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Committee of European Insurance and Occupational Pensions Supervisors

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CEIOPS' Advice for Level 2 Implementing Measures on Solvency II:

SCR standard formula

Loss-absorbing capacity of technical provisions and deferred taxes

(former CP 54)

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Table of content

1. Introduction

1.1. In its letter of 19 July 2007, the European Commission requested CEIOPS to provide final, fully consulted advice on Level 2 implementing measures by October 2009 and recommended CEIOPS to develop Level 3 guidance on certain areas to foster supervisory convergence. On 12 June 2009 the European Commission sent a letter with further guidance regarding the Solvency II project, including the list of implementing measures and timetable until implementation.

1.2. This Paper aims at providing advice with regard to the calculation of the adjustment for loss-absorbing capacity of technical provisions as requested in Article 111 (i) of the Solvency II Level 1 text[1].

[1] Latest version from 19 October 2009 available at http://register.consilium.europa.eu/pdf/en/09/st03/st03643-re01.en09.pdf

2. Extract from Level 1 Text

2.1. According to the guiding principles referred to in the Commission's letter, the legal basis for the advice presented in this paper is primarily found in Article 111 of the Level 1 text which states:

"The Commission shall adopt implementing measures laying down the following: […]

(i) the method to be used when calculating the adjustment for the loss-absorbing capacity of technical provisions or deferred taxes, as laid down in Article 108; […]

2.2. Article 103 states:

"The Solvency Capital Requirement calculated on the basis of the standard formula shall be the sum of the following items:

(a) the Basic Solvency Capital Requirement, as laid down in Article 104;

(b) the capital requirement for operational risk, as laid down in Article 107;

(c) the adjustment for the loss-absorbing capacity of technical provisions and deferred taxes, as laid down in Article 108."

2.3. Article 108 states:

"The adjustment referred to in point (c) paragraph 1 of Article 103 for the loss-absorbing capacity of technical provisions and deferred taxes shall reflect potential compensation of unexpected losses through a simultaneous decrease in technical provisions or deferred taxes or a combination of the two.

That adjustment shall take account of the risk mitigating effect provided by future discretionary benefits of insurance contracts, to the extent insurance and reinsurance undertakings can establish that a reduction in such benefits may be used to cover unexpected losses when they arise. The risk mitigating effect provided by future discretionary benefits shall be no higher than the sum of technical provisions and deferred taxes relating to those future discretionary benefits.

For the purpose of the second paragraph, the value of future discretionary benefits under adverse circumstances shall be compared to the value of such benefits under the underlying assumptions of the best-estimate calculation."

Advice

3.1. Explanatory text

3.1.1. QIS4 Technical Specifications

3.1. For QIS4, two alternative approaches to calculating the loss absorbency of technical provisions were tested.

Default approach

3.2. Under the first approach, the capital charge for each risk was calculated under the following two scenarios:

- The insurer is not able to vary its assumptions on future bonus rates in response to the shock being tested (gross calculation), i.e. the bonus rates are the unchanged from those used to calculate the best estimate liability as part of the calculation of technical provisions.
- The insurer is able to vary its assumptions on future bonus rates in response to the shock being tested, based on reasonable expectations and having regard to plausible management actions (net calculation)

3.3. Both the net and gross capital requirements were then aggregated separately using the relevant correlation matrices.

3.4. The adjustment to the basic SCR for the loss-absorbing capacity of future discretionary benefits was determined by comparing the gross and net SCRs. This adjustment was limited to a maximum of the total value of future discretionary bonuses.

3.5. For the purposes of this paper, this approach is referred to as the **modular approach**.

3.6. A simplification where the net SCR was assumed to be equal to the gross SCR was also available to participants.

3.7. A further adjustment was made to reflect the loss-absorbing capacities of deferred taxes. This adjustment was calculated as follows:

- The basic SCR was calculated on the basis that the current (pre-stress) liability in respect of deferred taxes was excluded from the current (pre-stress) balance sheet.
- The capital requirement in respect of operational risk was added to the basic SCR.
- The liability in respect of deferred taxes was then calculated under the assumption that the undertaking made an immediate loss equal to the total value of the SCR.
- The adjustment to the basic SCR for the loss-absorbing capacity of deferred taxes was equal to the change in the deferred tax liability.

Lower boundary SCR

3.8. Under QIS4, participants were also required to calculate a lower boundary SCR where the SCR is calculated under the assumption that, as far as

possible, the undertaking passes on the impact of shocks to policyholders rather than absorb the loss themselves using own funds.

Alternative approach

3.9. Under the alternative approach, the basic SCR was calculated using a single scenario under which all of the risks covered by the standard formula occurred simultaneously. The process involved the following steps:

- The capital charge for each risk was calculated under the assumption that the insurer was not able to vary its assumptions on future bonus rates in response to the shock being tested (gross calculation).
- The gross capital charges were used as inputs to determine the single equivalent scenario based on the relative importance of each of the sub-risks to the undertaking. Undertakings had the option to determine the single equivalent scenario using net capital charges as inputs if this was felt to more accurately reflect the relative importance of each risk.
- The undertaking then considered the management actions which would be applied in such a scenario and, in particular, whether their assumptions about future bonus rates would change if such a scenario was to occur. It is to be noted that therefore the management actions which would be applied if all stresses occur simultaneously may not be the same as those which would be applied if the stresses occur individually as in the modular approach.
- The change in the undertaking's net asset value was then calculated on the assumption that all the shocks underlying the single equivalent scenario occurred simultaneously and that the undertaking made an operational loss equal to the capital charge in respect of operational risk. The management actions identified above as well as the loss-absorbing capacity of deferred taxes were taken into account.
- The adjustment to the basic SCR was for the loss-absorbing capacity of future discretionary benefits was determined by deducting the SCR for operational risk and the SCR calculated under the single equivalent scenario from the gross SCR.
- Undertakings were also required to calculate the "lower boundary SCR" under the single equivalent scenario.

3.10. For the purposes of this paper, this approach is referred to as the **single equivalent scenario approach**.

3.1.2. Feedback from QIS4

3.11. It was observed that the adjustment for loss absorbency of future profit sharing was one of the key elements in the calculation of the SCR for life and health insurers. Therefore it was considered that further and more detailed guidance on the approach and methodology to be used was needed.

3.12. The general points raised were:

- There was considerable inconsistency between undertakings in the results submitted. This was attributed to the difficulty of the

calculation, the need to use approximations to arrive at some figures, simplifications regarding the application of possible management actions and the requirement to carry out two sets of SCR model runs. It was also thought that the lack of clarity regarding the definition of discretionary benefits contributed to this inconsistency.

- The important role of judgement in determining realistic management and policyholder actions during a 99.5% VaR-level stress should be considered.
- If undertakings increase bonuses during an interest rate up stress, the net SCR may be greater than the gross SCR, which is not compatible with a loss absorbency test.

3.13. There was a variety of views as to whether simplifications were necessary/appropriate.

3.14. The following points were raised with regard to the modular calculations of the SCR (where gross and net calculations are as defined above):

- In some markets, many undertakings preferred to calculate the SCR only on a net basis as this required fewer valuation runs.
- Some undertakings highlighted that the gross calculation was artificial as this was not consistent with how the undertakings managed their business.
- Stochastic projections which ignore changes in bonus rates can give distorted results.
- Concern over the interaction between participating and non participating business.
- Questions as to how the gross calculation which does not allow for changes in bonus policy should incorporate other management actions.

3.15. The following points were raised with regard to the single equivalent scenario:

- Although there appeared to be a preference among undertakings for the alternative single equivalent scenario method over the modular approach, the method was tested widely only in one member state. Therefore further testing may be required.
- More realistic treatment of management actions and avoidance of double counting of risk-mitigation effects.
- Some practical benefits compared with the modular approach.
- Questions as to whether the net SCRs adequately reflect the relative importance of risks and the sensitivities to uncertain management actions.
- Questions regarding where the single equivalent scenario was the most appropriate scenario which could be used by undertakings and whether the scenario appropriately allowed for non linearity.
- Suggestion that the approach was only effective if an integrated asset liability model is used.

- The importance of checking that the most onerous stress test has been used in the equivalent scenario was highlighted.

3.16. The following points were raised with regard to the lower boundary SCR:

- The level of contribution varied by Member States.
- In one Member State, the lower boundary SCR resulted in a reduction of about 50% in the SCR, with some undertakings able to eliminate all SCR components except for operational risk.
- In another Member State constraints arising from local conduct of business rules restrict the extent to which future bonuses can be reduced in response to adverse conditions. As this is taken into account in the calculation of the basic SCR, no further information is gained from calculating the lower Boundary SCR.
- In other Member States, undertakings were unwilling to limit the range of possible future actions with regard to future profit sharing under stress by setting down precise rules.
- In other Member States there is limited discretion with regard to future bonus rates.
- The impact of the lower boundary SCR varied by risk module.
- Many supervisors agreed with the undertakings that the lower boundary SCR was neither meaningful nor compatible with the nature of the contracts/legislation in their member state.
- Need for increased clarity on how judgement can be monitored and controlled by the supervisor

3.17. Finally the following points were raised with regard to the loss absorbency through reduction in deferred taxation:

- There was a difference in opinion between Member States as to whether deferred taxes should be considered loss-absorbing in crisis situations.
- Further clarity with regard to the treatment of deferred taxes is required. Some simplifications may also be required.

3.1.3. Definition of future discretionary benefits

3.18. Ambiguity regarding the definition of future discretionary benefits was considered to be a contributing factor to the lack of consistency in QIS4 results for the loss absorbency of future profit sharing.

3.19. CEIOPS advice on Article 86 (a) distinguishes between guaranteed and discretionary benefits as follows:

- Guaranteed benefits: This represents the value of future cash-flows which does not take into account any future declaration of future discretionary bonuses. The cash flows take into account only those liabilities to policyholders or beneficiaries to which they are entitled at the valuation date.
- Conditional discretionary benefits: This is a liability based on declaration of future benefits influenced by legal or contractual

declarations and performance of the undertaking/fund. It could be linked with IFRS definition of "discretionary participation features" as additional benefits that are contractually based on:

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

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

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

- Pure discretionary benefit: This represents the liability based on the declaration of future benefits which are in discretion of the management. It could be linked with IFRS definition of "discretionary participation features" as additional benefits whose amount or timing is contractually at the discretion of the issuer.
- This distinction in 3 parts doesn't mean that the undertaking has to value each part separately. Only a distinction between guaranteed benefits and discretionary benefits should be required.

3.20. Both conditional and pure discretionary benefits could potentially be considered to be loss-absorbing and undertakings should consider the extent to which this is the case.

3.1.4. Management actions

3.21. The QIS4 feedback indicated that some Member States were uncomfortable with the level of judgement required to set assumptions regarding future management actions during a 99.5% VaR-level stress, in particular for participating business where the distribution of future profits is entirely at the discretion of management. There was also uncertainty as to how such management actions might be monitored by the supervisor.

3.22. CEIOPS' advice on assumptions about future management actions (CEIOPS-DOC-32/09) states that, in order to be taken into account for the calculation of the technical provisions, management actions must be objective, realistic and verifiable. The advice also sets out the detail as to how a (re)insurance undertaking might meet this criteria.

3.23. This advice would be a logical foundation for any advice on management actions in the context of the standard formula SCR since it is desirable that management actions are applied consistently between the technical provision and SCR calculations. This is particularly true where technical provisions are calculated using a stochastic model as the calculation of the best estimate will already incorporate some stressed scenarios.

3.24. CEIOPS has considered whether the advice already published on management actions is appropriate in the context of the SCR calculation. We have concluded that the criteria set out in the advice are also applicable when considering which assumptions about future management actions may be taken into account when calculating the SCR.

3.25. CEIOPS therefore advises the following:

- Any assumptions regarding future management actions for the assessment of the standard formula SCR must meet the criteria set out in CEIOPS' advice on assumptions about future management actions (CEIOPS-DOC-32/09).
- To the extent that the stress under consideration is considered to be an instantaneous stress, no management actions may be assumed to occur during the stress.
- However it may be necessary to reassess the value of the technical provisions after the stress. Assumptions about future management actions may be taken into account at this stage. The approach taken for the recalculation of the best estimate to assess the impact of the stress should be consistent with the approach taken in the initial valuation of the best estimate.

3.26. This advice applies to both the gross and net calculations of the SCR.

3.1.5. The role of the gross SCR

3.27. As explained in Section 3.1.1., for QIS4 the solvency capital requirement for each risk was calculated under the following two scenarios:

- The insurer is not able to vary its assumptions on future bonus rates in response to the shock being tested i.e. the bonus rates are the unchanged from those used to calculate the best estimate liability as part of the calculation of technical provisions. Within the context of this paper, this may be referred to as a **gross calculation** of the scenario (i.e. gross of the risk mitigating effect of future discretionary benefits). The resulting capital requirements on (sub-)module level and their aggregates are called **gross SCRs**.
- The insurer is able to vary its assumptions on future bonus rates in response to the shock being tested, based on reasonable expectations and having regard to plausible management actions. Within the context of this paper, this may be referred to as a **net calculation** of the scenario (i.e. net of the risk mitigating effect of future discretionary benefits). The resulting capital requirements on (sub-)module level and their aggregates are called **net SCRs**.

3.28. According to Article 108 of the Level 1 text, the adjustment for the loss-absorbing capacity of technical provisions and deferred taxes shall in particular reflect the risk mitigating effect provided by future discretionary benefits of insurance contracts. This seems to imply that the objective of the adjustment is to correct a calculation of the Basic SCR that does not allow for the risk mitigating effect provided by future discretionary benefits. The gross calculation is therefore a consequence of the definition of the adjustment in Article 108.

3.29. In QIS4, this approach was implemented as follows: the Basic SCR was determined by means of gross calculation. The adjustment for the loss-absorbing capacity of technical provisions was derived by comparing the result with the corresponding net calculations.

3.30. There are two reasons that can be identified for this approach:

- With the help of the gross calculation, the double counting of risk-mitigating effects can (at least partly) be avoided.
- The gross calculation provides additional information about the risk profile of the undertaking.

The restriction of double counting of risk mitigating effects is a technical necessity to derive a capital requirement that is in line with the 99.5% VaR objective. The information function of the gross calculation may support the risk assessment of undertakings and supervisors. However, owing to the diversity of profit sharing systems, the benefit of this information may vary across markets. While in some markets it may be considered an essential piece of information, in other markets the gross calculation appears more difficult to interpret in a useful way.

Double counting of risk mitigating effects

3.31. The disadvantage of a capital requirement calculation that relies on net calculations only is that the loss-absorbing capacity of technical provisions may be double counted. This double counting occurs because the standard formula SCR is calculated according to a modular approach. The overall risk that the undertaking is exposed to is divided into several sub-risks. The capital requirement for each sub-risk is quantified separately and then aggregated to arrive at the solvency requirement for the overall risk.

3.32. Under the modular approach the modelling of risk mitigating effects relating to profit sharing has to be analysed thoroughly. This type of risk mitigation has two particular features:

- It can be applied to several risks of the modular structure. While a financial or reinsurance risk mitigation instrument usually only covers certain risks, profit sharing often applies to all or a broad variety of risks.
- It is limited by the amount of future discretionary benefits.

3.33. Because of these characteristics it may happen that in the modular approach the mitigating effect is accounted for independently in several modules or sub-modules and thereby exceeds the overall available amount of future discretionary benefits. In such a case, the risk mitigating effect is overestimated and thereby the SCR is underestimated.

3.34. This double counting of risk mitigating effects can be illustrated by an example as follows:

Let a life with-profit insurer be exposed to four independent risks A, B, C and D. Let the capital requirement without the risk mitigating effect of future profit sharing for each of the risks be 100:

$SCR_A = SCR_B = SCR_C = SCR_D = 100$.

As the risks are independent, the gross requirement for the overall risk can easily be calculated as follows:[2]

[2] For the sake of simplicity we assume that independence implies that correlation factors of 0 are appropriate for the aggregation.

$$BSCR = \sqrt{SCR_A^2 + SCR_B^2 + SCR_C^2 + SCR_D^2} = \sqrt{40000} = 200 .$$

Let the value of future discretionary benefits be 110 and let the profit sharing system be of such nature that it mitigates 90% of all losses.[3] Hence, the SCR net of profit sharing on the module level is 10:

$nSCR_A = nSCR_B = nSCR_C = nSCR_D = 10$.

If the overall SCR is calculated by aggregating the net sub-module requirements, the result is:

$$SCR = \sqrt{nSCR_A^2 + nSCR_B^2 + nSCR_C^2 + nSCR_D^2} = \sqrt{400} = 20$$

By comparison with the gross calculation it can be observed that the risk mitigating effect of future discretionary benefits is 200 – 20 = 180. However, the value of future discretionary bonuses is only 110. The mitigating effect was overestimated by at least 70 in the modular net SCR calculation. The overall SCR is not 20, but at least 90.

This misestimation occurs because in each module a risk mitigating effect of 90 was taken into account although a maximum overall risk mitigating effect of 110 (value of future discretionary bonuses) is available. The misestimation cannot be detected if only the net calculation is done.

3.35. The probability of double counting risk mitigating effects increases with the granularity of the modular calculation. According to the Level 1 text, the standard formula consist of at least 13 modules or sub-modules which are relevant for a with-profit life business and where the risk mitigating effect of profit sharing is taken into account. In extreme cases the risk mitigating potential of future discretionary benefits could be accounted for 13 times where it is only available once.

3.36. If double counting is not prevented, the aggregated net SCR may only be a fraction of the real risk that the undertaking is exposed to. In particular where the profit sharing system has high potential to absorb losses this effect can significantly distort the risk measurement.

3.37. For this reason, Article 108 of the Level 1 text stipulates that the adjustment for the loss-absorbing capacity of future discretionary benefits is limited by the value of future discretionary benefits. It should be noticed that this rule may not be sufficient to fully prevent the double counting of the risk mitigating effect. For example, where a profit sharing system distinguishes between two kinds of future discretionary bonuses and each kind of bonuses can only cover different risks (for instance risks of different sub-portfolios), a comparison with the overall value of future discretionary bonuses may not detect a double counting of the risk-mitigating effect relating to one kind of benefits.

3.38. The double counting issue relates both to pure and conditional discretionary benefits as defined in paragraph 3.19. Even if conditional discretionary benefits are determined in a mechanical way, their risk mitigating effect may be double counted under the modular approach. Therefore, the definition of the gross calculation should not be defined in such a way that it leaves only the assumptions about pure discretionary

[3] This corresponds roughly to a 90/10 profit sharing rule. For the sake of simplicity complex features like value of option and guarantee are not taken into account in this example.

benefits unchanged while allowing for changes in conditional discretionary benefits. Although such an approach may help to interpret the gross calculation in a straightforward and more economic way, it would not sufficiently restrict double counting.

Interpretation of the gross calculation

3.39. The gross calculation may provide information as follows to undertakings and supervisors:

- The loss-absorbing capacity of technical provisions is a one-time effect. Once the future discretionary bonuses have been reduced to zero, the undertaking is exposed to risk which is not mitigated anymore by a profit sharing mechanism. The gross SCR measures this unmitigated risk and is therefore important information to assess the risk position of the undertaking. To some extent, this may resemble the role of reinsurance in the calculation of technical provision: Although only the technical provisions net of reinsurance are relevant in the determination of the own funds of the undertaking, it is common practice to calculate also the technical provisions gross of reinsurance to get better insight into the situation of the undertaking[4].
- As within the reach of the supervisory review process (Article 36 of the Level 1 text), the supervisory authorities shall assess the ability of the undertakings to withstand possible adverse events or future changes in economic conditions, it is key to be able to assess the impact of changes in the management actions assumptions when the outcome of these management actions have possibly a substantial impact on the solvency capital requirement. The gross calculation then may provide a measurement of a limit case in the sensitivity of the SCR calculation to a change in management actions assumptions: the limit case is the scenario where the undertaking would not be able to vary its assumptions on future bonus rates in response to the shock being tested.
- The adjustment of future discretionary benefits is a very powerful mean to absorb losses. According to the QIS4 results, the average reduction of the Basic SCR can be up to 80% in some markets. For single undertakings in these markets even higher reductions were observed. In these cases the net calculations provide only limited information about the risks profile of the undertaking. As the loss-absorbing capacity of technical provisions can significantly depend on management actions, the order of net SCRs may be more determined by the risk-specific assumptions on management actions (and the judgement applied to derive them) than by the risks that the undertaking is exposed to.

3.40. On the other hand, it can be argued that the gross approach is not realistic as it is not consistent with the way in which insurers manage their business in practice. This may be illustrated by the following example.

[4] The gross SCR as defined in this paper is calculated gross of the risk-mitigating effect of profit sharing. The gross best estimate provision as defined in Article 76(2) of the Level 1 text is calculated gross of the risk-mitigating effect of reinsurance and SPVs.

Suppose the profit sharing mechanism is such that the (re)insurance undertaking distributes 90% of all profits to policyholders. Suppose in the best estimate calculation, the investment scenario is such that the undertaking earns a profit of 100 in each year of the projection. The amount of discretionary benefits is therefore 90 for each future year.

Suppose now that, for the purposes of calculating the capital requirement for interest rate risk say, the technical provisions are recalculated in stressed conditions and the investment scenario is such that the (re)insurance undertaking earns a profit of 50 in each year of the projection. In reality, in such an investment scenario, the (re)insurance undertaking would distribute discretionary benefits of 45 for each future year. However under the gross calculation, it is assumed that the undertaking would continue to distribute discretionary benefits of 90, leading to a loss of 40 in each future year. This is surely not consistent with the way in which the majority of (re)insurance undertaking manage their business.

3.41. The gross calculation is a hypothetical calculation that does not and cannot attempt to reflect all aspects of the economic reality. In reality, the profit sharing mechanism will absorb a part of the losses. The gross calculation disregards this effect and seems to describe a situation where profit is distributed that has not been earned. However, it should be noted that such hypothetical or artificial calculations are a usual tool in the analysis of complex situations. For example, technical provisions are usually calculated gross and net of reinsurance. The gross calculation of technical provisions may be seen as a calculation of liabilities that assumes that the reinsurers will be unable to make any payments. Nevertheless the calculation of gross technical provisions is a common and useful approach to understand the economic situation of the undertaking.

3.42. Despite the artificial nature of the calculation, particularly for Member States where the loss-absorbing capacity of technical provisions is substantial, the gross calculation can provide useful information. Moreover, it is not clear how an approach based only on net calculations can be made consistent with Article 108 of the Level 1 text. Therefore CEIOPS believe that the default approach shall be that the Basic Solvency Capital Requirements should therefore be based on gross inputs.

Definition of the gross SCR calculation

3.43. In QIS4 the Basic SCR was calculated from module and sub-module requirements gross of the risk mitigating effect of profit sharing (gross SCRs). The gross SCR was defined as follows in the QIS4 Technical Specifications:

"The 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."

3.44. Feedback from QIS4 participants indicated that this definition of the gross calculation was not always sufficiently clear. In relation to profit sharing systems where future discretionary benefits are not granted according to

bonus rates, the definition was difficult to interpret. In order to remove this ambiguity, the approach can be clarified as follows:

The scenario should be calculated under the condition that the absolute amount of future discretionary benefits cash flows per policy and year remain unchanged before and after the shock being tested. I.e. the absolute amount of cash flows is unchanged from the one used to calculate the best estimate liability as part of the calculation of technical provisions.

3.45. One of the practical issues raised by the QIS4 participants is the difficulty in calculating the gross SCR where technical provisions are calculated using a stochastic model with dynamic bonus rates. In order to improve the practicability of the calculation in this situation, CEIOPS suggests that the gross calculation should be based on the average amount of future discretionary benefits cash flows across all scenarios used in the technical provision calculation.

3.46. Other practical issue raised during QIS4 is the calculation of the gross SCR in those cases where the profit sharing mechanism behaves in a mechanistic manner, for instance by stipulating in the contract clauses a fixed minimum percentage of future profits that should be automatically distributed (such future benefits would be classified as 'conditional discretionary benefits'). In the application of the stress scenarios to calculate the gross SCR and the net SCR in such cases, the following rules should be considered:

Calculation of Δ TP (with-profits)	Gross SCR calculation	Net SCR calculation
Δ Guaranteed benefits	Yes	Yes
Δ Conditional discretionary benefits	Only allow changes directly due to the impact of the risk under stress Disregard legal or contractual rules of the profit sharing mechanism	Yes Apply any legal or contractual rules of the profit sharing mechanism
Δ Pure discretionary benefits	Only allow changes directly due to the impact of the risk under stress	Yes Allow effect of management actions under stress

3.47. Another way to improve the practicability of the gross calculation could be an alternative definition as follows:

The scenario should be calculated under the condition that the value of future discretionary benefits remains unchanged before and after the shock being tested. Moreover, may be assumed that the value of options and guarantees in the technical provisions remain unchanged.

3.48. This definition has advantages as follows:

- It is in line with the definition of the adjustment for the loss-absorbing capacity of technical provisions in Article 108 of the Level 1 text. The difference between the gross SCR and the net SCR is the change in the value of future discretionary benefits caused by the shock. This is exactly what the adjustment seeks to quantify, namely the potential compensation of unexpected losses through a decrease in future discretionary benefits. Moreover it is consistent with the limitation of the adjustment in Article 108 which restricts the risk mitigating effect by means of the value of future discretionary benefits.
- The calculation of the gross SCR for market risk (except interest rate risk) does not require the recalculation of the technical provisions because these market risk scenarios do not affect the value of the

technical provisions for guaranteed benefits. The necessary calculations are identical to those which are necessary to calculate the net SCR. For the calculation of the gross interest rate risk SCR only a rediscounting of the cash-flows for guaranteed benefits is necessary.

- The calculation of the gross SCR for underwriting risk requires only the recalculation of the value of guaranteed benefits. This value is independent from future economic scenarios and can usually be calculated in a simple manner without applying economic scenario generators or other stochastic simulations techniques.
- The definition is consistent with the treatment of deferred taxes. The module and sub-module calculations of the SCR are all made gross of the risk-mitigating effect of deferred taxes. That means the SCR is calculated under the assumption that the value of deferred taxes does not change under stressed conditions. (An equivalent assumption is that the effect of the stress is determined in a balance sheet that does not account for deferred taxes.) The alternative definition of the gross SCR calculation in 3.47 can be understood in the same way: The stress has no effect on the value of future discretionary benefits (or equivalently the effect of the stress is determined in a balance sheet that does not account for future discretionary benefits.

3.49. In view of the stakeholder feedback on the above options, CEIOPS proposes to define the gross calculation as follows:

In the calculation of the net SCR for each (sub-)module, undertakings are calculating a stressed balance sheet and comparing it to the unstressed balance sheet that was used to calculate own funds. Therefore, for each (sub-)module undertakings can derive the best estimate value of the technical provisions relating only to future discretionary benefits from both balance sheets. The change in these provisions measures the impact of the risk mitigation. For each sub-module, this difference should be added to the net SCR used to derive the gross SCR.

3.1.6. Calculation of adjustment for loss-absorbing capacity of technical provisions

3.50. Two alternatives for calculating the adjustment for loss-absorbing capacity of technical provisions were tested in QIS4. These approaches may be referred to as the modular approach and the single equivalent scenario approach and are described in more detail in Section 3.1.1.

3.51. The modular approach has the following advantages:

- This approach is simpler to understand.
- It may provide a significant piece of information for a sensitivity analysis of SCR on changes in management actions in reaction to future shocks.
- Some Member States had reservations as to whether the single equivalent scenario would be appropriate for all firms.
- The single equivalent scenario approach was not extensively tested in QIS4.

3.52. The single equivalent scenario approach has the following advantages:

- Double counting of loss-absorbing capacity of technical provisions is avoided.
- Arguably it allows for more realistic treatment of management actions.
- From a practical perspective, there are less runs involved.
- The loss-absorbing capacity of deferred taxes can also be integrated in the scenario.

3.53. The primary disadvantage of the single equivalent scenario approach is that it is difficult for undertakings that are not familiar with the concept to understand the approach and as a result they may rely blindly on the tool provided by the supervisor. However this disadvantage is relatively easily alleviated by improving the available documentation. Furthermore, it is a disadvantage which will reduce over time as the approach is accepted as standard actuarial practice. Further explanation of the approach can be found in Appendix A.

3.54. On the other hand, the primary disadvantage of the approach adopted as default in QIS4 is that the effects of double counting are not fully captured. This could potentially lead to a significant understatement of the Solvency Capital Requirement.

3.55. Having regard to the above, and to the feedback from stakeholders as to whether the modular or single equivalent scenario approach is preferable, CEIOPS recommends than none of the approaches be abandoned before both approaches are further tested in the QIS5 exercise.

3.1.7. Further explanation of the single equivalent scenario

Inputs required to construct the single equivalent scenario

3.56. The single equivalent scenario is constructed based on the individual capital requirements for each risk. In order to be consistent with the calculation of the Basic SCR, the default approach shall be that gross capital requirements are used in the construction of the single equivalent scenario.

3.57. The individual capital requirements for each risk determine the relative importance of that risk in the single equivalent scenario. However, in some Member States, the features of participating business may be such that a construction of the equivalent scenario from net capital requirements is more appropriate. Where this is the case, supervisory authorities may allow (re)insurance undertakings to use net capital requirements to construct the single equivalent scenario. The (re)insurance undertaking is responsible for demonstrating that this approach is appropriate.

3.58. The use of net rather than gross capital requirements as inputs to construct the single equivalent scenario will affect the relative importance of individual risks and may therefore result in a different scenario than would be the case if gross capital requirements were used as inputs.

However in both cases the single equivalent scenario should correspond to a 1-in-200 year scenario.

3.59. Furthermore since, under the single equivalent scenario, all risks are assumed to occur simultaneously and only one set of management actions is applied, there is no double counting of loss absorbency of technical provisions. This is the case regardless of whether net or gross capital requirements are used as inputs to construct the single equivalent scenario.

3.60. To facilitate the introduction of the single equivalent scenario, CEIOPS will provide a spreadsheet which determines the single equivalent scenario for each (re)insurance undertaking.

Calculation of the Basic Solvency Capital Requirement

3.61. Article 103 states that the Solvency Capital Requirement shall be equal to the sum of:

- The Basic Solvency Capital Requirement (BSCR);
- The capital requirement for operational risk; and
- The adjustment for loss-absorbing capacity of technical provisions and deferred taxes.

3.62. As explained in section 3.1.6 the default approach shall be that the Basic SCR is calculated based on gross capital requirements. Therefore if the single equivalent scenario is constructed from net capital requirements it will be necessary to complement the scenario analysis with a simplified gross calculation of the Basic SCR.

3.63. Note that since gross capital requirements are used in the calculation of the Basic SCR, the adjustment would be expected to be negative i.e. lead to a reduction in the Basic SCR. This is because the primary effect in the single equivalent scenario is the introduction of loss absorbency of technical provisions.

Conclusions

3.64. The adjustment for loss-absorbing capacity of technical provisions can thus be determined as follows:

3.65. The capital requirement for each risk should be calculated under the assumption that the (re)insurance undertaking is not able to vary its assumptions on future bonus rates in response to the shock being tested. However, in some Member States, the features of participating business may be such that a construction of the equivalent scenario from net capital requirements is more appropriate. Where this is the case, supervisory authorities may allow (re)insurance undertakings to use net capital requirements to construct the single equivalent scenario. The (re)insurance undertaking is responsible for demonstrating that this approach is appropriate.

3.66. (Re)insurance undertakings should consider what management actions they would take in the single equivalent scenario and in particular how their assumptions regarding future bonus rates would change in the event that such a scenario would occur. Any management actions taken into account should be realistic, objective and verifiable as described in

CEIOPS' advice on assumptions about future management actions (CEIOPS-DOC-32/09).

3.67. The participant should then calculate SCRequivalent_scenario, where SCRequivalent_scenario is equal to the change in the undertaking's net asset value in the face of the equivalent scenario, taking into account management actions identified as described above. The calculation of the change in net asset value should be performed on the assumption that all the shocks making up the single equivalent scenario occur simultaneously.

3.68. Finally, the participant should calculate the adjustment as the difference between the Basic SCR and SCRequivalent_scenario.

3.69. The requirements of Article 108 are met by comparing the value of discretionary benefits under the single equivalent scenario to the value of future discretionary benefits calculated for the purposes of calculating the best estimate of technical provisions.

3.1.8 Scope of the loss-absorbing capacity of technical provisions

3.70. The adjustment for loss-absorbing capacity of technical provisions should account for risk mitigating effects in relation the following risks:

- market risk
- life underwriting risk
- health SLT underwriting risk
- counterparty default risk

3.1.9 Calculation of the adjustment for loss-absorbing capacity of deferred taxes

3.71. The calculation of the adjustment for loss-absorbing capacity of deferred taxes should be consistent with the calculation for loss-absorbing capacity of technical provisions.

3.72. The loss-absorbing capacity of deferred taxes should take into account decreases in deferred tax liabilities and increases in deferred tax assets. The latter should, however, only be taken into account up to the amount that stays available under stressed situations. Where under stress the asset may disappear, no allowance should be made.

3.73. The value of the deferred tax liability or asset should be recalculated under the single equivalent scenario. As described above, it is assumed that all the shocks making up the single equivalent scenario occur simultaneously. Furthermore it should be assumed that the undertaking makes an operational risk loss equal to SCR_{op} within the equivalent scenario. This ensures that the loss-absorbing capacity of deferred taxes is properly captured.

3.74. The adjustment for loss-absorbing capacity of deferred taxes is based on the difference between the value of deferred taxes as included on the balance sheet and the value of deferred taxes under the single equivalent scenario.

3.75. However where the adjustment for loss absorbency of technical provisions is calculated using the modular approach, a further adjustment should be made to reflect the loss-absorbing capacities of deferred taxes. As in QIS4, this adjustment should be calculated as follows:

- The Basic Solvency Capital Requirement (BSCR) should be calculated on the basis that the current (pre-stress) liability in respect of deferred taxes is excluded from the current (pre-stress) balance sheet.
- The capital requirement for operational risk should be added to the BSCR. The outcome is reduced by the adjustment for the loss-absorbing capacity of technical provisions. The result of this calculation is called SCR shock.
- The liability or asset in respect of deferred taxes should then be calculated under the assumption that the undertaking made an immediate loss equal to the SCR shock.

3.76. The adjustment to the basic SCR for the loss-absorbing capacity of deferred taxes is equal to the change in the deferred tax liability and/or asset.

3.77. Note that advice on the valuation of deferred tax assets and liabilities is included in CEIOPS advice on valuation of assets and other liabilities (CEIOPS-DOC-35/09)

3.1.10 Relation between the adjustment for loss-absorbing capacity of technical provisions and deferred taxes and the risk margin

3.78. Like other scenario assessments in the SCR standard formula the calculation of the adjustment for the loss-absorbing capacity of technical provisions should be based on a balance sheet that does not include the risk margin of the technical provisions. This approach corresponds to the assumption that the risk margin does not change under the scenario stress, or at least not in a material manner. This simplification is made to avoid a circular definition of the SCR – the size of the risk margin depends on the SCR – and it is usually a good approximation. This approach was tested in the past QIS.

3.79. However, under specific circumstances the value of the risk margin may change significantly in the scenarios. In this case, the corresponding change in basic own funds is not detected if only best estimate provisions are analysed in the scenarios.

3.80. An example may illustrate the issue: Let an undertaking be able to mitigate the effect of the equivalent scenario by 80% due to the loss-absorbing capacity of technical provisions. Let us further assume that in order to achieve this mitigation the undertaking reduces the future discretionary benefits to zero. How would the risk margin change if it was included in the single equivalent scenario? The loss-absorbing capacity of technical provisions is taken into account in the calculation of the risk margin. Usually it is assumed that risk margin is reduced by the mitigating effects in the same way as the SCR. This means that the risk margin without the loss-absorbing capacity of technical provisions is five times higher than with it. In the example, the risk margin after the scenario stress cannot be reduced by the loss-absorbing capacity of technical

provisions because no future discretionary benefits are left after the stress. Hence, the risk margin after stress is five times higher than before.

3.81. The example shows that the exclusion of the risk margin from the scenario analysis may overestimate the adjustment and thereby underestimate the SCR. On the other hand, the practical implications of an inclusion of the risk margin in the scenario are massive and are likely to make the calculation unfeasible for most undertakings. Therefore, CEIOPS does not suggest including the risk margin in the scenario analysis. If in particular cases the variability of the risk margin causes a significant deviation from the standard formula assumptions, then partial internal models or capital add-ons can be used to take this characteristic into account in the SCR calculation.

3.2. CEIOPS' advice

3.2.1. Management actions

3.82. With regard to management actions which are taken into account in the calculation of the SCR, CEIOPS advises the following:

- Any assumptions regarding future management actions for the assessment of the standard formula SCR must meet the criteria set out in CEIOPS' advice on assumptions about future management actions (CEIOPS-DOC-32/09)
- To the extent that the stress under consideration is considered to be an instantaneous stress, no management actions may be assumed to occur during the stress.
- However it may be necessary to reassess the value of the technical provisions after the stress. Assumptions about future management actions may be taken into account at this stage. The approach taken for the recalculation of the best estimate to assess the impact of the stress should be consistent with the approach taken in the initial valuation of the best estimate.

3.83. This advice applies to both the gross and net calculations of the SCR.

3.2.2. Gross and net SCR calculations

3.84. The solvency capital requirement for each risk shall be derived under a gross and a net calculation.

3.85. The gross calculation should be used to determine the Basic Solvency Capital Requirement and in the calculation of the adjustment for the loss-absorbing capacity of technical provisions as defined in Article 108 of the Level 1 text. The result of the gross calculation is used to prevent double counting of risk mitigating effects in the modular approach and as an additional source of information about the risk profile of the undertaking. The gross calculation does not reflect all aspects of the economic reality as it ignores the risk-mitigating effect of future discretionary benefits.

3.86. The net calculation of the solvency capital requirement should be defined as follows:

The insurer is able to vary its assumptions on future bonus rates in response to the shock being tested, based on reasonable expectations and having regard to plausible management actions.

3.87. The gross calculation as follows:

In the calculation of the net SCR for each (sub-)module, undertakings are calculating a stressed balance sheet and comparing it to the unstressed balance sheet that was used to calculate own funds. Therefore, for each (sub-)module undertakings can derive the best estimate value of the technical provisions relating only to future discretionary benefits from both balance sheets. The change in these provisions measures the impact of the risk mitigation. For each sub-module, this difference should be added to the net SCR used to derive the gross SCR.

3.2.3 Scope of the loss-absorbing capacity of technical provisions

3.88. The adjustment for loss-absorbing capacity of technical provisions should account for risk mitigating effects in relation the following risks:

- market risk
- life underwriting risk
- health SLT underwriting risk
- counterparty default risk

3.2.4. Calculation of the adjustment for loss absorbency of technical provisions and deferred taxes

3.89. Regarding the approach for the calculation of the adjustment for loss absorbency of technical provisions and deferred taxes CEIOPS recommends that both the following options be further tested in the QIS5 exercise, before a decision is taken as to which approach should be retained:

Option 1: Modular approach

3.90. Under the modular approach, the solvency capital requirement for each risk shall be calculated both gross and net of the loss absorbency of technical provisions.

3.91. The Basic Solvency Capital Requirement (BSCR) shall be calculated based by aggregating the gross capital requirements using the relevant correlation matrices.

3.92. The net Solvency Capital Requirement (nSCR) shall be calculated based by aggregating the net capital requirements using the relevant correlation matrices.

3.93. The adjustment to the BSCR for the loss-absorbing capacity of technical provisions shall then be determined by comparing the BSCR with the nSCR.

3.94. This adjustment is limited to a maximum of the total value of future discretionary bonuses for the purpose of calculating the technical provisions.

3.95. A further adjustment shall be made to reflect the loss-absorbing capacities of deferred taxes. This adjustment shall be calculated as follows:

- The BSCR shall be calculated on the basis that the current (pre-stress) liability in respect of deferred taxes is excluded from the current (pre-stress) balance sheet.
- The capital requirement for operational risk shall be added to the BSCR. The outcome is reduced by the adjustment for the loss-absorbing capacity of technical provisions. The result of this calculation is called SCR shock.
- The liability in respect of deferred taxes shall then be recalculated under the assumption that the undertaking made an immediate loss equal to the SCR shock.

- The adjustment to the BSCR for the loss-absorbing capacity of deferred taxes is equal to the change in the deferred tax liability.

Option 2: Single equivalent scenario

3.96. The Basic Solvency Capital Requirement (BSCR) shall be calculated based by aggregating the gross capital requirements using the relevant correlation matrices.

3.97. The net Solvency Capital Requirement (nSCR) shall be calculated using a single scenario under which all of the risks covered by the standard formula occurred simultaneously. The process involves the following steps:

- The capital charge for each risk shall be calculated gross of the adjustment for loss absorbency of technical provisions
- The gross capital charges shall be used as inputs to determine the single equivalent scenario based on the relative importance of each of the sub-risks to the undertaking. However, in some Member States, the features of participating business may be such that the construction of the single equivalent scenario from net capital requirements is more appropriate. Where this is the case, supervisory authorities may allow (re)insurance undertakings to use net capital requirements for the derivation of the single equivalent scenario. The (re)insurance undertaking is responsible for demonstrating that this approach is appropriate.
- The undertaking shall consider the management actions which would be applied in such a scenario and, in particular, whether their assumptions about future bonus rates would change if such a scenario was to occur.
- The change in the undertaking's net asset value shall then be calculated on the assumption that all the shocks underlying the single equivalent scenario occurred simultaneously. The management actions identified above shall be taken into account.

3.98. The adjustment to the BSCR for the loss-absorbing capacity of future discretionary benefits shall be determined by deducting the nSCR from the BSCR.

3.99. This adjustment is limited to a maximum of the total value of future discretionary bonuses.

3.100. The requirements of Article 108 are met by comparing the value of discretionary benefits under the single equivalent scenario to the value of future discretionary benefits calculated for the purposes of calculating the technical provisions.

3.101. The adjustment for loss-absorbing capacity of deferred taxes shall be taken into account within the scenario.

3.102. The value of the deferred tax liability shall be recalculated under the single equivalent scenario. As described above, it is assumed that all the shocks making up the single equivalent scenario occur simultaneously. Furthermore it shall be assumed that the undertaking makes an operational risk loss equal to the SCR in respect of operational risk within the equivalent scenario. This ensures that the loss-absorbing capacity of

deferred taxes is properly captured.

3.103. The adjustment for loss-absorbing capacity of deferred taxes is based on the difference between the value of deferred taxes as included on the balance sheet (other liabilities) and the value of deferred taxes under the single equivalent scenario.

Further considerations with regard to loss-absorbing capacity of deferred taxes

3.104. Under both approaches the calculation of the loss-absorbing capacity of deferred taxes should take into account decreases in deferred tax liabilities and increases in deferred tax assets. The latter should, however, only be taken into account up to the amount that stays available under stressed situations. Where under stress the asset may disappear, no allowance should be made.

Appendix A:[5]Simplified example of the derivation and use of the killer scenario[6]

A.1. The principle purpose of the "killer scenario" is to develop a combined scenario where a number of risk factors vary from the best estimate value and to use this scenario to test one of the weak assumptions of the correlation matrix approach to capital aggregation – that the impact of combinations of risks on capital required is additive.

Step 1: Derive individual/undiversified capital for each risk factor, and the correlation matrix
N.B. The correlation numbers are only for reference purpose and do not represent WW's view of appropriate correlation assumptions

Risk factor	*Stress test applied (% change)*	*Matrix of undiversified capital (U)*	*Correlation Matrix (C)*				
Risk A	30%	500	1.00	0.75	0.25	0.00	0.00
Risk B	-30%	25	0.75	1.00	0.25	0.00	0.00
Risk C	20%	100	0.25	0.25	1.00	0.00	0.00
Risk D	-10%	200	0.00	0.00	0.00	1.00	0.00
Risk E	10%	75	0.00	0.00	0.00	0.00	1.00
Sum		900					

Step 2: Check the correlation matrix is positive definite (PD) because in theory the killer scenario works only if the matrix is PD. One way of doing it is to check the least eigenvalue of the matrix and make sure it is positive.

Eigenvalues of C	1.89	1.00	1.00	0.86	0.25

Step 3: Use the matrix multiplication to multiply the correlation matrix (C) and the undiversified capital matrix (U). The result is a new matrix Y.

	Y = mmult(C,U)
Risk A	544
Risk B	425
Risk C	231
Risk D	200
Risk E	75

Step 4: Use matrix multiplication to multiply the transpose undiversified capital matrix U with matrix Y and take the square root of the result to get the diversified capital requirement.

Note that Step 3 and 4 are the equivalent matrix algorithm to the square root method of deriving diversified capital ie

[5] The material in Appendix A has been provided by Watson Wyatt Limited, June 2009
[6] The single equivalent scenario may also be referred to as the killer scenario

$$C_{div} = \sqrt{\sum C_i^2 + \sum \rho_{ij} C_i C_j}$$

Hence, diversified capital = (U^T x (C x U)) ^0.5 =(U^T x Y) ^ 0.5 = 593

Step 5: Allocate diversification benefit allowing for relative weight of risks and correlations.

	U		Y		Capital		Allocation
Risk A	500	x	544	/	593	=	459
Risk B	25	x	425	/	593	=	18
Risk C	100	x	231	/	593	=	39
Risk D	200	x	200	/	593	=	67
Risk E	75	x	75	/	593	=	9
Sum	900					Sum	**593**

Which gives:

		Split of diversified capital (Matrix A)	**Diversification reduction factor for risk**	**Implied percentile for medium bang scenario**	**Original 99.5th stress test**	**Stress test in the killer scenario**
Risk A		459	92% (=459/500)	99%	30%	28%
Risk B		18	72% (=18/25)	97%	-30%	-22%
Risk C		39	39% (=39/100)	84%	20%	8%
Risk D		67	34% (=67/200)	81%	-10%	-3%
Risk E		9	12% (=9/75)	63%	10%	1%
	Sum	593 *	66% (=593/900)	96%		

* The killer scenario algorithm guarantees that the capital allocations sum to the diversified capital, and that the scenario is most likely to occur.

A.2. Please note that the approach above is not without its limitations, for example in finding the combined scenario:

- It assumes that capital linearly increases in line with risk and this may not be the case.
- Changing the direction in which some risk factors are stressed may increase the overall capital requirement.
- The reduced stress tests have been derived assuming that all risk factors are multivariate-normally distributed and correlations are used to measure the dependencies between different risks, which may not be the case.

A.3. However, all these weaknesses are present in the correlation matrix approach to aggregating capital requirements (the approach used by the standard formula SCR). These weaknesses can be addressed in part or whole using more complex modelling and simulation approaches such as the "super killer scenario" and "super mega killer scenario", as might be found in more advanced internal models.

Appendix B: Impact of using net or gross capital requirements to construct the single equivalent scenario

B.1. Suppose that a firm is exposed to three risks A, B and C for which the capital charges excluding loss absorbency of technical provisions are 50, 100 and 200 respectively.

B.2. Assume that the above capital requirements are calculated based on stress tests of 25%, -40% and 40% respectively.

B.3. Suppose the three risks are aggregated using the following correlation matrix M_{corr}:

	A	**B**	**C**
A	1	0.25	0.5
B	0.25	1	0.75
C	0.5	0.75	1

Example 1: Using gross capital requirements to calculate the single equivalent scenario

B.4. The undiversified gross capital charges may be represented by the following matrix $M_{gross:}$

A	50
B	100
C	200

Step A

B.5. The first step in the construction of the single equivalent scenario is to calculate the product of the matrices M_{corr} and M_{gross}. For ease of reference this matrix may be referred to as M_1.

A	175
B	263
C	300

Step B

B.6. The aggregate, diversified capital requirement, D, may then be calculated as follows:

$$D = (M_{gross}^{T} * M_1)^{1/2},$$

where M_{gross}^{T} is the transpose of the matrix M_{gross}. In the example above D is equal to 308.

Step C

B.7. For each risk i, the diversification benefit may then be allocated to each of the different risks as follows:

$$M_{gross,i} * M_{1,i} / D,$$

where $M_{gross,i}$ is the gross capital requirement for risk i and $M_{1,i}$ is the entry in matrix M_1 for risk i.

B.8. This allows for both the relative weights of each risk and the correlations between risks. For example, for risk A the allocated diversified capital is (50 * 175)/308 = 28.

B.9. Let the matrix M_2 represent the allocated diversified capital for each risk.

A	28
B	85
C	195
Total	*308*

Step D

B.10. The allocated diversified capital may then be used to derive the required stress test.

B.11.

	M_2	Diversification factor	Implied[7] percentile	Original stress test	Stress test in single equivalent scenario[5]
A	28	57% (= 28/50)	93%	25%	14% (=57% * 25%)
B	85	85% (=85/100)	99%	-40%	-34% (= 85% * -40%)
C	195	97% (= 195/200)	99%	40%	39% (= 97% * 40%)
Total	*308*				

Example 2: Using net capital requirements to calculate the single equivalent scenario

B.12. Suppose now that the impact of loss absorbency of technical provisions is such that the gross capital requirements for each risk are uniformly reduced by 90%.

B.13. The undiversified net capital charges may be represented by the following matrix $M_{net:}$

A	5
B	10
C	20

[7] Note that this assumes that all risks are normally distributed

Step A

B.14. $M_{1} = M_{corr} * M_{net}$

A	17.5
B	26.3
C	30.0

Step B

B.15. $D = (M_{net}^{T} * M_{1})^{1/2} = 30.8$

Step C

B.16. $M_{2,i} = M_{net,i} * M_{1,i} / D$

A	2.8
B	8.5
C	19.5
Total	*30.8*

Step D

	M_2	Diversification factor	Implied percentile	Original stress test	Stress test in single equivalent scenario
A	2.8	57% (= 2.8/5)	93%	25%	14% (=57% * 25%)
B	8.5	85% (=8.5/10)	99%	-40%	-34% (= 85% * -40%)
C	19.5	97% (= 19.5/20)	99%	40%	39% (= 97% * 40%)
Total	*30.8*				

B.17. This example highlights that where the reduction for loss absorbency of technical provisions applies uniformly across all risks, the single equivalent scenario is the same regardless of whether gross or net inputs are used to construct the scenario.

Example 3: Using net capital requirements to calculate the single equivalent scenario

B.18. Suppose now that the impact of loss absorbency of technical provisions varies across risks such that the undiversified net capital charges may be represented by the following matrix $M_{net:}$

		Impact of loss absorbency
A	45	10%

B	10	90%
C	100	50%

B.19. In this case if steps one to four are followed as described above, the following single equivalent scenario is derived:

	M_2	Diversification factor	Implied percentile	Original stress test	Stress test in single equivalent scenario
A	32.4	72% (= 32.4/45)	97%	25%	18% (=72% * 25%)
B	7.1	71% (=7.1/10)	97%	-40%	-28% (= 71% * -40%)
C	96.0	96% (= 96.0/100)	99%	40%	38% (= 96% * 40%)
Total	*135.5*				

B.20. A comparison of the single equivalent scenario derived in Example 1 using gross inputs and Example 3 using net inputs shows that neither scenario is demonstrably weaker or stronger. In both cases, it is clear that Risk C is the most important risk. However the relative importance of Risks A and B differ depending on whether net or gross inputs are used to construct the scenario. This highlights the importance of careful consideration as to whether net or gross capital requirements are the most realistic reflection of the risks the firm is running.

	Original stress test	Stress test in single equivalent scenario	
		Example 1 (gross)	Example 3 (net)
A	25%	14%	18%
B	-40%	-34%	-28%
C	+40%	39%	38%

Appendix C: Impact assessment on the loss absorbing capacity of technical provisions

In its Call for Advice of 1 April 2009, the Commission has asked CEIOPS to contribute to the Commission's impact assessment of the Level 2 implementing measures.[8] To this end, a list of issues has been set up by the Commission and CEIOPS, identifying the Level 2 implementing measures that should be accompanied by an impact assessment. The objectives of the issues have been selected among the list of objectives used by the Commission in its Level 1 impact assessment.[9] On 12 June 2009, the Commission has issued an updated list of policy issues and options, to which reference is being made.[10] This impact assessment covers issue 9 of the list of policy issues and options.

Two summary tables accompany the impact assessment, published in a separate excel document.

1. Description of the policy issue

C.1. The Level 1 text requires the calculation of an adjustment for the loss-absorbing capacity of technical provisions.

This adjustment shall reflect potential compensation of unexpected losses through a decrease in technical provisions, and shall take account, in particular, of the risk absorbing effect provided by future discretionary benefits of life insurance contracts, to the extent insurance and reinsurance undertakings can establish that a reduction in such benefits may be used to cover any unexpected losses when they arise (Article 108 of the Level 1 text).

C.2. The issue that is being assessed here is which method should be used for calculating the amount by which firms can reduce their SCR capital charge to take account of the loss-absorbing capacity of technical provisions for future profit sharing.

C.3. The issue relates to the methodology to be used to measure the extent to which future benefits, which are expected to be paid to policyholders in relation to profit-sharing insurance policies, can be reduced to absorb losses, so that the final result of the SCR standard formula corresponds to the 99.5% one-year Value-at-Risk measure.

[8] http://www.ceiops.eu/media/files/requestsforadvice/EC-april-09-CfA/EC-call-for-advice-Solvency-II-Level-2.pdf

[9] http://ec.europa.eu/internal_market/insurance/docs/solvency/impactassess/final-report_en.pdf

[10] http://www.ceiops.eu/media/files/requestsforadvice/EC-June-09-CfA/Updated-List-of-policy-issues-and-options-for-IA.pdf.

2. Detailed description of policy options and assessment of the relative impacts on the different affected parties

Detailed description of the policy options

C.4. Option 1. A "one-off adjustment" (based on a "k-factor") is applied to the amount of technical provisions (as tested in QIS2).

This option that has been tested in QIS2 allows for the reduction of each module by a constant factor, the value of which synthetically reflects the intensity of the shift that the management will decide in the allocation of the profit sharing after a shock.

C.5. Option 2. An approach ("kc-factor" approach) where individual reductions of the SCR capital charge are calculated for each possible risk module and sub-modules of the standard formula, are then deducted from each risk module or sub-module SCR charges, and aggregated using the linear correlation matrices (as the one tested in QIS3 and the more refined one tested in QIS4).

This second option leads to differentiating the impact of the shocks on a module-by-module basis. The intensity of the reduction is variable according to the module, and therefore is more granular than in the first option.

C.6. Option 3. An adjustment based on the simulation of a single equivalent scenario (as the alternative method tested in QIS4 – see § TS.VIII.C.8).

This third option is also based on a differentiated reduction module-by-module, but the method also tackles the potential for double counting of the risk mitigating effect of future discretionary benefits as a result of the modular approach underlying the standard formula.

This method is based on a specific mathematical formula, that derives a "single equivalent scenario" (i.e. a combined scenario in which each stress occurs simultaneously) based on the individual capital requirements for each risk.

This "single equivalent scenario" formula, simplifies the calculation for taking into account the risk mitigating effects of the future profit sharing.

3. Relevant objectives

C.7. The determination of the method for calculating the adjustment to the SCR for the loss-absorbing capacity of technical provisions falls under the scope of the following objectives:

- Introduce risk-sensitive harmonized solvency standards;
- Introduce proportionate requirements for small undertakings;
- Harmonise supervisory powers, methods and tools;
- Promote compatibility of the prudential regime for EU insurers with the work of the IAIS and IAA.

4. Comparison between the different options based on the efficiency and effectiveness in reaching the relevant operational objectives

C.8. The comparison and ranking of the policy options is based on the effectiveness and efficiency of each option in reaching the relevant objectives. Effectiveness is defined as the extent to which options achieve the objectives of the proposal. Efficiency is defined as the extent to which options can be achieved at the lowest cost (cost-effectiveness).

Option 1

C.9. Option 1 is simple to implement, which has a positive impact on all undertakings. This would mean that option 1 is efficient and effective in realising the objective of proportionality. As the method would be simple and standardised, this would be efficient and effective in terms of achieving supervisory harmonisation and compatibility of prudential regimes.

C.10. However after being tested in QIS2, the advantage of simplicity has been overruled by the fact that it is an approximation that can lead to inaccurate results in some circumstances.

C.11. For instance, some life undertakings would report a negative SCR in QIS2 when applying this method, which is not acceptable. In such cases, the absence of capital requirements for some undertakings may have a positive impact by artificially limiting their need for own funds, but it would have a strong negative impact on policyholders. It cannot be accepted that due to an approximation, no capital would be required, eventually jeopardizing policyholders' protection.

C.12. Therefore, it can be concluded that this method is not effective enough in terms of risk sensitivity.

Option 2

C.13. Option 2 has been tested in QIS3, and after further refinement tested again in QIS4. As it was introduced in QIS3, it was criticized for its complexity, but this criticism was as strong anymore when tested in QIS4.

C.14. The complexity of the method is not incompatible with the objectives of supervisory harmonisation and compatibility of prudential regimes: the method is still efficient and effective relative to these objectives.

C.15. The impact is positive on undertakings and policyholders because the method provides more accurate results than the method under option 1. Therefore this method fulfils the objective of risk-sensitive harmonized solvency standards in terms of effectiveness.

C.16. As it is complex, there is a cost of the method in terms of efficiency.

C.17. The perception of the complexity of the method by the smaller undertakings might trigger the question whether the method is proportionate for the small undertakings. However the calculation should reflect the complexity underlying the management decisions on profit sharing within an uncertain and changing economic environment. If small undertakings write life business with complex profit sharing mechanisms, then the method proposed in Option 2 is proportionate to the complexity of the business written. Therefore the method should not be considered incompatible with the objective of introducing proportionate requirements for small undertakings.

Option 3

C.18. Option 3 has been tested in QIS4. As compared to option 2, a limited number of undertakings responding to QIS4 have actually tested this method, in very few countries.

C.19. The method is simpler than the method in Option 2 to the extent that an undertaking may have to perform less calculations. However, it is more

complex in the sense that the underlying model, in particular the derivation of the single equivalent scenario, may be difficult for many undertakings to understand.

C.20. This method is still compatible with the objectives of supervisory harmonisation and compatibility of prudential regimes: the method is efficient and effective relative to these objectives.

C.21. The impact is positive on undertakings and policyholders because the method provides accurate results. Therefore this method fulfils the objective of risk-sensitive harmonized solvency standards in terms of effectiveness, with a better efficiency than the method in Option 2.

C.22. For small undertakings who understand the underlying model, this method also fulfils the criteria of risk sensitivity, and from the supervisors point of view the method has a positive impact.

C.23. However this method, if used "blindly" without understanding the complexity of the underlying model, could provide a feeling of false security for small undertakings underwriting life business with complex profit sharing mechanisms. The effectiveness of the "risk sensitivity" criteria could be undermined in that case. With this proviso, the method is efficient and effective with regards to the objective of introducing proportionate requirements for small undertakings.

Conclusion

C.24. CEIOPS is of the opinion that option 2 should not be considered incompatible with the objective of introducing proportionate requirements for small undertakings.

C.25. With regard to option 3, although this method is considered sustainable, it should be further tested in QIS5 before recommending its adoption in the Level 2 measures.

C.26. In conclusion, taking into account the potential cost and benefits for policyholders and beneficiaries, insurance and reinsurance undertakings and supervisory authorities, the effectiveness and efficiency level to meet the relevant objectives, and the sustainability and comparability levels of option 2 and 3, CEIOPS requests further feedback on the appropriateness of option 2 and 3.