CEIOPS-FS-11/07

QIS3
Technical Specifications

PART I: INSTRUCTIONS

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Section 1

Valuation assumptions: standard approach

I.1.1 This section concerns valuation requirements for

- assets,
- technical provisions and
- other liabilities.

I.1.2 It should be highlighted that participants should apply this section on a best effort basis. Participants are allowed to take part on an approximate basis and focus on material issues if that is the best what is currently achievable in the time available to perform the valuation. Thus for instance participants could use any current information and practises on determining market values for assets, time-values of guarantees and options could be omitted (since their proper valuation would normally require a rather sophisticated valuation approach), the current book value could be taken as a starting point for other liabilities etc.

Assets

I.1.3 Assets should be valued at their market value. Where reliable, observable market prices in deep and liquid markets exist, asset values should be set equal to these market prices. For long positions on assets, the appropriate quoted market price is the bid price taken at the valuation date, while for short positions it is the offer price. (see also II.1.1).

I.1.4 If a market price is observable but is not reliable due for instance to illiquidity, reasonable proxies for valuation should be used, taking into account the degree of unreliability and illiquidity of the asset in an adequate manner. Participants are asked to provide a description of the proxies used.

I.1.5 In cases where there is no readily available market value, an alternative approach should be adopted, but this should still be consistent with any relevant market information. For tradable assets, this should be an estimate of the realisable value.

I.1.6 Illiquid or non-tradable assets should be valued on a prudent basis, fully taking into account the reduction on value due to the credit and liquidity risks attached.

- In absence of any sufficient evidence, the value of these assets should not be higher than their acquisition cost reduced by the

estimated profit margin charged by the seller at that moment, and the depreciation due to the use or obsolescence of the asset.

- In absence of any sufficient evidence, intangible assets, furniture, fittings, data process equipment and similar assets with a significant risk of depreciation in case of realisation should be valued at nil.

I.1.7 If independent and reliable expert opinions are available these may be considered in the valuation.

Technical provisions

Hedgeable and non-hedgeable risks

(see also II.1.2-II.1.8)

I.1.8 The valuation of the technical provision should take account of both hedgeable and non-hedgeable risks.

I.1.9 Where there is an unsure distinction between hedgeable and non-hedgeable risks, or where market-consistent values cannot be derived, the non-hedgeable approach should be followed (best estimate plus risk margin).

I.1.10 No reduction in technical provisions should be made on account of the creditworthiness of the undertaking itself.

I.1.11 Where separable, the value of hedgeable and non-hedgeable risks should be separately disclosed. For non-hedgeable risks, the risk margin should be separately disclosed.

Hedgeable risks

I.1.12 If a risk can be perfectly hedged or replicated on a sufficient deep, liquid and transparent market, the hedge or the replicating portfolio provides a directly observable price (mark-to-market). Reasonable inter/extra-polations from directly observable prices are also permitted.

I.1.13 Deep, liquid and transparent markets are defined as markets where participants can rapidly execute large-volume transactions with little impact on prices[1].

Non-hedgeable risks

I.1.14 For non-hedgeable risks the valuation should correspond to the explicit sum of a best estimate plus a risk margin, the latter being determined

[1] This definition was also used in Market Liquidity: Research Findings and Selected Policy Implications, CGFS Publications No. 11, May 1999.

according to a cost-of-capital (CoC) approach. However, for long-tailed non-life business alternative methods are envisaged.

I.1.15 This may also include risks that are of a financial nature, whenever there is no hedgeable price (as per paragraph I.1.12 above) from deep, liquid and transparent markets including an implicit allowance for additional uncertainty.

I.1.16 If from a non-hedgeable risk a hedgeable sub-risk can be separated for which there is a reliable hedgeable price on a sufficiently deep, liquid and transparent market, then the market value of this hedgeable sub-risk could be used in the valuation.

I.1.17 If for a non-hedgeable risk there is a hedge available that is traded on a financial market but is incomplete and will only to some extent eliminate the risks associated with a liability, then the valuation of the best estimate could be done by a reference to the market value of the incomplete hedge increased with an appropriate valuation of the expected basis-risk.

Best estimate

(see also II.1.9 to II.1.11)

I.1.18 The best estimate should be assessed using at least two different methods where available, that could be considered reliable and relevant. The most appropriate method (or combination of methods) should then be used to value the best estimate. A most appropriate method is a technique which is part of best practice and which capture the nature of the liability most adequately in a prudent, reliable and objective manner.

I.1.19 Insurers should describe which actuarial method they used to determine the best estimate and whether they used various actuarial methods.

I.1.20 In deriving the best estimate, all potential future cashflows that would be incurred in meeting liabilities to policyholders need to be identified and valued.

I.1.21 The best estimate equals the expected present value (probability weighted averages) of all future potential cash-flows (distributional outcomes), based upon current and reliable information and entity-specific assumptions.

I.1.22 A projection horizon which is long enough to capture all material cash flows arising from the contract or groups of contracts being valued should be used. If the projection horizon does not extend to the term of the last policy or claim payment, the firm should ensure that the use of a shorter projection horizon does not significantly affect the results.

Assumptions

I.1.23 The expected cashflows should be based on assumptions that are deemed to be realistic for the book of business in question, i.e. each

element sampled from a distribution believed to be reasonable and realistic with regard to all information available. Assumptions should be based on a participant's experience for the probability distributions for each risk factor, but taking into consideration market or industry data where own experience is limited or not sufficiently credible.

I.1.24 Such realistic assumptions should neither be deliberately overstated nor deliberately understated when performing professional judgements on factors where no credible information is available.

I.1.25 Cashflow projections should reflect expected demographic, legal, medical, technological, social or economic developments. For example, a foreseeable trend in life expectancy should be taken into account.

I.1.26 Appropriate assumptions for future inflation should be built into the cashflow projections. Care should be taken to identify the type of inflation to which particular cashflows are exposed. For some cashflows, the link may be to consumer prices, but there are other links such as salary inflation, which tends to exceed consumer price inflation.

Discounting

I.1.27 Cashflows should be discounted at the risk-free discount rate applicable for the relevant maturity at the valuation date. These should be derived from the risk-free interest rate term structure at the valuation date. Where the financial market provides no data for a maturity, the interest rate should be interpolated or extrapolated in a suitable fashion.[2]

I.1.28 Participants should use the term structure of interest rate supplied by CEIOPS for different EEA currencies, together with the US Dollar, Japanese Yen and Swiss Franc.

I.1.29 The creditworthiness of the undertaking is intended to have no influence on the value of the technical provision. Thus, if participants need to use term structures for other currencies (not supplied by CEIOPS), they should derive them based the following rationale: the risk-free interest rates relating to bullet maturities should be credit risk-free. The risk-free interest rates could be set by taking into account yields on government bonds, where available and appropriate. In some markets it could however be more appropriate due to illiquidity or/and insufficient selection of maturities to use swap rates as proxies for risk-free interest rates[3]. If so, appropriate considerations related to possible illiquidity or insufficient credit quality in the swap rates should be given.

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[2] The use of risk-adjusted discount rates (so-called deflators) can be allowed for cash flows linked to financial variables, provided that the underlying estimation process leads to results equivalent to those that would be obtained if the cash flows are projected using risk neutral probabilities and discounted with the risk-free interest rate term structure.

[3] For several reasons, the financial market usually price financial instruments with a reference to the swap curve.

Expenses

I.1.30 Expenses that will have to be incurred in the future to service an insurance contract are cash flows for which a provision should be calculated. For the valuation firms should make assumptions with respect to future expenses arising from commitments made on, or prior to, the valuation date.

- All future administrative costs, including investment management, commissions, claims expenses and an appropriate amount of overheads (costs not readily traceable to specific segmentation, function or process) should be considered. Expense assumptions should include an allowance for future cost increases. These should take into account the types of cost involved. The allowance for inflation should be consistent with the economic assumptions made. For disability income and other similar types of business, claims expenses may be a significant factor.

- Expenses related to future deposits or premiums should usually be taken into consideration.

- Firms should consider their own analysis of expenses, future plans and relevant market data. But this should not include economies of scale where these have not yet been realised.

- Whenever the present value of expected future contract loadings is taken as a starting point any shortfall relative to future expenses that will have to be incurred in the future to service an insurance contract should be recognised as an additional liability (and the opposite).

Taxation

I.1.31 Taxation payments required to meet policyholder liabilities should be allowed for on the basis that currently applies. In cases where changes to taxation requirements have been agreed (but not yet implemented), the pending adjustments should be reflected in the calculations. The recognition of taxation on the best estimate should be consistent with the amount and timing of the profits and losses that are expected to be incurred in the future.

Reinsurance

I.1.32 Best estimate should be valued both gross and net of reinsurance.

I.1.33 In certain reassurances, the timing of recoveries and the time of direct payments might markedly diverge, and this should be taken into account when valuing the net best estimate (e.g. when discounting cash-flows).

I.1.34 For QIS3 and practical reasons, when calculating the net best estimate, it should be assumed that the reinsurer will not default[4].

Future premiums from existing contracts

I.1.35 An appropriate allowance for future premiums should be given. However, future premiums in exceedance of the necessary level to support the obligations under an existing contract should not be taken into account.

I.1.36 Hence, contractual recurring premiums under the contracts should be taken into account, but no allowance should be given for expected renewal premiums that are not included within the current insurance contract and that both parties are free to refuse.

I.1.37 Where a contract includes options or guarantees that provide rights under which the policyholder can obtain a further contract on favourable terms (for example, renewal with restrictions on re-pricing or further underwriting), then the value of these guarantees and options should be included in the valuation of technical provisions.

I.1.38 Any uncertainty surrounding future premiums should be reflected through an appropriate probability assumption, consistent with the probability assumptions applied to other cash flows. Thus future premiums should be included in the determination of future cash flows with an appropriate assessment of the future expected persistency.

Risk margin

(see also II.1.12 to II.1.19)

I.1.39 A cost-of-capital methodology should be used in the determination of the risk margin for non-hedgeable risks.

I.1.40 For long-tailed non-life business, CEIOPS agreed that further analysis is needed (Advice to the EC on Pillar I issues – further advice CEIOPS DOC 08/07, para. 3.120). Therefore, participants can also provide results based on alternative methods.

Cost-of-capital specifications

SCR at year 1 (and from year 2 onward if no proxies are used): use of the standard formula

I.1.41 For the purpose of QIS3 insurers are requested to perform calculations from the standard formula, even if there were an approved internal model in place for the SCR(0) calculation.

I.1.42 On an optional basis, insurers which have developed an internal (partial internal) model(s) may also communicate the result of calculations made

[4] This assumption differs from what indicated in CP20.

from these models, provided that results from the standard formula are also communicated.

SCR at year 1 and future SCRs: market and credit risks

I.1.43 For the purpose of QIS3, future SCR at year 1 (used to calculate the risk margin) should include market and credit risks (i.e. credit spread risk plus counterparty default risk), and future SCRs from year 2 onward (used to calculate the risk margin) are limited to underwriting and operational risks and to counterparty default risk relating to reinsurers.

I.1.44 Insurers are invited to provide comments, in particular on which duration should credit etc. risks be taken into account in future SCRs (used to calculate the risk margin).

SCR at year 1 and future SCRs: premium risk

I.1.45 For the purpose of QIS3, premium risk is included in future SCR at year 1 (used to calculate the risk margin), but excluded from the subsequent SCRs (used to calculate the risk margin).

Future SCRs: credit reinsurance risk

I.1.46 If some mitigators (e.g. non EU and low–rated / unrated reinsurers) bear a credit risk, future SCRs should take it into account for the calculation of the risk margin of net TP.

Distinct calculations between different LoBs

I.1.47 Insurers are requested to differentiate calculations on different lines of business (LoB) or on homogeneous risk groups (HGR).

Proposed methods to differentiate

I.1.48 Differentiating the calculation of the risk margin on each LoB or HGR i, j, k… requires, for each future year 1, 2, etc, splitting future SCRs: SCR_1, SCR_2 etc. between LoBs / HGRs i, j, k…: SCR_{1i}, SCR_{1j}, SCR_{1k}…; SCR_{2i}, SCR_{2j}, SCR_{2k} … etc.

I.1.49 Participants may use what technique they find appropriate to break down the CoC margin calculation to individual LoBs / HGRs. Participants should describe their technique (including, if relevant, their choice for allocating assets), and explicit whether/why they found it more appropriate than those suggested by CEIOPS.

I.1.50 <u>*Default technique 1*</u>. For year 1, define SCR_{1i}, SCR_{1j}, SCR_{1k}… proportionally to each underwriting risk (except catastrophe risk) charge $SCR_{u.r.\text{~~(c.r.)~~}1i}$, $SCR_{u.r.\text{~~(c.r.)~~}1j}$, $SCR_{u.r.\text{~~(c.r.)~~}1k}$… (see SCR specifications, Section 3) that would be calculated for each reporting segment (as set out in I.1.73 for life and I.1.110 for non-life) i, j, k in isolation, in the absence of other reporting segments.

I.1.51 Adopt the same technique for years 2, etc, unless proxies for SCRs are used (see below).

I.1.52 *Default technique 2*. The SCR should be recalculated at reporting segment level based on a hypothecation of the firm's assets to the different reporting segment.

I.1.53 In order to satisfy the requirement laid down in para. I.1.59 (no diversification benefit across reporting segments), it is expected that $SCR_{1i} + SCR_{1j} + \ldots = SCR'_1$ etc calculated as taking no account of diversification across reporting segments.

I.1.54 As additional information participants are requested to provide results allowing full diversification across reporting segments, i.e. $SCR^*_{1i} + SCR^*_{1j} + \ldots = SCR_1$, etc.

Segmentation

I.1.55 LoBs in NL should be regarded as representing — at least for QIS3 — homogeneous groups of risks (HGRs).

I.1.56 For Life insurance, the value of the risk margin should be disclosed separately for each segment as defined in I.1.73.

I.1.57 Nevertheless, participants should perform the valuation of the risk margin at the level of HGRs (following actuarial best practice principles), which may differ from the segmentation prescribed in I.1.73. Participants are also asked to disclose the list of HGRs considered and their allocation to each of the segments defined in I.1.73.

I.1.58 For purposes of QIS3 a HGR is deemed to be a group of contracts that have the same or similar risk characteristics e.g. term assurance, critical illness cover, endowment assurance, annuities, saving products.

Aggregation of Technical Provisions calculated per LoB

I.1.59 To reach to the overall value of Technical Provisions, participants should assume that no diversification benefits arise from the grouping of technical provisions calculated per reporting segment (as set in I.1.73 for Life and I.1.110 for Non-life). However, diversification benefits arising at a lower level of granularity should be fully taken into account, based on plausible and realistic correlation assumptions.

I.1.60 As additional information (optional basis), participants are asked to disclose the potential value of diversification benefits arising from the grouping of technical provisions calculated per reporting segment (as set in I.1.73 for Life and I.1.110 for Non-life), as well as details on the aggregation methodology and assumptions considered.

Calculation of future SCRs: simplifications

I.1.61 Instead of calculating each SCR until the complete run–off of the portfolio, participants may use proxies from year 2 onward. The following methodologies are suggested:

I.1.62 1) **Non–life**. Since the risk margin is calculated on LoBs / HRGs i, j, k…, then future SCR_s : SCR_2, SCR_3 etc., or their proxies, have to be split between SCR_{2i}, SCR_{2j}, SCR_{2k} … ; SCR_{3i}, SCR_{3j}, SCR_{3k} … ; etc.

I.1.63 The following paragraphs suggest proxies for future SCR_{2k}, SCR_{3j} , … etc.

I.1.64 Future SCR at year 1 (SCR_1) will include market and credit risks, and future SCRs from year 2 onward will be limited to underwriting and operational risks and to reinsurer's credit / concentration risks. To derive proxies to future SCRs, it is assumed that the insurer has calculated future SCR' at year 1 (SCR'_1) only including underwriting, operational and reinsurance risks, and then split SCR'1 between SCR'_{1i}, SCR'_{1j}, SCR'_{1k}… (by using either the default methodology or its own methodology).

I.1.65 i) From year 2 onward, it is suggested that in each LoB i, j, …, the proxies to future

SCR_2^i, SCR_3^i, SCR_4^i, etc;

SCR_2^j, SCR_3^j, SCR_4^j, etc ;

…,

be the best estimates

BE_2^i, BE_3^i, BE_4^i, etc;

BE_2^j, BE_3^j, BE_4^j, etc;

… .

I.1.66 Thus, for each LoB i:

$SCR_2^i = SCR'^i_1 \cdot BE_2^i / BE_1^i$; $SCR_3^i = SCR'^i_1 \cdot BE_3^i / BE_1^i$; etc.

I.1.67 ii) As an alternative method, from year 2 onwards, it is suggested that in each LoB i, j, …, the future

SCR_2^i, SCR_3^i, SCR_4^i, etc;

SCR_2^j, SCR_3^j, SCR_4^j, etc ;

…,

are estimated using the best estimates

BE_2^i, BE_3^i, BE_4^i, etc;

BE_2^j, BE_3^j, BE_4^j, etc;

… .

as follows:

- the reserve risk capital charge for non-life underwriting risk is directly calculated as in the standard formula specifications (by using the relevant best estimate provision as volume measure)
- the operational risk charge is calculated by using the relevant best estimate provision as volume measure
- the charges for reinsurance counterparty and concentration risks are estimated with the method applied in Section 3.

The overall SCR estimate is determined by combining the charges for non-life underwriting risk (consisting solely of reserve risk), operational risk and reinsurance counterparty/concentration risk by means of the aggregation method of the SCR standard formula.

I.1.68 iii) Other proxies may be used in a particular LoB k if the insurer finds it more appropriate. For instance, in (long term) health insurance[5] proxies could be the numbers of expected future disability cases, each actualised to the date of each future SCR.

I.1.69 Thus, for disability risk products:

$$SCR_1 = SCR_0 \frac{N_1}{N_0} \quad ; \quad SCR_2 = SCR_0 \frac{N_2}{N_0}$$

where N_0 is the number of expected future disability cases, actualised to the date 0 and i is taken from the interest rate term structure having regard to the appropriate maturity:

$$N_0 = \frac{{}_1N}{(1+i)^1} + \frac{{}_2N}{(1+i)^2} + \frac{{}_3N}{(1+i)^3} + \ldots = \sum_{t\geq 1} \frac{{}_tN}{(1+i)^t}$$

and ${}_mN$ is the number of expected disability cases in year m;

likewise,

$$N_1 = {}_1N + \frac{{}_2N \cdot (1+i)^1}{(1+i)^2} + \frac{{}_3N \cdot (1+i)^1}{(1+i)^3} + \frac{{}_4N \cdot (1+i)^1}{(1+i)^4} + \ldots = \sum_{t\geq 1} \frac{{}_tN \cdot (1+i)^1}{(1+i)^t}$$

and

[5] Cf. FOPI's paper, *A Primer for Calculating... 18 April 2006,* p. 7

$$N_m = \sum_{t \geq m} {}_t \frac{N \cdot (1+i)^m}{(1+i)^t}$$

In any case participants are invited to describe (and justify) their proxies.

2) **Life**. The following proxies are suggested:

Mortality Risk	Capital at risk
Longevity Risk	Best estimate
Disability Risk	Capital at risk
Lapse risk	Difference (positive) between the best estimate and the surrender value
Expense risk	Annual expenses
Revision risk	Best estimate
CAT risk:	*depends on the CAT event considered in the standard SCR:*
increased mortality/disability rates	Capital at risk
increased lapse rate	Difference (positive) between the best estimate and the surrender value
Health u/w risk	Expected expenditures, allowing for inflation

I.1.70 Participants are asked to allocate their policies into the main risk category to which the contracts are contingent on. If practical, unbundling per type of risks for some contracts should be carried out.

I.1.71 After that allocation, estimation analogous to that described in the previous paragraphs for Non-life business should be followed (the best estimate being replaced by the relevant exposure measure).

Cost-of-Capital factor

I.1.72 All participants should assume a Cost-of-Capital factor of 6% above the risk-free interest rate on the valuation of the risk margin.

Life Technical provisions

Segmentation

I.1.73 For life business, the following general segmentation should be used:

1st level segmentation:

- Contracts with profit participation clauses

- Contracts where the policyholder bears the investment risk
- Other contracts without profit participation clauses
- Accepted reinsurance

For the valuation of the risk margin each of the 1st level segments should be further disaggregated into risk drivers in the following way:

- Death protection contracts
- Survivorship protection contracts
- Contracts where the main risk driver is disability/morbidity risk
- Saving contracts, that is contracts that resemble financial products providing no or negligible insurance protection relative to the aggregated risk profile.

I.1.74 Participants should allocate their policies according to the main risk driver. If practical, participants may allocate their policies after unbundling.

I.1.75 Participants are encouraged to perform the valuation of technical provisions (including best estimate and risk margin) on the basis of homogeneous groups of risks (which may differ from the above segmentation), following actuarial best practice. Results should, however, be disclosed on the basis of the above segmentation.

I.1.76 Amounts for health contracts with features similar to life business should be disclosed separately.

I.1.77 The segments / lines of business described in the 1st level segmentation are not necessarily mutually exclusive. Business should therefore be allocated according to its predominant characteristic.

Best estimate

Risk factors

I.1.78 Relevant risk factors should include at least the following:

- Mortality rates
- Morbidity rates
- Disability rates
- Lapse rates
- Option take-up rates
- Expense assumptions

I.1.79 No surrender value floor should be assumed for the amount of the market consistent value of liabilities for a contract.

I.1.80 Where the cash flow being valued contain options that may be exercised against the firm, or the potential outcomes have an asymmetrical distribution (e.g. guarantees), then the best estimate must take account of an appropriate market consistent value in respect of those options and/or asymmetries reflecting both the intrinsic and the time value.

Grouping of contracts (see also II.1.20 to II.1.22)

I.1.81 As a starting point, the valuation should be based on policy-by-policy data, but reasonable actuarial methods and approximations may be used. In particular the projection of future cash flows based on suitable specimen policies can be permitted.

Policyholders' behaviour (see also II.1.23 to II.1.25)

I.1.82 It is important to consider policyholder options to change the terms of the contract. Cashflow projections should take account of the proportion of policyholders that are expected to take up options. This may depend on financial conditions at the time 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.

I.1.83 When credible and relevant discontinuance experience is available firms should make use of it. Where a discretionary surrender value is paid on discontinuance, the estimates should allow for the payment the insurer would reasonably make in the scenario under consideration.

Management actions (see also II.1.26 to 1.27)

I.1.84 Future management actions should be reflected in the projected cash-flows and the items taken into account should be consistent with the firm's current principles and practices to run the business. The assumptions used should reflect the actions that management would reasonably expect to carry out in the circumstances of each scenario, such as changes in asset allocation, changes in rates of extra benefits or product changes, or the way in which a market value adjustment is applied. Allowance should be made for the time taken to implement actions.

I.1.85 In considering the reasonableness of projected management actions, firms should consider their obligations to policyholders, whether through policy wordings, marketing literature or other statements that give rise to policyholder expectations of how management will run the business.

I.1.86 As additional information participants are asked to disclose their assumptions on management actions and the objectivity, reasonability and verifiability of the assumptions.

Distribution of extra benefits (see also II.1.28 to II.1.32)

I.1.87 Technical provisions should generally include amounts in respect of guaranteed benefits as well as statutory and discretionary extra benefits.

I.1.88 Discretionary extra benefits should include both legal and constructive extra benefits taking into account any restrictions given in paragraph I.1.98.

I.1.89 Any constraints arising from legal restrictions or profit-sharing clauses in policy conditions should be taken into consideration. It should be assumed that, in applying such clauses, the approach to calculating profits for profit-sharing purposes will not change from that which applies currently.

I.1.90 Any constructive obligation to distribute extra benefits should also be considered.

I.1.91 Assumptions for distributing extra benefits should follow the general principles for management actions and a firm's principles and practices to run the business.

I.1.92 Firms may take into consideration recent levels of extra benefits, especially where their policy is to smooth changes in rates of extra benefits.

I.1.93 The valuation of the cost (or benefit) from smoothing should also reflect the practical intentions and restrictions of the firm when changing rates of extra benefits, including the minimum interval between changes and any publicly-disclosed or internally intended limits.

I.1.94 Where firms differentiate their extra benefits between policy types or risk groups, this should be reflected in the assumptions on the level of future extra benefits.

I.1.95 Where material to the results, firms should take into consideration the expected apportionment between annual and final extra benefits.

I.1.96 The valuation of extra benefits should be consistent with the future return on assets assumed to back the liabilities.

I.1.97 If a firm's principles and practices for distributing extra benefits are expected to lead to payments that are in excess of what can be generated from the policy fund any such amounts should be taken into account unless otherwise stated. These amounts can be related to realised or unrealised profits and they might be subject to a different and a primary loss-absorbing nature in adverse circumstances compared to those extra benefits generated from the policy fund.

I.1.98 However, cash flows arising from realised profit reserves appearing in the balance sheet where they may be used to cover any losses which may arise and where they have not been made available for distribution to

policy holders should be excluded from the valuation of technical provisions.

Unit-linked business (see also II.1.33)

I.1.99 The same cashflow projection approach should be used for unit and index-linked business. Firms should also assume that unit-linked funds perform on a market-consistent basis. All cashflows arising from the product should be considered, including expenses, death benefits and charges receivable by the insurer. Where firms have the right to increase charges, assumptions on increased charging should be consistent with the general principles for management actions.

Health insurance

I.1.100 The cash-flow projections for health insurance business should take account of claims inflation and premium adjustment clauses. It may be assumed that the effects of claims inflation and premium adjustment clauses cancel out each other in the cash flow projection, unless this approach undervalues the best estimate.

Pure risk insurance

I.1.101 Non-life insurance methodologies should be applied to pure risk insurance belonging to insurance class accident and health, unless the characteristics of contracts clearly require a different treatment in line with life insurance valuation methodologies.

Options and guarantees (see also II.1.34 to II.1.48)

I.1.102 The costs of options and guarantees should be valued on a market consistent basis including both the intrinsic and the time value.

I.1.103 Considerations regarding the effects of policyholder behaviour and other non-financial factors should also be taken into account in the valuation of options and guarantees.

I.1.104 The costs of any option and guarantee may be valued by using one or more of the following four methods:

- if the risk from the option or guarantee is hedgeable, the market costs of the hedge or replicating portfolio of the option or guarantee should be used;
- 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.

Other charges than expenses (see also II.1.49)

I.1.105 If a firm charges for instance for the cost of guarantees, options or smoothing in the determination of extra benefits, then when calculating the credit for those charges the projected future levels of such charges should be separately assessed and be consistent with the firm's principles and practices to run the business.

Calibration of stochastic asset models (see also II.1.50 to II.1.52)

I.1.106 If a stochastic asset model is being used, it should be calibrated to reflect the nature and term of the liabilities giving rise to significant guarantee and option costs. The option features reproduced should generally be for options where no significant credit risk is taken on.

I.1.107 The stochastic asset model should also be calibrated to the current risk-free interest rate term structure.

Implied volatility (see also II.1.53)

I.1.108 For the valuation of technical provisions the implied volatility is the relevant volatility measure for financial instruments.

Small insurers or portfolios (see also II.1.54 to II.1.66 and Annex C)

I.1.109 For small insurers or portfolios the outlined general valuation approach is expected to be followed. However, for some factors, elements or procedures more pragmatic approaches can be accepted. The general valuation objective for small insurers or portfolios is that the valuation approach should not materially alter the overall valuation result and systematically under estimate the true liability. The valuation approach for small insurers or portfolios should therefore reflect the main characters of the underlying liability to be valued and produce reasonable proxies for best estimate values.

Non-life Technical provisions

Segmentation

I.1.110 Values for non-life direct insurance should be indicated in each of the lines of business defined in Article 63 of the Council Directive on the annual accounts and consolidated accounts of insurance undertakings (91/674/EEC), with a further refinement, namely:

- Accident and health – workers' compensation
- Accident and health – health insurance

- Accident and health – others/default
- Motor, third-party liability
- Motor, other classes
- Marine, aviation and transport
- Fire and other property damage
- Third-party liability
- Credit and suretyship
- Legal expenses
- Assistance
- Miscellaneous non-life insurance

I.1.111 Facultative and proportional reinsurance should be treated as direct insurance, i.e. it should be allocated to one of the 12 LoBs listed in the previous paragraph.

I.1.112 Non-proportional reinsurance shall be split into: property business; casualty business; and marine, aviation and transport business.

I.1.113 The principle of substance over form should be followed in determining how contracts are to be treated, whether in respect to an allocation within non-life insurance, or in respect of an allocation between life and non-life insurance.

I.1.114 The valuation of the provision for claims outstanding and the premium provisions should generally be carried out separately. However, if such a separate treatment is not practical, participants may value these provisions together.

Best estimate

I.1.115 Participants are encouraged to perform the valuation of technical provisions (including best estimate and risk margin) on the basis of homogeneous groups of risks (which may be more granular than the above segmentation), following actuarial best practice. Results should, however, be disclosed on the basis of the above segmentation. To the extent possible, insurers should describe on what basis the groupings were made.

I.1.116 Participants should use statistical methods compatible with current actuarial 'best practice' and should take into account all factors that might have a material impact on the expected future claims experience. Typically, this will require the use of claims data on both an occurrence year and a development year basis (run-off triangles).

I.1.117 Participants should specify whether they use run–off triangles, and if so describe these. They should when relevant also state the name of the actuarial method that they apply.

I.1.118 Insurers should describe to which claims they apply a case by case approach and why. When relevant, they should provide details of the method (e.g. whether and if so, how case–by–case estimations are supplemented by actuarial methods).

Admissible proxies to best estimate and risk margin for QIS3 purposes

I.1.119 To increase the comparability of QIS3 results and encourage small and medium entities to participate, the following proxies or simplifications are suggested, exclusively for QIS3 purposes and exclusively for those participants that at the present time are not in a position to develop the 'standard' approach.

I.1.120 These simplifications neither prejudge nor condition the proxies that might eventually be recommended by CEIOPS.

Premiums provisions (stand-ready obligation)

I.1.121 Premium provisions substitute current unearned provisions and unexpired risk provisions. Premium provisions relate to the coverage period when the insurer provides the service of accepting and managing the risks to its policyholders. During the coverage period, the insurer is at risk of insured events occurring with varying severity.[6]

I.1.122 As a principle, the sum of the current unearned premium provision and the provision for unexpired risks is assumed to be an acceptable proxy of the sum of both the best estimate of premium provisions and its corresponding margin. (subject to possible further review)

I.1.123 Nevertheless, insurers should carry out a '*liability adequacy test*' to verify that the calculated proxies do not produce a lower amount than expected payments derived from claims and management expenses corresponding to the pending coverage period.

I.1.124 If the liability adequacy test shows a negative balance (higher expected expenses than unearned premium reserve), then premium provision should be accordingly increased.

I.1.125 If the liability adequacy test shows a positive balance (lower expected expenses than unearned premium reserve), then premium provision should be maintained at the amount equivalent to unearned premiums, and the positive balance considered as capital element, if the requirements provided for this are met[7].

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[6] CFO Forum Elaborated Principles for an IFRS Phase II Insurance Accounting Model. EP 4), page 3.

[7] Please refer to Calculation of Eligible Capital (Section 2).

I.1.126 A default methodology is proposed in Annex A to carry out this liability adequacy test for insurers that are not familiar with this type of test. (Mechanics of such a test should be further on consulted with the GC).

Post-claims technical provisions (outstanding claims provisions)

I.1.127 Post-claims technical provisions relate to the settlement period between claims being incurred and claims being settled. During the settlement period, the insurer is at risk of the incurred claims varying in amount and timing of payment.[8]

I.1.128 For claims with low uncertainty, both in timing and amount (generally claims which are settled in a short term), either the result of their individual valuation (case by case) or the result of sound statistical methods may be assumed as reasonable proxies of their best estimate, provided the entity has checked that the alternative used has produced consistent estimates with the actual results obtained in back-testing.

I.1.129 For claims with significant uncertainty, in either timing or amount (generally claims which are settled in a medium or long term), the best estimate should in principle be valued using relevant actuarial methods based on run-off triangles. To guarantee that the insurer controls both model and parameter errors, some general principles are suggested:

- As stated earlier (para. I.1.18), the best estimate should in general be assessed using at least two different methods that could be considered reliable and relevant. Two methods are considered different when they are based both on different actuarial techniques and different sets of assumptions, therefore cross-checking each other if there is some model or parameter error. The most appropriate method should then be used to value the best estimate. A most appropriate method is a technique which is part of best practice and which captures the nature of the liability most adequately.

- Goodness-of-fit tests should be applied to all the methods considered and those showing a poor quality of fit should be rejected.

- If the available data do not offer a robust behaviour to be integrated directly into run-off triangles and treated through generally accepted actuarial methods, the participant will try to adjust the historical data using objective and verifiable criteria, maintaining in any case homogeneity of different series used.

- If this adjustment were not possible or reliable, a case by case assessment is preferable to the application of too heterogeneous methods or to inconsistent sets of data.

[8] CFO Forum Elaborated Principles for an IFRS Phase II Insurance Accounting Model. EP 4), page 3.

I.1.130 However, if it is considered that the claims handlers consistently under or over estimate claims, this should be reflected in the overall best estimate provision.

Risk margin

I.1.131 As said in para. I.1.40, alternative approaches to the CoC methodology can be developed on long tail non-life business (e.g. a percentile approach for premium and incurred but not reported reserve risks). Care should be taken to ensure that other methodologies are consistent with the framework and allow for the objectives that the RM is intended to achieve (i.e. transfer or run-off).

I.1.132 Insurers should describe these alternative approaches, their scope of application, and the level of the risk margin they generate.

Admissible proxies for QIS3 purposes

I.1.133 Only if the insurer can not derive the value of the market risk margin with sufficient reliability or without incurring in excessive costs, the following proxies will be admitted:

Risk margin corresponding to non-life provisions

I.1.134 The insurer will classify its provisions in three categories, according the uncertainty inherent to the timing and amount of future cash flows stream which correspond each provision:

- Highly variable provisions, whose main example may be liability provisions (excluding motor vehicle liability), catastrophe provisions or those regarding non-proportional reinsurance accepted. The market value margin for these technical provisions may be quantified as 20 per cent of the best estimate, only if the entity justifies the reasons impeding to apply the 'cost of capital' approach used as a placeholder or alternative approaches specifically developed on long tail non-life business (e.g. percentile approach, …), as specified in para. I.1.40.

- Medium variable provisions, whose main examples may be motor vehicle insurance or fire insurance. The market value margin for these technical provisions may be estimated as 10 per cent of the best estimate under the same requirement as above.

- Low variable provisions, where market value margin may be estimated as 5 per cent of the best estimate.

I.1.135 Alternative method: use the simplified formulae suggested by CEA[9].

[9] This proxy has been described in the CEA paper "CEA, Solvency II, Cost of Capital, CEA note of 21 April 2006 at http://www.cea.assur.org/cea/v1.1/posi/pdf/uk/position291.pdf ", p. 12. Further developments by CEA on this issue in the course of QIS3 will need to be taken into account.

Other liabilities

I.1.136 No adjustment in the valuation of other liabilities should be made on account of the creditworthiness of the undertaking itself.

I.1.137 Other liabilities that are tradable in a deep, liquid market are valued at the amount for which they could be transferred, or settled, between knowledgeable willing parties in an arm's length transaction.

I.1.138 Obligations that are not tradable in a deep, liquid market should be valued on a prudent basis at the present value of the future cash flows allowing for all aspects that affect those cash flows, such as the right to early repayment , the right of conversion, and by being consistent with information provided by the financial markets. Reasonable simplifications are allowed.

Section 2

Calculation of eligible capital

I.2.1 Participants are requested to provide the information set forth below. For further details, reference is made to the explanatory note.

Summary information

I.2.2 The total amount of capital, providing the subtotals for tier 1 capital, tier 2 capital and tier 3 capital.

I.2.3 The MCR, the amount of the MCR covered by tier 1 capital and the amount of the MCR covered by tier 2 capital, not being contingent capital.

I.2.4 The SCR, the amount of the SCR covered by tier 1 capital, the amount of the SCR covered by tier 2 capital and the amount of the SCR covered by tier 3 capital.

I.2.5 The total amount of capital determined in accordance with the valuation principles for assets and liabilities under Solvency I.

I.2.6 The total amount of capital determined in accordance with the valuation principles for assets and liabilities under Solvency II.

Detailed information

I.2.7 Specification of tier 1 capital, as follows:

The amounts represented by:

(a) the excess of assets over liabilities valued in accordance with section X & Y (valuation of assets & liabilities & technical provisions) and any differences between this and the accounting balance sheet, and

(b) subordinated liabilities,

analysed between

- Paid up voting common shareholders' equity; or paid up initial or foundation fund; as appropriate
- Called up voting common shareholders' equity; or called up initial or foundation fund; as appropriate

- Retained earnings calculated using the accounting balance sheet;[10]

- Any net difference, net of tax, in the valuation of assets and liabilities[11] under accounting standards and with respect to the solvency evaluation (which serves as a reference standard), provided that these amounts comply with the principles set out for tier 1 capital;

- Subordinated members' accounts;

- Subordinated liabilities which possess the characteristics of subordination, loss-absorbency in a winding up and going concern situation, and substantively possess the characteristics of perpetuality, absence of requirements or incentives to redeem the nominal sum and absence of mandatory servicing costs;[12]

    - Provide separate totals for groups of subordinated liabilities with similar qualitative characteristics, stating those characteristics.

I.2.8 Specification of tier 2 capital, as follows:

- Subordinated liabilities which possess the characteristics of subordination and loss-absorbency in a winding up situation, and substantively possess the characteristics of perpetuality, absence of requirements or incentives to redeem the nominal sum and absence of mandatory servicing costs;

    - Provide separate totals for groups of subordinated liabilities with similar qualitative characteristics, stating those characteristics;

- Letters of credit and guarantees, provided by credit institutions authorised in accordance with Directive 2006/48/EC, and held in trust for the benefit of insurance creditors by an independent trustee;

- Members' calls by way of supplementary contribution from members of Protection and Indemnity Associations;

- Other contingent capital which possesses the characteristics of subordination, loss-absorbency in a winding up and going concern situation and substantively possesses the characteristics of

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[10] In so far as authorised under national law, all realised profits appearing as surplus funds in the statutory annual accounts shall not be considered as insurance and reinsurance liabilities, to the extent that these surplus funds may be used to cover any losses which may arise and where they have not been made available for distribution to policyholders and beneficiaries.

[11] In relation to liabilities which are recognised at fair value under accounting standards, any unrealised gains or losses which arise as a result of changes in the insurer's own credit standing are excluded from the computation of the net difference.

[12] QIS3 is being conducted on the basis that eligible capital is categorised in tiers according to defined qualitative characteristics. For further details on these characteristics, see the explanatory note.

perpetuality, absence of requirements or incentives to redeem the nominal sum and absence of mandatory servicing costs, analysed between:

- Unpaid share capital or initial fund that has not been called up
- Letters of credit and other commitments received
- Members' calls by way of supplementary contribution;
- Other contingent capital which has the characteristics for inclusion in tier 2 capital;

- Provide separate totals for groups of contingent capital with similar qualitative characteristics, stating those characteristics.

I.2.9 Specification of tier 3 capital, as follows:

- Subordinated liabilities which do not possess the characteristics for inclusion in tier 2 capital;
  - Provide separate totals for groups of subordinated liabilities with similar qualitative characteristics, stating those characteristics;
- Contingent capital which does not possess the characteristics for inclusion in tier 2 capital analysed between:
  - Unpaid share capital or initial fund that has not been called up;
  - Letters of credit and other contingent commitments received which do not possess the characteristics for inclusion in tier 2 capital;
    - Provide separate totals for groups of contingent capital with similar qualitative characteristics, stating those characteristics;
  - Members' calls by way of supplementary contribution.

I.2.10 The amount of holdings/participations of 20% or more in insurance, reinsurance and insurance holding companies and credit institutions, investment firms and financial institutions, (a) which have been subject to a market risk charge under the SCR market risk module, (b) which have not been subject to a market risk charge, and (c) which have been deducted from capital. Amounts a), b) and c) should be provided separately.

I.2.11 Information on contingent capital

- Provide, separately, for each contingent capital item included in tier 2 capital under other contingent capital, and for each contingent capital item included in tier 3 capital, a description of:
    - The quality of the counterparties concerned, in relation to their ability and willingness to pay;
    - The recoverability of the funds, taking account of the legal form of the item, as well as any conditions which would prevent the item from being successfully called up;
    - Information on the outcome of past calls, which have been made;
    - Any other relevant information.

I.2.12 Reconciliation between the total amount of eligible capital determined in accordance with the valuation principles for assets and liabilities under Solvency I and Solvency II.

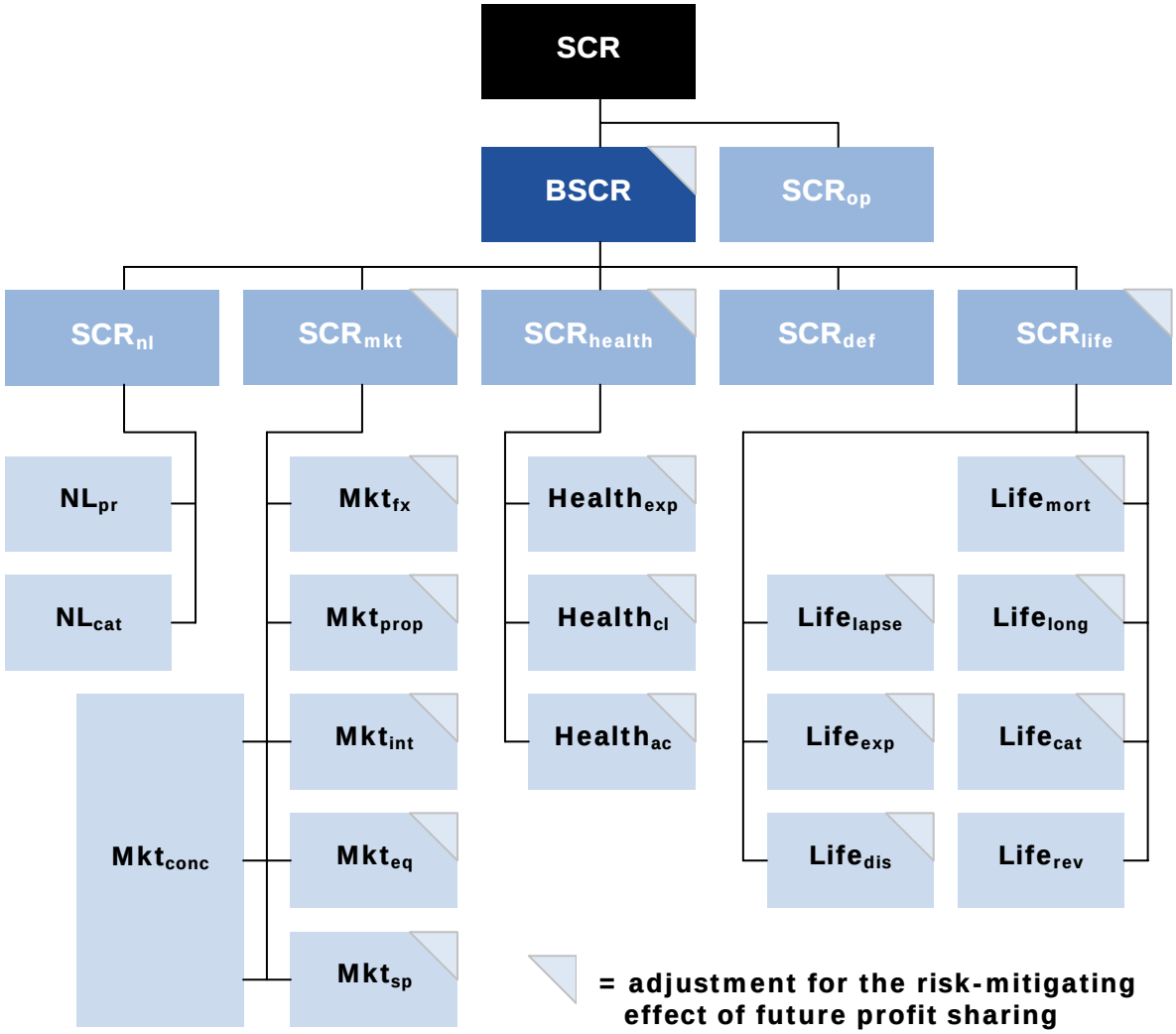
- Specify each significant difference, indicating which asset or liability item to which the difference relates.

Section 3

Solvency capital requirement: the standard formula

Overview

I.3.1 This section provides instructions for testing CEIOPS' SCR standard formula proposal. The standard formula calculation is divided into modules as follows:



I.3.2 For participants writing composite business or which have one or more funds in life insurance business where the assets of such funds are not transferable to other parts of the undertaking's business, special considerations apply, which are also laid down in Part II.

I.3.3 The principle of substance over form should be followed in determining how risks are to be treated. For instance, where claims are payable in the form of an annuity, agreed claims should normally be part of SCR_{life}, unless the impact of the associated risk on the risk capital charges for the individual risk modules can be expected to be negligible.

I.3.4 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.

I.3.5 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 Section 1. 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.

Segmentation for non-life insurance business

I.3.6 The analysis of non-life underwriting risk will require a segmentation of the participant's non-life insurance business into individual lines of business (LoBs). This follows the segmentation specified for the valuation of non-life technical provisions, as laid out in paras. I.1.110 to I.1.114.

Market risk on assets in excess of the SCR ("free assets")

I.3.7 Under the "simplified balance sheet" concept underlying the SCR, consideration is required as to whether one should apply market stresses to assets in excess of the SCR. This issue was highlighted in the feedback received from QIS2.

I.3.8 As in QIS2, the specifications for the SCR standard formula contained in this document follow the approach to include capital requirements on all assets, including assets in excess of the SCR. CEIOPS believes that this approach is consistent with the "simplified balance sheet" concept, under which available capital is defined as the excess of (all) assets over liabilities.

I.3.9 However, in the context of the feedback from the QIS2 exercise, some stakeholders have argued that market risk should only apply to the

assets that are backing technical provisions and the SCR, and that excess capital should not lead to increased capital requirements for market risk.

I.3.10 In its future technical work, CEIOPS will consider this issue further, including the question on whether any restrictions should apply with regards to the choice of assets within the overall portfolio that are considered "free". Therefore, participants are invited to supply, as additional information, an overall SCR estimate where the assets to be taken into consideration are limited to those required to back the total of the technical provisions and the SCR i.e. there is no capital charge in respect of free assets in excess of the SCR.

I.3.11 Such an estimate may for example be derived by an iterative calculation as follows:

Firstly undertakings could calculate an initial SCR, SCR1, based on including the full balance sheet (i.e. all assets), as is specified as the "placeholder" SCR in these specifications. In a second iteration free assets not needed to cover either the SCR or technical provisions may be excluded, leading to a smaller result for the SCR, SCR2. This calculation should be repeated until the coverage ratio is not significantly different from 100%.

Overall SCR calculation

Description

I.3.12 The SCR is the Solvency Capital Requirement.

Input

I.3.13 The following input information is required:

BSCR	=	Basic Solvency Capital Requirement
SCR_{op}	=	The capital charge for operational risk

Output

I.3.14 This module delivers the following output information:

SCR = The overall standard formula capital charge

Calculation

I.3.15 The SCR is determined as:

$$SCR = BSCR + SCR_{op}$$

SCR_{op} operational risk

Description

I.3.16 Operational risk is the risk of loss arising from inadequate or failed internal processes, people, systems or from external events. Operational risk also includes legal risks. Reputation risks and risks arising from strategic decisions do not count as operational risks. The operational risk module is designed to address operational risks to the extent that these have not been explicitly covered in other risk modules.

Input

I.3.17 The following input information is required:

TP_{life} = Total life insurance technical provisions (gross of reinsurance)

TP_{nl} = Total non-life insurance technical provisions (gross of reinsurance)

TP_{h} = Total health insurance technical provisions (gross of reinsurance)

$Earn_{life}$ = Total earned life premium (gross of reinsurance)

$Earn_{h}$ = Total earned health insurance premium (gross of reinsurance)

$Earn_{nl}$ = Total earned non-life premium (gross of reinsurance)

$BSCR$ = The basic SCR

Output

I.3.18 This module delivers the following output information:

SCR_{op} = The capital charge for operational risk

Calculation

I.3.19 The capital charge for operational risk is determined as follows:

$$SCR_{op} = min\left\{Op_{load} \bullet BSCR; max\left\{\begin{matrix} 0.03 \bullet Earn_{life} + 0.02 \bullet Earn_{nl} + 0.02 \bullet Earn_{h}; \\ 0.003 \bullet TP_{life} + 0.02 \bullet TP_{nl} + 0.002 \bullet TP_{h} \end{matrix}\right\}\right\}$$

where

Op_{load} = a pre-specified coefficient set as 30%.

I.3.20 Note that the structure of the formula for SCR_{op} has changed from that in QIS2 in that Op_{load} has been introduced, restricting SCR_{op} to a percentage of the other capital requirements (BSCR).

I.3.21 However, this formula should not be viewed as the final proposal for calculating the operational risk charge. CEIOPS considers that the suggested formula needs to be developed further to adequately reflect operational risk where an insurer writes unit-linked business. Through the QIS3 exercise CEIOPS is collecting the necessary information to assess the impact of the operational risk charge on an insurer writing unit-linked business. This will enable CEIOPS to finalise the design of the standard formula for operational risk.

I.3.22 Therefore, participants are asked to give the following additional information pertaining to unit-linked business in the spreadsheets:

- total earned life premium for unit-linked business (gross of reinsurance);
- total life insurance technical provisions for unit-linked business (gross of reinsurance);
- total earned life premium for unit-linked business (gross of reinsurance) where the allocation to cover management expenses is not fixed for a period exceeding 5 years;
- total life insurance technical provisions for unit-linked business (gross of reinsurance) where the allocation to cover management expenses is not fixed for a period exceeding 5 years;
- net administrative expenses in respect of unit-linked business where the allocation to cover management expenses is not fixed for a period exceeding 5 years.[13]

[13] Cf. Article 28 para. 7(c) of the life insurance directive 2002/83/EC.

Basic SCR calculation

Description

I.3.23 BSCR is the Solvency Capital Requirement before any adjustments, combining capital charges for five major risk categories.

Input

I.3.24 The following input information is required[14]:

SCR_{mkt}	=	The capital charge for market risk
SCR_{def}	=	The capital charge for counterparty default risk
SCR_{life}	=	The capital charge for life underwriting risk
SCR_{nl}	=	The capital charge for non-life underwriting risk
SCR_{health}	=	The capital charge for health underwriting risk
FDB	=	Total amount in technical provisions corresponding to future discretionary benefits
KC_{life}	=	The risk mitigating effect of future profit sharing for life underwriting risk
KC_{health}	=	The risk mitigating effect of future profit sharing for health underwriting risk
KC_{mkt}	=	The risk mitigating effect of future profit sharing for market risk

Output

I.3.25 The module delivers the following output:

$BSCR$	=	The Basic Solvency Capital Requirement

[14] where for market risk, life underwriting risk and health underwriting risk the capital charges are not including the potential risk mitigating effect of future profit sharing

Calculation

I.3.26 The BSCR is determined as follows:

$$BSCR = \sqrt{\sum_{rxc} CorrSCR_{r,c} \bullet SCR_r \bullet SCR_c} - min(\sqrt{\sum_{rxc} CorrSCR_{r,c} \bullet KC_r \bullet KC_c}, FDB)$$

where

$CorrSCR_{r,c}$ = the cells of the correlation matrix CorrSCR

SCR_r, SCR_c = capital charges for the individual SCR risks according to the rows and columns of the correlation matrix CorrSCR

KC_r, KC_c = risk mitigation effects for the individual SCR risks[15]

and CorrSCR is defined as follows:

$CorrSCR=$	SCR_{mkt}	SCR_{def}	SCR_{life}	SCR_{health}	SCR_{nl}
SCR_{mkt}	1				
SCR_{def}	0.25	1			
SCR_{life}	0.25	0.25	1		
SCR_{health}	0.25	0.25	0.25	1	
SCR_{nl}	0.25	0.5	0	0	1

[15] where KC_{def} and KC_{nl} are defined to be zero

SCR_{mkt} market risk module

Description

I.3.27 Market risk arises from the level or volatility of market prices of financial instruments. Exposure to market risk is measured by the impact of movements in the level of financial variables such as stock prices, interest rates, real estate prices and exchange rates.

Input

I.3.28 The following input information is required[16]:

Mkt_{int}	=	The capital charge for interest rate risk
Mkt_{eq}	=	The capital charge for equity risk
Mkt_{prop}	=	The capital charge for property risk
Mkt_{sp}	=	The capital charge for spread risk
Mkt_{conc}	=	The capital charge for risk concentrations
Mkt_{fx}	=	The capital charge for currency risk
KC_{eq}	=	The risk mitigating effect of future profit sharing for equity risk
KC_{prop}	=	The risk mitigating effect of future profit sharing for property risk
KC_{fx}	=	The risk mitigating effect of future profit sharing for currency risk
KC_{int}	=	The risk mitigating effect of future profit sharing for interest rate risk
KC_{sp}	=	The risk mitigating effect of future profit sharing for spread risk

[16] where for all subrisks (with the exception of concentration risk) the capital charges are not including the potential risk mitigating effect of future profit sharing

Output

I.3.29 The module delivers the following output:

SCR_{mkt} = The capital charge for market risk[17]

KC_{mkt} = The risk mitigating effect of future profit sharing for market risk

Calculation

I.3.30 The market sub-risks should be combined to an overall charge SCR_{mkt} for market risk using a correlation matrix as follows:

$$SCR_{mkt} = \sqrt{\sum_{rxc} CorrMkt_{r,c} \bullet Mkt_r \bullet Mkt_c}$$

where

$CorrMkt_{r,c}$ = the cells of the correlation matrix CorrMkt

Mkt_r, Mkt_c = capital charges for the individual market risks according to the rows and columns of the correlation matrix CorrMkt

and the correlation matrix *CorrMkt* is defined as:[18]

CorrMkt	Mkt_{int}	Mkt_{eq}	Mkt_{prop}	Mkt_{sp}	Mkt_{conc}	Mkt_{fx}
Mkt_{int}	1					
Mkt_{eq}	0	1				
Mkt_{prop}	0.5	0.75	1			
Mkt_{sp}	0.25	0.25	0.25	1		
Mkt_{conc}	0	0	0	0	1	
Mkt_{fx}	0.25	0.25	0.25	0.25	0	1

I.3.31 The risk mitigating effect KC_{mkt} of future profit sharing for market risk is determined as follows[19]:

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[17] not including the potential risk mitigating effect of future profit sharing

[18] CEIOPS stated in its Advice to the EC on Pillar I issue (CEIOPS-DOC 08/07) that it recognises that on market risk the QIS2 approach did not give due recognition for diversification effects and that some of the correlation assumptions between interest rate risk, equity risk, property risk and currency risk applied in QIS2 would need to be revised downwards (see para. 5.124 in CP 20). The values shown here reflect an initial choice. The final determination of the size of the correlation coefficients in the market risk module will require further technical work.

[19] Where KC_{conc} is defined to be zero.

$$KC_{mkt} = \sqrt{\sum_{rxc} CorrMkt_{r,c} \bullet KC_r \bullet KC_c}$$

Mkt_{int} interest rate risk

Description

I.3.32 Interest rate risk exists for all assets and liabilities of which the value is sensitive to changes in the term structure of interest rates or interest rate volatility and which are not allocated to policies where the policyholders bear the investment risk. In any event, these are fixed-income investments, insurance liabilities, and financing instruments (loan capital) and interest-rate derivatives. The value of assets and liabilities sensitive to interest rate changes can be determined using the (prescribed) term structure of interest rates ('zero rates'). This term structure can, of course, change over the period of a year.

Input

I.3.33 The following input information is required:

NAV = The net value of assets minus liabilities

Output

I.3.34 The module delivers the following output:

Mkt_{int} = The capital charge for interest rate risk[20]

KC_{int} = The risk mitigating effect of future profit sharing for interest rate risk

Calculation

I.3.35 The capital charge for interest rate risk is determined as the result of a pre-defined scenario:

$$Mkt_{int} = max\begin{Bmatrix} 0 \\ \Delta NAV \mid upwardshock \\ \Delta NAV \mid downwardshock \end{Bmatrix}$$

[20] not including the potential risk mitigating effect of future profit sharing

where ΔNAV|*upwardshock* and ΔNAV|*downwardshock* are the changes in the net value of asset and liabilities due to re-valuing all interest rate sensitive instruments using altered term structures.[21]

I.3.36 The altered term structures are derived by multiplying the current interest rate curve by $(1+s^{up})$ and $(1+s^{down})$, where both the up stress $s^{up}(t)$ and the down stress $s^{down}(t)$ for individual maturities t are specified as follows:

Maturity t (years)	*1*	*2*	*3*	*4*	*5*	*6*	*7*
relative change $s^{up}(t)$	0,94	0,77	0,69	0,62	0,56	0,52	0,49
relative change $s^{down}(t)$	-0,51	-0,47	-0,44	-0,42	-0,40	-0,38	-0,37

Maturity t (years)	*8*	*9*	*10*	*11*	*12*	*13*	*14*
relative change $s^{up}(t)$	0,46	0,44	0,42	0,42	0,42	0,42	0,42
relative change $s^{down}(t)$	-0.35	-0.34	-0.34	-0.34	-0.34	-0.34	-0.34

Maturity t (years)	*15*	*16*	*17*	*18*	*19*	*20+*
relative change $s^{up}(t)$	0,42	0,41	0,40	0,39	0,38	0,37
relative change $s^{down}(t)$	-0.34	-0.33	-0.33	-0.32	-0.31	-0.31

For example, the "stressed" 10-year interest rate $R_1(10)$ in the upward stress scenario is determined as

$$R_1(10) = R_0(10) \bullet (1 + 0.42)$$

where $R_0(10)$ is the 10-year interest rate based on the current term structure.

I.3.37 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.

I.3.38 Additionally, the results of the scenarios should also be determined under the condition that the participant is able to vary its assumptions on future bonus rates in response to the shock being tested.

The risk mitigating effect KC_{int} of future profit sharing for interest rate risk is determined as the difference between these two calculations.

[21] For the purposes of the specifications, the expression ΔNAV is used with the sign convention that positive values of ΔNAV signify losses.

Mkt_{eq} equity risk

Description

I.3.39 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.

I.3.40 For equity risk, a distinction can be made between systematic risk and idiosyncratic risk. The latter one arises out of inadequate diversification. Systematic risk refers to the sensitivity of the equity's returns to the returns of market portfolios, and cannot be reduced by diversification. Therefore it is also called undiversifiable risk.

I.3.41 The equity risk submodule is intended to capture systematic risk, whereas idiosyncratic equity risk is addressed in the concentration risk submodule.

I.3.42 The equity risk module uses indices as risk proxies, meaning that the volatility and correlation information is derived from these indices. It is assumed that all equities can be allocated to an index of the prescribed set.

I.3.43 The assumed shock scenarios for the individual indices reflect the systematic risk inherent to this market portfolio. It is assumed that the equity portfolio of the insurance companies have the same exposure to systematic risk as the index (the risk proxy) itself. It is therefore assumed that the beta is 1.

I.3.44 For the calculation of the risk capital charge, hedging and risk transfer mechanisms should be taken into account. However, as a general rule, hedging instruments should only be allowed with the average protection level over the next year. It is not allowed to use hedging instruments in the solvency calculation that are in force just at the balance sheet date.

Input

I.3.45 The following input information is required:

NAV = The net value of assets minus liabilities

Output

I.3.46 The module delivers the following output:

Mkt_{eq} = the capital charge for equity risk

KC_{eq} = The risk mitigating effect of future profit sharing for equity risk

Calculation

I.3.47 For the determination of the capital charge for equity risk, the following indices are considered:

No.	*Index*
1	Global
2	Other[22]

I.3.48 The calculation is carried out in two steps as follows:

I.3.49 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::

$$Mkt_{eq,i} = max\left(\Delta NAV \,\middle|\, equity\ shock_i; 0\right)$$

where

$equity\ shock_i$	=	Prescribed fall in the value of index *i* depending on the confidence level and standard deviation of the index *i*
$Mkt_{eq,i}$	=	the 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*
$equity\ shock_i$	32%	45%

I.3.50 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. It should be assumed that the participant's equity portfolio has the same exposure to the systematic risk as the index (the risk proxy) itself. It should therefore be assumed that the beta is 1.[23]

I.3.51 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.

I.3.52 Alternative investments should cover all types of equity type risk like hedge funds, derivatives, managed futures, investments in SPVs, CDOs

[22] comprising emerging markets, non-listed equities and alternative investments

[23] cf. para. I.3.43

(the equity tranche) etc., which can not be allocated to spread risk or classical equity type risk.

I.3.53 The attribution of individual equity positions to one of the indices i has to be determined in a straightforward manner, on a best efforts basis.

I.3.54 The equity exposure of mutual funds should be allocated on a "look-through" basis. If this is not feasible, the exposure has to be attributed on a best effort basis. Furthermore this could be waived if the mutual fund invests for example solely in European equities with no special individual hedging instruments. Then it is possible to consider the equity fund as one single equity for the output calculation.

I.3.55 In a second step, the capital charge for equity risk is derived by combining the capital charges for the individual indices using a correlation matrix as follows:

$$Mkt_{eq} = \sqrt{\sum_{rxc} CorrIndex^{rxc} \bullet Mkt_r \bullet Mkt_c}$$

where

$CorrIndex^{rxc}$ = the cells of the correlation matrix *CorrIndex*

Mkt_r, Mkt_c = capital charges for equity 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

I.3.56 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.

I.3.57 Additionally, the overall result of the calculation should also be determined under the condition that the participant is able to vary its assumptions on future bonus rates in response to the shock being tested.

The risk mitigating effect KC_{eq} of future profit sharing for interest rate risk is determined as the difference between these two calculations.

Mkt_{prop} property risk

Description

I.3.58 Property risk arises from the level or volatility of market prices of property.

Input

I.3.59 The following input information is required:

NAV = The net value of assets minus liabilities

Output

I.3.60 The module delivers the following output:

MCR_{prop} = The capital charge for property risk[24]

KC_{prop} = The risk mitigating effect of future profit sharing for property risk

Calculation

I.3.61 The capital charge for property risk is determined as the result of a pre-defined scenario:

$= \quad |$

where the *property shock* is the immediate effect on the net value of asset and liabilities expected in the event of a 20% 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.

I.3.62 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.

I.3.63 Additionally, the results of the scenario should also be determined under the condition that the participant is able to vary its assumptions on future bonus rates in response to the shock being tested.

[24] not including the potential risk mitigating effect of future profit sharing

I.3.64 The risk mitigating effect KC_{prop} of future profit sharing for property risk is determined as the difference between these two calculations.

Alternative approach to equity and property risk

I.3.65 As indicated in CEIOPS' Advice to the EC on Pillar I issues (para 5.127-5.133) a minority of CEIOPS Members advocates a different solution to the treatment of equity and property risk. This approach is based on the duration of liabilities, which intends to better reflect the asset and liability adequacy over the relevant time horizon in response to the issue raised by the EC in its letter to CEIOPS of 2 February 2007.

I.3.66 For QIS3 purposes participants are invited to provide data on the structure of their liabilities portfolio in order to allow CEIOPS to further explore this alternative approach for equity and property risks.

I.3.67 **On an optional basis**, participants can also test the results of this alternative approach. Preliminary figures used for the calibration are derived from para I.3.75 - I.3.80. Specific cells are included in the spreadsheets in order to derive the results of this approach. Participants are also invited to provide comments on this alternative approach (cf. to the qualitative questionnaire).

I.3.68 Please note that QIS3 will not be the last calibration exercise; as a consequence, any alternative approach for equity and property risks can be further developed at a later stage, including the calibration of the individual stress-scenarios.

Information required

I.3.69 The following additional information is required:

$duration_i$	=	The duration of the relevant portfolio i of insurance contracts
$Liab_{ij}$	=	The amount of insurance liabilities analysed by duration band (i=portfolio type) and by type (j=nominal liabilities or "real" liabilities
$Equi_i$	=	The market value of equities covering the portfolio i
D	=	The duration of the total portfolio of insurance liabilities
$Equi_{insurance}$	=	The market value of equities covering insurance liabilities
$Equi_{free}$	=	The market value of other equities, i.e. equities not covering insurance liabilities

I.3.70 Participants are invited to disclose the duration structure of their insurance liabilities portfolios: for each relevant portfolio separately for nominal and real liabilities. Nominal liabilities are liabilities for amounts that do not depend on future claims inflation or future general inflation. Real liabilities do depend among other things on one or other of these future inflations.

I.3.71 Relevant portfolios are to be defined by the undertaking either on an economic basis, or on a legal basis or contractual basis.

I.3.72 With regard to the determination of the duration of the relevant portfolios, participants may take account of regular renewals of their non–life contracts, if experience shows those renewals are stable and if it is reasonably prudent to take them into account.

I.3.73 Participants are also invited to provide details of how and on the basis of what experience they determine the duration of their liabilities.

Output for equity risk (optional)

I.3.74 The module delivers the following output:

$Mkt_{equity,alternative}$ = The capital charge for equity risk[25]

$KC_{equity,\ alternative}$ = The risk mitigating effect of future profit sharing for equity risk

Calculation

I.3.75 An alternative capital charge for equity risk is determined as the result of a pre-defined scenario:

$$Mkt_{equity,alternative} = max\left(\Delta NAV \,\middle|\, equity\ shock_i; 0\right)$$

where the *equity shock* is the immediate effect on the net value of assets (NAV) and liabilities expected in the event of a fall in equities, taking account of all the participant's individual direct and indirect exposures to equity prices.

I.3.76 For the purposes of QIS3:

- the duration of the equity portfolio of backing insurance liabilities shall be set equal to the average duration of the total portfolio of insurance liabilities; and

[25] not including the potential risk mitigating effect of future profit sharing

- the duration of the equity portfolio backing liabilities other than insurance liabilities shall be considered to be less than 2 years, as set out in paragraph I.3.78.

I.3.77 The fall in equities covering insurance liabilities shall be determined as a function of the duration of the insurance liabilities portfolio of the undertaking:

Duration of the portfolio	Fall to be applied on equities
0-2 years	36%
2-5 years	33%
5-10 years	23%
>10 years	13%

I.3.78 Other equities should be applied a 36% shock as they do not cover any liabilities. For instance, an undertaking whose insurance liabilities show a 9-year duration should apply a 23% fall for equities covering insurance liabilities and a 36% shock for other equities.

Output for property risk (optional)

I.3.79 The same approach is adopted for the output of the property risk capital charge, but with different values for the scenarios.

I.3.80 The scenario for property risk should be determined as a function of the duration of the insurance liabilities portfolio, using the following figures:

Duration of the portfolio	Fall to be applied on properties
0-2 years	18%
2-5 years	17%
5-10 years	12%
>10 years	7%

Mkt_{fx} currency risk

Description

I.3.81 Currency risk arises from the level or volatility of currency exchange rates.

Input

I.3.82 The following input information is required:

NAV = The net value of assets minus liabilities

Output

I.3.83 The module delivers the following output:

Mkt_{fx} = The capital charge for currency risk[26]

KC_{fx} = The risk mitigating effect of future profit sharing for currency risk

Calculation

I.3.84 The capital charge for currency risk is determined as the result of a pre-defined scenario:

$$Mkt_{fx} = \Delta NAV \mid fx\ shock$$

*w*here the fx shock is the immediate effect expected on the net value of asset and liabilities in the event of a 20% change (more onerous of a rise or fall) in value of all other currencies against the local currency in which the undertaking prepares its local regulatory accounts, taking account of all the participant's individual currency positions and its investment policy (e.g. hedging arrangements, gearing etc.).

I.3.85 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.

I.3.86 Additionally, the results of the scenario should also be determined under the condition that the participant is able to vary its assumptions on future bonus rates in response to the shock being tested.

I.3.87 The risk mitigating effect KC_{fx} of future profit sharing for currency risk is determined as the difference between these two calculations.

Mkt_{sp} spread risk

Description

I.3.88 Spread risk is the part of risk originating from financial instruments that is explained by the volatility of credit spreads over the risk-free interest rate term structure. It reflects the change in value due to a move of the credit curve relative to the risk-free term structure.

[26] not including the potential risk mitigating effect of future profit sharing

I.3.89 Currently, default and migration risks are not explicitly built in the spread risk module. However, the spread risk module will include parts of these risks implicitly via the movements in credit spreads. The credit indices used for the calibration rebalance on a monthly basis and, consequently, the change of their constituents, due to downgrades or upgrades, has a monthly frequency as well. Hence, the impact of intra-month downgrades/upgrades will partly be reflected in the movements of credit spreads.

I.3.90 Government bonds are exempted from an application of this module. The exemption relates to borrowings by the national government, or guaranteed by the national government, of an OECD or EEA state, issued in the currency of the government.[27]

Input

I.3.91 The following input information is required:

$rating_i$ = the external rating of credit risk exposure i

dur_i = the effective duration of credit risk exposure i[28]

MV_i = the credit risk exposure i as determined by reference to market values (exposure at default)

I.3.92 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

I.3.93 The module delivers the following output:

Mkt_{sp} = The capital charge for spread risk

KC_{sp} = The risk mitigating effect of future profit sharing for spread risk

Calculation

I.3.94 The capital charge for spread risk is determined as follows:

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[27] CEIOPS will analyse further the issue of exempting government bonds, including the exact definition of such an exemption.

[28] If the bond has no embedded options, or behaves like an option-free bond, effective duration can be estimated using modified duration. Modified duration is defined as the Macaulay duration divided by 1 plus the yield-to-maturity of the bond.

$$Mkt_{sp} = \sum_i MV_i \bullet m(dur_i) \bullet F(rating),$$

where

$F(rating_i)$ = a function of the rating class of the credit risk exposure which is calibrated to deliver a shock consistent with VaR 99.5%

$m(dur_i)$ = a function of the duration of the credit exposure

I.3.95 The function F is determined as follows:

$Rating_i$	$F(Rating_i)$
AAA	0.25%
AA	0.25%
A	1.03%
BBB	1.25%
BB	3.39%
B	5.60%
CCC	11.20%
Unrated[29]	2.00%

I.3.96 The function m is determined as follows:

$$m(dur_i) = \begin{cases} \min(dur_i; 8) & \text{if } rating_i = BB \text{ or the exposure is unrated} \\ \min(dur_i; 6) & \text{if } rating_i = B \\ \min(dur_i; 4) & \text{if } rating_i = CCC \\ dur_i & \text{otherwise} \end{cases}$$

I.3.97 The calculation of the capital charge for spread risk should be derived 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 spread levels.

I.3.98 Additionally, the results of the calculation should also be determined under the condition that the participant is able to vary its assumptions on future bonus rates in response to a change in spread levels corresponding to a 1 in 200 year event.

I.3.99 The risk mitigating effect KC_{sp} of future profit sharing for spread risk is determined as the difference between these two calculations.

[29] For an unrated 5-year maturity corporate credit the 2% risk weight approximately corresponds to the 8% CRD charge.

Mkt_{conc} market risk concentrations

Description

I.3.100 Market risk concentrations present an additional risk to an insurer because of:

- additional volatility that exists in concentrated asset portfolios; and
- the additional risk of partial or total permanent losses of value due to the default of an issuer

I.3.101 For the sake of simplicity and consistency, the definition of market risk concentrations 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.).

I.3.102 Government bonds are exempted from an application of this module. The exemption relates to borrowings by the national government, or guaranteed by the national government, of an OECD or EEA state, issued in the currency of the government.[30]

Input

I.3.103 Risk exposures from assets need to be grouped with respect to counterparties.

E_i = The net exposure at default to counterparty i

$Assets_{xl}$ = The amount of total assets excluding those where the policyholder bears the investment risk

$rating_i$ = The external rating of the counterparty i

I.3.104 All entities which belong to the same group should be considered as a single counterparty for the purposes of this module.

I.3.105 The net exposure at default to an individual counterparty i shall comprise the asset classes equity and fixed income (including hybrid instruments, e.g. junior debt, mezzanine CDO tranches, …). For the purposes of QIS3, real estate holdings and exposure to property funds are not to be included.

I.3.106 Financial derivatives on equity and defaultable bonds should be properly attributed (via their 'delta') to the net exposure. I.e., an equity put option

[30] CEIOPS will analyse further the issue of exempting government bonds, including the exact definition of such an exemption.

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.

I.3.107 Exposures via investment funds or such entities whose activity is mainly the holding and management of an insurer's own investment need to be considered on a look-through basis. The same holds for CDO tranches and similar investments embedded in 'structured products'.

Output

I.3.108 The module delivers the following output:

Mkt_{conc} = The capital charge for market concentration risk

Calculation

I.3.109 The calculation is performed in three steps: (a) excess exposure, (b) risk concentration charge per 'name', (c) aggregation.

I.3.110 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:[31]

$rating_i$	CT
AA-AAA	5%
A	5%
BBB	3%
BB or lower	3%

I.3.111 The risk concentration charge per 'name' i is calculated as:

$$Conc_i = Assets_{xl} \bullet XS_i \bullet (g_0 + g_1 \bullet XS_i),$$

I.3.112 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

[31] Note that a concentration threshold of e.g. 5% means that at most 20 of the largest risk concentrations need to be considered for the purposes of this module.

parameters g_0 and g_1, depending on the credit rating of the counterparty, are determined as follows:

$rating_i$	Credit Quality Step	g_0	g_1
AAA	1	0.1840	0.0401
AA			
A	2	0.2684	-0.0163
BBB	3	0.3862	-0.0416
BB or lower, unrated	4 – 6, -	0.9227	-0.4314

I.3.113 The total capital requirement for market risk concentrations is determined assuming independence between the requirements for each counterparty i:

$$Mkt_{conc} = \sqrt{\sum_i Conc_i^2}\ .$$

SCR_{def} counterparty default risk

Description

I.3.114 Counterparty default risk is the risk of default of a counterparty to risk mitigating contracts like reinsurance and financial derivatives.

Input

I.3.115 The main inputs to the counterparty default risk module are the estimated 'replacement cost' of an exposure and the probability of default (PD) of the counterparty.

RC_i = The replacement cost of re-insurance or financial derivatives if counterparty i defaults.

PD_i = The probability of default of counterparty i

I.3.116 RC is a conservative estimate of the net replacement cost of the exposure, given default of the counterparty. It is therefore the difference between gross and net technical provisions plus the extra premium to be paid minus any recoveries, collateral or other risk mitigants.

I.3.117 A PD estimate is derived from external ratings according to the following table:

$Rating_i$	Credit Quality Step	PD_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, unrated	6, -	30.41%

I.3.118 The ratings notation used by Standard and Poor's is given for illustrative purposes. In cases where several ratings are available for a given credit exposure, generally the second-best rating should be applied.

I.3.119 Unrated reinsurers not subject to Solvency II regulation would be treated as rating class 6 (CCC). Unrated reinsurers subject to Solvency II regulation would be treated as rating class 3 (BBB).

Output

I.3.120 The module delivers the following output:

SCR_{def} = The capital charge for counterparty default risk

Calculation

I.3.121 Three steps are performed: (a) calculation of the concentration in both reinsurance and financial derivatives exposures via the Herfindahl index, (b) calculation of capital requirements per counterparty and (c) aggregation.

I.3.122 The Herfindahl index for reinsurance exposure is computed as

$$H_{re} = \frac{\sum_{i \in \text{Re}} RC_i^2}{\left(\sum_{i \in \text{Re}} RC_i \right)^2},$$

where the sum is taken over all reinsurance counterparties. The Herfindahl index H_{fd} for the financial derivative exposures is computed in exactly the same way, were the sum is taken over all financial derivative counterparties.

I.3.123 The implicit correlation for reinsurance default is calculated as:

$$R_{re} = 0.5 + 0.5 \bullet H_{re}.$$

I.3.124 The implicit correlation of counterparty default for financial derivatives R_{fd} is calculated in exactly the same way from H_{fd}.

I.3.125 The counterparty default risk requirement Def_i for an exposure i is determined as follows, depending on the implicit correlation R (where R is either R_{re} or R_{fd} as computed above, depending on the type of the exposure):

- For an implicit correlation R of 0.5, the determination of Def_i is based on the Vasicek distribution:

$$Def_i = RC_i \bullet N\left[(1-R)^{-0.5} \bullet G(PD_i) + \sqrt{\frac{R}{1-R}} \bullet G(0.995) \right]$$

where

N = the cumulative distribution function for the standard normal random variable

G = the inverse of the cumulative distribution function for the standard normal random variable

- for an implicit correlation R of 1, Def_i is determined as follows:

  $Def_i = RC_i \bullet min(100 \bullet PD_i; 1)$; and

- for an intermediate value of the implicit correlation R between 0.5 and 1, Def_i is linearly interpolated between these two values.

I.3.126 Individual capital charges Def_i are added up for both reinsurance exposures and financial derivatives to get the capital requirement for counterparty credit risk, SCR_{def}.

SCR_{life} life underwriting risk module

Description

I.3.127 This concerns specific 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.

I.3.128 Life underwriting risk is split into biometric risks (comprising mortality risk, longevity risk and disability/morbidity risk), lapse risk, expense risk, revision risk and catastrophe risk.

I.3.129 Based on the principle of substance over form, set out in paragraph I.3.3, agreed claims arising from non-life business payable in the form of an annuity should normally be part of SCR_{life} (subject to materiality considerations). In particular, the risk of revision is applicable only to this type of annuities.

Input

I.3.130 The following input information is required[32]:

$Life_{rev}$ = the capital charge for revision risk

$Life_{mort}$ = the capital charge for mortality risk

$Life_{long}$ = the capital charge for longevity risk

$Life_{dis}$ = the capital charge for disability[33] risk

$Life_{lapse}$ = the capital charge for lapse risk

$Life_{exp}$ = the capital charge for expense risk

$Life_{CAT}$ = the capital charge for catastrophe risk

KC_{mort} = the risk mitigating effect of future profit sharing for mortality risk

KC_{long} = the risk mitigating effect of future profit sharing for longevity risk

KC_{dis} = the risk mitigating effect of future profit sharing for disability risk

KC_{lapse} = the risk mitigating effect of future profit sharing for lapse

[32] where for all subrisks (with the exception of revision risk) the capital charges are not including the potential risk mitigating effect of future profit sharing

[33] Disability risk is defined to include both disability risk and morbidity (or sickness) risk

risk

KC_{exp} = the risk mitigating effect of future profit sharing for expense risk

KC_{cat} = the risk mitigating effect of future profit sharing for catastrophe risk

Output

I.3.131 The module delivers the following output:

SCR_{life} = The capital charge for life underwriting risk[34]

KC_{life} = The risk mitigating effect of future profit sharing for life underwriting risk

Calculation

I.3.132 The capital charge for life underwriting risk is derived by combining the capital charges for the life sub-risks using a correlation matrix as follows:

$$SCR_{life} = \sqrt{\sum_{rxc} CorrLife^{rxc} \bullet Life_r \bullet Life_c}$$

where

SCR_{life} = the capital charge for life underwriting risk

$CorrLife^{rxc}$ = the cells of the correlation matrix *CorrLife*

$Life_r$, $Life_c$ = capital charges for individual life underwriting sub-risks according to the rows and columns of correlation matrix *CorrLife*

and where the correlation matrix *CorrLife* is defined as:

[34] not including the potential risk mitigating effect of future profit sharing

$CorrLife=$	$Life_{mort}$	$Life_{long}$	$Life_{dis}$	$Life_{lapse}$	$Life_{exp}$	$Life_{rev}$	$Life_{CAT}$
$Life_{mort}$	1						
$Life_{long}$	0	1					
$Life_{dis}$	0.5	0	1				
$Life_{lapse}$	0	0.25	0	1			
$Life_{exp}$	0.25	0.25	0.5	0.5	1		
$Life_{rev}$	0	0.25	0	0	0.25	1	
$Life_{CAT}$	0	0	0	0	0	0	1

I.3.133 The risk mitigating effect of future profit sharing for life underwriting risk KC_{life} is determined as follows: [35]

$$KC_{life} = \sqrt{\sum_{rxc} CorrLife^{rxc} \bullet KC_r \bullet KC_c}$$

$Life_{mort}$ mortality risk

Description

I.3.134 The treatment of mortality risk is intended to reflect uncertainty risk. Uncertainty risk comprises trend risk and parameter risk, to the extent these are not already reflected in the valuation of technical provisions.

I.3.135 It is applicable to the class of insurance contracts contingent on mortality risk (i.e., where the amount currently payable on death exceeds the technical provisions held, and therefore an increase in mortality rates is likely to lead to an increase in technical provisions)[36].

Input

I.3.136 No specific input data is required for this module.

Output

I.3.137 The module delivers the following output:

$Life_{mort}$ = The capital charge for mortality risk[37]

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[35] Where KC_{rev} is defined as zero.

[36] Contracts that give benefits both on life and death of the insured person are to be unbundled into those components contingent on mortality and longevity risk. If the unbundling is not possible or practical, they should allocate all TP or premium as being contingent to the 'major' risk.

[37] not including the potential risk mitigating effect of future profit sharing

KC_{mort} = The risk mitigating effect of future profit sharing for mortality risk

Calculation

I.3.138 The capital charge for mortality risk is defined as the result of a life mortality scenario defined as follows:

$$Life_{mort} = \sum_i \left(\Delta NAV \mid mortshock \right)$$

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[38]

mortshock = A (permanent) 10% increase in mortality rates for each age

I.3.139 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.

I.3.140 Additionally, the results of the scenario should also be determined under the condition that the participant is able to vary its assumptions on future bonus rates in response to the shock being tested.

I.3.141 The risk mitigating effect KC_{mort} of future profit sharing for mortality risk is determined as the difference between these two calculations.

$Life_{long}$ longevity risk

Description

I.3.142 The treatment of longevity risk is intended to reflect uncertainty risk. Uncertainty risk comprises trend risk and parameter risk, to the extent these are not already reflected in the valuation of technical provisions.

I.3.143 It is applicable to the class of insurance contracts contingent on longevity risk (i.e., where there is no death benefit, or where the amount currently payable on death is less than the technical provisions held, and therefore

[38] Undertakings should apply the principles in Section 1 of the specification regarding assumed policyholder behaviour, when assessing the value of the liabilities following the mortality shock.

a decrease in mortality rates is likely to lead to an increase in technical provisions)[39].

Input

I.3.144 No specific input data is required for this module.

Output

I.3.145 The module delivers the following output:

$Life_{long}$ = The capital charge for longevity risk[40]

KC_{long} = The risk mitigating effect of future profit sharing for longevity risk

Calculation

I.3.146 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[41]

longevityshock = a (permanent) 25% decrease in mortality rates for each age

I.3.147 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.

I.3.148 Additionally, the results of this scenario should also be determined under the condition that the participant is able to vary its assumptions on future bonus rates in response to the shock being tested.

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[39] It is intended that the provision for disability claims in payment should be included within the longevity risk module

[40] not including the potential risk mitigating effect of future profit sharing.

[41] Undertakings should apply the principles in Section 1 of the specification regarding assumed policyholder behaviour when assessing the value of the liabilities following the longevity shock.

I.3.149 The risk mitigating effect KC_{long} of future profit sharing for longevity risk is determined as the difference between these two calculations.

$Life_{dis}$ disability risk

Description

I.3.150 The treatment of disability risk is intended to reflect uncertainty risk. Uncertainty risk comprises trend risk and parameter risk, to the extent these are not already reflected in the valuation of technical provisions.

I.3.151 It is applicable to the class of insurance contracts where benefits are payable contingent on a definition of disability.[42]

Input

I.3.152 No specific input data is required for this module.

Output

I.3.153 The module delivers the following output:

$Life_{dis}$ = The capital charge for disability risk[43]

KC_{dis} = The risk mitigating effect of future profit sharing for disability risk

Calculation

I.3.154 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 = The change in the net value of assets minus liabilities[44]

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[42] Disability includes also morbidity or sickness, i.e. policies with (lump sum or annual) benefits that are payable contingent on some definition of sickness should be included here.

[43] not including the potential risk mitigating effect of future profit sharing

[44] Undertakings should apply the principles in Section 1 of the specification regarding assumed policyholder behaviour when assessing the value of the liabilities following the disability shock.

disshock = An increase of 35% 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

I.3.155 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.

I.3.156 Additionally, the results of this scenario should also be determined under the condition that the participant is able to vary its assumptions on future bonus rates in response to the shock being tested.

I.3.157 The risk mitigating effect KC_{dis} of future profit sharing for disability risk is determined as the difference between these two calculations.

$Life_{lapse}$ lapse risk

Description

I.3.158 Lapse risk relates to an unanticipated (higher or lower) rate of policy lapses, terminations, changes to paid-up status (cessation of premium payment) and surrenders.

Output

I.3.159 The module delivers the following output:

$Life_{lapse}$ = The capital charge for lapse risk[45]

KC_{lapse} = The risk mitigating effect of future profit sharing for lapse risk

Calculation

I.3.160 The capital charge for lapse risk is defined as follows:

$$Life_{lapse} = \sum_i (\Delta NAV \mid lapseshock)$$

where *i* denotes each policy. The other terms represent

ΔNAV = The change in the net value of assets minus liabilities[46]

---

[45] not including the potential risk mitigating effect of future profit sharing

lapseshock = The greater each year of (1) a 50% increase in the assumed rates of lapsation, or (2) an increase in absolute terms of 3% per annum in the assumed rate of lapsation, for policies where the surrender value currently exceeds the technical provisions held; together with a 50% reduction in the assumed rates of lapsation for policies where the surrender value is currently less than the technical provisions held

I.3.161 The life lapse 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.

I.3.162 Additionally, the result of the scenario should also be determined under the condition that the participant is able to vary its assumptions on future bonus rates in response to the shock being tested.

I.3.163 The risk mitigating effect KC_{lapse} of future profit sharing for lapse risk is determined as the difference between these two calculations.

$Life_{exp}$ expense risk

Description

I.3.164 Expense risk arises from the variation in the expenses associated with the insurance contracts.

Output

I.3.165 The module delivers the following output:

$Life_{exp}$ = The capital charge for expense risk[47]

KC_{exp} = The risk mitigating effect of future profit sharing for expense risk

Calculation

I.3.166 The capital charge for expense risk is determined as follows:

$$Life_{exp} = \Delta NAV \mid expshock$$

[46] Undertakings should apply the principles in Section 1 of the specification regarding assumed policyholder behaviour when assessing the value of the liabilities following the lapse shock.

[47] not including the potential risk mitigating effect of future profit sharing

where:

ΔNAV = The change in the net value of assets minus liabilities[48]

expshock = All future expenses are higher than best estimate anticipations by 10%, and the rate of expense inflation is 1% per annum higher than anticipated; but for policies with adjustable loadings[49], 75% of these additional expenses can be recovered from year 2 onwards through increasing the charges payable by policyholders

I.3.167 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.

I.3.168 Additionally, the result of the scenario should also be determined under the condition that the participant is able to vary its assumptions on future bonus rates in response to the shock being tested.

I.3.169 The risk mitigating effect KC_{exp} of future profit sharing for expense risk is determined as the difference between these two calculations.

$Life_{rev}$ revision risk

Description

I.3.170 Revision risk is intended to capture the risk of adverse variation of an annuity's amount, as a result of an unanticipated revision[50] of the claims process.[51] This risk should be applied only to annuities arising from non-life claims that are allocated to the SCR_{life} module according to the principle set out in paragraph I.3.3.

I.3.171 It should be noted that the revision risk was not included in QIS2, but a number of CEIOPS members have highlighted the importance of its inclusion for a proper assessment of the specificities of the risks stemming from non-life annuities. The design and calibration of this risk are thus at an earlier stage and should be regarded as indicative. The objective is to gather market information on the appropriateness of the

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[48] Undertakings should apply the principles in Section 1 of the specification regarding assumed policyholder behaviour when assessing the value of the liabilities following the expense shock.

[49] Policies with adjustable loadings are those for which expense loadings or charges may be adjusted within the next 12 months.

[50] This is meant to impact only on annuities that are genuinely reviewable. Annuities' whose amount is linked to earnings or prices or to some other index or that vary in deterministic value on change of status should not be classified as genuinely reviewable for these attributes.

[51] The eligibility and motivations for such reviews are directly related to the legal or statutory system applicable to the relevant claims. Nevertheless, the most frequent reason seems to be a deterioration of the health condition of the beneficiary.

inclusion of the revision risk for the various markets and lines of business, including the relative size of the initial tentative calibration. Participants are invited to comment on these issues.

Output

I.3.172 The module delivers the following output:

$Life_{rev}$ = The capital charge for revision risk[52]

Calculation

I.3.173 The capital charge for revision risk is determined as follows:

$$Life_{\text{rev}} = \Delta NAV \,|\, \text{rev } shock$$

where:

ΔNAV = The change in the net value of assets minus liabilities

revshock = A 3% increase in the annual amount payable for annuities exposed to revision risk. The impact should be assessed considering the remaining run-off period.

I.3.174 On the computation of this risk charge, participants should only consider the impact on those non-life 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).

$Life_{CAT}$ catastrophe risk

Description

I.3.175 Life CAT risks stem from extreme or irregular events (e.g. a pandemic) that are not sufficiently captured by the charges for the other life underwriting risk sub-modules. The treatment considers catastrophe risk in relation to both biometric and lapse risks.

Input

I.3.176 The following 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:

[52] not including the potential risk mitigating effect of future profit sharing

TP_i = For each policy i: the (net of reinsurance) technical provision held

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

I.3.177 Additionally, the following input data is required for the class of linked policies which can be lapsed or surrendered:

Surrender_strain_linked = The sum of the differences (where positive) between (a) the amount currently payable on surrender [53] and (b) the technical provisions held

Output

I.3.178 The module delivers the following output:

$Life_{CAT}$ = The capital charge for life catastrophe risk

KC_{CAT} = The risk mitigating effect of future profit sharing for life CAT risk

Calculation

I.3.179 The CAT risk charge for life underwriting risk is determined as follows:

$$Life_{CAT} = \sqrt{Life^2_{mort+dis,CAT} + Life^2_{lapse,CAT}}$$

$Life_{mort+dis,CAT}$ = the results of the calculation for mortality and disability catastrophe risk

[53] 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

$Life_{lapse,CAT}$ = the results of the calculation for lapse catastrophe risk

I.3.180 The mortality and disability catastrophe risk component is defined as follows

$$Life_{mort+dis,CAT} = \sum_i 0.0015 \bullet Capital\_at\_Risk$$

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* is determined as:

$$Capital\_at\_Risk = \sum_i (SA_i + AB_i \bullet Annuity\_factor - TP_i)$$

I.3.181 The lapse catastrophe risk component is defined as

$$Life_{lapse,CAT} = 0.75 \bullet Surrender\_strain\_linked$$

I.3.182 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.

I.3.183 Additionally, the result of the scenario should also be determined under the condition that the participant is able to vary its assumptions on future bonus rates in response to a 1 in 200 year life CAT event.

I.3.184 The risk mitigating effect KC_{CAT} of future profit sharing for life CAT risk is determined as the difference between these two calculations.

SCR_{health} health underwriting risk module

Description

I.3.185 This module is concerned with underwriting risk in health insurance that is practised on a similar technical basis to that of life assurance.[54]

I.3.186 Health underwriting risk is split into the three components: expense risk, claim/mortality/cancellation risk and epidemic/accumulation risk.

Input

I.3.187 The following input information is required:[55]

$Health_{exp}$	=	The capital charge for health expense risk
$Health_{cl}$	=	the capital charge for health claim / mortality / cancellation risk
$Health_{ac}$	=	The capital charge for health epidemic / accumulation risk
KC_{exp}	=	the risk mitigating effect of future profit sharing for health expense risk
KC_{cl}	=	the risk mitigating effect of future profit sharing for health claim / mortality / cancellation risk
KC_{ac}	=	the risk mitigating effect of future profit sharing for health epidemic / accumulation risk

Output

I.3.188 The module delivers the following output:

SCR_{health}	=	The capital charge for health underwriting risk
KC_{health}	=	the risk mitigating effect of future profit sharing for health underwriting risk

[54] health insurance within the meaning of Article 16a (4) of the EU-directive 73/239/EEC (as amended by EU-directive 2002/13/EC)

[55] where each of the capital charges does not include the potential risk mitigating effect of future profit sharing

Calculation

I.3.189 The capital charge for health underwriting risk is derived by combining the capital charges for the health sub-risks using a correlation matrix as follows:

$$SCR_{health} = \sqrt{\sum_{rxc} CorrHealth^{rxc} \bullet Health_r \bullet Health_c}$$

where

$CorrHealth^{rxc}$	=	the cells of the correlation matrix *CorrHealth*
$Health_r$, $Health_c$	=	Capital charges for individual health underwriting sub-risks according to the rows and columns of correlation matrix *CorrHealth*

and where the correlation matrix *CorrHealth* is defined as:

$CorrHealth=$	$Health_{exp}$	$Health_{cl}$	$Health_{ac}$
$Health_{exp}$	1		
$Health_{cl}$	0.5	1	
$Health_{ac}$	0	0	1

I.3.190 The risk mitigating effect KC_{health} of future profit sharing for health risk is determined as follows:

$$KC_{health} = \sqrt{\sum_{rxc} CorrHealth^{rxc} \bullet KC_r \bullet KC_c}$$

$Health_{exp}$ expense risk

Description

I.3.191 Expense risk arises if the expenses anticipated in the pricing of a product are insufficient to cover the actual costs accruing in the accounting year. There are numerous possible causes of such a shortfall, therefore all cost items of private health insurers have to be taken into account. In order to ensure comparability among the financial years, all annual results will be related to the gross premiums earned in the specific financial year.

Input

I.3.192 The following input information is required:

$\sigma_{h\,exp}$ = the standard deviation of the expense result in relation to the gross premium over the previous ten-year period

P_{ay} = gross premium earned for the accounting year

Output

I.3.193 The module delivers the following output:

$Health_{exp}$ = The capital charge for health expense risk

KC_{exp} = the risk mitigating effect of future profit sharing for health expense risk

Calculation

I.3.194 The capital charge for health expense risk is determined as follows:

$$Health_{exp} = \lambda_{exp} \cdot \sigma_{h\,exp} \cdot P_{ay}$$

where

λ_{exp} = expense risk factor which is set to deliver a health expense risk charge consistent with a VaR 99.5% standard

I.3.195 The factor λ_{exp} is set as:

λ_{exp}
2.58

Special treatment for small and young health insurance companies

I.3.196 In some cases, especially for rather young undertakings, expense results are only available for a short time period (i.e. the standard deviation of the expense result cannot be determined directly on the basis of the previous 10 year-period). Furthermore, expense results relating to the first years after starting-up of an undertaking might not be representative for future expense results. In those cases, the standard deviation for the expense result should be estimated as follows:

$$\sigma_{hexp} = \frac{1}{4} \bullet (10 - n') \bullet f_{exp} + \frac{1}{4} \bullet (n' - 6) \bullet \sigma_{hexp}(n)$$

where

$$n' = min\{max\{n;6\};10\}$$

and where

n	=	number of recent accounting years, where the gross premium earned continuously exceeded 3 Mio Euro (at most 10)
$\sigma_{h\ exp}(n)$	=	the standard deviation of the expense result over the previous n-year period
f_{exp}	=	parameter that will be used to estimate $\sigma_{h\ exp}$ for small companies

I.3.197 This means that for n ≥ 7 the company's individual standard deviations $\sigma_{h\ exp}(n)$ are taken into account; if n < 7, the estimate will be determined solely by the parameter f_{exp} which is independent of the undertaking's individual standard deviations.

I.3.198 The parameter f_{exp} is determined as follows:

f_{exp}
2%

I.3.199 The capital charge for health expense 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 assumed increase in expense costs.

I.3.200 Additionally, the calculation should also be carried out under the condition that the participant is able to vary its assumptions on future bonus rates in response to a 1 in 200 year health expense risk event.

I.3.201 The risk mitigating effect KC_{health} of future profit sharing for health expense risk is determined as the difference between these two calculations.

$Health_{cl}$ claim / mortality / cancellation risk

Description

I.3.202 This risk covers:

- claim risk or per capita loss risk arising in cases where the actual per capita loss is greater than the loss assumed in the pricing of the product;
- mortality risk arising when the actual funds from technical provisions becoming available due to death are lower than those assumed in the pricing of the product; and

- cancellation risk arising when the actual funds from technical provisions becoming available due to cancellations are lower than those assumed in the pricing of the product.

Input

I.3.203 The following input information is required:

$\sigma_{h\,cl}$ = The standard deviation of the $health_{cl}$ result[56] in relation to the gross premium over the previous ten-year period

P_{ay} = Gross premium earned for the accounting year

Output

I.3.204 The module delivers the following output:

$Health_{cl}$ = The capital charge for health claim / mortality / cancellation risk

KC_{cl} = The risk mitigating effect of future profit sharing for health claim / mortality / cancellation risk

Calculation

I.3.205 The capital charge for claim / mortality / cancellation risk is determined as follows:

$$Health_{cl} = \lambda_{cl} \cdot \sigma_{h\,cl} \cdot P_{ay}$$

where

λ_{cl} = $Health_{cl}$ risk factor which is set to deliver a health claim / mortality / cancellation risk charge consistent with a VaR 99.5% standard

I.3.206 The factor λ_{cl} is set as:

λ_{cl}
2.58

[56] The $health_{cl}$ result is the underwriting result with regard to claims, mortality and cancellation risk.

Special treatment for small and young health insurance companies

I.3.207 In some cases, especially for rather young undertakings, expense results are only available for a short time period (i.e. the standard deviation of the expense result cannot be determined directly on the basis of the previous 10 year-period). Furthermore, $health_{cl}$ results relating to the first years after starting-up an undertaking might not be representative for future $health_{cl}$ results. In those cases, the standard deviation for the $health_{cl}$ result should be estimated as follows:

$$\sigma_{hcl} = \frac{1}{4} \bullet (10 - n') \bullet f_{cl} + \frac{1}{4} \bullet (n' - 6) \bullet \sigma_{hcl}(n)$$

where

$$n' = min\{max\{n;6\};10\}$$

and where

n	=	Number of recent accounting years, where the gross premium earned continuously exceeded 3 Mio Euro (at most 10)
$\sigma_{h\,cl}(n)$	=	The standard deviation of the $health_{cl}$ result over the previous n-year period
f_{cl}	=	Parameter that will be used to estimate $\sigma_{h\,cl}$ for small companies

I.3.208 This means that for n ≥ 7 the company's individual standard deviations $\sigma_{h\,cl}(n)$ are taken into account; if n < 7, the estimate will be determined solely by the parameter f_{cl} which is independent of the undertaking's individual standard deviations.

I.3.209 The parameter f_{cl} is determined as follows:

f_{cl}
3%

I.3.210 The capital charge for health claim / mortality / cancellation 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 assumed occurrence of a claim / mortality / cancellation event.

I.3.211 Additionally, the calculation should also be carried out under the condition that the participant is able to vary its assumptions on future bonus rates in response to a 1 in 200 year health claim / mortality / cancellation risk event.

I.3.212 The risk mitigating effect KC_{cl} of future profit sharing for health claim / mortality / cancellation risk is determined as the difference between these two calculations.

$Health_{ac}$ epidemic / accumulation risk

Description

I.3.213 Epidemic / accumulation risk concerns the risks arising from the outbreaks of major epidemics (e.g., a severe outbreak of influenza). Such events typically also lead to accumulation risks, since the usual assumption of independence among persons would be nullified.

Input

I.3.214 The following input information is required:

$claims_{ay}$ = Claims expenditure for the accounting year in the health insurance market

P_{ay} = Gross premium earned for the accounting year

MP_{ay} = Total gross premium earned for the accounting year in the health insurance market

Output

I.3.215 The module delivers the following output:

$Health_{ac}$ = The capital charge for health epidemic / accumulation risk

KC_{ac} = The risk mitigating effect of future profit sharing for health epidemic / accumulation risk

Calculation

I.3.216 The capital charge for health epidemic / accumulation risk is determined as follows:

$$Health_{ac} = \lambda_{ac} \bullet claims_{ay} \bullet \frac{P_{ay}}{MP_{ay}}$$

where

λ_{ac} = $health_{ac}$ risk factor

I.3.217 The factor λ_{ac} is set as:

λ_{ac}
6.5%[57]

I.3.218 The capital charge for health epidemic 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 assumed occurrence of an epidemic event.

I.3.219 Additionally, the calculation should also be carried out under the condition that the participant is able to vary its assumptions on future bonus rates in response to a 1 in 200 year health epidemic risk event.

I.3.220 The risk mitigating effect KC_{ac} of future profit sharing for health epidemic risk is determined as the difference between these two calculations.

[57] The specified factor is higher than the factor used under QIS2 (1%) to adequately reflect health epidemic / accumulation risk, as well as the adjusted correlation assumptions for health epidemic / accumulation risk with respect to the other health risk sub-modules.

SCR_{nl} non-life underwriting risk module

Description

I.3.221 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.

Input

I.3.222 The following input information is required:

NL_{pr} = The capital charge for premium and reserve risk

NL_{CAT} = The capital charge for catastrophe risk

Output

I.3.223 The module delivers the following output:

SCR_{nl} = The capital charge for non-life underwriting risk

Calculation

I.3.224 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:

$$SCR_{nl} = \sqrt{\sum_{rxc} CorrNL^{rxc} \bullet NL_r \bullet NL_c}$$

where

$CorrNL^{rxc}$ = The cells of the correlation matrix *CorrNL*

NL_r, NL_c = Capital charges for individual non-life underwriting sub-risks according to the rows and columns of correlation matrix *CorrNL*

and where the correlation matrix *CorrNL* is defined as:

$CorrNL=$	NL_{pr}	NL_{CAT}
NL_{pr}	1	
NL_{CAT}	0	1

NL_{pr} premium & reserve risk

Description

I.3.225 This module combines a treatment for the two main sources of underwriting risk, **premium risk** and **reserve risk**.

I.3.226 **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).

I.3.227 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.

I.3.228 Premium risk relates to policies to be written (including renewals) during the period, and to unexpired risks on existing contracts.

I.3.229 **Reserve risk** stems from two sources: on the one hand, the absolute level of the claims provisions may be mis-estimated. On the other hand, because of the stochastic nature of future claims payouts, the actual claims will fluctuate around their statistical mean value.

Input

I.3.230 The following input information is required:

PCO_{lob} = the net provision for claims outstanding in each of the LoBs

$P_{lob}^{t,written}$ = estimate of net written premium in the individual LoB during the forthcoming year

$P_{lob}^{t,earned}$ = estimate of net earned premium in the individual LoB during the forthcoming year

$P_{lob}^{t-1,written}$ = net written premium in the individual LoB during the previous year

n_{lob} = number of historic years (at most 15)

LR_{lob}^{y} = net loss ratios[58] in each of the LoBs and for historic years *y=t-1, t-2,…, t-n*

$P_{lob}^{y,earned}$ = earned net premiums in each of the LoBs and for historic years *y=t-1, t-2,…, t-n*

I.3.231 The loss ratio LR_{lob}^{y} is defined as the ratio for year y of incurred claims in a given LoB over earned premiums, determined at the end of year y. The earned premiums should exclude prior year adjustments, and incurred claims should exclude the run-off result, that is they should be the total for losses occurring in year y of the claims paid (including claims expenses) during the year and the provisions established at the end of the year.

I.3.232 The estimates $P_{lob}^{t,written}$ and $P_{lob}^{t,earned}$ are provided by the participant.

Output

I.3.233 This module delivers the following output information:

NL_{pr} = The capital charge for premium and reserve risk

Calculation

I.3.234 The capital charge for the combined risk premium and reserve risk is determined as follows:

$$NL_{pr} = \rho(\sigma) \bullet V$$

where

V = Volume measure

σ = standard deviation of the combined ratio for the overall portfolio

$\rho(\sigma)$ = A function of the standard deviation

I.3.235 The function $\rho(\sigma)$ is specified as follows:

[58] Loss ratios (rather than combined ratios, as in QIS2) are used since these provide a more objective basis for the measurement of volatility, and since this lessens the burden on undertakings with respect to data collection.

$$\rho(\sigma) = \frac{exp(N_{0.995} \bullet \sqrt{log(\sigma^2 + 1)})}{\sqrt{\sigma^2 + 1}} - 1$$

where

$N_{0.995}$ = 99.5% quantile of the standard normal distribution

I.3.236 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, $\rho(\sigma) \approx 3 \bullet \sigma$.

I.3.237 The volume measure V and the standard deviation σ of the combined ratio for the overall non-life insurance portfolio are determined in two steps as follows:

- in a **first step**, for each individual line of business (LoB)[59] 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 in the individual LoBs are aggregated to derive an overall volume measure V and an overall standard deviation σ.

The calculations needed to perform these two steps are set out below.

Step 1: Volume measures and standard deviations per LoB

I.3.238 In an individual line of business 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

I.3.239 The volume measure for reserve risk in the individual LoB is determined as follows:

$$V_{(res,lob)} = PCO_{lob}$$

I.3.240 The volume measure for premium risk in the individual LoB is determined as follows:

[59] With regards to the definition of the segmentation of the non-life insurance portfolio into segments, we refer to paras. I.3.7 f.

$$V_{(prem,lob)} = \max(P_{lob}^{t,written}; P_{lob}^{t,earned}; 1.05 \bullet P_{lob}^{t-1,written})$$

I.3.241 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:

$$V_{(prem,lob)} = \max(P_{lob}^{t,written}; P_{lob}^{t,earned})$$

I.3.242 The standard deviation for reserve risk in the individual LoB is determined as follows:

LOB =	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*
$\sigma_{(res,lob)}$	15%	7,5%	15%	12,5%	7,5%	15%	10%	15%	10%	10%	10%	15%	15%	20%	20%

I.3.243 The standard deviation for premium risk in the individual LoB is derived as a credibility mix of an undertaking-specific estimate and a market-wide estimate as follows:

$$\sigma_{(prem,lob)} = \sqrt{c_{lob} \bullet \sigma_{(U,prem,lob)}^2 + (1 - c_{lob}) \bullet \sigma_{(M,prem,lob)}^2}$$

where

c_{lob} = Credibility factor for LoB

$\sigma_{(U,prem,lob)}$ = Undertaking-specific estimate of the standard deviation for premium risk

$\sigma_{(M,prem,lob)}$ = Market-wide estimate of the standard deviation for premium risk

I.3.244 The market-wide estimate of the standard deviation for premium risk in the individual LoB is determined as follows:

LoB =	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*
$\sigma_{(M.prem,lob)}$	7,5%	3%	5%	10%	10%	12.5%	10%	10%	12,5%	5%	7.5%	12.5%	15%	15%	15%

I.3.245 The credibility factor c_{lob} is defined as:

$$c_{lob} = \begin{cases} \dfrac{n_{lob}}{n_{lob} + k_{lob}} & \text{if } n_{lob} \geq 7 \\ 0 & \text{otherwise} \end{cases},$$

where

k_{lob} = credibility constant set as 4.0

I.3.246 The undertaking-specific estimate $\sigma_{(U,prem,lob)}$ of the standard deviation for premium risk is determined on the basis of the volatility of historic loss ratios as follows:

$$\sigma_{(U,prem,lob)} = \sqrt{\frac{1}{(n_{lob} - 1) \bullet V_{(prem,lob)}} \bullet \sum_{y} P_{lob}^{y} \bullet \left(LR_{lob}^{y} - \mu_{lob}\right)^2},$$

where

μ_{lob} = company-specific estimate of the expected value of the loss ratio in the individual LOBs

and μ_{lob} is defined as the premium-weighted average of historic loss ratios:

$$\mu_{lob} = \frac{\sum_{y} P_{lob}^{y} \bullet LR_{lob}^{y}}{\sum_{y} P_{lob}^{y}}$$

Step 2: Overall volume measures and standard deviations

I.3.247 The overall volume measure V is determined as follows:

$$V = \sum_{lob} (V_{(prem,lob)} + V_{(res,lob)})$$

where, for each individual line of business LoB, $V_{(prem,lob)}$ and $V_{(res,lob)}$ are the volume measures for premium and reserve risk as defined above.

I.3.248 The overall standard deviation σ is determined as follows:

$$\sigma = \sqrt{\frac{1}{V^2} \bullet \left(\sum_{rxc} CorrLob^{rxc} \bullet a_r \bullet a_c \bullet V_r \bullet V_c \right)}$$

where

r,c = All indices of the form (prem,lob) or (res,lob)

$CorrLob^{rxc}$ = the cells of the correlation matrix *CorrLob*

V_r, V_c = Volume measures for the individual lines of business, as defined in step 1

and where the factors a_r (and likewise a_c) are defined as follows:

$$a_r = \begin{cases} \sigma_{(prem,lob)} & \text{if } r = (prem,lob); \text{ and} \\ \sigma_{(res,lob)} & \text{if } r = (res,lob) \end{cases}$$

I.3.249 The correlation matrix CorrLob is specified as:

$$CorrLob = \begin{pmatrix} CorrLob_{pr} & \alpha \bullet CorrLob_{pr} \\ \alpha \bullet CorrLob_{pr} & CorrLob_{pr} \end{pmatrix}$$

where

CorrLob	=	the correlation matrix for premium and reserve risk, arranged in such a way that the first (respectively, the last) 15 rows and columns refer to the indices of the form (prem,lob) (respectively, to the indices of the form (res,lob))
$CorrLob_{pr}$	=	the correlation matrix for premium and reserve risk[60]
α	=	Factor representing on overall assumption between premium and reserve risk (set as 50%)

I.3.250 The correlation matrix $CorrLob_{pr}$ is specified as follows:

$CorrLob_{pr}$=	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1: A (workers' comp)	1														
2: A (health)	0,5	1													
3:A (other)H	0,5	0,5	1												
4: M (3rd party)	0,25	0,25	0,25	1											
5: M (other)	0,25	0,25	0,25	0,5	1										
6: MAT	0,25	0,25	0,25	0,5	0,25	1									
7: Fire	0,25	0,25	0,25	0,25	0,25	0,25	1								
8: 3rd party liab	0,5	0,25	0,25	0,5	0,25	0,25	0,25	1							
9: credit	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,5	1						
10: legal exp.	0,5	0,25	0,5	0,5	0,5	0,25	0,25	0,5	0,5	1					
11: assistance	0,25	0,25	0,25	0,25	0,5	0,5	0,5	0,25	0,25	0,25	1				
12: misc.	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	1			
13: reins. (prop)	0,25	0,25	0,25	0,25	0,25	0,25	0,5	0,25	0,25	0,25	0,5	0,25	1		
14: reins. (cas)	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,5	0,5	0,5	0,25	0,25	0,25	1	
15: reins. (MAT)	0,25	0,25	0,25	0,25	0,25	0,5	0,5	0,25	0,25	0,25	0,25	0,5	0,25	0,25	1

[60] i.e. CorrLob specifies the correlations between different LoBs within premium (and within reserve) risk.

Supplementary information

I.3.251 CEIOPS plans to further develop the non-life underwriting risk module after QIS3, addressing the degree to which undertaking-specific information could be built into the formula, and analysing the appropriateness of the calibration. Therefore, participants are invited to supply the following additional information, to the extent this is available:

- the participant's own estimate of the standard deviation for premium risk; and
- the participant's own estimate of the standard deviation for reserve risk,

for each of the LoBs considered in the formula.

NL_{cat} CAT risk

Description

I.3.252 CAT risks stem from extreme or irregular events that are not sufficiently captured by the charges for premium and reserve risk. In order to avoid double counting, the calibration of the scenarios and market losses should allow for the parts of catastrophe risks which are covered by premium risk.

I.3.253 For the modelling of non-life CAT risk in QIS3, regional CAT scenarios are considered that are specified by the local regulator. Additionally, a list of European (transregional) scenarios is prescribed.

Input

I.3.254 For the calculation of the effect of the transregional scenarios, no specific input data is required. The input requirements for the regional scenario-based or market-loss approaches are specified by the local supervisor.

Choice of scenarios

I.3.255 The regional scenarios can be outlined as follows:[61]

Austria

- Flood (the 2002 flooding serves as basis) the companies have to take the higher of a) and b).
  a) The companies have to calculate the impact of

[61] More detailed specifications for these regional scenarios are provided by the local supervisors.

this flooding with the assumption that the same loss frequency will occur, but with a higher average loss by 10%.
b) The companies have to take their market share multiplied by the market loss of a 2002 flooding (increased by approx. 10% to reflect inflation). The market loss is approx. €560 million.
The result of this scenario is = max(a;b)

- Hailstorm. It is assumed that 5% of the earned premiums in LoB "Other Motor" are needed to cover one single event.

- Windstorm (the 2000 storm serves as a basis), the companies have to take the higher of a) and b).
a) The companies have to take the historical loss ratios of the year 2000 in the relevant LoBs and apply them to the current premium income. The expected value of the loss ratio e.g. 60% could be deducted (has to be discussed).
b) In 2000 an average loss ratio for the LoB "Windstorm" of 250% was experienced. The companies have to take this ratio and apply it to the current premium income.
The result of this scenario is = max(a;b)

The above scenarios have to be calculated on a gross basis and afterwards the reinsurance programme has to be applied.

Denmark

- One windstorm resulting in a market loss of €6 billion;
- Two windstorms each resulting in a market loss of €2 billion.

France

- A major flood in the Paris area from the Seine, resulting in an estimated insurance industry loss of €5 billion;
- Two windstorms (1999 storms Lothar and Martin) resulting in a market loss of €14 billion;
- An earthquake in the South east coast of France (could be regarded as a trans-national scenario) resulting in a market loss of €15 billion.

Germany

- Storm risk affecting property insurance (excess market loss of 0.76‰ of the sum insured);
- Natural hazard risk (hail, storm, flooding, lightning) affecting other motor insurance (excess loss of €50 per policy);
- Earthquake risk affecting property insurance (excess market loss of 0.93‰ of the sum

	insured); • Flood risk affecting property insurance (excess market loss of 0,84‰ of the sum insured).
Italy	• An earthquake, resulting in an estimated market loss of €8 billion (affecting insurance class: fire). • A flood, resulting in an estimated market loss of €1 billion (affecting insurance classes: to be determined by undertakings)
Norway	• One Nat-Cat event with overall claims payments amounting to NOK 5 billion corresponding to €625 million (alternative A), or • Two Nat-Cat events with overall claims payments amounting to NOK 5 billion (corresponding to €625 million) per event (alternative B). • Due to the characteristics of the pool arrangement in force it was not deemed necessary to specify the kind of events that the Nat-Cat scenarios were related to, e.g. whether the catastrophic events were triggered by a flood, a windstorm or a landslide.
Poland	• A flood, resulting in an estimated insurance industry loss of €1 billion.
Portugal	• An earthquake, resulting in an estimated insurance market loss of 1,11% of the capital at risk, affecting property insurance policies exposed to seismic perils. This corresponds to an expected 250-year event, with a PML of €3 billion.
Sweden	• A storm resulting in a market loss of €1,500 million (Affecting insurance class: Fire and other property damage). • A financial crisis resulting in a market loss of €200 million (Affecting insurance class: Credit and suretyship). • An epidemic resulting in a market loss of €100 million (Affecting insurance class: Accident and health-others/default)
UK	• A Gulf of Mexico windstorm resulting in a $100 billion gross insurance industry loss, comprising $10 billion in offshore energy losses and $90 billion in property losses (including demand surge and storm surge), and • A major flood in the London area from the River Thames, resulting in an estimated insurance industry loss of £15 billion.

I.3.256 Additionally, the following trans-regional scenarios shall be evaluated by the participants:

I.3.257 *Windstorm scenario*:

A European windstorm corresponding to a 1 in 200 year event. [62]

I.3.258 *Man-made scenario*:

Participants should select their most severe man-made CAT risk scenario, either from the list below, or by specifying an individual man-made CAT risk scenario corresponding to a 1 in 200 year event:[63]

- Two insured aircraft, having the highest exposures for the firm to aircraft, colliding over a major city with the highest exposure for the firm
- Extreme motor accident, such as a level crossing accident causing a train crash with severe loss of life or a chemical spill resulting in contamination and poisoning;
- Total loss to the largest single property risk, including PML failure and resulting loss to other contracts;
- Terrorist attack or aircraft crash in a sport or musical event, involving a high number of people and affecting seriously the premise and its surroundings.

Output

I.3.259 This module delivers the following output information:

NL_{CAT} = The capital charge for non-life catastrophe risk

Calculation

I.3.260 The capital charge for non-life CAT risk is determined as follows:

$$NL_{CAT} = \sqrt{\sum_i CAT_i^2},$$

where the summation is over those specified catastrophes that exceed the materiality threshold, and

[62] Note that in cases where a regional windstorm scenario is specified by the local supervisor, and where the business of the insurer is concentrated in this region, the regional scenario applies and the consideration of the transregional windstorm scenario is obsolete (see para. I.3.255).

[63] In cases where such an individual scenario can be expected to be more severe than any of the scenarios in the list.

CAT_i = the cost of specified catastrophe i

The materiality threshold is set as 25% of the cost of the most severe scenario.

I.3.261 For each of the scenarios specified, participants have to estimate the cost CAT_i of the scenario (i.e. the effect on the net value of assets and liabilities) if the cost exceeds the materiality threshold.[64]

I.3.262 For regional scenarios, the calculation of CAT_i should follow the specifications set out by the local regulator. This could either follow a scenario-based approach, or a market loss approach.

I.3.263 In cases where a regional scenario can be regarded as the application of a transregional scenario, insurers whose business is concentrated in one regional area should use the regional scenario; other insurers should use the transregional scenario.

I.3.264 Where more than one regional scenario (in the same national market) is relevant for a participant, the aggregation of the results of the calculation for each of the regional scenarios should follow the specifications determined by the local supervisor. The aggregated result is then combined further with other scenarios as set out above.

Supplementary information

I.3.265 Participants should describe which man-made scenario they chose. In case this is an individual scenario, the participant should indicate how this was derived.

I.3.266 Participants will be invited to specify additional scenarios and indicate their approximate cost. They will also be invited to comment on the appropriateness of the specified scenarios and any difficulties they had estimating their effect.

[64] For many scenarios, for instance scenarios relating to countries in which no risks insured (either directly or via reinsurance) are located or in which it has minimal business, it will be immediately obvious that the cost is not material and no calculation or further analysis need be done. For other scenarios, some approximate analysis will be necessary to see if the materiality threshold is exceeded. Only for scenarios that exceed the threshold or where it is unclear whether the threshold is exceeded, need there be any detailed analysis.

Section 4

Solvency capital requirement: internal models

Participants are invited to complete this section of QIS3 at their discretion.

I.4.1 To the extent possible, estimates of required capital produced by internal models should be given for each of the risk modules described in Section 3. This is supplementary information – it is requested in addition to the results of the different modelling approaches tested in Section 3.

I.4.2 To the extent 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% standard over a one year time horizon), to allow comparability with the results of the standard formula calculation.

I.4.3 However, CEIOPS recognises that, in practice, it may be difficult to recalibrate internal models to this standard, and would also welcome risk capital estimates in an internal calibration standard which differs from the QIS3 calibration standard. In this case, participants should describe the internal calibration standard (time horizon, risk measure, level of prudence, scaling factor).

I.4.4 CEIOPS also recognises that, a disaggregation of the output from internal models to the level of granularity suggested in Section 3 may not be feasible, especially where participants follow an internal risk classification that differs from the one used in this exercise. However, internal estimates for capital in the main risk categories (SCR_{mkt}, SCR_{life}, SCR_{health}, SCR_{nl}, SCR_{def}, SCR_{op}) and the overall *SCR* would be especially welcome. Partial internal model estimates would also be welcome – particularly in areas such as interest rate risk and equity risk.

I.4.5 Participants are encouraged to comment on reasons for material differences between their internal model estimates and the results of the standard formula modelling treatments, especially where they suspect the latter fail to reflect the true drivers of risk.

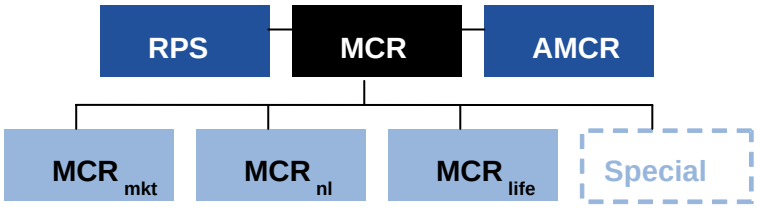
Section 5

Minimum capital requirement

I.5.1 This section provides instructions for testing CEIOPS' modular MCR proposal. Additional information is also collected in QIS3, to assist the design of transitional arrangements and the setting of the MCR floor; and to allow participants and CEIOPS to test an alternative MCR proposal presented by CEA.

Overall MCR calculation

I.5.2 The MCR calculation is divided into components as follows:



Input

I.5.3 The MCR aggregates the results of the following modules:

MCR_{mkt}	=	Market risk
MCR_{nl}	=	Non-life underwriting risk
MCR_{life}	=	Life underwriting risk
MCR^{s}_{health}	=	Special risk component, i.e. Health underwriting risk
RPS	=	Reduction for Profit Sharing
AMCR	=	Absolute minimum capital requirement

Output

I.5.4 Given that two alternative market risk charges are tested, without a placeholder between them; and that three alternative minimum floors are tested, with a placeholder among them; the calculation delivers the following outputs:

MCR_i	=	the Minimum Capital Requirement of the participant (no floor applied), under market risk Alternative *i* (*i*=1

or 2)

$MCR_i|_{AMCRi}$ = the Minimum Capital Requirement of the participant under market risk Alternative *i*, subject to the placeholder AMCR floor (*i*=1 or 2)

Calculation

I.5.5 The MCR before the floor adjustment (under both alternatives MCR_1 and MCR_2) should be calculated as

$$MCR = \sqrt{\sum_{r\times c} CorrMCR_{r,c} \cdot MCR_r \cdot MCR_c} - RPS$$

where

$CorrMCR_{r,c}$ = the cells of the correlation matrix CorrMCR

MCR_r, MCR_c = capital charges for the individual MCR risks according to the rows and columns of the correlation matrix CorrMCR

and *CorrMCR* is defined as follows:

CorrMCR=	MCR_{mkt}	MCR_{life}	MCR_{nl}	MCR_{health}
MCR_{mkt}	1			
MCR_{life}	0.25	1		
MCR_{nl}	0.25	0	1	
MCR_{health}	0.25	0.25	0	1

I.5.6 The effective MCR subject to the AMCR floor (under the placeholder floor $AMCR_1$ and the alternative floors $AMCR_2$ and $AMCR_3$) is

$$MCR|_{AMCR} = max\{MCR;\ AMCR\}$$

Interplay with the valuation of technical provisions

I.5.7 For the purposes of the MCR calculation specified in this section, technical provisions should be valued in accordance with the specifications laid out in Section 1. To ensure consistency with the SCR standard formula calculation, any reference to technical provisions within the MCR calculation is to be understood to exclude the cost-of-capital risk margin.

RPS Reduction for profit sharing

I.5.8 This component reflects the loss reduction potential of future non-guaranteed bonuses. The scope of the reduction includes both life and health insurance business.

Input

I.5.9 The following input information is required:

$TP_{wp,i}$ = sum of technical provisions for with-profits fund *i;* including the element relating to guaranteed benefits and the element relating to future non-guaranteed bonuses.

$TP_{surrender,i}$ = surrender value of benefits guaranteed under contracts (i.e. excluding any discretionary benefits) for with-profits fund *i*

$TP_{benefits,i}$ = the element of technical provisions relating to future non-guaranteed bonuses for with-profits fund *i*; as calculated within QIS3

I.5.10 For the purposes of this calculation, a with-profit fund means a group of with-profit contracts, which are treated as a unit together with the underlying liabilities and a segregated portfolio of backing assets that are not normally available to cover other liabilities.

Output

I.5.11 The module delivers the following output:

RPS = the adjustment of the MCR for reduction for profit sharing

I.5.12 Additionally, the following information should be disclosed:

$TP_{benefits}$ = the element of technical provisions relating to future non-guaranteed bonuses as calculated within QIS3

Calculation

I.5.13 The RPS calculation should be calculated as the sum of the reductions on the different relevant funds of the undertakings:

$$RPS = \sum_i min\left[max\left(TP_{wp,i} - TP_{surrender,i}; 0\right); TP_{benefits,i}\right] .$$

MCR_{mkt} market risk component

I.5.14 Two alternatives are tested on an equal footing, without specifying a placeholder.

I.5.15 For both alternatives, the calculation should be performed on the basis of the total balance sheet, but assets covering unit-linked liabilities shall be excluded.

Input

I.5.16 The following input information is required:

EQU	=	the market value of the overall equity and UCITS exposure
RE	=	the market value of the property exposure
FI_L	=	the market value of fixed income assets related to life business (including fixed income UCITS) including government bonds
FI_{NL}	=	the market value of fixed income assets related to non life business (including fixed income UCITS) including government bonds
FI	=	the market value of fixed income assets (FI_L + FI_{NL})
*FI**	=	the market value of fixed income assets (including fixed income UCITS), excluding government bonds. The exemption relates to borrowings by the national government, or guaranteed by the national government, of an OECD or EEA state, issued in the currency of the government.
TP	=	the market value of technical provisions, according to Section 1 of Part I of this specification
D_{FI}	=	the mean duration of the discounted cash flows relating to fixed income assets
D_{TP}	=	the mean duration of technical provisions
r(t)	=	the term structure of interest rates (prescribed)

I.5.17 UCITS exposures should be split between the *EQU, RE* and *FI(L, NL or *)* exposure on a look-through basis where this is possible. Otherwise they should be split consistently with their classification; if no simple classification is available they should be counted as equity.

I.5.18 The cash flows used to determine the duration of technical provisions should be consistent with the cash flows used to determine the best estimate.

ALTERNATIVE 1:

Output

I.5.19 The module delivers the following output:

MCR_{mkt1} = the MCR market risk charge, as calculated by Alternative 1

Calculation

I.5.20 The MCR market risk component is calculated by the following function:

$$MCR_{mkt1} = \sqrt{(0.12 \cdot EQU + 0.08 \cdot RE)^2 + (0.054 \cdot FI_L + 0.027 \cdot FI_{NL})^2}$$

ALTERNATIVE 2:

Output

I.5.21 The module delivers the following output:

MCR_{mkt2} = the MCR market risk charge, as calculated by Alternative 2

Calculation

I.5.22 The MCR market risk component is calculated by the following function:

$$MCR_{mkt2} = \sqrt{(MCR_{eq} + MCR_{prop})^2 + MCR_{spread}^2 + MCR_{int}^2}$$

where, the sub-components reflect equity risk, property risk, spread risk and interest rate risk, respectively; and

where the charge for interest rate risk is determined as follows:

$$MCR_{eq} = 0.12 \cdot EQU$$

$$MCR_{prop} = 0.08 \cdot RE$$

$$MCR_{spread} = 0.025 \cdot FI^*$$

$$MCR_{int} = max\left\{\begin{array}{c} 0 \\ FI \cdot D_{FI}^{mod} \cdot r(D_{FI}^{mod}) \cdot s^{up} - TP \cdot D_{TP}^{mod} \cdot r(D_{TP}^{mod}) \cdot s^{up} \\ FI \cdot D_{FI}^{mod} \cdot r(D_{FI}^{mod}) \cdot s^{down} - TP \cdot D_{TP}^{mod} \cdot r(D_{TP}^{mod}) \cdot s^{down} \end{array}\right\}$$

I.5.23 For the purposes of the calculation, the modified duration of a cash flow *C(t)* is calculated from the duration as

$$D_C^{mod} = \frac{1}{1+r(D_C)} \cdot D_C$$

I.5.24 The interest rate shock parameters in the formula are determined as

$$s^{up} = 0.18$$
$$s^{down} = -0.20$$

MCR_{NL} non-life underwriting risk component

Input

I.5.25 The following input information is required:

PCO_i = the MCR_{NL} technical provision volume measure for QIS3 purposes: total provisions for claims outstanding for line of business *i*, net of reinsurance

P_i = earned premiums in line of business *i* during the previous year, net of reinsurance

Output

I.5.26 The module delivers the following output:

MCR_{NL} = the MCR non-life underwriting risk charge

Calculation

I.5.27 The MCR non-life underwriting risk component is calculated by the following function:

$$MCR_{NL} = max(\sqrt{H_P}; 0.65) \cdot \left[\sum_i \alpha_i \cdot P_i \right] + max(\sqrt{H_{PCO}}; 0.65) \cdot \left[\sum_i \beta_i \cdot PCO_i \right]$$

I.5.28 where H_{PCO} and H_P are the Herfindahl indices for claims provisions and premiums, respectively, that serve as a proxy measure for diversification between lines of business:

$$H_{PCO} = \frac{\sum_i PCO_i^2}{\left(\sum_i PCO_i\right)^2}; \quad H_P = \frac{\sum_i P_i^2}{\left(\sum_i P_i\right)^2}.$$

I.5.29 The factors α_i and β_i are determined as follows:

LOB	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*
α_i	10%	4%	6.5%	13%	13%	16.5%	13%	13%	16.5%	6.5%	10%	16.5%	19.5%	19.5%	19.5%
β_i	19.5%	10%	19.5%	16.5%	10%	19.5%	13%	19.5%	13%	13%	13%	19.5%	19.5%	26.5%	26.5%

MCR_{life} life underwriting risk component

Input

I.5.30 The following input information is required:

TP_{long} = Sum of net technical provisions net of any benefits payable on immediate death in respect of contracts which give rise to a financial surplus on immediate death of the insured

CAR = The sum of the net of reinsurance capital at risk in the portfolio i.e. the sum of the amounts currently payable on death less the net of reinsurance technical provision held for each policy that gives rise to a financial strain on immediate death of the insured

Exp_{UL} = Last year's net administrative expenses relating to unit linked business

Output

I.5.31 The module delivers the following output:

MCR_{life} = The MCR life underwriting risk charge

Calculation

I.5.32 The MCR life underwriting risk component is calculated by the following function:

$$MCR_{life} = \sqrt{MCR_{long}^2 + MCR_{mort}^2} + MCR_{UL}$$

I.5.33 where a distinction is made between mortality risk, longevity risk and unit linked contracts. The calculation of the sub-components is as follows:

$$MCR_{Mort} = 0.00025 \cdot CAR$$

$$MCR_{Long} = 0.0015 \cdot TP_{long}$$

$$MCR_{UL} = 0.12 \cdot Exp_{UL}$$

MCR special risk component: Health underwriting risk

I.5.34 This module is concerned with underwriting risk in health insurance that is practised on a similar technical basis to that of life assurance.[65]

Input

I.5.35 The following input information is required:

N_{health} = Number of health insured persons

BE = The sum of the annual gross benefits (settled or not) for the policy holders and the annual expenses of the insurance company related to health insurance business that occurred in the accounting year. *BE* subsumes all the claims and expenses associated with claims risk, mortality risk, cancellation risk and expense risk.

Output

I.5.36 The module delivers the following output:

MCR^{s}_{health} = The MCR health underwriting risk charge

Calculation

I.5.37 The capital charge for health risk is determined as follows:

$$MCR^{s}_{health} = 1.28 \cdot \frac{\rho}{\sqrt{N_{health}}} \cdot BE, \text{ with } \rho = 5.$$

[65] Health insurance within the meaning of Article 16a (4) of the EU-directive 73/239/EEC (as amended by EU-directive 2002/13/EC)

AMCR Absolute Minimum Capital Requirement

I.5.38 The following placeholder AMCR is tested:

$AMCR_1$ = 1 million EUR

I.5.39 The following alternative AMCR values are also tested:

$AMCR_2$ = 2 million EUR

$AMCR_3$ = 3 million EUR

I.5.40 The floor values above do not represent a position or a recommendation on part of CEIOPS or the European Commission. The choice of the placeholder should not be interpreted by any means as a preference for that specific value. Its sole purpose is to streamline the presentation of testing results.

Additional quantitative information

I.5.41 To assist the design of transitional arrangements and the setting of the MCR floor, and to enable the testing of the CEA's alternative MCR proposal, the following information should be disclosed:

1/3 *SCR* = one-third of the Solvency Capital Requirement of the participant, calculated according to the standard formula

1/3 SCR_{IM} = one-third of the Solvency Capital Requirement of the participant, calculated according to an internal model (if available)

RSM = the Solvency I required solvency margin of the participant at the reference date (calculated according to the current valuation base)

MGF = the Solvency I Minimum Guarantee Fund of the participant at the reference date

I.5.42 In addition, for the non-placeholder floor requirements, the following outputs are to be disclosed:

$MCR_1|_{AMCR2}$ = the Minimum Capital Requirement of the participant under market risk Alternative 1, subject to the alternative floor $AMCR_2$

$MCR_1|_{AMCR3}$ = the Minimum Capital Requirement of the participant under market risk Alternative 1, subject to the alternative floor $AMCR_3$

$MCR_2|_{AMCR2}$ = the Minimum Capital Requirement of the participant under market risk Alternative 2, subject to the

alternative floor $AMCR_2$

$MCR_2|_{AMCR3}$ = the Minimum Capital Requirement of the participant under market risk Alternative 2, subject to the alternative floor $AMCR_3$

Alternative MCR market risk charge calculations (excluding free assets)

I.5.43 Optionally, participants may calculate the MCR charge on an alternative basis, where free assets are excluded from the MCR market risk charge. For this alternative calculation, and for QIS3 purposes only, CEIOPS recommends the following method: Assets that are not needed to cover liabilities are considered 'free'. When constructing the sub-portfolio of assets to cover liabilities, a constant asset mix is assumed: all asset side volume measures are scaled down proportionally, by applying a scaling factor L/A (the ratio of liabilities to assets). The reduced portfolio should be constructed separately for non-life and life business and, when a fund structure is in place, separately for each fund. Unit linked liabilities and their covering assets should be excluded.

I.5.44 Participants who wish to explore the "no free assets" alternative are invited to comment on how this approach could be integrated into the MCR in a simple and objective manner.

Section 6

Specifications for standard formula group data

I.6.1 This section provides instructions for calculating and reporting group SCR data. It is divided into two parts. The first part describes the general approach to the compilation of data on the business of a group as a whole. The second part provides technical specifications for the SCR standard formula as applied at group level and for the calculation of available group capital. It also addresses the use of internal group models (or partial models).

I.6.2 The competent authority responsible for group supervision will manage the QIS3 process for each of their own groups. A single contact point in each group will be asked to coordinated responses to all group questions including submission of solo data for individual group entities which will be needed to compare group level data with the sum of the solo data. Where participants are unable to follow a particular methodology they should explain why and, if they are able, suggest a preferred alternative.

I.6.3 These specifications are designed for the purposes of QIS3 and do not necessarily reflect final solutions for Solvency II.

General Approach

Objectives

I.6.4 The main objectives of the group questions in QIS3 are:

- to gather information on the potential size and source of group diversification benefits resulting from the application of the standard formula at group level. The group level results (which will recognise diversification benefits) will be compared with the sum of the solo SCRs of individual entities within the group (which will not recognise diversification benefits). Comparisons will also be made with internal group model results where one is used.

- to gather information on the application of the principle of transferability in a group context and its impact in terms of absolute amounts (particularly with regard to life companies, non-EEA group entities, cross-sector holdings, minority interests and subordinated debt);

- to gather information on the size and nature of group-specific risks;

- to gather information on difficulties experienced by participants in carrying out the calculations specified and any other relevant issues.

Required capital

I.6.5 Required group capital should be calculated by applying the SCR standard formula to the group as a whole[66], but adjusted to allow for non-transferability of assets between group entities. Technical specifications for this calculation are set out in the second part, starting para. I.6.30.

I.6.6 Participants are also encouraged to report results of the SCR standard formula applied directly to the group's statutory consolidated accounts (i.e. treating the group as a single entity), but adjusted by a positive amount calculated by themselves which reflects their own estimate of restrictions on transferability. Participants should explain how they have calculated this adjustment[67]. Technical specifications for this calculation are set out in the second part, starting para. I.6.69.

I.6.7 For comparative purposes participants should calculate the sum of the solo SCRs of individual EEA group entities[68], adjusted to eliminate intra-group transactions and, where necessary, to include EEA holding companies. Technical specifications for this calculation are set out in the second part, starting para. I.6.71.

Available capital

I.6.8 Available capital should be calculated according to the solo specifications for available capital as set out in Section 2. The calculations may be based on either:

- the group's statutory consolidated accounts; or
- where consolidated accounts are not available, the sum of each individual group entity's solo capital elements (including holding companies), adjusted to eliminate any double counting.

I.6.9 Technical specification for calculating available group capital is set out in the second part, starting para. I.6.78.

I.6.10 Surplus capital in one group entity (i.e. available capital in excess of that entity's SCR) may only count towards available group capital to the

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[66] The source for group input data will generally be the group's consolidated accounts but where these are not available or where certain risks need to be identified separately group data can be calculated by aggregating solo inputs of the individual entities within the group.

[67] In particular participants should explain how they adjust for "with profits" life business. An alternative approach to life business has been suggested which would distinguish between profit sharing and non-profit sharing portfolios or entities. SCRs for each of the former would be summed and added separately to the SCR of the rest of the group in order to eliminate diversification effects. This is not being tested now but any views on such an approach would be useful.

[68] The sum of solo SCR data will be available from the solo spreadsheet.

extent that it is freely transferable to cover losses in other parts of the group.

Internal models

I.6.11 Where an internal group model (or partial model) is used, participants should provide information on the structure of the model, assumptions used and its outputs in terms of absolute amounts (please refer to para. I.6.76 and the Qualitative Questionnaire for groups).

Group SCR floor

I.6.12 Participants should calculate MCRs for all EEA group entities in order to establish the group SCR floor.

Scope of the group

I.6.13 The scope of the group solvency requirements under Solvency II is expected to be based on Article 3 of the current Insurance Groups Directive (98/78/EC). The group should include the ultimate EEA insurance parent undertaking or insurance holding company and all related insurance undertakings[69] , i.e. subsidiaries (> 50 % control) and participations (20%-50% control).

I.6.14 In accordance with Annex 1.1B of the Insurance Groups Directive, group solvency calculations should take into account the group's proportional share in its related undertakings except that where a subsidiary has a solvency deficit the total deficit should be taken into account.

I.6.15 Where a group entity is excluded either in accordance with Article 3(3) of the Insurance Groups Directive or otherwise (e.g. because relevant data is not available or because of immateriality or because inclusion is deemed inappropriate) the value of the investment as shown in the group's accounts should be deducted from available group capital and participants should note all such exclusions, the reasons for them and the net asset value of each entity excluded.

Non-EEA group entities

I.6.16 Non-EEA insurance members of an EEA-owned group are expected to be taken into account in group solvency under Solvency II. QIS3 will be used to gather information on the most practical way of achieving this. For the purpose of QIS3, data on non-EEA entities should be separately identified. Non-EEA required and available capital should be calculated according to local rules[70].

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[69] In these specifications, where reference is made to "insurance undertakings" this should be read as also referring to "reinsurance undertakings".

[70] Under Solvency II it is expected that local rules will only be allowed to be used if they are considered to be equivalent to Solvency II requirements; otherwise Solvency II rules will apply. Where multiple control level apply (e.g. USA) the highest control level (i.e. first intervention point) should be used.

I.6.17 The extent to which surplus assets are transferable between EEA and non-EEA parts of the group should be taken into account. Unless there is full transferability, diversification benefits between EEA and non-EEA parts of a group should not be recognised (or should only be partially recognised) in the calculation of the group SCR. Similarly surplus capital in non-EEA parts of the group (i.e. capital in excess of local requirements) should not be included in available group capital unless it is freely available to cover losses elsewhere in the group (for further details on transferability see paragraphs I.6.25 to I.6.27 below).

I.6.18 For the purposes of QIS3 the SCRs of non-EEA entities should be added separately to the SCR of the EEA part of the group (i.e. diversification benefits are not recognised). Available capital in non-EEA entities should only be included in group available capital up to the level of the entity's required capital. Surplus available capital from non-EEA entities should be reported separately and participants should provide information regarding the extent to which they consider it to be transferable and hence available to cover losses in EEA entities. Technical specifications for this are set out in the second part, para. I.6.32.

I.6.19 Notwithstanding paragraph I.6.18, CEIOPS recognised that diversification across the whole group, included non-EEA entities, is an important part of many groups' approach to risk management. Therefore, in addition to the approach described in paragraph I.6.18, participants are invited to provide data to demonstrate the size of the diversification effects including non-EEA entities calculated either on the basis of their internal group model and/or calculated by applying the standard formula across the whole group (see second part, para. I.6.74 & I.6.75 for further details).

Non-EEA groups with EEA members

I.6.20 EEA competent authorities responsible for supervising EEA members of non-EEA groups will encourage such groups to participate. Views on the practical issues raised by the application of Solvency II at the level of a non-EEA parent will be particularly welcome.

Cross-sector participations

I.6.21 Under Solvency II it is expected that participations in credit institutions, investment firms and financial institutions will be treated in accordance with the Insurance Groups Directive as amended by the Financial Conglomerates Directive (see Article 28(6) of the FCD (2002/87/EC)). That is, such participations (i.e. holding of 20% or more) should either be deducted from available capital, or be subject to one of the consolidation methods set out in Annex 1 of the Financial Conglomerates Directive or not deducted.

I.6.22 For the purpose of QIS3, cross-sector participations should be separately identified and (where an alternative to deduction is used) the relevant sectoral requirements should be used to calculate a proxy SCR. Transferability is also an issue for cross-sector holdings in the same way

as it is for non-EEA members of the group. So the required capital for cross-sector participations should be added separately to the group SCR for the rest of the group (i.e. diversification benefits are not recognised). Available capital in cross-sector entities should only be included in group available capital up to the level of the entity's required capital. Surplus available capital in cross-sector entities should be reported separately and participants should provide information regarding the extent to which they consider it to be transferable and hence available to cover losses in EEA entities. Technical specifications for this are set out in the second part, para. I.6.33.

Non-regulated group entities

I.6.23 Participants should provide information on the treatment of non-regulated group members which are included in the consolidated balance sheet. These may include entities which provide services which are either ancillary to their insurance activities or which are non-regulated financial services (e.g. holding companies, service companies, SPVs used either for capital raising or securitisation, financial institutions such as leasing companies). Information on pension fund activity should also be provided including whether it is undertaken on behalf of members of the group or managed for third parties. Participants should provide information on the size of risks from such companies and how they are quantified. Any material external market and default risk in holding companies should be addressed. Participants should explain how transactions between the consolidated part of the group and other parts of the group are treated and how potential contagion or reputational risks are addressed.

Group diversification effects

I.6.24 Application of the standard SCR formula to a group as if it were a single entity will result in diversification benefits. For the purpose of QIS3 the standard formula as applied at group level should allow recognition of diversification effects subject to certain adjustments to take account of the principle of transferability.

Transferability

I.6.25 The principle of transferability (as set out in Annex 1.1.C.3 of the Insurance Groups Directive) should be applied. This is an issue at solo as well as group level so the treatment should be consistent at both levels. At solo level any restrictions on the transfer of assets reduces the extent to which profits in one portfolio can be used to offset losses in another. This principle also applies between different entities within a group. This has implications both for the calculation of available group capital (i.e. surplus capital in an entity should not count, or should not count in full, towards group capital if there are restrictions on its transferability) and the group SCR (i.e. group diversification benefits between entities which are subject to restricted transferability should not be recognised, or not recognised in full, in the calculation of the group SCR).

I.6.26 Restrictions on transferability exist, inter alia, in the following circumstances:

1. where assets are required to meet the solo capital requirements of an individual group entity,
2. where assets are allocated for a particular purpose, notably surplus assets within participation funds,
3. where assets are financed by subordinated debt instruments,
4. where assets are financed by minority interests,
5. where the availability of assets is restricted as a result of their location in non-EEA or cross-sector entities,
6. in cases of partial transferability resulting, for example, from transfer costs (e.g. local taxation, transaction costs etc).

I.6.27 The technical specifications set out in the second part of this section make certain adjustments to the standard SCR formula to account for non-transferability between group entities. Participants are invited to comment on the approach adopted and provide information on any preferred alternatives for assessing and accounting for non-transferability.

Group-specific risks

I.6.28 As well as potential benefits, membership of a group may also create group-specific risks. These may include for example:

1. contagion risk,
2. legal risk,
3. reputational risk,
4. complexity/lack of transparency,
5. conflict of interest,
6. concentrations/tail dependencies.

I.6.29 These risks are not addressed by the standard formula, nor in the technical specifications in the second part of this section. However, although group specific risks are typically difficult to quantify, the intention in Solvency II is that they should, as far as possible, be addressed in the pillar 1 required capital calculation. Therefore, for the purposes of QIS3, participants are asked to explain how they address such risks and suggest how they might be quantified.

Group technical specifications

I.6.30 This part is organized as follows:

- Capital requirement
  - "Standard" approach
    - A first approach for implementing the standard formula
    - Alternative approach for implementing standard formula at group level
    - Inputs required for comparison purposes
      - sum of 'solo' adjusted SCRs;
      - third countries integration into the standard formula.
  - Use of an internal model
    - Questions on the model
    - Results:
      - Scope of EEA entities
      - Inclusion of third countries
- Available capital

NOTA BENE: PARTICIPANTS ARE ASKED TO DESCRIBE ANY SPECIFIC DIFFICULTIES THEY EXPERIENCE IN FOLLOWING ANY OF THESE TECHNICAL SPECIFICATIONS (Cf. to separate questionnaire)

Capital Requirement

A first approach for implementing the standard formula

I.6.31 Calculations to be carried out under the standard formula concern EEA (re)insurance undertakings.

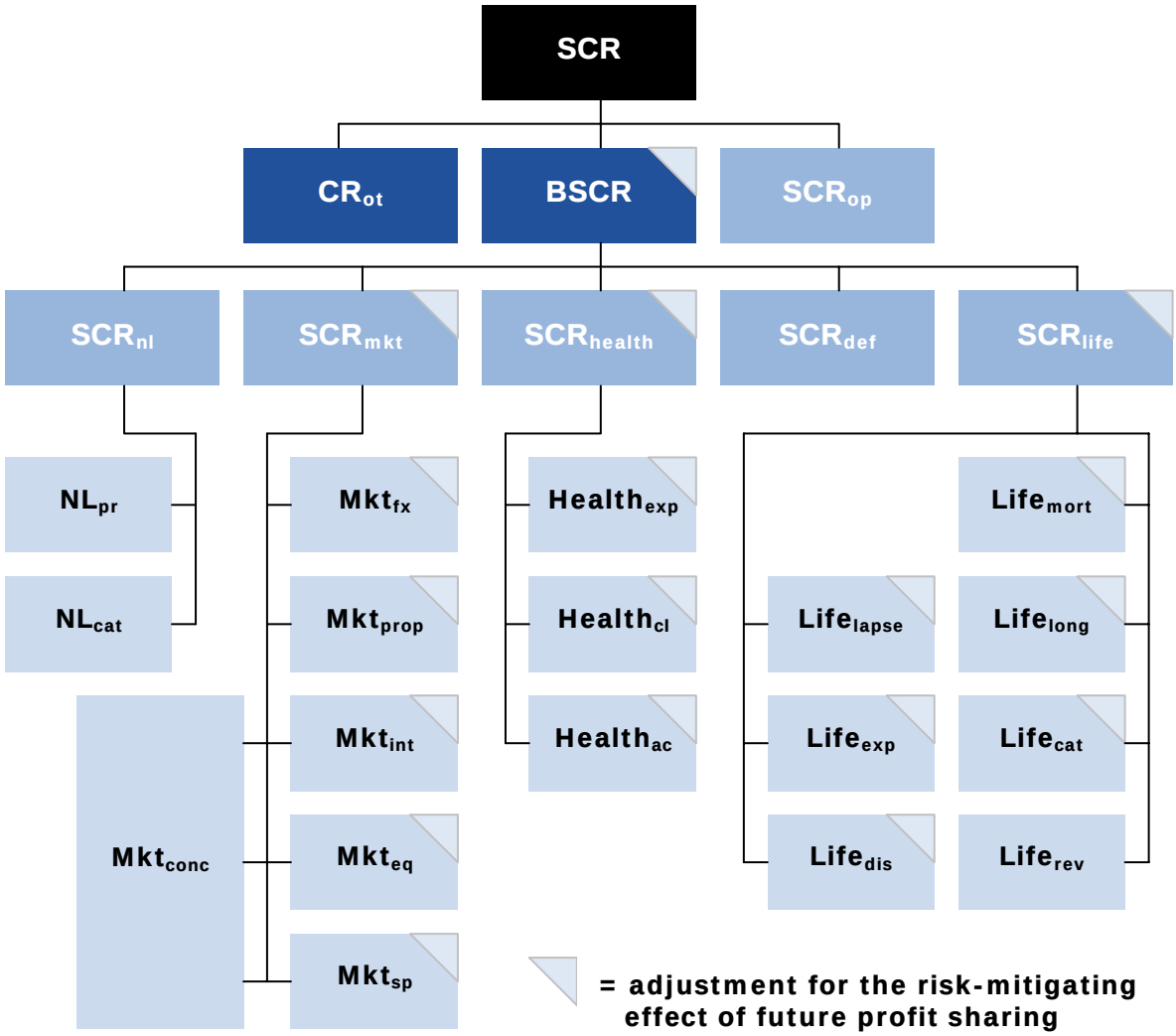
I.6.32 Participations in (re)insurance entities in third countries: their contribution to the capital requirement of the group should be the sum of the local requirements in these third countries. When (re)insurance entities in third countries form a subgroup for which a specific capital requirement exists, this latter could be retained, instead of the sum of the requirements of each solo entity. This will constitute CR_{tc}.

I.6.33 Participations held in other financial sectors: their contribution to the capital requirement of the group should be the other financial sector's requirements. When participations in another financial sector form a group for which a specific capital requirement exists, this latter, instead of the sum of the requirements of each solo entity) should be retained. This will form CR_{ofs}.

I.6.34 Participations in EEA (re)insurers accounted for at equity value and for those included proportionally: their contribution to the capital requirement of the group should be their solo SCR multiplied by the group's share in these participations. This will form CR_{eq}.

I.6.35 The sum of CR_{tc}, CR_{ofs}, CR_{eq} is equal to CR_{ot}[71] and will have to be added to the EEA insurance and reinsurance undertakings' SCR calculation, based on the implementation of the standard formula as specified below.

I.6.36 For the convenience of reading, the chart below sets out an overview of the SCR as calculated at group level.



NOTA BENE: IN THE FOLLOWING SPECIFICATIONS "I" IS AN INDEX THAT REFERS TO EACH EEA REGULATED ENTITY OF THE GROUP (INSURER OR REINSURER). THE ABSENCE OF INDEX MEANS THAT THE (SUB-)MODULE IS CALCULATED ON EEA

[71] 'ot' means 'others'

CONSOLIDATED [OR COMBINED] DATA (AS IF THE DIFFERENT EEA ENTITIES WERE ONE).

I.6.37 Groups which cannot carry out calculations on consolidated [or combined] data when required at the level of a given sub-module should instead make the sum of the solo SCR (sub-) modules, and indicate that they use this alternative approach, after having given justification for the use of an alternative approach to the proposed one.

Non life underwriting risk

NL_{pr}

I.6.38 The proposed method results in a specific aggregation of each NL_{pr} for each LoB and each entity, in the following manner:

- the NL_{pr} of different undertakings in the same country are supposed to be correlated at 75%;
- the NL_{pr} of different entities in different countries are supposed to be correlated at a lower ratio (but strictly higher than zero, due to the influence of the group on the solo underwriting policies). We propose to use at this stage a correlation of 50%.

I.6.39 This would imply that assuming:

- a and b being countries
- i and j being solo undertakings, that:

$$\mathrm{Corr}(NL_{pr}(a,i);NL_{pr}(b,j)) = \begin{cases} 1 \text{ if } a = b \text{ and } i = j \\ 0{,}75 \text{ if } a = b \text{ and } i \neq j \\ 0{,}5 \text{ if } a \neq b \end{cases}$$

I.6.40 In addition, groups are invited to propose alternative approach to the required one and give the results.

NL_{CAT}

I.6.41 The calculation of this module is based on the simulation of different extreme scenarios. The problem in a group arises when defining the relevant group scenarios. In QIS3, the scenarios are defined at EU or at geographical level.

I.6.42 Participants are asked to implement the European and regional scenarios defined at European and local level for the whole group (for its EEA entities). This means that the different catastrophic scenarios should be aggregated at group level.

Counterparty default risk

I.6.43 Replacement costs (RC)[72] should be calculated as the sum of all the individual RCs, because risk mitigants are generally relevant for each specific entity[73]. Furthermore, the calculation of individual RCs should be adjusted for counterparty default risk arising from intra-group transactions that should be eliminated.

Life underwriting risk

I.6.44 The correlation matrix between the sub-modules ($Life_{mort}$, $Life_{long}$, $Life_{dis}$, $Life_{lapse}$, $Life_{exp}$, $Life_{CAT}$) is the same as the one used at solo level.

$Life_{mort}$

I.6.45 The following approach is proposed:

$$Life_{mort} = \sum_{i=1}^{n} life_{i,mort}$$

I.6.46 $Life_{mort}$ reflects trend risks. It seems realistic to suppose that trend risks are dependent, meaning that a change of mortality rate in one entity will be similar in another entity.

$Life_{long}$

I.6.47 The same approach as for mortality risk is proposed.

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[72] Defined as "approximately the difference between gross and net TP (plus/minus any other credit/debt capable of offset), adjusted for the effect of collateral (…)" (CP20, §5.209)

[73] For example, let's consider two insurers A and B that are reinsured by the same reinsurer C. Both A and B have ceded 100 M€ of technical provisions to C. A has received 120 M€ of collateral, whereas B has received only 80 M€ of collateral.

If RC were calculated on 'consolidated [or combined] data', RC would be zero. But in reality, since the excess of collateral for A cannot usually compensate the insufficiency of collateral for B, the real position of the group is RC= +20 M€.

$$\text{Life}_{\text{long}} = \sum_{i=1}^{n} \text{life}_{i,\text{long}}$$

Life_{dis}

I.6.48 The same approach as for mortality and longevity risks is proposed.

$$\text{Life}_{\text{dis}} = \sum_{i=1}^{n} \text{life}_{i,\text{dis}}$$

$\text{Life}_{\text{lapse}}$

I.6.49 The capital charge for the group is deemed to be the sum of the solo charges, because of non transferability of policyholders' profits between different entities.

Life_{exp}

I.6.50 The capital charge for the group is deemed to be the sum of the individual charges (there is no sufficiently strong reason to recognize diversification across entities for this risk, because of reputation risk of groups for example).

Life_{rev}

I.6.51 The capital charge for the group is deemed to be the sum of the individual charges, this being consistent with the treatment of trend risks in the others sub modules of the life underwriting module (the underlying factors for that risk such as litigation could be contagious).

Life_{CAT}

I.6.52 Life_{CAT} should be considered as the sum of the solo Life_{CAT}, as there is no diversification of risks between entities and jurisdictions for this kind of risks (ex: pandemic risk).

Market risk

Mkt_{int}

I.6.53 For life business, a general assumption could be that profit–sharing business prevents transferability of profits between entities; this would

argue for the summation of each individual charge for this risk[74]. Conversely, in non life business there is no general barrier to transferability of profits between entities; this would argue for assessing Mkt_{int}^{NL} on consolidated [or combined] data (this assumes that the possible losses occurring in one entity could be offset by profits in another one). $Mkt_{i,int}$ resulting from upward shock and downward shock should not be added.

$$Mkt_{int} = \max\left\{\begin{array}{l} \sum_{i=1}^{n} \max(0; \Delta NAV_i^{Life,special} \mid upwardshock) + \max(0; \Delta NAV_{int}^{NL} \mid upwardshock) \\ \sum_{i=1}^{n} \max(0; \Delta NAV_i^{Life,special} \mid downwardshock) + \max(0; \Delta NAV_{int}^{NL} \mid downwardshock) \end{array}\right\}$$

Mkt_{eq}

I.6.54 The same approach as the one proposed for market interest rate risk Mkt_{int} could be adopted. In order to eliminate the capital charge stemming from intra-group transactions, the value of participations (insurance & reinsurance & cross sectoral participations when the group chooses to consolidate them (see above)) should be considered as being invested in cash for the calculation.

$$Mkt_{eq} = \sum_{i=1}^{n} Mkt_{i,eq}^{Life,special} + Mkt_{eq}^{NL}$$

Mkt_{prop}

I.6.55 We propose to use the same approach as for the Mkt_{eq},

$$Mkt_{prop} = \sum_{i=1}^{n} Mkt_{i,prop}^{Life,special} + Mkt_{prop}^{NL}$$

Mkt_{fx}

I.6.56 The proposed approach would be similar to the treatment of interest rate risk.

$$Mkt_{fx} = \sum_{i=1}^{n} Mkt_{i,fx}^{Life,special} + Mkt_{fx}^{NL}$$

Mkt_{sp}

I.6.57 The calculation is to be carried out on the consolidated [or combined] accounts. This automatically eliminates intra-group transactions that are fully or proportionally consolidated.

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[74] This is also the case for the entities falling under the "special" module. In the proposed formula, these undertakings are to be considered as put in the same category as life undertakings.

Mkt_{conc}

I.6.58 The proposed approach consists in applying the formula for Mkt_{conc} on consolidated [or combined] data. Indeed, the effect of being a group (diversification of assets in the balance sheet) and the offsets of consolidation [or combination] should be recognised.

Health underwriting risk ('special' module)

I.6.59 The correlation matrix between the sub-modules ($Health_{exp}$, $Health_{cl}$, $Health_{ac}$,) is the same as the one used at solo level.

$Health_{exp}$

I.6.60 The following approach is proposed:

$$Health_{exp} = \sum_{i=1}^{n} Health_{i,exp}$$

I.6.61 It seems realistic to suppose that $health_{exp}$ risks are dependent to be consistent with the treatment of trend risks in the life sub modules, meaning that a change in the standard deviation of the expense result is likely to be similar in another entity.

$Health_{cl}$

I.6.62 The same approach as for expense risk is proposed for claim/mortality/cancellation risk.

$$Health_{cl} = \sum_{i=1}^{n} Health_{i,cl}$$

$Health_{ac}$

I.6.63 At solo level, $Health_{ac}$ is a linear function of the gross premium earned for the accounted year at the national level. To avoid the double counting of some premium at group level, internal reinsurance should be deducted from the gross premium earned for the accounted year for the calculus of $Health_{ac.}$

$$Health_{ac} = \sum_{i=1}^{n} Health_{i,ac}^{adjusted\_for\_internal\_reinsurance}$$

Calculation of SCR_{op}

I.6.64 SCR_{op} could be calculated as the sum of the solo inputs.

I.6.65 Groups will be asked to specify if they think that the above approach is relevant at group level (without prejudice to QIS3 'solo' specifications) and in particular to which extent they consider that additional group specific risks should be taken into account.

Calculation of KC-factor for life insurance business

I.6.66 In the framework of QIS3, and to be in line with the current approach developed at solo level, the 'group KC factor' is deducted from the group SCR. In this context, consideration is to be given to the fact that the group SCR benefits from some diversification effects that would make the deduction of the sum of the individual KCs from the group SCR too generous. A reduction factor should be applied to this sum, which could be based on an evaluation of the diversification benefits before application of the 'KC factor'. This approach is explained in the following formula:

$$KC_{group} = \sum_i KC_i \cdot \frac{SCR_{group\_before\_kfactor} - CR_{ot}}{\sum_i SCR_i + \sum_i KC_i}$$

with:

$$SCR = SCR_{group\_before\_kfactor} - KC_{group}$$

I.6.67 CEIOPS is aware of the fact that the proposed method is an approximation.

I.6.68 In addition, participants are invited to suggest any alternative method and to give the results of its implementation (that could be compared to the proposed method).

Alternative approaches for implementing the standard formula at group level

I.6.69 An alternative method that is proposed to be tested here is to implement the standard formula on consolidated [or combined] data (for the European part of the group), as if the group were a unique entity. A positive amount, reflecting any barrier to the full transferability of profits between different entities should be added to the result (with profit sharing business in life insurance, tax costs, etc). With this approach, the result benefits from the 'volume effect' at group level (diversification effects are recognized in the former approach)

$$SCR_{group} = SCR_{conso-EEA} + CR_{ot}$$

I.6.70 Any difficulty encountered when processing the calculation should be pointed out by the participants.

Inputs required for comparison purposes

Sum of 'solo' adjusted SCRs

I.6.71 The aim is to calculate the contribution of each EEA solo entity to the SCR of the group by making the summation of 'solo adjusted SCRs', the 'solo adjusted SCR being defined as SCR calculated at each solo entity level with the elimination of intra-group transactions (this elimination is to be carried out at each sub-module level).

$$SCR_{group} = \sum SCR_{solo-adjusted} + CR_{ot}$$

I.6.72 In practice, the 'solo adjusted' SCR would be affected in the calculation of SCR_{Mkt} and $SCR_{def\ in}$ 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[75].

- Regarding SCR_{Def}: the capital charge stemming from default risk of intra group cessionaries (that is risks transferred into another entity of the group) should be taken equal to zero.

I.6.73 Any difficulty encountered when processing the calculation should be pointed out by the participants.

Information on third countries activities

I.6.74 In addition, participants may apply the calculations described above to the whole group, including third country entities, in order to provide information on the size of diversification effects arising from third country entities.

I.6.75 As regards the implementation of the standard formula as described in the first approach, the entities located in third countries should be treated in the following manner:

- For non-EEA entities, technical provisions have to be calculated using QIS3 technical specifications prescribed methods.

- The correlation factors present in the non-life underwriting risk module should be unchanged (correlations are supposed to be the

[75] NB: the 'adjusted' concentration charge is the solo concentration minus the concentration charge due to intra group assets

same between different EU countries and between one EEA Member state and a non EEA country).

- For the non-life catastrophic risk: use the same approach as in the detailed specifications, using the scenarios defined at solo level for third countries, and make use of the same aggregation criteria & method.

Use of an internal model

NOTA BENE: PARTICIPANTS ARE ASKED TO GIVE ABSOLUTE AMOUNTS WHEN DEALING WITH DIVERSIFICATION BENEFITS AND REQUIRED GROUP CAPITAL AS RESULTS OF THE IMPLEMENTATION OF THE INTERNAL MODEL.

I.6.76 If you have applied an internal group to any of the elements of the group SCR please describe (cf. to the separate questionnaire) the methodology underlying the model, and also how the model was calibrated and validated. In particular, participants are encouraged to comment on reasons for material differences between their internal model estimates and the results of the standard formula modelling treatments, especially where they suspect the latter fail to reflect the true drivers of risk. (For those undertakings that participated in QIS2, there is no need to repeat information already provided for QIS2, but please indicate if any change to the model has been applied for QIS3.)

I.6.77 Groups can additionally give the results obtained by their internal model implemented for whole group, including third countries activities.

Available capital

I.6.78 For the purpose of the calculation of available capital, participants will take as a basis their released 2006 consolidated [or combined] accounts and will take into account as a starting point the method currently used to determine available group capital elements (that is the implementation of 'solo' rules for the calculation of eligible elements, adjusted for availability and transferability), with the eventual prudential filters they are required to use in the current framework, when relevant. The following expands on the adjustments that are to be made on the current process for determining capital elements.

Total share capital (shareholders' capital + minority interests)

I.6.79 For the purpose of QIS3, the technical provisions of the group (for its European parts) are equal to the sum of the individual technical provisions net of intra-group reinsurance, as calculated by the technical valuation standards set out in the QIS3 solo specifications. Total share capital of the group should be adjusted by these elements. Any kind of intangible assets should be deducted from the available capital (as in the current framework) [or valued at zero].

I.6.80 Participants will have particularly to give the amount of the adjustment due to the use of the prescribed standards of valuation of technical provisions.

Minority interests

I.6.81 A minority interest's share in any surplus assets of a group entity in which it holds an interest is not necessarily available for use elsewhere in a group. Therefore a minority interest's share in any surplus capital should only be included in available group capital up to the minority interest's proportional share in the entity's solo SCR (as recommended in CEIOPS advice to Call for advice n°19). Conversely the contribution of solo entity's SCR to the group SCR should be limited to the group's proportional share in the entity unless the entity is in deficit in which case it's solo SCR should be included in full in the group required capital calculation.

I.6.82 In a practical way, minority interests (as adjusted[76] above) should be only recognised subject to their availability. In the current framework, eligible minority interests are calculated on the basis of the percentage of participation of these minority interests multiplied by the required solvency margin of the entities in which these minority interests hold – directly or indirectly – participations. In the Solvency II framework, under the consolidated approach, the solvency capital requirement for the group will not be the sum of the solo requirements (due to the recognition of some diversification benefits). Thus, it will not possible to calculate directly the contribution of a solo entity to the group SCR. However a proxy contribution could be calculated, resulting from the following formula:

$$\text{Contr}_i = \text{SCR}_i \times \frac{\text{SCR}}{\sum_{i=1}^{n} \text{SCR}_i}$$

I.6.83 CEIOPS is aware of the fact that, as for the proposed determination of the group 'KC-factor', 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).

Hybrid capital

I.6.84 These capital items (mainly non-cumulative preference shares and deeply subordinated debt), cannot in principle be considered as transferable if not issued by the ultimate parent of the group (in essence, this depends on the rights of the subscribers on the revenues of these instruments).If

[76] The adjustment of the total share of the group due to Solvency II valuation of technical provisions should be affected to their proportional share to shareholders' capital and minority interests if the group is not able to identify the origin of the differences in valuation between IAS and Solvency II principles.

not transferable, they should be subject to the limitations as set out in para. I.6.95 'non transferable items' below.

Subordinated debt

I.6.85 Subordinated debt issued by group entities is normally only available to support the business of the issuing entity because of its legal liability to the subscribers to that debt. In principle, subordinated debt issued by undertakings other than the ultimate parent undertaking should be considered as non transferable elements and then subject to the provisions of para. I.6.95 'non transferable items' below.

Unrealised capital gains

I.6.86 Unrealised capital gains are to be taken into account subject to their availability and transferability.

I.6.87 For groups that use IAS/IFRS standards for the establishment of consolidated [or combined] accounts, the unrealised capital gains accounted for in the own funds should be fully taken into account as they are net of policyholders bonuses and taxes. As regard the unrealised capital gains that are not accounted for, they should be taken into account net of policyholders' future bonuses and taxes.

'Tier 3' capital

I.6.88 These capital items are subject to the authorisation of each solo supervisor. For those elements that are admitted at solo level, they should be admitted at group level, subject to their transferability.

I.6.89 Participants are asked to make the distinction between the different Tier 3 elements that are taken into account at solo level and evaluate for each of them to which extent they can be considered as transferable throughout the group.

I.6.90 The non-transferable items should be subject to the limitation as set out in para. I.6.95 'non transferable items' below.

Treatment of cross sectoral participations

I.6.91 Groups should report for information purposes the amount of any surplus of eligible capital elements held in cross-sector entities that are 'consolidated' in the calculation.

I.6.92 As regards the participations that are 'not consolidated' in the group's solvency assessment, they should be deducted from the available capital of the group.

Treatment of third countries insurance participations

I.6.93 Groups should report for information purposes the amount of any surplus of eligible capital elements held in third countries entities that are 'consolidated' in the calculation.

I.6.94 For the third countries participations that are 'not consolidated' in the group's solvency assessment, the value of the corresponding participations should be deducted from the available capital.

Non transferable items

I.6.95 The sum of non-transferable assets should not exceed the solvency capital requirement in which these assets are located, with a specific reduction due to the diversification effects recognised in the consolidated group SCR (see above the treatment of minority interests).

$$\text{Contr}_i = \text{SCR}_i \times \frac{\text{SCR}}{\sum_{i=1}^{n} \text{SCR}_i}$$