are paid independently of the financial markets and undertakings specific information. If lapses and premium waiver could not be treated as independent of financial markets or independent of undertaking specific paramterers than lapses should be valued with similar technices as those for surrender option or investment guarantees.

TP.4.72. As a further example, possible simplifications in relation to fund/account value projections (which is important for valuing financial options and guarantees) are to:

- group assets with similar features/use representative assets or indexes;
- assume independency between assets, for instance, between equity rate of return and interest rate.

V.2.4.6 Non-life insurance specific

TP.4.73. Simplifications proposed in these specifications only will be applicable under the framework contained above to define the proportionality principle regarding technical provisions

Outstanding reported claim provision. First simplification

TP.4.74. Description. This simplification applies to the calculation of the best estimate of reported claims by means of consider the number of claims reported and the average cost thereof. Therefore is a simplification applicable when it does not deliver material model error in the estimate of frequency, severity and its combination. This simplification can be used to calculate outstanding claims provision and provision for incurred but not reported claims as a whole, adding to Ni the IBNR claims calculated as Nt mentioned in these specifications.

TP.4.75. Calculation. The calculation is rather straightforward:

$$\sum_{i}^{n}(Ni * Ai) - Pi$$

where:

Ni= number of claims reported, incurred in year i

Ai= average cost of claims closed in year i

Pi= payments for claims incurred in year i

Ni and Pi are known, while Ai is determined using the average cost of claims closed in the year i, independently of the accident year, multiplying that amount by a factor to take into account future inflation and discounting. See in annex A an explanatory example.

Undertakings should complete this reserve with an incurred but not reported provision (IBNR) and an ULAE provision.

Annex D provides a numerical example of this method

TP.4.76. Criteria for application. Additional to the general requirements set out in these specifications, the above method is an allowable simplification when the size of claims incurred in a year has a little variance, or the number of claims incurred in a year is big enough to allow the average cost to be representative.

TP.4.77. These two conditions are unlikely to exist in case of claims that have a medium or long term of settlement since the claim is reported.

TP.4.78. It should be noted that this method described does not seem appropriate in situations where only few development years or occurrence years respectively are available. In these cases it is likely that the claims which are still open are the more complex ones with higher average of expected ultimate loss. Especially for reinsurance business, this simplification is not applicable, as the necessary data are not available.

Outstanding reported claim provision. Second simplification

TP.4.79. These specifications in respect data quality standards and approximations points out that ‘in circumstances where (e.g. due to the nature or size of the portfolio) a lack of data for the valuation of technical provisions is unavoidable for the undertaking, insurers may have to use "*appropriate approximations, including case by case approaches*" (Article 81). In such cases, further judgmental adjustments or assumptions to the data may often need to be applied in order to allow the valuation to be performed using such approximations in line with the principle of proportionality’.

TP.4.80. Description. This method consists in the simple sum of estimates of each claim reported at the date of reference of the valuation. The allowance of a simplified method based on a ‘*case-by-case approach’* should be assessed carefully according the features of the claims portfolio and the undertaking internal structure and capabilities.

TP.4.81. Scope. Further the general requirements set out in these specifications, the undertaking should develop written documentation on:

- Procedures applicable to assess the initial valuation of a claim when hardly anything is known about its features. Valuation must be based on the experience on the average cost of claims with similar features
- The method to include inflation, discounting and direct expenses.
- The frequency of the valuations review which must be at least quarterly.
- The procedure to take into account the changes in both entity specific, legal, social, or economic environmental factors.
- The requirements in order to consider the claim to be closed.

TP.4.82. Calculation. This method should start estimating each individual provision for a single claim upon up-to-date and credible information and realistic assumptions. Furthermore:

- This estimate should take account of future inflation according a reliable forecast of the time-pattern of the payments.
- The future inflation rates should be market consistent and suitable for each line of business and company.
- Individual valuations should be revised as information is improved.
- Furthermore, where back testing evidences a systematic bias in the valuation, this should be offset with an appropriate adjustment according the experience gained with claims settlement in previous years and the expected future deviations.
- Undertakings should complete the valuation resulting from this method with an incurred but not reported provision (IBNR) and an ULAE provision.

TP.4.83. Criteria for application. Further the general requirements set out in these specifications, this method is an allowable simplification in the case of small portfolios where the undertaking has sufficient information, but the number of claims is too small to test patterns of regularity.

TP.4.84. This method is also allowable, although as an approximation, in case of (a) high-severity-low-frequency claims, and (b) new (re)insurance company or new line of business, although only temporarily until achieving sufficient information to apply standard methods. However, where the lack of information is expected to be permanent (e.g. the case of ‘tail’ risks with a very slow process of collecting claims information), the undertaking would be required to complement the data available by making extra efforts to look for relevant external information to allow the understanding of the underlying risks and to use extensively adequate expert opinion and judgements. Documentation is also a key aspect in this subject (see these specifications regarding data quality).

Incurred but not reported claims provision. First simplification

TP.4.85. Description. This simplification applies to the calculation of the best estimate of incurred but not reported claims (IBNR) by means an estimation of the number of claims that would expected to be declared in the followings years and the cost thereof.

TP.4.86. Calculation. The final estimate of this technical provision is derived from the following expression, where just for illustrative purposes a three-year period of observation has been considered (the adaptation of the formula for longer series is immediate):

$$IBNR\ reserve\ year\ t = C_t\ x\ N_t \quad ,$$

where

C_t = average cost of IBNR claims, after taking into account inflation and discounting. This cost should be based on the historical average cost of claims reported in the after the relevant accident year. Since a part of the overall cost of claims comes from provisions, a correction for the possible bias should be applied.

and

$$Nt = Rt * Av,\ being$$

$$AV = [\ (N_{t-1} / p_1) + (N_{t-2} / p_2) + N_{t-3}\ ]\ /\ [\ R_{t-1} + R_{t-2} + R_{t-3}]$$

Furthermore, in these expressions

N_{t-i} = number of claims incurred but not reported at the end of the year t-i, independently of the accident year (to assess the number of IBNR claims all the information known by the undertaking till the end of the year t should be included).

p_1= percentage of IBNR claims at the end of year t-3 that have been reported during the year t-2

p_2= percentage of IBNR claims at the end of year t-3 that have been reported during the years t-2 and t-1

R_{t-i}= claims reported in year t, independently of accident year.

TP.4.87. This method should be based on an appropriate number of years where reliable data are available so as to achieve a reliable and robust calculation. The more years of experience available the better quality of the mean obtained.

TP.4.88. Obviously this method only applies where the incurred and reported claims provision has been valued without considering IBNR, for example it has been assessed using some of the aforementioned simplifications.

Incurred but not reported claims provision. Second simplification

TP.4.89. Description. This simplification should apply only when it is not possible to apply reliably the first simplification. In this simplification the best estimate of non reported claims (IBNR) is estimated as a percentage of the provision for reported outstanding claims.

TP.4.90. Calculation. This simplification is based on the following formula:

$$Provision\ IBNR_{LOB} = factor_{LOB\_U} * PCO\_reported_{LOB},$$

where

$$PCO\_reported_{LOB} = provision\ for\ reported\ claims\ outstanding$$

$$factor_{LOB\_U} = factor\ specific\ for\ each\ LOB\ and\ undertaking.$$

TP.4.91. Criteria for application. Further the general requirements set out to use simpifications, this method may apply only when it is not possible to apply reliably the first simplification due the number of years of experience is insufficient. Obviously this method only applies where the incurred and reported claims provision has been valued without considering IBNR, for example it has been assessed using some of the aforementioned simplifications.

Simplification for claims settlement expenses

TP.4.92. Description. This simplification estimates the provision for claims settlement expenses as a percentage of the claims provision.

TP.4.93. Calculation. This simplification is based on the following formula, applied to each line of business:

$$Provision\ for\ ULAE = R * [\ IBNR + a * PCO\_reported\ ]$$

where:

R = Simple average of R_i (e.g. over the last two exercises) and

R_i = Expenses / (gross claims + subrogations).

$IBNR$ = provision for IBNR

$PCO\_reported$ = provision for reported claims outstanding

a = Percentage of claim provisions (set as 50 per cent)

TP.4.94. Criteria for application. Further the general requirements set out in these specifications, this method is an allowable simplification when expenses can reasonable be supposed proportional to provisions as a whole, this proportion is stable in time and the expenses distribute uniformly over the lifetime of the claims portfolio as a whole.

Simplification for premium provision

First simplification

TP.4.95. Description. This simplification estimates the best estimate of the premium provision when the undertaking is not able to derive a reliable estimate of the expected future claims and expenses derived from the business in force.

TP.4.96. Calculation. This simplification is based on the following formula, applied to each line of business:

Best estimate Premium provision =

[Pro-rate of unearned premium over the life of the premium + Adjustment for any expected insufficiency of the premium in respect future claims and expenses] / (1 + rf_rate_1y / 3)
time BE = (Present value of future premiums on existing contracts+Provision for unearned premiums + Provision for unexpired risks)/(1+i/3)

where *rf_rate_1y* is the risk-free interest rate 1-year term

TP.4.97. Criteria for application. Further the general requirements set out in these specifications, this method is an allowable simplification when the premium provision is supposed to decrease at an even rate during the forthcoming year.

Second simplification (expected claims ratio based simplification)

TP.4.98. Description

The expected loss method described in this subsection derives a best estimate for the premium provisions, based on an estimate of the combined ratio in the LOB in question.

These specifications are explained in respect of gross insurance business, although they may apply mutatis mutandis to the calculation of reinsurance recoverable corresponding premiums provisions.

TP.4.99. Input

The following input information is required:

- estimate of the combined ratio (CR) for the LOB during the run-off period of the premium provision
- present value of future premiums for the underlying obligations (as to the extent to which, according to these specifications, future premiums should be taken into account in the valuation of premium provisions.)
- unearned premium reserve for the underlying obligation (intended to denote the paid premium for the unexpired risk period determined on a *pro rata temporis* basis).

The combined ratio for an accident (= occurrence year) should be defined as the ratio of expenses and incurred claims in a given LOB or homogenous group of risks over earned premiums. The earned premiums should exclude prior year adjustment. The expenses should be those attributable to the premiums earned other than claims expenses. Incurred claims should exclude the run-off result.

Alternatively, if it is more practicable, the combined ratio for an accident year may be considered to be the sum of the expense ratio and the claims ratio. The expense ratio is the ratio of expenses (other than claims expenses) to written premiums and the expenses are those attributable to the written premiums. The claims ratio for an accident year in a given LOB or homogenous group of risks should be determined as the ratio of the ultimate loss of incurred claims over earned premiums.

TP.4.100. Output

Best estimate of the premium provision (gross of reinsurance).

TP.4.101. Calculation

The best estimate is derived from the input data as follows:

$$BE = CR \bullet [\ UPR/(1 - \text{commission rate})\ ] + (CR - 1) \bullet PVFP$$

Where:

BE	=	best estimate of premium provision
CR	=	estimate of combined ratio for LOB
UPR	=	unearned premium reserve
$PVFP$	=	Present value of future premiums (discounted using the prescribed term structure of risk-free interest rates)

TP.4.102. Where UPR is based on the total premium (without deducting acquisition costs), 'commission rate' in the formula above shall be set at nil.

Special cases

Where due to the features of the business, an undertaking lacks sufficient information to derive a reliable estimate of CR (e.g. CR refers to a new line of business), and a market development pattern is available for the LOB being measured, a further alternative is to combine such pattern with the market expected loss. This possibility does not apply where the undertaking lacks sufficiently reliable information due to non-compliance with the data quality standards set out in these specifications

Where the market expected loss is applicable, the undertaking shall follow a three step approach:

- 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 next year

- Use the market development pattern to split the total claims cost per development year. Discounting can then be applied using the rates applicable to each maturity

- The final step is to add the estimate for the present value of future expenses (based on the estimated expense ratio) and deduct the present value of future premiums

TP.4.103. Criteria for application

The following conditions should be met for an application of a market development pattern:

- it can be expected that the combined ratio remains stable over the run-off period of the premium provision;

- a reliable estimate of the combined ratio can be made;

- the unearned premium provision 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).

V.2.4.7 Reinsurance recoverables

Life reinsurance

TP.4.104. For the calculation of the probability-weighted average cash-flow of the recoverables or net payments to the policyholder the same simplifications as for the calculation of best estimate of life insurance policies could be applied.

TP.4.105. The result from the calculation shall be adjusted to take account of the expected losses due to the default of the counterparty (Article 81) (see the relevant subsection of these specifications).

Non-life reinsurance

TP.4.106. The approaches considered represent Gross-to-Net techniques meaning that it is presupposed that an estimate of the technical provisions gross of reinsurance (compatible with the Solvency II valuation principles) is already available. Following such techniques the value of reinsurance recoverables is derived in a subsequent step as the excess of the gross over the net estimate.

TP.4.107. Finally, it should be noted that where this sub-section addresses the issue of recoverables (and corresponding net valuations), this is restricted to recoverables from reinsurance contracts, and does not include consideration of recoverables from SPVs.

TP.4.108. From a practical perspective it is understood that the wording of the Level 1 text does not prevent methods of calculations – including simplifications – whereby the technical provisions net of reinsurance is estimated in a first step, while an estimate of the reinsurance recoverables is fixed as a residual (i.e. as the difference between the estimated technical provisions gross and net of reinsurance, respectively). Accordingly, this approach has been chosen in the following discussion of the Gross-to-Net techniques that may be applied in the context of non-life insurance.

Gross-to-net techniques

TP.4.109. A detailed analysis of the gross-to-net techniques can be found in the *Report on Proxies* elaborated by CEIOPS/Groupe Consultatif Coordination Group[32] as well as the gross-to-net techniques which were tested (based on the recommendations contained in this report) in the QIS4 exercise. This description of gross-to-net techniques has been included purely for informational purposes.

Analysis

TP.4.110. This sub-section includes the general high-level criteria to be followed by an (re)insurance undertaking applying gross-to-net techniques to guarantee its compatibility with the Solvency II framework.

[32] CEIOPS/Groupe Consultatif Coordination Group: "Report on Proxies", July 2008, http://www.ceiops.eu/media/docman/public_files/consultations/consultationpapers/Final%20Report%20on%20Proxies.pdf.

Compatibility of Gross-to-Net Calculations with the Level 1 Text

TP.4.111. The technical "gross-to-net" methods considered in this sub-section are designed to calculate the value of net technical provisions in a direct manner, by converting best estimates of technical provisions gross of reinsurance to best estimates of technical provisions net of reinsurance. The value of the reinsurance recoverables is then given as the excess of the gross over the net valuation:

Reinsurance recoverables = gross provisions – net provisions

TP.4.112. An application of gross-to-net valuation techniques – and more broadly of any methods to derive net valuations of technical provisions – may be integrated into the Solvency II Framework by using a three-step approach as follows:

- **Step 1**: Derive valuation of technical provisions net of reinsurance.
- **Step 2**: Determine reinsurance recoverables as difference between gross and net valuations.
- **Step 3**: Assess whether valuation of reinsurance recoverables is compatible with Article 81.

Step 1:Derivation of technical provisions net of reinsurance

TP.4.113. The starting point for this step is a valuation of technical provisions gross of reinsurance. For non-life insurance obligations, the value of gross technical provisions would generally be split into the following components per homogeneous group of risk or (as a minimum) lines of business:[33]

PP_{Gross} = the best estimate of premiums provisions gross of reinsurance;
PCO_{Gross} = the best estimate of claims provisions gross of reinsurance; and
RM = the risk margin.[34]

TP.4.114. From this, a valuation of the best estimate technical provisions net of reinsurance within a given homogeneous risk group or line of business may be derived by applying Gross-to-Net techniques to the best estimates components referred to above.[35]

TP.4.115. The technical provisions net of reinsurance in the given homogeneous risk group or line of business would then exhibit the same components as the gross provisions, i.e.

PP_{Net} = the best estimate of premiums provisions net of reinsurance;
PCO_{Net} = the best estimate of claims provisions net of reinsurance; and
RM = the risk margin.

Step 2:Determination of reinsurance recoverables as difference between gross and net valuations

TP.4.116. On basis of the results of step 1, the reinsurance recoverables (RR) per homogenous risk groups (or lines of business) may be calculated as follows (using the notation as introduced above):

[33] Note that according to Article 80 insurers shall segment their insurance obligations into homogeneous risk groups or – as a minimum – lines of business when calculating their technical provisions.
[34] This analysis assumes that the risk margin is not split further into a premium provision part and a claims provision part (following QIS4 specifications). It also assumes that the risk margin is calculated net of reinsurance.
[35] Alternatively, the best estimates net of reinsurance may also be derived directly, e.g. on basis of triangles with net of reinsurance claims data.

$$\mathbf{RR = (PP_{Gross} - PP_{Net}) + (PCO_{Gross} - PCO_{Net})}$$

TP.4.117. Note that implicitly this calculation assumes that the value of reinsurance recoverables does not need to be decomposed into best estimate and risk margin components.

Step 3: <u>Assessment of compatibility of reinsurance recoverables with Article 81</u>

TP.4.118. In this step, it would need to be assessed whether the determination of the reinsurance recoverables in step 2 is consistent with Article 81 of the Level 1 text.

TP.4.119. In particular, this would require an analysis as to whether the issues referred to in the second and third paragraph of Article 81, i.e. the time difference between direct payments and recoveries and the expected losses due to counterparty risks, were taken into account.

TP.4.120. To achieve consistency with the required adjustment related to expected losses due to counterparty defaults, it would generally be necessary to integrate an analogous adjustment into the determination of net of reinsurance valuation components in step 1. Such an adjustment would need to be treated separately (in the context of Article 86(g) as well as the relevant aspects of the SCR counterparty risk module) and would not be covered by one of the gross-to-net techniques discussed in this sub-section.

The Scope of Gross-to-Net Techniques

TP.4.121. Non-life insurance undertakings would be expected to use of Gross-to-Net methods in a flexible way be applying them to either premium provisions or provisions for claims outstanding or to a subset of lines of business or accident (underwriting) years, having regard to e.g. the complexity of their reinsurance programmes, the availability of relevant data, the importance (significance) of the sub-portfolios in question or by using other relevant criteria.

TP.4.122. An undertaking would typically use a simplified Gross-to-Net technique when e.g.

- The undertaking has not directly estimated the net best estimate
- The undertaking has used a case by case approach for estimating the gross best estimate.
- The undertaking cannot ensure the appropriateness, completeness and accuracy of the data.
- The underlying reinsurance programme has changed

Degree of Detail and Corresponding Principles/Criteria

TP.4.123. It seems unlikely that a Gross-to-Net simplified technique being applied to the overall portfolio of a non-life insurance undertaking would give reliable and reasonably accurate approximations of the best estimate of technical provisions net of reinsurance.[36] Accordingly, non-life insurance undertakings should in general 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 homogenous risk groups or as a minimum lines of business;
- to distinguish between the premiums provisions and provisions for claims outstanding (for a given homogenous risk group or line of business); and

[36] A possible exception may be a monoline insurer that has kept its reinsurance programme unchanged over time.

- 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 RBNS-claims and IBNR-claims, respectively.

TP.4.124. A further refinement that may need to be applied when stipulating the Gross-to-Net techniques would be to take into account the type of reinsurance cover and especially the relevant (i.e. most important) characteristics of this cover.

TP.4.125. When applying such refinements, the following general considerations should be made:

- Whereas increasing the granularity of Gross-to-Net techniques will generally lead to a more risk-sensitive measurement, it will also increase their complexity, potentially leading to additional implementation costs for the undertaking. 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).

- For certain kinds of reinsurance covers (e.g. in cases where the cover extends across several lines of business, so that it is difficult to allocate the effect of the reinsurance risk mitigation to individual lines of business or even homogeneous groups of risk, or where the cover is only with respect to certain perils of a LOB), increasing the granularity of Gross-to-Net techniques as described below will not suffice to derive an adequate determination of provisions net of reinsurance. In such cases, individual approaches tailored to the specific reinsurance cover in question would need to be used.

- As an alternative to Gross-to-Net calculations, it may be contemplated to use a direct calculation of net provisions based on triangular claims data on a net basis. However, it should be noted that such a technique would generally require adjustments of the underlying data triangle in order to take into account changes in the reinsurance program over time, and therefore would generally be rather resource intensive. Also, an application of such "direct" techniques may not yield a better quality valuation than an application of more granular Gross-to-Net techniques as discussed below.

Distinguishing between lines of business

TP.4.126. All five types of Gross-to-Net techniques briefly described in annex B.1 should in principle be able to capture the distinction between lines of business. However, for the Gross-to-Net technique based on historic accounting data only (i.e. type (1)), this is likely to depend on the reporting requirements in force. Moreover, the Gross-to-Net technique based on the premium model (i.e. type (5)) applies – for obvious reasons – only to the premium provisions.

Distinguishing between premium provisions and provisions for claims outstanding

TP.4.127. For both the premium provisions and the provisions for claims outstanding it is assumed at the outset that the Gross-to-Net methods should be stipulated for the individual lines of business.

Premium provisions

TP.4.128. With respect to the premium provisions, the relationship between the provisions on a gross basis (PPGross,k), the provisions on a net basis (PPNet,k) and the Gross-to-Net "factor"

(GNk(ck)) – for line of business (or homogeneous risk group) no. k – can be represented in a somewhat simplified manner as follows:[37]

$$\mathbf{PP_{Net,k} = GN_k(c_k)\times PP_{Gross,k}},$$

where $\mathbf{c}_k$ is a parameter-vector representing the relevant characteristics of the reinsurance programme covering the CBNI claims related to line of business no. k at the balance sheet day.

TP.4.129. With respect to the various types of Gross-to-Net techniques briefly described in annex B.1, it is only the alternative approaches (4) and (5) that in general are able to stipulate Gross-to-Net techniques to be used for converting best estimates of gross premium provisions to best estimates of net premiums provisions.

TP.4.130. However, if the reinsurance programme for the current accident year (the current business year) is the same as the programme for the preceding year(s), type (2) or (3) – or a combination of these – may also be used in this context, in the context of these specifications.

TP.4.131. 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 not clear-cut. In these cases the technical provisions related to the last underwriting year comprise both premiums provisions and provisions for claims outstanding[38] and the distinction between Gross-to-Net techniques for the two kinds of technical provisions makes no sense.

Provisions for claims outstanding

TP.4.132. With respect to the 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 (or homogenous risk group)). Accordingly, the relationship between the provisions on a gross basis ($PCO_{Gross,k,i}$), the provisions on a net basis ($PCO_{Net,k,i}$) and the Gross-to-Net "factor" ($GN_{k,i}(\mathbf{c}_{,k,i})$) for line of business (or homogeneous risk group) no. k and accident year no. i, can be represented in a somewhat simplified manner as follows:

$$\mathbf{PCO_{Net,k,i} = GN_{k,i}(c_{k,i})\times PCO_{Gross,k,i}},$$

where $c_{k,i}$ is a parameter-vector representing the relevant characteristics of the reinsurance programme for this combination of line of business and accident year.

TP.4.133. With respect to the types of Gross-to-Net approaches described in annex B.1, type no. (2), (3) and (5) can be applied to stipulate techniques proxies for the individual accident years (for a given line of business), cf. also the description of the most advanced Gross-to-Net technique tested in QIS4.

TP.4.134. However, some refinements of these methods may be considered in order to make the Gross-to-Net techniques more sophisticated:

a) stipulation of separate Gross-to-Net techniques for individual development years or a suitable grouping of the development years (for a given accident year);

b) stipulation of separate Gross-to-Net techniques for RBNS-claims and IBNR-claims;[39]

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[37] For the sake of simplicity it is assumed that the Gross-to-Net techniques in question can be represented by a multiplicative factor to be applied on the gross provisions.

[38] If the line of business in question contains multiyear contracts this will be the case for several of the latest underwriting years.

[39] For this purpose it should be clarified whether the so-called IBNER-claims should be included in the RBNS-claims or the IBNR-claims.

c) stipulation of separate Gross-to-Net techniques for "large" claims and "small" claims ("frequency" claims) – given some suitable thresholds for the separation of "large" and "small" claims; and

d) stipulation of separate Gross-to-Net techniques for proportional and non-proportional reinsurance programs.

TP.4.135. A rationale for introducing separate techniques for the individual development years or groups of development years may be that claims reported and settled at an early stage (after the end of the relevant accident year) in general 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 programme (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.

TP.4.136. A rationale for introducing separate techniques for RBNS-claims and IBNR-claims may be that the insurance undertakings in general will have more information regarding the RBNS-claims and should accordingly be able to stipulate the Gross-to-Net technique to be applied on the gross best estimate for RBNS-provisions in a more accurate manner. On the other hand the Gross-to-Net technique to be applied on the gross best estimate for IBNR-provisions is then likely to be stipulated in a less precise manner, especially if more sophisticated techniques are not available.

TP.4.137. Finally, a rationale for making a split between "large" claims and "small" claims may be that the uncertainties related to expected claim amounts on a net basis for claims classified as "large" may in some (important) cases be small or even negligible compared to the uncertainties related to the corresponding claim amounts on a gross basis. However, this supposition depends (at least partially) on the thresholds for separation of "large" and "small" claims being fixed for the individual lines of business.

TP.4.138. None of the Gross-to-Net techniques briefly described in annex B are able to capture all these refinements, even if some aspects related to refinements (a) and (b) are touched upon (in an indirect manner) when discussing the properties of the most advanced Gross-to-Net techniques tested in QIS4. Moreover, it would be relatively straightforward to adjust type no. (5) in order to capture refinement (c) and to some extent also refinement (a).

TP.4.139. However, in order to take into account these (possible) refinements it will in general be necessary to develop more sophisticated techniques than those being described in annex B. On the other hand, these refinements should only be introduced if they in fact lead to an increased accuracy of the best estimate of provisions for claims outstanding net of reinsurance.

TP.4.140. In this context, it may be argued that refinement (c) should be prioritised as this may be relevant for as least some of the commercial lines of business and is probably also the easiest refinement to implement. Before introducing this refinement it should also be considered whether the thresholds to be fixed in order to separate "large" and "small" claims could depend on the size of the undertaking (or the size of undertaking's portfolio within the line of business in question) or the nature of the reinsurance programme.

QIS5 QUALITATIVE QUESTIONNAIRE ON TECHNICAL PROVISIONS

Set of questions regarding assumptions and methods

NON LIFE INSURANCE AND HEALTH SIMILAR NON-LIFE TECHNIQUES (HEALTH S-NL-T)

QTP1. Please score the assumptions and methods used to calculate these technical provisions according the criteria shown in the first and second rows of each column (*the table refer only to assumptions and methods with a material impact)*. Fill only cells relevant according to your activities.

	Methodology to assess the values to use	Degree of definition of content / scope of the assumptions	Complexity required (*)	Reliability and back-testing	Significance of the use of expert judgement	Data sources	Historic records to derive future trends
Scoring	(satisfactory outputs / open to challenge / not relevant for the insurer's activities)	(clear definition/ too general / rather vague / not material)	(high / medium / low / not material)	(high confidence / normal / limited confidence / not material)	(high / medium / not material / ignored)	Mostly internal data / market underwrit. Benchmarks / financial market data	Less than three years / among 5-10 years / longer series of data
Future claims outflows for premium provisions							
Other outflows for premium previsions							
Claims inflation							
Speed of claims settlement							
Distribution of the number of claims							
Distribution of the severity of claims							
CAT claims							
Renewal assumptions / future premiums							
Other assumptions….							

(*) where the undertaking applies simplifications, the questions refer to the simplified methods.

QTP2. Please, provide any additional comments you deem relevant to the previous table. In particular on how to assess/measure/test the reliability of the methods or assumptions used.

QTP3. Please, explain the main methods used to calculate the best estimate of **non-life premiums provisions**.
QTP4. Please, explain whether you intend to evolve in the future the methods used in QIS5 to calculate the best estimate of **non-life premiums provisions** and how you envisage such evolution.
QTP5. Please, explain the main methods used to calculate the best estimate of **non-life claim provisions**, especially for long-tail claims
QTP6. Please, explain whether you intend to evolve in the future the methods used in QIS5 to calculate the best estimate of **claims provisions** and how you envisage such evolution.
QTP7. Have you obtained negative best estimates? If this is your case, please

a) identify its amount and its proportion in respect total positive technical provisions, and
b) describe the products leading to these estimates.

LIFE INSURANCE

QTP8. In the case of life insurance, please rank the assumptions used to calculate the technical provisions according the criteria shown in the first and second rows of each column. Fill only cells relevant according to your activities:

	Methodology to assess the values to use	Degree of definition of content / scope of the assumptions	Complexity required (*)	Reliability and back-testing	Significance of the use of expert judgement	Data sources	Historic records to derive future trends
Scoring	(satisfactory outputs / open to challenge / not relevant for the insurer's activities)	(clear definition/ too general / rather vague / not material)	(high / medium / low / not material)	(high confidence / normal / limited confidence / not material)	(high / medium / not material / ignored)	Mostly internal data / market underwrit. Benchmarks / financial market data	Less than three years / among 5-10 years / longer series of data
Biometric assumptions							
Expense assumptions							
Inflation or revision of benefits provided							
Renewal assumptions / future premiums							
Other assumptions on discontinuity/lapse (surrenders, ...)							
Future participation benefits							
Policyholders' rights due to options and guarantees							
Future management actions							
CAT claims							
Other assumptions							

(*) where the undertaking applies simplifications, the questions refer to the simplified methods.

QTP9. Please, provide any additional comments you deem relevant to the previous table. In particular on how to assess/measure/test the reliability of the methods/assumptions used.

QTP10. Please, comment on the pattern used to model lapse rates according to duration in force of contracts.

QTP11. Please, provide on average the following information in respect of profit sharing:

a) proportion of profits does the policyholder receive in profit-sharing business

b) proportion of technical provisions for future profit sharing compared to total technical provisions

QTP12. Please, provide the following information in respect of the **calculation of technical provisions as a whole**

a) proportion of technical provisions for unit-linked calculated as a whole

b) proportion of other technical provisions calculated as a whole

c) description of the main products included in (b) where technical provisions have been calculated as a whole

QTP13. Have you obtained negative best estimates? If this is your case, please

a) identify its amount and its proportion in respect total positive technical provisions, and

b) describe the products leading to these estimates.

QTP14. **Valuation of options and guarantees.** Questions only for those undertakings that have **NOT** considered the '***time value'*** of options and guarantees included in insurance contracts, in the valuation of technical provisions.

A.	Which type of options and guarantees you have sold to your policyholders	Please provide a brief description
B.	Why did you not considered the 'time value of option and guarantees'	a) Time value is negligible; or b) Do not have the models to do this
C.	What approach do you intend to use under SII?	a) No change; b) Develop Monte Carlo simulation approach; c) Develop closed form stochastic approach; d) Develop Attributed approach; or e) Deterministic approach
D.	If the answer to B is different than 'a) No change' how much work will be needed to be ready for SII in terms of man months of effort?	a) Under 2 man month or less; b) Between 2 and 6 man months; or c) More than 6 man months

QTP15. Valuation of options and guarantees. Questions only for those undertakings that have **<u>ALREADY</u>** considered the '***<u>time value'</u>*** of options and guarantees included in insurance contracts, in the valuation of technical provisions.

A.	Which type of options and guarantees you have sold to your policyholders	Please provide a brief description
B.	How the methodology used to calculate the best estimates captures the time value[40] of options and guarantees?	a) Monte Carlo simulation approach; b) Closed form stochastic approach; c) Attributed approach; or d) Other (please explain)
C.	If using a Monte Carlo stochastic approach, how many scenarios are used?	[Number to be submitted by company]
D.	If using a Monte Carlo stochastic approach, how accurately do the scenarios generally replicate the market price for representative financial instruments?	a) Less than 2% error; b) Between 2% to 4% error; c) Between 4% and 6% error; or d) More than 6% error
E.	Do you use scenarios provided by external parties?	If your answer is positive, please describe the procedures these external parties provide to guarantee (a) the quality of the scenarios or its generator (b) their suitability of the scenarios or the generator according to the nature of liabilities where they are applied
F.	Both where you sue internally developed scenarios or	Describe the procedures existing in your undertaking to guarantee

[40] The value of guarantees can be split between "intrinsic value" (i.e. the value if market conditions at the exercise date were to be the same as current conditions) and the "time value", which is the difference between the current value of the guarantees and the intrinsic value and represents the opportunity for future value. Only a stochastic approach (e.g. simulation or closed form) can accurately determine the value of guarantees, i.e. including time as well as intrinsic value.

	externally provided,	(a) the quality of the scenarios or its generator (b) their suitability of the scenarios or the generator according to the nature of liabilities where they are applied
G.	If using the attributed probabilities approach, what method was used to derive the attributed probabilities?	[Company to provide a brief explanation]
H.	If a deterministic approach was used, please provide a brief description of the approach together with the tests carried out to ensure market consistency?	[Company to provide a brief explanation]

QTP16. Future management actions.

A	What management actions were assumed when calculating best estimate liabilities?	a) Future management actions have no material impact b) None, although they might have some material impact c) Exceptional reductions to profit sharing payouts[41] linked to the overall financial strength of the company / fund d) Amending pure discretionary benefits e) Changing the investment mix for assets backing liabilities f) Increasing the charges levied on policies in adverse circumstances; g) Other (please described) [Multiple answers accepted]
B.	Please estimate the extent to which the use of management actions have reduced the total best estimate that would otherwise be derived?	a) less than 2%; b) between 2% to 5%; or c) more than 5%
C.	Please estimate the extent to which the use of management actions have reduced the best estimate corresponding future participation benefits or options and guarantees that would otherwise be derived?	a) less than 2%; b) between 2% to 5%; or c) more than 5%
D.	Which, if any additional management actions do you expect to assume when determining best estimates under SII compared to those assumed for	a) None; b) Exceptional reductions to profit sharing payouts[42] linked to the overall financial strength of the company / fund;

[41] Reductions in addition to normal reductions in bonuses following adverse experience, e.g. triggered by the solvency of the company and / or fund being seriously threatened

	QIS5?	c) Amending pure discretionary benefits; d) Changing the investment mix for assets backing liabilities; e) Increasing the charges levied on policies in adverse circumstances; and f) Other (please described) [Multiple answers accepted,]
E.	Do you allow for the possibility of not being able to adopt the management action? (i.e. changing the mix of assets or selling assets in stressed markets may be impossible, or only under unreasonable conditions)	

[42] Reductions in addition to normal reductions in bonuses following adverse experience, e.g. triggered by the solvency of the company and / or fund being seriously threatened

HEALTH INSURANCE

QTP17. In the case health insurance, please rank the assumptions used to calculate the technical provisions according the criteria shown in the first and second rows of each column. Fill only cells relevant according to your activities:

	Methodology to assess the values to use	Degree of definition of content / scope of the assumptions	Complexity required (*)	Reliability and back-testing	Significance of the use of expert judgement	Data sources	Historic records to derive future trends
Scoring	(satisfactory outputs / open to challenge / not relevant for the insurer's activities)	(clear definition/ too general / rather vague / not material)	(high / medium / low / not material)	(high confidence / normal / limited confidence / not material)	(high / medium / not material / ignored)	Mostly internal data / market underwrit. Benchmarks / financial market data	Less than three years / among 5-10 years / longer series of data
Biometric assumptions							
Morbidity assumptions							
Expense assumptions							
Inflation or revision of benefits provided							
Assumptions on discontinuity/lapse							
Renewal assumptions							
CAT claims							
Other assumptions							

(*) where the undertaking applies simplifications, the questions refer to the simplified methods.

QTP18. Please, provide any additional comments you deem relevant to the previous table. In particular on how to assess/measure/test the reliability of the methods/assumptions used.

REINSURANCE RECOVERABLES

QTP19. In the case reinsurance recoverable, please rank the assumptions used to calculate the technical provisions according the criteria shown in the first and second rows of each column:

	Definition of the content or scope of the assumptions	Methodology to assess the values to use	Complexity required (*)	Reliability and back-testing	Significance of the use of expert judgement	Data sources	Historic records to derive future trends
Scoring	(clear / general / vague / not material / not applicable)	(consolidated / open to challenge / not material / not applicable)	(high / medium / low / not material / not applicable)	(high confidence / normal / limited recover / not material)	(high / medium / not material / ignored / not applicable)	Mostly internal data / market under. Benchmarks / financial market data	Less than three years / among 5-10 years / longer series of data
Cash outflows projections							
Cash inflows projections due to claims recovered							
Other cash inflows							
Probability of default							
Loss given default							
Adjustment due expected default							
CAT claims							
Others assumptions							

(*) where the undertaking applies simplifications, the question refers to the simplified methods.

QTP20. Please, provide any additional comments you deem relevant to the previous table.

QTP21. Please provide comments on the treatment of SPV in the calculation of recoverable

QTP22. Please, list the methodologies you actually use to calculate your technical provisions, and those methodologies (even generically described) you envisage to implement as a consequence of Solvency II

	Already implemented, no substantial changed envisaged	Already implemented, but substantial changes necessary in the future	New methodologies to implement
Pre-claims cost distributions (premiums provision).			
Post-claims cost distribution (claims provision)			
Frequency distributions			
Claims patterns methodologies			
Discount rates			
Biometric tables			
Lapse modeling			
Stochastic scenario generator			
Others…..			

QTP23. Additional comments on the previous table (e.g. comments on feasibility, reliability, changes from one year to another).

Questions regarding the use of expert judgement

QTP24. The following table refers to the requirements set out in QIS5 specifications compared to the use of expert judgement the undertaking currently applies in the calculation of technical provisions. In each cell, please list the relevant areas.

	Full compliance with QIS5 specifications	Some areas with non-compliance, easily solvable (provide a description of these areas)	Important non-compliance
Scope of application			
Data adjustments			
Documentation			
Sensitivity analysis			
Benchmarking			
Back testing (1)			
Skill assessment			
Information to users of expert jud.			
Others			

(1) Back testing does not form part of QIS5. The row on back testing refers to the current practices of the undertaking.

QTP25. Please, provide any additional comments you deem relevant to the previous table

QTP26. To what extent do you consider that moving to Solvency II will increase your use of expert judgement in the process of calculation of technical provisions?

QTP27. Do you consider that the use of expert judgement may lead to significantly different practices due to the lack of sufficient guidance on how to make use of this judgement, or lack of sufficient standards for the experts on how to carry out the judgement?

QTP28. Other comments on expert judgement

Questions regarding future scenarios

QTP29. **Economic scenarios.** Please, comment on the following table:

	Future profit sharing	Other options and guarantees	Future management actions	Policyholders' behavior
Sufficient guidance in QIS5 specifications, at the light of existing 'state of the art'?				
Range of estimates obtained (e.g. too wide range / strong dependence on assumptions)				
Are simplifications provided sufficiently workable?				
Use of outsourcing (negligible or material use / risks and advantages / possibility of testing or challenging…)				
Model error and parameter error (e.g. possibility of assessment / mitigating mechanisms /…)				
Other comments				

Miscellaneous

QTP30. **Segmentation**. Description of any material problem or uncertainty in the application of QIS5 criteria on segmentation for the purposes of calculating technical provisions.

QTP31. **Segmentation.** In the case of risk margin calculations, have you had problems to allocate lines of business or homogeneous groups of risks as requested in QIS5 specifications?

QTP32. **Risk margin.** QIS5 specifications allow for five possibilities to calculate the risk margin (reminding simplifications are only applicable under the principle of proportionality). Please, provide approximate percentages about the use of each option (five percentages should complete 100 per cent)

a) Full calculation for all future SCR values without using approximations;

b) Calculation of future SCR values using approximate methods for individual risks or sub-risks;

c) Approximate method for whole SCR for future years (proportional approach);

d) Estimate all future SCRs "at once" (duration approach); or

e) Calculating risk margin as a fixed % of the best estimate

QTP33. **Risk margin.** Regarding the calculation of 'unavoidable market risk', please provide informantion on

a. Quantitative importance (SCR unavoidable market risk compared to total SCR used for risk margin calculations)

b. Method used to calculate SCR unavoidable market risk

QTP34. **Simplifications.** Do you consider that QIS5 specifications on the application of '*proportionality principle'* are sufficiently clear?.

QTP35. **Simplifications.** Please provide fill in on approximate basis the following table on the use of simplifications

Simplification used in the calculation of the best estimate	Proportion in respect total of technical provisions of each nature where simplification is used
Life insurance. Biometric risk factors	
Life insurance. Surrender option	
Life insurance. Financial options and guarantees	
Life insurance. Investment guarantees	
Life insurance. Other options and guarantees	
Life insurance. Future participation benefits	
Life insurance. Expenses and other charges	
Life insurance. Others	
Non life. Premiums provision. Method based on pro-rata of premiums	
Non life. Premiums provision. Method based expected claims ratio (CR)	
Non-life. Outstanding claims provision. First simplification or sufficiently similar	
Non-life. Outstanding claims provision. Second simplific. or sufficiently similar	
Non-life. IBNR claims provision. First simplification or sufficiently similar	
Non-life. IBNR claims provision. Second simplification or sufficiently similar	
Reinsurance recoverable. Simplification 1. Based-duration formula	

Reinsurance recoverable. Simplification 2. Based duration table	
Others (please, provide a general description of the method)	

QTP36. **Simplifications**. Do you consider that any other simplified method should be developed in the future on standardized basis?

QTP37. **Data quality standards.** Do meet the existing data in your undertaking the requirements QSI5 specifications set out in respect data quality standards?. If not or not fully, please identify the main areas of progress and provide an estimate both in terms of monetary budget and human resources (number of people and period of time) you will need to solve those areas

QTP38. **Treatment of taxes.** Please, comment on whether you have had problems to appropriately consider taxes in the calculation of technical provisions.

QTP39. Do you consider that the rules to calculate technical provisions will lead to significant changes in the manner you run their business? Please describe

(a) which are the expected changes, if any;
(b) the areas where those changes will impact;
(c) the consequences for undertakings.

QTP40. Do you consider that the rules to allow for future premiums (due to renewal options) may lead to significant changes in the terms and conditions of insurance contracts? Which would be the aimed targeted by the undertakings to promote such changes in terms and conditions? How those changes would impact on policyholders' rights?

a) Life insurance
b) Non-life insurance
c) Health insurance

QTP41. Impact of the allowance for future premiums due to renewal options

	Main lines of business (list the LOB with a material impact of renewal options)	Impact on the technical provisions (in local currency)	Impact on technical provisions (percentage technical provisions, before considering renewal options)
Life			
Non-life			

Health SLT			
Health SNLT			

QTP42. Do you consider that any other rule reflected in these specifications to calculate technical provisions will lead to significant changes in the terms and conditions of insurance contracts?

QTP43. Do you envisage some effect on policyholders derived from the manner technical provisions are calculated for solvency purposes?

QTP44. Please, comment on any other topic not mentioned above, should you consider this topic impacts significantly on the goals described at the beginning of this questionnaire.

QTP45. Please, comment on any other topic you deem relevant, even not being linked to the goals underlined in the presentation of this questionnaire.

SECTI

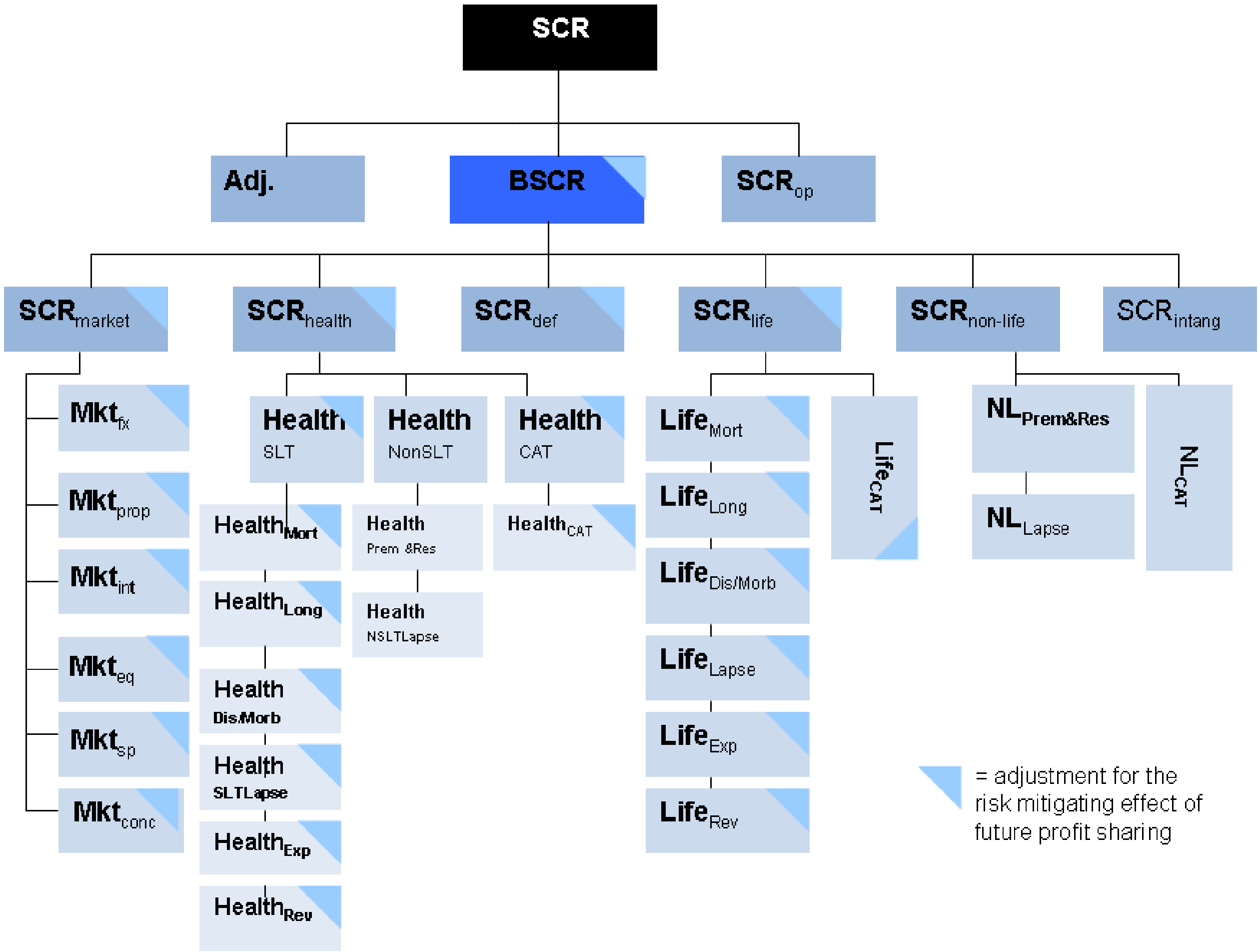
ON 2 – SCR – STANDARD FORMULA

SCR.1. Overall structure of the SCR

SCR.1.1. SCR General Remarks

Overview

SCR.1.1. The SCR standard formula calculation is divided into modules as follows:



SCR.1.2. For each module, the instruction is split into the following sub-sections:

- Description: this defines the scope of the module, and gives a definition of the relevant sub-risk;
- Input: this lists the input data requirements;
- Output: this describes the output data generated by the module; and
- Calculation: this sets out how the output is derived from the input.

SCR.1.3. The principle of substance over form should be followed in determining how risks are to be treated. For example, where annuities arise from health insurance such as accident or workers' compensation, for the purposes of the SCR calculation, such annuities should be included in the SLT health underwriting risk sub-module. Similarly, where annuities arise from other non-life insurance such as general liability insurance, for the purposes of the SCR they should be treated as if they were life insurance obligations and should therefore be included in the calculation of the SCR life underwriting risk module.

SCR.1.4. For the purposes of the SCR standard formula calculation specified in this section, technical provisions should be valued in accordance with the specifications laid out in the previous section. To avoid any circularity in the calculation, any reference to technical provisions within the calculations for the individual SCR modules is to be understood to exclude the cost-of-capital risk margin.

SCR.1.2 SCR Calculation Structure

1.2.1 Overall SCR calculation

Description

SCR.1.5. The SCR is the Solvency Capital Requirement.

Input

SCR.1.6. The following input information is required:

BSCR	=	Basic Solvency Capital Requirement
SCR_{op}	=	The capital charge for operational risk
Adj	=	Adjustment for the risk absorbing effect of future profit sharing and deferred taxes

Output

SCR.1.7. This module delivers the following output information:

SCR = The overall standard formula capital charge

Calculation

SCR.1.8. The SCR is determined as: SCR = BSCR - Adj +SCROp

Calibration

SCR.1.9. The parameters and assumptions used for the calculation of the SCR are intended to reflect a VaR risk measure (calibrated to a confidence level of 99.5%) and a time horizon of one year.

SCR.1.10. To ensure that the different modules of the standard formula are calibrated in a consistent manner, these calibration objectives have been applied to each individual risk module, while also taking account of any model error arising from the particular technique chosen to assess that risk.

SCR.1.11. For the aggregation of the individual risk modules to an overall SCR, linear correlation techniques are applied. The setting of the correlation coefficients is intended to reflect potential dependencies in the tail of the distributions, as well as the stability of any correlation assumptions under stress conditions.

1.2.2 Correlation

Description

SCR.1.12. The Basic Solvency Capital Requirement (BSCR) is the Solvency Capital Requirement before any adjustments, combining capital charges for six major risk categories.

Input

SCR.1.13. The following input information is required:

SCR_{mkt} = Capital charge for market risk
SCR_{def} = Capital charge for counterparty default risk
SCR_{life} = Capital charge for life underwriting risk
SCR_{nl} = Capital charge for non-life underwriting risk
SCR_{health} = Capital charge for health underwriting risk
$SCR_{Intangibles}$ = Capital charge for ntangible assets risk

Output

SCR.1.14. The module delivers the following output:

BSCR = Basic Solvency Capital Requirement

Calculation

SCR.1.15. The BSCR is determined as follows:

$$Basic\ SCR = \sqrt{\sum_{ij} Corr_{ij} \times SCR_i \times SCR_j} + SCR_{\text{Intangibles}}$$

where

$Corr_{i,j}$ = the cells of the correlation matrix CorrSCR

SCR_i, SCR_j = Capital charges for the individual SCR risks according to the rows and columns of the correlation matrix CorrSCR.
$SCR_{\text{Intangibles}}$ = the capital requirement for intangible asset risk calculated in accordance with SCR.4

SCR.1.16. The factor $Corr_{i,j}$ denotes the item set out in row i and in column j of the following correlation matrix CorrSCR:

i \ j	Market	Default	Life	Health	Non-life
Market	1	0.25	0.25	0.25	0.25
Default	0.25	1	0.25	0.25	0.5
Life	0.25	0.25	1	0.25	0
Health	0.25	0.25	0.25	1	0
Non-life	0.25	0.5	0	0	1

SCR.1.3 Role of proportionality in the calculation of the SCR ("Simplifications")

SCR.1.17. The principle of proportionality is intended to support the consistent application of the principles-based solvency requirements to all insurers.

SCR.1.18. The undertaking is responsible to determine the SCR by using appropriate methods selecting from the following list, taking into account nature, scale and complexity of the risks:

- full internal model
- standard formula and partial internal model
- standard formula with undertaking-specific parameters
- standard formula
- simplification

SCR.1.19. For the sake of completeness, the same steps or applying proportionality should be applied for the calculation of the technical provisions.

SCR.1.20. The undertaking should be able to explain what methods are used and why the specific methods are selected.

1.3.1 Process of assessment of proportionality for SCR standard formula simplifications

SCR.1.21. In assessing whether the standard calculation or the simplified calculation could be considered proportionate to the underlying risks, the insurer should have regard to the following steps:

Step 1: Assessment of nature, scale and complexity

SCR.1.22. The insurer should assess the nature, scale and complexity of the risks. This is intended to provide a basis for checking the appropriateness of specific simplifications carried out in the subsequent step.

Step 2: Assessment of the model error

SCR.1.23. In this step the insurer shall assess whether a specific simplification can be regarded as proportionate to the nature, scale and complexity of the risks analysed in the first step.

SCR.1.24. Where simplified approaches are used to calculate the SCR, this could introduce additional estimation uncertainty (or model error). The higher the estimation uncertainty, the more difficult it will be for the insurer to rely on the estimation and to verify that it is suitable to achieve the objective of deriving a 99.5% VaR.

SCR.1.25. Therefore the insurer shall assess the model error that results from the use of a given simplification, having regard to the nature, scale and complexity of the underlying risks. The simplification should be regarded as proportionate if the model error is expected to be non-material.

SCR.1.26. The undertaking should not be required to quantify the degree of model error in precise quantitative terms, or to re-calculate the value of the capital charge using a more accurate method in order to demonstrate that the difference between the result of the chosen method and the result of a more accurate method is immaterial. Instead it would be sufficient for the undertaking to demonstrate that there is reasonable assurance that the model error implied by the application of the chosen method (and hence the difference between these two amounts) is immaterial.

SCR.1.27. Where in the calculation process both the standard and the simplified calculation turn out to be proportionate, the standard calculation should be chosen. Likewise, where several simplifications turn out to be proportionate, the insurer should generally apply the simplification which is likely to include the smallest degree of model error.

SCR.2. Loss absorbing capacity of technical provisions and deferred taxes

SCR.2.1. Definition of future discretionary benefits

SCR.2.1. CEIOPS' advice on Article 86(a) distinguishes between guaranteed and discretionary benefits as follows:

- Guaranteed benefits: This represents the value of future cash-flows which does not take into account any future declaration of future discretionary bonuses. The cash flows take into account only those liabilities to policyholders or beneficiaries to which they are entitled at the valuation date.
- Conditional discretionary benefits: This is a liability based on declaration of future benefits influenced by legal or contractual declarations and performance of the undertaking/fund. It could be linked with IFRS definition of "discretionary participation features" as additional benefits that are contractually based on:
  - d) the performance of a specified pool of contracts or a specified type of contract or a single contract
  - e) realised and/or unrealised investment return on a specified pool of assets held by the issuer; or
  - f) the profit or loss of the company, fund or other entity that issues the contract.
- Pure discretionary benefit: This represents the liability based on the declaration of future benefits which are in discretion of the management. It could be linked with IFRS definition of "discretionary participation features" as additional benefits whose amount or timing is contractually at the discretion of the issuer.
- This distinction in 3 parts doesn't mean that the undertaking has to value each part separately. Only a distinction between guaranteed benefits and discretionary benefits should be required.

SCR.2.2. Both conditional and pure discretionary benefits could potentially be considered to be loss-absorbing and undertakings should consider the extent to which this is the case.

SCR.2.2 Management actions

SCR.2.3. Management actions which are taken into account in the calculation of the SCR are subject to the following requirements:

- Any assumptions regarding future management actions for the assessment of the standard formula SCR must meet the criteria set out in CEIOPS' advice on assumptions about future management actions (CEIOPS-DOC-27/09, CEIOPS-DOC-33/09).
- To the extent that the stress under consideration is considered to be an instantaneous stress, no management actions may be assumed to occur during the stress.
- However it may be necessary to reassess the value of the technical provisions after the stress. Assumptions about future management actions may be taken into account at this stage. The approach taken for the recalculation of the best estimate

to assess the impact of the stress should be consistent with the approach taken in the initial valuation of the best estimate.

SCR.2.4. This advice applies to both the gross and net calculations of the SCR.

SCR.2.3 Gross and net SCR calculations

SCR.2.5. The solvency capital requirement for each risk shall be derived under a gross and a net calculation.

SCR.2.6. The gross calculation should be used to determine the Basic Solvency Capital Requirement and in the calculation of the adjustment for the loss-absorbing capacity of technical provisions as defined in Article 108 of the Level 1 text. The result of the gross calculation is used to prevent double counting of risk mitigating effects in the modular approach and as an additional source of information about the risk profile of the undertaking. The gross calculation does not reflect all aspects of the economic reality as it ignores the risk-mitigating effect of future discretionary benefits.

SCR.2.7. The net calculation of the solvency capital requirement should be defined as follows:

The insurer is able to vary its assumptions on future bonus rates in response to the shock being tested, based on reasonable expectations and having regard to plausible management actions.

SCR.2.8. The gross calculation as follows:

In the calculation of the net SCR for each (sub-)module, undertakings are calculating a stressed balance sheet and comparing it to the unstressed balance sheet that was used to calculate own funds. Therefore, for each (sub-)module undertakings can derive the best estimate value of the technical provisions relating only to future discretionary benefits from both balance sheets. The change in these provisions measures the impact of the risk mitigation. For each sub-module, this difference should be added to the net SCR used to derive the gross SCR.

SCR.2.4 Scope of the loss-absorbing capacity of technical provisions

SCR.2.9. The adjustment for loss-absorbing capacity of technical provisions should account for risk mitigating effects in relation the following risks:

- market risk
- life underwriting risk
- health SLT underwriting risk
- counterparty default risk

SCR.2.5 Calculation of the adjustment for loss absorbency of technical provisions and deferred taxes

SCR.2.10. Regarding the approach for the calculation of the adjustment for loss absorbency of technical provisions and deferred taxes both the following methods are being tested in the QIS5 exercise:

Method 1: Modular approach

SCR.2.11. Under the modular approach, the solvency capital requirement for each risk shall be calculated both gross and net of the loss absorbency of technical provisions.

SCR.2.12. The Basic Solvency Capital Requirement (BSCR) shall be calculated based by aggregating the gross capital requirements using the relevant correlation matrices.

SCR.2.13. The net Solvency Capital Requirement (nSCR) shall be calculated based by aggregating the net capital requirements using the relevant correlation matrices.

SCR.2.14. The adjustment to the BSCR for the loss-absorbing capacity of technical provisions shall then be determined by comparing the BSCR with the nSCR.

SCR.2.15. This adjustment is limited to a maximum of the total value of future discretionary bonuses for the purpose of calculating the technical provisions.

SCR.2.16. A further adjustment shall be made to reflect the loss-absorbing capacities of deferred taxes. This adjustment shall be calculated as follows:

- The BSCR shall be calculated on the basis that the current (pre-stress) liability in respect of deferred taxes is excluded from the current (pre-stress) balance sheet.
- The capital requirement for operational risk shall be added to the BSCR. The outcome is reduced by the adjustment for the loss-absorbing capacity of technical provisions. The result of this calculation is called SCR shock.
- The liability in respect of deferred taxes shall then be recalculated under the assumption that the undertaking made an immediate loss equal to the SCR shock.
- The adjustment to the BSCR for the loss-absorbing capacity of deferred taxes is equal to the change in the deferred tax liability.

Calculation steps

SCR.2.17. For with-profits business in life insurance, the specification of the standard formula calculation takes into account the risk absorption ability of future profit sharing. This is achieved by a three step "bottom up" approach as follows:

SCR.2.18. The first step is to calculate the capital requirements for individual sub-risks – for example, interest rate risk – under two different assumptions:

that the insurer is able to vary its assumptions on future bonus rates in response to the shock being tested, based on reasonable expectations and having regard to plausible management decisions ($nMkt_{int}$ or $nXXX_{yyy}$);

and

that the insurer is not able to vary its assumptions on future bonus rates in response to the shock being tested (Mkt_{int} or XXX_{yyy}).

SCR.2.19. Performing these two calculations for different risks reflects the fact that the ability to vary policyholder benefits will depend on the nature of the shock to which the insurer is exposed. For example, the potential for risk mitigation might be more significant in the case of yield curve movements than, say, a shock to property values.

SCR.2.20. The second step is to aggregate both kinds of capital requirement separately, using the relevant correlation matrices. The results are two overall capital charges (excluding operational risk), one derived from capital charges including the risk absorbing effect of future profit sharing on sub-module level (aggregate of the nSCRs), and one derived from capital charges disregarding this effect (the Basic SCR, BSCR).

SCR.2.21. The final step is to determine an adjustment Adj_{FDB} to the Basic SCR by comparing both overall capital charges. Generally, the adjustment is given by the difference between the Basic SCR and the aggregate of the *nSCR*s.

SCR.2.22. However, the adjustment for the loss absorbing capacity of future discretionary bonuses itself can never exceed the total value of future discretionary bonuses (*FDB*).

Therefore:

$Adj_{FDB} = \min(BSCR$ – aggregate of $nSCR$s; $FDB)$

This upper bound to the adjustment is necessary to prevent double counting of risk absorbing effects on the sub-module level in the determination of the capital charge.

More detailed descriptions of this "three step approach" are included in the technical specifications for the individual modules laid out below.

If a participant wishes to simplify the process – particularly in cases where the risk absorbing effect is not expected to be material – it may simply declare the calculation including the risk absorbing effects of future profit sharing to be equal to the calculation excluding the risk absorbing effects of future profit sharing (i.e., it may put $nMkt_{int}=Mkt_{int}$).

Method 2: Single equivalent scenario

SCR.2.23. The Basic Solvency Capital Requirement (BSCR) shall be calculated based by aggregating the gross capital requirements using the relevant correlation matrices.

SCR.2.24. The net Solvency Capital Requirement (nSCR) shall be calculated using a single scenario under which all of the risks covered by the standard formula occurred simultaneously. The process involves the following steps:

- The capital charge for each risk shall be calculated gross of the adjustment for loss absorbency of technical provisions
- The gross capital charges shall be used as inputs to determine the single equivalent scenario based on the relative importance of each of the sub-risks to the undertaking. However, the features of participating business may be such that the construction of the single equivalent scenario from net capital requirements is more appropriate. Where this is the case, supervisory authorities may allow (re)insurance undertakings to use net capital requirements for the derivation of the single equivalent scenario. The (re)insurance undertaking is responsible for demonstrating that this approach is appropriate.

- The undertaking shall consider the management actions which would be applied in such a scenario and, in particular, whether their assumptions about future bonus rates would change if such a scenario was to occur.
- The change in the undertaking's net asset value shall then be calculated on the assumption that all the shocks underlying the single equivalent scenario occurred simultaneously. The management actions identified above shall be taken into account.

SCR.2.25. The adjustment to the BSCR for the loss-absorbing capacity of future discretionary benefits shall be determined by deducting the nSCR from the BSCR.

SCR.2.26. This adjustment is limited to a maximum of the total value of future discretionary bonuses.

SCR.2.27. The requirements of Article 108 are met by comparing the value of discretionary benefits under the single equivalent scenario to the value of future discretionary benefits calculated for the purposes of calculating the technical provisions.

SCR.2.28. The adjustment for loss-absorbing capacity of deferred taxes shall be taken into account within the scenario.

SCR.2.29. The value of the deferred tax liability shall be recalculated under the single equivalent scenario. As described above, it is assumed that all the shocks making up the single equivalent scenario occur simultaneously. Furthermore it shall be assumed that the undertaking makes an operational risk loss equal to the SCR in respect of operational risk within the equivalent scenario. This ensures that the loss-absorbing capacity of deferred taxes is properly captured.

SCR.2.30. The adjustment for loss-absorbing capacity of deferred taxes is based on the difference between the value of deferred taxes as included on the Solvency II balance sheet (other liabilities) and the value of deferred taxes under the single equivalent scenario.

SCR.2.31. Note that advice on the valuation of deferred tax assets and liabilities is included in CEIOPS advice on valuation of assets and other liabilities (CEIOPS-DOC-31/09).

<u>Input required for the calculation of the single equivalent scenario</u>

SCR.2.32. The use of net rather than gross capital requirements as inputs to construct the single equivalent scenario will affect the relative importance of individual risks and may therefore result in a different scenario than would be the case if gross capital requirements were used as inputs. However in both cases the single equivalent scenario should correspond to a 1-in-200 year scenario.

SCR.2.33. Furthermore since, under the single equivalent scenario, all risks are assumed to occur simultaneously and only one set of management actions is applied, there is no double counting of loss absorbency of technical provisions. This is the case regardless of whether net or gross capital requirements are used as inputs to construct the single equivalent scenario.

SCR.2.34. To facilitate the testing of the single equivalent scenario, CEIOPS provides a spreadsheet which determines the single equivalent scenario for each (re)insurance undertaking.

Calculation of the Basic Solvency Capital Requirement

SCR.2.35. The Solvency Capital Requirement shall be equal to the sum of:

- The Basic Solvency Capital Requirement (BSCR);
- The capital requirement for operational risk; and
- ;
- The adjustment for loss-absorbing capacity of technical provisions and deferred taxes.

SCR.2.36. As explained above, the default approach shall be that the Basic SCR is calculated based on gross capital requirements. Therefore if the single equivalent scenario is constructed from net capital requirements it will be necessary to complement the scenario analysis with a simplified gross calculation of the Basic SCR.

SCR.2.37. Note that since gross capital requirements are used in the calculation of the Basic SCR, the adjustment would be expected to be negative i.e. lead to a reduction in the Basic SCR. This is because the primary effect in the single equivalent scenario is the introduction of loss absorbency of technical provisions.

Further considerations with regard to loss-absorbing capacity of deferred taxes

SCR.2.38. Under both approaches the calculation of the loss-absorbing capacity of deferred taxes should take into account decreases in deferred tax liabilities and increases in deferred tax assets. The latter should, however, only be taken into account up to the amount that stays available under stressed situations. Where under stress the asset may disappear, no allowance should be made.

Relation between the adjustment for loss-absorbing capacity of technical provisions and deferred taxes and the risk margin

SCR.2.39. Like other scenario assessments in the SCR standard formula the calculation of the adjustment for the loss-absorbing capacity of technical provisions should be based on a balance sheet that does not include the risk margin of the technical provisions. This approach corresponds to the assumption that the risk margin does not change under the scenario stress, or at least not in a material manner. This simplification is made to avoid a circular definition of the SCR – the size of the risk margin depends on the SCR – and it is usually a good approximation. This approach was tested in the past QIS.

SCR.2.40. However, under specific circumstances the value of the risk margin may change significantly in the scenarios. In this case, the corresponding change in basic own funds is not detected if only best estimate provisions are analysed in the scenarios.

SCR.2.41. An example may illustrate the issue: Let an undertaking be able to mitigate the effect of the equivalent scenario by 80% due to the loss-absorbing capacity of technical provisions. Let us further assume that in order to achieve this mitigation the undertaking reduces the future discretionary benefits to zero. How would the risk margin change if it was included in the single equivalent scenario? The loss-absorbing capacity of technical provisions is taken into account in the calculation of the risk margin. Usually it is assumed that risk margin is reduced by the mitigating effects in the same way as the SCR. This means that the risk margin without the loss-absorbing capacity of technical provisions is five times higher than with it. In the example, the risk margin after the scenario stress cannot be reduced by the loss-absorbing capacity of technical provisions because no future discretionary benefits are left after the stress. Hence, the risk margin after stress is five times higher than before.

SCR.2.42. The example shows that the exclusion of the risk margin from the scenario analysis may overestimate the adjustment and thereby underestimate the SCR. On the other hand, the practical implications of an inclusion of the risk margin in the scenario are massive and are likely to make the calculation unfeasible for most undertakings. Therefore the risk margin should not be included in the scenario analysis. If in particular cases the variability of the risk margin causes a significant deviation from the standard formula assumptions, then partial internal models or capital add-ons can be used to take this characteristic into account in the SCR calculation.

SCR.3. SCR Operational risk

SCR.3.1. Definition

SCR.3.1. Operational risk is the risk of loss arising from inadequate or failed internal processes, or from personnel and systems, or from external events (Article 13(33) of the Level 1 text). Operational risk shall include legal risks, and exclude risks arising from strategic decisions, as well as reputation risks (Article 101(4)(f) of the Level 1 text). The operational risk module is designed to address operational risks to the extent that these have not been explicitly covered in other risk modules.

SCR.3.2. For the purpose of this section, reference to technical provisions is to be understood as technical provisions excluding the risk margin, to avoid circularity issues.

SCR.3.2. Calculation

Inputs

SCR.3.3. The inputs for this module are:

TP_{life}	Total life insurance technical provisions (gross of reinsurance), with a floor equal to zero. This would also include unit-linked business and life like obligations on non-life contracts such as annuities.
$TP_{SLT\ Health}$	Technical provisions corresponding to health insurance (gross of reinsurance) that correspond to Health SLT with a floor equal to zero.
$TP_{life\text{-}ul}$	Total life insurance technical provisions for unit-linked business (gross of reinsurance), with a floor equal to zero.
TP_{nl}	Total non-life insurance technical provisions (gross of reinsurance), with a floor equal to zero (excluding life like obligations of non-life contracts such as annuities).
$TP_{Non-SLT\ Health}$	Technical provisions corresponding to health insurance that correspond to Health non SLT (gross of reinsurance), with a floor equal to zero.
$Earn_{life}$	Total earned life premium (gross of reinsurance), including unit-linked business.
$Earn_{SLT\ Health}$	Total earned premiums corresponding to health insurance that correspond to Health SLT (gross of reinsurance)
$Earn_{life\text{-}ul}$	Total earned life premium for unit-linked business (gross of reinsurance)
$Earn_{nl}$	Total earned non-life premium (gross of reinsurance)

$Earn_{Non\,SLT\,Hea}$	Total earned premiums corresponding to health that correspond to Health non SLT (gross of reinsurance).

All the aforementioned inputs should be available for the last economic period and the previous one, in order to calculate their last annual variations.

Exp_{ul}	Amount of annual expenses (gross of reinsurance) incurred in respect of unit-linked business. Administrative expenses should be used (excluding acquisition expenses); the calculation should be based on the latest past years expenses and not on future projected expenses.
$BSCR$	Basic SCR

<u>Output</u>

SCR.3.4. This module delivers the following output information:

SCR_{op} = Capital charge for operational risk

<u>Calculations</u>

SCR.3.5. The capital charge for operational risk is determined as follows:

SCRop = Capital charge for operational risk

where

$$\boxed{SCRop = min\{0.30 \times BSCR; Oplnul\} + 0.25 \times Exp_{ul}}$$

where

Op_{lnul} = Basic operational risk charge for all business other than unit-linked business (gross of reinsurance)

is determined as follows:

$$Oplnul = \max(Oppremiums ; Opprovisions)$$

where

$$\begin{aligned} Oppremiums = {} & 0.04 * (Earnlife + EarnSLT\ Health – Earnlife\text{-}ul) + \\ & 0.03 * (Earnnon\text{-}life + EarnNon\ SLT\ Health) + \\ & Max(0 , 0.04 * (\Delta Earnlife – \Delta Earnlife\text{-}ul)) + \\ & Max(0 , 0.03 * \Delta Earnnon\text{-}life) \end{aligned}$$

and:

$$\begin{aligned}Op_{provisions} = {} & 0.0045 * (TP_{life} + TP_{SLT\ Health} - TP_{life\text{-}ul}) + \\ & 0.030 * (TP_{non\text{-}life} + TP_{Non\ SLT\ Health}) + \\ & Max(0, 0.045 * (\Delta TP_{life} - \Delta TP_{life\text{-}ul})) + \\ & Max(0, 0.03 * \Delta TP_{non\text{-}life}))\end{aligned}$$

where

Δ= change in earned premiums / technical provisions from year t-1 to t, for earned premiums / technical provisions increases which have exceeded an increase of 10%. Furthermore no offset shall be allowed between life and non-life Δ.

SCR.4. SCR Intangible asset risk module

SCR.4.1. Description

SCR.4.1. This risk module has been developed as a consequence of the Commission's interpretation that any asset recognised with a value for solvency purposes contributes to the excess of assets over liabilities. CEIOPS is aware that the treatment of the intangible assets in the SCR may depend on the choice that will be made at Level 2 with regard to the valuation of intangible assets and their treatment as elements of own funds. Depending on the proposal to be made by the Commission in this area, the treatment of the intangible asset risk may be modified after QIS5.

SCR.4.2. In the case of intangible assets, Article 75 of the Level 1 text allows them to be taken into account at their fair value under certain requirements.

SCR.4.3. This section provides a module for the calculation of an adequate capital charge for intangible assets.

SCR.4.2. Definition.

SCR.4.4. According to the Level 1 text, where basic own funds allow for (increase with) the value of intangible assets, the risks inherent to intangible assets should be considered in the standard calculation of the SCR.

SCR.4.5. Intangible assets are exposed to a twofold set of risks:

- Market risks, as for other balance sheet items, derived from the decrease of prices in the active market, and also from unexpected lack of liquidity of the relevant active market, that may result in an additional impact on prices, even impeding any transaction,
- Internal risks, inherent to the specific nature of these elements (e.g. linked to either failures or unfavourable deviations in the process of finalization of the intangible asset, or any other features in such a manner that future benefits are no longer expected from the intangible asset or its amount is reduced; risks linked to the commercialization of the intangible asset, triggered by a deterioration of the public image of the undertaking).

<u>Input</u>

SCR.4.6. The input for this module is:

factor_IA	80 per cent.
fair value intangible assets	

<u>Output</u>

SCR.4.7. The output for this module is the capital charge for intangible assets, noted as *SCR_intangible_assets*

Calculation

$$SCR_{\text{int}\,angible\_assets} = factorIA * fair\_value\_\text{int}\,angible\_assets$$

SCR.5. SCR market risk module

SCR.5.1. Introduction

Description

SCR.5.1. Market risk arises from the level or volatility of market prices of financial instruments. Exposure to market risk is measured by hte impact of movements in the level of financial variables such as stock prices, interest rates, real estate prices and exchange rates.

- Liquidity risk should be captured under Pillar 2 risk management.
- Assets which are allocated to policies where the policyholders bear the investment risk are excluded from the module only to the extent that the risk is passed on to policyholders. That is, any market risk in respect of such products that is not passed on to policyholders is included in the scope of this module.

SCR.5.2. Participations, other than in financial and credit institutions, excluded from the scope of group supervision[43], shall be excluded from the calculations below and subject to a 100% capital charge on their value..

SCR.5.2. General considerations where a delta-NAV approach is used

SCR.5.3. The change in net asset value shall be based on a balance sheet that does not include the risk margin of the technical provisions.

SCR.5.4. The impact of hedging instruments shall be allowed for as part of the scenarios. (Re)insurance undertakings shall have regard to section SCR.12 (risk-mitigation - financial instruments) in determining whether a financial risk mitigation instrument may be taken into account.

SCR.5.5. The revaluation of technical provisions should allow for any relevant adverse changes in option take-up behaviour of policyholders in this scenario.

SCR.5.6. Where risk mitigation techniques are permitted to be allowed for in the calculation of the SCR standard formula, the scenarios required for the calculation of the market risk module will incorporate their effect.

SCR.5.7. In order to properly assess the market risk inherent in collective investment funds, it will be necessary to examine their economic substance. Wherever possible, this should be achieved by applying a look-through approach in order to assess the risks applying to the assets underlying the investment vehicle. Each of the underlying assets would then be subjected to the relevant sub-module stresses and capital charges calculated accordingly.

[43] Participations will only be considered to be excluded from the scope of Group supervision where the related undertaking is situated in a third country where there are legal impediments to the transfer of information that is necessary to determine the value of that undertaking or the associated risks. For the purposes of QIS5, these related undertakings may include but, are not necessarily limited to those undertakings that are excluded from the scope of supplementary supervision under Article 3 (3) of the Insurance Groups Directive.

SCR.5.8. The same look-through approach shall also be applied for other indirect exposures.

SCR.5.9. Where a number of iterations of the look-through approach is required (e.g. where an investment fund is invested in other investment funds), the number of iterations shall be sufficient to ensure that all material market risk is captured.

SCR.5.10. The above recommendations can be applied to both passive and actively managed funds, except for investments in funds that track a well-diversified index including only listed equity from developed markets.

SCR.5.11. Where a collective investment scheme is not sufficiently transparent to allow a reasonable best effort allocation, reference should be made to the investment mandate of the scheme. It should be assumed that the scheme invests in accordance with its mandate in such a manner as to produce the maximum overall charge. For example, it should be assumed that the scheme invests in currencies other than the undertaking's reporting currency to the maximum possible extent permitted by the investment mandate. It should be assumed that the scheme invests assets in each rating category, starting at the lowest category permitted by the mandate, to the maximum extent. If a scheme may invest in a range of assets exposed to the risks assessed under this module, then it should be assumed that the proportion of assets in each exposure category is such that the overall charge is maximised.

SCR.5.12. As a third choice to the look-through and mandate-based methods, participants should consider the collective investment scheme as an equity investment and apply the global equity risk charge (if the assets within the collective investment scheme are predominately listed in the EEA or OECD) or other equity charge (if the assets within the collective investment scheme are predominately unlisted).

Input

SCR.5.13. The following input information is required[44]:

Mkt_{int}^{Up}	=	Capital charge for interest rate risk on the "up" shock
Mkt_{in}^{Down}	=	Capital charge for interest rate risk on the "down" shock
Mkt_{eq}	=	Capital charge for equity risk
Mkt_{prop}	=	Capital charge for property risk
Mkt_{sp}	=	Capital charge for spread risk
Mkt_{conc}	=	Capital charge for risk concentrations
Mkt_{fx}	=	Capital charge for currency risk
$nMkt_{int}^{Up}$	=	Capital charge for interest rate risk on the "up" shock including the risk absorbing effect of future profit sharing

[44]Where for all subrisks the first seven capital charges *Mkt* are not including the potential risk absorbing effect of future profit sharing.

$nMkt_{int}^{Down}$ = Capital charge for interest rate risk on the "down" shock including the risk absorbing effect of future profit sharing

$nMkt_{prop}$ = Capital charge for property risk including the risk absorbing effect of future profit sharing

$nMkt_{sp}$ = Capital charge for spread risk including the risk absorbing effect of future profit sharing

$nMkt_{conc}$ = Capital charge for concentration risk including the risk absorbing effect of future profit sharing

$nMkt_{fx}$ = Capital charge for currency risk including the risk absorbing effect of future profit sharing

$nMkt_{eq}$ = Capital charge for equity risk including the risk absorbing effect of future profit sharing

Output

SCR.5.14. The module delivers the following output:

SCR_{mkt} = Capital charge for market risk[45]

$nSCR_{mkt}$ = Capital charge for market risk including the risk absorbing effect of future profit sharing

Calculation

SCR.5.15. The market sub-risks should be combined to an overall charge SCR_{mkt} for market risk using a correlation matrix as follows:

$$SCR_{mkt} = \max\left(\sqrt{\sum_{rxc} CorrMktUP_{r,c} \bullet Mkt_{up,r} \bullet Mkt_{up,c}}, \sqrt{\sum_{rxc} CorrMktDown_{r,c} \bullet Mkt_{down,r} \bullet Mkt_{down,c}}\right.$$

where

$CorrMktUP_{r,c}$ = the cells of the correlation matrix CorrMktUP

$Mkt_{up\ r,}$, $Mkt_{up,c}$ = Capital charges for the individual market risks under the interest rate up stress according to the rows and columns of the correlation matrix CorrMkt

$CorrMktDown_{r,c}$ = the cells of the correlation matrix CorrMktDown

$Mkt_{down,\ r,}$, $Mkt_{down,c}$ = Capital charges for the individual market risks under the interest rate down stress according to the rows and columns of the correlation matrix CorrMkt

[45] Not including the potential risk absorbing effect of future profit sharing.

and the correlation matrices CorrMktUp and CorrMktDown are defined as:

CorrMktDown	Interest	Equity	Property	Spread	Currency	Concentration
Interest	1					
Equity	0.5	1				
Property	0.5	0.75	1			
Spread	0.5	0.75	0.5	1		
Currency	0.25	0.25	0.25	0.25	1	
Concentration	0	0	0	0	0	1

CorrMktUp	Interest	Equity	Property	Spread	Currency	Concentration
Interest	1					
Equity	0	1				
Property	0	0.75	1			
Spread	0	0.75	0.5	1		
Currency	0.25	0.25	0.25	0.25	1	
Concentration	0	0	0	0	0	1

SCR.5.16. Whilst the correlations for spread risk above are calibrated to spreads widening, for the sake of simplicity in the standard formula, a separate set of correlations is not proposed for undertakings claiming a liquidity premium and for whom the spreads narrowing constraint bites.

SCR.5.17. The capital charge for $nSCR_{mkt}$ is determined as follows:

$$nSCR_{mkt} = \max\left(\sqrt{\sum_{rxc} CorrMktUP_{r,c} \bullet nMkt_{up,r} \bullet nMkt_{up,c}}, \sqrt{\sum_{rxc} CorrMktDown_{r,c} \bullet nMkt_{down,r} \bullet nMkt_{down,c}}\right.$$

SCR.5.3.Mkt$_{int}$ interest rate risk

Description

SCR.5.18. Interest rate risk exists for all assets and liabilities for which the net asset value is sensitive to changes in the term structure of interest rates or interest rate volatility. This applies to both real and nominal term structures.

SCR.5.19. Assets sensitive to interest rate movements will include fixed-income investments, financing instruments (for example loan capital), policy loans, interest rate derivatives and any insurance assets.

SCR.5.20. The discounted value of future liability cash-flows will be sensitive to a change in the rate at which those cash-flows are discounted.

SCR.5.21.

SCR.5.22. Assets which are 'index linked' such as nominal bonds should have the same stress applied to them as non index linked assets.

SCR.5.23. The delta-NAV approach used in QIS4 should be retained in order to capture as effectively as possible this important risk.

Input

SCR.5.24. The following input information is required:

NAV = Net value of assets minus liabilities

Output

SCR.5.25. The module delivers the following output:

Mkt_{int}^{Up}	=	Capital charge for interest rate risk after upward shocks[46]
Mkt_{int}^{Down}	=	Capital charge for interest rate risk after downward shocks[47]
$nMkt_{int}^{Up}$	=	Capital charge for interest rate risk after upward shock including the risk absorbing effect of future profit sharing
$nMkt_{int}^{Down}$	=	Capital charge for interest rate risk after downward shock including the risk absorbing effect of future profit sharing

Calculation

SCR.5.26. The capital charge for interest rate risk is determined as the result of two pre-defined scenarios:

$$\mathrm{Mkt}_{\mathrm{int}}^{\mathrm{Up}} = \max(\Delta\mathrm{NAV}|_{\mathrm{up\&downvol}}, \Delta\mathrm{NAV}|_{up\&upvol})$$

$$\mathrm{Mkt}_{\mathrm{int}}^{\mathrm{Down}} = \max(\Delta\mathrm{NAV}|_{\mathrm{down\&downvol}}, \Delta\mathrm{NAV}|_{down\&upvol})$$

Where $\Delta\mathrm{NAV}|_{up\&upvol}$, $\Delta\mathrm{NAV}|_{up\&downvol}$, $\Delta\mathrm{NAV}|_{down\&upvol}$, $\Delta\mathrm{NAV}|_{down\&downvol}$ are the changes in the net value of asset and liabilities due to re-valuing all interest rate sensitive instruments using altered term structures with an up or down volatility stress[48] and a correlation between interest rate level and volatility shock of 0.

[46] Not including the potential risk absorbing effect of future profit sharing.
[47] Not including the potential risk absorbing effect of future profit sharing.
[48] For the purposes of the specifications, the expression ΔNAV is used with the sign convention that positive values of ΔNAV signify losses.

SCR.5.27. The interest rate volatility calculations should not be applied where the risk is demonstrably immaterial for the undertaking.

SCR.5.28. Where an undertaking is exposed to interest rate movements in more than one currency, the capital charge for interest rate risk should be calculated based on the same relative change on all relevant yield curves.

SCR.5.29. The altered term structures are derived by multiplying the current interest rate curve by $(1+s^{up})$ and $(1+s^{down})$, where both the upward stress $s^{up}(t)$ and the downward stress $s^{down}(t)$ for individual maturities t are specified as follows:

Maturity t (years)	*relative change $s^{up}(t)$*	*relative change $s^{down}(t)$*
0.25	70%	-75%
0.5	70%	-75%
1	70%	-75%
2	70%	-65%
3	64%	-56%
4	59%	-50%
5	55%	-46%
6	52%	-42%
7	49%	-39%
8	47%	-36%
9	44%	-33%
10	42%	-31%
11	39%	-30%
12	37%	-29%
13	35%	-28%
14	34%	-28%
15	33%	-27%
16	31%	-28%
17	30%	-28%
18	29%	-28%
19	27%	-29%
20	26%	-29%
21	26%	-29%
22	26%	-30%
23	26%	-30%
24	26%	-30%
25	26%	-30%
30	25%	-30%

For example, the "stressed" 15-year interest rate $R_1(15)$ in the upward stress scenario is determined as

$$R_1(15) = R_0(15) \bullet (1 + 0.33)$$

where $R_0(15)$ is the 15-year interest rate based on the current term structure.

Note that for maturities greater than 30 years a stress of +25%/-30% should be maintained.[49]

SCR.5.30. Irrespective of the above stress factors, the absolute change of interest rates in the downward scenario should at least be one percentage point for non-index-linked bonds. Where the unstressed rate is lower than 1%, the shocked rate in the downward scenario should be assumed to be 0%. This constraint does not apply to index linked bonds (i.e. those which contain no material inflation risk).

SCR.5.31. Implied current levels of interest rate volatility should be stressed by an additive 12 percentage points in the upwards direction, and 3 percentage points in the downward direction.

SCR.5.32. A correlation of 0 is implied between the interest rate volatility and the interest rate level.

SCR.5.33. The scenarios for interest rate risk should be calculated under the condition that the assumptions on future bonus rates (reflected in the valuation of future discretionary benefits in technical provisions) remain unchanged before and after the shocks being tested.

SCR.5.34. Additionally, the result of the scenarios should be determined under the condition that the participant is able to vary its assumptions in future bonus rates in response to the shock being tested. The resulting capital charges are $nMkt_{intUP}$ and $nMkt_{intDN}$, they in turn are derived in the same way as Mkt_{intUP} and Mkt_{intDN} by considering volatility up and down shocks zero correlated to level up and down shocks.

SCR.5.35. The capital charge for interest rate risk is derived from the type of shock that gives rise to the highest capital charge including the risk absorbing effect of future profit sharing:

If $nMkt_{intUP} > nMkt_{intDN}$ then $nMkt_{int} = \max(nMkt_{inUP},0)$ and $Mkt_{int} = Mkt_{intUP}$ if $nMkt_{int} > 0$ and = 0 otherwise

If $nMkt_{intDN} \leq nMkt_{intDN}$ then $nMkt_{int} = \max(nMkt_{intDN},0)$ and $Mkt_{int} = Mkt_{intDN}$ if $nMkt_{int} > 0$ and = 0 otherwise.

SCR.5.4. Mkt_{eq} equity risk

Description

SCR.5.36. Equity risk arises from the level or volatility of market prices for equities. Exposure to equity risk refers to all assets and liabilities whose value is sensitive to changes in equity prices.

[49] CEIOPS notes that the continuation of the stress of +25%/-30% for all maturities beyond 30 years may need to be reviewed in order to ensure that the calibration of the shock to the risk free interest rate term structure is compatible with the relative invariance of the unconditional ultimate long-term forward rate which is set as part of the macro-economic extrapolation of the risk-free interest rate curve as proposed by CEIOPS.

SCR.5.37. For the calculation of the risk capital charge, hedging and risk transfer mechanisms should be taken into account according to the principles of sub-section SCR.12. However, as a general rule, hedging instruments should only be allowed with the average protection level over the next year. For example, where an equity option provides protection for the next six months, as a simplification, undertakings should assume that the option only covers half of the current exposure.

SCR.5.38. Participants should not assume to purchase additional hedging instruments (for example, as part of a rolling hedging programme) beyond those in force at the balance sheet date within the standard formula SCR.

SCR.5.39. Since QIS4, the structure of the equity risk sub-module has evolved significantly. There are two possible ways to calculate the equity risk capital charge: as well as the standard approach there is also the possibility (where permitted, and restricted to certain types of liabilities) to use the "duration based" approach of Article 304.

SCR.5.40. For the "standard" approach, a symmetric adjustment mechanism applies, as set out in Article 106[50]. This mechanism is required to operate such that the equity shock lies within a band of 10% either side of the underlying standard equity stress.

SCR.5.41. An additional development to the equity risk sub-module as compared with the approach tested in QIS4 is the inclusion of a specific equity volatility stress.

Input

SCR.5.42. The following input information is required:

NAV= The net value of assets minus liabilities

Output

SCR.5.43. The module delivers the following output:

Mkt_{eq} = Capital charge for equity risk

$nMkt_{eq}$ = Capital charge for equity risk including the risk absorbing effect of future profit sharing

Calculation

SCR.5.44. For the determination of the capital charge for equity risk, the following indices are considered, where the equity index "Global" comprises equity listed in EEA or OECD countries, and the equity index "Other" comprises equity listed only in emerging markets, non-listed equity, hedge funds and any other alternative investments not included elsewhere in the market risk calibration:

SCR.5.45. The calculation is carried out as follows:

[50] The symmetric adjustment mechanism does not apply to the equity risk sub-module as calculated in accordance with Article 304.

SCR.5.46. In a first step, for each index i a capital charge is determined as the result of a pre-defined stress scenario for index i as follows:

$$Mkt_{eq,i} = max(\Delta NAV \mid equity\ shock_i ; 0)$$

where

equity shock$_i$ = Prescribed fall in the value of index *i*

$Mkt_{eq,i}$ = Capital charge for equity risk with respect to index *i*,

and where the equity shock scenarios for the individual indices are specified as follows:

	Global	*Other*
equity shock$_i$	30%	40%

SCR.5.47. Note that the stresses above take account of a YE09 symmetric adjuster to equity of **-9%,** so changing them from their base level of **39% and 49%.**

SCR.5.48. The capital charge $Mkt_{eq,i}$ is determined as the immediate effect on the net value of asset and liabilities expected in the event of the stress scenario equity *shock*$_i$ taking account of all the participant's individual direct and indirect exposures to equity prices.

SCR.5.49. For the determination of this capital charge, all equities and equity type exposures have to be taken into account, including private equity as well as certain types of alternative investments, excluding equity owned in an undertaking part of the same group in which case the approach for the treatment of participations applies. The treatment of participations is as follows:

- The equity level and volatility shocks are nil for participations in financial and credit institutions.

- The equity level shock is 22% for strategic participations (Related undertakings where the investment is of a strategic nature, because a long-term relationship has been established and will be maintained). Strategic participations are subject to the equity volatility shock foreseen in the paragraphs above.

- other participations are subject to the equity level shock as foreseen in the paragraphs above and to the equity volatility shock as foreseen in the paragraphs below.

SCR.5.50. Alternative investments should cover all types of equity type risk like hedge funds, derivatives, managed futures, investments in SPVs etc., which can not be allocated to spread risk or classical equity type risk, either directly, or through a look through test.

SCR.5.51. The equity exposure of mutual funds should be allocated on a “look-through” basis as specified for collective investments funds in the section SCR.5.2 (*general considerations where a delta-NAV approach is used*).

SCR.5.52. In a second step, the capital charge for equity level risk is derived by combining the capital charges for the individual indices using a correlation matrix as follows:

$$MKT_{eqLEV} = \sqrt{\sum_{rxc} CorrIndex^{rxc} \bullet Mkt_{LEVr} \bullet Mkt_{LEVc}}$$

where

$CorrIndex^{rxc}$	=	The cells of the correlation matrix *CorrIndex*
Mkt_{LEVr}, Mkt_{LEVc}	=	Capital charges for equity level risk per individual index according to the rows and columns of correlation matrix *CorrIndex*

and where the correlation matrix *CorrIndex* is defined as:

CorrIndex=	*Global*	*Other*
Global	1	
Other	0.75	1

SCR.5.53. The calculations for equity risk should be carried out under the condition that the assumptions on future bonus rates (reflected in the valuation of future discretionary benefits in technical provisions) remain unchanged before and after the shocks being tested.

SCR.5.54. The capital charge $Mkt_{eq,VOL}$ is determined as the immediate effect on the net value of asset and liabilities expected in the event of the stress scenario equity volatility *shock* taking account of all the participant's individual direct and indirect exposures to equity prices.

SCR.5.55. The equity volatility shocks should be applied, where possible, and where appropriate, to the same exposures, and in the same way as the equity level shock. The equity volatility calculations should not be applied where the risk is demonstrably immaterial for the undertaking.

SCR.5.56. Implied current levels of equity volatility should be stressed by an additive 10 percentage points in the upwards direction, and 3 percentage points in the downward direction.

SCR.5.57. The total charge for equity risk is derived by combining the capital charges for the level and volatility stresses using a correlation matrix as follows:

$$MKT_{eq} = \sqrt{\sum_{rxc} CorrEq^{rxc} \bullet Mkt_r \bullet Mkt_c}$$

where

$CorrIndex^{rxc}$ = The cells of the correlation matrix *CorrEq*

Mkt_r, Mkt_c = Capital charges for equity risk per level or volatility charge according to the rows and columns of correlation matrix *CorrEq*

and where the correlation matrix *CorrEq* is defined as:

CorrIndex=	*Level*	*Volatility*
Level	1	
Volatility	0.75	1

SCR.5.58. Additionally, the overall result of the calculation should be determined under the condition that the participant is able to vary its assumptions in future bonus rates in response to the shocks being tested. The resulting capital charge is $nMkt_{eq}$.

SCR.5.59. Article 304 of the Level 1 text tates that for certain undertakings, a Value at Risk measurement consistent with the typical holding period of investments may be applied. The conditions under which undertakings may apply this measure, are set out in the Level 1 text: .

Member States may authorise life insurance undertakings providing:

(a) occupational-retirement-provision business in accordance with Article 4 of Directive 2003/41/EC, or

(b) retirement benefits paid by reference to reaching, or the expectation of reaching, retirement where the premiums paid for those benefits have a tax deduction which is authorised to policyholders in accordance with the national legislation of the Member State that has authorised the undertaking;

and where

(i) all assets and liabilities corresponding to this business are ring-fenced, managed and organised separately from the other activities of the insurance undertakings, without any possibility of transfer, and

(ii) the activities of the undertaking related to points a) and b), in relation to which the approach referred to in this paragraph is applied, are carried out only in the Member State where the undertaking has been authorised, and

(iii) the average duration of the liabilities corresponding to this business held by the undertaking exceeds an average of 12 years,

to apply an equity risk sub-module of the Solvency Capital Requirement, which is calibrated using a Value-at-Risk measure, over a time period, which is consistent with the typical holding period of equity investments for the undertaking concerned, with a confidence level providing the policyholders and beneficiaries with a level of *protection equivalent to that set out in Article 101, if the approach provided for in this Article is only used in respect of those assets and liabilities referred in point i). In the calculation of the Solvency Capital Requirement these assets and liabilities shall be fully considered for the purpose of assessing the diversification effects, without prejudice to the need to safeguard the interests of policyholders and beneficiaries in other Member States.*

Subject to the approval by the supervisory authorities, the approach set out in subparagraph 1 shall only be used if the solvency and liquidity position as well as the strategies, processes and reporting procedures of the undertaking concerned with respect to asset – liability management are such as to ensure, on an on-going basis, that it is able to hold equity investments for a period which is consistent with the typical holding period of equity investments for the undertaking concerned. The undertaking shall be able to demonstrate to the supervisory authority that this condition is verified with the level of confidence necessary to provide policyholders and beneficiaries with a level of protection equivalent to that set out in Article 101.

Insurance and reinsurance undertakings shall not revert to applying the approach set out in Article 105, except in duly justified circumstances and subject to the approval of the supervisory authorities.

SCR.5.60. For undertakings applying such provisions, the equity risk capital charge $Mkt_{eq,I,\ LEV}$ will be 22%

SCR.5.61.

SCR.5.5. Mkt_{prop} property risk

<u>Description</u>

SCR.5.62. Property risk arises as a result of sensitivity of assets, liabilities and financial investments to the level or volatility of market prices of property.

SCR.5.63. The capital charge for property risk is calculated based on the impact of a shock scenario on the net value of assets and liabilities.

SCR.5.64. The capital charge for property risk Mkt_{prop} will be calculated as the result of a pre-defined scenario(s), $Mkt_{prop} = \Delta NAV \mid property\ shock$.

SCR.5.65. The property shock is the immediate effect on the net asset value of a fall in real estate benchmarks taking account of all the participant's individual direct and indirect exposures to property prices.

SCR.5.66. The following investments shall be treated as property and their risks considered accordingly in the property risk sub-module:

- land, buildings and immovable-property rights;
- direct or indirect participations in real estate companies that generate periodic income or which are otherwise intended for investment purposes;
- property investment for the own use of the insurance undertaking.

SCR.5.67. Otherwise, the following investments shall be treated as equity and their risks considered accordingly in the equity risk sub-module:

- an investment in a company engaged in real estate management, or
- an investment in a company engaged in real estate project development or similar activities, or
- an investment in a company which took out loans from institutions outside the scope of the insurance group in order to leverage its investments in properties.

SCR.5.68. Collective real estate investment vehicles should be treated like other collective investment vehicles with a look-through approach.

Input

SCR.5.69. The following input information is required:

NAV = Net value of assets minus liabilities

Output

SCR.5.70. The module delivers the following output:

Mkt_{prop} = Capital charge for property risk[51]

$nMkt_{prop}$ = Capital charge for property risk including the risk absorbing effect of future profit sharing

Calculation

SCR.5.71. The capital charge for property risk is determined as the result of a pre-defined scenario:

$$Mkt_{prop} = \Delta NAV \mid property\ shock$$

SCR.5.72. The property shock is the immediate effect on the net value of asset and liabilities expected in the event of a 25% fall in real estate benchmarks, taking account of all the participant's individual direct and indirect exposures to property prices. The property shock takes account of the specific investment policy including e.g. hedging arrangements, gearing etc.

SCR.5.73. The scenario for property risk should be calculated under the condition that the assumptions on future bonus rates (reflected in the valuation of future discretionary benefits in technical provisions) remain unchanged before and after the shock being tested.

SCR.5.74. Additionally, the result of the scenario should be determined under the condition that the participant is able to vary its assumptions in future bonus rates in response to the shock being tested. The resulting capital charge is $nMkt_{prop}$.

[51] Not including the potential risk absorbing effect of future profit sharing.

SCR.5.6. Mkt_{fx} currency risk

Description

SCR.5.75. Currency risk arises from changes in the level or volatility of currency exchange rates.

SCR.5.76. Undertakings may be exposed to currency risk arising from various sources, including their investment portfolios, as well as assets, liabilities and investments in related undertakings. The design of the currency risk sub-module is intended to take into account currency risk for an undertaking arising from all possible sources.

SCR.5.77. .

SCR.5.78. The *local currency* is the currency in which the undertaking prepares its local regulatory accountsAll other currencies are referred to as *foreign currencies*. A foreign currency is *relevant* for the scenario calculations if the amount of basic own funds depends on the exchange rate between the foreign currency and the local currency.

SCR.5.79. Note that for each relevant foreign currency C, the currency position should include any investment in foreign instruments where the currency risk is not hedged. This is because the stresses for interest rate, equity, spread and property risks have not been designed to incorporate currency risk. Note that the look-through approach for funds.

Input

SCR.5.80. The following input information is required:

NAV = Net value of assets minus liabilities

Output

SCR.5.81. The module delivers the following output:

Mkt_{fx}	=	Capital charge for currency risk[52]
Mkt_{fx}^{Up}	=	Capital charge for currency risk after an upward shock
Mkt_{fx}^{Down}	=	Capital charge for currency risk after a downward shock
$nMkt_{fx}$	=	Capital charge for currency risk including the risk absorbing effect of future profit sharing
$nMkt_{fx}^{Up}$	=	Capital charge for currency risk after an upward shock including the risk absorbing effect of future profit sharing
$nMkt_{fx}^{Down}$	=	Capital charge for currency risk after a downward shock including the risk absorbing effect of future profit sharing

Calculation

[52] Not including the potential risk absorbing effect of future profit sharing.

SCR.5.82. The capital charge for currency risk is determined as the result of two pre-defined scenarios:

$$Mkt^{Up}_{Fx,\,C} = \Delta NAV \mid fx\, upwardshock$$

$$Mkt^{Down}_{Fx,\,C} = \Delta NAV \mid fx\;\; downwardshock$$

SCR.5.83. All of the participant's individual currency positions and its investment policy (e.g. hedging arrangements, gearing etc.) should be taken into account. For each currency, the contribution to the capital charge $Mkt_{fx,C}$ will then be determined as the maximum of the results $Mkt_{fx,C}^{Up}$ and $Mkt_{fx,C}^{Down}$. The total capital charge Mkt_{fx} will be the sum over all currencies of $Mkt_{fx,C}$.

SCR.5.84. The charge is set at a 25% change, rise and fall respectively in value of all other currencies against the local currency in which the undertaking prepares its local regulatory accounts.

SCR.5.85. The scenario for currency risk should be calculated under the condition that the assumptions on future bonus rates (reflected in the valuation of future discretionary benefits in technical provisions) remain unchanged before and after the shock being tested.

SCR.5.86. The size of the shock for certain non euro but pegged currencies is as follows:

- Danish Krone against any of EUR, Lithuanian litas or Estonian kroon = ±*2.25%*
- Estonian Kroon against EUR or Lithuanian litas = ±0%
- Latvian lats against any of EUR, Lithuanian litas or Estonian kroon = ±1%
- Lithuanian litas against EUR or Estonian kroon = ±0%
- Latvian lats against Danish Krone = ±3.5%

SCR.5.87. Additionally, the result of the scenarios should be determined under the condition that the participant is able to vary its assumptions in future bonus rates in response to the shock being tested. The resulting capital charges are $nMkt_{fx}^{Up}$ and $nMkt_{fx}^{Down}$.

SCR.5.88. The capital charge for currency risk is derived from the type of shock that gives rise to the highest capital charge including the risk absorbing effect of future profit sharing:

If $nMkt_{fx}^{Up} > nMkt_{fx}^{Down}$ then $Mkt_{fx} = Mkt_{fx}^{Up}$ and $nMkt_{fx} = nMkt_{fx}^{Up}$.

If $nMkt_{fx}^{Up} \leq nMkt_{fx}^{Down}$ then $Mkt_{fx} = nMkt_{fx}^{Down}$ and $nMkt_{fx} = nMkt_{fx}^{Down}$.

SCR.5.7. Mkt_{sp} spread risk

Description

SCR.5.89. Spread risk is the part of risk that reflects the change in value of net assets due to a move in the yield on an asset relative to the risk-free term structure. The spread risk sub-module should address changes in both level and volatility of spreads.

SCR.5.90. Regarding the interaction between the spread risk sub-module and the counterparty default risk module: the Level 1 text relating to the counterparty default risk module is the starting point for this analysis: Article 105(6) states:

SCR.5.91. The counterparty default risk module shall reflect possible losses due to unexpected default, or deterioration in the credit standing, of the counterparties and debtors of insurance and reinsurance undertakings over the next twelve months. The counterparty default risk module shall cover risk-mitigating contracts, such as reinsurance arrangements, securitisations and derivatives, and receivables from intermediaries, as well as any other credit exposures which are not covered in the spread risk sub-module.

SCR.5.92. For each counterparty, the counterparty default risk module shall take account of the overall counterparty risk exposure of the insurance or reinsurance undertaking concerned to that counterparty, irrespective of the legal form of its contractual obligations to that undertaking.

- The spread risk sub-module should cover the credit risk of:
- credit derivatives
- other credit risky investments including in particular:
- participating interests
- debt securities issued by, and loans to, affiliated undertakings and undertakings with which an insurance undertaking is linked by virtue of a participating interest
- debt securities and other fixed-income securities
- participation in investment pools
- loans guaranteed by mortgages
- deposits with credit institutions

SCR.5.93. In relation to credit derivatives, only the credit risk which is transferred by the derivative is covered in the spread risk sub-module. Investments for the benefit of life-insurance policyholders who bear the investment risk are included only to the extent that the undertaking assumes spread risk.

SCR.5.94. No capital charge shall apply for the purposes of this sub-module to borrowings by or demonstrably guaranteed by national government of an OECD or EEA state, issued in the currency of the government, or issued by a multilateral development bank as listed in Annex VI, Part 1, Number 4 of the Capital

Requirements Directive (2006/48/EC) or issued by an international organisation listed in Annex VI, Part 1, Number 5 of the Capital Requirements Directive (2006/48/EC).

SCR.5.95. The spread risk module therefore applies to at least the following classes of bonds:

- Investment grade corporate bonds
- High yields corporate bonds
- Subordinated debt
- Hybrid debt.

SCR.5.96. For bonds, the spread risk module is designed to address a widening and narrowing of credit spreads.

SCR.5.97. Furthermore, the spread risk module is applicable to all types of asset-backed securities as well as to all the tranches of structured credit products such collateralised debt obligations. This class of securities includes transactions of schemes whereby the credit risk associated with an exposure or pool of exposures is tranched, having the following characteristics:

- payments in the transaction or scheme are dependent upon the performance of the exposure or pool of exposures; and
- the subordination of tranches determines the distribution of losses during the ongoing life of the transaction or scheme.

SCR.5.98. The spread risk sub-module will further cover in particular credit derivatives, for example (but not limited to) credit default swaps, total return swaps and credit linked notes that are not held as part of a recognised risk mitigation policy. As indicated above, the spread risk sub-module will also applicable to all tranches of structured credit products like collateralised debt obligations. In addition, traditional forms of asset backed securities, that is commercial and residential mortgage backed securities, home equity loans, credit card receivables, auto loans, student loans as well as whole-business securitisations, infrastructure finance notes and other covered bonds are also addressed by this sub-module.

SCR.5.99. Instruments sensitive to changes in credit spreads may also give rise to other risks, which should be treated accordingly in the appropriate modules. For example, the counterparty default risk associated with the counterparty of a risk-mitigating transaction should be addressed in the counterparty default risk module, rather than in the spread risk sub-module.

SCR.5.100. The design for the sub-module implies that credit spread risk hedging programmes can still be taken into account when calculating the capital charge for this risk type. This enables undertakings to gain appropriate recognition of, and allowance for, their hedging instruments – subject to proper treatment of the risks inherent in the hedging programmes.

SCR.5.101. The approach to be taken for collective investment vehicles is set out below. Similarly, a look-through approach should be applied to assets representing reinsurers' funds withheld by counterparty.

SCR.5.102. For collateralised debt obligations it will be important to take into account the nature of the risks associated with the collateral assets. For example, in the case of a CDO-squared, the rating should take into account the risks associated with the CDO tranches held as collateral, i.e. the extent of their leveraging and the risks associated with the collateral assets of these CDO tranches.

SCR.5.103. For credit derivatives, the capital charge is scenario-based. The scenario will consider both a rise and fall in credit spreads. The capital charge is determined by the more onerous of the two scenarios.

Input

SCR.5.104. The following input information is required:

MV_i	=	the credit risk exposure i as determined by reference to market values (exposure at default)
$rating_i$	=	for corporate bonds, the external rating of credit risk exposure i
$duration_i$	=	for corporate bonds, the duration of credit risk exposure i
$attach_i$	=	for structured credit products, the attachment point of the tranche held
$detach_i$	=	for structured credit products, the detachment point of the tranche held
$tenure_i$	=	for structured credit products, the average tenure of the assets securitised
$ratingdist_i$	=	for structured credit products, a vector of the rating distribution in the asset pool securitised

SCR.5.105. In cases where there is no readily-available market value of credit risk exposure *i*, alternative approaches consistent with relevant market information might be adopted to determine MV_i. In cases where several ratings are available for a given credit exposure, generally the second-best rating should be applied.

Output

SCR.5.106. The module delivers the following output:

Mkt_{sp}	=	Capital charge for spread risk
$nMkt_{sp}$	=	Capital charge for spread risk including the risk absorbing effect of future profit sharing

Calculation

SCR.5.107. The capital charge for spread risk is determined as follows:

$$Mkt_{sp} = Mkt_{sp}^{bonds} + Mkt_{sp}^{struct} + Mkt_{sp}^{cd} + Mkt_{sp}^{re}$$

where:

Mkt_{sp}^{bonds}	=	the capital charge for spread risk of bonds
Mkt_{sp}^{struct}	=	the capital charge for spread risk of structured credit products
Mkt_{sp}^{cd}	=	the capital charge for credit derivatives
Mkt_{sp}^{re}	=	the capital charge for spread risk of mortgage loans

SCR.5.108. The capital charge for spread risk of bonds is determined as follows:[53]

$$\mathrm{Mkt}_{\mathrm{sp}}^{bonds} = \max\begin{pmatrix} \sum_{\mathrm{i}} \mathrm{MV}_{\mathrm{i}} \bullet duration_i \bullet \mathrm{F}^{\mathrm{up}}(\mathrm{rating}_{\mathrm{i}}) - \Delta IlliquidLiabs^{Up} \\ \sum_{\mathrm{i}} \mathrm{MV}_{\mathrm{i}} \bullet duration_i \bullet \mathrm{F}^{\mathrm{down}}(\mathrm{rating}_{\mathrm{i}}) - \Delta IlliquidLiabs^{Down} \end{pmatrix} + \Delta\mathrm{Liab}_{\mathrm{ul}} \ ,$$

where:

$F^{up}(rating_i)$	=	a function of the rating class of the credit risk exposure which is calibrated to deliver a shock consistent with VaR 99.5% following a widening of credit spreads
$F^{down}(rating_i)$	=	a function of the rating class of the credit risk exposure which is calibrated to deliver a shock consistent with VaR 99.5% following a narrowing of credit spreads
$\Delta IlliquidLiabs^{Up}$	=	Change in value of liabilities to which an illiquidity premium is applied following a widening of credit spreads, as calculated below.
$\Delta IlliquidLiabs^{Down}$	=	Change in value of liabilities to which an illiquidity premium is applied following a narrowing of credit spreads, as calculated below.
ΔLiabul	=	The overall impact on the liability side for policies where the policyholders bear the investment risk with embedded options and guarantees of the stressed scenario, with a minimum value of 0 (sign convention: positive sign means losses). The stressed scenario is defined as a drop in value on the assets (except government bonds issued by an EEA or OECD government in its local currency) used as the reference to the valuation of the liabilities by $F(rating_i)$, e.g. for a

[53] Here the terms $\Delta\mathrm{IlliquidLiabs}^{\mathrm{Up}}$ and $\Delta\mathrm{IlliquidLiabs}^{\mathrm{Down}}$ are calculated as the differences between the values of technical provisions to which an illiquidity premium is applied before and after the assumed shock.

	BBB-rated asset with a duration of 4 years this means a drop by 10.0%

SCR.5.109.
To determine the spread risk capital charge for bonds, the following factors F^{up} and F^{down} shall be used:

Spread risk factors for bonds

	F^{up}	F^{down}	Duration Floor	Duration Cap
AAA	**1,0%**	**-0,4%**	1	--
AA	**1,5%**	**-1,0%**	1	--
A	**2,6%**	**-1,7%**	1	--
BBB	**4,5%**	**-3,0%**	1	7
BB	**8,4%**	**-6,3%**	1	5
B or lower	**16,2%**	**-8,6%**	1	3,5
Unrated	**5,0%**	**-3,3%**	1	7

The factors F^{up} are applied to assess the impact of a widening of spreads on the value of bonds, whereas the factors F^{down} are applied to assess the impact of a tightening of spreads on the value of bonds. For example, for a AAA-rated bond with a duration of 5 years a loss in value of 5% would be assumed under the widening of spreads scenario.

SCR.5.110. The shock factors of functions F^{up} and F^{down} will be multiplied with the modified duration of a bond. For variable interest rate bonds, the modified duration used in the calculation should be equivalent to a fixed income bond with coupon payments equal to the forward interest rate.

SCR.5.111. For unrated bonds, the issuer rating could be used as a proxy if the unrated bond does not inhibit any specificities which detriment credit quality, e.g. subordination.

SCR.5.112. Further to this, where an insurer has liabilities for which it is claiming an illiquidity premium this would be supplemented by also looking at the impact of F^{up} and F^{down} on the liability side.

SCR.5.113. The illiquidity premium for the individual currencies is quantified on basis of the "x-and-y formula" provided in the report on the liquidity premium[54]:

$$liquidity\_premium\_level = 50\% * (spread\_model\_portfolio - 40bps)$$

[54] Task Force Report on the Liquidity Premium, CEIOPS-SEC-34/10, 1 March 2010, http://www.ceiops.eu/media/files/publications/submissionstotheec/20100303-CEIOPS-Task-Force-Report-on-the-liquidity-premium.pdf. The (y) parameter in this formula has been amended for QIS5 to allow for the fact that the basic risk-free swap curve was adjusted by 10BPS for credit risk. However, these changes to the (y) parameter are not relevant for the determination of the equivalent shock for the model portfolio as described in the following.

where *spread_model_portfolio* refers to the average spread over and above the risk-free rate in a model portfolio of bonds.

SCR.5.114. On basis of this modeling of the illiquidity premium, an equivalent shock for the model portfolio is calculated as follows:

$$Equivalent\_shock\_for\_model\_portfolio^{up} = F^{up}(average\_rating\_model\_portfolio)$$
$$Equivalent\_shock\_for\_model\_portfolio^{down} = F^{down}(average\_rating\_model\_portfolio)$$

where *average_rating_model_portfolio* denotes the average rating of bonds in the model portfolio which is used to quantify the illiquidity premium.

The following average ratings for the model portfolios of the individual currencies are specified:

Currency	**Average rating of model portfolio**[55]
EUR, GBP, USD, CHF, JPY[56]	2,0% AAA 20,7% AA 47,9% A 29,3% BBB
SEK, DKK	AAA
NOK	AA
CZK, PLN, HUF, EEK, LVL, LTL	same as EUR[57]
RON, BGN, TRY, ISK	-[58]

SCR.5.115. Applying the formula for the illiquidity premium as given above this leads to a shock to the illiquidity premium component of the interest curve applied to liabilities to which an illiquidity premium is applied at the level of 50%**Equivalent_shock_for_model_portfolio*. Two new interest rate curves will thus be derived, one with the stress of illiquidity premia increasing, and one with illiquidity premia decreasing[59].

SCR.5.116. $\Delta IlliquidLiabs^{Up}$ and $\Delta IlliquidLiabs^{Down}$ are then calculated by using these new stressed interest rate curves to value the liabilities for which illiquidity premium is being claimed.

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55 In cases where a decomposition into several rating classes is specified, the resulting factors F^{up} and F^{down} should be determined as the weighted average of the factors for the individual classes.

56 An average rating decomposition for the model portfolios for EUR, GBP and USD was derived from Markit (http://indices.markit.com) which provides the current composition of its indices. An average rating decomposition grade of an index member is an average and published without notches. The decomposition is assumed to be also representative for the model portfolios for CHF and JPY.

57 But only 35% of the shock should be applied (since liquidity premium fort hese currencies iss et as 35% of liquidity premium for EUR)

58 For these currencies the liquidity premium is set to zero.

59 For the stress of decreasing illiquidity premia, a floor of zero for the stressed level of the illiquidity premium should be applied.

SCR.5.117. For unrated bonds, the issuer rating could be used as a proxy if the unrated bond does not inhibit any specificities which detriment credit quality, e.g. subordination.

SCR.5.118. The capital charge for spread risk of structured credit products is determined as follows:

$$Mkt_{sp}^{struct} = \sum_i MV_i \frac{max(G(ratingdist_i, tenure_i) \bullet (1 - R(ratingdist_i)) - attach_i ; 0)}{detach_i - attach_i}$$

where

$G(ratingdist_i, tenure_i)$	=	a function of the rating class and tenure of the credit risk exposure within a securitised asset pool which is calibrated to deliver a shock consistent with VaR 99.5%
$R(ratingdist_i)$	=	a function of the rating class of the credit risk exposure within a securitised asset pool which is calibrated to deliver a shock consistent with VaR 99.5%

SCR.5.119. The function G is determined as follows:

G(ratingdist$_i$, tenure$_i$)	**AAA**	**AA**	**A**	**BBB**	**BB**	**B**	**CCC or lower**	**Unrated**
0-1.9 years	0.8%	1.6%	4.7%	8.1%	20.9%	41.5%	65.9%	9.7%
2-3.9 years	1.6%	3.1%	8.1%	14.7%	34.1%	59.7%	83.3%	17.6%
4-5.9 years	2.3%	5.0%	10.9%	20.2%	43.0%	68.2%	88.4%	24.2%
6-7.9 years	3.5%	7.4%	14.0%	25.2%	50.4%	73.3%	90.7%	30.2%
8+ years	4.7%	9.7%	17.1%	30.2%	56.2%	77.1%	91.9%	36.2%

SCR.5.120. The function R is determined as follows:

R(ratingdist$_i$)	**AAA**	**AA**	**A**	**BBB**	**BB**	**B**	**CCC or lower**	**Unrated**
Recovery rate	50%	45%	40%	35%	30%	25%	20%	35%

SCR.5.121. When calculating Mkt_{sp}^{struct}, a cap of 100% of MV_i and a floor of 10% of MV_i are applied.

SCR.5.122. If the originator of a structure credit product does not comply with the 5% net retention rate foreseen in the CRD (2006/48/EC), the capital charge for the product should be 100%, regardless of the seniority of the position.

SCR.5.123. If a look-through on the level of securitised assets is not possible, the same stress as for the "equity, other" (of 49%) category should be applied to the structured product for which the look-through is not possible.

SCR.5.124. For credit derivatives a scenario-based approach is followed. Credit derivatives encompass credit default swaps (CDS), total return swaps (TRS), and credit linked notes (CLN), where:

- the (re)insurance undertaking does not hold the underlying instrument or another exposure where the basis risk between that exposure and the underlying instrument is immaterial in all possible scenarios; or
- the credit derivative is not part of the undertaking's risk mitigation policy.

SCR.5.125. For credit derivatives, the capital charge Mkt_{sp}^{cd} is determined, after netting with offsetting corporate bond exposures, as the change in the value of the derivative (i.e. as the decrease in the asset or the increase in the liability) that would occur following (a) a widening of credit spreads by 600% if overall this is more onerous, or (b) a narrowing of credit spreads by 75% if this is more onerous. A notional capital charge should then be calculated for each event. The capital charge should then be the higher of these two notional changes.

SCR.5.126. The capital charge for the spread risk of exposures secured by real estate is determined as follows:

$$Mkt_{sp}^{re} = 8\% \bullet \sum_i \left(RW_i^{\sec} \bullet Secured_i + RW_i^{un\sec} \bullet \max\left(Exposure_i - Secured_i ; 0 \right) \right)$$

where

$Exposure_i$	=	the total mortgage exposure to borrower *i*
$Secured_i$	=	the fully and completely secured part of the exposure to borrower *i*, calculated as the part of the exposure covered by real estate collateral after application of the haircut
RW_i^{sec}	=	the risk weight associated with the fully and completely secured part of the exposure to borrower *i*
RW_i^{unsec}	=	the risk weight associated with the unsecured part of to exposure to borrower *i*

The fully and completely secured part of the exposure is that part of the mortgage exposure that is covered by real estate collateral, after application of a haircut to that collateral value. It should also meet the conditions given in Directive 2006/48/EC, appendix VI section 9.

The haircut to be applied to the value of real estate collateral is 25% for residential real estate and 50% for commercial real estate. Therefore, the fully and completely secured part of the exposure is equal to 75% of the value of residential real estate collateral, and 50% of the value of commercial real estate collateral.

SCR.5.127. For **residential property** a risk weight of **35%** applies to the fully and completely secured part of exposure *i* in the following circumstances:

- Exposures or any part of an exposure fully and completely secured by mortgages on residential property which is or shall be occupied or let by the owner, or the beneficial owner in the case of personal investment companies;
- Exposures fully and completely secured, by shares in Finnish residential housing companies, operating in accordance with the Finnish Housing Company Act of 1991 or subsequent equivalent legislation, in respect of residential property which is or shall be occupied or let by the owner;
- Exposures to a tenant under a property leasing transaction concerning residential property under which the insurer is the lessor and the tenant has an option to purchase, provided that the exposure of the insurer is fully and completely secured by its ownership of the property.

SCR.5.128. If the secured part of exposure *i* does not fall within the circumstances stated in the previous paragraph, or if the conditions given in Directive 2006/48/EC, appendix VI section 9 are not met, it cannot be treated as fully and completely secured. In that case, a risk weight of 100% will be applied. The unsecured part of exposure *i* also receives a risk weight of 100%.

SCR.5.129. For **commercial property** a risk weight of **100%** is applied to both the fully and completely secured part and the unsecured part. A risk weight of 50% is applied to the fully and completely secured part *only* if the conditions given in Directive 2006/48/EC, appendix VI section 9 are met.

SCR.5.130. Fully and completely secured exposures receive a risk weight of 0% if these exposures are guaranteed by an OECD or EEA government, and if these exposures are in the currency of the government. This applies to both residential and commercial real estate.

SCR.5.131. Note that the market value of exposures secured by real estate is generally subject to interest rate risk. These exposures should therefore also be included in the interest rate risk submodule. Note further that property risk on the collateral value is already included in the Mkt_{sp}^{re} calculation, so that also including it in the property risk submodule would lead to double counting. The property risk submodule does therefore not apply to exposures secured by real estate.

SCR.5.132. The following simplification may be used provided:

- The simplification is proportionate to the nature, scale and complexity of the risks that the undertaking faces.

- The standard calculation of the spread risk sub-module is an undue burden for the undertaking.

SCR.5.133. The simplification is defined as follows:

$$Mkt_{sp}^{bonds} = MV^{bonds} . \sum_i \%MV_i^{bonds} \bullet F(rating_i duration) + \Delta Liab_{ul}$$

where:

MVbonds	=	Total market value of non-government bond portfolio
$\%Mv_i^{bonds}$	=	Proportion of non-government bond portfolio held at rating i
F	=	Defined as in the standard calculation
duration	=	Average duration of non-government bond portfolio, weighted with the market value of the bonds

and where $\Delta Liab_{ul}$ is the overall impact on the liability side for policies where the policyholders bear the investment risk with embedded options and guarantees of the stressed scenario, with a minimum value of 0 (sign convention: positive sign means losses). The stressed scenario is defined as a drop in value on the assets by

$$MV \; . \sum_i \%MV_i \bullet F(rating_i duration)$$

SCR.5.8. Mkt_{conc} market risk concentrations

Description

SCR.5.134. The scope of the concentration risk sub-module extends to assets considered in equity, interest rate, spread risk and property risk sub-modules within the market risk module, and excludes assets covered by the counterparty default risk module in order to avoid any overlap between both elements of the standard calculation of the SCR.

SCR.5.135. An appropriate assessment of concentration risks needs to consider both the direct and indirect exposures derived from the investments included in the scope of this sub-module.

SCR.5.136. Assets which are allocated to policies where the policyholders bear the investment risk should be excluded from this risk module. However, as these policies may have embedded options and guarantees, an adjustment (calculated using a scenario-based approach) is added to the formula to take into account the part of the risk effectively borne by the undertaking.

SCR.5.137. For the sake of simplicity and consistency, the definition of market risk concentrations regarding financial investments is restricted to the risk regarding the accumulation of exposures with the same counterparty. It does not include other types of concentrations (e.g. geographical area, industry sector, etc.).

SCR.5.138. According to an economic approach, exposures which belong to the same group as defined in Article 212 of the Level 1 text or to the same financial conglomerate as defined in Article 2(14) of the Financial Conglomerate Directive (2002/87/EC) should not be treated as independent exposures. The legal entities of the group or the conglomerate considered in the calculation of own funds should be treated as one exposure in the calculation of the capital requirement.

SCR.5.139. Government bonds are exempted from the application of this sub-module. The exemption concerns borrowings by or demonstrably guaranteed by national government of an OECD or EEA state, issued in the currency of the government, or issued by a multilateral development bank as listed in Annex VI, Part 1, Number 4 of the Capital Requirements Directive (2006/48/EC) or issued by an international organisation listed in Annex VI, Part 1, Number 5 of the Capital Requirements Directive (2006/48/EC).

SCR.5.140. Risks derived from concentration in cash held at a bank are captured in the counterparty default risk module, while risks corresponding to concentration in other bank assets shall be reflected in the concentration risk sub-module (no-hole, no-overlap).

SCR.5.141. Furthermore, bank deposits considered in the concentration risk sub-module can be exempted to the extent their value is covered by a government guarantee scheme in the EEA area, the guarantee is applicable unconditionally to the undertaking and provided there is no double-counting of such guarantee with any other element of the SCR calculation.

Input

SCR.5.142. Risk exposures in assets need to be grouped according to the counterparties involved.

E_i	=	Net exposure at default to counterparty i
$Assets_{xl}$	=	Amount of total assets considered in this sub-module according the paragraphs contained in this advice in the item *'Assets covered by concentration risk sub-module'*. Government bonds should be included in this amount, notwithstanding the exemption specified above.
$rating_i$	=	External rating of the counterparty i

SCR.5.143. Where an undertaking has more than one exposure to a counterparty then E_i is the aggregate of those exposures at default. $Rating_i$ should be a weighted rating determined as the rating corresponding to a weighted average credit quality step, calculated as:

Weighted average credit quality step = round (average of the credit quality steps of the individual exposures to that counterparty, weighted by the net exposure at default in respect of that exposure to that counterparty)

SCR.5.144. The net exposure at default to an individual counterparty i shall comprise assets covered by the concentration risk sub-module, including hybrid instruments, e.g. junior debt, mezzanine CDO tranches ….

SCR.5.145. When calculating the net exposures, financial mitigation techniques shall be considered in this sub-module except to the extent that they have already been taken into account in other modules or sub-modules. They shall be considered only when they meet the requirements set out for financial mitigation techniques.[60]

SCR.5.146. Financial derivatives on equity and defaultable bonds should be properly attributed to the net exposure, i.e. an equity put option reduces the equity exposure to the underlying 'name' and a single-name CDS ('protection bought') reduces the fixed-income exposure to the underlying 'name'. The exposure to the default of the counterparty of the option or the CDS is not treated in this module, but in the counterparty default risk module. Also, collaterals securitising bonds should be taken into account. Similarly, a look-through approach should be applied to assets representing undertakings' funds withheld by a counterparty.

SCR.5.147. Exposures via investment funds or such entities whose activity is mainly the holding and management of an undertaking's own investment need to be considered on a look-through basis unless otherwise stated in this advice. The same holds for CDO tranches and similar investments embedded in 'structured products'.

Output

SCR.5.148. The module delivers the following outputs:

Mkt_{conc}	=	Total capital charge concentration risk sub-module
$Mkt_{conc\_financial}$	=	Capital charge for financial concentration risk
$Mkt_{conc\_properties}$	=	Capital charge for properties concentration risk

Calculation

SCR.5.149. The calculation is performed in three steps: (a) excess exposure, (b) risk concentration charge per 'name', (c) aggregation.

SCR.5.150. The excess exposure is calculated as:

$$XS_i = \max\left\{0; \frac{E_i}{Assets_{xl}} - CT\right\},$$

where the concentration threshold CT, depending on the rating of counterparty i, is set as follows:

$rating_i$	Concentration threshold (CT)

[60] See section SCR12(risk-mitigation - financial instruments).

AA-AAA	3%
A	3%
BBB	1.5%
BB or lower	1.5%

SCR.5.151. The risk concentration charge per 'name' i is calculated as:

$Conc_i = Assets_{xl} \bullet XS_i \bullet g_i + \Delta Liab_{ul}$

where XS_i is expressed with reference to the unit (i.e. an excess of exposure i above the threshold of 8%, delivers $XS_i = 0.08$) and the parameter g , depending on the credit rating of the counterparty, is determined as follows:

$rating_i$	Credit Quality Step	g_i
AAA	1	0.12
AA		
A	2	0.21
BBB	3	0.27
BB or lower, unrated	4– 6, -	0.73

and where

SCR.5.152. $\Delta Liab_{ul}$ is the impact on the undertaking's liabilities (for policies where the policyholders bear the investment risk) of a change in the value of the assets of the issuer attracting a concentration risk charge by XSi * gi (subject to a minimum of nil).

SCR.5.153. For "names" which can only be found on the assets used as the reference to the valuation of the liabilities, the risk concentration charge per name 'i' is calculated as follows: Conci = ΔLiabul,i

SCR.5.154. The capital requirement for financial concentration risk is determined assuming a correlation of 0.25 among the requirements for each counterparty i.

$$Mkt_{conc\_financial} = \sqrt{\sum_i \left(Conc_i^2 + \sum_j 0.25 * Conc_i * Conc_j \right)}, \quad for \quad j \neq i$$

SCR.5.155. This sub-module (as for the whole of the market risk module) is in the scope of the approach for the loss absorbency of technical provisions

Special reference to UCITS

SCR.5.156. Investments in a single UCITS *i* are exempted from the concentration risk sub-module if the maximum share of the UCITS assets which are invested in a single body does not exceed

$$CT_{UCITS,i} = CT \cdot \frac{Assets_{xl}}{MW_{UCITS,i}},$$

where

$CT_{UCITS,i}$	=	concentration threshold for UCITS *i*
MWUCITS,i	=	*market value of the undertaking's investment in UCITS i*
CT	=	*concentration threshold of the sub-module, as defined above*
Assetsxl	=	*comparative measure of the sub-module*

SCR.5.157. Whether the UCITS is sufficiently diversified to meet this criterion, may for example be determined:

- from the composition of the UCITS' assets at the valuation date (e.g from list of top holdings),
- if the UCITS' investment policy is to replicate a certain index, from the composition of the index or
- from the diversification requirements for UCITS of the Member State that the UCITS is situated in.

SCR.5.158. A look-through approach should be applied to all UCITS which are not exempted from the sub-module.

Special reference to mortgage covered bonds and public sector covered bonds

SCR.5.159. In order to provide mortgage covered bonds and public sector covered bonds with a treatment in concentration risk sub-module according their specific risk features, the threshold applicable shall be 15 per cent when all the following requirements are met:

- the asset has a AA credit quality
- the portfolio of mortgages backing the asset is diversified into a sufficiently high number of borrowers
- there is no evidence of high correlation or connection among the default of one or few borrowers
- the covered bond meets the requirements defined in Article 22(4) of the UCITS directive 85/611/EEC

Concentration risk capital in case of properties

SCR.5.160. Undertakings shall identify the exposures in a single property higher than 10 per cent of 'total assets' considered in this sub-module according to paragraphs above (subsection *description*). Government bonds should be included in this amount, notwithstanding the exemption specified above.

SCR.5.161. For this purpose the undertaking shall take into account both properties directly owned and those indirectly owned (i.e. funds of properties), and both ownership and any other real exposure (mortgages or any other legal right regarding properties).

SCR.5.162. Properties located in the same building or sufficiently nearby shall be considered a single property.

SCR.5.163. This capital charge is calculated for properties concentration risk under the condition that the assumptions on future bonus rates (reflected in the valuation of future discretionary benefits in technical provisions) remain unchanged before and after a presumed change in volatility and/or default level of concentrated assets.

SCR.5.164. Additionally, the result of the calculation should be determined under the condition that the participant is able to vary its assumptions in future bonus rates in response to the shock being tested. If this calculation is not feasible in a reliable manner, the capital requirement for financial concentration risk shall be the obtained according the previous paragraph.

SCR.5.165. Exposures exceeding the threshold shall deliver a capital requirement calculated applying the formula reflected in this sub-module for financial investments rated as AA. Capital requirements for different properties shall be aggregated assuming a correlation factor 0 between the requirements for each property. The concentration risk component (in respect of properties only) is

$$Mkt_{conc} = \sqrt{\sum_i Conc_i^2} \ .$$

Aggregation of capital requirements reflecting financial and properties concentration risks

SCR.5.166. The total concentration risk capital requirement Mkt_{conc} for financial investments and properties shall be calculated by using the same correlation applied to sub-modules regarding properties and equity risk.

Treatment of risks associated to SPV notes held by a (re)insurance undertaking

SCR.5.167. SPV notesshould be treated as follows:

1) SPV notes having mostly the features of fixed-income bonds, authorized, where the SPV is defined as in point (26) of Article 13 of Directive 2009/138/EC[61] and meet the requirements set out in Article 211 of Directive 2009/138/EC and rated BBB (stable) or better: Their risks shall be considered in the 'spread risk', 'interest rate risk' and concentration sub-modules according its rating.

2)

3) Others SPV notes, including those having significant features of equities (i.e. equity tranche notes): Their risks shall be considered in the 'equity risk' sub-

[61] "special purpose vehicle" means any undertaking, whether incorporated or not, other than an existing insurance or reinsurance undertaking, which assumes risks from insurance or reinsurance undertakings and which fully funds its exposure to such risks through the proceeds of a debt issuance or any other financing mechanism where the repayment rights of the providers of such debt or financing mechanism are subordinated to the reinsurance obligations of such an undertaking

module. For this purpose the SPV notes shall be considered as non-traded equities, unless they are traded actively in a financial market.

SCR.5.168.

SCR.5.169.

SCR.5.170.

SCR.5.171.

SCR.6. SCR Counterparty risk module

SCR.6.1. Introduction

SCR.6.1. The counterparty default risk module should reflect possible losses due to unexpected default, or deterioration in the credit standing, of the counterparties and debtors of insurance and reinsurance undertakings over the forthcoming twelve months. The counterparty default risk module should cover risk-mitigating contracts, such as reinsurance arrangements, securitisations and derivatives, and receivables from intermediaries, as well as any other credit exposures which are not covered in the spread risk sub-module.

SCR.6.2. A differentiation of two kinds of exposures, in the following denoted by type 1 and type 2 exposures, and a different treatment according to their characteristics has to be applied.

SCR.6.3. The class of type 1 exposures covers the exposures which may not be diversified and where the counterparty is likely to be rated. The class should consist of exposures in relation to

- reinsurance arrangements,
- securitisations and derivatives,
- any other risk mitigating contracts,
- cash at bank,
- deposits with ceding institutions, if the number of independent counterparties does not exceed a certain threshold,
- capital, initial funds, letters of credit as well as any other commitments received by the undertaking which have been called up but are unpaid, if the number of independent counterparties does not exceed a certain threshold, and
- guarantees, letters of credit, letters of comfort which the undertaking has provided as well as any other commitments which the undertaking has provided and which depend on the credit standing of a counterparty.

SCR.6.4. The class of type 2 exposures covers the exposures which are usually diversified and where the counterparty is likely to be unrated. The class of type 2 exposure should consist of all exposures which are in the scope of the module and are not of type 1, in particular

- receivables from intermediaries,
- policyholder debtors,
- deposits with ceding institutions, if the number of independent counterparties exceeds a certain threshold, and
- capital, initial funds, letters of credit as well as any other commitments received by the undertaking which have been called up but are unpaid, if the number of independent counterparties exceeds a certain threshold.

SCR.6.5. The capital charges for type 1 and type 2 exposures should be calculated separately. A low diversification effect should be allowed in the aggregation of the requirements as follows:

$$SCR_{def} = \sqrt{SCR_{def,1}^2 + 1.5 \cdot SCR_{def,1} \cdot SCR_{def,2} + SCR_{def,2}^2},$$

where

SCR_{def} = Capital requirement for counterparty default risk
$SCR_{def,1}$ = Capital requirement for counterparty default risk of type 1 exposures
$SCR_{def,2}$ = Capital requirement for counterparty default risk of type 2 exposures

SCR.6.2. Calculation of capital requirement for type 1 exposures

SCR.6.6. The main inputs of the counterparty default risk module are the estimated loss-given-default (LGD) of an exposure and the probability of default (PD) of the counterparty. Given probabilities of default and losses-given-default (LGD) of the counterparties in the portfolio of type 1 exposures, the capital requirement for type 1 exposures is calculated as follows:

$$SCR_{def,1} = \min\left(\sum_i LGD_i ; q \cdot \sqrt{V}\right),$$

where the sum is taken over all independent counterparties with type 1 exposures and

LGD_i = Loss-given-default for type 1 exposure of counterparty i
q = Quantile factor
V = Variance of the loss distribution of the type 1 exposures

SCR.6.7. For the calculation of the variance V of the loss distribution, the following summations of loss-given-default values are relevant. For each rating class *j*, y_j and z_j are defined as follows:

$$y_j = \sum_i LGD_i \quad \text{and} \quad z_j = \sum_i \left(LGD_i\right)^2,$$

where sums run over all independent counterparties *i* in the rating class *j*.
The variance *V* of the loss distribution is then calculated as follows:

$$V = \sum_j \sum_k u_{j,k} \cdot y_j \cdot y_k + \sum_j v_j \cdot z_j$$

where *j* and *k* in the sums run over all rating classes and u_{jk} and v_j are fixed parameters which only depend on the rating classes, with

$$u_{ij} = \frac{p_i(1-p_i)p_j(1-p_j)}{(1+\gamma)(p_i+p_j)-p_i p_j} \qquad v_i = \frac{(1+2\gamma)p_i(1-p_i)}{2+2\gamma-p_i} \quad \text{with } \gamma = \frac{\tau}{\alpha} = 0.25$$

and where *p* denotes the probability of default. For QIS5 this should be set as follows:

$Rating_i$	Credit Quality Step	P_i
AAA	1	0.002%
AA		0.01%

A	2	0.05%
BBB	3	0.24%
BB	4	1.20%
B	5	6.04%
CCC or lower	6, -	30.41%

SCR.6.8. As in Directive 2006/48/EC, in cases where more than one rating is available for a counterparty, the second-highest rating should be used. In order to avoid a distortion of the default experience underlying this assessment, counterparties which would have defaulted without state intervention during the current crisis should be considered as defaulted for the estimation of the default probability of a rating class.

Counterparties without a credit rating

SCR.6.9. A probability of default of 10% should be assigned to counterparties which are not rated.

Counterparties which belong to the same group

SCR.6.10. If an undertaking has more than several counterparty which are not independent (for example because they belong to one group) then it is necessary to assign a probability of default to the whole set of dependent counterparties. This overall probability of default should be average probability of the counterparties weighted with the corresponding losses given-default.

Banks

SCR.6.11. Unrated banks compliant with the Capital Requirements Directive (2006/48/EC) shall be treated as if having a BBB rating.

SCR.6.3. Calculation of capital requirement for type 2 exposures

SCR.6.12. The capital requirement for counterparty default risk of type 2 exposures is calculated with a factor-based approach as follows:

$$SCR_{def,2} = x \cdot E + y \cdot E_{past-due},$$

where

x = Risk factor for type 2 exposures
E = Sum of the values of type 2 exposures, except for receivables from intermediaries which are due for more than T months.
y = Risk factor for past-due receivables from intermediaries
$E_{past-due}$ = Sum of the values of receivables from intermediaries which are due for more than T months.

SCR.6.13. The risk factor x should be a fixed number. It should not depend on the probability of default of the counterparties nor on the size or number of exposures. However, its calibration should implicitly allow for the typical diversification between type 2 exposures.

SCR.6.4. Loss-given-default for risk mitigating contracts

SCR.6.14. The LGD of an exposure is conceptually defined to be the loss of basic own funds which the insurer would incur if the counterparty defaulted.

SCR.6.15. In case of default, typically a part of the exposure can still be collected. In order to allow for the potential recovery of the counterparty, the LGD is amended by a factor (1 – RR) where RR denotes the recovery rate of the counterparty. The recovery rate may be different for reinsurance arrangements and securitisations on one hand and for derivatives on the other hand.

SCR.6.16. For a reinsurance arrangement or securitisation i, the loss-given-default LGD_i should be calculated as follows:

$$LGD_i = \max\left((1 - RR_{re}) \cdot \left(Recoverables_i + RM_{re,i} - Collateral_i\right);0\right),$$

where

RR_{re} = Recovery rate for reinsurance arrangements

$Recoverables_i$ = Best estimate recoverables from the reinsurance contract (or SPV) i according to Article 80 of the Level 1 text plus any other debtors arising out of the reinsurance arrangement or SPV securitisation

$RM_{re,i}$ = Risk mitigating effect on underwriting risk of the reinsurance arrangement or SPV securitisation i

$Collateral_i$ = Risk-adjusted value of collateral in relation to the reinsurance arrangement or SPV securitisation i.

SCR.6.17. The best estimate of the $Recoverables_i$ might be netted with liabilities towards the same legal entity to the extent they could be set off in case of the default of the legal entity. For this purpose, liabilities should be valued according to Article 75.

I. The risk mitigating effect RMre,i is an approximation of the difference between:
- the (hypothetical) capital requirement for underwriting risk under the condition that the reinsurance arrangement or the SPV securitisation is not taken into account in its calculation; and
- the capital requirement for underwriting risk (without any amendments).

II. Where an SPV also transfers market risk, the risk mitigating effect $RM_{re,I}$ should be given by the aggregation (assuming a correlation factor of 0.25) between the amount in I and the difference between:
- the (hypothetical) capital requirement for market risk under the condition that the risk mitigating effect of the SPV is not taken into account in its calculation; and
- the capital requirement for market risk (without any amendments).

SCR.6.18. Thus, if we denote the amount in I. as RMre,i,u/w and the difference referred in II. as RMre,i,mkt, the risk mitigating effect for such SPV is given by:

$$RM_{re,i} = \sqrt{RM_{re,i,u/w}^2 + RM_{re,i,mkt}^2 + 2 \cdot 0.25 \cdot RM_{re,i,u/w} \cdot RM_{re,i,mkt}},$$

SCR.6.19. For a derivative i, the loss-given-default LGDi should be calculated as follows:

$$LGD_i = \max\left(\left(1 - RR_{fin}\right) \cdot \left(MarketValue_i + RM_{fin,i} - Collateral_i\right);0\right),$$

where

RR_{fin} = Recovery rate for derivatives
$MarketValue_i$ = Value of the derivative i according to Article 75 of the Level 1 text
$RM_{fin,i}$ = Risk mitigating effect on market risk of the derivative i
$Collateral_i$ = Risk-adjusted value of collateral in relation to the derivative i.

6.3.1 Calculation of the risk mitigating effect

Sophisticated calculation of the risk mitigating effect

SCR.6.20. The determination of the risk mitigating effects $RM_{re,i}$ and $RM_{fin,i}$ is based on the calculation of two capital requirements:

- The (hypothetical) capital requirement for underwriting and market risk under the condition that the risk mitigating effect of the reinsurance arrangement, SPV or derivative of a particular counterparty is not taken into account in its calculation. These values are only determined for the purpose of the counterparty default risk module.
- The capital requirements for underwriting risk and market risk without any amendments are the requirements as defined in the Level 1 text for these modules. They are available as soon as the calculations of the particular modules have been made.

SCR.6.21. The gross capital requirements in relation to counterparty (i) are determined by a recalculation of the modules which are affected by the risk mitigating contracts with that counterparty. This should be done as follows for life reinsurance and for derivatives:

- If a module or sub-module is scenario-based, the scenario outcome should be reassessed assuming that the risk-mitigating contract with counterparty (i) will not provide any compensation for the losses incurred under the scenario.
- If the sub-module is factor-based, the volume measures which allow for the risk-mitigating effect of the contract need to be reassessed. In particular, the following changes need to be made in this respect:
- In the concentration sub-module of the market risk submodule, the exposure measures *E* should be calculated without allowance for risk-mitigating effects of contracts with counterparty (i);

SCR.6.22. In particular, if a module of the SCR did not allow for the risk mitigating effect of the risk-mitigating contract with counterparty (i) in the calculation of the net capital requirement, the net and gross capital requirements coincide and $RM_{re,i}$ and $RM_{fin,i}$ are zero.

SCR.6.23. For non-life reinsurance, the following method should be applied. If the reinsurance treaties with a counterparty affect only one non-life line of business, then the difference net $SCR_{nl}^{gross} - SCR_{nl}^{net}$ should be approximated by the following term:

$$\sqrt{\begin{aligned}&\left(NL_{cat}^{gross} - NL_{cat}^{net}\right)^2 + \left(3\sigma_{(\text{prem,lob})} \cdot \left(P_{lob}^{gross} - P_{lob}^{net}\right)\right)^2 + \left(3\sigma_{(\text{res,lob})} \cdot recoverables\right)^2 \\ &+ 9\sigma_{(\text{prem,lob})} \cdot \left(P_{lob}^{gross} - P_{lob}^{net}\right) \cdot \sigma_{(\text{res,lob})} \cdot recoverables\end{aligned}}$$

where

$\left(NL_{cat}^{gross} - NL_{cat}^{net}\right)$ = Counterparty's share of CAT losses

$\left(P_{lob}^{gross} - P_{lob}^{net}\right)$ = Reinsurance premium of the counterparty in the affected line of business

recoverables = Reinsurance recoverables in relation to the counterparty in the affected line of business

$\sigma_{(\text{prem,lob})}$ = Standard deviation for premium risk in the affected line of business as used in the premium and reserve risk sub-module

$\sigma_{(\text{res,lob})}$ = Standard deviation for reserve risk in the affected line of business as used in the premium and reserve risk sub-module

SCR.6.24. If the reinsurance treaties with a counterparty affect more than one non-life line of business, the terms defined above for each line of business can be summed up to determine an approximation for $SCR_{nl}^{gross} - SCR_{nl}^{net}$.

Simplified calculation for derivatives

SCR.6.25. The calculation of the risk mitigating effect for life reinsurance can be simplified as follows:

SCR.6.26. If the financial instruments of counterparty (i) affect only one sub-module of the market risk module, then the difference $SCR_{market}^{gross} - SCR_{market}^{net}$ may be replaced by the difference $Mkt_{sub-risk}^{gross} - Mkt_{sub-risk}^{net}$ of the sub-module affected.

SCR.6.27. If the financial instruments of counterparty (i) affect more than one submodule, the difference $SCR_{market}^{gross} - SCR_{market}^{net}$ may be replaced by the sum of the differences $Mkt_{sub-risk}^{gross} - Mkt_{sub-risk}^{net}$ of the sub-modules affected.

Simplified calculation for life reinsurance

SCR.6.28. The calculation of the risk mitigating effect for life reinsurance can be simplified as follows:

SCR.6.29. If the reinsurance treaties with counterparty (i) affect only one sub-module of the life underwriting risk module, then the difference $SCR_{life}^{gross} - SCR_{life}^{net}$ may be replaced by the difference $Life_{sub-risk}^{gross} - Life_{sub-risk}^{net}$ of the sub-module affected.

SCR.6.30. If the reinsurance treaties with counterparty (i) affect more than one submodule of the life underwriting risk module, the difference $SCR_{life}^{gross} - SCR_{life}^{net}$ may be replaced by the sum of the differences $Life_{sub-risk}^{gross} - Life_{sub-risk}^{net}$ of the sub-modules affected.

SCR.6.31. For proportional life reinsurance a further simplification is possible:

$$SCR_{life}^{gross} - SCR_{life}^{net} \approx \left(\frac{BE^{gross}}{BE^{net}} - 1 \right) \cdot SCR_{life}^{net},$$

where BE^{net} is the best estimate provision for life insurance net of reinsurance, and BEgross is the best estimate provision for life insurance net of reinsurance except reinsurance towards counterparty (i).

Simplified calculation for non-life reinsurance

SCR.6.32. The calculation of the risk mitigating effect for non-life reinsurance can be simplified as follows:

- In a first step, calculate $SCR_{nl}^{gross} - SCR_{nl}^{net}$ for all reinsurance counterparties together.
- In a second step, approximate the share of a single counterparty (i) as follows:

$$\left(SCR_{nl}^{gross} - SCR_{nl}^{net}\right)_i \approx \left(SCR_{nl}^{gross} - SCR_{nl}^{net}\right) \cdot \frac{\mathrm{Re}\,c_i}{\mathrm{Re}\,c_{total}},$$

where Rec_i are the reinsurance recoverables towards counterparty (i) and Rec_{total} the overall reinsurance recoverables.

Implementation of the simplified calculations for derivatives and reinsurance

SCR.6.33. The simplifications should only be used if the following conditions are met:

- There are no indications that the simplification significantly misestimates the risk mitigating effect.
- The capital requirement for counterparty default risk under the simplified calculation is less than 20% of the overall SCR before and deferred taxes. For this comparison the overall SCR can be calculated by means of the simplified calculation for the counterparty default risk capital requirement.
- The result of the sophisticated calculation is not easily available.

Simplification in relation to the number of counterparties

SCR.6.34. In order to reduce the number of calculations of risk mitigating effects, the following simplification are offered:

SCR.6.35. Instead of treating each counterparty (i) separately in the calculation of LGD_i and SCR_{def}, the set of counterparties is divided into disjoint subsets and the calculation is modified as follows:

- In the determination of LGD_i each subset is treated as one counterparty.
- For the calculation of SCR_{def} it is necessary to assign a probability of default (or a rating) to the subset. This probability of default is the highest probability of default of the counterparties in the subset.

SCR.6.5. Loss-given-default for type 1 exposures other than risk mitigating contracts

SCR.6.36. For cash at bank, deposits with ceding institutions and unpaid but called up capital the loss-given-default should be the value of the corresponding asset according to Article 75 of the Level 1 text.

SCR.6.37. For guarantees, letters of credit, letters of comfort and other commitment which depend on the credit standing of a counterparty the loss-given default should be the difference between their nominal value and their value according to Article 75 of the Level 1 text.,

SCR.6.38. If in relation to a counterparty more than one type 1 exposures exist, then the loss-given-default for this counterparty should be the sum of the losses-given-default of the single exposures assignment.

SCR.6.6. Independence of counterparties

SCR.6.39. The calculation of the capital requirements for type 1 exposures takes into account diversification effects between independent counterparties. An economic approach has to be taken in order to decide whether counterparties are independent or not.

SCR.6.40. Counterparties which belong to the same group as defined in Article 212 of the Level 1 text or to the same financial conglomerate as defined in Article 2(14) of the Financial Conglomerate Directive (2002/87/EC) should not be treated as independent counterparties. The legal entities of the group or of the capital requirement.

SCR.6.7. Treatment of risk mitigation techniques

SCR.6.41. The counterparty default risk module should take into account techniques to mitigate default risk like collaterals or netting of receivables with liabilities. Allowance should be made as follows:

Collaterals

SCR.6.42. If a collateral is posted in relation to the exposure, the custodian holding the collateral is independent from the counterparty and the requirements defined for collaterals in CEIOPS' Advice on financial risk mitigation techniques (CEIOPS-DOC-29/09) are met, then the loss-given-default (in case of a type 1 exposure) or the value of the exposure (in case of a type 2 exposure) may be reduced by the risk-adjusted value of the collateral.

The risk-adjusted value of the collateral should be calculated as follows:

$$Collateral = 80\% \cdot \left(MarketValue_{Collateral} - MktRisk_{Collateral}\right),$$

where

$MarketValue_{Collateral}$ = Market value of the collateral assets
$MktRisk_{Collateral}$ = Adjustment for market risk.

SCR.6.43. Where the collateral assets are bankruptcy remote and no there is no credit risk present, the factor of 80% should be replaced by a factor of 100%.

SCR.6.44. For the calculation of the adjustment for market risk, the reduction of the market value of the collateral according to the equity, property, credit spread and currency risk sub-module should be determined and aggregated according to the correlation matrix of the market risk module.

SCR.6.45. For the calculation of the currency risk sub-module, the currency of the collateral is compared to the currency of the secured credit exposure. If the collateral assets are bank deposits which are not subject to the credit spread risk, the adjustment should be increased by the capital requirement for counterparty default risk of the deposits.

SCR.6.46. If it is proportionate to the nature scale and complexity of the risks inherent in the collateral arrangement, a simplification as follows can be applied:

$$Collateral = 70\% \cdot MarketValue_{Collateral}$$

where the collateral assets are bankruptcy remote and there is no credit risk present, a simplification as follows can be applied:

$$Collateral = 85\% \cdot MarketValue_{Collateral}$$

Segregated assets

SCR.6.47. Where, and to the extent that, the liabilities of the counterparty are covered by strictly segregated assets under arrangements which meet the requirements set out in CEIOPS' Advice on financial risk mitigation techniques, the segregated assets should be treated like collaterals in the calculation of the counterparty default risk module.

Letters of credit

SCR.6.48. If a letter of credit is provided to secure a credit exposure and the arrangement meets the requirement defined in CEIOPS' Advice on financial risk mitigation techniques, then the counterparty of the credit exposure can be replaced by the provider of the letter of credit in the calculation of the counterparty default risk module. This replacement affects the probability of default that is taken into account in the calculation as well as the assessment whether the counterparty is independent from other counterparties.

SCR.6.49. A letter of credit should not be taken into account in the calculation of the counterparty default risk module if is approved as ancillary own funds.

Netting

SCR.6.50. The loss-given-default (in case of a type 1 exposure) or the value of the exposure (in case of a type 2 exposure) may be netted with liabilities towards the same legal entity to the extent they could be set off in case of default of the legal entity. The general requirement defined in CEIOPS' Advice on financial risk mitigation techniques and CEIOPS' Advice on reinsurance risk mitigation techniques (CEIOPS-DOC-44/09) should be met in relation to netting if it is taken into account in the calculation. In particular, if the legal situation in relation to netting is unclear, then no netting should be taken into account. No netting should be allowed for if the liabilities are expected to be met before the credit exposure is cleared.

SCR.6.8. Calibration

SCR.6.51. According to the above outset of the counterparty default risk module, the following parameters of the formula need to be specified:

- the recovery rates RR_{re} and RR_{fin},
- the parameters α and τ of the loss distribution for type 1 exposures,
- the quantile factor *q* which is applied to the standard deviation of the loss distribution to estimate the 99.5% quantile,
- the risk factors *x* and y for type 2 exposures as well as the number of months *T* which is used to define the past-due receivables of intermediaries,
- the thresholds to define when deposits with ceding institutions and called up but unpaid commitments are treated as type 1 or type 2 exposures.

Recovery rate

SCR.6.52. The recovery rates RR_{re} and RR_{fin} for reinsurance arrangements and derivatives are set at RR_{re} = 50% and RR_{fin} = 10%.

However, if a reinsurance counterparty has tied up an amount for collateralisation commitments (both on and off balance sheet, including commitments) greater than 60% of the assets on its balance sheet, the recovery rate should be set to 10% rather than 50%.

The parameters α and τ of the loss distribution for type 1 exposures

SCR.6.53. In order to determine the capital requirement from the loss distribution, only the variance of the distribution is used. This variance[62] only depends on the ratio τ/α.The ratio τ/α should properly reflect the volatility in the probability of default of reinsurers and issuers of derivatives as well as the dependence between the defaults of such counterparties. The ratio should be set at τ/α = 0.25.

The quantile factor *q*

SCR.6.54. The shape of the distribution depends both on the probability of default of the counterparties in the portfolio as well as their number.

SCR.6.55. The quantile factor should be set as follows:

$$q = \begin{cases} 3 & if \quad \sqrt{V} \leq 5\% \cdot \sum_i LGD_i \\ 5 & else \end{cases}$$

The risk factors for type 2 exposures

SCR.6.56. For type 2 exposures the capital requirement is calculated by multiplying the market value of the exposure with a fixed risk factor x. The risk factors for type 2 exposures have to be chosen consistently with the model for type 1 exposures. The risk

[62] See P. ter Berg: Portfolio modelling of counterparty reinsurance default risk. *Life & Pensions*, April 2008.

factor for intermediary receivable which are past-due for more than $T = 3$ months is set at $y = 90\%$. For all other type 2 exposures a risk factor $x = 15\%$ has to be applied.

The threshold to distinguish between type 1 and type 2 exposures

SCR.6.57. If the number of independent counterparties in relation to deposits with ceding institutions does not exceed 15, these exposures should be treated as type 1 exposures. The same should apply to called up but unpaid commitments. For determining the number of independent counterparties, those counterparties that belong to one group should be treated as one independent counterparty.

SCR.6.58. The undertaking is still allowed to classify these deposits with ceding institutions and called up but unpaid commitments as type 1 exposures. However, the undertaking must classify all such exposures as type 1 or as type 2.

SCR.7. SCR Life underwriting risk module

SCR.7.1. Structure of the SCR_{life} life underwriting risk module

SCR.7.1. This module concerns the risk arising from the underwriting of life insurance contracts, associated with both the perils covered and the processes followed in the conduct of the business.

SCR.7.2. Based on the principle of substance over form, agreed claims arising from non-life business payable in the form of an annuity should be part of SCR_{life} (subject to materiality considerations). In particular, the risk of revision is applicable only to this type of annuities.

SCR.7.3. A number of the life underwriting risk stresses are based on a delta-NAV (change in value of assets minus liabilities) approach. The change in net asset value should be based on a balance sheet that does not include the risk margin of the technical provisions. This approach is based on the assumption that the risk margin does not change materially under the scenario stress. This simplification is made to avoid a circular definition of the SCR since the size of the risk margin depends on the SCR.

SCR.7.4. Underwriting risks can affect an undertaking's liabilities as well as its assets. The scope of the life underwriting module is not confined to the liabilities.

SCR.7.5. The revaluation should allow for any relevant adverse changes in option take-up behaviour of policyholders in this scenario.

SCR.7.6. Where risk mitigation techniques meet the requirements set out in CEIOPS Advice on reinsurance and financial risk mitigation, the scenarios required for the calculation of the life underwriting risk module will incorporate their effect.

SCR.7.7. This module is intended to cover underwriting risk for all life guarantees and is split into two sub-modules: life underwriting risk (excluding catastrophe risk) and catastrophe risk.

SCR.7.8. The following input information is required:

$Life_{UL/C}$	=	Capital charge for life insurance obligations (excluding obligations stemming from catastrophe risk)
$nLife_{UL/C}$	=	Capital charge for life insurance obligations including the loss absorbing capacity of technical provisions (excluding obligations stemming from catastrophe risk)
$Life_{CAT}$		Capital charge for life insurance obligations catastrophe risk
$nLife_{CAT}$		Capital charge for life insurance obligations catastrophe risk including the loss absorbing capacity of technical provisions

SCR.7.9. The risk module delivers the following output:

SCR_{Life}	=	Capital charge for life underwriting risk
$nSCR_{Life}$	=	Capital charge for life underwriting risk including the loss absorbing capacity of technical provisions

SCR.7.10. The capital charge for life underwriting risk is derived by combining the capital charges for the life sub-modules using a correlation matrix as follows:

$$SCR_{Life} = \sqrt{\sum_{rxc} CorrUL_{r,c} \bullet Life_r \bullet Life_c}$$

where:

$CorrUL_{r,c}$	=	Cells of the matrix $CorrUL$
$Life_r, Life_c$	=	The capital charges for individual health underwriting sub-modules according to the rows and columns of correlation matrix $CorrUL$

and where the correlation matrix $Corr_{UL}$ is defined as:

$CorrUL$	$Life_{UL/C}$	$Life_{CAT}$
$Life_{UL/C}$	1	
$Life_{CAT}$	0.25	1

SCR.7.11. The capital charge for $nSCR_{Life}$ is determined as follows:

$$nSCR_{Life} = \sqrt{\sum_{rxc} CorrUL_{r,c} \bullet nLife_r \bullet nLife_c}$$

SCR.7.2. $Life_{UL/C}$ life underwriting risk sub-module (excluding life CAT risk)

Description

SCR.7.12. In this sub-module life underwriting risk is split into biometric risks (comprising mortality risk, longevity risk and disability/morbidity risk), lapse risk, expense risk and revision risk.

Input

SCR.7.13. The following input information is required:

$Life_{rev}$	=	Capital charge for revision risk
$Life_{mort}$	=	Capital charge for mortality risk
$Life_{long}$	=	Capital charge for longevity risk

$Life_{dis}$	=	Capital charge for disability risk
$Life_{lapse}$	=	Capital charge for lapse risk
$Life_{exp}$	=	Capital charge for expense risk
$nLife_{mort}$	=	Capital charge for mortality risk including the risk absorbing effect of future profit sharing
$nLife_{long}$	=	Capital charge for longevity risk including the risk absorbing effect of future profit sharing
$nLife_{dis}$	=	Capital charge for disability risk including the risk absorbing effect of future profit sharing
$nLife_{lapse}$	=	Capital charge for lapse risk including the risk absorbing effect of future profit sharing
$nLife_{exp}$	=	Capital charge for expense risk including the risk absorbing effect of future profit sharing

<u>Output</u>

SCR.7.14. The module delivers the following output:

$Life_{UL/C}$	=	Capital charge for life risk
$nLife_{UL/C}$	=	Capital charge for life risk including the risk absorbing effect of future profit sharing

<u>Calculation</u>

SCR.7.15. The capital charge for life risk is derived by combining the capital charges for the life sub-risks using a correlation matrix as follows:

$$Life_{UL/C} = \sqrt{\sum_{rxc} CorrLife_{r,c} \bullet Life_r \bullet Life_c}$$

where

$Life_{UL/C}$	=	Capital charge for life risk
$CorrLife_{r,c}$	=	the cells of the correlation matrix *CorrLife*
$Life_r$, $Life_c$	=	Capital charges for individual life sub-risks according to the rows and columns of correlation matrix *CorrLife*

and where the correlation matrix *CorrLife* is defined as:

	mortality	longevity	disability	lapse	expenses	revision
mortality	1					

longevity	-0.25	1				
disability	0.25	0	1			
lapse	0	0.25	0	1		
expenses	0.25	0.25	0.5	0.5	1	
revision	0	0.25	0	0	0.5	1

SCR.7.16. The net capital charge for life risk is determined as follows:

$$nLife_{UL/C} = \sqrt{\sum_{rxc} CorrLife_{r,c} \bullet nLife_r \bullet nLife_c}$$

where $nLife_{rev}$ is defined to be $Life_{rev}$

SCR.7.3. $Life_{mort}$ mortality risk

Description

SCR.7.17. Mortality risk is associated with (re)insurance obligations (such as term assurance or endowment policies) where a (re)insurance undertaking guarantees to make a single or recurring series of payments in the event of the death of the policyholder during the policy term.

SCR.7.18. It is applicable for (re)insurance obligations contingent on mortality risk i.e. where the amount currently payable on death exceeds the technical provisions held and, as a result, an increase in mortality rates is likely to lead to an increase in the technical provisions.

SCR.7.19. The capital requirement should be calculated as the change in net asset value (assets minus liabilities) following a permanent increase in mortality rates.

SCR.7.20. Where (re)insurance obligations provide benefits both in case of death and survival and the death and survival benefits are contingent on the life of the same insured person(s), these obligations should not be unbundled. For these contracts the mortality scenario should be applied fully allowing for the netting effect provided by the 'natural' hedge between the death benefits component and the survival benefits component (note that a floor of zero applies at the level of contract if the net result of the scenario is favourable to the (re)insurer).

SCR.7.21. Where obligations can be unbundled but are not material, then unbundling should not be required, in line with QIS5 guidance on segmentation.

SCR.7.22. Where model points are used for the purposes of calculating the technical provisions and the grouping of the data captures appropriately the mortality risk of the portfolio, each model points can be considered to represent a single insured person for the purposes of applying the above advice.

Input

SCR.7.23. No specific input data is required for this module.

Output

1. The module delivers the following output:

$Life_{mort}$	=	Capital charge for mortality risk
$nLife_{mort}$	=	Capital charge for mortality risk including the risk absorbing effect of future profit sharing

Calculation

SCR.7.24. The capital charge for mortality risk is defined as the result of a life mortality scenario defined as follows:

$$Life_{mort} = \sum_i \left(\Delta NAV \,\middle|\, mortshock\right)$$

where the subscript i denotes each policy where the payment of benefits (either lump sum or multiple payments) is contingent on mortality risk. The other terms represent

ΔNAV	=	The change in the net value of assets minus liabilities
$mortshock$	=	A (permanent) 15% increase in mortality rates for each age

SCR.7.25. The life mortality scenario should be calculated under the condition that the assumptions on future bonus rates (reflected in the valuation of future discretionary benefits in technical provisions) remain unchanged before and after the shocks being tested.

SCR.7.26. Additionally, the result of the scenario should be determined under the condition that the participant is able to vary its assumptions in future bonus rates in response to the shock being tested. The resulting capital charge is $nLife_{mort}$.

Simplification

SCR.7.27. The simplification may be used provided the following conditions are met:

- The simplification is proportionate to the nature, scale and complexity of the risks that the undertaking faces.

- The assumed 10% increase in mortality rates underlying the simplification for each annual increase in age is consistent with the mortality assumption used in the calculation of the best estimate liability.

- The capital requirement for mortality risk under the simplified calculation is less than 5% of the overall SCR before adjustment for the loss-absorbing capacity of technical provisions and deferred taxes. For this comparison the overall SCR can be calculated by means of the simplified calculation for the mortality risk capital requirement.

- The standard calculation of the mortality risk sub-module is an undue burden for the undertaking.

SCR.7.28. The simplification is defined as follows:

Mortality capital requirement = (Total capital at risk) * q(firm-specific) * n * 0.15 * (Projected Mortality Increase)

where:

n = modified duration of liability cash-flows

q = Expected average death rate over the next year weighted by sum assured

Projected Mortality Increase = $1.1^{((n-1)/2)}$

SCR.7.4. Life$_{long}$ longevity risk

Description

SCR.7.29. Longevity risk is associated with (re)insurance obligations (such as annuities) where a (re)insurance undertaking guarantees to make recurring series of payments until the death of the policyholder and where a decrease in mortality rates leads to an increase in the technical provisions, or with (re)insurance obligations (such as pure endowments) where a (re)insurance undertaking guarantees to make a single payment in the event of the survival of the policyholder for the duration of the policy term.

SCR.7.30. It is applicable for (re)insurance obligations contingent on longevity risk i.e. where there is no death benefit or the amount currently payable on death is less than the technical provisions held and, as a result, a decrease in mortality rates is likely to lead to an increase in the technical provisions.

SCR.7.31. The risk that a policyholder lives longer than anticipated is longevity risk.

SCR.7.32. The capital requirement should be calculated as the change in net asset value (assets minus liabilities) following a permanent decrease in mortality rates.

SCR.7.33. Where (re)insurance obligations provide benefits both in case of death and survival and the death and survival benefits are contingent on the life of the same insured person(s), these obligations should not be unbundled. For these contracts the longevity scenario should be applied fully allowing for the netting effect provided by the ‘natural’ hedge between the death benefits component and the survival benefits component (note that a floor of zero applies at the level of contract if the net result of the scenario is favourable to the (re)insurer).

SCR.7.34. Where obligations can be unbundled but are not material, then unbundling should not be required, in line with QIS5 guidance on segmentation.

SCR.7.35. Where model points are used for the purposes of calculating the technical provisions and the grouping of the data captures appropriately the longevity risk of the portfolio, each model points can be considered to represent a single insured person for the purposes of applying the above advice.

Input

SCR.7.36. No specific input data is required for this module.

Output

2. The module delivers the following output:

$Life_{long}$	=	Capital charge for longevity risk
$nLife_{long}$	=	Capital charge for longevity risk including the risk absorbing effect of future profit sharing

Calculation

SCR.7.37. The capital charge for longevity risk is defined as a result of a longevity scenario as follows:

$$Life_{long} = \sum_{i} \left(\Delta NAV \,\middle|\, longevityshock \right)$$

where the subscript i denotes each policy where the payment of benefits (either lump sum or multiple payments) is contingent on longevity risk. The other terms represent

ΔNAV	=	The change in the net value of assets minus liabilities
$longevityshock$	=	a (permanent) 25% decrease in mortality rates for each age

SCR.7.38. The life longevity scenario should be calculated under the condition that the assumptions on future bonus rates (reflected in the valuation of future discretionary benefits in technical provisions) remain unchanged before and after the shocks being tested.

SCR.7.39. Additionally, the result of the scenario should be determined under the condition that the participant is able to vary its assumptions in future bonus rates in response to the shock being tested. The resulting capital charge is $nLife_{long}$.

Simplification

SCR.7.40. The simplification may be used provided the following conditions are met:

- The simplification is proportionate to the nature, scale and complexity of the risks that the undertaking faces.

- The assumed 10% increase in mortality rates underlying the simplification for each annual increase in age is consistent with the mortality assumption used in the calculation of the best estimate liability.

- The capital requirement for longevity risk under the simplified calculation is less than 5% of the overall SCR before adjustment for the loss-absorbing capacity of technical provisions and deferred taxes. For this comparison the overall SCR can be calculated by means of the simplified calculation for the longevity risk capital requirement.

The standard calculation of the longevity risk sub-module is an undue burden for the undertaking.

SCR.7.41. The simplification is defined as follows:

Longevity capital requirement = 25% * q *$(1.1)^{((n-1)/2)}$ * n * (Best estimate provisions for contracts subject to longevity risk)

where:

n = modified duration of liability cash-flows

q = Expected average death rate over the next year weighted by sum assured.

SCR.7.5.$Life_{dis}$ disability risk

Description

SCR.7.42. Morbidity or disability risk is associated with all types of insurance compensating or reimbursing losses (e.g. loss of income) caused by illness, accident or disability (income insurance), or medical expenses due to illness, accident or disability (medical insurance), or where morbidity acts as an acceleration of payments or obligations which fall due on death.

SCR.7.43. It is applicable for (re)insurance obligations contingent on a definition of disability. However CEIOPS expects that the majority of (re)insurance obligations for which disability-morbidity risk is applicable will be covered by the health module rather than by the life underwriting module. This sub-module of the life underwriting risk module is therefore likely to be applicable only in cases where it is not appropriate to unbundle contracts.

SCR.7.44. Where obligations can be unbundled but are not material, then unbundling should not be required, in line with the principle of materiality developed in the QIS5 specifications on segmentation.

SCR.7.45. The (re)insurance obligations may be structured such that, upon the diagnosis of a disease or the policyholder being unable to work as a result of sickness or disability, recurring payments are triggered. These payments may continue until the expiry of some defined period of time or until either the recovery or death of the policyholder. In the latter case, the (re)insurance undertaking is also exposed to the risk that the policyholders receives the payments for longer than anticipated i.e. that claim termination rates are lower than anticipated (recovery risk).

Input

SCR.7.46. No specific input data is required for this module.

Output

SCR.7.47. The module delivers the following output:

$Life_{dis}$	=	Capital charge for disability risk
$nLife_{dis}$	=	Capital charge for disability risk including the risk absorbing effect of future profit sharing

Calculation

SCR.7.48. The capital charge for disability risk is defined as the result of a disability scenario as follows:

$$Life_{dis} = \sum_i \left(\Delta NAV \mid disshock\right)$$

where the subscript i denotes each policy where the payment of benefits (either lump sum or multiple payments) is contingent on disability risk. The other terms represent

ΔNAV	=	Change in the net value of assets minus liabilities
$Disshock$	=	• Increase of 50% in disability rates for the next year, together with a (permanent) 25% increase (over best estimate) in disability rates at each age in following years • Plus, where applicable, a permanent decrease of 20% in morbidity/disability recovery rates.

SCR.7.49. The life disability scenarios should be calculated under the condition that the assumptions on future bonus rates (reflected in the valuation of future discretionary benefits in technical provisions) remain unchanged before and after the shocks being tested.

SCR.7.50. Additionally, the result of the scenario should be determined under the condition that the participant is able to vary its assumptions in future bonus rates in response to the shock being tested. The resulting capital charge is $nLife_{dis}$.

Simplification

SCR.7.51. The simplification may be used provided the following conditions are met:

- The simplification is proportionate to the nature, scale and complexity of the risks that the undertaking faces.

- The assumed 10% increase in mortality rates underlying the simplification for each annual increase in age is consistent with the mortality assumption used in the calculation of the best estimate liability.

- The capital requirement for disability-morbidity risk under the simplified calculation is less than 5% of the overall SCR before adjustment for the loss-absorbing capacity of technical provisions and deferred taxes. For this comparison the overall SCR can be calculated by means of the simplified calculation for the disability-morbidity risk capital requirement.

  The standard calculation of the disability-morbidity risk sub-module is an undue burden for the undertaking.

SCR.7.52. The simplification is defined as follows:

Disability capital requirement =

(total disability capital at risk)$_1$ * i(firm-specific)$_1$ * 0.50

+ (total disability capital at risk)$_2$ * i(firm-specific)$_2$ * 0.25 * (Projected Disability Increase) * (n-1)

+ 20% * t *$(1.1)^{((n-1)/2)}$ * n * (Best estimate provisions for contracts subject to disability claims)

Where:

n = Modified duration of liability cash-flows

i_1,i_2 = Expected movements from healthy to sick over the first (next) and second years respectively weighted by sum assured or annual payment as appropriate for the product in question.

Projected Disability Increase = $1.1^{((n-2)/2)}$

t = Expected termination rate i.e. movement from sick to healthy/dead over the next year

SCR.7.6. $Life_{lapse}$ lapse risk

Description

SCR.7.53. In the scenario calculations of QIS5, the revaluation of technical provisions should allow for relevant adverse changes in option take-up behaviour of policyholders under the specified scenario.

SCR.7.54. In relation to the policyholder options that the lapse sub-module covers, a comprehensive approach should be taken. Ideally, the module should take account of all legal or contractual policyholder options which can significantly change the value of the future cash-flows. This includes options to fully or partly terminate, decrease, restrict or suspend the insurance cover as well as options which allow the full or partial establishment, renewal, increase, extension or resumption of insurance cover.

SCR.7.55. In the following, the term "lapse" is used to denote all these policyholder options.

Input

SCR.7.56. No specific input data is required for this module.

Output

SCR.7.57. The module delivers the following output:

$Life_{lapse}$	=	Capital charge for lapse risk (not including the risk absorbing effect of future profit sharing)
$nLife_{lapse}$	=	Capital charge for lapse risk including the risk absorbing effect of future profit sharing

Calculation

SCR.7.58. The capital requirement for lapse risk should be calculated as follows:

$$Life_{lapse} = \max(Lapse_{down}; Lapse_{up}; Lapse_{mass}),$$

where

$Life_{lapse}$	=	Capital requirement for lapse risk
$Lapse_{down}$	=	Capital requirement for the risk of a permanent decrease of the rates of lapsation
$Lapse_{up}$	=	Capital requirement for the risk of a permanent increase of the rates of lapsation
$Lapse_{mass}$	=	Capital requirement for the risk of a mass lapse event

SCR.7.59. Capital requirements for the three sub-risks should be calculated based on a policy-by-policy comparison of surrender value and best estimate provision. The surrender strain of a policy is defined as the difference between the amount currently payable on surrender and the best estimate provision held. The amount payable on surrender should be calculated net of any amounts recoverable from policyholders or

agents e.g. net of any surrender charge that may be applied under the terms of the contract. In this context, the term “surrender” should refer to all kind of policy terminations irrespective of their name in the terms and conditions of the policy. In particular, the surrender value may be zero if no compensation is paid on termination.

SCR.7.60. The capital requirement for the risk of a permanent decrease of the rates of lapsation should be calculated as follows:

$$Lapse_{down} = \Delta NAV \mid lapseshock_{down},$$

where

ΔNAV	=	Change in the net value of assets minus liabilities (not including changes in the risk margin of technical provisions where it needs to be calculated separately)
$lapseshock_{down}$	=	Reduction of 50% in the assumed option take-up rates in all future years for all policies without a positive surrender strain or otherwise adversely affected by such risk. Affected by the reduction are options to fully or partly terminate, decrease, restrict or suspend the insurance cover. Where an option allows the full or partial establishment, renewal, increase, extension or resumption of insurance cover, the 50% reduction should be applied to the rate that the option is not taken up. The shock should not change the rate to which the reduction is applied to by more than 20% in absolute terms.

SCR.7.61. The capital requirement for the risk of a permanent increase of the rates of lapsation should be calculated as follows:

$$Lapse_{up} = \Delta NAV \mid lapseshock_{up},$$

where

ΔNAV	=	Change in the net value of assets minus liabilities (not including changes in the risk margin of technical provisions where it needs to be calculated separately)
$lapseshock_{up}$	=	Increase of 50% in the assumed option take-up rates in all future years for all policies with a positive surrender strain or otherwise adversely affected by such risk. Affected by the increase are options to fully or partly terminate, decrease, restrict or suspend the insurance cover. Where an option allows the full or partial establishment, renewal, increase, extension or resumption of insurance cover, the 50% increase should be applied to the rate that the option is not taken up. The shocked rate should not exceed 100%.

SCR.7.62. Therefore, the shocked take-up rate should be restricted as follows:

$$R_{up}(R) = \min(150\% \cdot R; 100\%) \quad \text{and}$$

$$R_{down}(R) = \max(50\% \cdot R; R - 20\%),$$

where

R_{up}	=	shocked take-up rate in $lapseshock_{up}$
R_{down}	=	shocked take-up rate in $lapseshock_{down}$
R	=	take-up rate before shock

SCR.7.63. The capital requirement for the risk of a mass lapse event $Lapse_{mass}$ should be defined as 30% of the sum of surrender strains over the policies where the surrender strain is positive.

SCR.7.64. For non-retail business, the capital requirement for the risk of a mass lapse event $Lapse_{mass}$ should be defined as 70% of the sum of surrender strains over the policies where the surrender strain is positive.

Simplifications

Calculation on policy-by-policy basis

SCR.7.65. If it is proportionate to the nature, scale and complexity of the risk, the comparison of surrender value and best estimate provision referred to in paragraph **Error! Reference source not found.** might be made on the level of homogeneous risk groups instead of a policy-by-policy basis. A calculation on the level of homogeneous risk groups should be considered to be proportionate if

- the homogeneous risk groups appropriately distinguish between policies of different lapse risk;
- the result of a policy-by-policy calculation would not differ materially from a calculation on homogeneous risk groups; and
- a policy-by-policy calculation would be an undue burden compared to a calculation on homogeneous risk groups which meet criteria (a) and (b).

Factor-based formula for scenario effect

SCR.7.66. A simplified calculation of $Lapse_{down}$ and $Lapse_{up}$ may be made if the following conditions are met:

- The simplified calculation is proportionate to nature, scale and complexity of the risk.
- The capital requirement for lapse risk under the simplified calculation is less than 5% of the overall SCR before adjustment for the loss-absorbing capacity of technical provisions and deferred taxes. For this comparison the overall SCR can be calculated by means of the simplified calculation for the lapse risk capital requirement.

- The quantification of the scenario effect defined above would be an undue burden.

SCR.7.67. The simplified calculations are defined as follows:

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

and

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

where

$l_{down}; l_{up}$	=	estimate of the average rate of lapsation of the policies with a negative/positive surrender strain
$n_{down}; n_{up}$	=	average period (in years), weighted by surrender strains, over which the policy with a negative/positive surrender strain runs off
$S_{down}; S_{up}$	=	sum of negative/positive surrender strains

SCR.7.68. The simplified calculation should be done at an appropriate granularity. Note that under the simplification, the constraint to look at $Lapse_{down}$, $Lapse_{up}$, and mass Lapse still applies.

SCR.7.7.Life$_{exp}$ expense risk

Description

SCR.7.69. Expense risk arises from the variation in the expenses incurred in servicing insurance or reinsurance contracts.

SCR.7.70. It is likely to be applicable for all (re)insurance obligations.

SCR.7.71. Note that as opposed to QIS4 there is no specific reference to policies with adjustable loadings.

Input

SCR.7.72. No specific input data is required for this module.

Output

SCR.7.73. The module delivers the following output:

$Life_{exp}$	=	Capital charge for expense risk
$nLife_{exp}$	=	Capital charge for expense risk including the risk absorbing effect of future profit sharing

Calculation

SCR.7.74. The capital charge for expense risk is determined as follows:

$$Life_{exp} = \Delta NAV \mid expshock$$

where:

ΔNAV	=	Change in the net value of assets minus liabilities
expshock	=	Increase of 10% in future expenses compared to best estimate anticipations, and increase by 1% per annum of the expense inflation rate compared to anticipations.

SCR.7.75. The life expense risk scenario should be calculated under the condition that the assumptions on future bonus rates (reflected in the valuation of future discretionary benefits in technical provisions) remain unchanged before and after the shock being tested.

SCR.7.76. An expense payment should not be included in the scenario, if its amount is already fixed at the valuation date (for instance agreed payments of acquisition provisions).

SCR.7.77. Additionally, the result of the scenario should be determined under the condition that the participant is able to vary its assumptions in future bonus rates in response to the shock being tested. The resulting capital charge is $nLife_{exp}$.

Simplification

SCR.7.78. The simplification may be used provided the following conditions are met:

- The simplification is proportionate to the nature, scale and complexity of the risks that the undertaking faces.
- The capital requirement for expense risk under the simplified calculation is less than 5% of the overall SCR before adjustment for the loss-absorbing capacity of technical provisions and deferred taxes. For this comparison the overall SCR can be calculated by means of the simplified calculation for the expense risk capital requirement.

  The standard calculation of the expense risk sub-module is an undue burden for the undertaking.

SCR.7.79. The simplification is defined as follows:

- Expense risk capital requirement =
- (Renewal expenses in the 12 months prior to valuation date) * n(exp) * 10%
- + (Renewal expenses in the 12 months prior to valuation date) *
- $(\frac{1}{k} * ((1+k)^{n(\exp)} - 1) - \frac{1}{i} * ((1+i)^{n(\exp)} - 1))$

- Where n(exp) = average (in years) period over which the risk runs off, weighted by renewal expenses

- i = Expected inflation rate (i.e. inflation assumption applied in calculation of best estimate)

- k = Stressed inflation rate (i.e. i + 1%)

SCR.7.8. $Life_{rev}$ revision risk

Description

SCR.7.80. In the context of the life underwriting risk module, revision risk is intended to capture the risk of adverse variation of an annuity's amount, as a result of an unanticipated revision of the claims process.

SCR.7.81. This risk should be applied only to:

- Annuities arising from non-life claims (excluding annuities arising from health obligations which are treated in the health SLT module) where the amount of the annuity may be revised during the next year.

- Benefits that can be approximated by a life annuity arising from non-life claims (excluding annuities arising from health obligations which are treated in the health SLT module) where the amount of the annuity may be revised during the next year.

Input

SCR.7.82. No specific input data is required for this module.

Output

SCR.7.83. The module delivers the following output:

$Life_{rev}$ = Capital charge for revision risk

Calculation

SCR.7.84. The capital charge for revision risk is determined as follows:

$$Life_{rev} = \Delta NAV \,|\, \mathrm{rev}\ shock$$

where:

ΔNAV	=	Change in the net value of assets minus liabilities
$revshock$	=	Increase of 3% in the annual amount payable for annuities exposed to revision risk. The impact should be assessed considering the remaining run-

off period.

SCR.7.9. Life_{CAT} catastrophe risk sub-module

Description

SCR.7.85. The mortality catastrophe sub-module is restricted to (re)insurance obligations which are contingent on mortality, i.e. where an increase in mortality leads to an increase in technical provisions

SCR.7.86. Catastrophe risk stems from extreme or irregular events whose effects are not sufficiently captured in the other life underwriting risk sub-modules. Examples could be a pandemic event or a nuclear explosion.

SCR.7.87. Catastrophe risk is mainly associated with products (such as term assurance, critical illness or endowment policies) in which a company guarantees to make a single or recurring & periodic series of payments when a policyholder dies.

SCR.7.88. (Re)insurance undertakings shall also be required to consider whether any of the catastrophe scenarios defined as part of the health or any of the man-made scenarios are applicable for the business covered by the life underwriting module. Where this is the case, (re)insurance undertakings shall be required to apply these stresses in addition to the mortality catastrophe stress.

Input

SCR.7.89. No specific input data is required for this module.

Output

SCR.7.90. The module delivers the following output:

$Life_{CAT}$	=	Capital charge for life catastrophe risk
$nLife_{CAT}$	=	Capital charge for catastrophe risk including the risk absorbing effect of future profit sharing

Calculation

SCR.7.91. The capital charge for life catastrophe risk component is defined as follows:

$$Life_{CAT} = \Delta NAV \mid life\ CAT\ shock$$

SCR.7.92. The $Life_{CAT}$ capital requirement should be calculated as the change in net asset value (assets minus liabilities) following an absolute increase in the rate of policyholders dying over the following year of 1.5 per mille.

SCR.7.93. Participants are requested to calculate the capital charge for life CAT risk should be calculated under the condition that the assumptions on future bonus rates (reflected in the valuation of future discretionary benefits in technical provisions) remain unchanged before and after a life CAT event.

SCR.7.94. Additionally, participants are also requested to determine the result of the scenario under the condition that the participant is able to vary its assumptions in future bonus rates in response to the shock being tested. The resulting capital charge is $nLife_{CAT}$.

Simplification

SCR.7.95. The simplification may be used provided the following conditions are met:

- The simplification is proportionate to the nature, scale and complexity of the risks that the undertaking faces.

- The capital requirement for catastrophe risk under the simplified calculation is less than 5% of the overall SCR before adjustment for the loss-absorbing capacity of technical provisions and deferred taxes. For this comparison the overall SCR can be calculated by means of the simplified calculation for the expense risk capital requirement.

  The standard calculation of the catastrophe risk sub-module is an undue burden for the undertaking.

SCR.7.96. The following formula may be used as a simplification for the Life catastrophe risk sub-module: the input data is required for each policy where the payment of benefits (either lump sum or multiple payments) is contingent on either mortality or disability:

$$Life_{CAT} = \sum_i 0.0015 \cdot Capital\_at\_Risk_i$$

where the subscript i denotes each policy where the payment of benefits (either lump sum or multiple payments) is contingent on either mortality or disability, and where $Capital\_at\_Risk_i$ is determined as:

$$Capital\_at\_Risk_i = SA_i + AB_i \bullet Annuity\_factor - BE_i$$

and

BE_i = Best estimate provision (net of reinsurance) for each policy i

SA_i = For each policy i: where benefits are payable as a single lump sum, the Sum Assured (net of reinsurance) on death or disability. Otherwise, zero.

AB_i = For each policy i: where benefits are not payable as a single lump sum, the Annualised amount of Benefit (net of reinsurance) payable on death or disability. Otherwise, zero.

Annuity_factor = Average annuity factor for the expected duration over which benefits may be payable in the event of a claim

SCR.8. Health underwriting risk

SCR.8.1. Structure of the Health Module

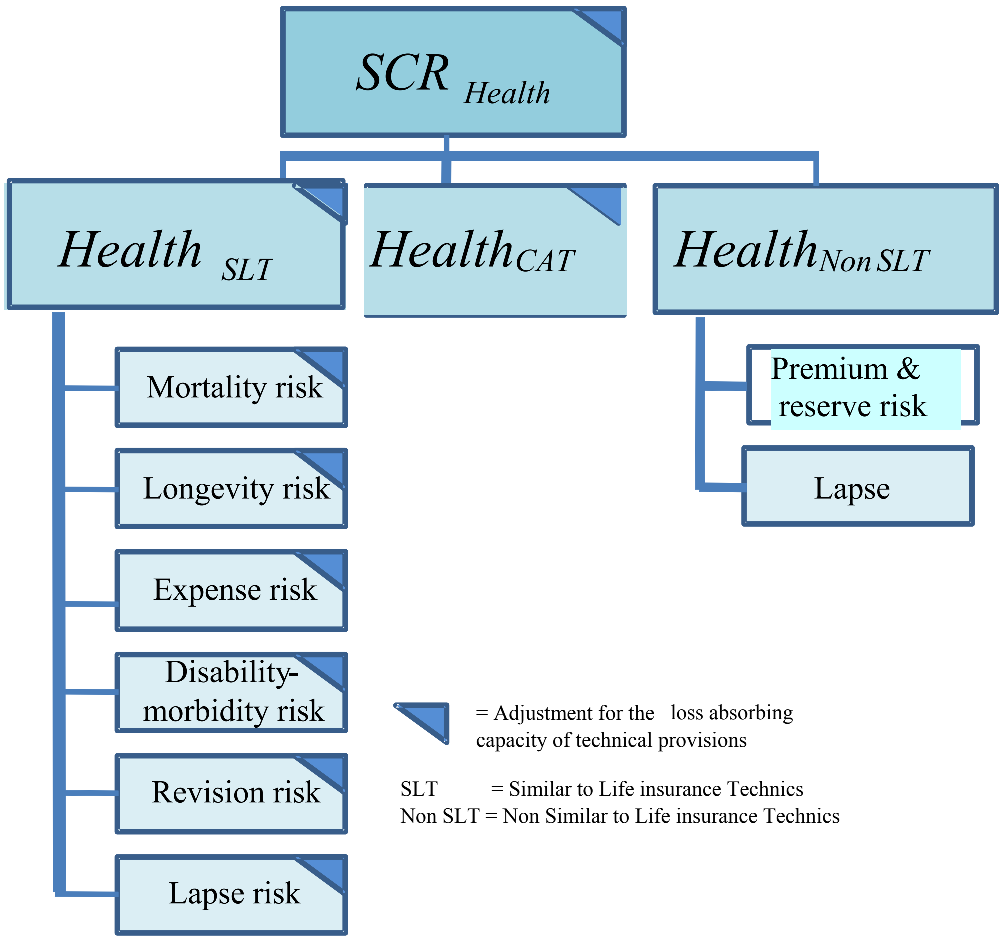
SCR.8.1. Health insurance obligations are all types of insurance compensating or reimbursing losses (e.g. loss of income) caused by illness, accident or disability (income insurance), or medical expenses due to illness, accident or disability, whether preventive or curative (medical insurance).

SCR.8.2. Health insurance obligations pursued on a similar technical basis to that of life insurance (SLT Health) are the health insurance obligations for which life techniques have been used for valuing the best estimate.

SCR.8.3. Health underwriting risks are split into 3 categories:

- Health insurance obligations pursued on a similar technical basis to that of life insurance (**SLT Health**)
- Health insurance obligations not pursued on a similar technical basis to that of life insurance (**Non-SLT Health**).
- Health insurance obligations Catastrophe risk (**Health CAT**)

SCR.8.4. Overall description:



SCR.8.5. The following input information is required (where each capital charge does not include the potential loss absorbing capacity of technical provisions):

$Health_{SLT}$	=	Capital charge for health insurance obligations pursued on a similar technical basis to that of life insurance
$Health_{Non\,SLT}$	=	Capital charge for health insurance obligations **not** pursued on a similar technical basis to that of life insurance
$nHealth_{SLT}$	=	Capital charge for health insurance obligations pursued on a similar technical basis to that of life insurance including the loss absorbing capacity of technical provisions
$Health_{CAT}$	=	Capital charge for health insurance obligations catastrophe risk
$nHealth_{CAT}$	=	Capital charge for health insurance obligations catastrophe including the loss absorbing capacity of technical provisions risk

SCR.8.6. The risk module delivers the following output:

SCR_{Health}	=	Capital charge for health underwriting risk
$nSCR_{Health}$	=	Capital charge for health underwriting risk including the loss absorbing capacity of technical provisions

SCR.8.7. The capital charge for health underwriting risk is derived by combining the capital charges for the health sub-modules using a correlation matrix as follows:

$$SCR_{Health} = \sqrt{\sum_{rxc} CorrHealth_{rxc} \bullet Health_r \bullet Health_c}$$

where:

$CorrHealth_{rxc}$	=	Cells of the matrix $CorrHealth$
$Health_r, Health_c$	=	The capital charges for individual health underwriting sub-modules according to the rows and columns of correlation matrix $CorrHealth$

and where the correlation matrix $CorrHealth$ is defined as:

$CorrHealth$	$Health_{SLT}$	$Health_{Non\,SLT}$	$Health_{CAT}$
$Health_{SLT}$	1		
$Health_{Non\,SLT}$	0.75	1	
$Health_{CAT}$	0.25	0.25	1

SCR.8.8. The capital charge for $nSCR_{Health}$ is determined as follows:

$$nSCR_{Health} = \sqrt{\sum_{rxc} CorrHealth_{rxc} \bullet nHealth_r \bullet nHealth_c}$$

SCR.8.2.SLT Health (Similar to Life Techniques) underwriting risk sub-module

Description

SCR.8.9. The SLT Health underwriting risk arising from underwriting health insurance obligations, pursued on a similar technical basis to life insurance, following from both the perils covered and processes used in the conduct of business.

SCR.8.10. Based on the principle of substance over form, this module includes agreed claims arising from non-life business in health insurance payable in the form of an annuity should be part of SCR_{life} (subject to materiality considerations).

Input:

SCR.8.11. The following input information is required:

$Health_{mortality}^{SLT}$	=	Capital charge for SLT Health mortality risk
$Health_{longevity}^{SLT}$	=	Capital charge for SLT Health longevity risk
$Health_{disability\,/\,morbidity}^{SLT}$	=	Capital charge for SLT Health disability and morbidity risk
$Health_{\text{expense}}^{SLT}$	=	Capital charge for SLT Health expense risk
$Health_{revision}^{SLT}$	=	Capital charge for SLT Health revision risk
$Health_{lapse}^{SLT}$	=	Capital charge for SLT Health lapse risk
$nHealth_{mortality}^{SLT}$	=	Capital charge for SLT Health mortality risk including the loss absorbing capacity of technical provisions
$nHealth_{longevity}^{SLT}$	=	Capital charge for SLT Health longevity risk including the loss absorbing capacity of technical provisions
$nHealth_{disability\,/\,morbidity}^{SLT}$	=	Capital charge for SLT Health disability and morbidity risk including the loss absorbing capacity of technical provisions
$nHealth_{\text{expense}}^{SLT}$	=	Capital charge for SLT Health expense risk including the loss absorbing capacity of technical provisions
$nHealth_{revision}^{SLT}$	=	Capital charge for SLT Health revision risk including the loss absorbing capacity of technical provisions
$nHealth_{lapse}^{SLT}$	=	Capital charge for SLT Health lapse risk including the loss absorbing capacity of technical provisions

Output:

SCR.8.12. The sub-module delivers the following output:

$Health_{SLT}$	=	Capital charge for health insurance obligations pursued on a similar technical basis to that of life insurance
$nHealth_{SLT}$	=	Capital charge for health insurance obligations pursued on a similar technical basis to that of life insurance including the loss absorbing capacity of technical provisions

Calculation:

SCR.8.13. The capital charge for SLT Health underwriting risk is derived by combining the capital charges for the SLT Health sub-modules using a correlation matrix as follows:

$$Health_{SLT} = \sqrt{\sum_{rxc} CorrHealth_{rxc}^{SLT} \bullet Health_{r}^{SLT} \bullet Health_{c}^{SLT}}$$

where:

$CorrHealth_{rxc}^{SLT}$	=	Cells of the matrix $CorrHealth^{SLT}$
$Health_r^{SLT}, Health_c^{SLT}$	=	The capital charges for individual health underwriting sub-modules according to the rows and columns of correlation matrix $CorrHealth^{SLT}$

and where the correlation matrix $CorrHealth^{SLT}$ is defined as:

$CorrHealth^{SLT}$	$Health_{mortality}^{SLT}$	$Health_{longevity}^{SLT}$	$Health_{disability/morbidity}^{SLT}$	$Health_{lapse}^{SLT}$	$Health_{expense}^{SLT}$	$Health_{revision}^{SLT}$
$Health_{mortality}^{SLT}$	1					
$Health_{longevity}^{SLT}$	-0.25	1				
$Health_{disability/morbidity}^{SLT}$	0.25	0	1			
$Health_{lapse}^{SLT}$	0	0.25	0	1		
$Health_{expense}^{SLT}$	0.25	0.25	0.50	0.5	1	
$Health_{revision}^{SLT}$	0	0.25	0	0	0.50	1

SCR.8.14. The capital charge for $nHealth_{SLT}$ is determined as follows:

$$nHealth_{SLT} = \sqrt{\sum_{rxc} CorrHealth_{rxc}^{SLT} \bullet nHealth_r^{SLT} \bullet nHealth_c^{SLT}}$$

SCR.8.15. The capital charges including the loss absorbing capacity of technical provisions are computed as set in the CEIOPS' advice on the loss absorbing capacity of technical provisions for the standard formula SCR (CEIOPS-DOC-46/09).

8.2.1. SLT Health mortality risk

Description:

SCR.8.16. The SLT Health mortality risk covers the risk of loss, or of adverse change in the value of insurance liabilities, resulting from changes in the level, trend, or volatility of mortality rates, where an increase in the mortality rate leads to an increase in the value of insurance liabilities.

SCR.8.17. The SLT Health mortality sub-module aims at capturing the increase in general mortality that negatively affects the obligations of the undertaking. For the health products concerned by this risk, mortality risk relates to the general mortality probabilities used in the calculation of the technical provisions. Even if the health product does not insure death risk, there may be a significant mortality risk because the valuation includes profit at inception: if the policyholder dies early he/she will not pay future premiums and the profit of the insurer will be lower than allowed for in the technical provisions. For SLT health insurance this can be a relevant effect.

SCR.8.18. The risk module delivers the following output:

$Health_{mortality}^{SLT}$	=	Capital charge for SLT Health mortality risk
$nHealth_{mortality}^{SLT}$	=	Capital charge for SLT Health mortality risk including the loss absorbing capacity of technical provisions

SCR.8.19. The calculation of $Health_{mortality}^{SLT}$ and $nHealth_{mortality}^{SLT}$ is computed as in the Life mortality risk module.

8.2.2. SLT Health longevity risk

SCR.8.20. Description: the SLT Health longevity risk covers the risk of loss, or of adverse change in the value of insurance liabilities, resulting from the changes in the level, trend, or volatility of mortality rates, where a decrease in the mortality rate leads to an increase in the value of insurance liabilities.

SCR.8.21. The risk module delivers the following output:

$Health_{longevity}^{SLT}$	=	Capital charge for SLT Health longevity risk
$nHealth_{longevity}^{SLT}$	=	Capital charge for SLT Health longevity risk including the loss absorbing capacity of technical provisions

SCR.8.22. The calculation of $Health_{longevity}^{SLT}$ and $nHealth_{longevity}^{SLT}$ is computed as in the Life longevity risk module.

8.2.3. SLT Health disability/morbidity risk

SCR.8.23. Description: the SLT Health Disability/morbidity risk covers the risk of loss, or of adverse change in the value of insurance liabilities, resulting from changes in the level, trend or volatility of the frequency or the initial severity of the claims, due to changes:

- In the disability, sickness and morbidity rates
- In medical inflation

SCR.8.24. The disability/morbidity risk includes the recovery which is the risk of loss, or of adverse change in the value of insurance liabilities, resulting from the changes in the level, trend or volatility of the recovery rates where a decrease in the recovery rate (moving from sick or disabled to full revalidation) leads to an increase in the value of insurance liabilities.

SCR.8.25. The following input information are required:

$Health^{SLT}_{Medical}$	=	Capital charge for disability/morbidity risk for medical insurance
$Health^{SLT}_{Income}$	=	Capital charge for disability/morbidity risk for income insurance
$nHealth^{SLT}_{Medical}$	=	Capital charge for disability/morbidity risk for medical insurance including the loss absorbing capacity of technical provisions
$nHealth^{SLT}_{Income}$	=	Capital charge for disability/morbidity risk for income insurance including the loss absorbing capacity of technical provisions

SCR.8.26. The risk module delivers the following output:

$Health^{SLT}_{disability\,/\,morbidity}$	=	Capital charge for SLT Health disability and morbidity risk
$nHealth^{SLT}_{disability\,/\,morbidity}$	=	Capital charge for SLT Health disability and morbidity risk including the loss absorbing capacity of technical provisions

SCR.8.27. The capital charge for SLT Health disability/morbidity risk is determined as follows:

$$Health^{SLT}_{disability\,/\,morbidity} = Health^{SLT}_{Medical} + Health^{SLT}_{Income}$$

$$nHealth^{SLT}_{disability\,/\,morbidity} = nHealth^{SLT}_{Medical} + nHealth^{SLT}_{Income}$$

8.2.4. SLT Health disability/morbidity risk for medical insurance

SCR.8.28. For medical insurance, the determination of the disability/morbidity capital charge cannot be based on disability or morbidity probabilities. A large part of the risk in medical expense insurance is independent from the actual health status of insured person. For example, it may be very expensive to find out whether the insured person is ill or to prevent the insured person from becoming ill – these expenses are usually covered by the health policy. If an insured person is ill, the resulting expenses significantly depend on the individual case. It can also happen that an insured person is ill but does not generate significant medical expenses.

SCR.8.29. Moreover, technically the business is not based on disability /morbidity probabilities but on expected annual medical expenses.

SCR.8.30. The disability/morbidity risk for medical insurance could be modelled as defined below. The risk of loss in income insurance should be modelled in a different scenario.

Input

SCR.8.31. The calculation is scenario-based. Input information is the effect of two specified scenarios on the net value of assets minus liabilities (NAV).

Output

SCR.8.32. The sub-module delivers the following output

$Health^{SLT}_{Medical}$	=	Capital charge for disability/morbidity risk for medical insurance
$nHealth^{SLT}_{Medical}$	=	Capital charge for disability/morbidity risk for medical insurance including the loss absorbing effect of technical provisions

Calculation

SCR.8.33. The capital charge is computed by analysing the scenarios *claim shock up* and *claim shock down* defined as follows:

Scenario Permanent absolute change of claim inflation		Permanent relative change of claims
claim shock up	+1%	+5%
claim shock down	−1%	−5%

SCR.8.34. The scenario *claim shock down* needs only to be analysed for policies that include a premium adjustment mechanism which foresees an increase of premiums if claims are higher than expected and a decrease of premiums if claims are lower than expected. Otherwise, undertakings should assume that the result of the scenario *claim shock down* is zero.

SCR.8.35. In a first step, capital charges for increase and decrease of claims are calculated:

$$Health^{SLT}_{medical,up} = \Delta NAV | claim\ shock\ up$$

$$Health^{SLT}_{medical,down} = \Delta NAV | claim\ shock\ down$$

$$nHealth^{SLT}_{medical,up} = \Delta NAV | claim\ shock\ up$$

$$nHealth^{SLT}_{medical,down} = \Delta NAV | claim\ shock\ down$$

SCR.8.36. ΔNAV is the change in the net value of assets and liabilities under the scenario. The scenario is assumed to occur immediately after the valuation date. In the first two scenarios, the calculation is made under the condition that the assumptions on future bonus rates remain unchanged before and after the shocks. The last two calculations are made under the condition that the assumptions on future bonus rates may be changed in response to the shock. Moreover, the revaluation should allow for any relevant adverse changes in policyholders behaviour (option take-up) in this scenario.

SCR.8.37. The relevant scenario (*up* and *down*) is the most adverse scenario taking into account the loss absorbing capacity of technical provisions:

$$nHealth_{medical}^{SLT} = \max(nHealth_{medical,up}^{SLT}; nHealth_{medical,down}^{SLT})$$

$$Health_{medical}^{SLT} = \begin{cases} Health_{medical,up}^{SLT} & \textbf{if} \quad nHealth_{medical,up}^{SLT} > nHealth_{medical,down}^{SLT} \\ Health_{medical,down}^{SLT} & \textbf{if} \quad nHealth_{medical,up}^{SLT} < nHealth_{medical,down}^{SLT} \\ \max(Health_{medical,up}^{SLT}; Health_{medical,down}^{SLT}) & \textbf{if} \quad nHealth_{medical,up}^{SLT} = nHealth_{medical,down}^{SLT} \end{cases}$$

8.2.5. SLT Health disability/morbidity risk for income insurance

SCR.8.38. For income insurance, the determination of the capital requirement for disability/morbidity risk is based on disability or morbidity probabilities. Considering that the risk in income insurance depends on the health status, the SLT Health disability/morbidity risk for income insurance should be treated in the same way as disability/morbidity risk in the Life underwriting risk module.

SCR.8.39. The risk module delivers the following output:

$Health_{Income}^{SLT}$	=	Capital charge for disability/morbidity risk for income insurance
$nHealth_{Income}^{SLT}$	=	Capital charge for disability/morbidity risk for income insurance including the loss absorbing capacity of technical provisions

SCR.8.40. The calculation of $Health_{Income}^{SLT}$ and $nHealth_{Income}^{SLT}$ is computed as set in Life disability-morbidity risk.

8.2.6. SLT Health Expense risk

SCR.8.41. Description: the SLT Health expense risk covers the risk of loss, or of adverse change in the value of insurance liabilities, resulting from changes in the level, trend, or volatility of the expenses incurred in servicing insurance or reinsurance contracts. Expense risk arises if the expenses anticipated when pricing a guarantee are insufficient to cover the actual costs accruing in the following year. All expenses incurred have to be taken into account.

SCR.8.42. The risk module delivers the following output:

$Health^{SLT}_{\text{expense}}$	=	Capital charge for SLT Health expense risk
$nHealth^{SLT}_{\text{expense}}$	=	Capital charge for SLT Health expense risk including the loss absorbing capacity of technical provisions

SCR.8.43. The calculation of $Health^{SLT}_{\text{expense}}$ and $nHealth^{SLT}_{\text{expense}}$ is computed as in the Life expense risk module.

8.2.7. SLT Health Revision risk

SCR.8.44. Description: the SLT Health Revision risk covers the risk of loss, or of adverse change in the value of insurance liabilities resulting from fluctuations in the level, trend, or volatility of the revision rates applied to benefits, due to changes in either:

- the legal environment (or court decision); only future changes approved or strongly foreseeable at the calculation date under the principle of constant legal environment,
- the state of health of the person insured (sick to sicker, partially disabled to fully disabled, temporarily disabled to permanently disabled).

SCR.8.45. This sub-module includes annuities arising from non-life claims in health insurance.

SCR.8.46.

SCR.8.47. The risk module delivers the following output:

$Health^{SLT}_{revision}$	=	Capital charge for SLT Health revision risk
$nHealth^{SLT}_{revision}$	=	Capital charge for SLT Health revision risk including the loss absorbing capacity of technical provisions

SCR.8.48. The calculation of $Health^{SLT}_{revision}$ and $nHealth^{SLT}_{revision}$ is computed as in the Life revision risk module.

8.2.8. SLT Health Lapse risk

SCR.8.49. Description: the SLT Health Lapse risk covers the risk of loss, or of adverse change in the value of insurance liabilities, resulting from changes in the level or volatility of the rates of policy lapses, terminations, renewals and surrenders.

SCR.8.50. The risk module delivers the following output:

$Health^{SLT}_{lapse}$	=	Capital charge for SLT Health lapse risk
$nHealth^{SLT}_{lapse}$	=	Capital charge for SLT Health lapse risk including the loss absorbing capacity of technical provisions

SCR.8.51. The calculation of $Health^{SLT}_{lapse}$ and $nHealth^{SLT}_{lapse}$ is computed as in the Life lapse risk module, but for $Lapse_{up}$, and for $Lapse_{down}$, the increase and the decrease is 20% instead of 50%.

SCR.8.3. Non-SLT Health (Non-similar to Life Techniques) underwriting risk sub-module

The modelling approach for NSLT health insurance included in the draft QIS5 technical specifications does not capture the risk profile of several significant health insurance products. A taskforce on health insurance has been initiated with the objective of improving the risk-sensitivity of the standard formula for NSLT health insurance. The conclusions of the taskforce will be taken into account in the finalisation of the QIS5 technical specifications.

SCR.8.52. Description: the Non-SLT Health underwriting risk arising from the underwriting of health insurance obligations, not pursued on a similar technical basis to that of life insurance, following from both the perils covered and processes used in the conduct of business.

SCR.8.53. Underwriting risk is the specific insurance risk arising from insurance contracts. It relates to the uncertainty about the results of the insurer's underwriting. This includes uncertainty about:

- the amount and timing of the eventual claim settlements in relation to existing liabilities;
- the volume of business to be written and the premium rates at which it will be written; and
- the premium rates which would be necessary to cover the liabilities created by the business written.
- The risk resulting from decisions made by policyholders regarding whether they decide to renew or not to i.e. the risk that the actual take up rate for options / guarantees differs from that assumed when setting technical provisions. (If business is written on terms that are not profitable, then it will be necessary to consider an increase in take up rates for future premiums.)

Input

SCR.8.54. The following input information is required:

$Health^{NonSLT}_{\text{Premium\&Reserve}}$	=	Capital charge for NSLT Health premium and reserve risk
$Health^{NonSLT}_{\text{Lapse}}$	=	Capital charge for NSLT Health Lapse risk

Output

SCR.8.55. The risk module delivers the following output:

$Health_{Non\ SLT}$	=	Capital charge for Health insurance obligations not pursued on a similar technical basis to that of life insurance

Calculation

SCR.8.56. The capital charge for non-life underwriting risk is derived by combining the capital charges for the non-life sub-risks using a correlation matrix as follows:

$$Health^{NonSLT} = \sqrt{\left(Health_{pr}^{NonSLT}\right)^2 + \left(Health_{lapse}^{NonSLT}\right)^2}$$

8.3.1. Non SLT Health premium & reserve risk

SCR.8.57. This module combines a treatment for the two main sources of underwriting risk, premium risk and reserve risk.

SCR.8.58. Premium risk is understood to relate to future claims arising during and after the period until the time horizon for the solvency assessment. The risk is that expenses plus the volume of losses (incurred and to be incurred) for these claims (comprising both amounts paid during the period and provisions made at its end) is higher than the premiums received (or if allowance is made elsewhere for the expected profits or losses on the business, that the profitability will be less than expected).

SCR.8.59. Premium risk is present at the time the policy is issued, before any insured events occur. Premium risk also arises because of uncertainties prior to issue of policies during the time horizon. These uncertainties include the premium rates that will be charged, the precise terms and conditions of the policies and the precise mix and volume of business to be written.

SCR.8.60. Premium risk shall therefore cover:

- the risk of loss because the premium provision at the start of the year proves inadequate – that is premium provision at the start of the year plus outstanding premiums receivable plus interest at risk free rate is insufficient to cover claims incurred during the year plus premium provision at end of year.

- the risk of loss on new contracts written during the year – that is premiums receivable during the year plus interest is insufficient to cover claims incurred during the year plus premium provision at the end of the year.

SCR.8.61. CEIOPS identifies four types of risk of loss:

- New premiums may be written at inadequate rates.

- The loss on exposure during the year may be more than expected.

- The provisions at the start of the year for exposure after the end of the year may need to be increased.

- There may be losses on "future premiums" that have been taken into account when calculating technical provisions.

SCR.8.62. Premium risk relates to policies to be written (including renewals) during the period, and to unexpired risks on existing contracts.

SCR.8.63. Premium risk shall also allow for volatility of expense payments. Expense risk can be quite material for some lines of business and shall therefore be fully reflected in the module calculations. Expense risk is implicitly included as part of the premium risk.

SCR.8.64. Reserve risk stems from two sources:

- The absolute level of the claims provisions may be mis-estimated

- Because of the stochastic nature of future claims payouts, the actual claims will fluctuate around their statistical mean value.

SCR.8.65. Both premium and reserve risk include uncertainty in the timing of payments and any cost therein.

Input

SCR.8.66. In order to carry out the non-life premium and reserve risk calculation, the undertaking shall be required to provide the following information

PCO_{lob}	=	best estimate for claims outstanding for each LoB. This should be the gross amount less expected recoveries from reinsurance and special purpose vehicles (after allowing for expected default)
$P_{lob}^{t,written}$	=	estimate of net written premium for each LoB during the forthcoming year
$P_{lob}^{t,earned}$	=	estimate of net earned premium for each LoB during the forthcoming year
$P_{lob}^{t-1,written}$	=	net written premium for each LoB during the previous year
C_{lob}^{PP}	=	Expected present value of net claims and expense payments which relate to claims incurred after the following year and covered by existing contracts for each LoBs.

SCR.8.67. Earned premium, $P_{lob}^{t,earned}$, should be calculated with reference to Solvency 2 technical provisions (rather than current accounting approaches):

$$P_{lob}^{t,earned} = P_{lob}^{t,written} + \text{opening Premium provison}_{\text{lob}} - \text{closing Premium provision}_{\text{lob}}$$

SCR.8.68. In respect of C_{lob}^{PP} the term relates purely to part of the premium provision brought forward at the start of the year and which remains outstanding at the end of the year, whereas the other term is a proxy for premiums to be written or premiums to be earned during the year, noting that the risks relating to these are rather different and only partly overlap. It is not intended to cover random events after the year but changes in provisions on claims after the year as a result of new information.

SCR.8.69.

SCR.8.70. The module delivers the following output:

$Health_{\text{Premium\&Reserve}}^{NonSLT}$	=	Capital charge for NSLT Health premium and reserve risk

Calculation

SCR.8.71. The capital charge for the combined premium risk and reserve risk is determined as follows:

$$Health_{\text{Premium\&Reserve}}^{NonSLT} = \rho(\sigma_{NonSLT\ Health}) \cdot V_{NonSLT\ Health}$$

where

$V_{NonSLT\ Health}$	=	Volume measure (for NSLT Health insurance obligations)
$\sigma_{NonSLT\ Health}$	=	Standard deviation (for NSLT Health insurance obligations) resulting from the combination of the reserve and premium risk standard deviation
$\rho(\sigma_{NonSLT\ Health})$	=	A function of the standard deviation

SCR.8.72. The function $\rho(\sigma)$ is specified as follows:

$$\rho(\sigma) = \frac{\exp(N_{0.995} \bullet \sqrt{\log(\sigma^2+1)})}{\sqrt{\sigma^2+1}} - 1$$

where

$N_{0.995}$	=	99.5% quantile of the standard normal distribution

SCR.8.73. The function $\rho(\sigma_{NonSLT\ Health})$ is set such that, assuming a lognormal distribution of the underlying risk, a risk capital charge consistent with the VaR 99.5% standard is produced. Roughly $\rho(\sigma_{NonSLT\ Health}) \approx 3 \cdot \sigma_{NonSLT\ Health}$.

SCR.8.74. The volume measure $V_{NonSLT\ Health}$ and the standard deviation $\sigma_{NonSLT\ Health}$ for the NSLT Health insurance obligations are determined in 2 steps as follows:

- in a first step, for each lines of business (LoB) standard deviations and volume measures for both premium risk and reserve risk are determined;
- in a second step, the standard deviations and volume measures for the premium risk and the reserve risk are aggregated to derive an overall volume measure $V_{NonSLT\ Health}$ and an overall standard deviation $\sigma_{NonSLT\ Health}$.

<u>Step 1: Volume measures and standard deviations per LoB</u>

SCR.8.75. For each line of business the volume measures and standard deviations for premium and reserve risk are denoted as follows:

$V_{(\text{prem,lob})}$	=	Volume measure for premium risk (for NSLT Health insurance obligations)
$V_{(\text{res,lob})}$	=	Volume measure for reserve risk (for NSLT Health insurance obligations)
$\sigma_{(\text{prem,lob})}$	=	Standard deviation for premium risk (for NSLT Health insurance obligations)
$\sigma_{(\text{res,lob})}$	=	Standard deviation for reserve risk (for NSLT Health insurance obligations)

<u>Step 1(1)</u>

SCR.8.76. The volume measure for premium risk for each line of business is determined as follows:

$$V_{(prem,lob)} = \max(P_{lob}^{t,written}; P_{lob}^{t,earned}; P_{lob}^{t-1,written}) + C_{lob}^{PP}$$

SCR.8.77. If the insurer has committed to its regulator that it will restrict premiums written over the period so that the actual premiums written (or earned) over the period will not exceed its estimated volumes, the volume measure is determined only with respect to estimated premium volumes, so that in this case:

$$V_{(prem,lob)} = \max(P_{lob}^{t,written}; P_{lob}^{t,earned}) + C_{lob}^{PP}$$

SCR.8.78. The market-wide estimates of the net standard deviation for premium risk for each line of business are:

LOB	Net premium factor
Accident	9%*(NCR$_i$/GCR$_i$)
Sickness	6%*(NCR$_i$/GCR$_i$)
Workers compensation	5.5%*(NCR$_i$/GCR$_i$)

SCR.8.79. The net-gross ratio (NCRi/GCRi) is defined as follows:

$$\frac{NCR_i}{GCR_i} = \sqrt{\frac{1+\left(\Omega_{lob}^{net}/M_{lob}^{net}\right)^2}{1+\left(\Omega_{lob}^{gross}/M_{lob}^{gross}\right)^2}},$$

where

$$M_{lob}^{net} = M_{lob}^{gross}\cdot\left[1-F_{m+\sigma^2,\sigma}(a+b)+F_{m+\sigma^2,\sigma}(a)\right]+a\cdot\left[F_{m,\sigma}(a+b)-F_{m,\sigma}(a)\right]-b\cdot\left[1-F_{m,\sigma}(a+b)\right]$$

$$\Omega_{lob}^{net} = \begin{pmatrix} \left(\Omega_{lob}^{gross\,2}+M_{lob}^{gross\,2}\right)\cdot\left[1-F_{m+2\sigma^2,\sigma}(a+b)+F_{m+2\sigma^2,\sigma}(a)\right]+a^2\cdot\left[F_{m,\sigma}(a+b)-F_{m,\sigma}(a)\right] \\ -2b\cdot M_{lob}^{gross}\cdot\left[1-F_{m+\sigma^2,\sigma}(a+b)\right]+b^2\cdot\left[1-F_{m,\sigma}(a+b)\right]-M_{lob}^{net\,2} \end{pmatrix}^{1/2}$$

$$\sigma = \sqrt{\ln\left(1+\left(\frac{\Omega_{lob}^{gross}}{M_{lob}^{gross}}\right)^2\right)}$$

and

$$m = \ln M_{lob}^{gross} - \frac{\sigma^2}{2}.$$

SCR.8.80. The terms used in these formulas are defined as follows:

M_{lob}^{gross}	=	Average cost per claim gross of reinsurance per LOB, estimated from the claims of the last year
Ω_{lob}^{gross}	=	Standard deviation of the cost per claim gross of reinsurance per LOB, estimated with the standard estimator from the claims of the last year
a	=	Retention of non-proportional reinsurance contract
b	=	Limit of the non-proportional reinsurance contract
$F_{m,\sigma}$	=	distribution function of a Lognormal random variable with

parameters (m, σ)

$F_{m+\sigma^2,\sigma}$ = distribution function of a Lognormal random variable with parameters $(m+\sigma^2, \sigma)$

$F_{m+2\sigma^2,\sigma}$ = distribution function of a Lognormal random variable with parameters $(m+2\sigma^2, \sigma)$

•

Step 1(2)

SCR.8.81. The volume measure for reserve risk for each line of business is determined as follows:

$$V_{LOB}^{res} = PCO_{LOB}$$

SCR.8.82. he market-wide estimate of the net of reinsurance standard deviation for reserve risk for each line of business are:

LOB	Net reserve factor
Accident	16%
Sickness	10%
Workers compensation	11%

No further adjustments are needed to these results.

Step 1(3)

SCR.8.83. The standard deviation for premium and reserve risk in the individual LOB is defined by aggregating the standard deviations for both risks under the assumption of a correlation coefficient of 0.50:

$$\sigma_{LOB} = \sqrt{\left(\sigma_{LOB}^{prem} \cdot V_{LOB}^{prem}\right)^2 + \left(\sigma_{LOB}^{res} \cdot V_{LOB}^{res}\right)^2 + \left(\sigma_{LOB}^{prem} \cdot V_{LOB}^{prem}\right) \cdot \left(\sigma_{LOB}^{res} \cdot V_{LOB}^{res}\right)} \Big/ \left(V_{LOB}^{prem} + V_{LOB}^{res}\right)$$

Step 2: Overall volume measures and standard deviations

SCR.8.84. The volume measure $V_{NonSLT\ Health}$ is determined as follows:

$$V_{NonSLT\ Health} = \sum_{lob} V_{lob}^{NonSLT\ Health} \quad \text{where} \quad V_{lob}^{NonSLT\ Health} = \left(V_{lob}^{prem} + V_{lob}^{res}\right) \cdot \left(0.75 + 0.25 \cdot DIV_{lob}\right)$$

and

$$DIV_{lob} = \frac{\sum_j \left(V_{(prem,j,lob)} + V_{(res,j,lob)}\right)^2}{\left(\sum_j \left(V_{(prem,j,lob)} + V_{(res,j,lob)}\right)\right)^2}$$

where the index j denotes the geographical segments as set out in Annex K and $V_{(prem,j,lob)}$ and $V_{(res,j,lob)}$ denote the volume measures as defined above but restricted to the geographical segment j.

However, the factor DIV_{lob} should be set to 1 where the standard deviation for premium or reserve risk of the line of business is an undertaking-specific parameter.

Undertakings may choose to allocate all of their business in a line of business to the main geographical segment in order to simplify the calculation.

SCR.8.85. The overall standard deviation $\sigma_{NonSLT\ Health}$ is determined as follows:

$$\sigma_{NonSLT\ Health} = \frac{\sqrt{\sum_{rxc} CorrLob_{Non\ SLT}^{rxc} \cdot \sigma_r \cdot \sigma_c \cdot V_r \cdot V_c}}{\sum_r V_r}$$

where

r, c	=	All indices of the form (LOB)
$CorrLob_{Non\ SLT}^{rxc}$	=	Cells of the correlation matrix $CorrLob_{Non\ SLT}$
σ_r, σ_c	=	Standard deviation for the individual lines of business, as defined in step 1
V_r, V_c	=	Volume measures for the individual lines of business, as defined in step 1

SCR.8.86.

SCR.8.87. The correlation matrix CorrLob between lines of business is the following:

LoB	$CorrLob_{Non\ SLT}$	Accident	Sickness	Worker's Compensation
	Accident	1		
	Sickness	0,5	1	
	Worker's Compensation	0,5	0,5	1

Output

SCR.8.88. This module delivers the following output information:

$Health^{NonSLT}_{\text{Premium\&Reserve}}$	=	Capital charge for NSLT Health premium and reserve risk

8.3.2. $\text{Health}^{\text{Non SLT}}_{\text{Lapse}}$ Lapse risk

SCR.8.89. When assessing technical provisions, assumptions need to be made about the take up rate of options / guarantees etc that form part of future premiums. Typically, the inclusion of these future premiums will lead to a reduction in technical provisions, assuming that business is written on profitable terms. If actual take up rates were lower than expected, there would be a reduction in own funds compared to what was expected.

SCR.8.90. The capital requirement for lapse risk should be calculated where the undertaking allows for future premiums in the calculation of technical provisions due to the existence of unilateral renewal options available to the policyholder.

$$\text{Health}^{\text{Non SLT}}_{\text{Lapse}}=\max\,(\text{Lapse}_{\text{down}};\text{Lapse}_{\text{up}})$$

where

$\text{Health}^{\text{Non SLT}}_{\text{Lapse}}$	=	Capital requirement for Health Non SLT lapse risk
$Lapse_{down}$	=	Capital requirement for the risk of a permanent decrease of lapse rates
$Lapse_{up}$	=	Capital requirement for the risk of a permanent increase of lapse rates

SCR.8.91. The capital requirement for the risk of a permanent decrease of lapse rates should be calculated as follows:

$$Lapse_{down} = \Delta NAV \mid lapseshock_{down}\,, \quad \text{where}$$

ΔNAV	=	Change in the net value of assets minus liabilities (not including changes in the risk margin of technical provisions where it needs to be calculated separately)
$lapseshock_{down}$	=	Increase of 50% in the assumed option take-up rates in all future years for all policies. The shocked rate should not exceed 100%. (Note that an increase in take-up rate implies a reduction in the lapse rate.)

SCR.8.92. The capital requirement for the risk of a permanent increase of the lapse rate should be calculated as follows:

$$Lapse_{up} = \Delta NAV \mid lapseshock_{up}\,, \quad \text{where}$$

ΔNAV	=	Change in the net value of assets minus liabilities (not including changes in the risk margin of technical provisions where it needs to be calculated separately)
$lapseshock_{up}$	=	Reduction of 50% in take-up rates in later future years for all remaining policies. The shocked rate should not change the rate to which the reduction is applied by more than 20% in absolute terms. (Note that a reduction in take-up rate implies an increase in the lapse rate.)

SCR.8.93. As for life underwriting risk, the amount is calculated at a total portfolio level and is not split by line of business.

SCR.8.4.Health CAT risk sub-module

8.4.1. Introduction

SCR.8.94. The CAT risk capital charge covers the risk of loss, or of adverse change in the value of insurance liabilities, resulting from the significant uncertainty of pricing and provisioning assumptions related to outbreaks of major epidemics, as well as the unusual accumulation of risks under such extreme circumstances (Article 105 (4) c) in Level 1 text).

SCR.8.95. The Health Catastrophe standardised scenarios considered in this document are:

- Arena disaster
- Concentration scenario
- Pandemic scenario

SCR.8.96. The above selection was based on the likelihood of such events occurring being extreme or exceptional and therefore giving rise to losses, or adverse changes in the value of insurance liabilities.

SCR.8.97. The list may not be exhaustive for all undertakings. Where this is the case, any additional risk should be captured through alternative scenarios.

SCR.8.98. Consistently with non life:

- Scenarios are EEA based.
- Scenarios are provided gross of reinsurance and gross of all other mitigation instruments (for example national pool arrangements). Undertakings shall take into account reinsurance and other mitigation instruments to estimate their net loss.
- Scenarios have not been provided by line of business nor segmented between NSLT and SLT. The scenarios are for health in general allowing for the respective risks affecting SLT and NSLT.

SCR.8.99. The module delivers the following output:

$Health_{CAT}$	=	Net capital charge for Health catastrophe risk (for Health insurance obligations)

SCR.8.100. The $Health_{CAT}$ will be the sum of the capital charges for the three scenarios above. It is assumed all three are independent. Independence is assumed, as follows:

Input

$Health_{Arena}$	=	Capital charge for Health catastrophe risk under an Arena scenario
$Health_{Concentration}$	=	Capital charge for Health catastrophe risk under an Concentration scenario
$Health_{Pandemic}$	=	Capital charge for Health catastrophe risk under an Pandemic scenario

Calculation

$$Health_{CAT} = Health_{Arena} + Health_{Concentration} + Health_{Pandemic}$$

SCR.8.101. All scenarios, unless explicitly mentioned are described gross of risk mitigation.

SCR.8.102. Undertakings will be required to net down the estimation of their respective gross estimations for $Health_{Arena}$, $Health_{Concentration}$, $Health_{Pandemic}$.

SCR.8.103. Undertakings may estimate the net capital charge for Catastrophe Risk applying the following formulae:

Where the XL cover follows a proportional cover:

MAX ((L*MS*QS)-XLC, 0) +MIN ((L*MS*QS), XLF) + REINST

Where a proportional cover follows an XL cover:

MAX ((L*MS)-XLC, 0) *QS +MIN((L*MS), XLF) *QS + REINST

Where

L= the total gross loss amount. The total gross loss amount of the catastrophe will be provided as part of the information of the scenario.

MS= the market share. This proportion might be determined with reference to exposure estimates, historical loss experience or the share of total market premium income received. The total market loss amount of the catastrophe will be provided as part of the information of the scenario.

QS= quota share retention. Allowance must be made for any limitations, e.g. event limits which are frequently applied to QS treaties

XLC= the upper limit of the XL programme that is applicable in case of the scenario event

XLF= the XL retention of the XL programme that is applicable in case of the scenario event.

REINST = the reinstatement premium or premiums (in case of scenarios with a succession of 2 or more identical events)

SCR.8.104. However risk mitigation contracts can take a variety of forms and the above equation may not be applicable. Guidance is provided through a set of examples that show how firms ought to net down their gross estimations and this is included in the annex J.3. A helper tab will be included trying to illustrate such examples. Undertakings should provide the details of calculations and explain how they have arrived to the net estimation.

SCR.8.105. In the EEA there is a variety of national arrangements which provide protection in different ways. Without going into the specifics of each arrangement, undertakings should net down their gross estimation to reflect such protection, if applicable. Where Reinsurers provide or could potentially provide cover to the national arrangements, such reinsurance companies need to estimate a capital charge for this exposure.

SCR.8.106. Where there are separate reinsurance programmes for each country the aggregations (across countries) are done net of reinsurance. Where there are separate reinsurance programmes per peril, the aggregation (across perils) are done net of reinsurance.

SCR.8.107. In calculating net losses undertakings should include consideration of reinstatement premiums directly related to the scenario. Both Outwards reinstatement premiums associated with reinstating risk transfer protection and Inwards reinstatement premiums in respect of assumed reinsurance business should be calculated.

8.4.2. Arena disaster

Input

E_p	=	exposure measure i.e. average sum insured by product type p
MS_P	=	market share by product type (personal accident, total permanent disability and medical insurance).

SCR.8.108. Each undertaking will be required to provide its average sum insured by product type, E_p. The product types defined are a representation of the type of benefits paid (so you can have many different products but overall the type of benefits paid under these products should fall into one of the 5 categories below x_p)

SCR.8.109. For the estimation of E_p, undertakings need to consider:

- In the case of disability where payments are not lump sums, the exposure measure should be the present value of expected future payments for disability claims.
- In calculating the present value of future payments, firms should assume that a short term disability would last for 12 months and a long term disability would last for 10 years (or a shorter period for which the average policy would make payments) from the date of the catastrophe event; firms should also make allowance for any deferred period before claim payments commence.
- For medical expense insurance, the sum insured shall be taken to be zero.
- Firms shall also add extra exposure for any Personal Accident riders.

SCR.8.110. The market share by product type MS_p shall be provided by the undertaking. The factors shall be estimated according to their share of the market for each of the respective member states where they have exposure. If this information is not readily available, the undertaking should be able to make some estimation, based on their knowledge of their market. Undertakings should provide a short explanation of how they have arrived at their estimation.

<u>Calculation</u>

SCR.8.111. The total capital charge is estimated as follows:

$$CAT_{ARENA\_STATE} = S * \sum^{products} I_P * x_P * E_P * MS_P$$

$$CAT_{ARENA} = \sum^{allSTATES} CAT_{ARENA\_STATE}$$

Where

S = the number of people affected by the event

I_p = insurance penetration for product type and by member state

X_p= proportion of accidental deaths/disabilities (short and long term) and injuries (p = product type).

MS_P = market share by product type: personal accident, total permanent disability and medical insurance.

E_p = exposure measure i.e. average sum insured by product type

SCR.8.112. The value for S is 50% * the full arena capacities provided in the table below. Full arena capacities are provided in annex J.1

SCR.8.113. The values of I_p are provided in annex J.2.

SCR.8.114. The product type factors X_p for all member states:

Table 2. Injury Distributions

	%
Accidental Deaths	12
Permanent Total Disability	2
Long Term Disability	5
Short Term Disability	15
Medical/Injuries	30
Total percentage	65

SCR.8.115. Where the health product types considered are features of a larger product package (such as workers' compensation) then a calculation of required capital should be made for each of the relevant product types.

SCR.8.116. Disabilities are split in to short-term and long-term in assessing likely claim amounts under disability income policies taking into account the monthly benefit amount and the expected duration of the claim. Where a lump sum is payable under a permanent and total disability policy or rider benefit then this would be considered as a long term disability claim.

Output

The output is given by:

$Health_{Arena}$	=	Capital charge for Health catastrophe risk under an Arena scenario

8.4.1. Concentration scenario

Input

SCR.8.117. Each undertaking will be required to provide:

E_p	=	exposure measure i.e. average sum insured by product type p
S	=	largest known concentration of lives in a group scheme portfolio

SCR.8.118. Each undertaking will be required to provide its average sum insured by product type, E_p. The product types defined are a representation of the type of benefits paid (so you can have many different products but overall the type of benefits paid under these products should fall into one of the 5 categories below x_p)

SCR.8.119. For the estimation of E_p, undertakings need to consider:

- In the case of disability where payments are not lump sums, the exposure measure should be the present value of expected future payments for disability claims.
- In calculating the present value of future payments, firms should assume that a short term disability would last for 12 months and a long term disability would last for 10 years (or a shorter period the average policy would make payments) from the date of the catastrophe event; firms should also make allowance for any deferred period before claim payments commence.
- For medical expense insurance, the sum insured should be taken as the average claim paid in the last two underwriting years in respect of hospital treatments for accidental causes.
- Firms shall also add extra exposure for any Accident riders.

SCR.8.120. Where the health product types considered are features of a larger product package (such as workers' compensation) then a calculation of required capital should be made for each of the relevant product types.

SCR.8.121. Disabilities are split in to short-term and long-term in assessing likely claim amounts under disability income policies taking into account the monthly benefit amount and the expected duration of claim. Where a lump sum is payable under a permanent and total disability policy or rider benefit then this would be considered as a long term disability claim.

SCR.8.122. For the estimation of S undertakings need to select the scheme with the largest known concentration of lives within a group scheme portfolio.

Calculation

SCR.8.123. The capital charge for this scenario is estimated as follows:

$$CAT_{CONC\_STATE} = S \; * \sum^{products} x_P * E_P$$

$$CAT_{CONC} = \sum^{STATES} CAT_{CONC\_STATE}$$

where

CAT_{CONC} = is the capital charge for the concentration scenario.

S = largest known concentration of lives in a group scheme portfolio.

X_p= proportion of accidental deaths/disabilities (short and long term) and injuries (p = product type)

E_p = exposure measure i.e. average sum insured by product type and by undertaking.

SCR.8.124. All policies which include one or more of the following product types should carry out the calculation. The product type factors X_p for all member states:

Table 3. Injury Distribution

	%
Accidental Deaths	12
Permanent Total Disability	2
Long Term Disability	5
Short Term Disability	15
Medical/Injuries	30
Total percentage	65

Output

The output is given by:

$Health_{Concentration}$	=	Capital charge for Health catastrophe risk under an concentration scenario

8.4.2. Pandemic scenario

SCR.8.125. The scenario will impact the following products:

- disability income (both long and short term)
- products covering permanent and total disability either as a stand alone benefit or as part of another product, such as a stand alone critical illness product.

Input

SCR.8.126. Each undertaking will be required to provide:

E_p	=	exposure measure i.e. average sum insured by product type p

SCR.8.127. For the estimation of E_p, undertakings need to consider:

- In the case of disability where payments are not lump sums, the exposure measure should be the present value of future payments for disability claims.
- In calculating the present value of future payments, firms should assume that claimants would not recover and that payments would cease only on death or at the end of the claim payment period specified in the policy conditions; firms should also make allowance for any deferred period before claim payments commence

Calculation

SCR.8.128. The total capital charge is estimated as follows:

$$CAT_{PAN\_STATE} = R \sum^{products} E_P$$

$$CAT_{PAN} = \sum^{STATES} CAT_{PAN\_STATE}$$

where

CAT_{PAN} is the capital charge for the pandemic scenario
R = is the proportion of lives affected by the Pandemic = 0.075‰

E_P = exposure measure i.e. average sum insured by product type and by undertaking.

Output

SCR.8.129. The output is given by:

$Health_{pandemic}$	=	Capital charge for Health catastrophe risk under a pandemic scenario

SCR.8.5. Use of undertaking-specific parameters (USP)

SCR.8.130. The condition of use of the undertaking-specific parameters (USP) in the Health Non similar to life techniques underwriting risk module follow the same rules as for the Non Life lines of business.

SCR.8.6. Comprehensive pools in health insurance

SCR.8.131. CEIOPS is aware of the diversity that characterises health systems across Europe, and is willing to take into account the specificities of the different regimes, as long as such differentiated treatments are adequately justified and kept in line with the level 1 text requirements.

SCR.8.132. Datapools and mutual claim pools, which find their historical inspiration as a form of social insurance, are forms in which activities and organizations have grown in the health insurance industry. Often this concerns compulsory health insurance.

SCR.8.133. Heterogeneity in the mean for health insurance risks is often modelled through the use of (generalized) linear regression models. This generates actuarial fair expected values for such health insurance risks. Variances of these health insurance risks will be reduced due to the modelling of the heterogeneity in the means. This has a mitigating effect on the risk level and should be addressed in the calculation of the SCR.

SCR.8.134. A mutual claim pool is a natural extension of the datapool. For all members of the claim pool it implies a further mitigation of the SCR-level.

SCR.8.135. Provided that they comply with the data requirements for USP, data from comprehensive pools can be used to estimate USP by means of a standardised method defined in this technical specifications.

SCR.8.136.

SCR.8.137.

SCR.8.138.

SCR.8.139.

SCR.8.140.

SCR.8.141.

SCR.8.7. Definition of Health insurance obligations

SCR.8.142. The Level 1 text leaves unchanged the "legal" classification of classes for administrative authorisation provided in the EU Directives of 1973 and 1992 for non-life and life insurance respectively (see Annexes I and II of the Level 1 text). Consequently, for authorisation purposes, health insurance is considered as non-life insurance activities. In particular, a non-life insurance undertaking doing health business is not a composite insurance undertaking.

SCR.8.143. There are two main types of health insurance in the Level 1 text:

- Health insurance which is legally classified in Non-life activities (classes 1 - accident - and 2 - sickness, see Annex I of the Level 1 text) and health insurance as an alternative to Social Security (Article 204 – it concerns almost exclusively German and Austrian health insurance) which is legally classified in Non-life activities too according to the classes of insurance.
- Permanent health insurance not subject to cancellation currently existing in Ireland and the United Kingdom is legally considered as life insurance activities (Article 2 (3) of the Level 1 text).

SCR.8.144. As stated above, health insurance covers multiple risks that have in common the event covered or the causing factor, i.e. any event affecting the physical or mental integrity of the person. The fundamental difficulty lies in the very great variety of businesses described as "health insurance" in the EU.

SCR.8.145. In Solvency II, the logic of the SCR calculation is to require a segmentation of the undertaking's health insurance business according to the underlying risk drivers rather than on the legal contract aspect.

SCR.8.146. In the CEA-Groupe Consultatif "Solvency II Glossary", Health insurance is considered as a "generic term applying to all types of insurance indemnifying or reimbursing losses (e.g. loss of income) caused by illness or disability, or for expenses of medical treatment necessitated by illness or disability".

SCR.8.147. CEIOPS suggests to basically keep the same definition to define Health insurance obligations:

Health insurance obligations are all types of insurance compensating or reimbursing losses (e.g. loss of income) caused by illness, accident or disability (income insurance), or medical expenses due to illness, accident or disability, whether preventive or curative (medical insurance).

SCR.8.148. To clarify the boundary between health and life insurance obligations, it can be noted that life insurance obligations always relate to the length of human life. Life obligations may be related to guarantees offering life and/or death coverage of the insured in the form of a single or multiple (regular in case of an annuity or not) payments to a beneficiary. They include (non exhaustive list):

- Assurance on survival to a stipulated age only,

- Assurance on death only,
- Assurance on survival to stipulated age or on earlier death,
- Life assurance with return of premiums,
- Marriage assurance, birth assurance,
- Annuities.

SCR.8.8. Guidance on the classification of specific insurance products

SCR.8.149. To help clarify the issue, CEIOPS has defined and classified several potentially problematic products in the table below. The classification below only deals with a few products, the aim is not to deal with every kind of guarantee sold in any national market.

Definition	Classification for SCR purposes
Critical illness insurance = dread disease insurance	
An insurance policy that makes a lump sum payment in the event of the policyholder contracting one of a list of critical illnesses (e.g. cancer,). Critical illness insurance can be sold as a separate health or life insurance policy, but can also be a rider to a (group) life or health insurance contract. Under this product different types of covers may exist (creditor insurance, individual protection...). Such different covers may need classification under SLT or non-SLT depending on the underlying risks.	Health insurance obligations
So called "Accelerated critical illness insurance" An insurance policy that makes a lump sum payment on the earlier of the following events: - The death of the policyholder - The policyholder contracting one of a list of critical illnesses (e.g. cancer) or (potentially) on disability because the main risk driver is usually the death rather than contracting the illness.	Life insurance obligations
Permanent health insurance not subject to cancellation currently existing in Ireland and the United Kingdom	Health insurance obligations (SLT Health) – because it is income protection

An insurance policy that pays a monthly income if the policyholder become unable to work because of illness or accidental injury for a given period Terminology: PHI is not just available in the UK and Ireland. It is just another term referring to disability insurance. It is also referred to as income protection (IP)	
<u>Private medical insurance (as sold in the UK)</u> An insurance policy that pays for the treatment for curable short-term illness or injury (commonly known as acute conditions). Cover is generally renewed annually	Health insurance obligations (Non-SLT Health)
<u>Funeral cost insurance</u> A life policy with a low sum assured intended to pay for the burial costs on the death of the insured. Also referred to as an assistance policy or rider to a health insurance policy.	Life insurance obligations
<u>Long term care insurance</u> An insurance policy that makes periodic payments when the policyholder needs assistance for activities of daily living or medical care required to manage a chronic condition. The policy will generally cover some of, if not all, the costs associated with skilled nursing facilities, residential care homes, assisted living or other types of similar facilities.	Health insurance obligations
<u>Health insurance as an alternative to social security (as defined in Article 206 of the Level 1 text).</u>	Health insurance obligations
<u>Workers compensation insurance (see Annex B for further explanations)</u> Insurance cover for the cost of medical care and rehabilitation for workers injured on the job, during the way to and from the job, or to work related diseases. Workers compensation insurance also compensates for wage loss and provides disability or death benefits for beneficiaries if the insured person is killed or injured in work-related accidents.	Health insurance obligations

All kind of annuities paid on non-life products (e.g. stemming from third party liability claims, motor third party liability claims , accident insurance)	Life insurance obligations
Annuities related to Workers' Compensation	Health insurance obligations (SLT Health)
Unemployment guarantees	Non-life insurance obligations
Mortgage insurance = creditor insurance (payment protection insurance products)	Contracts can in most or all cases be unbundled.
Assistance as defined in Article 6 of the Level 1 text	Non-life insurance obligations
Supplementary insurance underwritten in addition to life insurance, in particular, (1) insurance against personal injury including incapacity for employment, (2) insurance against death resulting from an accident and (3) insurance against disability resulting from an accident or sickness	Health insurance obligations
Preventive medical expenses	Health insurance obligations
Accepted proportional health reinsurance obligations	Treated like health insurance obligations in the health underwriting risk module
Accepted non-proportional health reinsurance obligations	Depending on technical nature treated in the non-life underwriting risk module (non-proportional casualty reinsurance) or the life underwriting risk module

Mortgage insurance contracts

SCR.8.150. In some cases, creditor insurance provides for the following guarantees: death guarantee, accidental death guarantee, disability/critical illness. In some markets, credit insurance is offered in connection with trade credits and insures against default of the debtor. It is usually purchased by companies and not individuals. The insurance pays in case of default:

- Independent of the cause of default (subject to any restrictions mentioned in the insurance contract).
- Dependant on the employment state.

SCR.8.151. For consumer credit, it usually insures against death, morbidity/disability and possibly unemployment. The mortality component is priced using life methodologies, whereas other components tend to be priced using non-life methodologies (but could also be based on life methodologies).

SCR.8.152. For personal loans, the insurance covers mostly mortality risk (so that it is actually a term insurance with varying death benefit). It is also possible to add morbidity/disability protection as for consumer credits.

SCR.8.153. Mortgage insurance could be treated similarly to income insurance, although the risks could depend more on macroeconomic parameters than in other health insurance products.

SCR.8.154. In each case, mortgage insurance can in most or all cases be unbundled in:

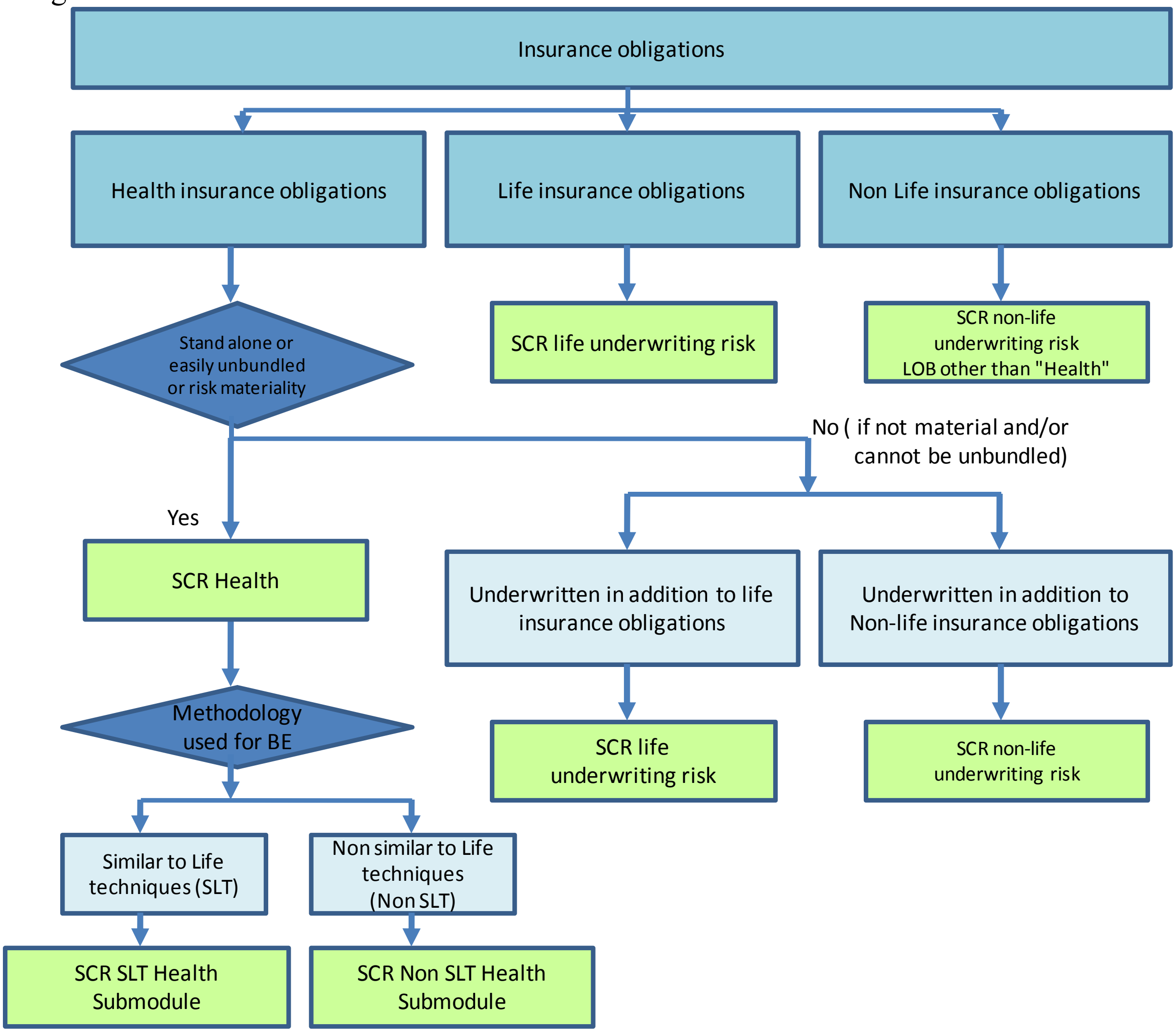
- Life insurance obligations (term insurance)
- Health insurance obligations (disability insurance)
- Non-life insurance obligations (unemployment insurance)

SCR.8.155. Obligations should be categorized according to the type of obligations.

SCR.8.156. In order to ensure a consistent implementation of Solvency II, CEIOPS considers that further work may be useful in order to adequately cope with the risks associated to health insurance obligations. CEIOPS may give further clarifications on the classification of specific insurance products under Level 3 guidance.

SCR.8.157. To decide which underwriting risk module best reflects the technical nature of the underlying risks and therefore should be used for the SCR calculation, the following decision-tree makes the link between the insurance obligation and the type of methodology used to value the best estimate.

Decision tree for the categorisation of health, non-life and life insurance obligations:



SCR.9. Non-life underwriting risk

SCR.9.1. SCR_{nl} non-life underwriting risk module

Description

SCR.9.1. Underwriting risk is the specific insurance risk arising from insurance contracts. It relates to the uncertainty about the results of the insurer's underwriting. This includes uncertainty about:

- the amount and timing of the eventual claim settlements in relation to existing liabilities;
- the volume of business to be written and the premium rates at which it will be written; and
- the premium rates which would be necessary to cover the liabilities created by the business written.
- The risk that risk resulting from decisions made by policyholders regarding whether they decide to renew or not to i.e. the risk that the actual take up rate for options / guarantees differs from that assumed when setting technical provisions. (If business is written on terms that are not profitable, then it will be necessary to consider an increase in take up rates for future premiums.)

SCR.9.2. The aggregation is done in two stages consistently with the approach for the Life underwriting risk and the Health underwriting risk modules.

Stage 1 - SCR_{nl}

Input

SCR.9.3. The following input information is required:

$NL_{pr+lapse}$	=	Capital charge for premium and reserve risk net of risk mitigation and lapse risk
NL_CAT	=	Capital charge for catastrophe risk net of risk mitigation

Output

SCR.9.4. The module delivers the following output:

SCR_{nl}	=	Capital charge for non-life underwriting risk net of risk mitigation

Calculation

SCR.9.5. The capital charge for non-life underwriting risk is derived by combining the capital charges for the non-life sub-risks using a correlation matrix as follows:

$$SCR_{nl} = \sqrt{\sum CorrNL1^{rxcl} * NL_r * NL_c}$$

where

$CorrNL1^{rxc}$ = The cells of the correlation matrix *CorrNL1*

NL_r, NL_c = Capital charges for individual non-life underwriting sub-risks according to the rows and columns of correlation matrix *CorrNL1*

and where the correlation matrix CorrNL1 is defined as:

CorrNL1	$NL_{pr+lapse}$	*NL_CAT*
$NL_{pr+lapse}$	1	
NL_CAT	0.25	1

Stage 2 – $SCR_{nl+lapse}$

Input

SCR.9.6. The following input information is required:

NL_{pr} = Capital charge for premium and reserve risk net of risk mitigation

NL_{lapse} = Capital charge for lapse risk net of risk mitigation

Output

SCR.9.7. The module delivers the following output:

$SCR_{pr+lapse}$ = Capital charge for non-life underwriting risk net of risk mitigation

Calculation

SCR.9.8. The capital charge for non-life underwriting risk is derived by combining the capital charges for the non-life sub-risks using a correlation matrix as follows:

$$SCR_{nl} = \sqrt{\sum CorrNL2^{rxcl} * NL_r * NL_c}$$

where

$CorrNL2^{rxc}$ = The cells of the correlation matrix *CorrNL2*

NL_r, NL_c = Capital charges for individual non-life underwriting sub-risks according to the rows and columns of correlation matrix *CorrNL2*

and where the correlation matrix CorrNL2 is defined as:

CorrNL2	NL_{pr}	NL_{lapse}
NL_{pr}	1	
NL_{lapse}	0	1

SCR.9.2. NL_{pr} Non-life premium & reserve risk

Description

SCR.9.9. This module combines a treatment for the two main sources of underwriting risk, premium risk and reserve risk.

SCR.9.10. Premium risk is understood to relate to future claims arising during and after the period until the time horizon for the solvency assessment. The risk is that expenses plus the volume of losses (incurred and to be incurred) for these claims (comprising both amounts paid during the period and provisions made at its end) is higher than the premiums received (or if allowance is made elsewhere for the expected profits or losses on the business, that the profitability will be less than expected).

SCR.9.11. Premium risk is present at the time the policy is issued, before any insured events occur. Premium risk also arises because of uncertainties prior to issue of policies during the time horizon. These uncertainties include the premium rates that will be charged, the precise terms and conditions of the policies and the precise mix and volume of business to be written.

SCR.9.12. Premium risk shall therefore cover:

- the risk of loss because the premium provision at the start of the year proves inadequate - that is premium provision at the start of the year plus outstanding premiums receivable plus interest at risk free rate is insufficient to cover claims incurred during the year plus premium provision at end of year.

- the risk of loss on new contracts written during the year - that is premiums receivable during the year plus interest is insufficient to cover claims incurred during the year plus premium provision at the end of the year.

SCR.9.13. CEIOPS therefore identifies four types of risk of loss:

- New premiums may be written at inadequate rates.
- The loss on exposure during the year may be more than expected.
- The provisions at the start of the year for exposure after the end of the year may need to be increased.
- There may be losses on "future premiums" that have been taken into account when calculating technical provisions.

SCR.9.14. Premium risk relates to policies to be written (including renewals) during the period, and to unexpired risks on existing contracts.

SCR.9.15. Premium risk shall also allow for volatility of expense payments. Expense risk can be quite material for some lines of business and shall therefore be fully reflected in the module calculations. Expense risk is implicitly included as part of the premium risk.

SCR.9.16. Reserve risk stems from two sources:

- The absolute level of the claims provisions may be mis-estimated
- Because of the stochastic nature of future claims payouts, the actual claims will fluctuate around their statistical mean value.

SCR.9.17. Both premium and reserve risk include uncertainty in the timing of payments and any cost therein.

Input

SCR.9.18. In order to carry out the non-life premium and reserve risk calculation, the undertaking shall be required to provide the following information:

PCO_{lob}	=	best estimate for claims outstanding for each LoB. This should be the gross amount less expected recoveries from reinsurance and special purpose vehicles (after allowing for expected default)
$P_{lob}^{t,written}$	=	estimate of net written premium for each LoB during the forthcoming year
$P_{lob}^{t,earned}$	=	estimate of net earned premium for each LoB during the forthcoming year
$P_{lob}^{t-1,written}$	=	net written premium for each LoB during the previous year

C_{lob}^{PP}	=	Expected present value of net claims and expense payments which relate to claims incurred after the following year and covered by existing contracts for each LoBs.

SCR.9.19. Earned premium, $P_{lob}^{t,earned}$, should be calculated with reference to Solvency II technical provisions (rather than current accounting approaches):

$$P_{lob}^{t,earned} = P_{lob}^{t,written} + \text{opening Premium provison}_{lob} - \text{closing Premium provision}_{lob}$$

SCR.9.20. In respect of C_{lob}^{PP} the term relates purely to part of the premium provision brought forward at the start of the year and which remains outstanding at the end of the year, whereas the other term is a proxy for premiums to be written or premiums to be earned during the year, noting that the risks relating to these are rather different and only partly overlap. It is not intended to cover random events after the year but changes in provisions on claims after the year as a result of new information.

SCR.9.21.

Calculation

SCR.9.22. The premium and reserve risk capital charge delivers the following output information:

NLpr	=	Capital charge for premium and reserve risk

SCR.9.23. The capital charge for the combined premium risk and reserve risk is determined as follows:

$$NL_{pr} = \rho(\sigma) \bullet V$$

where

V	=	Volume measure
σ	=	combined standard deviation, resulting from the combination of the reserve and premium risk standard deviations
$\rho(\sigma)$	=	A function of the standard deviation

SCR.9.24. The function $\rho(\sigma)$ is specified as follows:

$$\rho(\sigma) = \frac{\exp(N_{0.995} \bullet \sqrt{\log(\sigma^2 + 1)})}{\sqrt{\sigma^2 + 1}} - 1$$

where

$N_{0.995}$ = 99.5% quantile of the standard normal distribution

SCR.9.25. The function $\rho(\sigma)$ is set such that, assuming a lognormal distribution of the underlying risk, a risk capital charge consistent with the VaR 99.5% standard is produced. Roughly, $\rho(\sigma) \approx 3 \bullet \sigma$

SCR.9.26. The volume measure V and the combined standard deviation σ for the overall non-life insurance portfolio are determined in two steps as follows:

- For each individual LoB, the standard deviations and volume measures for both premium risk and reserve risk are determined;

SCR.9.27. The standard deviations and volume measures for the premium risk and the reserve risk in the individual LoBs are aggregated to derive an overall volume measure V and an overall standard deviation σ.

SCR.9.28. The calculations needed to perform these two steps are set out below.

Step 1: Volume measures and standard deviations per LoB

SCR.9.29. The calculation of both premium and reserve risk shall be done for each LoB as defined below and consistently with the SCR, MCR and TP segmentation and numbering.

SCR.9.30. The following numbering of LoBs applies for the calculation[63]:

LoB number	
1	Motor, third-party liability
2	Motor, other classes
3	Marine, aviation, transport (MAT)
4	Fire and other property damage
5	Third-party liability
6	Credit and suretyship
7	Legal expenses
8	Assistance

[63] This segmentation is the same as the segmentation applied in the valuation of the technical provisions, excluding the health LoBs which for the purpose of the SCR calculation are treated in a specific module.

9	Miscellaneous
10	Non-proportional reinsurance – property
11	Non-proportional reinsurance – casualty
12	Non-proportional reinsurance – MAT

SCR.9.31. For each LoB, the volume measures and standard deviations for premium and reserve risk are denoted as follows:

$V_{(prem,lob)}$	=	The volume measure for premium risk
$V_{(res,lob)}$	=	The volume measure for reserve risk
$\sigma_{(prem,lob)}$	=	standard deviation for premium risk
$\sigma_{(res,lob)}$	=	standard deviation for reserve risk

SCR.9.32. The volume measure for premium risk in the individual LoB is determined as follows:

$$V_{(prem,lob)} = \max(P_{lob}^{t,written}; P_{lob}^{t,earned}; P_{lob}^{t-1,written}) + C_{lob}^{PP}$$

SCR.9.33. If the insurer has committed to its regulator that it will restrict premiums written over the period so that the actual premiums written (or earned) over the period will not exceed its estimated volumes, the volume measure is determined only with respect to estimated premium volumes, so that in this case:

$$V_{(prem,lob)} = \max(P_{lob}^{t,written}; P_{lob}^{t,earned}) + C_{lob}^{PP}$$

SCR.9.34. The market-wide estimates of the net standard deviation for premium risk for each line of business are:

LoB_t	*standard deviation for premium risk (net of reinsurance)*
Motor (3rd-party)	$10\%*(NCR_i/GCR_i)$
Motor (other)	$8.5\%*(NCR_i/GCR_i)$
MAT	$18\%*(NCR_i/GCR_i)$
Fire	$12.5\%*(NCR_i/GCR_i)$
3rd-party liab	$15\%*(NCR_i/GCR_i)$

Credit	21.5%*(NCR_i/GCR_i)
Legal exp.	6.5%*(NCR_i/GCR_i)
Assistance	5%*(NCR_i/GCR_i)
Misc.	13%*(NCR_i/GCR_i)
Reins (prop)	17.5%*(NCR_i/GCR_i)
Reins (cas)	17%*(NCR_i/GCR_i)
Reins (MAT)	16%*(NCR_i/GCR_i)

SCR.9.35. The net-gross ratio (NCRi/GCRi) is defined as follows:

$$\frac{NCR_i}{GCR_i} = \sqrt{\frac{1+\left(\Omega_{lob}^{net}/M_{lob}^{net}\right)^2}{1+\left(\Omega_{lob}^{gross}/M_{lob}^{gross}\right)^2}}\,,$$

where

$$M_{lob}^{net} = M_{lob}^{gross}\cdot\left[1-F_{m+\sigma^2,\sigma}(a+b)+F_{m+\sigma^2,\sigma}(a)\right]+a\cdot\left[F_{m,\sigma}(a+b)-F_{m,\sigma}(a)\right]-b\cdot\left[1-F_{m,\sigma}(a+b)\right]$$

$$\Omega_{lob}^{net} = \begin{pmatrix} \left(\Omega_{lob}^{gross\,2}+M_{lob}^{gross\,2}\right)\cdot\left[1-F_{m+2\sigma^2,\sigma}(a+b)+F_{m+2\sigma^2,\sigma}(a)\right]+a^2\cdot\left[F_{m,\sigma}(a+b)-F_{m,\sigma}(a)\right] \\ -2b\cdot M_{lob}^{gross}\cdot\left[1-F_{m+\sigma^2,\sigma}(a+b)\right]+b^2\cdot\left[1-F_{m,\sigma}(a+b)\right]-M_{lob}^{net\,2} \end{pmatrix}^{1/2}$$

$$\sigma = \sqrt{\ln\left(1+\left(\frac{\Omega_{lob}^{gross}}{M_{lob}^{gross}}\right)^2\right)}$$

and

$$m = \ln M_{lob}^{gross} - \frac{\sigma^2}{2}.$$

SCR.9.36. The terms used in these formulas are defined as follows:

M_{lob}^{gross}	=	**Average cost per claim gross of reinsurance per LOB, estimated from the claims of the last year**
Ω_{lob}^{gross}	=	**Standard deviation of the cost per claim gross of reinsurance per LOB, estimated with the standard estimator from the claims of the last year**
a	=	**Retention of non-proportional reinsurance contract**

b	**=**	**Limit of the non-proportional reinsurance contract**
$F_{m,\sigma}$	**=**	**distribution function of a Lognormal random variable with parameters** (m,σ)
$F_{m+\sigma^2,\sigma}$	**=**	**distribution function of a Lognormal random variable with parameters** $(m+\sigma^2,\sigma)$
$F_{m+2\sigma^2,\sigma}$	**=**	**distribution function of a Lognormal random variable with parameters** $(m+2\sigma^2,\sigma)$

•

SCR.9.37. The volume measure for reserve risk for each individual LoB is determined as follows:

$$V_{(res,lob)} = PCO_{lob}$$

SCR.9.38. The market-wide estimate of the net of reinsurance standard deviation for reserve risk for each line of business are:

LoB_t	*standard deviation for reserve risk (net of reinsurance)*
Motor, 3rd-party	9.5%
Motor, other	10%
MAT	14%
Fire	11%
3rd-party liab	15.5%
Credit	20%
Legal exp.	9%
Assistance	11%
Misc.	15%
Reins (prop)	20%
Reins (cas)	20%
Reins (MAT)	20%

SCR.9.39. No further adjustments are needed to these results.

SCR.9.40. The standard deviation for premium and reserve risk in the individual LoB is defined by aggregating the standard deviations for both subrisks under the assumption of a correlation coefficient of $\alpha = 0.5$:

$$\sigma_{(lob)} = \frac{\sqrt{\left(\sigma_{(prem,lob)}V_{(prem,lob)}\right)^2 + 2\alpha\sigma_{(prem,lob)}\sigma_{(res.lob)}V_{(prem,lob)}V_{(res.lob)} + \left(\sigma_{(res,lob)}V_{(res,lob)}\right)^2}}{V_{(prem,lob)} + V_{(res,lob)}}$$

Step 2: Overall volume measures and standard deviations

SCR.9.41. The overall standard deviation σ is determined as follows:

$$\sigma = \sqrt{\frac{1}{V^2} \cdot \sum_{rxc} CorrLob_{r,c} \cdot \sigma_r \cdot \sigma_c \cdot V_r \cdot V_c}$$

where

r,c	=	All indices of the form (lob)
$Corr_{Lobrxc}$	=	the cells of the correlation matrix $Corr_{Lob}$
Vr,Vc	=	Volume measures for the individual lines of business, as defined in step 1

SCR.9.42. The overall volume measure for each LoB, V_{lob} is obtained as follows:

$$V_{lob} = \left(V_{lob}^{prem} + V_{lob}^{res}\right) \cdot \left(0.75 + 0.25 \cdot DIV_{lob}\right)$$

where

$$DIV_{lob} = \frac{\sum_j \left(V_{(prem,j,lob)} + V_{(res,j,lob)}\right)^2}{\left(\sum_j \left(V_{(prem,j,lob)} + V_{(res,j,lob)}\right)\right)^2}$$

and where the index j denotes the geographical segments as set out in Annex K and $V_{(prem,j,lob)}$ and $V_{(res,j,lob)}$ denote the volume measures as defined above but restricted to the geographical segment j.

However, the factor DIV_{lob} should be set to 1 for the line of business credit and suretyship and where the standard deviation for premium or reserve risk of the line of business is an undertaking-specific parameter.

Undertakings may choose to allocate all of their business in a line of business to the main geographical segment in order to simplify the calculation.

SCR.9.43. For the entries of the correlation matrix $Corr_{Lob}$ please refer to CEIOPS' Advice on non-life underwriting risk calibration. The matrix has a shape as follows:

CorrLob	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
1: M (3rd party)	1											
2: M (other)	0,5	1										
3: MAT	0,5	0,25	1									
4: Fire	0,25	0,25	0,25	1								
5: 3rd party liab	0,5	0,25	0,25	0,25	1							
6: credit	0,25	0,25	0,25	0,25	0,5	1						
7: legal exp.	0,5	0,5	0,25	0,25	0,5	0,5	1					
8: assistance	0,25	0,5	0,5	0,5	0,25	0,25	0,25	1				
9: misc.	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	1			
10:reins. (prop)	0,25	0,25	0,25	0,5	0,25	0,25	0,25	0,5	0,25	1		
11:reins. (cas)	0,25	0,25	0,25	0,25	0,5	0,5	0,5	0,25	0,25	0,25	1	
12:reins. (MAT)	0,25	0,25	0,5	0,5	0,25	0,25	0,25	0,25	0,5	0,25	0,25	1

Output

SCR.9.44. This module delivers the following output information:

NL_{pr} = Capital charge for premium and reserve risk

SCR.9.3. NL_{Lapse} Lapse risk

SCR.9.45. When assessing technical provisions, assumptions need to be made about the take up rate of options / guarantees etc that form part of future premiums. Typically, the inclusion of these future premiums will lead to a reduction in technical provisions, assuming that business is written on profitable terms. If actual take up rates were lower than expected, there would be a reduction in own funds compared to what was expected.

SCR.9.46. The capital requirement for lapse risk should be calculated where the undertaking allows for future premiums in the calculation of technical provisions due to the existence of unilateral renewal options available to the policyholder.

$$Non\_Life_{lapse} = \max(Lapse_{down}; Lapse_{up}),$$

where

$Non\text{-}Life_{lapse}$	=	Capital requirement for lapse risk
$Lapse_{down}$	=	Capital requirement for the risk of a permanent decrease of lapse rates
$Lapse_{up}$	=	Capital requirement for the risk of both a permanent increase of lapse rates

SCR.9.47. The capital requirement for the risk of a permanent decrease of lapse rates should be calculated as follows:

$$Lapse_{down} = \Delta NAV \mid lapseshock_{down}, \quad \text{where}$$

ΔNAV	=	Change in the net value of assets minus liabilities (not including changes in the risk margin of technical provisions where it needs to be calculated separately)
$lapseshock_{down}$	=	Decrease of 50% in the assumed option take-up rates in all future years for all policies. The shocked rate should not exceed 100%. (Note that an increase in take-up rate implies a reduction in the lapse rate.)

SCR.9.48. The capital requirement for the risk of a permanent increase of the lapse rate should be calculated as follows:

$$Lapse_{up} = \Delta NAV \mid lapseshock_{up}, \quad \text{where}$$

ΔNAV	=	Change in the net value of assets minus liabilities (not including changes in the risk margin of technical provisions where it needs to be calculated separately)
$lapseshock_{up}$	=	Increase of 50% in take-up rates in later future years for all remaining policies. The shocked rate should not change the rate to which the reduction

is applied by more than 20% in absolute terms. (Note that a reduction in take-up rate implies an increase in the lapse rate.)

SCR.9.49. As for life underwriting risk, the amount is calculated at a total portfolio level and is not split by line of business.

SCR.9.4. NL_{cat} CAT risk

Description

SCR.9.50. Under non-life underwriting, catastrophe risk is defined in the L1 Directive as: "the risk of loss, or of adverse change in the value of insurance liabilities, resulting from significant uncertainty of pricing and provisioning assumptions related to extreme or exceptional events."

SCR.9.51. CAT risks stem from extreme or irregular events that are not sufficiently captured by the charges for premium and reserve risk. The catastrophe risk charge has to be calibrated at the 99.5% VaR (annual view).

SCR.9.52. The CAT risk sub-module shall be calculated using one of the following alternative methods:

Method 1: standardised scenarios

SCR.9.53. The catastrophe standardised scenarios are still work in progress. These scenarios shall be complete for June 2010.

SCR.9.54. The non life catastrophe standardised scenarios considered in this document are:

SCR.9.55. Natural Catastrophes: extreme or exceptional events arising from the following perils:

- Windstorm
- Flood
- Earthquake
- Hail

SCR.9.56. Man-Made Catastrophes: extreme or exceptional events arising from:

- Motor
- Fire

- Marine
- Aviation
- Liability
- Credit & Suretyship
- Terrorism

SCR.9.57. Storm surge is also considered. Where this is covered and is considered to be a material peril, it has been included with the windstorm peril due to the inherently coupled nature.

SCR.9.58. The above selection was based on the likelihood of such events resulting extreme or exceptional and therefore giving rise to losses, or adverse changes in the value of insurance liabilities.

SCR.9.59. Furthermore:

- Scenarios are all EEA-based. An exception to this is the French Dom/Tom scenario which will be included for June.
- Geographical specifications are recognised where appropriate.
- Scenarios are provided gross of reinsurance and gross of all other mitigation instruments (for example national pool arrangements or cat bonds). Undertakings shall take into account reinsurance and other mitigation instruments to estimate their net loss as specified further.
- Scenarios have been provided by peril or event and not by line of business. However as the risk margin is required to be calculated at the line of business level it is necessary to provide some guidance on how the resultant overall catastrophe charge can be allocated to individual lines of business. This will be done for June 2010.

SCR.9.60. Undertakings need to assess whether the standardised scenarios appropriately capture the risks to which they are exposed. Circumstances in which the standardised scenarios presented in this paper will be inadequate, include among others:

- Where undertakings have exposures outside the EEA.
- Where undertakings write non proportional reinsurance business and this cannot be properly reflected by the scenario.
- Where undertakings write miscellaneous business

- When a standardized scenario is not relevant and a partial internal model is not proportionate

Method 2: factor based method

SCR.9.61. Undertakings shall apply the factor based method in two cases:

- When a standardized scenario is not relevant and a partial internal model is not proportionate.
- For the Miscellaneous line of business.

SCR.9.62. This method may also be used in other circumstances as an alternative to Method 1, for example:

- Undertakings with exposures outside the EU, in relation to these exposures.
- Where undertakings write non proportional reinsurance business and this cannot be properly reflected by the scenario.

SCR.9.63. If undertakings write material amounts of non proportional reinsurance or have material amount of exposures outside the EU, we would expect them to seek partial internal model approval.

9.4.1. Method 1: Catastrophe Standardised Scenarios

NL_CAT

Input

SCR.9.64. The following input information is required:

NL_CAT_{NatCat}	=	Catastrophe capital charge for natural catastrophes net of risk mitigation
$NL\_CAT_{Man\ made}$	=	Catastrophe capital charge for man made net of risk mitigation

Calculation

SCR.9.65. The NL_CAT will be the aggregation of the capital charges for Natural catastrophe and man made disasters. It is assumed both are independent. Independence is assumed, as follows:

$$NL\_CAT = \sqrt{(NL\_CAT_{NatCat})^2 + (NL\_CAT_{Manmade})^2}$$

	Nat Cat	*Man made*
Nat cat	1	0
Man Made	0	1

SCR.9.66. Undertakings may estimate the net capital charge for Catastrophe Risk applying the following formulae:

Where the XL cover follows a proportional cover:

MAX ((L*MS*QS)-XLC, 0) +MIN ((L*MS*QS), XLF) + REINST

Where a proportional cover follows an XL cover:

MAX ((L*MS)-XLC, 0) *QS +MIN((L*MS), XLF) *QS + REINST

Where

L= the total gross loss amount. The total gross loss amount of the catastrophe will be provided as part of the information of the scenario.

MS= the market share. This proportion might be determined with reference to exposure estimates, historical loss experience or the share of total market premium income received. The total market loss amount of the catastrophe will be provided as part of the information of the scenario.

QS= quota share retention. Allowance must be made for any limitations, e.g. event limits which are frequently applied to QS treaties

XLC= the upper limit of the XL programme that is applicable in case of the scenario event

XLF= the XL retention of the XL programme that is applicable in case of the scenario event.

REINST = the reinstatement premium or premiums (in case of scenarios with a succession of 2 or more identical events)

SCR.9.67. However risk mitigation contracts can take a variety of forms and the above eqation may not be applicable. Guidance is provided through a set of examples that show how firms ought to net down their gross estimations and this is included in annex J.3. A helper tab will be included trying to illustrate such examples. Moreover, undertakings, including captives, should be able to take into account the risk mitigation effect of aggregate limits as defined in section 14.2.4. Undertakings should provide the details of calculations and explain how they have arrived to the net estimation.

SCR.9.68. In the EEA there is a variety of national arrangements which provide protection in different ways. Without going into the specifics of each arrangement, undertakings should net down their gross estimation to reflect such protection, if applicable. Where Reinsurers provide or could potentially provide cover to the national arrangements, such reinsurance companies need to estimate a capital charge for this exposure.

SCR.9.69. Where there are separate reinsurance programmes for each country the aggregations (across countries) are done net of reinsurance. Where there are separate reinsurance programmes per peril, the aggregation (across perils) are done net of reinsurance.

SCR.9.70. In calculating net losses undertakings should include consideration of reinstatement premiums directly related to the scenario. Both Outwards reinstatement premiums associated with reinstating risk transfer protection and Inwards reinstatement premiums in respect of assumed reinsurance business should be calculated.

NL_CAT_{NatCat}

SCR.9.71. Annex J.4 provides a table which specifies the countries that need to carry out the calculations for each of the natural catastrophe perils.

<u>Input</u>

$CAT_{countries}$	Catastrophe capital charge for each event type by country
$Corr_{Countries}$	Correlation between countries
CAT_{n_peril}	Catastrophe capital charge for each event type across all countries
$Corr_{n\_peril}$	Correlation between natural perils

<u>Calculation</u>

SCR.9.72. The NL_CAT_{NatCat} will be given as:

$$NL\_CAT_{NatCat} = \sqrt{\sum_{n\_peril,i,j} Corr_{i,j} * CAT_{n\_peril,i} * CAT_{n\_peril,j}}$$

$$CAT_{n\_peril} = \sqrt{\sum_{countries,i,j} Corr_{i,j} * CAT_{countries,i} * CAT_{countries,j}}$$

where:

$CAT_{countries}$	*Catastrophe capital charge for each event type by country*
$Corr_{Countries}$	*Correlation between countries*
CAT_{n_peril}	*Catastrophe capital charge for each event type across all countries*

$Corr_{n\_peril}$	*Correlation between natural perils*

SCR.9.73. The correlation matrixes $Corr_{Countries}$ for each peril are:

For Windstorm:

	AT	BE	CH	CZ	DE	DK	ES	FR	UK	IE	IS	LU	NL	NO	PL	SE	HU
AT	1																
BE	0.25	1															
CH	0.5	0.25	1														
CZ	0.25	0.25	0.25	1													
DE	0.25	0.5	0.25	0.25	1												
DK	0	0.25	0	0	0.5	1											
ES	0	0	0.25	0	0	0	1										
FR	0.25	0.5	0.5	0.25	0.5	0.25	0.25	1									
UK	0	0.5	0	0	0.25	0.25	0	0.25	1								
IE	0	0.25	0	0	0.25	0	0	0	0.5	1							
IS	0	0	0	0	0	0	0	0	0	0	1						
LU	0.25	0.75	0.25	0.25	0.5	0.25	0	0.75	0.25	0.25	0	1					
NL	0.25	0.75	0.25	0.25	0.5	0.5	0	0.5	0.5	0.25	0	0.5	1				
NO	0	0	0	0	0.25	0.5	0	0	0.25	0	0	0.25	0.25	1			
PL	0	0.25	0	0.25	0.5	0.25	0	0	0	0	0	0.25	0.25	0	1		
SE	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0.5	0	1	0
HU	0.25	0	0	0.25	0	0	0	0	0	0	0	0	0	0	0.25	0	1

For Flood:

	AT	BE	CH	CZ	FR	DE	HU	IT	NL	PL	RO	SI	SK	UK
AT	1													
BE	0	1												
CH	0.25	0	1											
CZ	0.75	0	0	1										
FR	0	0.25	0.25	0	1									
DE	0.75	0.25	0.25	0.75	0.25	1								
HU	0.75	0	0	0.25	0	0.75	1							
IT	0	0	0.25	0	0	0	0	1						

NL	0	0.75	0	0	0.25	0.75	0	0	1					
PL	0.75	0	0	0.75	0	0.75	0.25	0	0	1				
RO	0.75	0	0	0.25	0	0.75	0.75	0	0	0.25	1			
SI	0	0	0	0	0	0	0	0.25	0	0	0	1		
SK	0.75	0	0	0.75	0	0.75	0.25	0	0	0.5	0.25	0.25	1	
UK	0	0	0	0	0	0	0	0	0	0	0	0	0	1

For earthquake: This matrix will be completed in June 2010.

SCR.9.74. The correlation between perils is defined as follows:

	Windstorm	*Earthquake*	*Flood*	*Hail*
Windstorm	1			
Earthquake	0	1		
Flood	0.25	0	1	
Hail	0.25	0	0	1

<u>Output</u>

SCR.9.75. The module delivers the following output:

NL_CAT Catastrophe capital charge for non life net of risk mitigation

***Cat**Windstorm*

$Cat_{Windstorm}$

<u>Input</u>

SCR.9.76. Undertakings need to provide the following information:

TIV_{ZONE}= Total insured value for the windstorm exposed Fire and other damage line of business exposures by each zone[64].

<u>Calculation</u>

SCR.9.77. The formula to be applied by undertakings for their respective gross exposures in each of the EEA countries is as follows:

$$WTIV_{ZONE} = F_{ZONE} * TIV_{ZONE}$$

[64] As listed in www.cresta.org

$$CAT_{Windstorm} = Q_{CTRY}\sqrt{\sum_{rxc} AGG_{r,c} * WTIV_r * WTIV_c}$$

where,

$CAT_{Windstorm}$	The estimation of the gross windstorm cat capital charge for a specific country
$Q_{CTRY} =$	1 in 200 year factor for each country[65]
$F_{ZONE} =$	relativity factors for each zone by country[66]
$AGG_{r,c} =$	Rows and columns of the aggregation matrix AGG by country.[67]
$WTIV_{ZONE}=$	Geographically weighted total insured value by zone
$TIV_{ZONE}=$	Total insured value for the windstorm exposed Fire and other damage line of business exposures by each zone[68].

SCR.9.78. Apply the calculations on a gross basis and then net down each scenario (A and B) for reinsurance as per section 3, including consideration of any reinstatement premiums and coverage limits.

$Net\_Cat_{Windstorm(A)} = Event_{A1}$ followed by $Event_{A2}$,

Where

$Event_{A1} = 0.8 * CAT_{Windstorm}$ then net down for reinsurance
$Event_{A2} = 0.4 * CAT_{Windstorm}$ then net down for reinsurance

$Net\_CAT_{windstorm(B)} = Event_{B1}$ followed by $Event_{B2}$

Where

$Event_{B1} = 1 * CAT_{Windstorm}$ then net down for reinsurance
$Event_{B2} = 0.2 * CAT_{Windstorm}$ then net down for reinsurance

$Net\_Cat_{Windstorm} = Max(Net\_Cat_{Windstorm(A)}, Net\_Cat_{Windstorm(B)})$

<u>Output</u>

$CAT_{Winstorm}$ = Catastrophe capital charge for windstorm

[65] These values are provided in the Excel spreadsheet "Parameters for non-life catastrophe risk".
[66] These values are provided in the Excel spreadsheet "Parameters for non-life catastrophe risk".
[67] These values are provided in the Excel spreadsheet "Parameters for non-life catastrophe risk".
[68] As listed in www.cresta.org.

$Cat_{Earthquake}$

Input

SCR.9.79. Undertakings need to provide the following information:

TIV_{ZONE}=	Total insured value for the windstorm exposed Fire and other damage line of business exposures by each zone[69].

Calculation

SCR.9.80. The formula to be applied by undertakings for their respective gross exposures in each of the EEA countries is as follows:

$$WTIV_{ZONE} = F_{ZONE} * TIV_{ZONE}$$

$$CAT_{Earthquke} = Q_{CTRY} \sqrt{\sum_{rxc} AGG_{r,c} * WTIV_r * WTIV_c}$$

where,

$CAT_{earthquake}$	The estimation of the gross earthquake cat capital charge for a specific country
Q_{CTRY} =	1 in 200 year factor for each country[70]
F_{ZONE} =	Relativity factors for each zone by country[71]
$AGG_{r,c}$ =	Rows and columns of the aggregation matrix AGG by country.[72]
$WTIV_{ZONE}$=	Geographically weighted total insured value by zone
TIV_{ZONE}=	Total insured value for the earthquake exposed Fire and other damage line of business exposures by each zone[73].

Output

$CAT_{Earthquake}$ = Net Catastrophe capital charge for earthquake

Cat_{Flood}

Input

[69] As listed in www.cresta.org
[70] These values are provided in the Excel spreadsheet "Parameters for non-life catastrophe risk".
[71] These values are provided in the Excel spreadsheet "Parameters for non-life catastrophe risk".
[72] These values are provided in the Excel spreadsheet "Parameters for non-life catastrophe risk".
[73] As listed in www.cresta.org

SCR.9.81. Undertakings need to provide the following information:

TIV_{ZONE}= Total insured value for the windstorm exposed Fire and other damage line of business exposures by each zone[74].

Calculation

SCR.9.82. The formula to be applied by undertakings for their respective gross exposures in each of the EEA countries is as follows:

$$WTIV_{ZONE} = F_{ZONE} * TIV_{ZONE}$$

$$CAT_{Flood} = Q_{CTRY} \sqrt{\sum_{rxc} AGG_{r,c} * WTIV_r * WTIV_c}$$

where,

CAT_{Flood} The estimation of the gross flood cat capital charge for a specific country

Q_{CTRY} = 1 in 200 year factor for each country[75]

F_{ZONE} = relativity factors for each zone by country[76]

$AGG_{r,c}$ = Rows and columns of the aggregation matrix AGG by country[77]

$WTIV_{ZONE}$= Geographically weighted total insured value by zone

TIV_{ZONE}= Total insured value for the flood exposed 'Fire and other damage', static 'Marine Aviation and Transport', 'Motor, other' line of business[78] exposures by each CRESTA zone..

SCR.9.83. To allow for multiple events in a year undertakings are required to:

- Apply the calculations on a gross basis and then net down each scenario (A and) for reinsurance as per section 3, including consideration of any reinstatement premiums and coverage limits.

$Net\_CAT_{Flood(A)}$ = $Event_{A1}$ followed by $Event_{A2}$,

Where
$Event_{A1}$ = 0.65* CAT_{Flood} then net down for reinsurance
$Event_{A2}$ = 0.45* CAT_{Flood} then net down for reinsurance

$Net\_CAT_{Flood(B)}$ = $Event_{B1}$ followed by $Event_{B2}$

Where

[74] As listed in www.cresta.org.
[75] These values are provided in the Excel spreadsheet "Parameters for non-life catastrophe risk".
[76] These values are provided in the Excel spreadsheet "Parameters for non-life catastrophe risk".
[77] These values are provided in the Excel spreadsheet "Parameters for non-life catastrophe risk".
[78] As defined by the CEIOPS advice on segmentation.

Event $_{B1}$ = 1* CAT_{Flood} then net down for reinsurance
Event $_{B2}$ = 0.1* CAT_{Flood} then net down for reinsurance

And then,

$$Net\_Cat_{Flood} = Max\,(Net\_Cat_{FloodA)}, Net\_Cat_{Flood(B)})$$

Output

CAT_{Flood} = Catastrophe capital charge for flood

Cat_{Hail}

SCR.9.84. The process for hail shall be provided for June 2010. However this shall follow very a very similar description as that for other perils.

NL_CATMan-made

Input

SCR.9.85. The following input information is required:

CAT_{Fire} = Catastrophe capital charge for fire

CAT_{Motor} = Catastrophe capital charge for motor

CAT_{Marine} = Catastrophe capital charge for marine

CAT_{Credit} = Catastrophe capital charge for credit

$CAT_{Liability}$ = Catastrophe capital charge for Liability

$CAT_{Aviation}$ = Catastrophe capital charge for Aviation

$CAT_{Terrorism}$ = Catastrophe capital charge for Terrorism

Calculation

SCR.9.86. The $NL\_CAT_{ManMade}$ will be given as:

$$CAT_{m\_peril} = \sqrt{\sum_{countries,i,j} Corr_{i,j} * CAT_{countries,i} * CAT_{countries,j}}$$

$$NL\_CAT_{ManMade} = \sqrt{\sum_{m\_perils} Corr_{peril} * CAT_{m\_peril}}$$

where

CAT_{m_peril} Catastrophe charge for man-made perils

$Corr_{m\_peril}$ Correlation between man-made perils

and is given by:

	Motor	*Fire*	*Marine*	*Credit*	*Liability*	*Terrorism*
Motor	1	0	0	0		
Fire	0	1	0	0		
Marine	0	0	1	0		
Credit	0	0	0	1		
Liability					1	
Terrorism						1

SCR.9.87. Independence is assumed between the types of man-made events.

SCR.9.88. Undertakings are required to net down for risk mitigation each of the gross capital charges estimated under each scenario unless explicitly stated otherwise.

Output

SCR.9.89. The $NL\_CAT_{ManMade}$ will be given as net catastrophe risk charge for man made events.

Fire

SCR.9.90. Undertakings with exposures under the Fire and other damage line of business are exposed to this scenario.

SCR.9.91. Below is an illustration of what has been considered to be a possible Fire man made scenario: Actual historic examples would include for example Buncefield and Toulouse.

Scenario Rotterdam
Consider an explosion or fire in the oil refineries at the port of Rotterdam – one of the largest ports in the world. Large volumes of crude oil are stored around the port, and these catch fire as a result of the explosion. The fire causes a large number of fatalities, closure of the whole port (business interruption), almost complete destruction of port buildings and machinery as well as generating a highly toxic cloud of fumes.

Scenario Armament company
Due to a short circuit in an army aircraft a fire occurs in the premises of an armament company. In the building are 10 highly developed fighter jets, which are destroyed along with the hall and machinery.

Input

SCR.9.92. Undertakings will be required to provide the following inputs for each of the sub lines that they are exposed to:

E_x = Sum Insured for Fire for residential, commercial and industrial business

Calculation

SCR.9.93. A split according to residential, industrial and commercial provides a more risk sensitive result. For residential risks, the underlying catastrophic scenario is a clash of many individual risks, whereas for industrial risks, the catastrophic scenario can be one single industrial plant suffering a large loss.

SCR.9.94. The scenario incorporates both an extreme single as well as a market loss event. The capital charge is estimated as follows:

$$CAT_{FIRE} = \sum^{sub-lines} E_X * F_X$$

$$SCR\_CAT_{FIRE} = Max(LSR, CAT_{FIRE})$$

where,

E_x = is the sum insured by for residential, commercial and industrial respectively
F_x = are the Fire/BI market wide factors for residential, commercial and industrial respectively
LSR = is the single largest risk across all sub lines
Corr = is the correlation matrix, correlations between residential/commercial/industrial business
F_x are :

Residential	0.004%
Commercial	0.010%
Industrial	0.073%

Output

CAT_{Fire} = *Net Catastrophe capital charge for fire*

SCR.9.95. Undertakings should then apply any adjustment due to risk mitigation to estimate the net capital charge. Details should be provided on this calculation.

Motor

SCR.9.96. Below are illustrations of a possible Motor man-made scenario:

> <u>*Motor Scenario 1 – Selby-like*</u>
>
> *Consider a car, which falls off a bridge onto a railway and causes a collision of two trains. Assume 10 fatalities and 80 injured persons as well as a high degree of material damage to the car, the trains and the bridge.*
>
> <u>*Motor Scenario 2 – Mont Blanc tunnel like*</u>
>
> *Consider a collision of two trucks in a tunnel of 500 meter length. Both trucks catch fire and cause the quick development of heat and smoke. Assume 40 fatalities, 40 injured persons as well as a high degree of damage to the tunnel and the vehicles. There are also associated Business Interruption losses.*
>
> <u>*Motor Scenario 3 –Extreme crash*</u>
>
> *Consider a major collision of a car with a coach killing all passengers on board the coach. Assume coach passengers are Premier League / Bundesliga / Serie A football players travelling to international football match.*

SCR.9.97. Undertakings with exposures under the Motor Third Party Liability line of business are exposed to this scenario.

<u>Input</u>

SCR.9.98. Undertakings will need to provide details of:

$VY_{COUNTRY}$	=	Highest sum insured offered. For example if unlimited, undertakings should type in "unlimited" or a monetary amount
$LIM_{COUNTRY}$	=	the value of the largest policy limit that they offer in each country

<u>Calculation</u>

SCR.9.99. The calibration is based on a Pan-European loss scenario as follows:

GL_{MTPL} Gross Loss of Europe-wide Scenario = €275m
RP_{MTPL} Return Period of Europe-wide Scenario = 20 years

SCR.9.100. The return period of 20 years should be amenable to some form of subjective real-world judgment when considered against the historic events. In addition, a 1-

in-20 year pan European loss should exceed the 1-in-200 year loss for any individual undertaking.

SCR.9.101. The underlying model for these extreme losses is being assumed to be a Poisson / Pareto with vehicle years driving the Poisson frequency and the pan-Europe scenario some pareto parameters. The only other parameter needed is the pareto shape parameter, alpha.

ALPHA Pareto shape parameter = 2

SCR.9.102. The underlying vehicle base is assumed to be:

$TVY_{COUNTRY}$ Vehicle years for Motor TPL by country

SCR.9.103. There is then a weighting factor used to apportion the likelihood that the base loss scenario is caused by a vehicle insured by each country.

$W_{COUNTRY}$ Europe-wide scenario weight for each country.

$$W_{COUNTRY} = TVY_{COUNTRY} / \Sigma_{COUNTRY} (TVY_{COUNTRY})$$

SCR.9.104. In addition, the scenario considers limits of coverage provided by undertakings in different countries. However, allowance must be made for losses caused outside the ‘home’ country of the insurance. The scenario therefore includes a ‘limit failure factor’ for each country which represents a proportion of the extreme losses that are considered to occur in such a way that the cover under the original policy is unlimited.

$F_{COUNTRY}$ Proportion of ‘limit failure losses’ amongst the extreme losses for each country.

SCR.9.105. The suggested value of this parameter is 6% for all countries except Iceland and Malta where 0% was chosen. (Note that this parameter has no effect for countries with unlimited exposures.).

SCR.9.106. The Gross Risk Charge “GRC” is then given by the solution to:

$$0.005 = F_{MTPL} * \Sigma_{COUNTRY} (F_{COUNTRY} * W_{COUNTRY} * VY_{COUNTRY} / TVY_{COUNTRY}) * (GL_{MTPL} / GRC)^{ALPHA} + F_{MTPL} * \Sigma_{COUNTRY\ (where\ GRC<LIMCOUNTRY)} [((1-F_{COUNTRY}) * W_{COUNTRY} * VY_{COUNTRY} / TVY_{COUNTRY}) * (GL_{MTPL} / GRC)^{ALPHA}]$$

<u>Output</u>

CAT_{Motor} = Gross catastrophe capital charge for motor

SCR.9.107. Undertakings should then apply any adjustment due to risk mitigation to estimate the net capital charge for Motor. Details should be provided on this calculation.

SCR.9.108. The net risk charge should be calculated by the undertaking allowing for any additional contingent premiums payable.

Marine

SCR.9.109. Undertakings with exposures under MAT, in particular Marine property and liability are exposed to this scenario.

SCR.9.110. Below are illustrations of a possible Marine man-made scenario:

Marine Scenario 1 – Collision *A Collision between a gas/oil tanker and a cruise ship causing 100 deaths and 950 seriously injured people. The cruise ship is operated out of Miami and claims are litigated in the US. The tanker is deemed at fault, is unable to limit liability and has cover with a P&I club for four/fourths liability* *Marine Scenario 2 – Loss of major platform/complex* *A total loss to all platforms and bridge links of a major complex*

SCR.9.111. Two distinct Marine scenarios are considered in calculating CAT_{Marine} charge:

$CAT_{Marine1}$ = Major marine collision event,

and

$CAT_{Marine2}$ = Loss of major offshore platform/complex

Input

Required inputs for Marine collision are:

SI_{Ht}, SI_{Hc}	= undertakings maximum gross marine hull exposures to tankers (t) and cruise ships I
SI_{Lt}	= undertakings max gross exposure to marine liability, subject to scenario specification
SI_{Lo}	Undertakings gross exposure to liability in respect of Oil pollution.

SCR.9.112. Required inputs for the loss of major offshore platform/complex are:

SI_i	undertakings gross exposures by subclass i (for example: property damage, removal of wreck, loss of production income, making wells safe) to the undertakings largest offshore complex accumulation

Calculation

SCR.9.113. Marine Collision

Description: Collision between a gas / oil tanker and a cruise ship causing 100 deaths and 950 seriously injured persons.

The cruise ship is operated out of Miami and claims are litigated in the US.

The tanker is to blame, is unable to limit liability, and has cover with a P&I club for four fourths collision liability.

Costing Info:

$m	Unit cost	Number	Gross Loss
Death	2	100	200
Injury	3	950	2,850
Oil Pollution	550	1	550
Total			3,600

Notes for undertakings: P&I clubs and their reinsurers should note that this scenario exhausts the Collective Overspill P&I Protection and First Excess layer of the Oil Pollution protection under the Intl Group reinsurance programme

Hull insurers should consider their largest gross lines in respect of both Tankers and Cruise ships

Marine Reinsurers will need to consider carefully their potential for accumulation under this scenario and document any methodology or assumptions when calculating their gross loss position.

SCR.9.114. The formula to be applied by undertakings in calculating their respective gross exposures is as follows:

$$\text{CAT}_{\text{Marine1}} = \sum SI_{Ht}, SI_{Hc}, SI_{Lt}, SI_{Lo}$$

where

SI_{Ht}, SI_{Hc}	undertakings maximum gross marine hull exposures to tankers (t) and cruise ships I
SI_{Lt}	Undertakings max gross exposure to marine liability, subject to scenario specification and
SI_{Lo}	Undertakings gross exposure to liability in respect of Oil pollution

SCR.9.115. Loss of major platform/complex

Description: This scenario contemplates a Piper Alpha type total loss to all platforms and bridge links of a major complex

All coverages in respect of property damage, removal of wreckage, liabilities, loss of production income and capping of well/making well safe

Notes for undertakings: Only consider Marine lines of business in calculating gross and net losses; A&H, Personal Accident & Life catastrophe risk charges are andled separately.

Marine Reinsurers will need to consider carefully their potential for accumulation under this scenario and document any methodology or assumptions when calculating their gross loss position.

SCR.9.116. The formula to be applied by undertakings in calculating their respective gross exposures is as follows:

$$\mathrm{CAT}_{\mathrm{Marine2}} = \sum_i SI_i$$

where

SI_i = undertakings gross exposures by subclass *i* (for example: property damage, removal of wreck, loss of production income, making wells safe) to the undertakings largest offshore complex accumulation

SCR.9.117. Undertakings should then net down each CAT_{Marine} scenario for reinsurance.

Output

SCR.9.118. The Net_$\mathrm{CAT}_{\mathrm{Marine}}$ charge is calculated as:

$$Net\_CAT_{Marine} = \sqrt{(Net\_CAT_{Marine1})^2 + (NetCAT_{Marine2})^2}$$

Credit and Suretyship

SCR.9.119. Undertakings with exposures under the Credit and Suretyship line of business are exposed to this scenario.

Input

$\mathrm{SCR}_{CAT\_individual\_max\_loss\_net}$

$\mathrm{SCR}_{CAT\_recession\_net}$

Calculation

$$SCR_{CAT\_credit\_net} = \sqrt{(SCR_{CAT\_individual\_\max\_loss\_net})^2 + (SCR_{CAT\_recesion\_net})^2}$$

where

$\mathrm{SCR}_{\mathrm{CAT_individual_max_}}$loss shall be calculated as the maximum loss derived from one of the two following cases:

a) The default of the largest three exposures using a PML% of 14% and a recourse rate of 28%. These assumptions are reflecting a loss given default of approximately 10% for the large risks. The largest exposure shall be identified according the sum of the following magnitudes

I. + Ultimate gross loss amount after PML and recourse.

II. - Recovery expected from reinsurance

III. + Increase of risk associated to reinsurance recovery considered in letter (II), to the extent this increase has not already been considered in counterparty default risk SCR

IV. +/- any other variation based on existing legal or contractual commitments, which modify the impact of the failure of the exposure on the undertaking (an example might be the reinstatements in respect of existing reinsurance contracts)

This sum shall identify the amount to compare with the output of paragraph b) in order to derive $SCR_{CAT\_individual\_max\_loss\_net}$.

b) The default of the largest three group exposures using a PML% of 14% and a recourse rate of 28%. For the identification of the largest group exposure and the assessment of the losses the undertaking shall apply the methodology described in paragraph a).

SCR.9.120. $SCR_{CAT\_recession\_net} = SCR_{CAT\_recession\_ratio\_net}$ * *Net earned premium* including a dampening mechanism based on the net loss ratio of the undertaking. The

SCR.9.121. $SCR_{CAT\_recession\_net}$ shall be calculated according the following method and assumptions:

- Exposures shall be classified into homogeneous groups of risks based on the nature of the exposures.
- For each group of exposures the undertaking shall calculate the net loss ratio, $SCR_{CAT\_recession\_ratio\_net}$ and $SCR_{CAT\_recession\_net}$ based on the failure rates, recourse rate and loss given default as described below.
- The percentages refer to the original assured amounts (gross exposures). However the aggregated $SCR_{CAT\_recession\_ratio\_net}$ and $SCR_{CAT\_recession\_net}$ are based on the overall net loss ratio.
- With the failure rates the $SCR_{CAT\_recession\_net}$ can be calculated for the current scenario and the worst case scenario:
  a. *Fail_rate_max* = the maximum value observed in the selected index of failures rates in a long period of observation. With the *Fail_rate_max* the worst case scenario can be calculated in case *Fail_rate_current* = *Fail_rate_max.*
  b. *Fail_rate_min* = the minimum 3 years average observed in the same data.
  c. *Fail_rate_current* = the current failure rate.
  d. *Failure rate max(min;current)* = maximum of the *fail_rate_min* and *fail_rate_current.*
  e. *Recourse rate* must correspond with the current scenario and the worst case scenario.
  f. *Loss given default* is the result of the ultimate gross loss amount compared to the gross exposure.

- The above-mentioned rates shall be derived from the failure rates observed and periodically updated (see below the specific item at this respect).
- The dampening mechanism is limited to a $SCR_{CAT\_recession\_ratio\_net}$ of 200% of the net earned premium with a net loss ratio lower than 25% and to a $SCR_{CAT\_recession\_ratio\_net}$ of 100% of the net earned premium with a net loss ratio higher than 125%. Within the limits the $SCR_{CAT\_recession\_ratio\_net}$ = 225% minus *net loss ratio*. This mechanism aims to ensure that at the peak of the cycle (low *failure* rates), the $SCR_{CAT\_recession\_net}$ shall reach its highest value and C&S undertakings shall be required to have enough own funds to cover a higher SCR. On the other hand, at the trough of the cycle, SCR will be at its lowest value, so that own funds will be released. In other words, as undertakings face harder net claims ratio due to an increase of failure rates, the SCR decreases.

SCR.9.122. A summary of 10 possible scenario´s is included within QIS 5 TS with the following assumptions:

- The *fail_rate_max* is 0,50%, the *fail_rate_min* is 0,05% and the current failure rate varies from 0,05% up to 0,50%.
- The retention after reinsurance recovery for $SCR_{CAT\_individual\_max\_loss\_net}$ will be € 10 million per risk (both single and group exposures) and for $SCR_{CAT\_recession\_net}$ 50% based on a 50% Quota Share.

Output

$SCR_{CAT\_credit\_net}$

Aviation

SCR.9.123. The process for Aviation shall be provided for June 2010.

Liability

SCR.9.124. The process for Liability shall be provided for June 2010.

Terrorism

SCR.9.125. The process for Aviation shall be provided for June 2010.

9.4.2 Method 2: Factor Method

Input

SCR.9.126. The following input information is required:

$P_{lob}^{t,written}$ = estimate of the net written premium in the individual LoB during the forthcoming year

Output

NL_{CAT} = Capital charge for the non-life catastrophe risk for method 2

Formula

SCR.9.127. The capital charge for the non-life CAT risk is determined as follows:

$$\sqrt{\left(\sum_{t\neq 3,4,10,12}(c_t \times P_t)^2 + (c_3 \times P_3 + c_{12} \times P_{12})^2 + (c_4 \times P_4 + c_{10} \times P_{10})^2\right)}$$

Events	Lines of business affected	Factor ct
Storm	**Fire and property; Motor, other classes**	**175%**
Flood	**Fire and property; Motor, other classes**	**113%**
Earthquake	**Fire and property; Motor, other classes**	**120%**
Hail	**Motor, other classes**	**30%**
Major fires, explosions	**Fire and property**	**175%**
Major MAT disaster	**MAT**	**100%**
Major motor vehicle liability disasters	**Motor vehicle liability**	**40%**
Major third party liability disaster	**Third party liability**	**85%**
Credit	**Credit**	**139%**
Miscellaneous	**Miscellaneous**	**40%**

NPL Property	**NPL Property**	**250%**
NPL MAT	**NPL MAT**	**250%**
NPL Casualty	**NPL Casualty**	**250%**

SCR.10. Undertaking specific parameters

SCR.10.1. Subset of standard parameters that may be replaced by undertaking-specific parameters

SCR.10.1. The following subset of standard parameters in the life, non-life and health underwriting risk modules may be replaced by undertaking-specific parameters:

a) Non life premium and reserve risk parameters: standard deviation for premium risk $\sigma_{(prem,LoB)}$ and standard deviation for reserve risk $\sigma_{(res,LoB)}$, as defined in CEIOPS' advice on the SCR non-life underwriting risk module (CEIOPS-DOC-41/09).

b) NSLT health premium and reserve risk parameters: standard deviation for premium risk $\sigma_{(prem,LoB)}$ and standard deviation for reserve risk $\sigma_{(res,LoB)}$, as defined in CEIOPS' advice on SCR health risk module (CEIOPS-DOC-43/09).

c) SLT Health Revision Risk: replace a standard parameter of revision shock in the SLT Health Revision risk as defined in CEIOPS' advice on SCR Health risk module (CEIOPS-DOC-43/09).

d) Revision Risk: replace a standard parameter of revision shock in the Revision risk as defined in CEIOPS' advice on SCR life risk module (CEIOPS-DOC-42/09).

SCR.10.2. For all other parameters undertakings shall use the values of standard formula parameters. The parameters in simplifications are not considered to be standard parameters.

SCR.10.2. The supervisory approval of undertaking-specific parameters

SCR.10.3. Should undertakings wish to replace all or a subset of the parameters specified above by undertaking-specific parameters, they should assume they have received the supervisory approval provided that the following requirements are met:

a) The calibration of the standard formula parameters do not appropriately reflect undertakings risk profile and that the use of undertaking-specific parameters leads to a more appropriate result.

b) The undertaking meets the criteria with respect to the completeness, accuracy and appropriateness of the data used to calibrate the undertaking-specific parameters, including the use of any qualitative adjustment made.

c) Undertaking-specific parameters have not been used to "cherry-pick" the areas which give the lowest SCR.

d) The undertakings provides the results for at least two of the methods included below.

e) The undertaking-specific parameters have been calibrated following the standardised methods and meet the following criteria:

- the risks covered by the undertaking-specific parameters are conceptually the same as those covered by the standard formula parameters,
- the underlying assumptions behind the standard formula parameters and behind undertaking-specific parameters are the same,
- the standard methodology provided should enable a robust and reliable estimation of the undertaking-specific parameters,
- the data used to estimate such undertaking-specific parameters complies with the criteria set out in the following section.

SCR.10.3. Criteria with respect to the completeness, accuracy, and appropriateness of the data

SCR.10.4. Definitions of completeness, accuracy, and appropriateness of the data are provided in CEIOPS' Advice on Technical Provisions – Article 86 f Standards for Data Quality (CEIOPS-DOC-37/09, former CP 43).

SCR.10.5. For the purpose of this study, data is considered to represent numerical values including those that have been subject to qualitative adjustments based on expert judgement[79] and/or prior analysis and experience.

SCR.10.6. Undertakings are not allowed to rely solely on expert judgment, and without reference to specific internal or external data.

SCR.10.7. Data used for the purpose of estimating undertaking-specific parameters shall comply with the following criteria:

- The data shall meet the standards laid down in CEIOPS' Advice on Data Quality Standards.
- The data can be internal or external directly relevant for the operations of that undertaking.
- The data used for calibration of undertaking-specific parameters should be consistent with the underlying assumptions of the standardised methodology.
- The undertaking's data set can be easily adapted and incorporated into the proposed standardised methodology. This shall apply at all stages of the calculation.
- The estimation error as a result of using the data shall not imply that the data is inappropriate.
- The data is considered to be representative for the expected conditions in the following year. When undertaking-specific parameters are calibrated on the basis of historic data, especially on the basis of lengthy time series, all historic data should be representative for the future conditions and environment of operations.

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[79] Further information on expert judgement is described in paras. CEIOPS' Advice on Technical Provisions - Article 86 Actuarial and statistical methodologies to calculate the best estimate (CEIOPS-DOC-33/09, former CP 39)).

- Where adjustments to the data have been introduced, such adjustments should have only been introduced to make the data more relevant and appropriate. The adjustments must be documented.
- Any bias in the data shall be borne in mind and its impact shall be analyzed.

SCR.10.8. When external data is used solely or as a combination of both internal and external data, data shall be directly relevant for the operations of that undertaking, i.e. this data shall accurately reflect the risk profile of the undertaking and be as suitable as, or complement, internal data.

SCR.10.9. Furthermore undertakings are allowed to use external pooled data. Pooled data can be useful in cases such as the launch a new product or when undertakings do not have sufficient internal data. For example, small health mutuals may not have a sufficient internal data to calculate own parameters and might therefore wish to use pooled data.

SCR.10.10. If undertakings use pooled data to calibrate undertaking-specific parameters, undertakings shall meet the following additional criteria:

- Governance of pooling mechanism and of new database is set up as well as signed and fulfilled by members of pooling mechanism.
- The pooling mechanism is transparent and auditable.
- The rules on data management shall ensure that the data provided to the pool by different members are sufficiently comparable: in particular this shall relate to data collection, definition, assessment and cleaning/adjustment.
- The pool shall comprise similar undertakings with similar risk profile not only among them but also to the undertaking, that is:
  - The pooled data shall represent data from undertakings with a similar risk profile and the nature of the business carried out is the same,
  - Where this impact on the degree of homogeneity of the data, the pool shall not include undertakings with different legal structure,
  - The pool of data shall be based on gross data of the business considered in order to allow each undertaking to derive values net of reinsurance by applying their own reinsurance programme.
  - In respect of the volatility levels estimated by the undertaking-specific parameters, the undertaking shall verify whether the pooled data provide homogeneous features compared to those of the undertaking. In particular, where the size of the pooled data is significantly different from the size of risk exposures of the undertaking, and this difference in size has impact on volatility, an appropriate adjustment shall be carried out to guarantee that the undertaking specific parameters reflect the volatility of the undertaking rather than the volatility of the wider pooled data considered.

SCR.10.11. In case of non-internal data the undertakings are asked to indicate what kind of data they have used (solely external, mix of internal and external, pooled) with a short rationale.

SCR.10.12. The general data quality requirements in relation to appropriateness, completeness and accuracy which apply to all replaceable parameters can be complemented by requirements that relate to particular replaceable parameters. These additional requirements, if needed, are provided together with the standardised method to calculate the undertaking-specific parameter. For example, particular requirements on the data for the average claim size and the average claim number estimations could be:

- the data should reflect the current reinsurance programme of the undertaking (i.e. either the data were observed under a comparable reinsurance cover or they were prepared for that purpose by taking gross data and applying the current reinsurance programme in order to estimate data net of reinsurance);
- the data should stem from a sufficiently long period such that if cycles exist, at least a full cycle is covered in the data. For example, if the average claim number for hail crop insurance needs to be estimated, it would not be appropriate to use only data from the past year where no big hail events were observed;
- the data is sufficiently homogeneous to produce a reliable estimate (this could be specified by limits on the coefficient of variation of the data set).

SCR.10.13. If the undertaking does not satisfy the criteria required to be met in respect of the data used for estimating undertaking-specific parameters, but expects it can be possible in the moment of Solvency II entering into force it may anyway carry out the calculation with additional qualitative explanation which data conditions has been neglected.

SCR.10.14. Examples where data may be considered to be unsatisfactory are (nonexhaustive):

- Low frequency of claims due to the nature of claim process/small portfolio which limit the extraction of the proper sample length,
- Data set from a time point before a significant change (for example legislation), whose impact cannot be adequately analyzed,
- New business without suitable external data,
- No reliable data collection process.

SCR.10.15. Undertakings may have data limitations, with respect to availability of best estimate data in the format required to estimate undertaking-specific parameters, for example:

- Many undertakings may have made "best estimates" in the past and then adjusted them for reporting purposes.

- Some "best estimates" may not be in line with the Solvency II requirements: for instance, intended to be the mean and fully adjusted for extreme events not sufficiently represented in the data, and they may not have been discounted using the appropriate risk free yield curve.

- The degree of rigour and consistency in the estimation may be lower than the standard undertakings need to adopt under Solvency II.

- Where undertakings have not calculated best estimates in the past (this would be the case where their estimates were deliberately prudent) it would not seem appropriate to use these estimates.

SCR.10.16. Where undertakings have not made anything that could reasonably be described as a best estimate in the past and they are not able to reproduce this historically, undertakings should justify that the use of the data, together with any adjustments, appropriately reflects the risk profile of the undertaking and satisfies as close as possible the requirements set out above. The adjustment should be shortly described.

SCR.10.17. Undertakings are able to do the estimation on an underwriting year basis, if they do not have historic data on an accident year basis. However, where the results could be materially different between both approaches (for example in the case of multiyear contracts) undertakings are required to show supervisory authorities how the final parameters are an adequate representation of an accident year basis parameter

SCR.10.18. The application and relevance of the proportionality principle is limited due to the optional character of the use of undertaking-specific parameters and because poor quality data is unlikely to give rise to a more appropriate reflection in the parameter values of the risk profile than the standard formula. The replacement of the standard parameters must be justified by demonstrating that the estimation based on the internal data or external data is more appropriate and relevant to the undertaking’s risk profile than that used otherwise. CEIOPS appreciates a short description with justification.

SCR.10.4. The standardised methods to calculate undertaking-specific parameters

SCR.10.19. Credibility mechanism shall be used when applying undertaking-specific parameters and shall be included for undertaking-specific parameters for both premium and reserve risk, because the estimators used in the standardised methods include a significant estimation error.

SCR.10.20. Undertakings shall derive the undertaking-specific parameters as follows:

For premium risk:

$$\sigma_{(prem,lob)} = c \cdot \sigma_{(U,prem,lob)} + (1-c) \cdot \sigma_{(M,prem.lob)}$$

where

c = credibility factor for LOB,

$\sigma_{(U,prem,lob)}$ = undertaking-specific estimate of the standard deviation for premium risk,

$\sigma_{(M,prem,lob)}$ = standard parameters of the standard deviation for premium risk which are provided in CEIOPS' advice on Calibration of Non Life Underwriting Risk.

For reserve risk:

Undertakings shall derive new parameters as follows:

$$\sigma_{(res,lob)} = c \cdot \sigma_{(U,res,lob)} + (1-c) \cdot \sigma_{(M,res.lob)},$$

where

c = credibility factor,

$\sigma_{(U,res,lob)}$ = undertaking-specific estimate of the standard deviation for reserve risk,

$\sigma_{(M,res,lob)}$ = standard parameters of the standard deviation for reserve risk which are provided in CEIOPS' advice on Calibration of Non Life Underwriting Risk.

SCR.10.21. The credibility factors to be applied shall be chosen according to the length of the time series N_{lob} used for the estimation and the LoB property.

- For Third-party liability, Motor vehicle liability and Credit and suretyship:

N_{lob}	5	6	7	8	9	10	11	12	13	14	≥15
C	34%	43%	51%	59%	67%	74%	81%	87%	92%	96%	100 %

- for all other lines of business:

N_{lob}	5	6	7	8	9	≥10
C	34%	51%	67%	81%	92%	100%

SCR.10.5. Premium Risk

10.5.1. Assumptions

SCR.10.22. Undertaking-specific parameters allows for expense volatility implicitly. Undertakings shall assume claims and expense volatility are similar, and thus no additional adjustments are needed to the volatility determined using loss ratio only.

SCR.10.23. Insurance and reinsurance undertakings shall adjust their data for inflation where the inflationary experience implicitly included in time series used is not representative of the inflation that might occur in the future, where this is considered to have a material impact – undertaking shall explain the approach taken.

10.5.2. Analysis

SCR.10.24. The analysis is performed using the net earned premiums as the volume measure and the net ultimate claims after one year to derive a standard deviation.

10.5.3. Standardised methods

SCR.10.25. Since none of the methods is considered to be perfect, undertakings shall apply a variety of methods to estimate their appropriate volatility.

SCR.10.26. The choice of methods should be justified with a short explanation of the appropriateness of the methods to the lines of business properties and available data quality.

SCR.10.27. Basically at least using two methods of the suggested below are expected, but if it is not possible the calculation based on one method is also acceptable accompanied by a comment why this method is the only one appropriate.

SCR.10.28. Undertakings shall explain how and why they have selected the final factor, taking into consideration their risk profile.

SCR.10.29. Substantial changes in the methods shall be classified as partial internal model subject to requirements from articles 112, 113 and 120-126.

SCR.10.30. The standardised methods for estimating the undertaking-specific parameters $\sigma_{(U,prem,lob)}$ are:

Method 1

SCR.10.31. The assumptions are that for the particular undertaking, any year and any LoB:

- The expected loss is proportional to the premium
- The company has a different but constant expected loss ratio (ie does not allow for premium rate changes)
- The variance of the loss is proportional to the earned premium and
- The least squares fitting approach is appropriate.

SCR.10.32. Let's define the following terms:

$U_{Y,lob}$	=	The ultimate after one year by accident year and LoB
μ_{lob}	=	Expected loss ratio by LoB
β_{lob}^2	=	Constant of proportionality for the variance of loss by LoB
$\varepsilon_{Y,lob}$	=	An unspecified random variable with distribution with mean zero and unit variance
$V_{Y,lob}$	=	Earned premium by accident year and LoB
N_{lob}	=	The number of data points available by LoB
V_{lob}	=	The result from the volume calculation from the current year V_{lob}=max(estimate of net written premium during the forthcoming year, estimate of net earned premium during the forthcoming year, net written premium during the previous year)+

		expected present value of net claims and expense payments which relate to claims incurred after the following year and covered by existing contracts

Then let's formulate the distribution of losses as:

$$U_{Y,lob} \sim V_{Y,lob}\mu_{lob} + \sqrt{V_{Y,lob}}\beta_{lob}\varepsilon_{Y,lob}$$

Let's re-arrange this to give a set of independent, identically distributed observations:

$$\beta_{lob}\varepsilon_{Y,lob} = \frac{U_{Y,lob} - V_{Y,lob}\mu_{lob}}{\sqrt{V_{Y,lob}}}$$

The estimator for β_{lob} becomes:

$$\hat{\beta}_{lob}^2 = \frac{1}{N_{lob} - 1}\sum_Y \frac{\left(U_{Y,lob} - V_{Y,lob}\mu_{lob}\right)^2}{V_{Y,lob}}$$

Minimising this estimator let's obtain:

$$\hat{\mu}_{lob} = \frac{\sum_Y U_{Y,lob}}{\sum_Y V_{Y,lob}}$$

Which we can substitute back into our estimator of β_{lob} which becomes:

$$\hat{\beta}_{lob} = \sqrt{\frac{1}{N_{lob} - 1}\sum_Y \frac{\left(U_{Y,lob} - V_{Y,lob}\frac{\sum_Y U_{Y,lob}}{\sum_Y V_{Y,lob}}\right)^2}{V_{Y,lob}}}$$

SCR.10.33. The standard deviation $\sigma_{(U,prem,lob)}$ then becomes :

$$\sigma_{(U,prem,lob)} = \frac{\hat{\beta}_{lob}}{\sqrt{V_{lob}}}$$

SCR.10.34. The additional data requirements for this undertaking-specific parameter:

The data used should meet the following additional requirements:

- The data should reflect the premium risk that is covered in the line of business during the following year, in particular in relation to its nature and composition. The data should be adjusted for catastrophe claims to the extent they are addressed in the non-life or health CAT risk sub-modules.

- Claims should be net of reinsurance. The data should reflect the reinsurance cover of the undertaking for the following year.

- Claims should be adjusted for inflation. All data used should be adjusted for any trends which can be identified on a prudent, reliable an objective basis.

- Claim should not include unallocated expense payments.

- The data should stem from a sufficiently long period such that if cycles exist, at least a full cycle is covered in the data. The data should at least cover 5 years.

- The data should not lead to the increase of the estimation error to the material amount compared to the estimated value.

SCR.10.35. If the undertaking does not satisfy the criteria required to be met in respect of the data used for estimating undertaking-specific parameters, but expects it can be possible in the moment of Solvency II entering into force it may anyway carry out the calculation with additional qualitative explanation which data conditions has been neglected.

Method 2

SCR.10.36. The assumptions are that for the particular undertaking, any year and any LoB:

- The expected loss is proportional to the premium

- The company has a different but constant expected loss ratio (for example the undertaking does not allow for premium rate changes, or changes in the underlying risk)

- The variance of the loss is proportional to the earned premium

- The distribution of the loss is lognormal and

- The maximum likelihood fitting approach is appropriate

SCR.10.37. Let's define the following terms:

$U_{Y,lob}$	=	The ultimate after one year by accident year and LoB
μ_{lob}	=	Expected loss ratio by LoB
β_{lob}^2	=	Constant of proportionality for the variance of loss by LoB
$\varepsilon_{Y,lob}$	=	An unspecified random variable with distribution with mean zero and unit variance
$V_{Y,lob}$	=	Earned premium by accident year and LoB
$M_{Y,lob}$	=	The mean of the logarithm of the ultimate after one year by accident year and LoB
$S_{Y,lob}$	=	The standard deviation of the logarithm of the ultimate after one year by accident year and LoB

V_{lob}	=	The result from the volume calculation from the current year V_{lob}=max(estimate of net written premium during the forthcoming year, estimate of net earned premium during the forthcoming year, net written premium during the previous year)+ expected present value of net claims and expense payments which relate to claims incurred after the following year and covered by existing contracts

SCR.10.38. Then let's formulate the distribution of losses as:

$$U_{Y,lob} \sim V_{Y,lob}\mu_{lob} + \sqrt{V_{Y,lob}}\beta_{lob}\varepsilon_{Y,lob}$$

SCR.10.39. This allows to formulate the parameters of the lognormal distributions as follows:

$$S_{Y,lob} = \sqrt{\log\left(1 + \frac{\beta_{lob}^2}{V_{Y,lob}\mu_{lob}^2}\right)}$$

$$M_{Y,lob} = \log\left(V_{Y,lob}\mu_{lob}\right) - \frac{1}{2}S_{lob}^2$$

SCR.10.40. The resultant simplified log Likelihood becomes

$$\log L = \sum_Y \left(-\log\left(S_{Y,lob}\right) - \frac{\left(\log\left(U_{Y,lob}\right) - M_{Y,lob}\right)^2}{2S_{Y,lob}^2} \right)$$

SCR.10.41. Then the parameter values β_{lob} and μ_{lob} are chosen that maximise this likelihood.

SCR.10.42. The standard deviation $\sigma_{(U,prem,lob)}$ then becomes :

$$\sigma_{(U,prem,lob)} = \frac{\hat{\beta}_{lob}}{\sqrt{V_{lob}}}$$

SCR.10.43. The additional data requirements for this undertaking-specific parameter are stated in paragraph SCR.10.34.

SCR.10.44. If the undertaking does not satisfy the criteria required to be met in respect of the data used for estimating undertaking-specific parameters, but expects it can be possible in the moment of Solvency II entering into force it may anyway carry out the calculation with additional qualitative explanation which data conditions has been neglected.

Method 3

SCR.10.45. Since the method defined above for the calculation undertaking-specific estimates for standard deviation of premium risk include a significant estimation error, an alternative methodology is considered based on the Swiss Solvency Test[80].

SCR.10.46. Under this approach, the calculation of undertaking-specific standard deviations in premium risk are based on the assumption that the claim number per accident year and claim size depend on a random variable Θ= [Θ_1, Θ_2] which represents the random fluctuation in number (Θ_1) as well as in claim size (Θ_2).

As:

$$\sigma_{(U,prem,lob)} = \frac{1}{V_{(prem,lob)}} \sqrt{Var(S_N)} \text{, where}$$

$V_{(prem,lob)}$ - volume measure (known at the beginning of the year),

$S_N = \sum_{i=1}^{N} X_i$ – sum of a random number of claims, the claim size itself is also random,

and let's assume that

$N|\Theta_1$ ~Poiss (λ (Θ_1)),

$X_i|\Theta_2$ ~F(μ(Θ_2),σ(Θ_2)), where N and X_i are conditionally independent, λ, μ and σ denote the parameters of the distributions

using the variance decomposition formula and the above assumptions it is easy to show that:

$$Var(S_N) = Var(E(S_N \mid \Theta)) + E(Var(S_N \mid \Theta)) =$$
$$Var(\lambda(\Theta_1))Var(\mu(\Theta_2)) + Var(\lambda(\Theta_1))(E[\mu(\Theta_2)])^2 + Var(\mu(\Theta_2))E[\lambda(\Theta_1)]^2 +$$
$$E(\lambda(\Theta_1))E[\mu(\Theta_2)]^2 + E\lambda(\Theta_1)E[\sigma(\Theta_2)]^2,$$

which allows to use only characteristics of the underlying distributions N and X in the estimation.

SCR.10.47. For the simplifying assumptions that only N depends on Θ and $\lambda(\Theta) = \lambda\Theta$, where $E(\Theta)$=1 we get[81]:

$$Var(S_N) = \mu^2 \lambda^2 Var(\Theta) + \lambda\mu^2 + \lambda\sigma^2$$

[80] See "Technical document on the Swiss Solvency Test", http://www.finma.ch/archiv/bpv/download/e/SST_techDok_061002_E_wo_Li_20070118.pdf

[81] For more details please see "The Insurance Risk in the SST and in Solvency II: Modelling and Parameter Estimation" by Alois Gisler, http://www.actuaries.org/ASTIN/Colloquia/Helsinki/Papers/S3_24_Gisler.pdf

Therefore the undertaking should calculate, on the basis of the internal data of the undertaking concerned, or of data which is directly relevant for the operations of that undertaking, the following input data:

μ	=	the average value of claim size in the individual LoB with an inflation adjustment; the estimate should be derived by ● summing up past, inflation adjusted individual ultimate claims values, ● dividing above sum by the number of claims.
σ	=	the standard deviation of claim size in the individual LoB with an inflation adjustment estimated by means of the standard estimator
λ	=	the average number of claims in the individual LoB per earned premium by: average number of claims = total number of claims/total earned premiums with an inflation adjustment) multiplying the average number of claims with $V_{(prem,lob)}$ If a volume measure other than earned premiums appears to be statistically more appropriate and this can be justified by the undertaking, the volume measure may replace earned premiums in the above procedure.
$Var(\Theta)$	=	estimate of the variance of random factor in the claim number in the individual LoB during the forthcoming year;

SCR.10.48. Insurance and reinsurance undertkiangs should estimate $Var(\Theta)$ based on following input data:

J	=	maximum numbers of years with available data based on which undertaking calculate undertaking-specific parameter
N_j	=	numbers of claims in year j
v_j	=	A priori expected number of claims in year j

Insurance and reinsurance undertkiangs should estimate $Var(\Theta)$ as[82]:

$$Var(\Theta) = \left(c \cdot \frac{v_{\bullet}}{J} \right)^{-1} \left(\frac{V_F}{\overline{F}} - 1 \right) \text{, where:}$$

$$F_j = \frac{N_j}{v_j},$$

$$v_{\bullet} = \sum_{j=1}^{J} v_j ,$$

$$\overline{F} = \sum_{j=1}^{J} \frac{v_j}{v_{\bullet}} F_j ,$$

$$V_F = \frac{1}{J-1} \sum_{j=1}^{J} v_j \left(F_j - \overline{F} \right)^2 ,$$

$$c = \sum_{j=1}^{J} \frac{v_j}{v_{\bullet}} \left(1 - \frac{v_j}{v_{\bullet}} \right).$$

SCR.10.49. The data used for this undertaking-specific parameter to estimate μ, σ, λ and $Var(\Theta)$ should meet the following additional requirements:

- The data should reflect the premium risk that is covered in the line of business during the following year, in particular in relation to its nature and composition. The data should be adjusted for catastrophe claims to the extent they are addressed in the non-life or health CAT risk sub-modules.

- Claim sizes should be net of reinsurance. The data should reflect the reinsurance cover of the undertaking for the following year. Elements of reinsurance which cannot be related to individual claims (e.g. stop loss reinsurance) should be taken into account in an appropriate manner.

- Claim sizes should be adjusted for inflation. All data used should be adjusted for any trends which can be identified on a prudent, reliable an objective basis.

- Claim sizes should not include expense payments.

- The data should stem from a sufficiently long period such that if cycles exist, at least a full cycle is covered in the data. The data used to estimate $Var\lambda(\Theta)$ should at least cover 5 years.

[82] For more details of Var(Θ) estimation please see "The Insurance Risk in the SST and in Solvency II: Modelling and Parameter Estimation" by Alois Gisler, page 24/25, http://www.actuaries.org/ASTIN/Colloquia/Helsinki/Papers/S3_24_Gisler.pdf.
Alternatively CEIOPS considers providing estimates of Var(Θ) since Θ could be understood as the non-undertaking specific random variable which reflects more condition to which is subject the whole market.

- The data should not lead to the increase of the estimation error to the material amount compared to the estimated value.

- The level of prudence in the earned premiums used to estimate $E\lambda(\Theta)$ should be similar. Any other volume measure used should reflect the number of claims.

SCR.10.50. If the undertaking does not satisfy the criteria required to be met in respect of the data used for estimating undertaking-specific parameters, but expects it can be possible in the moment of Solvency II entering into force it may anyway carry out the calculation with additional qualitative explanation which data conditions has been neglected.

SCR.10.6. Reserve Risk

10.6.1. Assumptions

SCR.10.51. For expenses, undertakings shall analyse claims payments excluding amounts for expenses. Claims and expense volatility are assumed to be similar, and thus no additional adjustments are needed to the volatility determined using claims data only.

SCR.10.52. The effect of discounting will be the same in the stressed scenario as in the best estimate. As a result, no modification to our result is necessary.

SCR.10.53. Insurance and reinsurance undertakings shall adjust their data for inflation where the inflationary experience implicitly included in time series used is not representative of the inflation that might occur in the future, for example in the case of bodily injury claims.

10.6.2. Analysis

SCR.10.54. The analysis is performed using:

- the opening value of the net reserves as the volume measure and the net claims development result after one year for these exposures to derive a standard deviation.

- the net paid or net incurred triangle.

SCR.10.55. Under the Merz-Wüthrich approach used in methods 2 and 3 below, the estimator explicitly only captures the prediction error and does not capture model error (for example the chain ladder assumptions do not hold) or the error in case the past data do not reflect the future business.

10.6.3. Standardised methods

SCR.10.56. Since none of the methods is considered to be perfect, undertakings shall apply a variety of methods to estimate their volatility.

SCR.10.57. The choice of methods should be justified with a short explanation of the appropriateness of the methods to the lines of business properties and available data quality.

SCR.10.58. Basically at least using two methods of the suggested below are expected, but if it is not possible the calculation based on one method is also acceptable accompanied by a comment why this method is the only one appropriate.

SCR.10.59. Undertakings shall explain how and why they have selected the final factor, taking into consideration their risk profile.

SCR.10.60. Substantial changes in the methods shall be classified as partial internal model subject to requirements from articles 112, 113 and 120-126.

SCR.10.61. The standardised methods for estimating the undertaking-specific parameters $\sigma'_{(U,res,lob)}$ are:

Method 1

SCR.10.62. The assumptions are that for any undertaking, any year and any LoB:

- The expected reserves in one year plus the expected incremental paid claims in one year is the current best estimate for claims outstanding,
- The variance of the best estimate for claims outstanding in one year plus the incremental claims paid over the one year is proportional to the current best estimate for claims outstanding, and
- The least squares fitting approach is appropriate.

SCR.10.63. Definition of terms:

β^2_{lob}	=	Constant of proportionality for the variance of the best estimate for claims outstanding in one year plus the incremental claims paid over the one year by LoB
$\varepsilon_{Y,lob}$	=	An unspecified random variable with distribution with mean zero and unit variance
$PCO_{lob,i,j}$	=	The best estimate for claims outstanding by LoB for accident year i and development year j
$I_{lob,i,j}$	=	The incremental paid claims by LoB for accident year i and development year j
$V_{Y,lob}$	=	Volume measure by calendar year and LoB
$R_{Y,lob}$	=	The best estimate for outstanding claims and incremental paid claims for the exposures covered by the volume measure, but in one year's time by calendar year and LoB
N_{lob}	=	The number of data points available by LoB where there is both a value of $V_{C,Y,lob}$ and $R_{C,Y,lob}$.
PCO_{lob}	=	The best estimate for claims outstanding by LoB

SCR.10.64. Then let's define the following relationships:

$$V_{Y,lob} = \sum_{i+j=Y+1} PCO_{lob,i,j}$$

$$R_{Y,lob} = \sum_{\substack{i+j=Y+2 \\ i \neq Y+1}} PCO_{lob,i,j} + \sum_{\substack{i+j=Y+2 \\ i \neq Y+1}} I_{lob,i,j}$$

SCR.10.65. Then let's formulate the distribution of losses as:

$$R_{Y,lob} \sim V_{Y,lob} + \sqrt{V_{Y,lob}}\beta_{lob}\varepsilon_{Y,lob}$$

SCR.10.66. Let's re-arrange this to give a set of independent, identically distributed observations:

$$\beta_{lob}\varepsilon_{Y,lob} = \frac{R_{Y,lob} - V_{Y,lob}}{\sqrt{V_{Y,lob}}}$$

SCR.10.67. The estimator for β_{lob} becomes:

$$\hat{\beta}_{lob} = \sqrt{\frac{1}{N_{lob} - 1}\sum_{Y}\frac{\left(R_{Y,lob} - V_{Y,lob}\right)^2}{V_{Y,lob}}}$$

SCR.10.68. The $\sigma_{(U,res,lob)}$ then becomes :

$$\sigma_{(U,res,lob)} = \frac{\hat{\beta}_{lob}}{\sqrt{PCO_{lob}}}$$

SCR.10.69. The additional data requirements for this undertaking-specific parameter:

The data used should meet the following additional requirements:

- The data should reflect the reserve risk that is covered in the line of business during the following year, in particular in relation to its nature and composition.

- Best estimates and payments should be net of reinsurance. The data should reflect the reinsurance cover of the undertaking for the following year (i.e. either the data were observed under a comparable reinsurance cover or they were prepared for that purpose by taking gross data and applying the current reinsurance programme in order to estimate data net of reinsurance).

- Best estimates and payments should be adjusted for inflation. All data used should be adjusted for any trends which can be identified on a prudent, reliable an objective basis.

- Best estimates and payments should not include expenses.

- The data should stem from a sufficiently long period such that if cycles exist, at least a full cycle is covered in the data. The data should at least cover 5 years.

- • The data should not lead to the increase of the estimation error to the material amount compared to the estimated value.

SCR.10.70. If the undertaking does not satisfy the criteria required to be met in respect of the data used for estimating undertaking-specific parameters, but expects it can be possible in the moment of Solvency II entering into force it may anyway carry out the calculation with additional qualitative explanation which data conditions has been neglected.

Method 2

SCR.10.71. This approach is based on the mean squared error of prediction of the claims development result over the one year and fitting a model to these results. The mean squared errors are calculated using the approach detailed in "Modelling The Claims Development Result For Solvency Purposes" by Michael Merz and Mario V Wüthrich, Casualty Actuarial Society E-Forum, Fall 2008[83].

SCR.10.72. The output from the Merz and Wüthrich method would be:

$$\sqrt{MSEP} = \sigma_{(\mathrm{U,res,lob})} * PCO_{lob}$$

SCR.10.73. Therefore $\sigma'_{(U,res,lob)} = \dfrac{\sqrt{MSEP}}{PCO_{lob}}$

SCR.10.74. The additional data requirements for this undertaking-specific parameter:

The data used should meet the following additional requirements:

- The estimation should be made on complete claims triangles for payments. The data should stem from a sufficiently long period such that all material payments can be estimated from the triangle. The data should at least cover 5 years.
- The data should reflect the reserve risk that is covered in the line of business during the following year, in particular in relation to its nature and composition.
- Payments should be net of reinsurance. The data should reflect the reinsurance cover of the undertaking for the following year (i.e. either the data were observed under a comparable reinsurance cover or they were prepared for that purpose by taking gross data and applying the current reinsurance programme in order to estimate data net of reinsurance).
- Best estimates and payments should be adjusted for inflation. All data used should be adjusted for any trends which can be identified on a prudent, reliable an objective basis.
- The payments should not include expenses.
- The claims triangle should be consistent with the model assumptions of the Merz and Wüthrich method.

[83] See http://www.soa.org/library/journals/north-american-actuarial-journal/2008/april/naaj-2008-vol12-no2-merz-wuthrich.pdf and http://www.actuaries.org/ASTIN/Colloquia/Manchester/Abstracts/wuethrich_abstract_final.pdf

- The data should not lead to the increase of the estimation error to the material amount compared to the estimated value.

SCR.10.75. If the undertaking does not satisfy the criteria required to be met in respect of the data used for estimating undertaking-specific parameters, but expects it can be possible in the moment of Solvency II entering into force it may anyway carry out the calculation with additional qualitative explanation which data conditions has been neglected.

Method 3

SCR.10.76. This approach is essentially consistent with the standard formula representation of the relationship between volatility of future reserve deterioration and volume.

SCR.10.77. This approach is based on calculating the mean squared error of prediction of the claims development result over the one year and fitting a model to these results. The mean squared errors are calculated using the approach detailed in "Modelling The Claims Development Result For Solvency Purposes" by Michael Merz and Mario V Wüthrich, Casualty Actuarial Society E-Forum, Fall 2008.

SCR.10.78.

$CLPCO_{lob}$	=	The best estimate for claims outstanding by LoB estimated via the Chain Ladder method

Therefore $\sigma'_{(U,res,lob)} = \dfrac{\sqrt{MSEP}}{CLPCO_{lob}}$.

SCR.10.79. The additional data requirements for this undertaking-specific parameter are the same as for method 2.

SCR.10.80. If the undertaking does not satisfy the criteria required to be met in respect of the data used for estimating undertaking-specific parameters, but expects it can be possible in the moment of Solvency II entering into force it may anyway carry out the calculation with additional qualitative explanation which data conditions has been neglected.

SCR.10.7. Shock for revision risk

SCR.10.81. These undertaking-specific parameters shall be calculated by following standardised method. Substantial changes in the method shall be classified as partial internal model subject to requirements from articles 112, 113 and 120-126.

SCR.10.82. Revision risk is intended to capture the risk of adverse variation of an annuity's amount, as a result of an unanticipated revision of the claims process. This risk should be applied only to annuities and to those benefits that can be approximated by a life annuity arising from non-life claims (in particular, life assistance benefits from workers' compensation LoB). The undertaking-specific shock for revision risk is restricted only to workers' compensation or to annuities which are not significantly subject to inflation risk. This restriction steems from the assumption in calculation procedure, that the number and severity of revisions are independent. In case of inflation the number and severity are usually dependent beacuse the value of inflation determines which annuities will be revised and the severity of this revision.

SCR.10.83. On the computation of this risk charge, it shall be considered the impact on those annuities for which a revision process is possible to occur during the next year (e.g. annuities where there are legal or other eligibility restrictions should not be included). Unless the future amounts payable are fixed and known with certainty, all those benefits that can be approximated by a life annuity (life assistance) are also subject to revision risk.

SCR.10.84. In order to derive undertaking-specific parameters for revision risk, undertaking concered shall use time series of annual amounts of individual annuities (life assistance benefits) in payment in consecutive years, during the time horizon in which they are subject to revision risk.

Input

μ_X = the historical average relative change of individual annuities (or life assistance benefits)

σ_X = the historical standard deviation of relative change of individual annuities (or life assistance benefits), estimated by means of the standard estimator

$E(N)$ = estimate of percentage of individual annuities (or life assistance benefits) for which a revision process is possible to occur during the forthcoming year; the estimate shall be derived by

- estimating the average percentage of individual annuities (or life assistance benefits) for which a revision process occurred per best estimate of annuities provision (average percentage of revised annuities = (total number of revised annuities / total number of annuities) / total best estimate of annuities provision),

- multiplying the average percentage of individual annuities (or life assistance benefits) with best estimate of annuities provision.

If a volume measure other than best estimate of annuities provision appears to be statistically more appropriate and this can be justified by the undertaking, the volume measure may replace in the above procedure.

σ_N = the historical standard deviation of percentage of individual annuities (or life assistance benefits) for which a revision process occurred), estimated by means of the standard estimator

Calculation:

- For each calendar year t, identify the set of annuities (or life assistance claims) that were exposed to revision risk during the whole year. Include also those individual annuities that were exposed only during a part of the year, but where an upward revision has effectively occurred in that period. Annuities (or life assistance claims) that entered or exited the books during the period (e.g. new claims, death of the beneficiary) should be excluded.

- Statistical fitting techniques should then be applied to these sets of observations, with the objective to fit a theoretical probability distribution to the relevant random variable Rev describing the 1-year percentage change in the annual amount of annuities (or life assistance claims) at the portfolio level.

- Insurers are expected to validate the goodness-of-fit of all the distributions and assumptions made, using the sets of observations above derived. Particular attention should be paid to the robustness of the fitting techniques to the tails of the distributions. Non satisfactory results in these tests would be sufficient conditions to reject the request to use the undertaking specific parameter under analysis.

- The next step is to calculate the mean and standard deviation of the distribution of Rev using the appropriate and unbiased estimators and the sets of observations.

- The relevant size of the shock (*Revshock*) is then given by the difference between the quantile 99.5% of the distribution $VaR_{0.995}(Rev)$ and its average $\overline{\mathrm{Re}v}$ divided by the average. In this step, it should be confirmed that the 'average' rate of revision assumed in the best estimate calculation is consistent with this result.

SCR.10.85. The calculation of undertaking-specific revision shock in revision risk is based on the assumption that the frequency and the severity of revision depend on a random variable Θ which represents the random in the frequency process as well as in the severity of revision.

As:

$$\mathrm{Re}\,vshock = \frac{VaR_{0.995}(\mathrm{Re}\,v) - \overline{\mathrm{Re}\,v}}{\overline{\mathrm{Re}\,v}}, \text{ where}$$

$\mathrm{Re}\,v = \sum_{i=1}^{N} X_i$ - sum of a random cases of annuities revision,

assuming that

$N|\Theta \sim \mathrm{NB}\ (\alpha(\Theta), q(\Theta))$,

$X_i|\Theta \sim \mathrm{LN}(\mu(\Theta),\sigma(\Theta))$, where N and X_i are conditionally independent, α, q, μ and σ denote the parameters of the distributions.

Therefore

$\overline{\mathrm{Re}\,v} = \mu_X E(N)$ - the averege of the distribution,

$VaR_{0.995}(\mathrm{Re}\,v) = f(\mu_X, \sigma_X, E(N), \sigma_N)$.

SCR.10.86. $VaR_{0.995}(\mathrm{Re}\,v)$ shall be derived using simulation. The undertaking shall:

I. simulate one number n_j from *NB* $(E(N), \sigma_N)$,

II. simulate n_j numbers of x_i from $LN(\mu_X, \sigma_X)$, i=1, ..., n,

III. calculate $\mathrm{Re}\,v_j = \sum_{i=1}^{n_j} x_i$,

IV. repeat 50 000 times steps I – III, which means calculate Rev_j for j=1, ..., 50 000,

V. calculate $VaR_{0.995}(\mathrm{Re}\,v)$ as $F^{-1}_{\mathrm{Re}\,v_j}(0.995)$ of simulated values.

SCR.10.87. The additional data requirements for this undertaking-specific parameter:

- The goodness-of-fit of the distributions and assumptions to the sets of observations should be considered satisfactory. In particular, the estimates of the average, standard deviation and 99.5% quantile of the *Rev* distribution should be sufficiently robust.

- The number of available historical years, and the number of annuities (or life assistance claims) within each year should be sufficiently large to allow for statistically credible results.

- The mix of types of annuities (or life assistance claims) should be relatively comparable across different years and should be representative of the current portfolio.

- There should not be structural changes in the environment, which could lead to a significant change in the behaviour of the revision risk drivers (e.g. change in legislation), both during the historical period and when compared with the expectations for next year.

SCR.10.88. If the undertaking does not satisfy the criteria required to be met in respect of the data used for estimating undertaking-specific parameters, but expects it can be possible in the moment of Solvency II entering into force it may anyway carry out the calculation with additional qualitative explanation which data conditions has been neglected.

SCR.11. Ring- fenced funds

SCR.11.1. This chapter deals with the treatment of ring fenced funds for the purposes of QIS5. It covers adjustments to the SCR and to own funds as appropriate to the circumstances of the ring fenced fund.

SCR.11.2. A ring-fenced fund as referred to in the Level 1 text arises as a result of an arrangement where:

a) There is a barrier to the sharing of profits/losses arising from different parts of the undertaking’s business leading to a reduction in pooling/diversification related to that ring fenced fund; or

b) Own funds (restricted own funds) can only be used to cover losses on a defined portion of the undertaking’s (re)insurance portfolio or with respect to particular policyholders or in relation to particular risks such that those restricted own funds are only capable of fulfilling the criteria in Article 93(1) (a) and/or (b) in respect of that defined portion of the portfolio, or with respect to those policyholders or those risks; or

c) Both a) and b) apply.

SCR.11.3. In practice, arrangements arise in respect of a) and c) above. It is unlikely that there will be any arrangements where only b) applies.

Identification of ring fencing adjustments

SCR.11.4. Level 3 guidance will be developed to assist in the identification of ring-fenced funds. However for QIS5 purposes if participants have arrangements or products that meet the descriptions which follow, these arrangements or products should be considered as giving rise to ring-fencing adjustments under Solvency II:

a) An ‘experience fund’ used to calculate discretionary benefits for a profit-sharing arrangement

Key features

SCR.11.5. Policyholders share in the profits/experience from an identified pool of assets and liabilities. The assets/liabilities may be physically separated from the rest of the undertaking but do not need to be.

SCR.11.6. Providers of capital to the profit sharing arrangement may receive regular payments or charges but cannot use (fully or partially) the assets of the ring-fenced fund.

SCR.11.7. Assets within the fund are held to meet the benefits for the current policyholders. However, any surplus assets above those required to meet benefits to the current policyholders (i.e. any own funds within the ring-fenced fund) are fully transferable, can be returned to the shareholders/other providers of capital or can be used to absorb losses as and when they occur.

SCR.11.8. These arrangements are typical of “with profits” business where the only ring fencing required under Solvency II is to ensure that the impact of profit sharing is taken into account in the calculation of the SCR. The arrangements do not affect the recognition of diversification within the SCR calculation.

SCR.11.9. The assets/liabilities form an experience fund. In this case, the calculation of the undertaking's SCR needs to take account of the profit sharing arrangement but the amount of own funds do not need any adjustment.

b) A fund of assets and liabilities in respect of with profits business that is only available to cover losses arising in respect of particular policyholders or in relation to particular risks

Key features

SCR.11.10. Policyholders within the ring-fenced fund have distinct rights relative to other business written by the insurer, and shareholders have no direct obligations to policyholders.

SCR.11.11. There are restrictions on the use of assets held within this fund to meet liabilities or losses arising outside the fund.

SCR.11.12. An excess of assets over liabilities is usually maintained within the fund and this excess is then deemed to be "restricted" own funds since its use is subject to the restrictions referred to in the previous paragraph.

SCR.11.13. There is often a profit sharing mechanism within the ring-fenced fund whereby policyholders receive a minimum proportion of the profits generated in the fund which are distributed through additional benefits or lower premium, and shareholders may then receive the balance of any distributed profits.

SCR.11.14. In this case, the SCR needs to reflect the effect of the profit sharing mechanism and an appropriate adjustment should be made to own funds.

c) Occupational retirement pensions business (IORP)

SCR.11.15. In some Member States, insurance undertakings are permitted to carry out occupational pensions business subject to the provisions of the IORP Directive where the Member States have chosen to apply Article 4 of the IORP Directive. Where this is the case, assets and liabilities relating to the pensions business have to be ring-fenced (Article 4 of the IORP permits Members States to apply the IORP Directive approach provided that: […] *all assets and liabilities corresponding to the said business shall be ring-fenced, managed and organised separately from the other activities of the insurance undertakings, without any possibility of transfer*).[84] For those undertakings which operate on this basis, the approach to ring fencing adjustments set out in these specifications should be adopted.

d) Clarification of the approach to composites

[84] The SII Directive refers to these undertakings in relation to the calculation of the equity risk charge (Article 304 of the Level 1 text, duration-based equity risk sub-module).

SCR.11.16. Composites refer to those undertakings which are authorised to carry out simultaneously both life and non-life insurance activities under the terms defined in article 73(5).

SCR.11.17. According to the Level 1 text, there is an implicit barrier to the sharing of profits arising from the life business to the non-life part of the business, as article 74(1) states that "*profits from life insurance shall benefit life policyholders as if the life insurance undertaking only carried on the activity of life insurance*".

Article 74(3) further requires that notional MCR's are calculated separately for the life and the non-life (re)insurance activities, and that each of these "*minimum financial obligations shall not be borne by the other activity*". Article 74(6) further requires undertakings to show separately the sources of results of both activities and the clear identification of eligible basic own fund items covering each notional MCR. Only in those cases referred in article 74(7) (i.e. where "*the amount of eligible basic own fund items with respect to one of the activities is insufficient to cover the relevant notional MCR, […] whatever the results in the other activity"*) restrictions on the transferability of own funds may arise. However, in such cases, the undertaking may ask for supervisory authorisation for the transfer of eligible basic own fund items from one activity to the other.

SCR.11.18. However, the Level 1 text does not restrict, on a going-concern basis and as long as both notional MCR's are fully covered and the supervisor is informed, the use of the available eligible own funds still available from one activity or the other to cover the SCR. Thus, there does not appear to be a constraint on the transferability of own funds within the undertaking for the SCR. In this respect, recital 44 of the Level 1 text contains the following statement: "*Insurance undertakings pursuing both life and non-life activities should manage those activities separately, in order to protect the interests of life policy holders. In particular, those undertakings should be subject to the same capital requirements as those applicable to an equivalent insurance group, made up of a life insurance undertaking and a non-life undertaking, taking into account the increased transferability of capital in the case of composite insurance undertakings."*

SCR.11.19. As a result, CEIOPS understands that the L1 text does not of itself consider that the life and non-life activities of composites are to be treated as ring-fenced funds. However each undertaking should take into account contractual or legal requirements specific to the jurisdiction in which that composite is operating, which might give rise to ring-fenced funds. In those cases, the approach to ring-fencing adjustments set out in these specifications should be adopted.

Clarification of the scope of ring fencing

SCR.11.20. For the purposes of QIS 5 participants should note that conventional unit linked and reinsurance business do not fall within the scope of ring-fenced funds; nor do reserves the use of which is restricted.

SCR.11.21. It is recognised that the arrangements which give rise to ring fenced funds as described above relate to life products . However because arrangements will differ according to national specificities it is not appropriate to state that ring fenced funds cannot arise in respect of non-life business arrangements.

SCR.11.22. In line with the principle of proportionality the approach may be adapted for those ring-fenced funds which are not material either individually **or in total.** Materiality should be assessed by reference to the assets and the liabilities of the ring-fenced fund.

SCR.11.23. Where there is a number of ring fenced funds which exhibit similar characteristics, the calculation of ring fencing adjustments in respect of own funds may be simplified. A calculation method may be applied to all the similar ring fenced funds, provided that the undertaking has established that the methodology produces sufficiently accurate results.

General procedure to calculate the SCR in the presence of ring-fenced arrangements which affect the SCR

SCR.11.24. For the calculation of the SCR, participants should apply the following steps:

a) When performing the calculation of each individual capital charge, the corresponding impact at the level of sub-portfolios of assets (based on unadjusted assets i.e. before any adjustment to own funds) and liabilities (those relevant to capture the effect of each ring-fenced fund) shall be computed;

b) Where positive effects[85] are observed at the level of a ring-fenced fund, the gross[86] capital charge at such level should take into account any potential increase of liabilities (e.g. additional distribution of profits to policyholders) even though the overall impact of the shock on the undertaking is negative. In practice, this can only happen in those cases of bidirectional scenarios (interest rate risk, currency risk, lapse risk) where positive effects calculated at the level of a ring-fenced fund can be observed;

c) In parallel, the capital charges at the level of each ring-fenced fund should be calculated net of the mitigating effect of future discretionary benefits. Where the ring-fenced fund relates to the existence of profit sharing mechanisms, the assumptions on the variation of future bonus rates should be realistic, with due regard to the impact of the shock at the level of the ring-fenced fund and to any contractual, legal or statutory clauses of the profit sharing mechanism. The relevant (downward) adjustment for the loss absorbency capacity of technical

[85] Note that the reference to positive effects should be understood as positive impacts of the SCR scenario (ΔNAV) where the change in NAV is calculated before taking into account any additional increase of liabilities implied by the arrangement.

[86] Gross of the mitigating effect of future discretionary benefits.

provisions should not exceed, in relation to a particular ring-fenced fund, the amount of future discretionary benefits within the ring-fenced fund;[87]

d) For each of gross/net, the total capital charge for the individual risk is given by the sum of the capital charges calculated at the level of each ring-fenced fund and that calculated at the level of the remaining sub-portfolio of business;

e) For each of gross/net, the total capital charges for each individual risk are then aggregated using the usual procedure of the standard formula to derive the total SCR.

SCR.11.25. The procedure outlined in the previous number assumes that the modular approach is used to calculate the adjustment for loss absorbency of technical provisions. With respect to the alternative approach – termed equivalent scenario approach – the procedure would be equivalent, except that step c) above would be applied at the SCR level (step c) would only need to be applied at the individual risk charge level if the equivalent scenario is derived using net capital charges as inputs).[88]

General procedure to calculate own funds in the presence of ring-fenced funds where an adjustment to own funds is relevant

SCR.11.26. When performing the adjustment to the eligible own funds in practice, participants should apply the following steps:

a) Calculate a notional SCR for each ring-fenced fund as well as a notional SCR for risks outside any ring-fenced fund. These calculations are based on unadjusted assets (before any adjustment to own funds). Note that the notional SCR should be calculated for each ring-fenced fund as if that fund were a standalone entity, but based on the worst case scenario for the undertaking as a whole. In cases of bidirectional scenarios, if the worst case scenario produces a negative result for a particular capital charge (after taking into account potential increase of liabilities due to profit sharing mechanisms) then it should be set to zero.

b) If a ring-fenced fund has sufficient own funds to cover its notional SCR, then the total own funds available to meet the SCR for the undertaking as a whole should exclude the excess own funds over the notional SCR in the ring-fenced fund. Own funds used to meet the notional SCR for the ring-fenced funds would be included in total own funds as would the shareholder value. (Future transfers attributable to shareholders in respect of profit sharing arrangements where benefits to policyholders are reflected in technical provisions. The amount representing the value of future shareholder transfers is not restricted and therefore forms part of the own funds available to meet the SCR for the undertaking as a whole.)

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87 In such cases, the decision on which scenario should be taken on board (upward or downward shock) should relate to the worst overall result to the undertaking (net charges) after the potential increases in liabilities referred in the previous bullet point.

88 For detailed information on the approaches to derive the adjustment for the loss absorbency capacity of technical provisions, consult CEIOPS Advice on SCR- Loss absorbing capacity of technical provisions, CEIOPSDOC- 46/09 (October 2009), see http://www.ceiops.eu//content/view/17/21/ (former CP 54).

c) If a ring-fenced fund does not have sufficient own funds to meet its notional SCR, then the own funds which meet any part of the notional SCR may nonetheless be recognised in meeting the SCR for the undertaking as a whole.

Example of the calculation of the SCR in the presence of ring-fenced funds

SCR.11.27. Assume an undertaking has two profit sharing mechanisms that benefit different groups of policyholders A and B. Those mechanisms are such that, by contractual laws, 80% of any future emerging profit (irrespective of the source, i.e. underwriting or financial) has to be allocated to the respective group of policyholders and technical provisions increase by the value of the 80% emerging profit. Only the remaining 20% can be released to shareholders.

SCR.11.28. The blocks of business A and B constitute two ring-fenced funds. Within each ring-fenced fund, the expected value of future profit sharing should be part of the value of technical provisions (following Solvency II valuation rules). The amount of future discretionary benefits for groups A and B is 100 and 300 respectively.

SCR.11.29. Additionally the undertaking holds a block of non-participating business C.

SCR.11.30. The undertaking needs to calculate the SCR following the approach outlined in paragraph SCR.1.[89]

SCR.11.31. For instance, the calculation of the interest rate risk charge, step a) would require the computation of the impact of both the upward and downward scenarios at the level of each ring-fenced fund (and at the level of the remaining business, C).

	A	B	C	(Sum)
ΔNAV before any adjustment (per relevant segment)				
upward shock	250	-100	-400	-250
downward shock	-80	200	500	620

SCR.11.32. Step b)[90] requires the reduction of positive ΔNAV partial results, due to barriers of sharing the profits generated within a ring-fenced fund to other areas of the business. In the current example, where positive, the ΔNAV results are reduced by 80% (such amount is retained in the ring-fenced fund and used to increase the benefits of the corresponding groups of policyholders).

	A	B	C	(Sum)
After increase of liabilities within the RFF				
upward shock	50	-100	-400	-450
downward shock	-80	40	500	460

SCR.11.33. Step c) is concerned with the calculation of the net capital charges, and highlights the importance to assess the extent by which the management is able to reduce future discretionary bonuses at the level of each ring-fenced fund. In this example, it is assumed that the 1/3 of the negative ΔNAV results is mitigated by the

[89] For practicality reasons, it will be assumed that the adjustment for the loss absorbency capacity of technical provisions is calculated using the modular approach.

[90] Note that this step only needs to be performed when calculating capital charges based on the worst of a range of scenarios – namely on interest rate, currency and lapse risks.

reduction in future discretionary bonuses (note that on block of business C this is not possible because it is non-participating business).

	A	B	C	(Sum)
Net charges - after adjustment for loss absorbency of TP				
upward shock	50	-67	-400	-417
downward shock	-53	40	500	487

SCR.11.34. Based on these results, the upward shock scenario is chosen to compute the SCR, as it corresponds to the worst scenario at the level of the undertaking. In summary, the gross and net capital charges for interest rate risk are respectively 450 and 417 (step d)). Note that ignoring step b) would lead to much lower capital charges – respectively 250 and 217.

SCR.11.35. The calculation would then progress in an analogous manner for the remaining individual risks within the market risk module and, after that, for the individual risks within the other risk modules. Assume the interest rate risk is the only risk in the market module and there is one further individual risk, mortality risk. The table below shows the breakdown of the SCR into the different components.

	A	B	C	Entity
Interest rate risk shock				
only revaluation of A&L	-250	67	400	217
after additional distribution of profit sharing	-50	67	400	417
Mortality risk shock	10	125	200	335
Calculation of SCR	10	169	529	**653**

SCR.11.36. Note: A correlation of 50% between Interest rate risk and Mortality risk is assumed, for the purposes of this example.

<u>Calculation of total eligible own funds in the presence of ring-fenced funds</u>

<u>Case 1: Ring fenced fund in surplus after deducting notional SCR</u>

SCR.11.37. Where there are sufficient own funds within each ring-fenced fund to cover the respective notional SCR, the own funds in excess of the notional SCR should be excluded.

SCR.11.38. If this is the case any amount representing the value of future shareholder transfers – see above – is not restricted and therefore forms part of the own funds available to meet the SCR for the undertaking as a whole – see RFF B below.

	A	B	C	Entity
Own funds	200	400	1400	2000
Case of RFF with restricted own funds				
SCR	10	169	529	653
Shareholder value in RFF	0	30	0	30
OF available to cover SCR	10	199	1400	**1609**
OF unavailable to cover SCR	190	201	0	391
Case of RFF without restricted own funds				
SCR				653
OF available to cover SCR	200	400	1400	**2000**
OF unavailable to cover SCR	0	0	0	0

<u>Case 2: Ring fenced fund in deficit after deducting notional SCR</u>

SCR.11.39. Where there are insufficient own funds within a ring-fenced fund to cover the notional SCR for that ring-fenced fund (fund B in this example):

a) There is no restriction on the amount of own funds in that ring fenced fund;

b) The deficit in that ring fenced fund is met by own funds outside the ring fencing arrangements, i.e. arising in non-participating business C in this example.

SCR.12. Risk mitigation – financial instruments

SCR.12.1. Introduction

SCR.12.1. These specifications cover financial risk mitigation techniques mentioned in article 111 (1) (f) of the Level 1 text including in its scope instruments such as financial derivatives (i.e. futures, options, credit derivatives).

SCR.12.2. The use of securitization as a mitigation technique of non-financial risks and the framework to consider the effect of reinsurance in the calculation of the SCR are not covered in this subsection. At this respect, although financial risk mitigation techniques and reinsurance have some common features, the markets they refer to and their respective specific characteristics are sufficiently different to require separate consideration.

SCR.12.3. The definition of financial risk mitigation techniques does not include the risk mitigating effect provided by discretionary profit sharing.

SCR.12.4. This specifications develop the qualitative Level 2 implementing measures envisaged in the number 1, letter f), of article 111, and should be read in conjunction with those SCR provisions regarding the quantitative treatment of the mitigation techniques, part of Article 111 (1) (e) of the Level 1 text.

SCR.12.2. Definitions

SCR.12.5. For the sole purpose of this specifications, a '*financial risk mitigation technique'* is a financial contract whose future value or future cash flows vary in opposite direction and equivalent, or sufficiently similar, amount to the variations of the future value or future cash flows of the assets or liabilities considered by the undertaking in its solvency assessment.

c) Discretionary profit sharing shall not be treated as a financial risk mitigation technique. It shall be taken into account in the calculation of best estimates of technical provisions the standard formula of the SCR according to the requirements for management actions. The same holds for other management actions taken into account after the scenario stress.

d) This subsection applies to the use of securitization as a mitigation technique to transfer out financial risks. Nevertheless this subsection does not apply when the financial risks are transferred with underwriting risks and such financial risks have been assumed by the undertaking as part of the liabilities derived from an insurance contract, and furthermore they are not significant.

The following are examples of financial risk mitigation techniques covered by this subsection that are allowed for in the standard calculation of the SCR, provided they meet the requirements set out in this paper:

- Put options bought to cover the risk of falls in assets,

- Protection bought through credit derivatives or collaterals, to cover the risk of failure, downgrade in the credit quality,… of certain exposures,
- Currency swaps and forwards to cover currency risk in relation to assets or liabilities,
- Swaptions acquired to cover variable/fixed risks.

SCR.12.6. ‘Financial risk mitigation techniques’ are admissible for the purposes of the calculation of the SCR with the standard formula to the extent they represent legally enforceable rights for the undertaking at the date of reference of the solvency assessment, and they meet the requirements set out in this specifications.

SCR.12.7. As set out below, a ‘financial risk mitigation technique’ should be based on an intended decision of the undertaking to mitigate its risk profile according the targeted overall risk management policy.

SCR.12.8. According the principles set out in this paper, the allowance for financial risk mitigation techniques in the calculation of the SCR with the standard formula is restricted to instruments and excludes processes and controls the undertaking has in place to manage the investment risk. This does not preclude the allowance for future management actions in the calculation of technical provisions under the scope and requirements contained in the subsection of these specifications on future management actions.

SCR.12.9. ‘Financial risk mitigation techniques’ failing the requirements set out in this specifications shall be considered in the standard calculation of the SCR according the following:

a. Credit risks and other risks arising from the use of the technique shall be reflected in the SCR in accordance with article 101(5) notwithstanding that the technique is inadmissible as a financial risk mitigation technique;

b. The financial risk mitigation technique shall not, to any extent, reduce the risk charges in respect of the risks being hedged by that technique. However, where the risk charge is assessed using scenarios of different directions, the change in the value of the financial risk mitigation technique shall be considered in those scenarios where its value decreases i.e. where it leads to an increase in the risk charge.

SCR.12.3. Interpretation

SCR.12.10. The application of this subsection to concrete cases or situations not explicitly reflected shall be developed considering that the design and calibration of the standard calculation of the SCR provide a 99.5 confidence level in a 1-year time horizon according to the following features:

e) Undertakings cannot anticipate the shocks considered in the SCR calculation and all undertakings are affected by the shocks in the same way. The shocks considered in that calculation are unavoidable

f) The calculation shall be made on the basis of assets and liabilities existing at the date of reference of the solvency assessment, considering they cannot be changed before or during the calibrated shock.

g) The standard calculation of the SCR shall not allow as admissible those financial mitigation techniques that generate material risks not explicitly or sufficiently captured in the standard calculation of the SCR. This is the case of 'financial risk mitigation techniques' involving material basis risks, referred to below. Financial risk mitigation techniques having particularly complex features may also be inadmissible if they generate significant levels of operational risk that cannot be reflected in the SCR.

h) Innovative financial risk mitigation techniques shall be allowed in the context of the calculation of the SRC with the standard formula, only if there is clear evidence it is satisfied the requirement set out in article 101(5) of the Level 1

SCR.12.11. Techniques or cases not specifically addressed in these measures, shall be assessed according the principles reflected in this subsection and, by analogy, the regulations applicable for the same techniques or cases in other financial sectors. This subsection l applies to any technique satisfying the definition of '*financial risk mitigation techniques*' as defined in this subsection and which have the same or similar economic effects.

SCR.12.12. The use of financial risk mitigation techniques shall be the consequence of an overall risk management policy, where both qualitative and quantitative features shall be appropriately considered Annex A to these specifications develops the content of this principle.

SCR.12.4. General approach to financial risk mitigation techniques

SCR.12.13. According to the Level 1 text, the effect of financial risk mitigation techniques on the SCR shall only be recognised if the following two conditions are satisfied:

a) Credit risk and other risks arising from the use of such techniques are properly reflected in the SCR (article 101(5));

b) The instrument provides for an effective transfer or risk from the undertaking to a third party (article 111(1)(f)).

SCR.12.14. As a consequence, the calculation of the SCR using the standard formula should allow for the effects of financial risk mitigation techniques through, on the one hand, a reduction in requirements commensurate with the extent of risk mitigation and, on the other hand, an appropriate treatment of any corresponding risks that are acquired in the process.

SCR.12.15. To provide a verifiable and objective framework to the overall treatment of financial risk mitigation techniques in the context of the calculation of the SCR with the standard formula, it is advisable to separate these two effects.

12.4.1. Principle 1: Economic effect over legal form

SCR.12.16. Financial risk mitigation techniques that have a material impact on an undertaking's risk profile, should be recognised and treated equally, regardless of their legal form, provided that their economic or legal features do not oppose to the requirements for such recognition.

SCR.12.17. Where financial risk mitigation techniques are recognised in the SCR calculation, any material new risks shall be identified and the capital required at the 99.5^{th} confidence level quantified and included within the SCR. Where the financial risk mitigation techniques actually increase risk, then the SCR should be increased.

SCR.12.18. The calculation of the SCR with the standard formula should recognise financial risk mitigation techniques in such a way that there is no double counting of mitigation effects.

12.4.2. Principle 2: Legal certainty, effectiveness and enforceability

SCR.12.19. The financial risk mitigation instruments used to provide the risk mitigation together with the action and steps taken and procedures and policies implemented by the undertaking shall be such as to result in risk mitigation arrangements which are legally effective and enforceable in all jurisdictions relevant to the arrangement and, where appropriate, relevant to the hedged asset or liability.

SCR.12.20. The undertaking shall take all appropriate steps, for example a sufficient legal review, to ensure and confirm the effectiveness and ongoing enforceability of the financial risk mitigation arrangement and to address related risks.

SCR.12.21. In case where the full effectiveness or ongoing enforceability cannot be verified, the financial risk mitigation technique shall not be recognised in the SCR calculation. 'Ongoing enforceability' refers to any legal or practical constraint that may impede the undertaking from receiving the expected protection. The allowance in the SCR of the 'counterparty default risk' derived from the *'financial risk mitigation technique*' does not preclude the necessity of satisfying the *'ongoing enforceability'*.

SCR.12.22. Shared financial risk mitigation techniques. According this principle and principle 5, shared financial risk mitigation techniques which provide simultaneous protection to various parties and where the activation of one of them means the loss of protection (totally or partially) for the rest of parties, are not allowed to reduce the calculation of the SCR with the standard formula.

SCR.12.23. Procedures and processes. According this principle and principles 3 and 5, procedures and processes not materialized in already existing financial contracts providing protection at the date of reference of the solvency assessment, shall not be allowed to reduce the calculation of the SCR with the standard formula. This is the case for financial stop-loss processes, whose consideration is not appropriate in the standard calculation of the SCR according the framework of this subsection.

SCR.12.24. Future contracts. Undertakings should not allow for additional hedging instruments (for example, as part of a rolling hedging programme) beyond those in force at the balance sheet date within the standard formula SCR, unless the conditions under which the undertaking has the right to renew the hedge, are fully committed at the date of the solvency assessment and all costs for the renewal are taken into account in the SCR calculation.

SCR.12.25. Basis risk. Since the design of the standard formula of the SCR does not take into account basis risk, according principles 1 and 2, when the underlying assets or references of the financial mitigation instrument do not match perfectly the exposures of the undertaking, the financial risk mitigation technique shall be allowed in the calculation of the SCR with the standard formula only if the undertaking can demonstrate that the basis risk is not material compared to the mitigation effect and, furthermore, the allowance of the financial risk mitigation technique is in line with the 99.5% confidence level of the SCR.

The following 'financial risk mitigation techniques' shall be considered involving material basis:

- equity derivatives whose underlying equities or indexes have not a correlation nearby 1 with the hedged asset or liability, especially in case of stressed situations.
- CDS referred to names different than the hedged name, or with a correlation not nearby 1, with a different tenor or a different nominal.

SCR.12.26. Undertakings whose overall risk management policy envisages the use of financial mitigation techniques with a material basis risk in respect of the hedged exposures, before using such techniques should obtain the prior supervisory approval to apply internal models appropriately designed to capture the basis risks according the targeted confidence level.

12.4.3. Principle 3: Liquidity and ascertainability of value

SCR.12.27. To be eligible for recognition, the financial risk mitigation technique relied upon shall be valued consistently in line with the principles laid down for Valuation of assets and liabilities, other than technical provisions. Furthermore, this value shall be over time sufficiently reliable and appropriate to provide certainty as to the financial risk mitigation achieved.

SCR.12.28. Regarding the liquidity of the financial risk mitigation technique, the following three general statements shall apply:

- The undertaking should have written internal policy regarding liquidity requirements that financial risk mitigation techniques should meet, according to the objectives of the undertaking's risk management policy;

- Financial risk mitigation techniques considered to reduce the SCR have to meet the liquidity requirements established by the undertaking.

- The liquidity requirements shall guarantee an appropriate coordination of the liquidity features of the hedged assets or liabilities, the liquidity of the financial risk mitigation technique, and the overall policy of the undertaking regarding liquidity risk management.

SCR.12.29. A mitigation technique covering just a part of the next twelve months should only be allowed with the average protection level over the next year. A pro rata temporis calculation provides an appropriate balance among accuracy and simplicity.

For example, where an equity option provides protection for the next six months, undertakings should assume that the option only provides half of the risk mitigating effect that it does if the shock takes place immediately.

Where the exposure to the risk that is being hedged will cease before the end of the next year with objective certainty, the same principle should be applied but in relation to the full term of the exposure.

12.4.4. Principle 4: Credit quality of the provider of the financial risk mitigation technique

SCR.12.30. Providers of financial risk mitigation instruments should have an adequate credit quality to guarantee with appropriate certainty that the undertaking will receive the protection in the cases specified by the contracting parties. Credit quality should be assessed using objective techniques according to generally accepted practices.

SCR.12.31. As a general rule, when the undertaking applies the standard calculation for a certain risk module, only financial protection provided by entities rated BBB (stable) or better shall be allowed in the assessment of SCR. For unrated counterparties, the undertaking shall be able to demonstrate that they meet at least the standard of a BBB rating company. In the event of default, insolvency or bankruptcy of the provider of the financial risk mitigation instrument – or other credit events set out in the transaction document – the financial risk mitigation instrument should be capable of liquidation in a timely manner or retention.

SCR.12.32. The assessment of the credit quality of the provider of protection shall be based on a joint and overall assessment of all the features or contracts directly and explicitly linked to the financial risk mitigation technique. This assessment shall be carried out in a prudent manner, in order to avoid any overstatement of the credit quality.

SCR.12.33. As an example, should the financial risk mitigation technique be collateralized (adding extra quality to the promise-to-protect of the direct provider), the assessment of the credit quality of the protection shall consider the collateral if

- It meets the requirements set out below regarding collaterals and,

- According article 101(5) of the level 1 text, the risks arising from the collateral are appropriately captured in the standard calculation of the SCR (i.e. the counterparty default risk module).

SCR.12.34. Where a provider of protection downgrades below BBB (stable) or becomes unrated and it is expected with a high confidence that this rating will be recovered in a short term, the financial mitigation technique may be considered admissible under the condition of meeting the provision set out in paragraph 3.89 within the next three months.

SCR.12.35. The correlation between the values of the instruments relied upon for risk mitigation and the credit quality of their provider shall not be unduly adverse, i.e. it should not be materially positive (known in the banking sector as ‘wrong way risk’). As an example, exposures in a company belonging to a group should not be mitigated with CDS provided by entities of the same group, since it is very likely that a failure of the group will lead to falls in the value of the exposure and simultaneous downgrade or failure of the provider of protection. This requirement does not refer to the systemic correlation existing between all financial markets as a whole in times of crisis.

12.4.5. Principle 5: Direct, explicit, irrevocable and unconditional features

SCR.12.36. Financial risk mitigating techniques can only reduce the capital requirements if:

- They provide the undertaking with a direct claim on the protection provider (direct feature); and

- They contain an explicit reference to specific exposures or a pool of exposures, so that the extent of the cover is clearly defined and incontrovertible (explicit feature); and

- They are not subject to any clause, the fulfillment of which is outside the direct control of the undertaking, that would allow the protection provider to unilaterally cancel the cover or that would increase the effective cost of protection as a result of certain developments in the hedged exposure (irrevocable feature); and

- They are not subject to any clause outside the direct control of the undertaking that could prevent the protection provider from its obligation to pay out in a timely manner in the event that a loss occurs on the underlying exposure (unconditional feature).

SCR.12.5. Special features regarding credit derivatives

SCR.12.37. The reduction of the standard SCR based on the mitigation of credit exposures by using credit derivatives shall only be allowed when the undertaking has in force generally applied procedures for this purposes and considers generally admitted criteria. Requirements set out in other financial sectors for the same mitigation techniques may be considered as generally applied procedures and admitted criteria.

SCR.12.38. In order for a credit derivative contract to be recognised, the credit events specified by the contracting parties must at least cover:

- Failure to pay the amounts due under the terms of the underlying obligation that are in effect at the time of such failure (with a grace period that is closely in line with the grace period in the underlying obligation); and

- Bankruptcy, insolvency or inability of the obligor to pay its debts, or its failure or admission in writing of its inability generally to pay its debts as they fall due, and analogous events; and

- Restructuring of the underlying obligation, involving forgiveness or postponement of principal, interest or fees that results in a credit loss event. Definition of 'restructuring' will be considered according to generally standardised clauses and the own undertaking's guidance, according to its risk management policy.

SCR.12.39. Since the definition of credit events is an evolving topic, (i.e. definition of restructuring) the regulation set out in the previous paragraph should be regularly reviewed, and amended if necessary as part of level 3 guidance, to take into account market developments and future standardized conventions.

SCR.12.6. Collateral

SCR.12.40. A collateralized transaction is a transaction in which an undertaking has a credit exposure or potential credit exposure which is hedged in whole or in part by collateral posted by a counterparty or by a third party on behalf of the counterparty.

SCR.12.41. In addition to the general requirements set out in this subsection and for legal certainty, effectiveness and enforceability, the legal mechanism by which collateral is pledged or transferred must ensure that the undertaking has the right to liquidate or take legal possession of it, in a timely manner, in case of any event related to the counterparty set out in the transaction documentation (and, where applicable, of the custodian holding the collateral).

SCR.12.42. Undertakings must have clear and robust procedures for the timely liquidation of collateral to ensure that any legal conditions required for declaring the default of the counterparty and liquidating the collateral promptly are observed. This assessment shall be appropriately coordinated with the assessment and policies applied in compliance of the liquidity principle.

SCR.12.43. Unless it becomes impossible according to market conditions, admissible collateral in the calculation of the SCR with the standard formula must protect the undertaking against the same events listed in this paper for credit derivatives.

SCR.12.7. Segregation of assets

SCR.12.44. Where, and to the extent that, the liabilities of the counterparty are covered by strictly segregated assets under arrangements that ensure the same degree of protection as a collateral that meets the above mentioned requirements, then the segregated assets shall be treated as if were a collateral with an independent custodian. In order to ensure the same degree of protection, the arrangements must meet in particular the requirements stated below.

SCR.12.45. The strictly segregated assets shall be individually identified, their deposit-taking institutions, the jurisdictions of localization of the assets, and the situations where the transfer of the assets to the creditor takes place. These situations should cover at least the cases required for collaterals and the one mentioned in later.

SCR.12.46. The legal certainty and enforceability shall require the following:

- The undertaking has a right in rem on the strictly segregated assets and they cannot be used to reimburse other creditors in the event of default of the counterparty according the legal regulations of all the jurisdictions of localization of the assets, as the jurisdiction of the counterparty. In case of default of the counterparty, the undertaking should have the right directly obtain the ownership of the assets without any restriction, delay or legal impediment,

- The counterparty should identify the strictly segregated assets and explicitly recognize the legal rights of the undertaking to trigger the guarantee, and their correlative obligations to transfer immediately the ownership of the assets to the undertaking,

- The arrangement should describe in an explicit and detailed manner, the legal procedures providing the undertaking the legal right to obtain the ownership of the segregated assets, once occurred the events triggering the guarantee.

SCR.12.47. The assessment of the legal enforceability should include a careful consideration of any risks connected to the localization of the assets outside of the jurisdiction of the undertaking. The arrangement should ensure that the country where the assets are located will not restrict the undertaking’s rights in relation to the asset, even in times of economic or political crisis.

SCR.12.48. The principle regarding 'credit quality' shall require the following:

- The deposit-taking institutions are BBB(stable) rated or better and subject to supervisory action. Unrated or non-supervised deposit-taking institutions are not acceptable.

- The counterparty shall have processes to promptly refill the guarantee where market prices of the strictly segregated asset require such action. Lack of prompt refill shall be considered as triggering the guarantee.

SCR.12.49. The principle regarding direct, explicit, irrevocable and unconditional features shall require:

- The counterparty shall recognize that the strictly segregated assets shall not be transferable or changeable by other assets, without permission of the undertaking,

- Localizations of strictly segregated assets could be freely changed without existing legal or practical restrictions or impediments, other than the necessary permission of the undertaking,

- Once triggered the guarantee, there will be no legal or practical restrictions or impediments to localize the strictly segregated assets in the jurisdiction designed by the undertaking,

- Local regulations applicable to the strictly segregated assets and its deposit, shall explicitly guarantee that the strictly segregated assets are completely immune to any other responsibility or liability of the counterparty, both in ongoing concern basis and in case of its winding up.

SCR.12.50. The segregation of assets shall not be revocable without permission of the undertaking.

SCR.13. Risk mitigation – reinsurance

SCR.13.1. In considering whether the reinsurance risk mitigation techniques effectively transfers risk and the extent to which credit for such transfer of risk may be taken within the calculation of the SCR, the following principles shall be followed:

SCR.13.1. Principle 1 – Effective Risk Transfer

SCR.13.2. The risk mitigation technique shall effectively transfer risk from the undertaking. The undertaking needs to be able to show the extent to which there is an effective transfer of risk in order to ensure that any reduction in SCR or increase in available capital resulting from its reinsurance arrangements is commensurate with the change in risk that the insurer is exposed to.

SCR.13.3. The transfer of risk from the undertaking to the third party shall be effective in all circumstances in which the undertaking may wish to rely upon the transfer. Examples of factors which the undertaking shall take into account in assessing whether the transaction effectively transfers risk and the extent of that transfer include:

- whether the documentation associated with the reinsurance reflects the economic substance of the transaction;
- whether the extent of the risk transfer is clearly defined and beyond dispute;
- whether the transaction contains any terms or conditions the fulfilment of which is outside the direct control of the undertaking. Such terms or conditions may include those which:
    - would allow the third party unilaterally to cancel the transaction, except for the non-payment of monies due from the undertaking to the third party under the contract; or
    - would increase the effective cost of the transaction to the undertaking in response to an increased likelihood of the third party experiencing losses under the transaction; or
    - would oblige the undertaking to alter the risk that had been transferred with the purpose of reducing the likelihood of the third party experiencing losses under the transaction; or
    - would allow for the termination of the transaction due to an increased likelihood of the third party experiencing losses under the transaction; or
    - could prevent the third party from being obliged to pay out in a timely manner any monies due under the transaction; or
    - could allow the maturity of the transaction to be reduced;
- whether the transaction is legally effective and enforceable in all relevant jurisdictions.

SCR.13.4. An undertaking shall also take into account circumstances in which the benefit to the undertaking of the transfer of risk could be undermined. For instance, where the undertaking, with a view to reducing potential or actual losses to third parties, provides support to the transaction, including support beyond its contractual obligations.

SCR.13.5. The mere fact that the probability of a significant variation in either the amount or timing of payments by the reinsurer is remote, does not by itself mean that the reinsurer has not assumed risk. The entirety of the contract needs to be considered.

SCR.13.6. In determining whether there is a transfer of risk, the entire contract shall be considered. Further, where the contract is one of several related contracts the entire chain of contracts, including contracts between third parties, shall be considered in determining whether there is a transfer of risk. In addition, the entire legal relationship between the cedant and reinsurer shall be taken into account in this determination.

SCR.13.7. When a reinsurance risk mitigation technique includes basis risk (for example as might happen where payments are made according to external indicators rather than directly related to losses):

- There shall be no allowance of such reinsurance risk mitigation instruments in the calculation of the standard formula SCR unless the undertaking is able to demonstrate that the basis risk is not material.
- If allowance of the reinsurance risk mitigation technique in the calculation of the SCR is made, the calculation shall account for the basis risk in line with the 99.5% confidence level of the SCR.

SCR.13.8. For the non-life premium and reserve risk module under the standard formula SCR, one of the underlying assumptions of the design of the non-life premium and reserve risk sub-module (and the corresponding health risk sub-module) is ~~as follows~~ that for a reinsurance arrangement, the ratio of net risk to gross risk (on a 99.5% Value-at-Risk level) is less than (or at least not significantly greater than) the net-to-gross ratio of best estimate provisions and premiums. Where this assumption is not valid, the sub-module produces a wrong estimate of the net risk:

- Recoverables and premiums for reinsurance shall only be taken into account in the determination of the volume measures "net best estimate" and "net premiums" of the non-life premium and reserve risk sub-module, if the ratio of net to gross risk is in proportion with the reinsurance part of the best estimate and the premium. This would mean that the ratio of net to gross risk does not significantly exceed the net-to-gross ratio of premiums and best estimate provisions.
- In particular, no allowance shall be made for finite reinsurance or comparable SPV constructions of the non-life premium and reserve risk sub-module in the standard formula.

SCR.13.2. Principle 2: Economic effect over legal form

SCR.13.9. Reinsurance risk mitigation techniques shall be recognised and treated consistently, regardless of their legal form or accounting treatment, provided that their economic or legal features meet the requirements for such recognition. The economic effect of the transaction shall be considered over the legal form.

SCR.13.10. The SCR shall reflect the economic substance of the arrangements that implement the technique. In principle, this would be through:

- a reduction in requirements commensurate with the extent of risk transfer, and

- an appropriate treatment of any corresponding risks that are acquired in the process.

Where practical and appropriate to provide a verifiable and objective framework to the overall treatment of reinsurance risk mitigation techniques in the context of the standard formula calculation of the SCR, it is advisable to separate these two effects.

SCR.13.11. The impact on the risk associated with the reinsurance risk mitigation technique shall be treated consistently, regardless of the legal form of the protection.

SCR.13.3. Principle 3: Legal certainty, effectiveness and enforceability

SCR.13.12. The reinsurance contracts used to provide the risk mitigation together with the action and steps taken, and procedures and policies implemented by the insurance undertaking, shall be such as to result in risk mitigation arrangements which are legally effective and enforceable in all relevant jurisdictions.

SCR.13.13. To the extent that the effectiveness or ongoing enforceability cannot be verified or the mitigation technique is not documented, the benefits of the mitigation technique shall not be recognised in the SCR calculation, but the calculation shall recognise any additional risks in accordance with the formula.

SCR.13.14. The SCR standard formula shall to the extent practicable be increased to allow for the possibility that reinsurance protection will not be renewed on expiry or will be renewed on adverse terms.

SCR.13.4. Principle 4: Valuation

SCR.13.15. The design of the standard formula SCR calculation recognises reinsurance risk mitigation techniques in such a way that there is no double counting of risk mitigation effects.

SCR.13.16. Where the reinsurance risk mitigation techniques actually increase risk, the SCR shall be increased.

SCR.13.5. Principle 5: Credit quality of the provider of the reinsurance risk mitigation instrument

SCR.13.17. Undertakings shall consider the credit quality of the providers of reinsurance risk mitigation contractual arrangements and shall only take into account effective risk transfer having regard to the credit quality.

SCR.13.18. Subject to meeting all other relevant criteria and principles laid down in this advice:

- For reinsurance with entities subject to the Directive (other than SPVs): reinsurance should not be recognised if the entity does not meet the SCR;

- For reinsurance with entities subject to equivalent supervision (other than SPVs): reinsurance should not be recognised if the entity does not meet the equivalent of the SCR;
- For reinsurance with entities (other than SPVs) not subject to the Directive or equivalent supervision: reinsurance should not be recognised if the entity has a lower rating than BBB (stable) or if the undertaking is not able to demonstrate that the entity meets a standard of at least BBB (stable).
- For reinsurance with SPVs subject to the Directive: reinsurance should not be recognised if the requirements of the Level 1 text on SPVs are not met.
- For reinsurance with SPVs not subject to the Directive reinsurance shall be recognised only when:
  - the undertaking has provided the supervisor with the information equivalent to that required for the authorization and supervision of a SPV subject to the directive;
  - the undertaking has informed the supervisor of the applicable regulations in the relevant jurisdictions that may affect the SPV or the rights of the undertaking to recieve the expected protection; and
  - the supervisor considers that the requirements of the Level 1 text on SPVs are met by the SPV.

SCR.13.19. Notwithstanding the above, to the extent that collateral, meeting the requiremnts of CEIOPS' advice on the allowance of financial mitigation techniques, has been provided, the reinsurance shall be recognised up to the amount of the collateral.

SCR.13.20. In determining the strength of an entity with which an undertaking has reinsured or the compliance of a SPV with the mandatory conditions, the undertaking shall use the latest available information, which should be no more than 12 months old.

SCR.13.21. Credit quality shall be assessed using objective techniques according to generally accepted practices.

SCR.13.22. Risk mitigation may be used to mitigate the credit risk arising from reinsurance counterparties, subject to the corresponding section on the allowance of financial mitigation techniques in the standard formula.

SCR.14. Captive simplifications

SCR.14.1. Scope for application of simplifications

SCR.14.1. The simplifications indicated below are split in two different categories. SCR.14.11 to SCR.14.25 are about simplifications only applicable to captives based on their specific business model. SCR.14.26 to SCR.14.27 deal with simplifications applicable to the ceding undertakings of captive reinsurance undertakings.

SCR.14.2. Simplifications suggested in this section may be applied by entities meeting the definition of captives as stated in Article 13(2) and 13(5) of the Level 1 text. The definitions in Articles 13(2) and 13(5) are to be understood in the sense that the group of the captive undertaking does not include another insurance or reinsurance undertaking, other than another captive undertaking which meets the requirements (a) and (b) below, besides other provisions stated in those definitions.

SCR.14.3. If the undertaking does not meet the legal definition of a captive as stated above, it will be considered as an insurance or reinsurance undertaking for the purpose of this advice. This terminology (specific to SCR.14.11 – SCR.14.27) does not put into question the definition of captives as stated in 13(2) and 13(5) of the Level 1 text. In this circumstance, the undertaking could nevertheless benefit from general simplifications.

SCR.14.4. The application of the simplifications will be limited to captives meeting the following requirements (Requirements **a (i-ii) and b)**:

(a) (i) The insurance obligations of an insurance captive undertaking only relate to contracts where all insured persons and beneficiaries in respect of unexpired risks are legal entities of the group of the captive undertaking and where all insured persons and beneficiaries were legal entities of the group at the time the contract was entered into.

(a) (ii) The reinsurance obligations of a captive undertaking only relate to contracts where all insured persons and beneficiaries of the underlying direct insurance contracts in respect of unexpired risks are legal entities of the group of the captive undertaking and where all insured persons and beneficiaries of the underlying direct insurance contracts were legal entities of the group at the time the contract was entered into.

(b) The insurance obligations of the direct insurance captive undertaking do not relate to any third party liability insurance.

SCR.14.5. The term 'beneficiary' indicated in SCR.14.4 is to be understood as defined in recital 16 of the Level 1 text: *"…The term beneficiary is intended to cover any natural or legal person who is entitled to a right under an insurance contract*". From this recital it is clear that only insurance contracts are targeted since the Level 1 text specifically uses the term 'reinsurance contracts' when referring to reinsurance contracts. The term 'beneficiary' in TS.C.4 would thus relate to a situation in which a natural or legal person would have a direct right against a captive insurance undertaking or a captive reinsurance undertaking resulting from an insurance contract.

SCR.14.6. The term 'insured person' is commonly defined as being 'a person whose interests are protected by an insurance contract or 'a person who contracts for an insurance contract that indemnifies him against loss of property, life or health'. The terms 'insured person' and 'beneficiary' are thus always linked to the existence of an insurance contract linking the insured person, the beneficiary and an entity of the group.

SCR.14.7. In addition to these requirements, the particular simplification should be proportionate to the nature, scale and complexity of the risks inherent in business of the captive undertaking. The assessment of proportionality should take into account the defining characteristic of a captive undertaking as stated in Recital 21.

SCR.14.8. Irrespective of whether the captive undertaking meets the requirements (ai), (aii) and (b) in TS.C.4 or makes use of particular captive simplifications, it can make use of the general simplifications provided for insurance and reinsurance undertakings, if the criteria of these simplifications can be fulfilled.

SCR.14.9. Captives which exclusively write for instance one or more of the following risks could benefit from the simplifications in this advice (non exhaustive list):

- Property damage to property belonging to the captive owner's group;
- Machinery breakdown of equipment belong to the inventory of the captive owner's group;
- Risks which would fall under the category 'financial loss to the captive owner', like Business Interruption, Product and Environmental liability, Keyman insurance, Counterparty default insurance, Computer Crime and Fraud, Hull / Cargo insurance, Bankers' Blanked Bond, Transport insurance, Theft and Robbery insurance.
- Non compulsory liability in general. In this context, the notion of related/unrelated risk has been extensively addressed in appendix 1, paragraph 6 of the document 'IAIS issues paper on regulation and supervision of captive insurance companies'.
- Compulsory third party risks for those amounts that exceed the minimum level foreseen by legislation (if such a minimum exists). For instance, in some jurisdictions, MTPL is limited by the law to some fixed amount say 200 million EUR for instance. If an industrial or commercial group decides to insure itself for the layer 100 million EUR in excess of 200 million EUR in a captive, it is doing so on a voluntary basis and this type of insurance would then also be classified as 'financial loss' insurance. The industrial or commercial group would legally only be liable up to the amount foreseen by the law i.e. 200 million EUR in the example referred to above and this amount is insured by the industrial or commercial group via external insurance to a non-captive undertaking applying no simplifications foreseen in this advice. This example however only relates to reinsurance captive undertakings.

SCR.14.10. In the examples referred to above, the insured person would always be an entity of the captive owner's group and the beneficiary would also be some entity of that group since these examples all represent ‘financial loss’ insurance to the captive owner.

SCR.14.2. Simplifications for captives only

14.2.1. Market interest rate risk

SCR.14.11. Undertakings should apply a separate factor to the market value of interest rate sensitive assets, as well as a separate factor to the best estimate in each line of business in order to test the interest rate shock scenario. The factors to be applied to asset values are derived by using the term structure in force, and different maturities. To this end, assets are grouped into maturity intervals as follows:

Maturity of asset	Simplified duration
less than a year	0.5 year
between 1 and 3 years	2 years
between 3 and 5 years	4 years
between 5 and 10 years	7 years
above 10 years	12 years

SCR.14.12. The factors derived can be directly applied to market values of assets in case of upward / downward shocks. These shocks on assets have been calibrated, for each maturity above, using the solver to estimate the coupon rate such that the present value of future cash flow equals to the nominal and measuring the difference between the present value of future cash flow using the normal discount rate and the discount rates after shocks.

SCR.14.13. The effect of the interest rate shocks on the market value of interest rate sensitive assets MV_i, grouped in maturity intervals I, is calculated as follows:

$$Interest\ rate\ risk\ asset\ up = \sum_i MV_i \cdot dur_i \cdot rate_i \cdot shock_{i,up}$$

$$Interest\ rate\ risk\ asset\ down = \sum_i MV_i \cdot dur_i \cdot rate_i \cdot shock_{i,down}$$

where

dur_i = simplified duration of maturity interval i

$rate_i$ = risk-free rate for simplified duration of maturity interval i

$shock_{i,up}$ = relative upward shock of interest rate for simplified duration of maturity interval i

$shock_{i,down}$ = relative downward shock of interest rate for simplified duration of maturity interval i

SCR.14.14. The simplified calculation should be done separately for assets of different currency.

SCR.14.15. For the shocks on liabilities, captives should in a first step asses the duration of the liabilities per LoB. In a second step, the relevant term structure is used to calculate the change in the best estimate BE_{lob} as follows:

$$\text{Interest rate risk best estimate up} = -\sum_{lob} BE_{lob} \cdot dur_{lob} \cdot rate_{lob} \cdot shock_{lob,up}$$

$$\text{Interest rate risk best estimate down} = -\sum_{lob} BE_{lob} \cdot dur_{lob} \cdot rate_{lob} \cdot shock_{lob,down}$$

where

dur_{lob}	=	modified duration of the best estimate in line of business *lob*
$rate_{lob}$	=	risk-free rate for modified duration dur_{lob}
$shock_{lob,up}$	=	relative upward shock of interest rate for modified duration dur_{lob}
$shock_{lob,down}$	=	relative downward shock of interest rate for modified duration dur_{lob}

SCR.14.16. The simplified calculation should be done separately for assets of different currency.

14.2.2. Market spread risk

SCR.14.17. Undertakings may assume all assets to be submitted to the spread risk module are rated BBB.

SCR.14.18. For structured bonds, credit derivatives and bonds with a lower rating than BBB the standard calculation of the spread risk module needs to be applied.

14.2.3. Concentration risk

SCR.14.19. Intra-group asset pooling arrangements of captive undertakings may be exempted from the concentration risk module to the extent that there exist legally effective formal provisions where the captive's liabilities can be offset by intra-group exposures it may hold on entities of the group.

SCR.14.20. In order to take into account the nature of the business written by captives, the exemption threshold applicable in TS._concentration risk shall be a 15 per cent, where the following requirements are met:

- o the credit institution or cash-pooling entity of the group has a rating of AA;
- o the credit institutions do not belong to the same group;

SCR.14.21. A look-through approach to intra-group asset pooling arrangements may be applied for the calculation of the market risk module, if the account of the captive undertaking meets the requirements stated for segregated assets in TS.CEIOPS advice on financial mitigation techniques CEIOPS-DOC-26/09 .

14.2.4. Non-life underwriting risk module

SCR.14.22. For non-life premium and reserve risk, simplified formulas as follows can be used:

$$NL_{pr,lob} = 0.9 \cdot \sqrt{V_{(prem,lob)}^2 + 2 \cdot 0.5 \cdot V_{(prem,lob)} \cdot V_{(res,lob)} + V_{(res,lob)}^2}$$

$$NL_{pr} = \sqrt{\sum_{lob} NL_{pr,lob}^2 + 0.35 \cdot \sum_{\substack{(r,c)\\(r \neq c)}} NL_{pr,r} \cdot NL_{pr,c}}$$

where (r,c) denotes a pair of lines of business and

$NL_{pr,lob}$	=	Capital requirement for premium and reserve risk for Line of business lob
$V_{(prem,lob)}$	=	Volume measure for premium risk for line of business lob as defined in TS.non life underwriting
$V_{(res,lob)}$	=	Volume measure for reserve risk for line of business lob as defined in TS. Non life underwriitng

SCR.14.23. The risk mitigating effect of an aggregate limit can be taken into account by modifying the volume measure for premium risk of a line of business in the calculation above as follows:

$$V'_{(prem,lob)} = \min\left(\frac{Agg_{lob}}{0.9}; V_{(prem,lob)}\right),$$

where Agg_{lob} is the aggregate limit for line of business lob.

SCR.14.24. The formulas in TS.C.22 and TS.C.23 will be updated once the calibration exercice in the non life underwriting risk module has been finalised.

SCR.14.25. The aggregate limit shall represent the net retention per line of business, after reinsurance, taken into account the limits stated in acceptance as well as in reinsurance treaties, increased by a possible reinstatement premium. If for one line of business, several treaties are written but for one of them no limit can be defined, the aggregate limit shall not be taken into account. If an aggregate limit covers several lines of business (so called 'umbrella treaties', or 'multi-line treaties'), it should be assured that this overall limit is not taken into account for each line of business. Further work is necessary on the treatment of the aggregate limit at the level of a particular line of business in case of umbrella or multi-line treaties. The choice of the aggregate limit should ensure that the probability of a loss exceeding the aggregate limit has a zero probability.

SCR.14.3. Simplifications applicable on ceding undertakings to captive reinsurers

14.3.1. SCR counterparty risk / recoverables towards a captive

SCR.14.26. If an explicit, legally effective and enforceable guarantee by the captive owner for the liabilities of the captive exists, then the credit rating of the guarantor instead of the captive may be used

- in the calculation of the SCR counterparty default risk module for the ceding undertaking and
- in the calculation of the adjustment for expected losses due to counterparty default for the recoverables towards the captive.

14.3.2. Cut-through liability clauses

SCR.14.27. Captives' ceding undertakings may consider the probability of default of the retroceding undertakings of a captive if a legally effective and enforceable 'cut-through-liability' clause exists or a similar binding agreement, for the amounts involved in the transactions with the captive. These amounts can be adjusted accordingly in the counterparty default risk module calculation of the ceding undertaking.

SECTION 3 – INTERNAL MODEL

IM1. Introduction and background

1. To progress further the impact of the Solvency II Framework Directive Proposal in relation to the use of internal models for calculating the solvency capital requirement (SCR), participants are strongly encouraged to answer the questions listed in this section, as well as the questions in the group section. The answers to these questions will help to assess the progress of internal modelling through-out Europe and to prepare supervisory authorities and the industry to approval process of internal models. Some explanations are provided in the blue boxes in order to help in filling in the questionnaire.

2. The goals of the fifth Quantitative Impact Study (QIS5) for internal models are:

   (a) to collect reliable and comparable quantitative and qualitative data from partial and full internal models that is currently used by firms for assessing their capital needs. This data will assist CEIOPS in conducting a range of statistical analyses and then providing a possible update of the calibration of the standard formula and its likely impacts on the Solvency II regime;

   (b) to help undertakings in an assessment of how they are advanced in fulfilling the conditions and identify potential gaps between the current stage of their models and the requirements;

   (c) to collect general information from all insurance undertakings to assess the current and potential future levels of applications for full and partial internal models in Europe to enable supervisory authorities to prepare themselves and to provide an estimate of the costs related to the application for undertakings and supervisory authorities.

3. To achieve the first goal, firms will have to assess the quality and comparability of the data against high level principles. Therefore firms should concentrate on comparing the results and the modelling aspects of the standard formula with those derived from their internal models. Key areas to address in this context are the modelling requirements of the Level 2 implementing measures proposals by the European Commission, and the data that has been used when firms calibrate their models. It is important also to understand the differences in assumptions and definitions between those underlying existing models in firms and those anticipated under Solvency II[91].

4. To this end, and to the extent that this is practicable, the estimates derived from internal models should be compatible with the overall calibration objectives for the standard formula (i.e. a VaR 99.5% confidence level for the variation of basic own funds over a one year time horizon).

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[91] For instance the valuation of assets and liabilities under Solvency II differs from that currently used by undertakings.

5. The importance of qualitative issues is highlighted by the second goal. Comparing with the QIS4, CEIOPS is interested in the assessment how the internal models at the current stage comply with the standard requirements provided in the Level 2 proposals.

6. Finally, the QIS5 exercise should also serve as a tentative mapping exercise of the current development stage of internal models used by market participants, and to indicate to what extent insurance undertakings plan to use internal models for calculating their SCR or use partial internal models to calculate modules of the SCR or in respect of some or all modules for some but not all of their business units. To gain an accurate picture of current developments, internal models referred to in this section should be understood as comprising those that include any risk management analysis to quantify risks and to help to assess the economic capital needed to meet those risks.

Guidance how to fill in the questionnaire:

7. Under the Solvency II regime, groups may apply for an internal model which would be used to assess both the group SCR and the solo SCR for undertakings within the group. In this paper, this type of internal model will be referred to as a group internal model.

8. The qualitative questionnaire for internal models is organised in 4 different sections (see table below).

(1) Undertakings

a) which are not part of a group and which currently use or intend to use an internal model or,
b) which are part of a group, and intending to use an internal model for the solo SCR calculation which is not a group internal model,
should answer to the questions of the sections IM.B, IM.C, but not to the questions in the section IM.D and in the group section.

(2) Undertakings being part of a group and intending to use a group internal model for the solo SCR calculation are requested to answer to the questions in the sections IM.B, IM.C, IM.D but not in the group section. However, to allow an analysis of the specificities of the solo calculation compared to the general characteristics of the model, these undertakings shall provide two sets of answers to the questions raised in the section IM.C: one set would be the same for all the undertakings of the group and shall describe the general characteristics of the group internal model and the second set would, if relevant, describe the differences between these generalities and the characteristics of the group internal model when it is used for the solo SCR calculation.

(3) Groups willing to apply for an internal model for the group calculation should answer to questions raised in the sections IM.B, IM.C and in the group section.

	Undertakings which plan to build, currently building or using internal models in order to get an approval to calculate Solvency II SCR or only for internal risk management	Undertakings which currently building or using internal models in order to get an approval to calculate Solvency II SCR
Solo undertakings or undertakings which are part of a group but solo internal model is not based on a group internal model	IM B	IM B IM C
Solo undertakings which are part of a group and solo internal model is based on/part of a group internal model	IM B	IM B IM C (two sets of answers, see blue box above, point 2) IM D
Groups	IM B	IM B IM C GIM (Group section)

IM2. Questions for insurance undertakings (both solo entities and groups) which plan to build, are currently building or already use internal models in order to get an approval to calculate SII SCR or only for internal risk management.

9. Please identify which sections are applicable for you: IM.B/ IM.C/IM.C (two sets of answers)/ IM.D/Group section

10. If you are a solo company which is part of a group but the solo internal model is not based/part of the group internal model please provide a brief rationale for building a separate internal model.

11. If you are a solo company which is part of a group, do you intend to calculate the solo SCR from a group internal model, as set out in Article 231 of the Framework Directive (yes/no)? If yes, has the internal model been created?

12. Are you already using internal models for some individual aspects of your business?

13. If no, are you currently developing an internal model for comprehensive use in managing your business?

14. If you are planning to apply to get your internal model approved in order to calculate the SCR

(a) are you currently working on the implementation of your internal model for Solvency II purposes?

(b) if no, could you provide the potential date of the beginning of such work?

(c) could you provide the planned date of submitting the application?

(d) if you consider that your risk profile deviates from the assumptions underlying the standard formula, please provide the main reasons for this (e.g. deviations in terms of risk exposure, deviations in terms of volatility, non-linear dependency of risks, presence of cycles, incompatibilities of your risks with the SCR modular approach, other – please specify).

(e) could you please identify risk modules that might lead to inappropriate capital requirements if the standard formula is adopted?

15. If the internal model will be used only for internal risk management, under what circumstances would you reconsider this decision (i.e. to use an internal model rather than the standard formula)?

Definitions of costs:

16. **Incremental costs: are those costs incurred in complying with regulation that would <u>not</u> be incurred or would not have been <u>incurred in absence of the new Directive.</u>**

17. In order to define incremental costs, insurers should therefore, consider whether they may still incur those costs anyway because of their stakeholders' (in particular policyholders, shareholders, rating agencies, etc.) expectations. In these cases there will be some overlap between regulatory and commercial requirements[92]. For example:

    1) If certain requirements of quality standards for risk management and the internal model were dropped, firms may still want to maintain a similar level of quality to meet credit rating or counterpart expectations.
    2) Firms may want to ensure that they establish and maintain systems and controls and internal reporting lines that are appropriate to the business.
    3) Insurers already use an internal model for assessing, for instance, capital needs.

18. Hence, the incremental costs related to Solvency II have to be distinguished from the total costs related to internal models and in often are only a small fraction thereof.

19. **One-off costs**: Costs that are incurred in the transition to the new regulatory regime plus the costs as a result of necessary amendments over time. These are the costs

[92] This is for instance one of the ideas of the use test requirement. If companies would not use the internal model for their own purposes in absence of Solvency II, this would be a strong indication that they are deviating from the purpose of this requirement and the model itself mainly fulfils regulatory purposes.

incurred in complying with regulation which firms would not have incurred had a particular rule not been mandatory.

20. **On-going costs**: Annual running costs. These are the costs incurred in complying with Solvency II regulation, which firms would avoid in subsequent years if a particular rule was no longer mandatory.

21. Costs estimation:

   a. Please provide in the table the total costs (in EUR) and what percentage of these costs is incremental to Solvency II requirements[93].

(f) What are your overall incremental costs for your internal model, separated by one-off costs and on-going costs (please, fill in the table)?

(g) For partial internal models applicants:

– How much, if at all, do you think your one-off costs would rise if applying for full internal model?

– How would your on-going costs change by substituting the remaining standard formula items for an internal model?

Type of cost	**Total costs in EUR**	**Incremental costs (if relevant)**		
		Percentage of total cost	**One-off incremental costs in EUR**	**On-going annual incremental costs in EUR** (*if applicable)*
Design and calibration of calculation kernel				
Data collection, management and quality assurance				
Governance				
Validation				
Operational (e.g. IT, license or fees, staff including training, etc.)				
Other: please state				

[93] Please refer to the definitions in the blue box for the distinction the types of costs.

IM3. Questions for insurance or reinsurance undertakings which are currently building or already using an internal model for assessing economic capital and for which they plan to apply for approval to use to calculate the SCR under Solvency II (both solo entities and groups)

TS.IM.C.1 Scope of the internal model

Scope of the internal model:

22. Undertakings may model:

- One or more or all risk modules for the whole business;
- One or more risk or all modules for one or more or all major business units;
- One or more risk sub-modules for the whole business, in the same or different risk modules;
- One or more risk sub-modules, in the same or different risk modules, for one or more major business units;
- The adjustment for the loss-absorbing capacity of technical provisions and deferred taxes for the whole business or for one or more major business units;
- The capital requirement for operational risk for the whole business or for one or more major business units.

23. Undertakings may use different risk categorizations than those in the standard formula. For example, they may decide to model risks not covered by the standard formula. Internal models do not need to follow a modular structure.

24. What is the current scope of the internal model? In particular which risks / major business units / entities are included in your internal model?

25. What is the intended scope of the internal model for which you would plan to apply? Are there any risks / major business units / entities you intend adding to the scope of the internal model – please describe?

26. Please compare the structure of your internal model with that of the standard formula. For instance, which risk modules of the standard formula are a) combined, b) divided in your partial internal model.

For undertakings using or intending to use partial internal models (PIM):

27. Please justify the scope of your partial internal model highlighting which criteria you used to define major business units (if relevant) and to choose the scope of the partial internal model (e.g partial internal model as transitory step to full internal model / risk not covered by the standard formula - which ones?/ certain risks covered adequately by standard formula (e.g. a non-life company could have a premium and reserve PIM but rely on the standard formula for market risks) – which ones?/ business units not covered adequately by standard formula – which ones?/ acceptable trade off taking into account costs and benefits - for which risks?/ not enough data for some of the

risks – which ones?/ an absence of a model which better reflects the risk profile - for which risks?/ other, please specify)

28. If you plan to seek partial internal model approval, for which risk modules, sub-modules, major business units in the SCR (see articles 104-105 of the Directive) do you plan to substitute internal model for the standard model?

TS.IM.C.2 Pre-application process

Pre-application:

29. The pre-application process is a voluntary process for undertakings where an undertaking is able to get a view from the supervisory authority on how prepared they are to submit an application to use their internal model to calculate the SCR. More details are given in CEIOPS Level 3 guidance on pre-application.

30. Are you already taking part in the voluntary pre-application process?

31. If no, are you planning to take part in the pre-application process? If yes, please provide the intended date.

TS.IM.C.3 External models and data

32. Did you work with consultants to develop your internal model? If yes, for which specific part of the implementation?

33. Do you use external models / data in your internal model? If yes, which ones and for which risks / major business units / entities?

34. In which areas were amendments, which adjust the external model / data to your risk profile, necessary? Did you identify the external model / data limitations and risks arising from the use of external models / data? Are they material and/or quantifiable? Please describe them briefly.

TS.IM.C.4 Internal model changes

35. Have you already in place a process to develop the policy for internal model changes? If yes, how did you distinguish major and minor changes? If no, do you have any ideas about criteria which can be applied to distinguish between them?

36. Due to your yearly planning processes, do you expect regular major changes to your internal model? If yes, in which areas or with respect to which circumstances.

TS.IM.C.5 Use test (art. 120)

37. How do you plan to demonstrate that the use of your internal model is sufficiently material to result in pressure to improve the quality of the internal model?

38. To what extent is your internal model widely used and plays an important role in the system of governance, risk management and decision making (to small degree / to medium degree / to large degree)? Please provide some examples. How would you demonstrate that persons who effectively run the undertaking take into account outcomes of the internal model in building and developing the business strategy?

39. To what extent does your risk management strategy consider the results produced by your internal model (to a small degree / to a medium degree / to a large degree)? If to a small or medium degree please identify gaps and if to a large degree please provide examples or a justification for such an assessment.

40. Are the outputs of the internal model included in regular reporting for the

(a) administrative, management or supervisory body (monthly / quarterly / half-yearly / annually/ not yet), and

(b) other persons who effectively run the undertaking (monthly / quarterly / half-yearly / annually/ not yet)?

41. How do you ensure that your administrative, management or supervisory body and the persons who effectively run the undertaking understand the internal model and its limitations? How do you plan to improve this understanding? Does the documentation include evidence that all levels of management understand the relevant aspects of the internal model?

42. Please indicate where you use your internal model, for example in internal project plans; accounting; financial reporting; budgeting; risk management; capital planning; capital allocation; investment policy; economic capital calculations; regulatory capital calculations; MCEV calculations; remuneration; strategic business decisions; product development; pricing; performance analysis; ALM; reinsurance; bonus setting; assessing other customer benefits; target setting; mergers and acquisitions; own risk and solvency assessment; assessment of risk mitigation; portfolio transfer pricing; investment policy; dividend payments; stress tests; market consistent technical provisions; CoC risk margin; assessment of uncertainty in technical provisions; asset allocation; dynamic hedging; other areas – please specify.

43. Please report on possible instances that (will) require to re-run your internal model. (e.g. a model re-run due to a material data update). How long would a re-run take in each case? In estimating the time period, please take into account all processes involved in the redetermination of the probability distribution forecast (e.g. parameter estimation etc.) in order to calculate economic capital.

TS.IM.C.6 Statistical quality (art. 121)

44. What is the nature of the probability distribution forecast(s) as result(s) of your internal model (in terms of the number future events covered, underlying quantity of monetary amount etc.)? Where and for what reason does the internal model produce only key points of the distribution forecast? In that case, how do you ensure the appropriateness of the distribution forecast and compensate for the lack of full information?

45. Do you consider the methods used to calculate the probability distribution forecast to be already consistent with the methods used to calculate Solvency II technical provisions (article 121, point 2) and more general, with the valuation of assets and liabilities? If not, what are the issues you are facing and how do you plan to deal with them.

Ability to rank the risks:

46. On the basis of the criteria given (coverage, resolution, congruence consistency) the undertaking shall provide evidence that the ability of the internal model to rank risk is sufficient to ensure that it is widely used in and plays an important role in the system of governance, in particular the risk management system, decision-making processes and capital allocation as described in the Use test.

47. The following interpretation is given for the four criteria:

• Coverage: The risk-ranking ability shall exist for all material risks covered by the internal model.
• Resolution: The differentiation between the various risks and risk drivers has to be sufficiently precise to allow senior management to take appropriate decisions.
• Congruence: The structure of different kinds of risk-ranking reflects the structure of risks or risk categories and the risk management system.
• Consistency: Risks of a similar nature are ranked consistently throughout the undertaking and over time. The overall risk ranking shall be reconciled with the capital allocation.

48. Do you consider that your internal model has the ability to rank risk sufficiently for risk management purposes (article 121, point 4) (yes / mostly / not yet)? If not yet, briefly describe the shortcomings existing at present. In doing so, please refer to the criteria given for risk ranking (coverage, resolution, congruence, consistency).

Accuracy, completeness and appropriateness of the data:

49. Undertakings shall interpret the terms “accuracy”, “completeness” and “appropriateness” as having the following meaning:

• “Accurate” refers to the degree of confidence that can be placed in the data. Data must be sufficiently accurate to avoid material distortion of the model output.
• “Complete” means that databases provide comprehensive information for the undertaking.
• “Appropriate” means that data does not contain biases which make it unfit for purpose.

50. Do you consider that the data used in your internal model is sufficiently accurate, complete and appropriate (article 121, point 3) (totally / substantially / partially / substantially not)? Please specify this to the extent possible by risk category or activity. Which steps have you taken / will you take to establish the required data quality?

51. How do you assure the quality of the data used in your internal model? Please describe the regular data quality checks that you have or intend to put in place? You may address each risk category separately and/or refer to e.g. risk driver data vs. risk exposure data.

52. What are your main sources (name or description of time series) of input data for key risk modules / drivers? For each source and input data set, please specify if it is publicly available, entity-specific or external but not publicly available?

Expert judgement:

53. Expert judgement refers to the use by insurance or reinsurance undertakings of appropriate and relevant assumptions to substitute or complement existing data, taking into account their business expertise.

54. Expert judgment is applied in all internal modeling activities. The use of expert judgment is essential when estimating extreme scenarios, for example at/or beyond the 99.5% percentile. Here, observations are typically scarce (e.g. modeling of natural catastrophes). However, even when a large number of observations is available, expert judgment may also be required, for example, if the observations of past events are not suitable for predicting the future occurrence of events. Any analysis based purely on historical observations and without expert judgment may lead to parameter estimates which are not adequate.

55. Please indicate in which areas and to which aims you complement or substitute data with expert judgment. Is the use of expert judgment adequately justified (to small degree / medium degree / large degree).If to a small or medium degree please identify gaps and if to a large degree please provide examples or a justification for such an assessment.

56. Please describe the general architecture of your internal model and how dependencies are taken into account (what type of dependency measure). How does the dependency structure look like? Please describe the aggregation mechanism, and especially the modelling of diversification effects between risks categories for which only some key points of the probability distribution forecast are known.

57. Which risk mitigation techniques do you take into account in your internal model (traditional reinsurance / ART / securitisation / loss absorbing technical provisions / loss absorbing other liabilities / tax issues / asset and liability hedging strategies / other ones – please specify)?

Future management action:

58. Future management actions may be linked to any decision which the undertaking has the right to make. This may involve only the undertaking itself, or relate to any third party. Irrespective of whether the right to make the decision stems from a contractual, statutory or commercial option or from any other source, any and all decisions shall be covered. A future management action is the currently anticipated exercise or implementation behaviour of any such right of decision. For example, future management actions may comprise changes in asset allocation or changes in the application of a market value adjustment.

59. What kinds of future management actions are taken into account in your internal model (changes in future bonus rates / reductions in surrender values / changes in asset dispositions / changes in expense charges / changes in risk premium charges / changes in or use of dynamic option and guarantee charge mechanisms / restrictions in the ability to surrender / dynamic hedging/ other ones – please specify)?

60. Please explain the process that you have or will have in place if a significant deviation from the planned management actions occurs (as a consequence of events beyond the undertaking's control).

Replicating portfolio and other techniques:

61. Internal models can be complex and demanding with respect to calculation times. In light of this, some undertakings indicated that they intend to rely on proxy techniques that approximate results that would be obtained by means of more accurate techniques. These proxy methods can then produce figures more quickly and thereby enable these undertakings to provide more frequent reporting.

62. The remaining questions in this part specifically relate to situations where an undertaking has a more accurate technique at its disposal but has chosen to use approximations at least in some instances, for example in order to reduce calculation times.

63. One example is the replicating portfolio technique which is used by several undertakings, especially in life insurance: The main idea is to represent the cash-flows arising from existing contracts by cash-flows arising from a portfolio of financial instruments. The replicating portfolio is the one that "best" reflects the liability cash-flows. There are several possible definitions of what "best" might mean in this context. For undertakings this technique can be useful to circumvent nested simulations or to assess quickly the impact of adverse market scenarios, as the replicating instruments are chosen so that valuation can be done using closed-form formulae. For the calculation of technical provisions, however, undertakings rely on their more accurate valuation techniques.

64. Do you use approximation techniques as described above?

If yes, please answer to the following questions:

(a) For which risks and which instances do you use such approximation techniques?

(b) Do you nevertheless use the more complex and accurate technique for some instances? If yes, please elaborate on those instances.

(c) Do you calibrate the proxy model by means of the more accurate technique? How often is a recalibration done?

(d) To what extent is the calculation time reduced by using the approximation technique?

(e) Do you quantify the quality of the proxy model with respect to the more complex technique? If yes, do you have a tolerance threshold put in place?

65. If you use within your internal model in particular the replicating portfolio technique, please answer to the following questions:

1. In which part of your business do you use replicating portfolios (All / Life / Non-Life / other – please elaborate)

(f) Please provide the different uses of replicating portfolios.

(g) How often do you determine the replicating portfolio? Does the use of the replicating portfolio involve its redetermination?

(h) How do you asses the quality of the replicating portfolio? How do you validate the replicating portfolio?

(i) What are the most intricate parts in the determination of the replicating portfolio? What are the limitations associated with this technique?

TS.IM.C.7 Calibration (art. 122)

66. In deriving economic capital from the probability distribution forecast generated by your internal model, do you use as attachment point:

(1) zero / “breakeven”, thereby using the expected profit as a first cushion of risk absorption,

(2) its expected value, or

(3) other? Please specify .

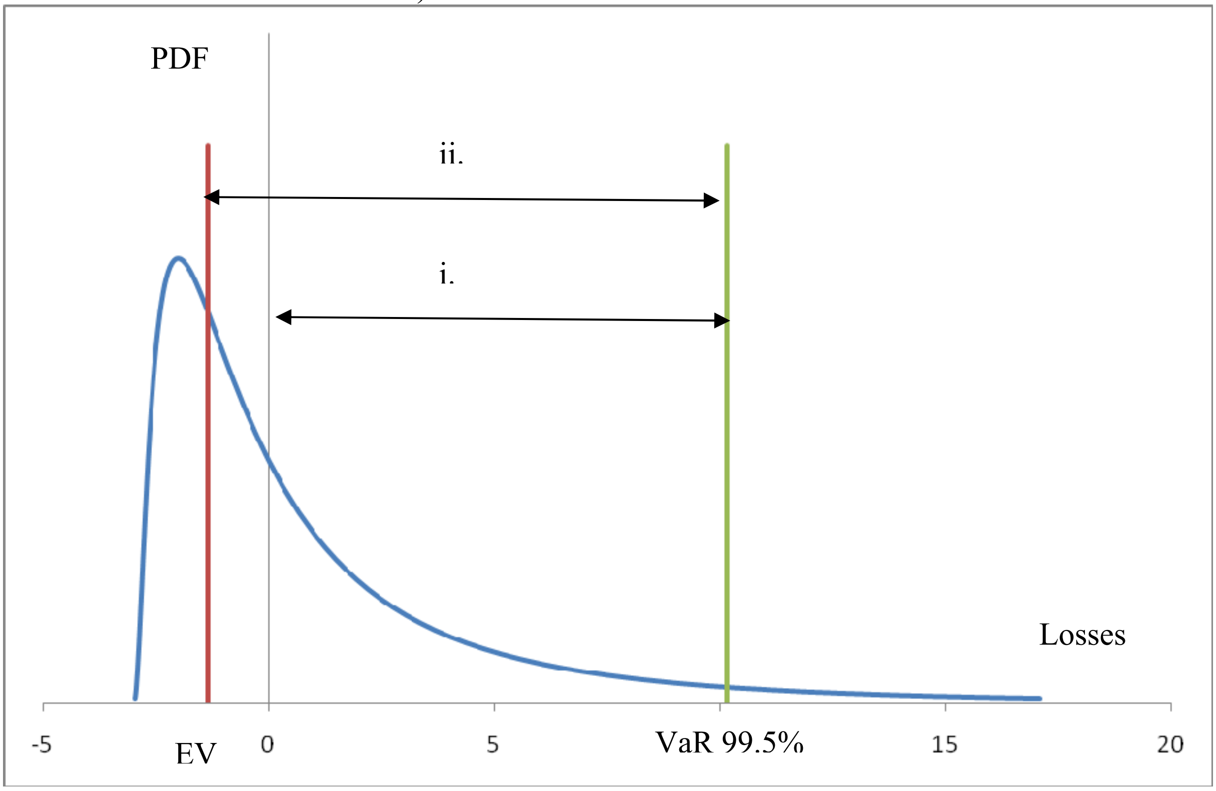
67. If for example you use the Value-at-Risk at 99.5% of the decrease of basic own funds, the question reads in mathematical terms as follows: Is the economic capital (EC) defined as

i. EC := VaR_99.5%

or

ii. EC := VaR_99.5% - EV

EV denotes the expected value. For a graphical representation please cf. the figure below (please note that here a decrease in basic own funds corresponds to positive values of the distribution).



68. Which risk measure do you use for your economic capital? Please describe the confidence level, the type of measure and the time horizon and the underlying variable. If it is different from the standard formula risk measure, please explain the reason and how would you perform the recalibration (e.g. directly from the probability distribution forecast / scaling using normal distribution assumption / scaling using some other distribution assumption / other parametric transformation function / in other ways - please specify)? Please briefly describe the methods you used.

69. Do you use different risk measures, confidence levels or time horizons for different modules or risk drivers? Please indicate for which one and shortly justify the choice.

70. If yes, briefly describe how results coming from different calibrations are aggregated.

TS.IM.C.6 Profit and loss attribution (art. 123)

71. Do you have a process in place that demonstrates how the categorisation of risk chosen in the internal model explains the causes and sources of profits and losses?

72. If yes or partly, could you describe briefly your process?

73. Do you use the profit and loss attribution results in your planning process? Are there any other links to the uses of the internal model? Please describe.

TS.IM.C.8 Validation (art. 124)

Validation policy:

74. The validation policy sets out the way in which undertakings will validate their internal model and why that system is appropriate.

75. The validation should not only apply to the calculation kernel, but should encompass the qualitative and quantitative processes of the internal model, and that the areas of the internal model that need to be validated shall include at least data, methods, assumptions, expert judgement, documentation, systems IT, model governance and the use test

76. Do you have a validation policy in place for your internal model?

77. To what extend are/will be validated data / methods /assumptions / expert judgement / documentation / systems IT / model governance / use test / other - please specify (to small degree / to medium degree / to large degree)? If to a small or medium degree please identify gaps and if to a large degree please provide examples or a justification for such an assessment.

78. What is/will be the approach that you follow for the validation of the use of expert judgement in relation to data?

79. Do you have a defined process and triggers which incorporates validation results into the internal model review? If yes briefly describe them.

Independence of validation:

80. The independence within the validation process is essential to effective validation, as it creates objective challenge to the internal model. Specifically the validation policy shall set out how independent review, external or internal, is being used within the validation process. The undertaking shall set out how the review is independent, taking into account at least the responsibilities and the reporting structures for internal review and remuneration structures for external review.

81. Do you use any external review to assist you with the validation, and how are you satisfied that their review is independent?

82. Have you set up an internal model validation department/unit?

83. If yes or partly,

1. Is the department/unit that is responsible for the validation task also responsible for a) design, b) implementation, c) documentation and d) the use of the internal model?

(a) Are the people responsible for the validation task a) independent from the persons who take operational decisions and b) independent from the area/departments where risk activities are exercised?

(b) Is the validation task done independently from the a) design, b) implementation, c) testing, d) documentation and e) use of the internal model?

84. If no, and you intend to use internal review within the validation process, how will you satisfy yourself that this internal review is independent?

85. Which validation tools do you use? Please describe them briefly and indicate how frequently they are used.

86. Does your internal model incorporate stress tests as part of the validation process? If yes, how are they designed and calibrated?

87. Do you conduct any reverse stress tests? If yes, how are they designed and calibrated?

88. Please briefly describe known internal model shortcomings / weaknesses including any circumstances where the internal model does not work effectively.

TS.IM.C.9 Documentation (art. 125)

Documentation:

89. Documentation must be sufficiently detailed and comprehensive enough to allow knowledgeable third parties to understand the internal model. Furthermore, the outputs of the internal model should be completely reproducible on the basis of the documentation and the input of the internal model. This creates a high standard requirement for internal model documentation; the questions below should be answered bearing in mind these requirements.

90. Which of the following documents exist for your internal model, and to what extent do you consider the documentation fulfils the requirements outlined above? If you have any comments to the listed documents, please provide them in the column: Comments.

	Documentation complete / substantially fulfils the requirements	Documentation partly complete or partially fulfils the requirements	Documentation does not exist	Comments
1. Model description and				

	Documentation complete / substantially fulfils the requirements	Documentation partly complete or partially fulfils the requirements	Documentation does not exist	Comments
overview				
General Model Governance:				
2. Policies, controls and procedures for the management of the internal model				
3. Model change policy				
4. Model documentation governance policy				
5. Roles and responsibilities of personnel involved in the development and management of the internal model				
6. Evidence of Use Test				
7. Training Manual for Management and Staff Training in use and understanding of Internal Model				
8. Evidence of Training for Management and Staff Training in use and understanding of Internal Model				
Model changes				
9. Record of Major and Minor changes to the model				
Technological Specifications:				
10. Description of the Information Technology platform(s) used in the internal model				
11. Description of Contingency plans relating to the technology				

	Documentation complete / substantially fulfils the requirements	Documentation partly complete or partially fulfils the requirements	Documentation does not exist	Comments
platform(s) used				
12. User guide				
13. Source code				
<u>Data</u>				
14. Data policy				
15. Documentation evidencing or justifying the accuracy, completeness and appropriateness of the data				
16. Data management and Storage policy				
17. Data directory				
<u>Statistical Quality Standards</u>				
18. Detailed description of Internal Model Methodology				
19. Description of underlying assumptions				
<u>Expert Judgement</u>				
20. Description of where Expert Judgement is applied in the model				
21. Justification of use of Expert Judgement where used in the model				
22. Validation of Expert Judgement as applied in the model				
<u>Calibration</u>				
23. If your model output uses a risk measure other than 1-year VaR at 99.5%, do you have documentation				

	Documentation complete / substantially fulfils the requirements	Documentation partly complete or partially fulfils the requirements	Documentation does not exist	Comments
evidencing or verifying that the chosen risk measure is at least as strong as 1 year VaR at 99.5%?				
Profit and Loss Attribution				
24. Profit and Loss Attribution Policy				
25. Results of Profit and Loss Attribution				
Validation				
26. Validation policy				
27. Description and report/results of Validation Tests				
Scope				
28. Partial Internal Model Scope				
29. Qualitative and quantitative indicators for the coverage of risk				
Other				
30. Description of risk mitigation techniques accounted for in the internal model				
31. Description of Future Management Actions accounted for in the internal model				
32. Description of known internal model shortcomings / weaknesses, including circumstances under which the internal model				

	Documentation complete / substantially fulfils the requirements	Documentation partly complete or partially fulfils the requirements	Documentation does not exist	Comments
does not work effectively				

91. Please list and describe any other documentation you consider part of the internal model documentation not listed above which are necessary to allow supervisory authority an effective assessment of the internal model?

TS.IM.C.10 Partial internal models

92. Please provide the reason(s) for using a partial internal model. Please describe briefly some details for the choice.

93. Please provide a detail description of how, you would integrate the partial internal model with the standard formula, if you were allowed to choose the aggregation method? If the partial internal model includes risks not covered in the standard formula please specify how they are integrated.

94. Are you planning to develop a partial internal model further towards a full internal model? What would be the time horizon?

IM4. Questions for solo insurance undertakings using a group internal model

TS.IM.D.1 Adjustments from the group internal model

95. How are intra-group transactions treated in the solo internal model from a quantitative point of view (e.g. same methodology than external counterparties, specific methodology, same parameterization than external counterparties, different parameterization than external counterparties, other, please specify)? Please differentiate the different types of transactions (e.g. reinsurance, participations, loans etc.).

96. Are there risks for which you apply a different methodology than that used in the group internal model? Please specify them.

97. Are there any assumptions of the group internal model which do not fit to your risk profile and where an adjustment was/will be necessary? If yes, please provide examples.

98. Are there risks for which you would opt for the standard formula at solo level, whereas the risks are included in the group internal model? Why would you do so?

99. Please explain for which risks you use your own calibration and for which you use the same parameters as the group internal model. Which risk factors are not covered by the group internal model?

100. Please describe to what extent you participate in the group internal model creation process (more than one answer is possible to choose): feeds with the data, discuss the methodology of the group internal model, discuss the local specificities, calculates its SCR or calculation is done at the group level, validates the solo results, other? Please specify.

101. Do you see instances for which you cannot rely on the group internal model to fulfill the use test requirements at solo level? If yes, how do you intend to address this issue?

102. Please indicate any other features of the group internal model for which you would deviate from the group internal model to perform your solo SCR calculation.

IM5. Quantitative data requests for insurance undertakings using an internal model for assessing capital needs (both solo entities and groups)

103. Groups are required to provide the results obtained by their internal model implemented for the whole group, including non-EEA activities. Participants should also provide the amounts of diversification effects obtained for each level of aggregation of risks. Groups are also requested to describe how diversification is treated in their Internal Model with particular reference to EEA/non-EEA and worldwide segmentation and to state how lines of business with emphasis especially but not exclusively on how with-profits are dealt with.

104. Participants should explain the reasons for differences between their internal model estimates and the results of the standard formula modelling treatments.

105. It should be noted that a disaggregation of the output from internal models to the level of granularity of the standard formula may not be feasible for all internal models and internal lines of business may not be fully compatible with those used in the QIS. However, internal estimates for capital corresponding to main risk classes and the overall SCR is especially welcomed (both solo-entity and group results). Similarly, more granular results (risk sub-classes) and capital requirements for lines of business or modules of the internal model that are different from the standard formula modules are also welcomed.

106. The estimates derived from full or partial internal models should be compatible with the calibration objectives for the standard formula, i.e. a VaR 99.5 % standard over a one year time horizon (art. 101). This means that for comparability reasons and,

for QIS5 purposes only, a recalibration should be performed if other objectives are used.

107. Some specific data requests on internal models will be also included in the spreadsheet (e.g. correlations and diversification effects at different levels, risk mitigation effects, scenario parameters, volatility parameters). Moreover, description of the original calibration (i.e. before any recalibration) for the main risk categories should be disclosed (e.g. risk measure, confidence level, time horizon).

SECTION 4 – Minimum Capital Requirement

MCR.1. Introduction

MCR.1 This section provides instructions for calculating the Minimum Capital Requirement of the undertaking. Following Article 129 of the Level 1 text, the calculation combines a linear formula with a floor of 25% and a cap of 45% of the SCR (whether calculated using the standard formula or an internal model). The MCR also includes an absolute floor expressed in euros.

MCR.2 For composite undertakings, the notional non-life and life MCR referred to in Article 74(2) of the Level 1 text are also calculated.

MCR.2. Overall MCR calculation

Input

MCR.3 The following input information is required:

MCR_A	=	the linear formula component for non-life business – activities on a non-life technical basis
MCR_B	=	the linear formula component for non-life business – activities technically similar to life
MCR_C	=	the linear formula component for life business – activities on a life technical basis
MCR_D	=	the linear formula component for life business – supplementary non-life activities
SCR	=	the SCR of the undertaking
$AMCR$	=	the absolute floor of the MCR, as defined in Article 129(1)d of the Level 1 text, and clarified further below.

MCR.4 Where an undertaking provided information both on its SCR calculated using the standard formula and its SCR calcualted using a full or partial internal model, the MCR should be calculated twice, first using the SCR standard formula and second using the internal model SCR.

MCR.5 It is noted that following the Level 1 text any capital add-on imposed under Article 37 is included in the definition of the MCR corridor. For the purpose of QIS5, the capital add-on is considered to be zero for all undertakings.

MCR.6 Following Article 129(1)d of the Level 1 text, the value of the absolute floor *AMCR* is

(i) EUR 2 200 000 for non-life insurance undertakings, including captive insurance undertakings, save in the case where all or some of the risks included in one of the classes 10 to 15 listed in Part A of Annex 1[94] are covered, in which case it shall be no less than EUR 3 200 000,

(ii) EUR 3 200 000 for life insurance undertakings, including captive insurance undertakings,

(iii) EUR 3 200 000 for reinsurance undertakings, except in the case of captive reinsurance undertakings, in which case the Minimum Capital Requirement shall be no less than EUR 1 000 000,

(iv) the sum of the amounts set out in points (i) and (ii) for insurance undertakings as referred to in Article 73(5) (also known as “old composite” undertakings).

MCR.7 The absolute floor for “new composite” undertakings i.e. the undertakings referred to in Article 73(2) should be regarded as equal to the life absolute floor, defined in point (ii) above.

<u>Output</u>

MCR.8 The calculation delivers the following output:

MCR	the Minimum Capital Requirement of the undertaking

MCR.9 The following intermediate outputs are also calculated:

MCR_{linear}	=	the linear formula referred to in Article 129(2) of the Level 1 text, whose calculation is further detailed below.
$MCR_{combined}$	=	the combined MCR of the undertaking, i.e. the linear formula result subject to a floor of 25% and a cap of 45% of the SCR (without taking into account the absolute floor)

<u>Calculation</u>

MCR.10 The MCR linear formula is calculated as the sum of four components, whose calculation is detailed further below:

$$MCR_{linear} = MCR_A + MCR_B + MCR_C + MCR_D$$

[94] Motor vehicle liability; Aircraft liability; Liability for ships (sea, lake and river and canal vessels); General liability; Credit; Suretyship

MCR.11 The combined MCR of the undertaking is calculated as follows:

$$MCR_{combined} = \{\min[\max(MCR_{linear}; 0.25 \cdot (SCR)); 0.45 \cdot (SCR)\ ]\}$$

MCR.12 The MCR of the undertaking should be calculated as follows:

$$MCR = \max\{MCR_{combined}; AMCR\}$$

MCR.3. Linaer formula – General considerations

MCR.13 The volume measures referred to in the linear formula, in particular technical provisions, written premiums and capital-at-risk, should be allocated between the four components MCR_A, MCR_B, MCR_C and MCR_D without double counting.

MCR.14 For the purpose of the calculation of the linear formula, the technical provision net of reinsurance is the difference between the gross technical provision and the reinsurance recoverables, where the recoverables should not include recoverables from finite reinsurance.

MCR.15 For the purpose of the calculation of the linear formula, the premiums net of reinsurance are the premiums written less the reinsurance premiums which correspond to these premiums. The reinsurance premiums should not include payments of reinsurance premiums for finite reinsurance.

MCR.16 For consistency with the volume measures used in the SCR standard formula, the technical provision volume measures in the linear formula are understood without the risk margin (i.e. the best estimate technical provision should be used)

MCR.4. Linear formula component for non-life activities practised on a non-life technical basis

<u>Input</u>

MCR.17 The following input information is required:

TP_j	=	technical provisions (not including the risk margin) for each line of business, net of reinsurance, subject to a minimum of zero
P_j	=	written premiums in each line of business over the last 12-month period, net of reinsurance, subject to a minimum of zero

<u>Output</u>

MCR.18 The calculation delivers the following output:

MCR_A	=	the linear formula component for non-life business – activities on a non-life technical basis

<u>Calculation</u>

MCR.19 The linear formula component MCR_A for non-life business – activities on a non-life technical basis is calculated by the following function:

$$MCR_A = \sum_j \max\left(\alpha_j \cdot TP_j ; \beta_j \cdot P_j\right)$$

MCR.20 The segmentation of lines of business for the above formula and the calibration of the factors α_j and β_j is the following:

j	*Line of business*	α_j	β_j
A.1	Motor vehicle liability	12%	14%
A.2	Motor, other classes	15%	10%
A.3	Marine, aviation, transport	21%	27%
A.4	Fire and other property damage	15%	18%
A.5	Third-party liability	19%	21%
A.6	Credit and suretyship	30%	33%
A.7	Legal expenses	11%	10%
A.8	Assistance	15%	6%
A.9	Miscellaneous	24%	19%
A.10	NP reinsurance – property	30%	24%
A.11	NP reinsurance – casualty	30%	22%
A.12	NP reinsurance – MAT	30%	20%
A.13	Accident	21%	15%
A.14	Sickness	15%	12%
A.15	Workers compensation	15%	7%

MCR.21 The segments A.1 to A.9 and A.13 to A.15 include both insurance and proportional reinsurance accepted. Other reinsurance accepted than proportional reinsurance should be allocated to the segments A.10 to A.12.

MCR.5. Linear formula component for non-life activities technically similar to life

MCR.22 The calculation of the linear formula component MCR_B follows the same approach as the calculation of linear formula component MCR_C with the same segmentation, the same factors and the same volume measures in respect of non-life activities practised on a technical basis similar to life insurance.

MCR.6. Linear formula component for life activities on a life technical basis

Input

MCR.23 The following input information is required:

TP_j	=	technical provisions (not including the risk margin) for each segment included in this component, net of reinsurance, subject to a minimum of zero
CAR	=	capital-at-risk, i.e. the sum of financial strains for each policy on immediate death or disability where it is positive. The financial strain on immediate death or disability is the amount currently payable on death or disability of the insured and the present value of annuities payable on death or disability of the insured less the net technical provisions (not including the risk margin) and less the increase in reinsurance recoverables which is directly caused by death or disability of the insured. As a starting point, the calculation should be based on a policy-by-policy approach, but reasonable actuarial methods and approximations may be used in accordance with the calculation of the best estimate.

Output

MCR.24 The calculation delivers the following output:

MCR_C	=	the linear formula component for life business – activities on a life technical basis

Calculation

MCR.25 The linear formula component MCR_C for life business – activities on a life technical basis is calculated by the following function:

$$MCR_C = \max\{\alpha_{C.1.1} \cdot TP_{C.1.1} + \alpha_{C.1.2} \cdot TP_{C.1.2};\ WP\_floor \cdot TP_{C.1.1}\} + \\ + \sum_{j \in \{C.2.1, C.2.2, C.3\}} \alpha_j \cdot TP_j + \alpha_{C.4} \cdot CAR.$$

MCR.26 The floor for with-profit business *WP_floor* is equal to 1.9%. The technical provision segments taken into account in this component and the calibration of the factors α_j are as follows:

Index (j)	*Segment*	α_j
Contracts with profit participation clauses:		
C.1.1	technical provisions for guaranteed benefits	6.1%
C.1.2	technical provisions for future discretionary benefits	-11%
Contracts where the policyholder bears the investment risk, such as unit-linked business:		
C.2.1	technical provisions for contracts without guarantees	0.6%

C.2.2	technical provisions for contracts with guarantees	2.2%
Contracts without profit participation clauses:		
C.3	technical provisions for contracts without profit participation clauses	3.5%

MCR.27 Technical provisions for reinsurance accepted should be apportioned according to the segmentation of direct classes, using the same factors as for direct business. The technical provisions of reinsurance accepted of with-profit business should be completely assigned to segment C.1.1.

MCR.28 Capital-at-risk is treated as a single volume measure in the linear formula with no granularity, with the following risk factor:

Index	*Segment*	$\alpha_{C.4}$
C.4	capital-at-risk for all contracts	0.1%

MCR.7. Linear formula component for life activities – supplementary obligations practised on a non-life technical basis

MCR.29 The calculation of the linear formula component MCR_D follows the same approach as the calculation of linear formula component MCR_A with the same segmentation, the same factors and the same volume measures in respect of supplementary non-life and health obligations.

MCR.8. Notional non-life and life MCR (for composite insurance undertakings)

Input

MCR.30 The following input information is required:

MCR_A	=	the linear formula component for non-life business – activities on a non-life technical basis
MCR_B	=	the linear formula component for non-life business – activities technically similar to life
MCR_C	=	the linear formula component for life business – activities on a life technical basis
MCR_D	=	the linear formula component for life business – supplementary non-life activities
SCR	=	the SCR of the undertaking
$AMCR_{NL}$	=	for “old composite undertakings”, i.e. the insurance undertakings referred to in Article 73(5): the non-life absolute floor, i.e. the amount set out in point (i) of Article 129(1)d of the Level 1 text for “new composite undertakings”, i.e. the insurance undertakings referred to in Article 73(2): zero

$AMCR_{Life}$ = the life absolute floor, i.e. the amount set out in point (ii) of Article 129(1)d of the Level 1 text

MCR.31 Where a composite undertaking provided information both on its SCR calculated using the standard formula and its SCR calcualted using a full or partial internal model, the calculation should be carried out twice, first using the SCR standard formula and second using the internal model SCR.

Output

MCR.32 The calculation delivers the following outputs:

$NMCR_{NL}$ = the notional non-life MCR of the undertaking

$NMCR_{Life}$ = the notional life MCR of the undertaking

MCR.33 The following intermediate outputs are also calculated:

$NMCR_{linear\_NL}$ = the notional non-life component of the linear formula

$NMCR_{linear\_Life}$ = the notional life component of the linear formula

$NSCR_{NL}$ = the notional non-life component of the SCR

$NSCR_{Life}$ = the notional life component of the SCR

$NMCR_{combined\_NL}$ = the notional non-life combined MCR result

$NMCR_{combined\_Life}$ = the notional life combined MCR result

Calculation

MCR.34 The linear formula result of a composite insurance undertaking (i.e. the insurance undertakings referred to in Article 73(2) and (5) of the Level 1 text – is split between notional non-life and life components as follows:

$$NMCR_{linear\_NL} = MCR_A + MCR_B$$

$$NMCR_{linear\_Life} = MCR_C + MCR_D$$

MCR.35 The notional split of the SCR (needed to calculate the corridor for the notional non-life and life MCR) into non-life and life components is determined according to the ratio of the notional non-life and life linear formula components as follows:

$$NSCR_{NL} = \frac{NMCR_{linear\_NL}}{MCR_{linear}} \cdot SCR$$

$$NSCR_{Life} = \frac{NMCR_{linear\_Life}}{MCR_{linear}} \cdot SCR$$

MCR.36 The notional non-life and life SCR results do not constitute a capital requirement on their own: they are regarded as interim results of the notional non-life and life MCR calculations.

MCR.37 The notional combined non-life and life MCR results are calculated from the above results by the following formula:

$$NMCR_{combined\_NL} = \{\min[\max(NMCR_{linear\_NL}; 0.25 \cdot NSCR_{NL}); 0.45 \cdot NSCR_{NL}]\}$$

$$NMCR_{combined\_Life} = \{\min[\max(NMCR_{linear\_Life}; 0.25 \cdot NSCR_{Life}); 0.45 \cdot NSCR_{Life}]\}$$

MCR.38 It is noted that following the Level 1 text any capital add-on imposed under Article 37 is included in the definition of the MCR corridor, and should therefore be taken into account in the calculation of the notional combined non-life and life MCR. However, for the purpose of QIS5, the capital add-on is considered to be zero for all undertakings and the above formulas are therefore simplified.

MCR.39 From the results of the above calculation steps, the notional non-life MCR and the notional life MCR of a composite insurance undertaking are determined as follows:

$$NMCR_{NL} = \max\{NMCR_{combined\_NL}; AMCR_{NL}\}$$

SECTION 5 – OWN FUNDS

OF.1. Introduction

OF.1. This section provides specifications for calculating and reporting own funds. The specifications in QIS5 are designed for the purposes of QIS5 only and do not necessarily reflect the final implementing measures and guidance for Solvency II.

OF.2. The level 1 text requires a list of own funds items and this approach has been followed for the QIS 5 technical specifications. As part of the QIS 5 exercise, a reconciliation reserve will be included in Tier 1 basic own funds to ensure that the value of individual basic own fund items does not exceed the total of excess of assets over liabilities and subordinated liabilities.

OF.3. All items should be determined in accordance with the QIS5 valuation specifications.

QIS 5 will operate on the basis of applying Solvency II to all existing items of own funds ie classification based on compliance with Solvency II criteria and in addition, participants will be asked to analyse own funds on the basis that transitional provisions permit grandfathering of capital instruments. See paragraphs OF.36 to 1.39.

OF.2. Classification of own funds into tiers and list of capital items:

OF.4. The lists below identify basic own funds and ancillary own funds, with their relevant characteristics and which tier they fit within, for QIS5 purposes.

OF.2.1. Tier 1 – List of own-funds items

OF.5. The following basic own-funds items shall be classified as Tier 1 provided that they meet the criteria set out in paragraph OF.7 and where applicable paragraphs OF.8 and OF.9:

1. Unless otherwise stated, the excess of assets over liabilities and subordinated liabilities, valued in accordance with Article 75 and Section 2 of Chapter VI of the Framework Directive:

    a) Paid up and called up common equity, known as ordinary share capital less own shares held by the undertaking;

    b) The initial fund, members' contributions or the equivalent basic own-funds item for mutual and mutual-type undertakings less any items of the same held by the undertaking;

    c) Share premium account;

d) Reserves, being:

   i. retained earnings, including profit for the year and net of forseeable dividends. A dividend is foreseeable at least when it is declared or approved by the directors regardless of any requirement for formal approval at the annual general meeting;
   ii. other reserves (from the financial statements); and
   iii. Reconciliation reserve, being an amount representing the total excess of assets and liabilities reduced by the basic own-fund items included in Tier 2 (OF.15), Tier 3 under OF.17 and elsewhere in Tier 1 (this captures the effect of moving from the financial statements valuation basis to a Solvency II valuation basis).

e) Surplus funds that fall under Article 91 (2) of the Framework Directive;

f) Amounts representing deferred tax assets that the undertaking shall not use within the following 12 months and which cannot be legally transferred to another entity;

g) Other paid in capital instruments

   i. Preference shares
   ii. Subordinated liabilities
   iii. Subordinated mutual member accounts;

2. The excess of assets over liabilities is represented by items included in 1(a) – (e) and (1)(g)(i) and (iii). i.e. all items other than subordinated liabilities ((1)(g)(ii)).

OF.6. The total of the above amounts will be reduced by adjustments in respect of the following items:

a) Reserves the use of which is restricted

b) participations the undertaking holds in financial and credit institutions[95]

c) ring fenced funds

d) deferred tax assets that the undertaking shall not use within the following 12 months and which cannot be legally transferred to another entity

OF.2.2. Tier 1 Basic Own-Funds – Criteria for classification

OF.7. The criteria for classification as tier 1 are as follows:

[95] These are the participations referred to in Article 92 (2) of the Level 1 text.

(a) The item will be the most deeply subordinated or in the case of other paid in capital instruments (OF.5(1)(g)) senior only to the most deeply subordinated item in a winding up.

(b) The item will not cause or accelerate the insolvency of the insurance or reinsurance undertaking.

The holder of the instrument must not be in a position to petition for the insolvency of the issuer; and the instrument is not taken into account for the purposes of determining whether the institution is insolvent (either because it is treated as shareholders' equity or it is not treated as a liability in determining balance sheet insolvency – ie whether liabilities exceed assets). The undertaking must be able to cancel coupon dividend payments without the risk of investors invoking default and triggering legal insolvency.

(c) The item is fully paid in and is immediately available to absorb losses.

(d) The item absorbs losses at least when the insurance or reinsurance undertaking breaches its Solvency Capital Requirement and it should not hinder its re-capitalisation.

(e) The item is undated or has an original maturity of at least 10 years. The maturity date is deemed to be the first opportunity to repay or redeem the basic own-funds item unless there is a contractual obligation to replace the item with an item of the same or higher quality capital.

(f) The item is only repayable or redeemable at the option of the insurance or reinsurance undertaking, subject to approval from the supervisory authority and must not include any incentives to redeem or repay that item. Incentives to redeem can include but are not limited to step-ups associated with a call option.

(g) The item must provide for the suspension of the repayment or redemption if the insurance or reinsurance undertaking breaches its Solvency Capital Requirement or would breach it if the instrument is repaid or redeemed. The supervisory authority may waive the suspension of repayment or redemption of the item provided that it is exchanged for or converted into another item of equivalent or higher quality and the Minimum Capital Requirement is complied with.

(h) The insurance or reinsurance undertaking has full discretion over payment of coupon/dividend or other similar payments. For items in OF.5(1)(a) and (b) (ordinary share capital and equivalent items for mutuals) the level of distribution is not in any way tied or linked to the amount paid in at issuance and is not subject to a cap; there is no preference as to distribution of income or capital.

(i) In respect of other paid in capital instruments OF.5(1)(g), the item must provide for the cancellation of coupon/dividend or other similar payments if the insurance or reinsurance undertaking breaches its Solvency Capital

Requirement or if paying the coupon/dividend would breach its Solvency Capital Requirement. The supervisory authority may waive the cancellation of the payment of interest or dividend provided that the payment does not further weaken the solvency position of the undertaking and the Minimum Capital Requirement is complied with.

(j) Where an insurance or re-insurance undertaking exercises its discretion or is required (because of actual or potential breach of the SCR) to cancel a coupon/dividend payment, there must be no requirement or entitlement to settle that payment at a future date. Alternative coupon satisfaction mechanisms (ACSM) may be permitted under the terms of the instrument only in the case of "other paid in capital instruments" (OF.5(1)(g) where they provide for coupons/dividends to be settled through the issue of ordinary shares. The use of ASCM is only acceptable if it achieves the same economic result as the cancellation of the coupon (i.e. there is no decrease in own funds because the reduction of reserves by the amount of the coupon/dividend is matched by an increase in share capital). To meet this condition, any coupons not paid in cash should be satisfied without delay using unissued ordinary shares which have already been approved or authorised under national law or the appropriate statutes of the undertaking.

(k) The item must be free of any encumbrances and must not be connected with any other transaction, which when considered with the item could undermine the characteristics and features of that item.

Examples of potential encumbrances include, but are not limited to: rights of set off, restrictions, charges or guarantees. Where an investor subscribes for capital in an undertaking and at the same time that undertaking has provided financing to the investor, only the net financing provided by the investor is considered as eligible own funds. In addition, adopting an economic approach and applying the principle of substance over form, where there is evidence of a group of connected transactions whose economic effect is the same as the holding of 'own shares', the assets that those transactions generate for the undertaking should be deducted from its own funds, to the extent necessary to guarantee that own funds reliably represent the net financial position of its shareholders, further to other allowed items.

OF.8. Items in other paid in capital instruments (OF.5(1)(g)) must possess one of the following principal loss absorbency mechanisms for which the trigger event is a significant breach of the Solvency Capital Requirement.

(a) the item automatically converts into either ordinary share capital or the initial fund at the trigger event; or

(b) at the trigger event, the principal amount of the item is written down *pari passu* with retained earnings, by the amount of the breach of the Solvency Capital Requirement. The item can only be written back up again from future profits also on a pari passu basis once the undertaking complies with the Solvency Capital Requirement.

OF.9. A significant breach of the Solvency Capital Requirement is defined as the earlier of the following events:

(a) Own funds are equal to or less than 75% of the Solvency Capital Requirement.

(b) A breach of the Solvency Capital Requirement is not resolved within a two month period.

OF.10. If the instrument has a write-down mechanism, explain how it works. If the write-down occurs at a trigger point, explain the methodology and the basis for any future write-ups.

OF.11. If the instrument has a conversion feature/option, explain how this works.

OF.12. If the instrument utilises ACSM, explain how this works.

OF.2.3. Reserves the use of which is restricted

OF.13. In certain jurisdictions, reserves may be required, under national law or under the specific statutes / articles of an undertaking, to be established and used only for certain prescribed purposes. These will form part of other reserves in the financial statements. (These specific reserves should be distinguished from equalisation provisions which may appear in the financial statements but which are superseded by the valuation of technical provisions under Solvency 2 and which would therefore contribute to "Other items arising from Solvency II valuation – see paragraph OF.5 (1) d) (iii)). Reserves of this nature should only be eligible for inclusion in own funds in relation to the risks they cover Any amount in excess of that covering the related risks should therefore be excluded from own funds if it is not available at all or deducted from Tier 1 and included in Tier 2 if it would be available for all risks/losses in a winding up. The treatment will therefore need to have regard to the legal restrictions on the use of the reserve and in particular whether these continue to apply in the case of a winding up. Where the amount of the reserve is less than the elements of the SCR for which the reserve could be used, no adjustment is necessary.

OF.2.4. Participations

For the purposes of QIS 5, the table below sets out the approach to be followed in relation to the different types of participations and subsidiaries.

A. Participations – included in the scope of Group supervision

	Nature of participation/ subsidiary	**Approach**

1	Financial and credit institutions Where the participation is in an intermediate holding company, this should be treated as a financial institution.	Exclude from own funds by deducting an amount representing the value of the participation from Tier 1. Any investment in Tier 2 own funds of the participation should be deducted from Tier 2 basic own funds.
2	Related undertakings where the investment is of a strategic nature, because a long-term relationship has been established and will be maintained	Specific equity risk charge (22% level shock and +10 percentage points/-3 percentage points volatility shock)
3	Other related undertakings (i.e. those not included in 1 or 2).	Standard equity risk charge (49% level shock and +10 percentage points/-3 percentage points volatility shock). If participations are listed in EEA or OECD countries, the standard equity risk charge is (39% level shock and +10 percentage points/-3 percentage points volatility shock)

B. Participations – excluded from the scope of Group supervision (Article 214 (2) (a)) or deducted from own funds eligible for the Group solvency purposes (Article 229)

Nature of participation/ subsidiary	**Approach**
Financial and credit institutions Where the participation is in an intermediate holding company, this should be treated as a financial institution.	Exclude from own funds by deducting an amount representing the value of the participation from Tier 1. Any investment in Tier 2 own funds of the participation should be deducted from Tier 2 basic own funds.
Other related undertakings	Market risk charge 100%

OF.14. Participations will only be considered to be excluded from the scope of Group supervision under Part B of the table above where the related undertaking is situated in a third country where there are legal impediments to the transfer of information that is necessary to determine the value of that undertaking or the associated risks. For the purposes of QIS5, these related undertakings may include but, are not necessarily limited to those undertakings that are excluded from the scope of supplementary supervision under Article 3 (3) of the Insurance Groups Directive.

OF.2.5. Tier 2 Basic own-funds – List of own-funds items

OF.15. The following items that are not included in Tier 1 shall be classified as Tier 2 provided that they meet the criteria set out in paragraph OF.16

1. Unless otherwise stated, the excess of assets over liabilities and subordinated liabilities valued in accordance with Article 75 and Section 2 of Chapter VI of the Framework Directive:

(a) Called up ordinary share capital;

(b) Other capital instruments:

i. Other called up capital instruments that absorb losses first or rank pari passu, in going concern, with capital instruments that absorb losses first.

ii. Other paid-in capital instruments including preference shares, subordinated mutual members accounts and subordinated liabilities, that do not have the features required for Tier 1 but that meet the criteria below;

OF.2.6. Tier 2 Basic own-funds – Criteria for Classification

OF.16. The following criteria apply:

(a) The item must rank after the claims of all policyholders and beneficiaries and non-subordinated creditors.

(b) In the case of a capital instrument that is called up but not paid up, the instrument must meet the criteria for tier 1 other than the item being fully paid in and being immediately available to absorb losses.

(c) The item will not cause or accelerate the insolvency of the insurance or reinsurance undertaking.

The holder of the instrument must not be in a position to petition for the insolvency of the issuer; and the instrument is not taken into account for the purposes of determining whether the institution is insolvent. The undertaking must be able to defer/cancel coupon dividend payments without the risk of investors invoking default and triggering legal insolvency.

(d) The item is undated or has an original maturity of at least 5 years. The maturity date is deemed to be the first opportunity to repay or redeem the basic own-funds item unless there is a contractual obligation to replace the item with an item of the same or higher quality capital.

(e) The item is only repayable or redeemable at the option of the insurance or reinsurance undertaking, subject to approval from the supervisory authority and can include moderate incentives to redeem or repay that item. Incentives to redeem can include but are not limited to step-ups associated with a call option. Step-ups must not apply before 5 years from issue date and must not exceed either 100bps or 50% of the initial credit spread in order to be considered moderate.

(f) The item must provide for the suspension of its repayment or redemption if the insurance or reinsurance undertaking breaches its Solvency Capital Requirement or would breach it if the instrument is repaid or redeemed. The supervisory authority may waive the suspension of repayment or redemption of the item as long the instrument is exchanged for or converted into another tier 1 or tier 2 basic own fund item and the Minimum Capital Requirement is complied with.

(g) The item must provide for the deferral of payments of interest or dividends or other similar payments if the insurance or reinsurance undertaking breaches its Solvency Capital Requirement or if paying the interest, dividends or other similar payments would breach the Solvency Capital Requirement. The supervisory authority may waive the deferral of the payment of interest or dividend provided that the payment does not further weaken the solvency position of the undertaking and the Minimum Capital Requirement is complied with.

(h) The item should be free of any encumbrances and must not be connected with any other transaction, which when considered with the item could undermine that characteristics and features of that item.

Examples of potential encumbrances include, but are not limited to, rights of set off, restrictions, charges or guarantees. Where an investor subscribes for capital in an undertaking and at the same time that undertaking has provided financing to the investor, only the net financing provided by the investor is considered as eligible own funds.

OF.2.7. Tier 3 Basic own-funds– List of own-funds items

OF.17. The following items shall be classified as Tier 3:

(a) Amounts representing deferred tax assets that the undertaking shall not use within the following 12 months and which cannot be legally transferred to another entity;

(b) Other capital instruments including preference shares, subordinated mutual members accounts and subordinated liabilities.

OF.2.8. Tier 3 Basic own-funds– Criteria

OF.18. Any basic own-funds item that is not classified as Tier 1 or Tier 2 shall be classified in Tier 3 provided that it meets the following criteria:

(a) The item shall rank after the claims of all policyholders and beneficiaries and non-subordinated creditors.

(b) The item shall not cause or accelerate the insolvency of the insurance or reinsurance undertaking.

(c) The item shall be undated or have an original maturity of at least 3 years. The maturity date shall be deemed to be the first contractual opportunity to repay or redeem the item unless there is a contractual obligation to replace the item with an item of the same or higher quality capital.

(d) The item must provide for the suspension repayment or redemption if the insurance or reinsurance undertaking breaches its Solvency Capital Requirement or would breach it if the instrument is repaid or redeemed. The supervisory authority may waive the suspension of repayment or redemption of the item as long the instrument is exchanged for or converted into another tier 1, tier 2 or tier 3 basic own fund item and the Minimum Capital Requirement is complied with.

(e) The item must be able to provide for the the deferral of coupon/dividends payments if the insurance or reinsurance undertaking breaches its Minimum Capital Requirement (i.e during the ladder of supervisory intervention) or paying the coupon would breach the Minimum Capital Requirement.

(f) The item should be free of any encumbrances and must not be connected with any other transaction, which could undermine that instrument's classification as an item of basic own-funds.

Examples of potential encumbrances include, but are not limited to, rights of set off, restrictions, charges or guarantees. Where an investor subscribes for capital in an undertaking and at the same time that undertaking has provided financing to the investor, only the net financing provided by the investor is considered as eligible own funds.

OF.2.9. Tier 2 Ancillary own-funds

OF.19. Ancillary own funds are items of capital other than basic own-funds which can be called up to absorb losses. They can comprise the following items to the extent they are not basic own-funds items:

(a) Unpaid share capital or initial fund that has not been called up;

(b) Letters of credit or guarantees;

(c) Any other legally binding commitments received by insurance and reinsurance undertakings.

OF.20. Article 96 gives specific examples of ancillary own funds and provides for them to be classified as Tier 2.

OF.21. For the purposes of QIS5 any ancillary own funds items covered by article 96 ie:

a. Letters of credit and guarantees which are held in trust for the benefit of insurance creditors by an independent trustee and provided by credit institutions authorised in accordance with Directive 2006/48/EC

b. Any future claims which mutual or mutual-type associations of ship owners with variable contributions solely insuring risks to ships (sea, lake and river and canal vessels), liability for ships (sea, lake and river and canal vessels) and the legal expenses and costs of litigation, that may have against their members by way of a call for supplementary contributions, within the next 12 months.

c. Any future claims which mutuals or mutual-type associations with variable contributions may have against their members, within the following 12 months, that does not fall under (b) above and which are currently eligible to meet solvency requirements under the Solvency I regime.

If any other item is currently eligible to meet solvency requirements but would constitute ancillary own funds under Solvency II then it may also be classified as Tier 2 ancillary own funds provided that it represents own fund items which, if called up and paid in, would be classified in Tier 1.

The amount of Tier 2 ancillary own funds included for QIS5 purposes should be that which is currently recognised or approved for the Solvency I regime.

Otherwise the item should be classified as Tier 3 ancillary own funds. Details of the current arrangment should be given together with an explanation as to why this item should be treated as ancillary own funds, subject to supervisory approval, once Solvency II is in force.

OF.22. Items or arrangements which currently exist but which do not count towards the available solvency margin may in future be approved as ancillary own funds. These should not be included for QIS5 purposes but information should be supplied in response to the questions set out below.

OF.23. In addition information should be provided as to those arrangements into which undertakings may enter and for which approval as ancillary own funds may be sought.

OF.2.10. Tier 3 Ancillary own-funds

OF.24. Existing arrangements currently eligible for the available solvency margin but which would constitute ancillary own funds under Solvency II and which would not be eligible as Tier 2 ancillary own funds.

OF.25. What existing items do you count now that would constitute ancillary own funds under Solvency II, subject to supervisory approval?

OF.26. What other items which you do not currently count as capital to meet the solvency margin might constitute ancillary own funds under Solvency II?

OF.27. To what extent do you envisage entering into new arrangements that would constitute ancillary own funds, subject to supervisory approval?

OF.28. Do you have any other own funds items not listed above that you may seek to include with supervisory approval?

OF.3. Eligibility of own funds

Eligibility and limits applicable to Tiers 1, 2 and 3

OF.29. To meet the Solvency Capital Requirement:

(i) the proportion of Tier 1 items must be at least 50% of the SCR;

(j) the amount of Tier 3 items must be less than 15% of the SCR.

OF.30. To meet the Minimum Capital Requirement only tier 1 items and tier 2 basic own funds items are eligible. At least 80% of the MCR shall be met by tier 1 items. Tier 3 basic own fund items and ancillary own funds are not eligible for the MCR. Participants should note that for composites a notional MCR applies in respect of each of the life and non-life activities of an undertaking and that the basic own funds covering each of these must be identified as required by Article 74 of the Level 1 text.

OF.31. Within the limits above, other paid in instruments (paragraph OF.5(1)(g)) shall be no greater than 20% of total Tier 1 own funds.

OF.32. An insurance or reinsurance undertaking may include in a lower tier of own-funds an item which would have been eligible to be included in a higher tier of own-funds which exceeded the limits for the higher tier item. Where an own-funds item is included in a tier of own-funds, that item may not at the same time be included in another tier.

OF.4. Transitional provisions

OF.33. It is generally accepted that transitional provisions are necessary in the case of own funds to ensure a smooth transition to Solvency II and avoid market disruption. QIS5 will test the impact not only on the basis that Solvency II is fully implemented and what the position would be on initial implementation i.e. with the benefit of grandfathering of capital instruments. The grandfathering criteria set out below aim to make grandfathering practicable for the purposes of QIS 5 only and are not indicative of the content of the final transitional provisions.

OF.34. The grandfathering criteria generally differ from the Solvency II criteria in two respects: Firstly, any reference to the SCR is excluded as it is not reflected in current capital instrument criteria. Secondly, some of the criteria have been modified in order to include current instruments which are widely used and satisfy most, but not all, Solvency II criteria. The differences between the grandfathering criteria to be adopted for QIS5 purposes and the Solvency II criteria for Tier 1 items and Tier 2 basic own fund items are summarised in at the end of this section.

OF.35. The grandfathering criteria for QIS5 have been drawn up to address the issue of mapping from one regime to another. A key part of QIS5 will be the gathering of data to establish the extent to which particular criteria under Solvency II are not met by current issuance. For this purpose the QIS5 participants are asked to complete the attached questionnaire in respect of each instrument (or group of the same instruments) for which a grandfathering treatment is adopted. The quantitative results plus the feedback on the questionnaire will then form a basis for assessing the need for grandfathering and detailing the grandfathering criteria.

OF.4.1. Criteria for grandfathering into to Tier 1

OF.36. Basic own funds items listed in OF.5(1)(g) may be classified as Tier 1 provided they meet the following criteria:

a. The item is the most deeply subordinated or senior only to the most deeply subordinated item in a winding up.

b. The item will not cause or accelerate the insolvency of the insurance or reinsurance undertaking.

   The holder of the instrument must not be in a position to petition for the insolvency of the issuer; and the instrument is not taken into account for the purposes of determining whether the institution is insolvent (either because it is treated as shareholders' equity or it is not treated as a liability in determining balance sheet insolvency – ie whether liabilities exceed assets. The undertaking must be able to defer/cancel coupon dividend payments without the risk of investors invoking default and triggering legal insolvency.

c. The item is fully paid and is immediately available to absorb losses.

d. The item is undated or has an original maturity of at least 10 years. The maturity date is deemed to be the first opportunity to repay or redeem the basic own-funds item unless there is a contractual obligation to replace the item with an item of the same or higher quality capital.

e. The item is only repayable or redeemable at the option of the insurance or reinsurance undertaking, subject to approval from the supervisory authority.

f. Any incentives to redeem is moderate. Incentives to redeem can include but are not limited to step-ups associated with a call option. Step-ups must not apply before 10 years from issue date and must not exceed either 100bps or 50% of the initial credit spread in order to be considered moderate.

g. The undertaking must be able to cancel or defer coupon/dividend or other similar payments in a period of stress.

   Instruments may have a range of provisions relating to the waiver of coupon/dividend or other similar payments. These may range from full discretion at all times to mandatory cancellation under certain conditions.

h. The item must be free of any encumbrances and must not be connected with any other transaction, which when considered with the item could undermine the characteristics and features of that item.

   Examples of potential encumbrances include, but are not limited to: rights of set off, restrictions, charges or guarantees. Where an investor subscribes for capital in an undertaking and at the same time that undertaking has provided financing to the investor, only the net financing provided by the investor is considered as eligible own funds. In addition, adopting an economic approach and applying the principle of substance over form, where there is evidence of a group of connected transactions whose economic effect is the same as the holding of 'own shares', the assets that those transactions generate for the undertaking shall be deducted from its own funds, to the extent necessary to guarantee that own funds reliably represent the net financial position of its shareholders, further to other allowed items.

i. In addition, although the item may not exhibit the characteristics which are specifically linked to compliance with the SCR under Solvency II, it should possess some features which enable it to absorb losses on a going concern basis. These might include some form of conversion or write-down mechanism and features requiring cancellation of coupon/dividend or other similar payments even if they are not expressed in terms of the relevant Solvency II criteria in respect of these matters.

OF.37. Participants should explain how the features identified under (i) provide going concern loss absorbency.

OF.4.2. Criteria for grandfathering into Tier 2

OF.38. Basic own funds items listed in OF.15(1)(b)(ii) (or items deemed equivalent to basic own fund items listed in OF.15(1)(b)(ii) according to national law) may be classified as Tier 2 provided they meet the following criteria:

- The item must rank after the claims of all policyholders and beneficiaries and non-subordinated creditors.

- The item is fully paid in and is immediately available to absorb losses.

- The item is undated or has an original maturity of at least 5 years. The maturity date is deemed to be the first opportunity to repay or redeem the basic own-funds item unless there is a contractual obligation to replace the item with an item of the same or higher quality capital.

- The item is only repayable or redeemable at the option of the insurance or reinsurance undertaking, subject to review from the supervisory authority.

- Any incentives to redeem is moderate. Incentives to redeem can include but are not limited to step-ups associated with a call option. Step-ups must not apply before 5 years from issue date and must not exceed either 100bps or 50% of the initial credit spread in order to be considered moderate.

- The item must be free of any encumbrances and must not be connected with any other transaction, which when considered with the item could undermine the characteristics and features of that item.

  Examples of potential encumbrances include, but are not limited to: rights of set off, restrictions, charges or guarantees. Where an investor subscribes for capital in an undertaking and at the same time that undertaking has provided financing to the investor, only the net financing provided by the investor is considered as eligible own funds.

OF.4.3. Limits for grandfathering

OF.39. The limits set out below aim to make grandfathering practicable for the purposes of QIS 5 and should not be relied upon as indicative of final transitional provisions. Limits may be raised, lowered or new ones introduced in the final transitional provisions.

- Items which satisfy the criteria in paragraph OF.38 may be included in Tier 1 own funds subject to the limit set out in OF. 31. The total of Tier 1 grandfathered basic own fund items and the other paid in instruments referred to in paragraph OF.5(1)(g) shall be no greater than 20% of total Tier 1 own funds. Items in excess of this limit may be counted as Tier 2 own funds.

- Items which satisfy the criteria in paragraph OF.38 may be counted as Tier 2 basic own funds subject to the operation of the limits described in paragraphs OF.3.

OF.40. If the instrument has a write-down mechanism, explain how it works. If the write-down only occurs at a trigger point, explain the methodology.

OF.41. If the instrument has a conversion feature/option, explain how it works.

OF.42. If the instrument utilises ACSM, explain how this works.

OF.43. What existing items do you count now that would constitute ancillary own funds under Solvency II, subject to supervisory approval?

OF.44. What other items which you do not currently count as capital to meet the solvency margin might constitute ancillary own funds under Solvency II?

OF.45. To what extent do you envisage entering into new arrangements that would constitute ancillary own funds, subject to supervisory approval?

OF.46. Do you have any other items that you may seek to include with supervisory approval?

OF.47. Participants should explain how the features identified under (i) provide going concern loss absorbency.

OF.5. Summary tables

Tier 1 Basic Own-Funds – Criteria for QIS 5 classification		Grandfathering Criteria for QIS 5	Comments
(a)	The item will be the most deeply subordinated or in the case of other paid in capital instruments (OF.5(1)(g)) senior only to the most deeply subordinated item in a winding up.	The item is the most deeply subordinated or senior only to the most deeply subordinated item in a winding up.	
(b)	The item will not cause or accelerate the insolvency of the insurance or reinsurance undertaking. The holder of the instrument must not be in a position to petition for the insolvency of the issuer; and the instrument is not taken into account for the purposes of determining whether the institution is insolvent (either because it is treated as shareholders' equity or it is not treated as a liability in determining balance sheet insolvency – ie whether liabilities exceed assets). The undertaking must be able to cancel coupon dividend payments without the risk of investors invoking default and triggering legal insolvency.	The item will not cause or accelerate the insolvency of the insurance or reinsurance undertaking. The holder of the instrument must not be in a position to petition for the insolvency of the issuer; and the instrument is not taken into account for the purposes of determining whether the institution is insolvent (either because it is treated as shareholders' equity or it is not treated as a liability in determining balance sheet insolvency – ie whether liabilities exceed assets). The undertaking must be able to defer/cancel coupon dividend payments without the risk of investors invoking default and triggering legal insolvency.	
(c)	The item is fully paid in and is immediately available to absorb losses.	The item is fully paid and is immediately available to absorb losses.	
(d)	The item absorb losses at least once when the insurance or reinsurance undertaking breaches its Solvency Capital Requirement and it should not hinder its re-capitalisation.	In addition, although the item may not exhibit the characteristics which are specifically linked to compliance with the SCR under Solvency II, it should possess some features which enable it to absorb losses on a going concern basis. These might include some form of conversion or write-down mechanism and features requiring cancellation of coupon/dividend or other similar	Criteria based around the SCR are unlikely to exist under Solvency I. This criterion is intended to provide some additional loss absorbency features for grandfathered instruments.

		payments even if they are not expressed in terms of the relevant Solvency II criteria in respect of these matters.	
(e)	The item is undated or has an original maturity of at least 10 years. The maturity date is deemed to be the first opportunity to repay or redeem the basic own-funds item unless there is a contractual obligation to replace the item with an item of the same or higher quality capital.	The item is undated or has an original maturity of at least 10 years. The maturity date is deemed to be the first opportunity to repay or redeem the basic own-funds item unless there is a contractual obligation to replace the item with an item of the same or higher quality capital.	
(f)	The item is only repayable or redeemable at the option of the insurance or reinsurance undertaking, subject to approval from the supervisory authority …	The item is only repayable or redeemable at the option of the insurance or reinsurance undertaking, subject to approval from the supervisory authority.	
	….and must not include any incentives to redeem or repay that item. Incentives to redeem can include but are not limited to step-ups associated with a call option.	Any incentives to redeem is moderate. Incentives to redeem can include but are not limited to step-ups associated with a call option. Step-ups must not apply before 10 years from issue date and must not exceed either 100bps or 50% of the initial credit spread in order to be considered moderate.	Many existing instruments have incentives to redeem so the grandfathering criterion permits moderate incentives to redeem.
(g)	The item must provide for the suspension of the repayment or redemption if the insurance or reinsurance undertaking breaches its Solvency Capital Requirement or would breach it if the instrument is repaid or redeemed. The supervisory authority may waive the suspension of repayment or redemption of the item provided that it is exchanged for or converted into another item of equivalent or higher	In addition, although the item may not exhibit the characteristics which are specifically linked to compliance with the SCR under Solvency II, it should possess some features which enable it to absorb losses on a going concern basis. These might include some form of conversion or write-down mechanism and features requiring cancellation of coupon/dividend or other similar payments even if they are not	Criteria based around the SCR are unlikely to exist under Solvency I. This criterion is intended to provide some additional loss absorbency features for grandfathered instruments.

	quality and the Minimum Capital Requirement is complied with.	expressed in terms of the relevant Solvency II criteria in respect of these matters.	
(h)	The insurance or reinsurance undertaking has full discretion over payment of coupon/dividend or other similar payments. For items in OF.5(1)(a) and (b) (ordinary share capital and equivalent items for mutuals) the level of distribution is not in any way tied or linked to the amount paid in at issuance and is not subject to a cap; there is no preference as to distribution of income or capital.	The undertaking must be able to cancel or defer coupon/dividend or other similar payments in a period of stress. Instruments may have a range of provisions relating to the waiver of coupon/dividend or other similar payments. These may range from full discretion at all times to mandatory cancellation under certain conditions.	The Solvency II criterion is likely to be too narrow for instruments where the legal documentation could not have been drafted with this criterion in mind.
(i)	In respect of other paid in capital instruments OF.5(1)(g), the item must provide for the cancellation of coupon/dividend or other similar payments if the insurance or reinsurance undertaking breaches its Solvency Capital Requirement or if paying the coupon/dividend would breach its Solvency Capital Requirement. The supervisory authority may waive the cancellation of the payment of interest or dividend provided that the payment does not further weaken the solvency position of the undertaking and the Minimum Capital Requirement is complied with.	In addition, although the item may not exhibit the characteristics which are specifically linked to compliance with the SCR under Solvency II, it should possess some features which enable it to absorb losses on a going concern basis. These might include some form of conversion or write-down mechanism and features requiring cancellation of coupon/dividend or other similar payments even if they are not expressed in terms of the relevant Solvency II criteria in respect of these matters.	Criteria based around the SCR are unlikely to exist under Solvency I. This criterion is intended to provide some additional loss absorbency features for grandfathered instruments.

(j)	Where an insurance or re-insurance undertaking exercises its discretion or is required (because of actual or potential breach of the SCR) to cancel a coupon/dividend payment, there must be no requirement or entitlement to settle that payment at a future date. Alternative coupon satisfaction mechanisms (ACSM) may be permitted under the terms of the instrument only in the case of "other paid in capital instruments" (OF.5(1)(g)) where they provide for coupons/dividends to be settled through the issue of ordinary shares. The use of ACSM is only acceptable if it achieves the same economic result as the cancellation of the coupon (i.e. there is no decrease in own funds because the reduction of reserves by the amount of the coupon/dividend is matched by an increase in share capital). To meet this condition, any coupons not paid in cash should be satisfied without delay using unissued ordinary shares which have already been approved or authorised under national law or the appropriate statutes of the undertaking.	The undertaking must be able to cancel or defer coupon/dividend or other similar payments in a period of stress. Instruments may have a range of provisions relating to the waiver of coupon/dividend or other similar payments. These may range from full discretion at all times to mandatory cancellation under certain conditions.	Criteria based around the SCR are unlikely to exist under Solvency I. This criterion is intended to provide some additional loss absorbency features for grandfathered instruments.

(k)	The item must be free of any encumbrances and must not be connected with any other transaction, which when considered with the item could undermine the characteristics and features of that item. Examples of potential encumbrances include, but are not limited to: rights of set off, restrictions, charges or guarantees. Where an investor subscribes for capital in an undertaking and at the same time that undertaking has provided financing to the investor, only the net financing provided by the investor is considered as eligible own funds. In addition, adopting an economic approach and applying the principle of substance over form, where there is evidence of a group of connected transactions whose economic effect is the same as the holding of 'own shares', the assets that those transactions generate for the undertaking should be deducted from its own funds, to the extent necessary to guarantee that own funds reliably represent the net financial position of its shareholders, further to other allowed items.	The item must be free of any encumbrances and must not be connected with any other transaction, which when considered with the item could undermine the characteristics and features of that item. Examples of potential encumbrances include, but are not limited to: rights of set off, restrictions, charges or guarantees. Where an investor subscribes for capital in an undertaking and at the same time that undertaking has provided financing to the investor, only the net financing provided by the investor is considered as eligible own funds. In addition, adopting an economic approach and applying the principle of substance over form, where there is evidence of a group of connected transactions whose economic effect is the same as the holding of 'own shares', the assets that those transactions generate for the undertaking shall be deducted from its own funds, to the extent necessary to guarantee that own funds reliably represent the net financial position of its shareholders, further to other allowed items.	
	Items in other paid in capital instruments (OF.5(1)(g)) must possess one of the following principal loss absorbency mechanisms for which the trigger event is a significant breach of the Solvency Capital Requirement. (a) the item automatically converts into either ordinary share capital or the initial fund at the trigger event; or (b) at the trigger event, the principal amount of the item is written down pari	In addition, although the item may not exhibit the characteristics which are specifically linked to compliance with the SCR under Solvency II, it should possess some features which enable it to absorb losses on a going concern basis. These might include some form of conversion or write-down mechanism and features requiring cancellation of coupon/dividend or other similar payments even if they are not	Criteria based around the SCR are unlikely to exist under Solvency I. This criterion is intended to provide some additional loss absorbency features for grandfathered instruments.

	passu with retained earnings, by the amount of the breach of the Solvency Capital Requirement. The item can only be written back up again from future profits also on a pari passu basis once the undertaking complies with the Solvency Capital Requirement. A significant breach of the Solvency Capital Requirement is defined as the earlier of the following events (a) own funds are equal to or less than 75% of the Solvency Capital Requirement or (b) a breach of the Solvency Capital Requirement is not resolved within a two month period.	expressed in terms of the relevant Solvency II criteria in respect of these matters.	

Tier 2 Basic Own-Funds – Criteria for QIS5 classification		**Grandfathering Criteria for QIS5**	**Comments**
(a)	The item must rank after the claims of all policyholders and beneficiaries and non-subordinated creditors.	The item must rank after the claims of all policyholders and beneficiaries and non-subordinated creditors.	
(b)	In the case of a capital instrument that is called up but not paid up, the instrument must meet the criteria for tier 1 other than the item being fully paid in and being immediately available to absorb losses.	The item is fully paid in and is immediately available to absorb losses.	The grandfathering criterion is related to capital instruments which would need to be paid in to qualify under Solvency I
(c)	The item will not cause or accelerate the insolvency of the insurance or reinsurance undertaking.		
(d)	The item is undated or has an original maturity of at least 5 years. The maturity date is deemed to be the first opportunity to repay or redeem the basic own-funds item unless there is a contractual obligation to replace the item with an item of the same or higher quality capital.	The item is undated or has an original maturity of at least 5 years. The maturity date is deemed to be the first opportunity to repay or redeem the basic own-funds item unless there is a contractual obligation to replace the item with an item of the same or higher quality capital.	

(e)	The item is only repayable or redeemable at the option of the insurance or reinsurance undertaking, subject to approval from the supervisory authority	The item is only repayable or redeemable at the option of the insurance or reinsurance undertaking, subject to review by the supervisory authority.	
	and can include moderate incentives to redeem or repay that item. Incentives to redeem can include but are not limited to step-ups associated with a call option. Step-ups must not apply before 5 years from issue date and must not exceed either 100bps or 50% of the initial credit spread in order to be considered moderate.	Any incentives to redeem is moderate. Incentives to redeem can include but are not limited to step-ups associated with a call option. Step-ups must not apply before 5 years from issue date and must not exceed either 100bps or 50% of the initial credit spread in order to be considered moderate.	
(f)	The item must provide for the suspension of its repayment or redemption if the insurance or reinsurance undertaking breaches its Solvency Capital Requirement or would breach it if the instrument is repaid or redeemed. The supervisory authority may waive the suspension of repayment or redemption of the item as long the instrument is exchanged for or converted into another tier 1 or tier 2 basic own fund item and the Minimum Capital Requirement is complied with.		Criteria based around the SCR are unlikely to exist under Solvency I
(g)	The item must provide for the deferral of payments of interest or dividends or other similar payments if the insurance or reinsurance undertaking breaches its Solvency Capital Requirement or if paying the interest, dividends or other similar payments would breach the Solvency Capital Requirement. The supervisory authority may waive the cancellation of the payment of interest or dividend provided that the payment does not further weaken the solvency position of the undertaking and		Criteria based around the SCR are unlikely to exist under Solvency I

	the Minimum Capital Requirement is complied with.		
(h)	The item should be free of any encumbrances and must not be connected with any other transaction, which when considered with the item could undermine that characteristics and features of that item. Examples of potential encumbrances include, but are not limited to, rights of set off, restrictions, charges or guarantees. Where an investor subscribes for capital in an undertaking and at the same time that undertaking has provided financing to the investor, only the net financing provided by the investor is considered as eligible own funds.	The item must be free of any encumbrances and must not be connected with any other transaction, which when considered with the item could undermine the characteristics and features of that item. Examples of potential encumbrances include, but are not limited to: rights of set off, restrictions, charges or guarantees. Where an investor subscribes for capital in an undertaking and at the same time that undertaking has provided financing to the investor, only the net financing provided by the investor is considered as eligible own funds.	

SECTION 6 – GROUPS

G.1. Introduction

G.1.1. *Aim*

G.1. This section provides specifications for calculating and reporting group capital requirements and group own funds. In order to test the methods set out in the Framework Directive it is essential that as many groups as possible participate in QIS5.

G.2. As in QIS 4, the competent authority responsible for group supervision (the current Lead Supervisor appointed by each College of supervisors) will manage the QIS5 process for each of their groups.

G.3. The specifications in QIS5 are designed for the purposes of QIS5 only and do not necessarily reflect the final implementing measures and guidance for Solvency II.

G.4. The main objective of QIS5 is to measure the overall impact from Solvency I to Solvency II. Data should be valued in accordance with the QIS5 valuation specifications. 2009 annual accounts may be taken as a starting point which should be adjusted for material differences with QIS5 valuation standards.

G.5. The proportionality rules which apply to the solo specifications also apply to the groups specifications.

G.1.2. *Description of the methods*

G.6. For mutual groups, combined accounts should be used instead of consolidated accounts.

G.7. Groups participating in QIS5 are requested to calculate the Solvency Capital Requirement and the group own funds according to the following methods:

Solvency II Default method – Accounting Consolidation

1. The standard formula for the calculation of the Solvency Capital Requirement (SCR) applied to the consolidated data (Article 230).

Solvency II Alternative method – Deduction & Aggregation (D&A)

2. The sum of the standard formula solo SCR and solo own funds of the participating insurance undertaking[96] and the proportional share of each related insurance undertaking in the group with the necessary adjustments (Article 233);

Combination of default and alternative methods ***(optional)***

G.8. Article 220(2) states that the group supervisor may decide, after consultation with the other supervisory authorities concerned and the group itself, apply to the group a combination of methods 1 and 2, where the exclusive application of method 1 would not be appropriate.

Group solvency capital requirement currently in force

G.9. The group capital requirements and capital resources under the regime currently in force, as calculated under the Insurance Groups Directive as amended by the Financial Conglomerates Directive.

Group solvency capital on the basis of a group internal model

G.10. Groups are also invited to provide the results of any internal models which they may use to calculate group solvency capital requirement.

G.11. The table below summarizes the methods of calculations requested and the expected answers from the groups participating. More details as regards the different methods of calculations are in the relevant paragraphs and guidance.

Summary of methods and expected answers			
	EEA groups without non-EEA entities	EEA groups with non- EEA entities	EEA subgroup(s) of non-EEA groups
S1 - current calculations	**Already available**	**Already available**	**Already available**
S2 – default method	**Expected**	**Expected**	**Expected**
S2 – D&A (SII applied to the non-EEA entities)	**Expected**	**Expected**	**Expected**
S2 – D&A (local rules applied to the non-EEA entities)		**Invited**	
S2 – combination of methods	Optional if relevant	Optional if relevant	Optional if relevant
S2 – IntMod	If relevant	If relevant	If relevant
S2 – default and	Optional, if relevant	Optional, if relevant	

96 In these specifications any reference to insurance undertaking also includes reinsurance undertaking.

D&A - subgroup calculation			

G.1.3. *Comparison of the methods*

G.12. It is important that the same set of group entities is included in all the calculations to ensure the comparability of the results of the different methods applied.

G.13. The consolidated group SCR as calculated under the default method will be compared with the Group solvency capital requirement currently in force method in order to measure the overall impact from the Solvency I to the Solvency II regime.

G.14. The consolidated group SCR as calculated under the default method will be compared with the results of the D&A method adjusted for intra-group transactions to have a measure of diversification benefits.

G.1.4. *Scope*

G.15. Calculations shall be carried out at the level of the ultimate EEA participating insurance undertaking or insurance holding company (i.e. the EEA entity which normally issues consolidated accounts) and encompass the "group" as defined in Article 212(1)(c). In general, the scope of the group for QIS5 should be the same as for the IFRS consolidated accounts unless the lead/group supervisor already requires adjustments to that scope pursuant to Article 3.3 of the IGD (i.e. exclusion from the group supervision on a non-EEA undertaking if there are legal impediment to the transfer of the necessary information or since the inclusion on an undertaking - both EEA and non-EEA - may be of negligible interest, inappropriate or misleading). For a solvency assessment, participations in entities that are excluded from the scope of the group supervision according to Article 3.3 of the IGD should be deducted from the own funds for the group solvency.

G.16. All parts of the group necessary to ensure a proper understanding of the group and the potential sources of risks within the group have to be included within the scope of group for the purpose of properly assessing group solvency.

G.1.5. *Availability of group own funds*

G.17. In order to assess the group solvency, it is necessary to determine the amount of group own funds which are eligible for covering the group SCR. This assessment has to be made after the elimination of double use of eligible own funds and for both calculation methods (default or deduction/aggregation).

G.18. This assessment needs, in particular, consider the availability of the own funds of each entity within the scope of group solvency. This means that own funds that can not be made both fungible (i.e. absence of dedication to a certain purpose) and transferable (i.e. absence of significant obstacles to moving assets from one entity to another of the group) for the group within a maximum of 6 to 9 months (Article 138.3) can not be considered effectively available at group level.

G.1.6. *QIS5 assumptions for the treatment of third country related insurance undertakings and non-EEA groups*

G.19. The Level 1 text provides for the treatment of non-EEA insurance activities in the following cases:

- to EEA groups that have a related insurance third country undertaking;
- to non-EEA groups that have a related insurance undertaking in the EEA;
- to the reinsurance activities of non-EEA undertakings that reinsure EEA undertakings or groups.

G.20. These three scenarios are subject to equivalence assessments as laid out in the Level 1 text. CEIOPS has published a consultation paper (CP 78) on the technical criteria for assessing 3rd country equivalence in relation to Articles 172, 227 and 260.[97] However, the equivalence assessments and any decisions thereof are not relevant for the purposes of QIS 5.

a. EEA groups that have a related third county (re)insurance undertaking (Article 227)

G.21. When using the deduction and aggregation method for the inclusion of third country (re)insurance undertakings, participants:

- are expected to calculate the solo requirements of the related third country (re)insurance undertaking(s) using the rules laid out in Title I, Chapter VI;
- are also invited to use the local solo requirements that apply to the related third country (re)insurance undertaking(s).

b. Non-EEA headquartered groups that have an EEA subgroup

G.22. Where a group that has its head office outside the EEA has a sub-group in the EEA, groups are expected to calculate group solvency using the Solvency II rules at the level of the EEA subgroup.

[97] http://www.ceiops.eu/media/files/consultations/consultationpapers/CP78/CEIOPS-CP-78-09-L2-Advice-Equivalence-for-reinsurance-and-group-supervision.pdf

G.23. The group calculations should be performed at the level of the ultimate participating undertaking in the Community. Where more than one subgroup exists within the EEA, participants are requested to undertake a group calculation for each subgroup.

c. Reinsurance activities of non-EEA undertakings that reinsure EEA undertakings or groups (Article 172)

G.24. As regards the risk mitigation from non-EEA reinsurers, it is suggested to consider it when doing the calculations either with the standard formula or an internal model.

G.2. Accounting consolidation-based method

G.2.1. *Group technical provisions*

G.25. CEIOPS considers that the group best estimate of insurance liabilities should be the sum of solo best estimate of insurance liabilities with only the elimination of the part of the best estimate resulting from internally reinsured activities in order to avoid double counting of commitments as in the consolidated accounts.

G.26. The group risk margin is a part of group technical provisions and should be recalculated taking into account the diversification between entities within the scope of the group supervision.

G.2.2. *Treatment of participations in the consolidated group SCR*

G.27. The sub-section describes the calculation of the group SCR according to the default method set out in Article 230 (Accounting consolidation-based method).

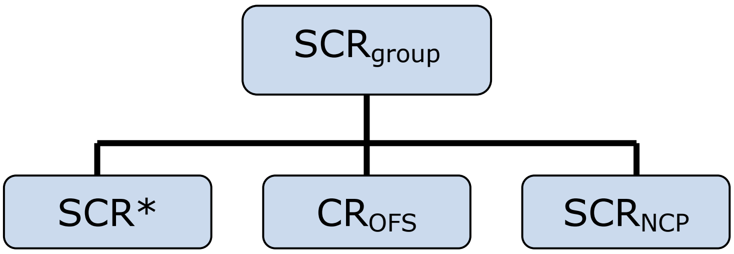
G.28. The treatment of participations at group level should be based on the following criteria:

- the assessment of the participation should be based on economic principles, not just on legal grounds. Control and influence should always be assessed at a group level to determine the significance of participations. This ensures that situations where several entities of a group have small participations in the same undertaking are not overlooked;

- in general, the consolidation approach used for accounting purposes should be used for solvency purposes to the extent that consolidation is based on economic principles suitable for a solvency assessment.

G.29. The component of group SCR in respect of the controlled (dominant influence) insurance entities, SPVs, insurance holding companies and ancillary entities is defined *SCR**. This component is calculated by applying the standard formula to the consolidated data as if it were a single entity and based on QIS5 solo specifications. This means that diversification benefits are recognized between these groups' entities, including between EEA and non-EEA insurance entities and participating business.

G.30. The group SCR – named also *SCRgroup* - is then calculated as the sum of *SCR**, the capital requirement for other financial sectors assessed on the basis of sectoral rules, including IORPs (CR_{OFS}), and the SCR for non-controlled (significant influence) participations (SCR_{NCP}).This can then be shown as a sum of the SCR components as in the diagram below:



G.31. Further detail on specific elements of *SCR**, CR_{OFS} and SCR_{NCP} are set out below.

a. Participations in insurance entities

G.32. When the group's participation in a (re)insurer is regarded as a dominant influence, according to the definition of the Level 1 text, this will imply a full integration of the participation in the accounts or a proportional integration (if there is jointly shared control). In case of a fully integrated participation, minority interests would in turn contribute to cover part of the group SCR, with some limitations,. The same treatment applies to an SPV over which dominant influence is exercised.

G.33. When the group's participation in a (re)insurer is regarded as a significant influence, according to the definition of the Level 1 text, the contribution to the group SCR in respect of the participation should be calculated as the group's share in the participation multiplied by the solo SCR of this participation. This approach is considered consistent with the equity accounting method described in IAS 28. If the solo SCR of the current year is not available, the previous SCR, adjusted for the annual development of premiums for non-life business and technical provisions for life business, should be used. Where data from the previous year are not available,, Solvency I data could be used as a proxy. The contribution of the participation in an

G.34. If the groups deem that following the IFRS consolidation rules for the treatment of SPV leads to inappropriate outcomes they can remove the SPV from the consolidated accounts.

G.35. When the group's interest in a (re)insurer is lower than 20% and is not regarded as a significant influence, the contribution to the group SCR should be calculated by applying the relevant capital charges (inter alia equity risk charge and the concentration risk charge) to the value of the group's interest.

b. Participation in insurance holding companies

G.36. Controlled insurance holding companies shall be consolidated, that is a full integration of the participations in the intermediate insurance holding company and in the insurance undertakings participated by the intermediate insurance holding company is required.

G.37. The insurance holding company will, for the purpose of calculation group solvency, be treated as an insurance entity regarding the calculation of solvency capital requirement and as regards own funds (articles 226 and 235).

c. Participation in ancillary insurance entities

G.38. Controlled ancillary insurance entities should be consolidated through a full integration of the participation in the accounts.

G.39. Ancillary insurance entities are entities of which the principal activity consists in:

- owning or managing property
- managing data-processing services
- or any other similar activity which is ancillary to the principal activity of an insurance undertaking.

G.40. Ancillary insurance entities that are subject to a significant influence should be consolidated through the equity method. Treatment in the group SCR should then be consistent with the treatment in the solo SCR.

d. Participations in other financial sector entities and IORPs

G.41. The contribution of participations (both dominant and significant influence) held in other financial sectors to the group SCR should be the other financial sector's requirements.

G.42. In case of financial non-regulated entity a notional solvency requirement shall be calculated. Notional solvency requirement means the capital requirement with which such an entity would have to comply under the relevant sectoral rules as if it were a regulated entity of that particular financial sector.

G.43. When participations in another financial sector form a group for which a specific capital requirement exists, the latter, (instead of the sum of the requirements of each solo entity) should be used.

G.44. The same criteria (use of sectoral rules) should be applied as regards the assessment of the contribution of participations in institutions for occupational retirement provision (IORPs).

G.45. The capital requirements of participations in other financial sectors and IORPs will form CR_{OFS} which is to be added to SCR^* without recognition of any diversification effects.

e. Participation in non financial sector

G.46. As a general principle, participations in entities outside the financial sector (both dominant and significant influence) should be consolidated through the equity method, this means that the relevant capital charges (inter alia equity risk charge and the concentration risk charge) is to be calculated on the value of that participation. Treatment in the group SCR should then be consistent with the treatment in the solo SCR.

G.2.3. *Additional guidance for the calculation of the consolidated group SCR*

a. Market risk (currency risk)

G.47. Currency risk at group level needs to take into account the currency risk towards the currency of the groups consolidated accounts. Therefore, the local currency referred to in the currency risk calculation of the standard formula is the group currency for the calculation for the group SCR.

b. Adjustment for the loss-absorbing capacity of technical provisions

G.48. See the sub-section on participating business and ring fenced funds.

c. Double use of the loss absorbing capacity of technical provisions

G.49. The loss-absorbing capacity of technical provisions may be double counted. This double counting occurs because the standard formula SCR is calculated according to a modular approach. The overall risk that the undertaking is exposed to is divided into several sub-risks. The capital requirement for each sub-risk is quantified separately and then aggregated to arrive at the solvency requirement for the overall risk.

G.50. CEIOPS would also like to draw the attention of participants to the adjustment done in the standard formula to ensure that there is no double use of the loss absorbing capacity of technical provisions. In the case of a group that includes several with-profits, ensuring that there is no double use is even more complex. For example, where there are several entities writing with-profit within a group, a comparison with the overall value of future discretionary bonuses may not detect a double counting of the risk-mitigating effect relating to one kind of benefits. The limitation of the loss-absorbing effect of future profit sharing to the amount of FDB on the pre-stressed balance sheet needs to be applied to both the loss-absorbing effect at the group level and at the solo level.

d. Adjustment for the loss-absorbing capacity of deferred tax liabilities and assets

G.51. Where the taxation regime applicable to (re)insurance groups does not allow them to benefit from tax integration for all the entities that are part of the group (e.g. cross-border groups), groups may use the following simplification to assess the adjustment for the loss-absorbing effect of deferred taxes at group level:

G.52. Where the taxation regime applicable to insurance groups does not allow them to benefit from tax integration for all the entities part of the group (e.g. groups that are not part of the same fiscal group), the adjustment for the loss-absorbing effect of deferred taxes at group level is the sum of the adjustments at solo level. For entities included in the calculation of SCR* (for which diversification is recognised), groups may use the following simplification to assess the adjustment for the loss-absorbing effect of deferred taxes at group level:

$$Adj_{DT}^{Group} = \sum_i Adj_{DT,i}^{solo} \times \frac{SCR^*}{\sum_i SCR_i^{solo}}$$

where:

the index (i) covers all entities of the group included in the calculation of the SCR* and:

$Adj_{DT,i}^{solo}$ is the solo Adjustment for the loss-absorbing effect of deferred taxes of entity i (at solo level)

SCR_i^{solo} is the solo SCR of entity i (at solo level), after adjustment for the risk absorbing effect of future profit sharing and before adjustment for loss absorbing effect of deferred taxes

$\frac{SCR^*}{\sum_i SCR_i^{solo}}$ the ratio should be considered as a proportional adjustment due to diversification effects

G.53. Whenever possible, the above mentioned simplification should be calculated net of intra-group transactions as regards the solo SCR and the adjustment for deferred taxes at solo level in order to improve the accuracy of the simplification.

G.2.4. *Floor to the group SCR*

a. General considerations

G.54. A group SCR floor applies when using the default method (not when using the D&A method) and is equal to the sum of the solo MCR.

G.55. The solo MCR used for the group SCR floor calculation shall be the MCR determined after applying the corridor referred to in Article 129(3) or after applying the absolute floor referred to in Article 129(1)(d).

G.56. The calculation of the proportional share of the MCR set out in article 230(2)(b) shall consider the proportional share of the related undertaking that is included in the consolidated accounts (i.e. covered with minority interests when these are included as group own funds).

G.57. Therefore, when the proportional share used in the consolidated accounts is 100% for a related undertaking (either corresponding group participation or minority interests participations treated as group own funds), the proportional share of article 230 (2)(b) shall be 100 per cent.

G.58. The contribution of non-EEA entities and other financial sector entities to the group SCR floor should be the local capital requirement corresponding to the final intervention point of the local supervisor.

b. Guidance for the calculation of the equivalent of the MCR for non- EEA entities

G.59. The local MCR for non-EEA entities to be taken into account when calculating the group floor should be the legal level under which the authorisation will be withdraw in the third country.

G.60. Some jurisdictions include a formulaic approach to measure available and required capital and hence derive a mathematical result that could be compared to the MCR. The local triggers below are suggested for QIS5. Comments are welcomed on the appropriateness of those local MCR (level under which the authorisation will be withdrawn in the non EEA jurisdiction):

- Japan: 200% of the Solvency Margin Ratio (SMR). Due to a quirk in the regulations, the SMR ratio is multiplied by a factor of two so, to ascertain the real solvency ratio, therefore considering that the equivalent MCR is SMR at 200% (consistent with a ratio of available capital to required capital at 100%).

- United States: example: the authorized control level (100% of the Authorized Control level - first point where it affects the ability of the company to write new business - the regulations also allow the supervisor to take over control of the entity) is equivalent to the MCR.

- Switzerland: the Swiss Solvency Test (SST) defines three intervention thresholds based on the SST ratio. Only the third zone implies ultimate action to be taken by the regulator to protect policyholders. Where it is not possible for an insurance undertaking to initiate suitable measures and where the measures ordered by FINMA also do not result in success in the short term, FINMA will revoke the insurance undertaking's authorisation. Therefore the threshold 3 (33% of the Target Capital) can be considered to be the equivalent to the MCR in the Solvency II framework

G.2.5. *Consolidated group own funds*

G.61. When applying the default method, eligible own funds at group level should be assessed as follows.

a. Step 1 - Balance sheet according to accounting consolidation rules (IAS/IFRS)

G.62. The balance sheets of all entities belonging to the group, including both EEA and non-EEA entities, are consolidated according to the accounting consolidation rules. As a result, intra-group transactions and internal creation of capital are eliminated.

b. Step 2 - Regulatory balance sheet according to Solvency II rules

G.63. Group own funds should be valued in accordance with the solo (market consistent) valuation specifications for the insurance undertakings of the group.

G.64. Own funds related to other financial sectors and IORPs should be valued according to the relevant sectoral rules, consistently with the Financial Conglomerate Directive.

c. Step 3 - Contribution of non available own funds of the related undertakings to group own funds (Minority interests are treated separately)

G.65. According to Article 222(3) of the directive, in addition to own funds referred to in paragraph 2 of the same Article (surplus funds and any subscribed but not paid-up capital), supervisory authorities may consider that other own funds can also not effectively be made available to cover the SCR of the participating insurance undertaking for which the group solvency is calculated. Such non-available own funds may cover the group SCR only in so far as they are eligible for covering the SCR of the related undertaking.

G.66. Own funds to which the group supervisors should pay particular attention are indicated in subsection 2.6 of that section.

G.67. For each related undertaking, the global amount of solo non-available own funds should be considered available for covering the group SCR up to the contribution of solo SCR to group SCR.

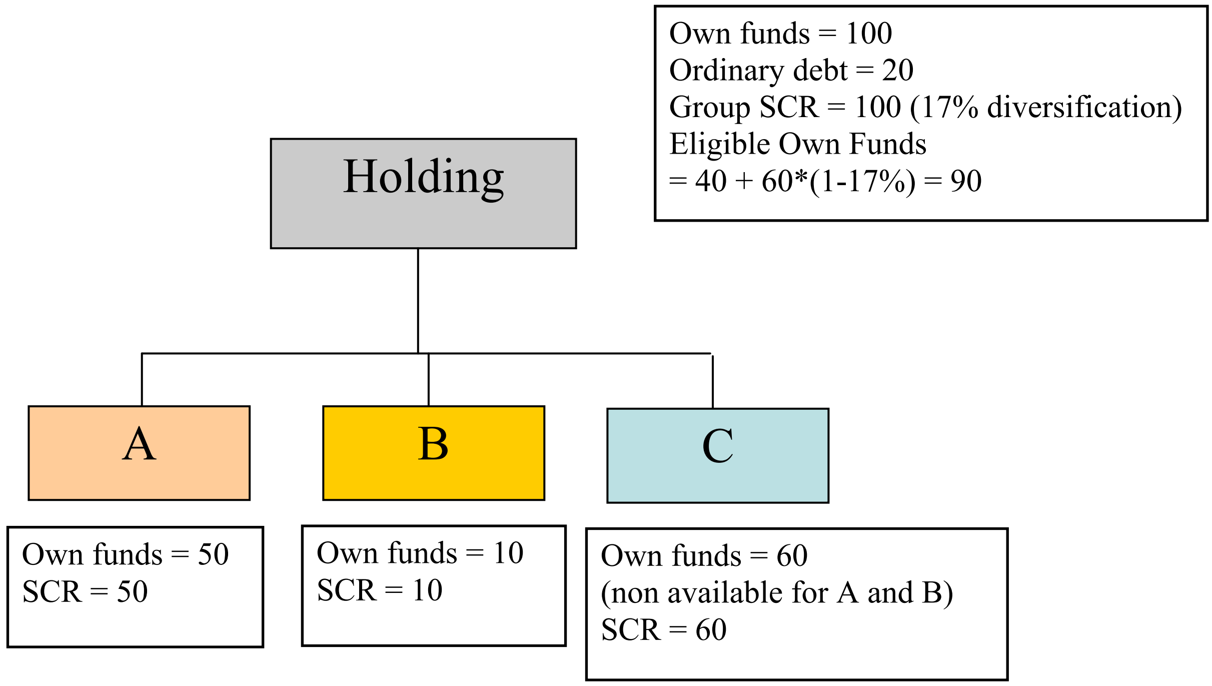
G.68. In order to assess the contribution of solo SCR to group SCR from entity j $\left(Contr_j\right)$ included in the calculation of SCR* (the entities for which diversification is recognised), the following proxy should be used:

$$Contrj = \quad SCRj \times \frac{SCR^*}{\sum_i SCR_i^{solo}}$$

where:

- the index (i) covers all entities of the group included in the calculation of the SCR*
- SCR_i^{solo} is the solo SCR of entity i
- SCR_J is the SCR of undertaking j
- the ratio can be considered as a proportional adjustment due to diversification effects

G.69. Without such a limitation of availability of solo own funds, own funds available to cover the SCR* would be overestimated, as shown in the example below.



If the own funds non available for all the group are not reduced by a factor to take into account diversification, in such a case, the group seems to cover its capital requirements while only 40 of real own funds (after elimination of internal creation of capital via ordinary debt - that only the group supervisor can see) are available to cover risks coming from A and B that contributes for 50 to the group SCR

G.70. As already stated in QIS4, CEIOPS is aware of the fact that this proposed approach results in a simplification, since there is no specific reason for which diversification benefits should come 'equally' from each undertaking of the group (that is to say that the possible reduction of the SCR obtained at group level comes equally from each undertaking, in proportion of their solo SCR).

G.71. The effect of such limitation of availability of solo own funds (using the theoretical contribution of the solo SCR to the group SCR) may affect the extent to which eligible own funds in subsidiaries are included in group available own funds.

G.72. As regards the undertakings operating in the other financial sectors, the same non available own funds can contribute to the coverage of the group SCR only in so far as they are eligible to meet capital adequacy requirements as established in applicable sectoral legislation, and only within the limits provided therein.

G.73. As a result, the global amount of non available solo own funds which are available to cover the group SCR is equal to the amount up to the sum of the contributions to group SCR at solo level, after the elimination of double use of eligible own funds (see Article 222 of the Level 1 text), and it does not stem from the consolidated balance sheet.

G.74. For undertakings using an internal model the attribution of diversification can be carried out using the internal model. Participants are invited to explain the method used for allocating diversification effects when using an internal model.

d. Step 4 - Available group own funds

G.75. The available group own funds (AGOF) to cover the group SCR can be calculated by deducting from the regulatory group own funds the sum of non available solo excess own funds (determined for each entity included in the regulatory consolidated balance).

e. Step 5 - Eligible group own funds

G.76. In order to be considered eligible to cover the SCR* and SCR_{NCP} the available group own funds (AGOF) must comply at group level with the tiers limits applied at solo level.

G.77. As regards the undertakings operating in the other financial sectors, consistently with the method 1 of the Financial Conglomerate Directive, the elements eligible at group level are those that qualify in accordance with the relevant sectoral rules.

G.2.6. *Availability of certain own funds for the group*

G.78. As mentioned above, there may be restrictions on availability of certain own funds which have to be considered when assessing the available own funds at group level.. Supervisors should pay particular attention to at least the following items:

a. Eligible own funds related to participating business and ring fenced funds

G.79. See the sub-section on participating business and ring fenced funds.

b. Eligible ancillary own funds

G.80. Under Article 222(5), any ancillary own funds of a related insurance undertaking for which the group solvency is calculated may only be included in the calculation in so far as the ancillary own funds have been duly authorized by the supervisory authority responsible for the supervision of that related undertaking.

G.81. CEIOPS considers those ancillary own funds may be included in the calculation only in so far as they are eligible for covering the SCR of the related undertaking and up to the contribution of the related undertaking to the group SCR.

c. Hybrid capital and subordinated liabilities

G.82. Hybrid capital and subordinated debts cannot, in principle, be considered as available to cover the SCR of the participating undertaking if they are not issued or guaranteed by the ultimate parent undertaking of the group. This depends on the rights of the subscribers on the revenues of these instruments. In particular, subordinated liabilities issued by group undertakings are normally only available to support the business of the issuing undertaking because of its legal liability to subscribers to those debts.

G.83. Hybrid capital instruments and subordinated liabilities issued by undertakings other than the ultimate parent undertaking should be admitted to contribute to the coverage of the group SCR only in so far as they are admitted for covering the SCR of the related undertaking and up to the contribution of the related undertaking to the group SCR.

G.84. The same instruments issued by an undertaking operating in another financial sector can contribute to the coverage of the group SCR only in so far as they are eligible to meet capital adequacy requirements as established in applicable sectoral legislation, and only within the limits provided therein.

G.85. If the subordinated liabilities contribute to the group SCR for a total in excess of their contribution to the solo SCR, participants are requested to indicate the amount of such contribution, explain the modalities applied, indicate the relevant national rules.

d. Eligible own funds related to deferred tax assets

G.86. Where the taxation regime applicable to insurance groups does not allow them to benefit from tax integration for all the entities part of the group (e.g. groups that are not part of the same fiscal group), eligible own funds related to deferred tax assets may be included in the calculation of the group own funds only in so far as they are eligible for covering the SCR of the related undertaking and up to the contribution of the related undertaking to the group SCR.

e. Participations in non-EEA insurance entities

G.87. All insurance undertakings of the group are captured in the group SCR calculations, including any non-EEA insurance undertakings.

G.88. As regards the calculation of group own funds, there may be specific cases where the own funds in excess of the solo SCR are effectively non available for use elsewhere in the group within a maximum period of time of 6 to 9 months (Article 138.3).

G.89. In such cases, eligible own funds in non-EEA are available to meet the SCR of the participating undertaking only in so far as they are admitted for covering the SCR of the non-EEA undertaking and any excess own funds is not available at group level.

f. Minority interests

G.90. Any minority interests in the available own funds exceeding the SCR of a related undertaking should not be considered as effectively available for the group.

G.91. Given that the SCR of the group is less than the sum of the solo requirements due to the recognition of some diversification benefits, it will not be possible to calculate directly the contribution of minority interest of a subsidiary to the group SCR.

G.92. In order to calculate such a contribution from the minority interests of subsidiary j $(Contr_j)$ for which diversification is recognised, the following proxy should be used:

$$Contr_{mi-j} = SCR_{mi-j} \times \frac{SCR^*}{\sum_i SCR_i^{solo}}$$

where:

- the index (i) covers all entities of the group included in the calculation of the SCR*
- *SCRmi-j* refers to the contribution of the minority interest of the subsidiary j to the solo SCR
- the ratio can be considered as a proportional adjustment due to diversification effects

G.93. The effect of such theoretical assessment of contribution to the group SCR may affect the inclusion within eligible group own funds of a minority interest in the SCR of a subsidiary. Participants are invited to suggest any alternative method for allocating diversification effects when using an internal model.

G.3. Deduction and aggregation method

G.94. This section details the application of the deduction and aggregation (D&A) method for calculating group solvency (alternative method). Under this method, rather than applying the standard formula to the consolidated accounts, group solvency is assessed through the sum of the solo solvency capital requirements and own funds of the participating undertaking and of the proportional share of its related undertakings.

G.95. This should include non-EEA insurance undertakings, financial regulated entities as well as insurance holding companies (pursuant to Articles 226 and 235).

G.96. When using the deduction and aggregation method for the inclusion of third country (re)insurance undertakings, participants:

- are expected to calculate the solo requirements of the related third country (re)insurance undertaking(s) using the rules laid out in Title I, Chapter VI;

- are also invited to use the local solo requirements that apply to the related third country (re)insurance undertaking(s).

G.97. The treatment of participations in particular types of entities at solo level will be reflected in the aggregated group SCR. For participations in non-financial entities there should be at least a standard equity risk charge in the solo SCR of the participating entity to ensure a consistent approach with the accounting consolidation method. Any risks arising from non-financial entities (which will have neither an SCR nor notional SCR) should be assessed in the context of group-specific risks.

G.3.1. *Aggregated group SCR*

G.98. The aggregated group SCR is the sum of the following:

- the SCR of the participating undertaking;

- the proportional share of the SCR of the related undertakings.

G.99. The unadjusted sum of the solo SCRs of each group entity will be calculated from the output of the solo spreadsheets in order to identify any intra-group diversification effects when comparing this method with the accounting consolidation method.

$$\text{unadjusted}\, SCR_{group} = \sum SCR_{solo-unadjusted} + CR_{ot}$$

G.100. The 'solo unadjusted SCR' is the SCR of each solo undertaking that has not been adjusted to account for any intra-group transactions. CRot is defined as the sum of the capital requirements for all other group businesses where a solo-unadjusted SCR cannot be readily calculated.

G.101. However, the D&A method needs to be adjusted for intra-group transactions in order to produce an accurate group solvency position. When the default method is applied, these transactions are eliminated automatically, but not where a pure aggregation approach is applied. In the deduction and aggregation method adjustments are needed to eliminate market and counterparty risk charges on intra-group transactions in the aggregated group SCR to ensure that those risk charges are not added twice (i.e. there is no double charge by adding the risk charges in both the participating and related undertaking).

$$SCR_{group} = \sum SCR_{solo-adjusted} + CR_{ot}$$

G.102. Therefore, there should be two results for the aggregated group SCR – the unadjusted aggregated group SCR and the adjusted aggregated group SCR.

G.103. In practice, the ‘solo adjusted’ SCR would be calculated for SCRMkt and SCRdef in the following manner:

- Regarding SCR_{Mkt}, the idea is to say that the shocks prescribed in a scenario based approach do not affect the intra-group transactions. With a factor based approach, there is a zero charge for intra-group assets.[98]

- Regarding SCR_{def} the capital charge stemming from default risk of intra-group cedants (that is risks transferred into another entity of the group) should be taken to be equal to zero.

G.104. Groups may take into account materiality considerations in calculating the adjustment for intra-group transactions. In that case, participants should explain what materiality rule was used, as well as its rationale. Participants may wish to focus on the most material intra-group transactions, e.g. financial reinsurance arrangements, loans, etc.

G.3.2. *Aggregated group own funds*

G.105. The aggregated group eligible own funds are the sum of the following:

[98] NB: the ‘adjusted’ concentration charge is the solo concentration minus the concentration charge due to intra-group assets.

- the own funds eligible for the SCR of the participating undertaking;

- the proportional share of the participating undertaking in the own funds eligible for the SCR of the related undertakings.

G.106. In order to eliminate the potential for double gearing, the own funds in each group entity should be based on an assessment of the solo own-funds after the deduction of participations and subsidiaries and removal of other intra-group arrangements. As under this option no diversification benefits are being considered in assessing the group SCR, there should be no adjustments in the capital resources reflecting diversification benefits.

G.4. Use of an internal model to calculate the group SCR

G.107. The Directive also permits the Group SCR to be calculated using an internal model, or for elements of the Group SCR (also for some entities) to be calculated using a partial internal model. As well as providing the information requested above on the different options on the Group SCR Standard Formula, groups are also invited to provide information on the calculation of the Group SCR using a full or partial internal model. If an internal model has been used to calculate the Group SCR or to calculate any elements of it, please refer in addition to the questions specific to internal models at the end of that section to the one on internal model for the general qualitative questionnaire and data requests on internal models.

G.5. Combination of methods (optional)

G.108. CEIOPS has proposed an optional calculation whereby groups may choose to combine the accounting consolidation and deduction and aggregation methods. In practice, this means that at least one entity within the scope of the group is subject to a different method.The objective of this option is to test the discretionary provision in Article 220(2) that allows the group supervisor to ask, after consulting the other supervisors concerned and the group itself, for the use of the deduction and aggregation method or a combination of both the methods. Possible situations where supervisors would assess the use of the alternative method, include issues around:

- the quality and amount to information available in relation to a related undertaking in order for it to be subject to the accounting consolidation

- the extent to which a related undertaking is covered by the group risk management and internal control systems and the group reporting procedures set out in Article 246

- entities that fall within the scope of an internal model

- the level of complexity in the calculation arising from a combination approach, such that the accounting consolidation method would be overly burdensome and the use of the deduction and aggregation method does not materially affect the quality of the group calculation.

G.109. In QIS 5, groups are free to decide, in consultation with the group supervisor, which entities are subject to each method.

G.110. When using the combination of both admissible methods, the group SCR floor should be applied. In such case, the group SCR floor defined in Article 230(2) should only apply to the insurance part of the group covered by the consolidated method (i.e. by comparing the sum of the MCR of the entities covered by the consolidated method to the part of the group SCR calculated with that method).

G.6. Treatment of participating businesses and ring fenced funds

G.6.1. *General comments on group SCR calculation and loss absorbing capacity of technical provisions*

<u>Summary of how loss absorbing capacity of technical provisions is taken into account in the standard formula</u>

G.111. Technical provisions best estimate includes future discretionary benefits to be given to policyholders (FDB). For each of the sub-modules of the standard formula, a gross and a net calculation are done. The gross calculation does not include any management actions (and therefore changes in the FDB) assumed to happen following a given shock. The net calculation does include plausible management actions in response to the shock being tested (and therefore reasonable expectations of changes in future bonus rates). Gross and Net calculations are then aggregated and the reduction for the loss absorbing capacity of technical provisions shall be determined as the difference between the two. The adjustment cannot be higher than the amount FDB at t=0 to avoid any double use of that mitigant.

G.112. An alternative, equivalent scenario approach can also be used to take into account the loss absorbing capacity of technical provisions, in that case the reduction can also not be higher than the amount of FDB at t=0. This is also done by comparing the aggregation via the standard formula correlation matrixes of gross and net capital charges.

G.113. The last steps of the calculation of the Solvency Capital Requirement include the addition of the capital requirement for operational risk and a deduction of the loss absorbing capacity of deferred tax liabilities and assets. Deferred taxes assets, however, may only be taken into account up to the amount that stays available under stressed situations. Where under stress the asset may disappear, no allowance should be made.

G.114. Where undertakings within a group write participating business, there may be items profit sharing mechanisms within the technical provisions, which can only be used to cover the liabilities for a limited set of policyholders within a legal entity. It is all the more important to identify those items at group level as there can exist several participating businesses stemming from different countries with their own specificities. As a result, the straight application of the standard formula to the consolidated accounts is complex and requires specific attention.

G.115. If an arrangement is considered as ring-fenced fund at solo level, it has also to be considered ring fenced in the consolidated accounts. As a consequence, any adjustment done for the calculation of the capital requirement and own funds at solo level for those funds will apply, mutatis mutandis, at group level when calculating the group SCR and own funds. Therefore, as far as ring-fenced funds are concerned, participants should refer to section 5 of the QIS5 specifications.

G.116. The group net calculation should include the allowance of plausible management actions at the group level and consistent management actions at the solo level in response to the shock being tested (and therefore reasonable expectations of changes in future bonus rates).

G.117. Participants' attention is drawn to the fact that the loss-absorbing effect of technical provisions may be limited to certain parts of the group because of contractual or legal constraints (e.g. the legal entity of origin). When calculating the adjustment for the loss-absorbing effect of technical provisions at group level, participants should ensure that the assumptions they make are consistent with any such contractual or legal constraints in this regard (see example below).

G.6.2. *General comments on available own funds*

G.118. In QIS4, guidance for the treatment of certain participating businesses were provided for the purposes of group solvency and available group own funds. At the same time QIS4 tested an approach to ring fenced funds at the solo level. With the finalisation of CEIOPS advice in respect of the latter it is now appropriate for QIS5 to reflect the impact of the ring fenced funds adjustments at group level.

G.119. Where the default method is applied the group will need to identify any subsidiary for which a ring fencing adjustment has been made either to the SCR or to both the SCR and available own funds. Under the deduction & aggregation method the effects of ring fencing adjustments will automatically be carried forward to the group calculations and no further adjustments are required.

G.120. If at solo level the only ring fencing adjustment is the recognition of the impact of a profit sharing mechanism in respect of the outcome of bi-directional scenarios, the same methodology as applies at solo level should be adopted at group level (see SCR section). However, in the group calculation this would have regard to the worst case scenario for the group as a whole.

G.121. Where at solo level in addition to the SCR impact described, own funds within a ring fenced fund are restricted so that only the amount meeting the notional SCR calculated for the ring fenced fund is treated as available, the same approach will need to be adopted at group level. Own funds within a solo ring fenced fund can be regarded as available group own funds to the extent they are meeting the notional SCR for the ring fenced fund. The notional SCR will need to be adjusted from that calculated at solo level so that it represents the relevant contribution to the consolidated group SCR. The adjustment methodology set out in step 3 of group own funds calculations should be applied as a proxy to establish the contribution of the notional SCR of the ring fenced fund to the group SCR ie the ratio of SCR* to the sum of all solo SCRs should be applied to the notional SCR of the ring fenced fund.

G.122. Under both the accounting consolidation and deduction & aggregation methods however there will be a need to identify any undertakings which do not have ring fencing adjustments at solo level but for which ring fencing adjustments are required at group level (i.e. restrictions on own funds at group level). This might only arise where the whole of the business of the solo undertaking comprises one ring fenced fund. The solo methodology would then apply as though that undertaking were a ring fenced fund and the group the undertaking of which it forms a part, in respect of the accounting consolidation method. If this situation were to apply in the case of a method 2 calculation the amount of own funds in excess of the solo SCR would be excluded from available group own funds.

G.123. It follows from the above that groups will need to ensure that they are aware of the nature of arrangements and the national specificities which apply in the jurisdictions in which their related undertakings operate and which might give rise to ring fenced funds in one jurisdiction even if they do not have the same effect in the jurisdiction of the parent undertaking.

G.6.3. *Example for the calculation of the group SCR with the consolidated method in the case of several participating businesses*

G.124. The following example aims at drawing the attention of participants on the calculation of sub-modules or modules of the standard formula via a scenario in a group context.

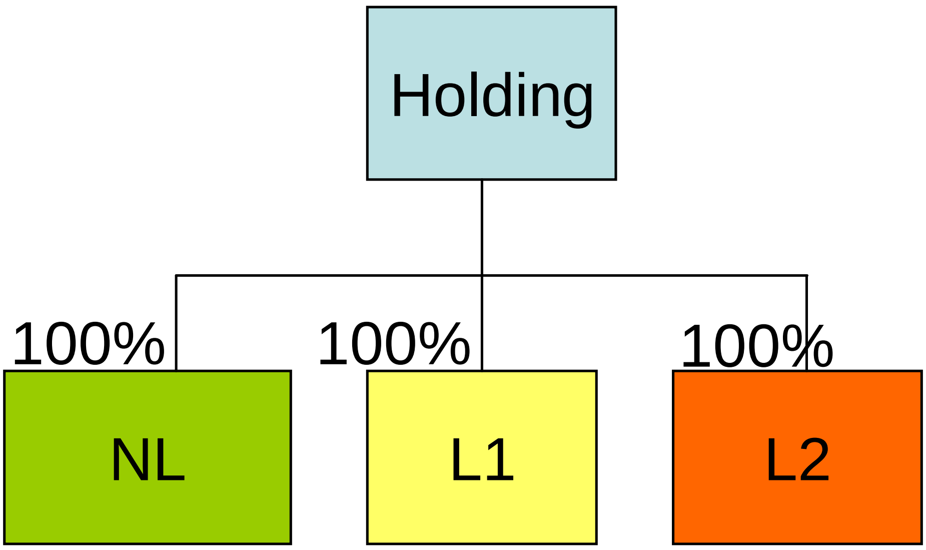
G.125. Let's consider a group with 3 insurance undertakings and one holding. The only activity of the holding is to hold the 3 insurance undertakings: NL, L1 and L2:

- NL is a non-life insurance undertaking of the country X

- L1 is a life undertaking writing participating business attributing to policyholders the maximum of the minimum guaranteed rate of 2% and 90% of its financial products of L1 of the country Y

- L2 a life insurance undertaking also writing participating business attributing to policyholders 95% of the return on assets of L2 of the country Z.

G.126. The following scheme illustrates the structure of the group where no intra-group transactions occur.



G.127. For the purpose of the example, the interest rate risk sub-module will be considered.

G.128. The table below summarises the impact for the solo undertakings and the group of the interest rate shock.

		NL	L1	L2	Group
FDB at t=0	FDB	**0**	**40**	**10**	**50**
Up shock	Delta NAV IR up gross	-50	-20	+60	-10
	Delta NAV IR up net*	-50	+10	+50	+10
	Demand for FDB	0	30	-10	20
	Offered FDB	0	40	10	50
	Resulting FDB	0	10	20	30
	Resulting Delta NAV IR up net**	**-50**	**+10**	**+50**	**+10**
Down shock	Delta NAV IR down gross	+20	+10	-45	-15

	Delta NAV IR down net*	+20	-5	-25	-10
	Demand for FDB	0	-15	20	5
	Offered FDB	0	40	10	50
	Resulting FDB	0	55	0	55
	Resulting Delta NAV IR down net**	**+20**	**-5**	**-35**	**-20**
IR capital charge	Delta NAV IR	**-50**	**-5**	**-35**	**-20**

* before FDB limit applied
** after FDB limit applied

G.129. The example illustrates a case where the impact of the interest rate shock is much lower at group level than at solo level as the undertakings within the group have opposite sensibility to that risk within the group. It also shows the importance being sure that the offsets between positives and negative effects coming from different part of the groups observed in the example are fully justified.

G.130. In more detail, if we look at the calculation of down shock, the global decrease of 20 for the group comes from:

- an increase of 20 for the non life business coming from NL
- a decrease of 5 for the business of L1
- a decrease of 25 for the business of L2, however the loss-absorbency capacity of the FDBs within L2 is limited to 10 and hence a decrease of 35 for the business of L2 applies

It has to be ensured that all the legal and contractual commitments and appropriate management actions have been included for business of the group underwritten by L1 and L2.

G.131. It would not seem appropriate not to distinguish the change of net asset value for the assets and liabilities coming from L1, L2 and the rest of the group (NL here). For example, the down shock on interest rate on the business of L2 will have an impact on the liability coming from that entity that depends not only on the change of the discount rate but also on future discretionary benefits for L2 policyholders. Those future discretionary benefits depend only on the return on assets of L2 (and not of the others assets of the group) and that has therefore to be reassessed separately. The rationale also applies when an equivalent scenario is used for group calculation.

G.132. Once those calculations have been done for each participating business and the rest of the business ensuring that all relevant constraints have been taken into account, then potential offsets of positive and negative effects can be done to find here the global impact of the decrease of interest rate at the group level.

G.7. Guidance for firms that are part of a subgroup of a non-EEA headquartered group

G.133. Undertakings that are part of a wider third country group (i.e. where the ultimate worldwide parent undertaking is located outside the EEA) and that are also part of an EEA subgroup are expected to participate in the QIS 5 exercise.

G.134. Where a subgroup exists in the EEA, the group calculations should apply with respect to that subgroup pursuant to Article 213(2)(a) and (b). The EEA subgroup is expected to apply the group calculations in the same manner as an EEA group. Firms should look to where any current IGD calculations apply as an indicator of where the calculations should be performed.

G.135. There might also be circumstances where more than one subgroup of a non-EEA group exists within the EEA. Where such a situation arises, each subgroup should apply the group calculations separately at the level of the ultimate parent in the EEA. This is consistent with the application of Article 213(2)(a) and (b).

G.136. It is recommended that the sub-groups use only the two admissible methods (the accounting consolidation method and the deduction & aggregation method). The other optional calculations as mentioned in section "Description of the methods" are not required from the sub-groups.

G.137. Where the subgroup undertakes the group calculations on the basis of a group internal model, such calculations should be provided to the group supervisor(s) of that subgroup(s).

G.138. All other parts of group technical specifications should be applied *mutatis mutandis* at the level of the subgroup.

G.8. Guidance for running the QIS5 exercise at a national or regional sub-group level

G.139. Articles 216 and 217 provide for the possibility to apply group supervision to the ultimate parent undertaking at a national or regional level. Such sub-group supervision can be implemented if a Member State uses the national option mentioned in Article 216 and the competent supervisory authority then exercises the right to exercise group supervision at the level of the ultimate parent undertaking at a national or regional level.

G.140. Since the supervision of sub-group solvency is one of the key elements of sub-group supervision, CEIOPS considers it useful to test the calculation at the sub-group level during the QIS5 exercise. The calculation might be helpful for both – the sub-group to ease the preparation for future implementation of Solvency II and the relevant competent authority to get a picture about the impact of a sub-group SCR calculation. Such a calculation should only be done on an optional basis.

G.141. During the preparation of the QIS5 exercise the supervisory authorities should approach the ultimate parent undertakings at national level which are on top of such sub-groups and discuss with them the possibility to run the QIS5 exercise at the level of the sub-group. Where agreement is reached that a subgroup calculation will be carried out for QIS5, the group supervisor should be informed. Consensus should be reached amongst relevant national supervisors if a regional subgroup calculation is sought.

G.142. To be clear, national and regional subgroup calculations are only required for QIS 5 where they are asked for by national supervisors.

G.8.1. *Scope of the sub-group at a national or regional level*

G.143. The scope of the subgroup should be the same as prescribed in the introduction in the part related to the scope so that consolidation is undertaken at the level of the ultimate parent undertaking at national or regional level. Firms should look to where any current IGD calculations apply as an indicator of where the calculations may be performed.

G.8.2. *Methods*

G.144. Since the Framework Directive does not foresee any specific requirements to be applied by the sub-groups, the technical specifications shall be followed by the sub-groups. In order to minimise the burden of calculations on several levels, it is recommended that the sub-groups use only the accounting consolidation method and the deduction & aggregation method.

G.145. In case the whole group submits also the QIS5 results based on group internal model and this model enables to calculate the sub-group's SCR, such calculation should be provided to the group and national supervisors.

G.146. The other optional calculations as mentioned in section "Description of the methods" would not be required from the sub-groups.

G.147. All other parts of group technical specifications should be applied mutatis mutandis at the level of the subgroup.

G.9. Questionnaire for Participating Groups

When preparing the spreadsheets, it will be decided whether some questions will be directly incorporated in the spreadsheets rather than in a "pure" qualitative questionnaire.

Level of preparedness and reliability

QG.1. Please describe and assess your groups' level of preparedness in preparation to Solvency II especially with regard to the SCR and own funds calculation. Please identify which of the sentences below best describes your situation (it can be more than one; please indicate your situation if none of these applies to your case).

a) Fully prepared, all data available and no problems with methodologies;

b) No problem with data, but problems with methodologies;

c) Some problems with the data;

d) Problems with some undertakings from the group;

e) None.

QG.2. What level of resource (in full-time equivalent months) was required to complete the group aspects of QIS5?

QG.3. Did you experience any difficulties while following the group level technical specifications? (Y/N) Participants who did are invited to describe these difficulties identifying the areas.

a) Technical specifications were not sufficient;

b) Technical specifications were sufficient but should be further clarified.

Scope of the group and data

QG.4. Please describe any differences between the scope of entities subject to group supervision and the scope of entities that make up the consolidated accounts. Please describe which companies were included/excluded and why.

QG.5. In particular, if you have considered that following the IFRS consolidation rules for the treatment of SPV leads to inappropriate outcomes they can remove the SPV from the consolidated accounts, please comment the reasons of such a choice as well as the consequences for the calculation of own funds and SCR.

QG.6. 2009 annual accounts may be taken as a starting point which should be adjusted for material differences with QIS5 valuation standards. Where this was not possible, please describe the reason(s) and impact(s).

QG.7. Did you experience any major practical difficulties while producing group data for QIS 5? (Y/N) In affirmative case:

a) Identify the type of data for which difficulties were encountered.

b) Which were the major practical difficulties?

c) How did you solve these problems?

d) Where, from you point of view, specific guidance is needed?

Group SCR

QG.8. Which methods did you use?

a) Method 1 (Accounting consolidation-based method);

b) Method 2 (Deduction and Aggregation);

c) Combination of method 1 and 2;

d) Internal model;

i. If yes, is the model partial?

ii. If yes, does the model allows for diversification between the different entities

Combination of methods

QG.9. Did you provide the optional calculation using a combination of the consolidated method and the deduction and aggregation one? (Y/N) If this was the case, you are invited to clearly:

a) Identify the entities which have been consolidated or aggregated;

b) Provide an explanation as to why they have chosen to consolidate or aggregate different entities;

c) Assess the impact this has on group solvency. For example, what are some of the economic reasons why a group would aggregate an entity rather than consolidate it into the calculations.

QG.10. CEIOPS would also welcome comments on the advantages and disadvantages of a combination approach in assessing the risk profile of the group.

QG.11. It is important that the same set of group entities is included in all the calculations to ensure the comparability of the results of the different method applied. Where this was not possible, please note the differences.

Group SCR (standard formula)

QG.12. Did you experience any difficulties when calculating the group SCR? (Y/N) If so, where would additional guidance be required?

QG.13. Did you experience any difficulties following the simplification for the adjustment for the loss-absorbing effect of deferred taxes? (Y/N) Please describe if the approach doesn't fit to your group and which one would fit better.

QG.14. CEIOPS welcome participants' feedback on the materiality of the issue of double use of the loss absorbing capacity of future discretionary benefits at group level and potential ways to alleviate it.

Group Specific risks (standard formula and internal model)

QG.15. Under QIS 5, operational risk is calculated in the same way for a group and a solo undertaking. Do you consider that operational risk is covered properly in a quantitative way in the SCR calculation? (Y/N) Participants are invited to provide evidence on the effect on operational risk exposures (including legal risk) across different group entities (reduction or increase).

QG.16. In order to reflect the total risks that the group may face, the group SCR should reflect the risks that arise at the level of the group and that are specific to the group. Particular attention should be paid to any specific risks existing at the group level (group specific risks) that would not be sufficiently covered by the standard formula or the internal model used, because they are difficult to quantify.

a) Please give detailed information (quantitative and qualitative) on how you addressed the following group specific risks in particular:

i. contagion risk

ii. conflict of interest

iii. reputational risk

iv. strategic risk

v. intra group transaction and concentration risk

vi. internal reinsurance

vii. currency risk (in the standard formula)

b) If the group uses internal models please include any negative effects considered, method applied, back testing, etc..

Own Funds

QG.17. Did you experience any specific difficulties in the calculation of group own funds? (Y/N) If so, please describe which and whether additional guidance would be needed.

QG.18. Are there, in your specific case, any legal or other barrier that may conflict the free transfer of surpluses in the following cases:

a) From Non-EEA entities to the group? (Y/N)

b) From participating business? (Y/N)

c) From ring fenced structures? (Y/N)

d) From other sectors entities? (Y/N)

e) From non regulated entities? (Y/N)

If you have answered "yes" in any of the previous cases, please provide details.

QG.19. Do subordinated liabilities contribute to the coverage of the group SCR for a total in excess of their contribution to the solo SCR? (Y/N) If so, participants are requested to:

a) Indicate the amount of such contribution;

b) Explain the modalities applied; and

c) Indicate the relevant national rules.

Other financial sectors

QG.20. Participants are asked to give detailed information on how they treated credit institutions, investment firms and financial institutions (see Article 228 of the Level 1 text).

a) Did you apply method 1 or 2 of the Annex 1 of the Directive 2002/87/EC?; or

b) Those participations were deducted from the group own funds?

QG.21. Do you consider that further guidance is needed for the treatment of credit institutions, investment firms and financial institutions) (Y/N) If so, regarding which specific aspects?

QG.22. Do you consider that further guidance is needed for the treatment of IORPs, unregulated financial entities and unregulated non-financial entities belonging to your group? (Y/N) If so, regarding which specific aspects.

Non-EEA entities

QG.23. Participants are invited to rank in order of importance the key non-EEA jurisdictions for the purposes of their group calculations.

QG.24. In addition, participants are invited to give a list of the jurisdictions of non-EEA reinsurers and their importance in their reinsurance programmes.

Others

QG.25. Are there any views you wish to express which can not be covered elsewhere?

G.10. Qualitative questionnaire related to group internal models

Scope of the model

QGIM1. Please describe the scope of your internal model and how you chose it for the group calculation, both in terms of risks and of legal entities. In the other way around, which risks and/or undertakings are excluded from the scope of internal model and why?

QGIM2. Do you have processes in place to assess the materiality (in a quantitative or qualitative way) of risks/entities excluded from the scope of the model? If yes, what are your main drivers to assess this materiality?

QGIM3. Do you plan to use your group internal model to assess and report the SCR for solo undertakings within the group?

QGIM4. If you do not intend to use the group internal model to derive the solo SCR for some undertakings which are included in the scope of the group internal model, please provide the rationale for this choice. Would these undertakings use a different solo internal model or would they use the standard formula?

Technical characteristics of the model

QGIM5. If you should choose one of the sentences hereunder to describe your internal model, which one would it be?

(a) At the ultimate level of the group, the internal model aggregates capital charges estimated for the different undertakings.

(b) At the ultimate level, the internal model aggregates capital charges for the different risks, these risks being considered on a consolidated basis.

(c) At the ultimate level, the internal model aggregates all the capital charges estimated for a given risk and a given undertaking.

(d) All the risk factors are modeled simultaneously for all the undertakings and therefore no further aggregation step is required.

QGIM6. If the scope of your internal model does not encompass all the risks and/or undertakings and/or business units within the group, how do you plan to integrate the results of the internal model in the standard formula calculation (as defined in Article 112 of the Directive)?

QGIM7. If your internal model covers undertakings using different currencies, could you be describe how you assess at group level the risk related to the fluctuations of foreign exchange rates?

QGIM8. How does your model assess the contributions of the different undertakings to the group SCR (see section on non available own funds in the group section of technical specifications)?

QGIM9. When your group internal model is used to derive solo SCRs for some undertakings in the group, what are the main adaptations needed to comply with the solo requirements (e.g. replace group parameters by solo parameters, capital charges for intra-group transactions…)?

Governance of the group internal model

QGIM10. Generally in your internal model, who will be responsible for designing the parts related to the different undertakings (e.g. the subsidiary is fully responsible and delivers its model to the group; the subsidiary is responsible insofar that it meets standards provided by the group; the group develops all the internal model)? Where relevant, please differentiate your answer for different risks and/or undertakings.

QGIM11. Same question as 11 for the validation of the model.

QGIM12. Which language(s) do you currently use in your documentation? Where several languages are used, what are the main drivers to decide on the most adequate language(s) to be used for a given piece of documentation?

QGIM13. Do you encounter any restrictions such as different implementation dates due to the legal composition of your group when implementing the internal model in some undertakings? If yes, how do you deal with them?

ANNEXES

Annex A: Estimation of all future SCRs "at once"

Non-life insurance

AA.1. With respect to non-life insurance (excluding non-life annuities) the duration approach implies that the risk margin for an individual line of business ($CoCM_{lob}$) can be calculated in the following manner:

$$CoCM_{lob} = CoC \cdot \{SCR_{RU,lob}(0)/(1+r_1) + \sum_{t>0} SCR_{RU,lob}(t)/(1+r_{t+1})^{t+1}\}$$

$$\approx \{CoC/(1+r_1)\} \cdot \{SCR_{RU,lob}(0) + UW_{RU,lob,>0} + OP_{RU,lob,>0} + CD_{RU,lob,>0}\},$$

AA.2. where the following variables and parameters all relate to the same line of business:

$SCR_{RU,lob}(0)$ = the SCR as calculated at time $t = 0$ for the reference undertaking's portfolio of (re)insurance obligations;

$UW_{RU,lob,>0}$ = an approximation of the sum of all future SCRs covering the underwriting risk related to the reference undertaking (as discounted to $t = 1$);

$OP_{RU,lob,>0}$ = an approximation of the sum of all future SCRs covering the operational risk related to the reference undertaking (as discounted to $t = 1$);

$CD_{RU,lob,>0}$ = an approximation of the sum of all future SCRs covering the counterparty default risk related to ceded reinsurance and SPVs related to the reference undertaking (as discounted to $t = 1$); and

CoC = the Cost-of-Capital rate.

AA.3. Within this set-up, the approximated sums of future SCRs related to each of the three main kinds of risks to be covered by the risk margin calculations are estimated as follows (for the given line of business):

$$UW_{RU,lob,>0} = Dur_{mod,lob}(1) \cdot 3 \cdot \sigma_{(res,lob)} \cdot PCO_{Net,lob}(1),$$

$$OP_{RU,lob,>0} = Dur_{mod,lob}(1) \cdot \lambda \cdot PCO_{Gross,lob}(1),$$

$$CD_{RU,lob,>0} = Dur_{mod,lob}(1) \cdot SCR_{RU,CD,lob}(0) \cdot PCO_{Re,lob}(1)/PCO_{Re,lob}(0),$$

where following variables and parameters all relate to the same line of business:

$PCO_{Net,lob}(1)$ = the best estimate provision for claims outstanding net of reinsurance as calculated at $t = 1$;

$PCO_{Gross,lob}(1)$ = the best estimate provision for claims outstanding gross of reinsurance as calculated at $t = 1$;

$PCO_{Re,lob}(1)$ = reinsurers' share of the best estimate provision for claims outstanding as calculated at $t = 1$;

$PCO_{Re,lob}(0)$ = reinsurers' share of the best estimate provision for claims outstanding as calculated at $t = 0$;

$SCR_{RU,CD,lob}(0)$= the capital charge for the counterparty default risk related to ceded reinsurance and SPVs as allocated to the given line of business at $t = 0$;

$Dur_{mod,lob}(1)$ = the modified duration of reference undertaking's (re)insurance obligations net of reinsurance at $t = 1$;

$\sigma_{(res,lob)}$ = the standard deviation for reserve risk as defined in the premiums and reserve risk module of the SCR standard formula; and

λ = the percentage to be applied on the best estimate technical provisions gross of reinsurance as defined in the operational risk module of the SCR standard formula.

AA.4. The parameter λ should be set to 4.4 per cent (i.e. $\lambda = 0.044$).[99]

AA.5. This simplification takes into account the maturity and the run-off pattern of the obligations net of reinsurance. However, it is based on the following simplified assumptions:

- the length of the contracts is one year at the most, i.e. there is no premium and catastrophe risk after year 0 (non-life underwriting risks),
- the average credit standing of reinsurers and SPVs remains the same over the years (counterparty default risk),
- the modified duration is the same for obligations net and gross of reinsurance (operational risk, counterparty default risk).

AA.6. An undertaking that intends to use this simplification for one or several lines of business (or homogenous risk groups), should consider to what extend the assumptions referred to above are fulfilled for the line(s) of business in question. If some or all of these assumptions do not hold, the undertaking should carry out a qualitative assessment of how material the deviation from the assumptions is. If the impact of the deviation is not material compared to the risk margin as a whole, then the simplification can be used. Otherwise the undertaking should either adjust the formula appropriately or is encouraged to use a more sophisticated calculation or method.

AA.7. If there is a notable difference in the modified durations of the obligations gross of reinsurance, net of reinsurance and reinsurers' share of the obligations, then the formula should be adjusted such that the modified duration used in $OP_{RU,lob,>0}$ is based on obligations gross of reinsurance and the modified duration used in $CD_{RU,lob,>0}$ is based on reinsurers' share of the obligations.

[99] Cf. CEIOPS' Advice for Level 2 Implementing Measures on Solvency II: SCR standard formula – Article 111(f) Operational Risk (former CP 53).

AA.8. If there arises premium risk or catastrophe risk after the first year then an additional risk charge that represents this risk should be added to the formula.

AA.9. In the calculations described in above it has been tacitly assumed that with respect to the present approach the unavoidable market risk can be disregarded for the lines of business within non-life insurance. If this assumption does not hold – and the unavoidable market risk is believed to have a substantial impact on the SCR-calculations – the method referred to should be adjusted by including an element covering this risk, e.g. by using the approximation described in a previous sub-section. As always the choice of simplified methods should be advocated by the undertaking.

AA.10. It should also be noted that the calculations sketched above have disregarded the diversification effects between underwriting risk and counterparty default risk. In the present context this should be viewed as a consequence of the trade-off between simplifications and accuracy that in general is present.

Life insurance

AA.11. With respect to life insurance the risk margin for a given line of business ($CoCM_{lob}$) could be calculated according to the following formula:

$$CoCM_{lob} = (CoC/(1+r_1))\cdot Dur_{mod,lob}(0)\cdot SCR_{RU,lob}(0),$$

where the following variables and parameters all relate to the same line of business:

$SCR_{RU,lob}(0)$ = the SCR as calculated at time $t = 0$ for the reference undertaking's portfolio of (re)insurance obligations;

$Dur_{mod,lob}(0)$ = the modified duration of reference undertaking's (re)insurance obligations net of reinsurance at $t = 0$; and

CoC = the Cost-of-Capital rate.

AA.12. This approach applies also to life-like non-life obligations (e.g. non-life annuities).

AA.13. This simplification takes into account the maturity and the run-off pattern of the obligations net of reinsurance. However, it is based on the following simplified assumptions:

- the composition and the proportions of the risks and sub-risks do not change over the years (basic SCR),
- the average credit standing of reinsurers and SPVs remains the same over the years (counterparty default risk),
- the modified duration is the same for obligations net and gross of reinsurance (operational risk, counterparty default risk),
- the unavoidable market risk in relation to the net best estimate remains the same over the years (market risk),
- the loss absorbing capacity of the technical provisions in relation to the net best estimate remains the same over the years (adjustment).

AA.14. An undertaking that intends to use this simplification for one or several lines of business (or homogenous risk groups), should consider to what extend the assumptions referred to above are fulfilled for the line(s) of business in question. If some or all of these assumptions do not hold, the undertaking should carry out a qualitative assessment of how material the deviation from the assumptions is. If the impact of the deviation is not material compared to the risk margin as a whole, then the simplification can be used. Otherwise the undertaking should either adjust the formula appropriately or is encouraged to use a more sophisticated calculation or method.

AA.15. For the lines of business within life insurance the current SCR as calculated for the reference undertaking covers the unavoidable market risk. However, according to the approach described in previous section the unavoidable market risk is restricted to the unavoidable mismatch between the cash-flows of the insurance liabilities and the financial instruments available to cover these liabilities. By taking this restriction into account, and especially the simplified method of calculation described, it may be the case that the formula referred to exaggerates the impact of unavoidable market risk on the risk margin for these lines of business. In such cases it is allowed to adjust the formula in order to take into account the simplified calculation of unavoidable market risk in an adequate manner.

AA.16. Moreover, in order to determine the present SCR for the reference undertaking, it is necessary to recalculate the SCR covering life underwriting risk for the individual lines of business. This recalculation can be simplified by redistributing the sub-risk charges (mortality, longevity etc.) for the whole portfolio to the individual lines of business in proportion to appropriate risk measures. In this context the risk measures listed in table A.1 may be used.

Table A.1.Possible candidates for risk measures for the simplified risk margin calculations in life insurance.

Sub-risks	**Exposure measures**
Mortality	Capital at risk × Duration of treaties under mortality risk
Longevity	Best estimate of treaties under longevity risk
Disability	Capital at risk × Duration of treaties under disability risk
Lapse	Best estimate of treaties under lapse risk
	– Surrender values of treaties under lapse risk
Expenses	Renewal expenses × Duration
Revision	Best estimate of annuities exposed to revision risk
CAT	Capital at risk of treaties under mortality and disability risk

AA.17. The formula given above is based on the assumption that the relative loss-absorbing capacity is constant over the run-off of the portfolio and therefore amendments to the estimated risk margin should be made if this assumption does not hold.

Combinations of non-life and life insurance

AA.18. If the line of business comprises both traditional non-life obligations and obligations in form of annuities, the risk margin is calculated by combining the results of a non-life calculation and a life calculation.

Health insurance

AA.19. With respect to health insurance it should be noted that the structure of the module and the approach of the risks has been changed considerably through the work with CP 50.[100] Accordingly, the simplifications described in the QIS4 Technical Specifications are no longer valid.

AA.20. According to the section of these specifications regarding segmentation, the health insurance obligations shall be segmented into obligations pursued on a similar bases as life insurance (SLT Health) and non-life insurance (Non-SLT Health), respectively. Moreover, the SLT health obligations shall be segmented further according to the segmentation for life insurance obligations. In a similar manner the non-SLT health obligations shall be segmented further according to the segmentation for non-life insurance obligations.

AA.21. A consequence of this approach will be that for a line of business within life insurance which comprises SLT health obligations, the calculation of the present SCR for the reference undertaking will have to take into account also the underwriting risks related to the health insurance obligations. A similar requirement applies to lines of business within non-life insurance comprising non-SLT health obligations.

AA.22. The considerations summarised in the previous paragraphs above may apply also for the calculation of the present SCR of the reference undertaking under the proportional method as described in a previous sub-section.

[100] CEIOPS' Advice for Level 2 Implementing Measures on Solvency II: SCR standard formula – Health underwriting risk module (former CP 50).

Annex B: Some technical aspects regarding the discount factors to be used in the calculation of the risk margin

AB.1. The purpose of this annex is to explain in some detail the discount factors to be used in the calculation of the risk margin.

AB.2. In a first step the usual formula for the calculation of the risk margin is presented. In a second step the corresponding scenario is described and thereby the appropriateness of the risk margin formula is verified.

Definition of the risk margin

AB.3. The following nomenclature is applied:

- Let the risk relating to the obligations run off within n years. Thus, it is sufficient to consider the time period which spans from $t = 0$ (valuation date) to $t = n$.
- Let $CoCM_0$ be the risk margin for the transferred insurance obligations at the time of transfer. After transfer, the obligations run off. This has an effect on the risk margin that the reference undertaking has to reserve.
- Let $CoCM_1,\dots,CoCM_{n-1}$ be the Cost of capital margins at $t = 0,\dots,n$ respectively.
- Let SCR_0, $\dots,SCR_{n-1}$ be the Solvency Capital Requirements of the reference undertaking in relation to the transferred insurance obligations at $t = 0,\dots,n$ respectively.
- Let CoC denote the Cost-of-Capital rate.
- Let $r_{(1,0)},\dots,r_{(n,0)}$ be the relevant risk-free rates at $t = 0$ for the maturities $1,\dots,n$ respectively. Let $r_{(m,k)}$ ($k = 1,\dots,n$ and $m = 1,\dots,n-k$) be the corresponding risk-free forward rates at $t = k$ for maturity m.

AB.4. The risk margin at $t = 0$ can be calculated according to the formula as follows:

$$CoCM_0 = CoC \cdot \sum_{s=0}^{n-1} \frac{SCR_s}{(1 + r_{(s+1,0)})^{s+1}}.$$

AB.5. The formula for the risk margin at $t = 0$ implies a similar formula for the risk margin at $t = k$ as follows:

$$CoCM_k = CoC \cdot \sum_{s=k}^{n-1} \frac{SCR_s}{(1 + r_{(s+1,k)})^{s+1}}.$$

AB.6. If the reference undertaking covers $CoCM_k$ with risk-free assets that match the cash-flow pattern of the formula, then these assets earn during the year from $t = k$ to $t = k+1$ an interest of

$$CoC \cdot \sum_{s=k}^{n-1} r_{(s,k)} \frac{SCR_s}{(1 + r_{(s+1,k)})^{s+1}},$$

and the unwinding of the margin in that year (including the interest) yields an expected profit of $CoC \cdot SCR_k$ as can easily be calculated.

The capitalisation scenario

AB.7. The reference undertaking receives the obligations as well as assets to cover best estimate and risk margin from the original insurer. The reference undertaking has no own funds to cover the SCR relating to the obligations. In order to meet the capital requirement, the reference undertaking requests external capital of the amount SCR_0 for one year. The interest on this capital is $CoC+r_{(1,0)}$, so in return, the reference undertaking has to pay back the amount $(1+CoC+r_{(1,0)}) \cdot SCR_0$ at the end of the year.

AB.8. Under the assumption that the obligations run off according to best estitmate assumption, the position of the reference undertaking at the end of the year ($t = 1$) is as follows:

- The development of the best estimate does not affect own funds: the assets covering the best estimate in $t = 0$ plus the risk-free rate earned during the year equal the claims payments during the year and best estimate at the end of the year.
- The unwinding of the risk margin produces own funds of the amount $CoC \cdot SCR_0$.
- The assets covering SCR_0 earn a risk-free rate of $r_{(1,0)} \cdot SCR_0$.
- The repayment of the capital reduces own funds by $(1+CoC+r_{(1,0)})\ SCR_0$.

To sum up, the own funds of the reference undertaking are reduced by the amount SCR_0, so that own funds are zero again.

AB.9. Therefore, the reference undertaking is at $t = 1$ in the same situation as at $t = 0$. It has to raise new capital of the amount SCR_1 in order to meet the SCR. The process outlined above can be iterated until run-off of the liabilities. At $t = n$, the reference undertaking is relieved from the insurance obligation and no own funds will be left.

AB.10. This proves that the formula stated in these specifications is in line with the risk margin definition of the Level 1 text. In particular, the way of discounting is accurate because the payment of the amount $CoC \cdot SCR_s$ is made at $t = s+1$.[101]

[101] Indeed, the reference undertaking could agree with the capital provider to pay the spread $CoC \cdot SCR_s$ in advance at $t=s$. But then the value of the spread would be $CoC \cdot SCR_s/(1+r_{(1,s)})$.

Annex C: Further comments regarding simplifications for sub-modules under the life underwriting risk

AC.1. In this annex an overview of the most common simplifications for life underwriting risk that can be used on level no. 2 of the basic decision hierarchy are given. These methods, used to assess the capital charge for the sub-risks under the life underwriting risk, are presented in more detail in the subsection on simplifications of the SCR. They can be used both to assess the present and the future capital charges for the sub-modules.

AC.2. In order to be able to use the simplifications to assess the capital charge for future years, all the relevant input data – the duration of the liabilities, the total capital at risk for the mortality sub-risk, the best estimate of technical provision for the longevity sub-risk, the expected average biometrical intensities, and so on – would have to be estimated for each future year *t* during the lifetime of the liabilities.

AC.3. Mortality risk: The capital charge for mortality risk can be taken as 15 per cent (the mortality shock rate) of the product of the following factors:

- the total capital at risk,
- an undertaking-specific expected average death rate over the next year (weighted by the sum assured),
- the modified duration of the liability cash-flows and
- the Projected Mortality Increase ($1.1^{((n-1)/2)}$), cf. the assumption that the average mortality rate of the portfolio, due to age, increases over the period corresponding to the length of the duration with 10 per cent a year.

AC.4. Longevity risk: The capital charge for longevity risk can be taken as 25 per cent (the longevity shock rate) of the product of the following factors:

- the technical provisions (the best estimate) for contracts subject to longevity risk,
- an undertaking-specific expected average death rate over the next year (weighted by the sum assured),
- the modified duration of the liability cash-flows and
- the Projected Mortality Increase

AC.5. Disability risk: The capital charge for disability risk can be taken as the sum of

- the capital requirement for an increase of 50 per cent in morbidity/ disability inception rates for the first year,
- the capital requirement for an increase of morbidity/disability inception rates by 25 per cent for all subsequent years and
- the capital requirement in respect of the risk that the duration of claims is greater than expected, represented by a 20 per cent decrease in the termination rates, where the individual elements are calculated as sketched below.

AC.6. The individual elements sketched in the previous paragraphs should be calculated by using the following bases of calculation:

(a) For the increased morbidity/disability inception rates during the first year, the product of the following factors:

- the total disability capital at risk (in year one) and
- an undertaking-specific expected average rate of transition from healthy to sick over the first year (weighted by the sum assured/ annual payment).

(b) For the increased morbidity/disability inception rates during all subsequent years, the product of the following factors:

- the total disability capital at risk in year two,
- an undertaking-specific expected average rate of transition from healthy to sick over the second year (weighted by the sum assured/annual payment),
- the modified duration of the liability cash-flows diminished by one and
- the Projected Disability Increase ($1.1^{((n-2)/2)}$), cf. the assumption that the average disability rate of the portfolio, due to age, increases over the period corresponding to the length of the duration with 10 per cent a year.

(c) With respect to the risk that the duration of claims is greater than expected, 20 per cent the product of the following factors:

- technical Provisions for contracts subject to longevity risk,
- an undertaking-specific expected termination rate (i.e. average rate of transition from sick to healthy/dead over the next year),
- the modified duration of the liability cash-flows and
- the Projected Disability Increase ($1.1^{((n-1)/2)}$).

<u>Annex D. Example to illustrate the first method of simplification to calculate the best estimate of incurred but not reported claims provision.</u>

<u>General formulation</u>

AD.1. The final estimate of this technical provision is derived from the following expression, where just for illustrative purposes a three-year period of observation has been considered (the adaptation of the formula for longer series is immediate):

$$\text{IBNR reserve year } t = C_t \text{ x } N_t \quad ,$$

where

C_t = average cost of IBNR claims, after taking into account inflation and discounting. This cost should be based on the average cost of claims reported in the year t. Since a part of the overall cost of claims reported in the year t comes from provisions, a correction for the possible bias should be applied.

and

$Nt = Rt * Av$, being

$AV = [(N_{t-1} / p_1) + (N_{t-2} / p_2) + N_{t-3}] / [R_{t-1}+R_{t-2}+R_{t-3}]$

AD.2. Furthermore, in these expressions

N_{t-i} = number of claims incurred but not reported at the end of the year t-i, independently of the accident year (to assess the number of IBNR claims all the information known by the undertaking till the end of the year t should be included).

P_1= percentage of IBNR claims at the end of year t-3 that have been reported during the year t-2

p_2= percentage of IBNR claims at the end of year t-3 that have been reported during the years t-2 and t-1

R_{t-i}= claims reported in year t, independently of accident year.

AD.3. It should be noted that the sufficiency of this method should be regularly checked using run-off results.

<u>Numeric example</u>

AD.4. Assuming as date of reference of the valuation December the 31st of 2008, the undertaking has the following information:

N_2007 = 90

N_2006 = 100

N_2005 = 100 (85 reported in 2006 and 10 reported in 2007)

furthermore

R_2008 = 10.500	;	R_2007 = 8.500
R_2006 = 8.200	;	R_2005 = 8.700

AD.5. The overall cost of claims reported in 2008 amounts 11.000.000 €, from which 5.500.000 € are case reserves (with an estimated bias = 0.9).

AD.6. The estimated inflation for 2009, 2010 and 2011 is 5 per cent (every year). The discounting rate is 4 per cent for the same years.

AD.7. The claims reported every year are paid in a 50% the year of reporting, the year after is paid the 35%, and the third year is paid the 15% (this is an estimation based on entity experience or market experience).

A.1. Solution

Bias correction =	6.111.111		
	11.611.111		
50% =	5.805.556	6.095.833	5.861.378
35% =	4.063.889	4.480.438	4.142.416
15% =	1.741.667	2.016.197	1.792.392
After bias correction and inflation+discounting=			11.796.186
Overall cost of claims reported in 2008 =			11.796.186
		C2008 =	1.123
		p1=	0,85
		p2=	0,95
N2007/p1= 106		N2006/p2=	105
N2008=	129		
IBNR reserve =	144.501,20 €		

AD.8. If the average cost of IBNR claims is different to the average cost of reported claims, Ct can be adjusted.

AD.9. This method needs at least four years of experience. Thius, in case of new undertakings or a new line of business this simplification does not apply.

Annex E. Gross-to-net techniques

AE.1. Various gross-to-net proxies had been developed in the *Report on Proxies* elaborated by CEIOPS/Groupe Consultatif Coordination Group[102]. This annex gives an overview of the gross-to-net techniques which were tested (based on the recommendations contained in the Report on Proxies) in the QIS4 exercise.

AE.2. This description of gross-to-net techniques has been included purely for informational purposes; it is intended to provide an overview on the range and technical specificities of such methods developed so far.

The QIS4 Technical Specifications

AE.3. With respect to QIS4, the report on proxies proposed to test only two different designs of the Gross-to-Net proxies, both of them based on accounting data (in a broad sense):[103]

- one based on the provisions for RBNS claims ("case reserves") and
- one based on cumulated cash flows (i.e. cumulated claims payments).

These testing proposals were incorporated into the Technical Specifications (TS) without further changes.[104]

AE.4. This choice to narrow down the range of Gross-to-Net techniques for the purposes of QIS4 was made in order to keep the technical specifications sufficiently simple and practical.

AE.5. The main aspects of these testing proposals are summarised below.

Gross-to-Net-proxy based on provisions for RBNS-claims ("case reserves")

AE.6. This proxy uses a ratio of net over gross provisions of an available portfolio A in order to estimate the net provisions of another portfolio B (NP_B) based on the observable gross provisions of portfolio B (GP_B). In other words, the Gross-to-Net proxy (GN) is stipulated as

$$\mathbf{GN = NP_A/GP_A,}$$

[102] CEIOPS/Groupe Consultatif Coordination Group:"Report on Proxies", July 2008, http://www.ceiops.eu/media/docman/public_files/consultations/Final%20Report%20on%20Proxies%20clean.pdf

[103] "Report on Proxies", page 79.

[104] QIS4 Technical Specifications (MARKT/2505/08), page 85-88.

where NP_A and GP_A represents the net and gross provisions of portfolio A, respectively. Then this proxy is applied to calculate the net provisions for portfolio B as follows:

$$\mathbf{NP_B = GN \times GP_B}.$$

AE.7. However, it is not clear from the QIS4 TS whether the purpose of this proxy is to calculate the overall net provisions for claims outstanding or only the net provisions for RBNS-claims

AE.8. The following criteria should be fulfilled in order to apply this proxy:

- The benchmark portfolio (A) should be similar to the portfolio (B) for which the proxy is used, cf. the principle of substance over form.

- The ratio (GN) should be established by means of credible and sustainable data. This requires a data set exceeding at least two years.

AE.9. With respect to the properties of this proxy the QIS4 TS state that[105]

"ceded reinsurance varies with the size, the financial soundness and the risk aversion of a company, so that particular care is required when applying a ratio of net over gross from another benchmark portfolio. Such an approach should therefore only be used in cases where the benchmark portfolio is known to have a very similar nature as the own portfolio. Even if this is the case, however, the cession percentage for non-proportional reinsurance will heavily depend on the actual occurrence of large losses, and therefore be very volatile."

Gross-to-Net-proxy based on cumulated paid claims (cumulated cash-flows)

AE.10. This proxy derives an estimate of net provisions for claims outstanding by using the gross provisions for claims outstanding in combination with an estimate of the impact of the reinsurance covers for the individual accident years.106

AE.11. With respect to the rationale for using this proxy, it is noticed that for past accident years the reinsurance structure for an individual year is known and will (likely) not change retroactively. Accordingly, a comparison of net over gross cumulated cash flows per line of business in the past – differentiated by accident year – may be used to derive an estimate of the impact of proportional and non-proportional reinsurance for the individual accident year (i.e. a Gross-to-Net proxy for the individual accident year).

AE.12. For each line of business the Gross-to-Net proxies for the accident years not finally developed (GN_i) are stipulated as follows:

$$\mathbf{GN_i = A_{Net,i,n-i}/A_{Gross,i,n-i}},$$

where $A_{Gross,i,n-i}$ and $A_{Net,i,n-i}$ represent the cumulated paid claims gross and net of reinsurance, respectively, and n is the latest accident year with observed values of these cash-flows.

[105] QIS4 Technical Specifications, page 86.

[106] The following description is somewhat simplified and shortened compared to the description given in QIS4 TS.

AE.13. These proxies are then used to calculate the net provisions for claims outstanding for the individual accident years, that is

$$\mathbf{PCO_{Net,i} = GN_i \times PCO_{Gross,i}},$$

where $PCO_{Gross,i}$ and $PCO_{Net,i}$ represent the gross and net provisions for claims outstanding for accident year i, respectively.

AE.14. In order to apply this proxy both gross and net cumulated paid claims (gross and net cash flows) per accident year need to be available for each line of business.

AE.15. The QIS4 TS briefly explain some of the properties of this proxy:

- For newer accident years and especially the last accident year (where i=n) the stipulated proxy might be a bit too high due to the fact that the IBNR claims are likely to constitute a large part of the provisions for claims outstanding.[107] Accordingly, the stipulated proxy is likely to lead to an overestimation of the net provisions in these cases.

- The Gross-to-Net proxies referred to above concern the provisions for claims outstanding. For the premium provisions, i.e. the provisions for (covered but not incurred) claims related to the current accident (business) year (where i=n+1), a Gross-to-Net proxy can be stipulated by using the (anticipated) proportional part of the reinsurance cover for this year. This will be a conservative approach for the ceding (re)insurance undertaking, since the impact of the non-proportional reinsurance for the current accident (business) year is not taken into account.

The QIS4 Results

AE.16. The use of Gross-to-Net proxies in QIS4 is summarised as follows in CEIOPS' QIS4-report (see the sub-section 7.2.5 on simplifications and proxies):[108]

"Concerning reinsurance, only few undertakings were able to determine amounts relating to reinsurance recoverables (or net figures) by applying actuarial reserving techniques based on reinsured or net triangular claims data. Instead, many participants used triangle analysis techniques only for the calculation of best estimates gross of reinsurance, and derived the reinsurer's part of gross provisions by applying one of the two Gross-to-Net proxies. The wide use of Gross-to-Net proxies underlines that it is difficult for the undertakings to get data net of reinsurance.

However, some undertakings remarked that an application of this proxy[109] may lead to poor results in the case of excess loss covers, where the risk mitigating effect of the reinsurance cover would be underestimated. It was also remarked that the use of both types of Gross-to-Net proxies described in the specifications on the same portfolio sometimes resulted in materially different valuations.

[107] The underlying assumption seems to be that the gross amounts of IBNR-claims on average are higher than the average gross amounts of paid claims and RBNS-claims. Accordingly, the impact of the reinsurance cover is likely to be larger for IBNR-claims than for paid claims and RBNS-claims.

[108] "CEIOPS' Report on its fourth Quantitative Impact Study (QIS4) for Solvency II", page 80.

[109] CEIOPS' Report on QIS4 does not state which of tested proxies that these undertakings refer to.

A similar situation could be observed with regard to the determination of premium provisions, where only a few participants were capable of carrying out an actuarial projection of future cash flows arising from future claim events. …"

AE.17. Some further comments are given regarding the participating undertakings' experience with the Gross-to-Net proxies stipulated for QIS4-purposes (see sub-section 7.3.3 on best estimates in non-life insurance):[110]

"The gross-to-net proxy was used by some undertakings as net claims data triangles are unsuitable for immediate application of actuarial reserving techniques since they often contain irregularities.

Undertakings within one country commented that it is difficult to use actuarial techniques to calculate the best estimate reinsurance provision taking into account all contractual details.

…

More guidance should be developed concerning the valuation of reinsurer's shares in technical provisions. To avoid over-reliance on very simple techniques such as the Gross-to-Net Proxy, guidance on other more sophisticated actuarial techniques which would be better aligned with the true risk mitigating effect of reinsurance covers should be sought."

AE.18. As a general summary regarding the experiences from QIS4, it may be stated that the need for Gross-to-Net proxies has been confirmed, cf. the statement that many insurance undertakings have problems with determining the cash flows related to reinsurance recoverables.

AE.19. On the other hand, the experience from QIS4 highlights the need to introduce clear admissibility criteria for the use of such Gross-to-Net techniques in order to ensure that the valuation of technical provisions net of reinsurance will lead to consistent results across different undertakings and markets. Also, it seems necessary to develop actuarial guidance on a range of techniques for determining net provisions to avoid an over-reliance on a few proxy techniques.

AE.20. In this context it should also be noticed that the problems of identifying the cash flows related to reinsurance arrangements seem to apply to all kinds of (non-life) insurance undertakings (i.e. independent of their size) – a fact that should be taken into account when deciding on the scope of Gross-to-Net techniques for Solvency II purposes.

Annex F:[111] Simplified example of the derivation and use of the single equivalent scenario[112]

AF.1. The principle purpose of the "single equivalent scenario" is to develop a combined scenario where a number of risk factors vary from the best estimate value and to use this scenario to test one of the weak assumptions of the correlation matrix approach to capital aggregation – that the impact of combinations of risks on capital required is additive.

110 CEIOPS' Report on QIS4, page 107.

111 The material in Annex F has been provided by Watson Wyatt Limited, June 2009

112 The single equivalent scenario may also be referred to as the killer scenario

Step 1: **Derive individual/undiversified capital for each risk factor, and the correlation matrix N.B. The correlation numbers are only for reference purpose and do not represent WW's view of appropriate correlation assumptions**

Risk factor	*Stress test applied (% change)*	*Matrix of undiversified capital (U)*	*Correlation Matrix (C)*				
Risk A	30%	500	1.00	0.75	0.25	0.00	0.00
Risk B	-30%	25	0.75	1.00	0.25	0.00	0.00
Risk C	20%	100	0.25	0.25	1.00	0.00	0.00
Risk D	-10%	200	0.00	0.00	0.00	1.00	0.00
Risk E	10%	75	0.00	0.00	0.00	0.00	1.00
Sum		900					

Step 2: **Check the correlation matrix is positive definite (PD) because in theory the single equivalent scenario works only if the matrix is PD. One way of doing it is to check the least eigenvalue of the matrix and make sure it is positive.**

Eigenvalues of C	1.89	1.00	1.00	0.86	0.25

Step 3: **Use the matrix multiplication to multiply the correlation matrix (C) and the undiversified capital matrix (U). The result is a new matrix Y.**

	Y = mmult(C,U)
Risk A	544
Risk B	425
Risk C	231
Risk D	200
Risk E	75

Step 4: **Use matrix multiplication to multiply the transpose undiversified capital matrix U with matrix Y and take the square root of the result to get the diversified capital requirement.**

Note that Step 3 and 4 are the equivalent matrix algorithm to the square root method of deriving diversified capital ie

$$C_{div} = \sqrt{\sum C_i^2 + \sum \rho_{ij} C_i C_j}$$

Hence, diversified capital = $(U^T \times (C \times U))$ ^0.5 =$(U^T \times Y)$ ^ 0.5 = 593

Step 5: **Allocate diversification benefit allowing for relative weight of risks and correlations.**

	U		Y		Capital		Allocation
Risk A	500	x	544	/	593	=	459
Risk B	25	x	425	/	593	=	18

Risk C	100	x	231	/	593	=	39
Risk D	200	x	200	/	593	=	67
Risk E	75	x	75	/	593	=	9
Sum	900					Sum	**593**

Which gives:

		Split of diversified capital (Matrix A)	Diversification reduction factor for risk	Implied percentile for medium bang scenario	Original 99.5^{th} stress test	Stress test in the single equ scenario
Risk A		459	92% (=459/500)	99%	30%	28%
Risk B		18	72% (=18/25)	97%	-30%	-22%
Risk C		39	39% (=39/100)	84%	20%	8%
Risk D		67	34% (=67/200)	81%	-10%	-3%
Risk E		9	12% (=9/75)	63%	10%	1%
	Sum	593 *	66% (=593/900)	96%		

* The single equivalent scenario algorithm guarantees that the capital allocations sum to the diversified capital, and that the scenario is most likely to occur.

AF.2. Please note that the approach above is not without its limitations, for example in finding the combined scenario:

- It assumes that capital linearly increases in line with risk and this may not be the case.
- Changing the direction in which some risk factors are stressed may increase the overall capital requirement.
- The reduced stress tests have been derived assuming that all risk factors are multivariate-normally distributed and correlations are used to measure the dependencies between different risks, which may not be the case.

AF.3. However, all these weaknesses are present in the correlation matrix approach to aggregating capital requirements (the approach used by the standard formula SCR). These weaknesses can be addressed in part or whole using more complex modelling and simulation approaches such as the "super killer scenario" and "super mega killer scenario", as might be found in more advanced internal models.

Annex G: Impact of using net or gross capital requirements to construct the single equivalent scenario

AG.1. Suppose that a firm is exposed to three risks A, B and C for which the capital charges excluding loss absorbency of technical provisions are 50, 100 and 200 respectively.

AG.2. Assume that the above capital requirements are calculated based on stress tests of 25%, -40% and 40% respectively.

AG.3. Suppose the three risks are aggregated using the following correlation matrix M_{corr}:

	A	B	C
A	1	0.25	0.5
B	0.25	1	0.75
C	0.5	0.75	1

Example 1: Using gross capital requirements to calculate the single equivalent scenario

AG.4. The undiversified gross capital charges may be represented by the following matrix $M_{gross:}$

A	50
B	100
C	200

Step A

AG.5. The first step in the construction of the single equivalent scenario is to calculate the product of the matrices Mcorr and Mgross. For ease of reference this matrix may be referred to as M_1.

A	175
B	263
C	300

Step B

AG.6. The aggregate, diversified capital requirement, D, may then be calculated as follows:

$$D = (M_{gross}^{T} * M_1)^{1/2},$$

where M_{gross}^{T} is the transpose of the matrix M_{gross}. In the example above D is equal to 308.

Step C

AG.7. For each risk i, the diversification benefit may then be allocated to each of the different risks as follows:

$$M_{gross,i} * M_{1,i} / D_{,}$$

where $M_{gross,i}$ is the gross capital requirement for risk i and $M_{1,i}$ is the entry in matrix M_1 for risk i.

AG.8. This allows for both the relative weights of each risk and the correlations between risks. For example, for risk A the allocated diversified capital is (50 * 175)/308 = 28.

AG.9. Let the matrix M_2 represent the allocated diversified capital for each risk.

A	28
B	85
C	195
Total	*308*

Step D

AG.10. The allocated diversified capital may then be used to derive the required stress test.

B.1.

	M_2	Diversification factor	Implied[113] percentile	Original stress test	Stress test in single equivalent scenario[5]
A	28	57% (= 28/50)	93%	25%	14% (=57% * 25%)
B	85	85% (=85/100)	99%	-40%	-34% (= 85% * -40%)
C	195	97% (= 195/200)	99%	40%	39% (= 97% * 40%)
Total	*308*				

Example 2: Using net capital requirements to calculate the single equivalent scenario

AG.11. Suppose now that the impact of loss absorbency of technical provisions is such that the gross capital requirements for each risk are uniformly reduced by 90%.

AG.12. The undiversified net capital charges may be represented by the following matrix $M_{net:}$

A	5
B	10
C	20

Step A

$M_1 = M_{corr} * M_{net}$

A	17.5
B	26.3
C	30.0

Step B

$D = (M_{net}^T * M_1)^{1/2} = 30.8$

Step C

[113] Note that this assumes that all risks are normally distributed

$M_{2,i} = M_{net,i} * M_{1,i} / D$

A	2.8
B	8.5
C	19.5
Total	*30.8*

Step D

	M_2	Diversification factor	Implied percentile	Original stress test	Stress test in single equivalent scenario
A	2.8	57% (= 2.8/5)	93%	25%	14% (=57% * 25%)
B	8.5	85% (=8.5/10)	99%	-40%	-34% (= 85% * -40%)
C	19.5	97% (= 19.5/20)	99%	40%	39% (= 97% * 40%)
Total	*30.8*				

AG.13. This example highlights that where the reduction for loss absorbency of technical provisions applies uniformly across all risks, the single equivalent scenario is the same regardless of whether gross or net inputs are used to construct the scenario.

Example 3: Using net capital requirements to calculate the single equivalent scenario

AG.14. Suppose now that the impact of loss absorbency of technical provisions varies across risks such that the undiversified net capital charges may be represented by the following matrix $M_{net:}$

		Impact of loss absorbency
A	45	10%
B	10	90%
C	100	50%

AG.15. In this case if steps one to four are followed as described above, the following single equivalent scenario is derived:

	M_2	Diversification factor	Implied percentile	Original stress test	Stress test in single equivalent scenario
A	32.4	72% (= 32.4/45)	97%	25%	18% (=72% * 25%)
B	7.1	71%	97%	-40%	-28%

		(=7.1/10)			(= 71% * -40%)
C	96.0	96% (= 96.0/100)	99%	40%	38% (= 96% * 40%)
Total	*135.5*				

AG.16. A comparison of the single equivalent scenario derived in Example 1 using gross inputs and Example 3 using net inputs shows that neither scenario is demonstrably weaker or stronger. In both cases, it is clear that Risk C is the most important risk. However the relative importance of Risks A and B differ depending on whether net or gross inputs are used to construct the scenario. This highlights the importance of careful consideration as to whether net or gross capital requirements are the most realistic reflection of the risks the firm is running.

	Original stress test	Stress test in single equivalent scenario	
		Example 1 (gross)	Example 3 (net)
A	25%	14%	18%
B	-40%	-34%	-28%
C	+40%	39%	38%

ANNEX H. Financial risk mitigation techniques and overall risk management

AH.1. The use of financial risk mitigation techniques shall be the consequence of an overall risk management policy, where both qualitative and quantitative features shall be appropriately considered.

AH.2. As a consequence, undertakings should not make their decisions regarding financial risk mitigation techniques taking their effect in the solvency capital requirements as the single or the main element to decide, but mainly according its desired risk profiles, assumed and retained, both in the current situation and in stressed situations.

AH.3. It shall not be considered appropriate the assumption of exposures exceeding the qualitative management abilities or the quantitative financial capacities of the undertaking, based on the expectancy of adopting afterwards a mitigation technique, not firmly committed at the date of the assumption of the original exposure.

AH.4. It is the responsibility of each undertaking to assess which type of financial risk mitigation technique is appropriate according to the nature of the risks assumed and the capabilities of the undertaking to manage and control the financial risk mitigation technique. The undertaking must be able to demonstrate the effect of the risk mitigation achieved and its impact on the SCR.

AH.5. An undertaking applying financial risk mitigation should satisfy the following requirements:

- The relevant staff should be considered as involved in the development of key functions of the risk management, and therefore the 'fit and proper' requirements set out in the article 42 of the Level 1 text apply;

- The undertaking should develop a written complete analysis of functioning and inherent risks of the financial risk mitigation technique. In particular, it shall document the legal, liquidity/termination or other risks that can derive from the financial risk mitigation technique, the actions adopted to face such risks and the potential consequences of the risks (i.e. in a worst-case scenario).

  The extent of this documentation will depend on the complexity and on the actual, or potential, impact of the financial risk mitigation technique.

  In any case, the above areas, and any other significant feature of the technique and its management, should be reflected with the appropriate and proportionate level of detail in the relevant documentation.

  Furthermore, the documentation shall be reviewed and updated on regular basis, and at least in each mandatory calculation of the SCR.

  Undocumented or deficiently documented financial risk mitigation techniques should not be considered, not even on a partial basis, for SCR purposes. Nevertheless, supervisors may admit those financial risk mitigation techniques whose documentation is incomplete or deficient, provided the undertaking solves this in an appropriate and timely manner and there is sufficient evidence that the documentation will be kept updated on regular basis.

- The undertaking has procedures in place to capture in its capital requirements the impact of the risks derived from the financial risk mitigation technique;

- There are internal procedures to provide satisfactory evidence that the functioning and risks of the financial risk mitigation technique are managed and controlled with the appropriate intensity and frequency. This shall include appropriate mechanisms to ensure that the mitigation technique can counted upon in time of stress.

AH.6. The administrative and management bodies shall have the responsibility to understand and approve the policy to use any financial risk mitigation techniques, and to set mechanisms which guarantee the fulfilment of these provisions. In particular, the aforementioned bodies shall ascertain that the knowledge, expertise and application of the procedures are carried out by an appropriate number of sufficiently qualified staff, in order to make possible appropriate cross-controls and avoid undesirable dependences.

AH.7. Knowledge and expertise shall be tested according the academic background and professional experience regarding the concrete techniques to apply. This test shall refer to the staff responsible of making day-to-day decisions, operating and monitoring the techniques. The aim of this test of knowledge and expertise is to guarantee that such staff is aware

- of the functioning of the technique both from a theoretical and practical point of view, including under different scenarios (in particular, in adverse yet plausible ones),

- of the operational procedures, processes, conventions and practices of the financial markets used for this purpose,

- of the management, control and reporting procedures the undertaking has decided to apply to the technique.

Annex I: Examples of assumptions consistent with generally available data on insurance and reinsurance technical risks

AI.1. Data assumptions examples:

- If an undertaking has launched a new product, they will not have sufficient historic data to derive best estimate assumptions. The undertaking may use a relevant market benchmark as an alternative to own data or combine the data into a single larger risk group.

- Alternatively, data may be of poor quality. For instance, certain data fields may not be available for every record. The insurer may have to make assumptions based on summarised information or external business related data.

- The undertaking may need to build an inflation index for example cost of care, for which they have no own data. Reference to alternative data may be used instead (for example, NHS or local authorities).

AI.2. Analysis assumptions examples:

- For life business, examples of such assumptions are demographic assumptions (mortality, morbidity, and lapse) and expense assumptions.

- For non life business examples include assumptions regarding relevance of historic data because of changes in product design, target market, distribution network or underwriting.

- An example of where an undertaking may need to take future trends into account is if analysis of historic expense data shows a trend of decreasing expenses as a result of increasing economies of scale. An undertaking will need to determine whether this trend may be expected to continue into the future and as a result should be reflected in the expense assumption. In doing so, the undertaking should take into account factors such as the potential for further reductions in expenses, expected levels of new business etc

- Assumptions may be made regarding the applicability of age to age factors. Some of these factors may have a material affect on the overall valuation result. In order to increase the reliability of the result the insurer may exclude or down weight certain age to age factors or cohorts from the main method and allow for this in a different manner, for example through the tail or curve fitting exercise.

- Another example could be where one or two losses are assumed to be large and do not fit with the rest of the portfolio. The undertaking may wish to exclude them from the overall modelling process and project them case by case.

- The insurer may need to assess whether it is relevant to include a large loss. They may assume this has been an infrequent event and needs to be taken out of the projection and allowed for separately. Another example would be an analysis of historic expense data that might be distorted by a one off expenditure on IT systems which would not be expected to continue going forward.

AI.3. Modelling assumptions examples:

- The undertaking may wish to place less credibility on its own claims experience and combine this with an underwriting loss ratio, where this is an efficient use of the available information.

- In the absence of relevant claims data assumptions will need to be made in respect of long tail classes where the insurer needs to decide what tail factor to apply to developing claims.

- The modeller can make assumptions regarding the curve fitting process. May decide to use a more conservative fit, for example a curve with a fatter tail to allow for large claims.

- Application of bootstrap will require prior residual analysis and making assumptions about the applicability of certain residuals.

- Most companies make the assumption that elements of the current environment will continue in the future. This can include tax rates calculations, reinsurance arrangements, business volumes etc…

AI.4. Validation assumptions examples:

- The assumption that a given market development pattern is a suitable benchmark to validate portfolio and undertaking specific assumptions

ANNEX J TO CHAPTER 9 (RELATED TO NON-LIFE CATASTROPHE RISK)

Annex J.1: Full capacity stadium/Arena information

Stadium/Arena information			
Country	**Name**	**Location**	**Capacity**
AT	Ernst Happel Stadion	Vienna	50,000
BE	Koning Boudewijn Stadion	Brussels	50,000
BG	Vasil Levski National Stadium	Sofia	43,632
CH			
CR			
CY			
CZ	Synot Tip Arena (Eden)	Prague	21,000
DK	Parken	Copenhagen East	50,000
EE	A. le Coq Arena	Tallinn	9,700
FI	Helsinki Olympic Stadium	Helsinki	50,000
FR	Stade de France	Saint Denis	80,000
HE			
DE	Signal Iduna Park	Dortmund	80,552
HU	Puskás Ferenc Stadion	Budapest	56,000
IS	Laugardalsvöllur	Reykjavík	20,000
IE	Croke Park	Dublin	82,300
IT	Giuseppe Meazza	Milan	83,679
LV	Mezaparks	Riga	45,000
LT	Siemens Arena	Vilnius	12,500
LU	Rockhal	Esch-sur-Alzette	7,700
MT	Ta' Qali National Stadium	Ta' Qali	35,000
NL	Amsterdam Arena	Amsterdam South East	51,628
NO	Ullevaal Stadion	Oslo (North)	25,600
PO	National Stadium	Warsaw	55,000
PT	Estádio da Luz	Lisbon	65,400
RO	Arena Romana	Bucharest	50,000
SK	Tehelne pole	Bratislava	30,000
SI	Ljudski vrt	Maribor	12,435
ES	Camp Nou	Barcelona	98,787
SE	Nya Ullevi	Gothenburgh	43,000
UK	Wembley Stadium	London	90,000

Annex J.2: Insurance penetration statistics Ip[114]

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
	UK	FR	DE	IT	ES	NL	BE	AT	PT	DK	NO	CZ	FI	HE	HU	IE	PO	CH	SI
% population																			
Income protection	5%	64%	21%	39%	48%	92%	39%	0.10%											
Medical expenses insurance: including hospital cash, etc.	10%	91%	25%	34%	24%	92%	77%	34%	18%	16%	1%	0%	0%		0%	51%	0%		
Medical expenses insurance: reimbursement only			11%																
Long term care	0%	5%	13%	1%	0.03%			0.10%											
Standalone critical illness	1%							0.60%							1%				
Personal accident	20%	18%	15%	5%	3%		6%					13%			9%				

[114] Numbers that are not included in the above table for member states will be provided for June 2010

Annex J.3. Reinsurance illustrations

A 1 Country; Cat Excess of loss cover
Assume 800 excess 100 with 1 reinstatement cost 40

Gross loss	**1,000**
Cat XL retention	100
Cat XL limit	950
Cat XL reinstatement premium	40
ri recovery	850
ri premium	40
Net loss	**190**

B 1 Country; Cat Excess of loss cover with 10% quota share
Assume 800 excess 100 with 1 reinstatement cost 40
Quota share applies after Cat XL programme

Gross loss	**1,000**
Cat XL retention	100
Cat XL limit	950
Cat XL reinstatement premium	40
Cat XL ri recovery	850
net loss after Cat XL	150
QS ri recovery	15
Cat XL ri premium	40
Net loss	**175**

C 1 Country; Cat Excess of loss cover with 10% quota share
Nat Cat type event
Assume 800 excess 100 with 1 reinstatement cost 40
Quota share applies before Cat XL programme

Gross loss	**1,000**
Cat XL retention	100
Cat XL limit	950
Cat XL reinstatement premium	40
QS ri recovery	100
net loss after Cat XL	900
Cat XL ri recovery	800
Cat XL ri premium	38
Net loss	**138**

D 2 countries; Global Cat Excess of loss
Nat Cat type event affects 2 countries

Same currency in each country
In this situation the firm aggregates its gross losses across countries using 3.4
It then applies its RI programme to the result
Assume the 2 countries have a correlation of 75%

	Total	**Country A**	**Country B**
Gross loss	**1,414**	**1,000**	**500**
Cat XL retention	100		
Cat XL limit	2,000		
Cat XL reinstatement premium	100		
RI recovery	1,314		
RI premium	69		
Net loss	**169**		

Note: need to take care if different currencies are used in different countries. This will depend on the details of the reinsurance treaty

E 2 countries; Separate Cat Excess of loss covers
Nat Cat type event affects 2 countries
Same currency in each country
In this situation the firm applies its RI programme to the gross loss in each country
Then aggregates the net results using 3.4
Assume the 2 countries have a correlation of 75%

	Total	Country A	Country B
Gross loss	**1,414**	**1,000**	**500**
Cat XL retention		50	50
Cat XL limit		1,400	600
Cat XL reinstatement premium		65	35
RI recovery		950	450
RI premium		46	29
Net loss	**163**	**96**	**79**

Note: need to take care if different currencies are used in different countries

F 2 countries; Global Cat Excess of loss
Nat Cat type event affects 2 countries
Same currency in each country
Allocating the RI cover pro-rata to the countries to get net results by country
Then aggregates the net results using 3.4
Assume the 2 countries have a correlation of 75%

	Total	Country A	Country B
Gross loss	**1,414**	**1,000**	**500**
Cat XL retention		67	33

Cat XL limit		1,333	667
Cat XL reinstatement premium		67	33
RI recovery		933	467
RI premium		49	25
Net loss	**164**	**116**	**58**

Note: need to take care if different currencies are used in different countries
- will depend on the details of the reinsurance treaty

Annex J.4: List of countries that are materially affected by perils in Non life.

Country	Windstorm	Earthquake	Flood	Hail
AT	complete	june	complete	june
BE	complete	june	complete	june
BG	n/a	complete	june	n/a
CR	n/a	complete	n/a	n/a
CY	n/a	complete	n/a	n/a
CZ	june	june	complete	n/a
CH	complete	june	june	june
DK	complete	n/a	n/a	n/a
EE	n/a	n/a	n/a	n/a
FI	n/a	n/a	n/a	n/a
FR	complete	june	june	june
DE	complete	june	complete	june
HE	n/a	june	n/a	n/a
HU	complete	june	complete	n/a
IS	june	n/a	n/a	n/a
IE	complete	n/a	n/a	n/a
IT	n/a	june	june	june
LV	n/a	n/a	n/a	n/a
LT	n/a	n/a	n/a	n/a
LU	complete	n/a	n/a	june
MT	n/a	n/a	n/a	n/a
NL	complete	n/a	n/a	june
NO	complete	n/a	n/a	n/a
PO	june	n/a	june	n/a
PT	n/a	complete	n/a	n/a
RO	n/a	complete	june	n/a
SK	june	complete	complete	n/a
SI	n/a	complete	june	n/a
ES	june	n/a	n/a	n/a
SE	complete	n/a	n/a	n/a
UK	complete	n/a	complete	n/a

*n/a = this means that the peril is not considered to be material compared to other perils for this particular member state.
*June: these countries will be complete by June. The CTF has already estimated the 1 in 200 LDR for all countries, so part of the process is already complete.

Annex K to chapters 8 and 9

Geographical segmentation for health and non-life underwriting risk

This annex defines the 18 geographical segments which are used in the health and non-life underwriting risk sub-modules of the standard formula to measure geographical diversification. The segmentation is based on "macro-geographical regions" developed by the United Nation Statistics Division for statistical purposes.

1. Central & Western Asia *(UN geo-scheme Central Asia and Western Asia, less Cyprus)*

Armenia	Azerbaijan	Bahrain	Georgia
Iraq	Israel	Jordan	Kazakhstan
Kuwait	Kyrgyzstan	Lebanon	Oman
Palestinian Territories	Qatar	Saudi Arabia	Syrian Arab Republic
Tajikistan	Turkey	Turkmenistan	United Arab Emirates
Uzbekistan	Yemen		

2. Eastern Asia *(UN geo-scheme Eastern Asia)*

China	Hong Kong	Japan	Macao
Mongolia	North Korea	South Korea	Taiwan

3. South and South-Eastern Asia *(UN geo-scheme Southern Asia and South-Eastern Asia)*

Afghanistan	Bangladesh	Bhutan	Brunei Darussalam
Cambodia	India	Indonesia	Iran
Lao PDR	Malaysia	Maldives	Myanmar
Nepal	Pakistan	Philippines	Singapore
Sri Lanka	Thailand	Timor-Leste	Vietnam

4. Oceania *(UN geo-scheme Oceania region)*

American Samoa	Australia	Cook Islands	Fiji
French Polynesia	Guam	Kiribati	Marshall Islands
Micronesia	Nauru	New Caledonia	New Zealand
Niue	Norfolk Island	N. Mariana Islands	Palau
Papua New Guinea	Pitcairn	Samoa	Solomon Islands
Tokelau	Tonga	Tuvalu	Vanuatu
Wallis & Futuna Islands			

5. Northern Africa ***(UN geo-scheme Northern Africa and Western Africa plus Cameroon, Central African Republic and Chad)***

Algeria	Benin	Burkina Faso	Cameroon
Cape Verde	Central African Rep.	Chad	Cote d'Ivoire
Egypt	Gambia	Ghana	Guinea
Guinea-Bissau	Liberia	Libya	Mali
Mauritania	Morocco	Niger	Nigeria
Saint Helena	Senegal	Sierra Leone	Sudan
Togo	Tunisia	Western Sahara	

6. Southern Africa ***(UN geo-scheme Southern Africa, Eastern Africa and Middle Africa other than countries specified under Northern Africa)***

Angola	Botswana	Burundi	Comoros
Dem Rep of Congo	Djibouti	Equatorial Guinea	Eritrea
Ethiopia	Gabon	Kenya	Lesotho
Madagascar	Malawi	Mauritius	Mayotte
Mozambique	Namibia	Rep of the Congo	Reunion
Rwanda	Sao Tome & Principe	Seychelles	Somalia
South Africa	Swaziland	Uganda	United Rep. of Tanzania
Zambia	Zimbabwe		

7. Eastern Europe ***(UN geo-scheme Eastern Europe)***

Belarus	Bulgaria	Czech Republic	Hungary
Moldova	Poland	Romania	Russian Federation
Slovakia	Ukraine		

8. Northern Europe ***(UN geo-scheme Northern Europe)***

Aland Islands	Channel Islands	Denmark	Estonia
Faeroe Islands	Finland	Guernsey	Iceland
Republic of Ireland	Isle of Man	Jersey	Latvia
Lithuania	Norway	Svalbard, Jan Mayen	Sweden
United Kingdom			

9. Southern Europe ***(UN geo-scheme Southern Europe, plus Cyprus)***

Albania	Andorra	Bosnia	Croatia
Cyprus	Gibraltar	Greece	Italy
Macedonia	Malta	Montenegro	Portugal
San Marino	Serbia	Slovenia	Spain

Vatican City

10. Western Europe ***(UN geo-scheme Western Europe)***

Austria	Belgium	France	Germany
Liechtenstein	Luxembourg	Monaco	Netherlands
Switzerland			

11. Northern America excluding the USA ***(UN geo-scheme Northern America, less the USA)***

Bermuda	Canada	Greenland	St Pierre & Miquelon

12. Caribbean & Central America ***(UN geo-scheme Caribbean and Central America)***

Anguilla	Antigua & Barbuda	Aruba	Bahamas
Barbados	Belize	British Virgin Islands	Cayman Islands
Costa Rica	Cuba	Dominica	Dominican Republic
El Salvador	Grenada	Guadeloupe	Guatemala
Haiti	Honduras	Jamaica	Martinique
Mexico	Montserrat	Netherlands Antilles	Nicaragua
Panama	Puerto Rico	St-Barthelemy	St Kitts & Nevis
St Lucia	St Martin	St Vincent	Trinidad & Tobago
Turks & Caicos Is'ds	US Virgin Islands		

13. Eastern South America ***(UN geo-scheme South America divided)***

Brazil	Falkland Islands	French Guiana	Guyana
Paraguay	Suriname	Uruguay	

14. Northern, southern and western South America ***(UN geo-scheme South America divided)***

Argentina	Bolivia	Chile	Colombia
Ecuador	Peru	Venezuela	

15. North-east US ***(NAIC North-eastern zone)***

Connecticut	Delaware	District of Columbia	Maine
Maryland	Massachusetts	New Hampshire	New Jersey
New York	Pennsylvania	Rhode Island	Vermont

16. South-east US ***(NAIC South-eastern zone, less US Virgin Islands)***

Alabama	Arkansas	Florida	Georgia
Kentucky	Louisiana	Mississippi	North Carolina
Puerto Rico	South Carolina	Tennessee	Virginia
W. Virginia			

17. Mid-west US ***(NAIC Midwestern zone)***

Illinois	Indiana	Iowa	Kansas
Michigan	Minnesota	Missouri	Nebraska
North Dakota	Ohio	Oklahoma	South Dakota
Wisconsin			

18. Western US ***(NAIC Western zone, less American Samoa and Guam)***

Alaska	Arizona	California	Colorado
Hawaii	Idaho	Montana	Nevada
New Mexico	Oregon	Texas	Utah
Washington	Wyoming		