Working Paper

Initial thoughts on the use of simplifications

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1. Introduction

1.1 CEIOPS is preparing its advice on proportionality as part of the implementing measures. FinReq is CEIOPS' working group working on this matter.

1.2 FinReq has asked the CEA for its thoughts on how to interpret the "nature, scale and complexity" proportionality criteria in practical situations and have requested a "mapping exercise" whereby realistic industry examples are used to show when proportionality can and cannot be applied. The CEA welcomes this opportunity to contribute its views and thoughts.

1.3 In addition, FinReq has asked the CEA to give guidance on the following 4 questions

- What quantitative thresholds are needed to define the scale criteria?
- Whether the proportionality principle should just be a complete package or whether it should apply to individual SCR risk modules and lines of business?
- How the application of the proportionality principle should relate to "cherry picking" and the use of entity specific parameters?
- How to combine the nature, scale and complexity criteria?

1.4 Proportionality is a new and wide ranging concept that is essential to the success of Solvency II. The questions CEIOPS has asked the CEA's opinion on are important, but only a subset of the overall issues needing to be addressed in respect of proportionality. This paper should therefore be viewed in this context, i.e. it addresses some, but not all, of the issues associated with proportionality. The CEA also recognises that the debate on proportionality is likely to evolve over time. As such, this paper should be viewed as a first step that presents our preliminary views at this stage of the Solvency II project. These views should also be considered in the context of the CEA's other publications, which can be found on the CEA's website: www.cea.eu.

1.5 The CEA would welcome follow-up meetings and discussions to further develop these thoughts and other aspects of proportionality.

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1.6 In order to provide our thoughts on the questions raised by CEIOPS this paper adopts a holistic approach and considers:

- What objectives proportionality should seek to achieve
- How to interpret the proportionality criteria individually
- How these criteria should be combined in to determine whether or not a particular simplification should be used

1.7 Responses to CEIOPS' specific questions are contained in Appendix A.

2. Proportionality Principle

Background

2.1 The Framework Directive Proposal ("the Directive") states in numerous places the need for proportionality, e.g. in Article 28.3: "Member States shall ensure that the requirements laid down in this Directive are applied in a manner which is proportionate to the nature, complexity and scale of the risks inherent in the business of an insurance or reinsurance undertaking".

2.2 Even without this Solvency II would need to adhere to proportionality as under the Treaty of Lisbon "… the principle of proportionality regulates the exercise of powers by the European Union, seeking to set within specified bounds the action taken by the institutions of the Union. Under this rule, the institutions' involvement must be limited to what is necessary to achieve the objectives of the Treaties. In other words, the extent of the action must be in keeping with the aim pursued …"

Objectives for proportionality

2.3 In our response1 to CP24 we provided some high level comments on proportionality, which provide objectives for proportionality, namely that it should:

- Make Solvency II achievable for all companies and in particular not impose a disproportionate and excessive cost burden on smaller companies
- Apply to all aspects of Solvency II, i.e. all three pillars
- Provide simplifications for all risk modules, sub-risk modules and business segments
- Simplifications should be available to all companies regardless of their size
- Ensure similar levels of policyholder protection between those companies using proportionality and those not doing so. Where a simplified approach results in an increased potential for model error then incorporating some degree of conservatism in its calibration to reach the same level of confidence (as the sophisticated approach) is acceptable. This is preferable to not having a degree of conservatism and much greater restrictions on the use of simplifications and proxies
- Be transparent, accountable and harmonised
- Fully involve companies in decisions over which simplifications might be appropriate for their business

2.4 The CEA also believes that proportionality should be applied with flexibility and that the approach outlined in this paper should be used by companies and supervisors as a guide as to how to apply proportionality rather than being a hard rule. Some flexibility should be possible depending upon a company's particular circumstance and risk profile. The simplification approach taken by a company should be the result of discussion between the company and its supervisors. It is essential that supervisors seek and take into account the input of the company on these matters as they best know their business and what is likely to be appropriate.

2.5 In their specific questions (see 1.3) CEIOPS' imply that a possible objective of proportionality could be to address the issue of "cherry picking" in connection with the use of entity specific parameters. The CEA agrees that "cherry picking" should generally be avoided. However, the CEA does not think that proportionality is the correct way of achieving this. Where entity specific parameters are used their reasonableness and appropriateness should be appropriately validated with proportionality applying to this validation process. However, it should not be used to restrict the use entity specific parameters.

How to decide when simplifications can be used

2.6 This paper suggests the following two stage approach for deciding when simplifications can be used:

Stage 1	Use a nature and complexity filter as a guide to identify where simplifications are likely to be appropriate
Stage 2	Use scale thresholds as a guide as to when to limit the use of certain simplifications where this is needed to mitigate risk from any inaccuracy inherent in the approaches

[1] CEA response to CEIOPS CP 24 on the Draft Advice on the Principle of Proportionality in the Solvency II Framework Directive Proposal, 25 April 2008

2.7 In order to apply a nature and complexity filter we first need to consider how to interpret these terms.

Nature

2.8 In the CEA's view and in the context of applying proportionality, the characteristics that should be associated with the term "nature" are:

- How homogeneous the risk is
- Level of certainty, i.e. to what extent future values and parameters can be predicted? For example, other things being equal, we would expect there to be less certainty over expected future values for long tailed business than for short tailed business as there is more time for experience to change and new trends to emerge
- The extent of potential policyholder loss, especially in the tail. For example, travel insurance business typically has relatively stable and narrow ranges for expected future claims. In contrast, occasional large (outlier) losses occur in credit insurance business, i.e. it is "fat tailed". Another example is catastrophe (re)insurance covering losses from hurricanes where there is very considerable uncertainty over expected losses, i.e. how many hurricanes occur, how severe they are and whether they hit heavily insured areas
- How highly correlated the risk is with other risks, especially tail correlations

2.9 Risks that are more predictable are easier to model and there is less chance that they will be understated. In such instances it is easier to develop proxies and benchmark runoff patterns that contain relatively small calibration margins to compensate for the extra uncertainty associated with not having entity specific experience. As the level of uncertainty gets bigger it becomes increasingly more difficult to be sure that a particular calibration margin will be appropriate, making it more important to get specialist actuarial help on a case-by-case basis.

2.10 Typically there is more uncertainty over underwriting risk for non-life business than is the case for life because there is less data on which to base best estimate assumptions and future trend risk is usually more significant.

Complexity

2.11 In the CEA's view and in the context of applying proportionality, the characteristics that should be associated with the term "complexity" are:

- Extent to which losses are the result of the interaction of a number of different factors. A good example of this is the optionality inherent in the guarantees provided on profit sharing contracts, which may depend upon the overall future asset returns and interest rate levels. For certain combinations of these parameters a guarantee may ultimately prove to be worthless whereas for others it may prove to be very costly. In addition, the actions of policyholders (surrender rates, take-up of options, etc) and company management actions can affect the value of the guarantees
- Path dependency, e.g. where intermediate as well final investment returns affect profit sharing best estimate values
- Gearing / leveraging resulting in profits and losses being multiplied, e.g. as is inherent in CDO investments and some derivative products
- Level of expertise needed. For some lines of non-life business specialists are needed to determine appropriate claim reserves, e.g. where data is limited or unstable or if there have been changes in historical trends

2.12 Complexity is therefore associated with the level of calculation sophistication and / or level of expertise needed. Where a particular simplification materially does not capture the complexity of the business it may not be possible to alleviate this by incorporating a degree of conservatism in its calibration because the simplified and sophisticated approaches are just too different.

2.13 Complexity and nature can be inter-related. For example, on non-life business uncertainty over future claims experience may require more sophisticated and complex approaches, e.g. requiring specialist actuarial knowledge in order to determine appropriate best estimate liabilities.

Stage 1 – nature and complexity filter

2.14 We now consider how to use nature and complexity as a filter. This is needed because there will be instances where the nature and / or complexity of the risks mean that it is inappropriate for a particular simplification to be used because they would introduce too much potential error.

Model error

2.15 The use of simplifications potentially introduces the risk of "model error". By model error we refer to the inaccuracy and imprecision potentially introduced through the use of more approximate calculation methods inherent in a simplification.

2.16 For the avoidance of doubt, the CEA is **not** advocating that companies should quantify the model error inherent in any simplifications they use. Instead the CEA is advocating that the proportionality criteria are used to avoid circumstances where model error might be excessive thereby avoiding the need to quantify it.

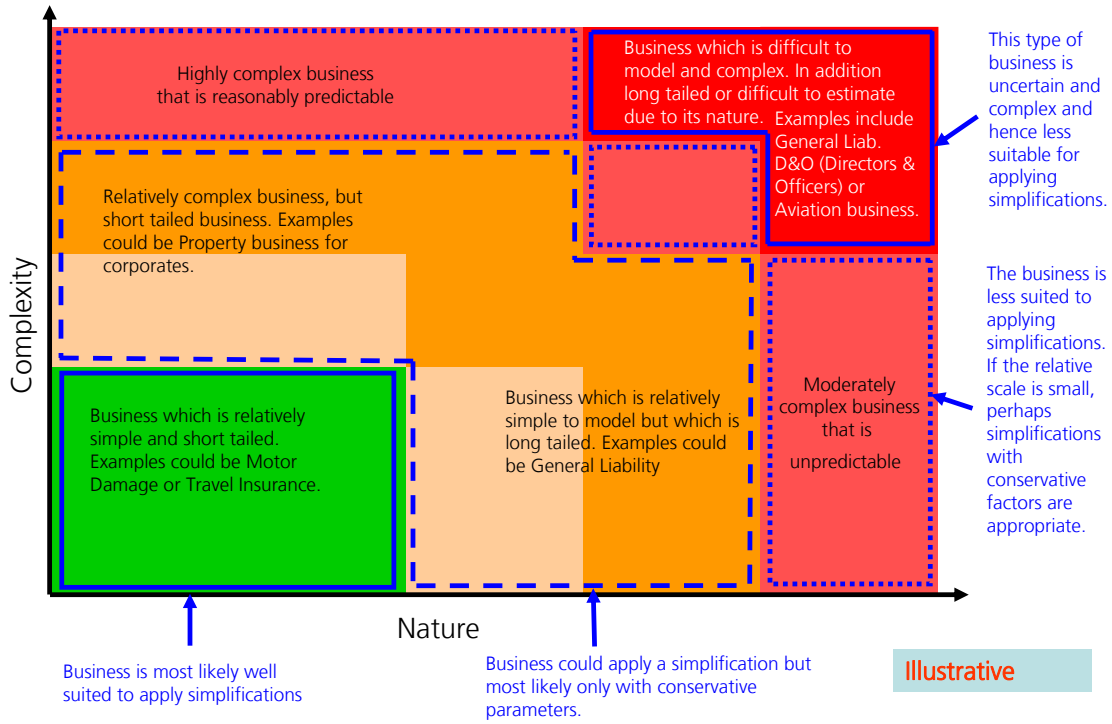
2.17 As indicated in 2.1 above, an acceptable way of mitigating the risk posed by model error may be to incorporate a degree of conservatism in the calibration of simplification to ensure that the risk from model error is then no greater than that implicit in the default approach, e.g. the SCR standard approach / best estimate liability methodology. This has the advantage of making available simplifications that might otherwise not have been available thereby increasing the range of simplifications available to companies.

2.18 However, as will have been evident from the above discussion over how to interpret nature and complexity, the use of simplifications is more appropriate for some risks and lines of business than others. The CEA therefore sees the nature and complexity criteria as being used as a filter to identify when simplifications are likely to be appropriate and to avoid excessive risk from model error.

Illustrative nature and complexity filter

2.19 An illustrative example of such a filter or mapping exercise is shown below in Figure 1 for non-life best estimate liabilities. As described in 2.4 above, any such approach should be used in conjunction with a joint qualitative assessment made by the company and its supervisors.

Figure 1



2.20 The products in the green area (bottom left hand corner) are products that are relatively simple with relatively predictable future claims experience such as travel insurance, which is short tailed and typically has relatively small individual losses and hardly any significant outlier large losses. For such a product proxies and benchmark run-off patterns can be developed with relatively little degree of conservatism in the calibration, which can be used with little, if any, scale limitations.

2.21 Other products that might fall in the green area are motor damage for cars and short term health insurance, which are both short tailed products where it is usually relatively simple to estimate best estimate liabilities.

2.22 The classes of business falling inside the (middle) orange areas are those whose nature and/or complexity mean that to a greater or lesser extent the model error risk could be a concern, i.e. some scale thresholds are likely to be required.

2.23 The red areas (far top, far right and top right hand corner) contain classes of business such as aviation, D&O insurance (Directors & Officers) or property catastrophe insurance where typically there is considerable uncertainty over future claims experience and which require a high level of experience and knowledge to determine appropriate best estimate liabilities. For these lines of business simplifications may not be appropriate even with significant calibration margins. In practice we would expect that the number of insurers writing these products to be limited to large companies able to apply the sophisticated methods required.

Stage 2 – scale threshold limits

2.24 A key objective of proportionality (see 2.1) is to make Solvency II as achievable as possible for smaller companies. In order to achieve this it is necessary to allow limited use of simplifications where the model error has not been entirely alleviated by introducing a degree of conservatism in their calibration. This is needed to widen the range of simplifications available and to avoid excessive capital requirements. For example, it may be acceptable to use a particular simplification that has some remaining model error associated with it for a small part of the business, but not for a larger part of the business. This can be achieved through the use of individual scale thresholds.

2.25 Note that scale restrictions will not be needed for all simplifications, e.g. in the green areas of Figure 1 where it is likely that incorporating a degree of conservatism in the calibration will fully alleviate any model error. In such cases there should be no scale limitation on either an individual or overall basis.

Relative scale thresholds are needed

2.26 As described in 2.1 above, the CEA believes that similar levels of protection should be provided to policyholders regardless of the absolute size of their company and whether or not they are using simplifications. This requires a relative rather than absolute scale measure.

2.27 In order to appreciate this, consider two companies that are identical except that one is five times the size of the other in all aspects. Suppose for the larger company it is decided that a particular simplification (with where necessary a degree of conservatism in its calibration) can be used for a particular line of the business, but that its use should not exceed 10% of some volume measure in order to avoid unacceptable risks to its policyholders. If scale were to have an absolute as well as relative component this would imply that the smaller company should get preferential treatment, i.e. be allowed to use it for a threshold greater than 10%. However, given that the companies are identical in all aspects except absolute size, this would mean that the policyholders in the smaller company were at greater risk than those in the larger company, which the CEA is against. Hence the conclusion that scale thresholds have to be relative and not absolute.

Understanding the overall use of simplifications

2.28 In practice companies are likely to use more than one simplification, which requires consideration of the overall effect and possible risks associated with the use of multiple simplifications.

2.29 In order to consider the overall position we need a common measure of model error risk. The CEA recommends that this is achieved by CEIOPS setting the individual scale threshold limits on a common basis. Namely, that they are all expressed in terms of the maximum percentage of the overall SCR or best estimate liability that would be calculated using them, e.g. a 5% limit would mean that up to 5% of the overall SCR (or best estimate liability) could acceptably be calculated using the simplification, subject to no other simplifications with threshold limits

being used. Note that the SCR or best estimate liability used for this purpose would be that calculated using the simplifications and that we are not suggesting that companies should have to calculate them without simplifications. The scale thresholds should be tested on a best efforts basis and applied pragmatically.

2.30 Using any one simplification to the maximum possible extent (i.e. at the scale threshold limit) and no others will therefore result in the same maximum acceptable level of model error. It follows from this that using say a simplification with a 10% threshold limit to calculate 5% of the SCR will result in the same potential model error as using a different one with a 20% limit to calculate 10% of the SCR.

2.31 The scale thresholds therefore provide a means of comparing different simplifications using a common measure of model error. The illustrative table below demonstrates this with the common measure being derived as the model error per 1% of the overall SCR or best estimate liability as appropriate. Note that the figures are only illustrative and also that there is no need to calculate the absolute model error. A relative measure of 1 denotes the maximum amount of model error that would be acceptable, e.g. that obtained when using a particular simplification, and no other, at the threshold limit.

Simplification	Individual scale threshold (% overall SCR or best estimate liability)	Measure of model error per 1% of the overall SCR or best estimate liability
A	50%	1/50
B	20%	1/20
C	5%	1/5

2.32 When considering the figures in the above table it is important to note that the only work involved for CEIOPS is to derive the individual scale threshold limits as the measure of model error is derived directly from this. If an individual limit is say 50% then the relative measure is 1/50, if the limit is 20% then the relative measure is 1/20 and so on.

2.33 Model error is akin to random noise and as such the model error associated with different simplifications is likely to be uncorrelated. Other things being equal, there is less overall model error risk associated with using a number of different simplifications to a lesser extent than using one simplifications to a greater extent because of diversification effects. Such diversifications effects therefore need to be allowed for.

2.34 In theory a correlation matrix approach could be used to allow for diversification effects, but this is unlikely to feasible because the very large number of possible simplification combinations would make the correlation matrix needed too large. A more pragmatic approach would be to simply add the measure of model error where a high positive correlation is expected (e.g. where the same or very similar simplifications are used) and then to use a sum of squares approach to combine this with the measure of model error from other uncorrelated simplifications.

2.35 To illustrate how such an aggregation approach might work consider an example using the (illustrative) figures in the above table where 25% of the overall SCR was calculated using simplification A (25 * 1/50 = 1/2) and 10% of the overall SCR calculated using simplification B (10 * 1/20 = 1/2). As the two different simplifications are used the overall measure of model error would be SQRT ($½^2 + ½^2$) =0.71 showing that there is further scope to use simplifications as the overall measure of model risk is less than 1.

Summary of application of scale criteria

2.36 The above approach for applying the scale criteria can be summarised as follows:

- CEIOPS to derive individual scale threshold limits such that the potential model error is the same for all when using the simplification at the limit
- Derive a common measure of model error by expressing the individual scale thresholds as the proportionate model error per 1% of the overall SCR or best estimate liability
- Determine a guide as to whether the particular combination of simplifications is appropriate for a company by summing the measures of model risk for highly correlated simplifications and using a sum of squares approach to aggregate this with the measures of model risk for uncorrelated simplifications.
- If this value is less than or equal to one, it indicates that it is likely to be appropriate to use that combination of simplifications
- Overlay this with a joint qualitative assessment from the company and supervisors

2.37 The above approach requires an indication of the percentage of the overall SCR and / or best estimate liability that will be calculated using a simplification. This could be interpreted as introducing circularity, which would make the approach unworkable. However, provided a degree of pragmatism is accepted this will not be the case. All that should be required is for companies to estimate the relative sizes of the various components of their SCR and / or best estimate liabilities that would be calculated using the simplifications. For example, from past QIS3 and QIS4 exercises and where reasonable Solvency I and accounting figures.

Appendix A

Responses to CEIOPS' specific questions

A.1 In this section, we have provided answers to your questions.

A.2 Question 1: "What quantitative thresholds are needed to define the scale criteria: which parameters can be adopted (SCR, Technical Provisions, Premiums, …)"

A.3 Our answer:

- As described 2.23 to 2.37 above, the CEA proposes that there should be individual scale thresholds that are expressed as a percentage of the overall SCR and / or best estimate liability as appropriate. These scale thresholds should not depend upon the absolute size of the company.

A.4 Question 2: "Whether the proportionality principle should just be a "complete package" or whether it could apply to single module/sub-module of the SCR standard formula and to single LOBs for the technical provisions"?"

A.5 Our answer:

- The CEA believes that in proportionality should be applied to each single module/sub-module, but should also have regard to the overall position to ensure that the overall use of simplifications is appropriate. We propose above an approach for doing this in 2.7 to 2.37.

A.6 Question 3: "How the application of the proportionality principle should relate to the use of entity specific parameters (risk of cherry picking)?"

A.7 Our answer:

- As described in 2.5 the CEA does not believe that proportionality should be used to control possible "cherry picking" in respect of the use of entity specific parameters.

A.8 Question 4: "How to assess the combination of the three criteria of nature, scale and complexity"

A.9 Our answer:

- We propose an approach in 2.7 to 2.37 above.

Appendix B

CEA latest publications

Joint CEA-PEIF-CFO Forum-CRO Forum Letter on Current Solvency II Directive Negotiations
Date : 2008-11-13

CEA Response to CEIOPS' Own Risk and Solvency Assessment
Date : 2008-09-18

CEA Comments on CRD Potential Changes
Date : 2008-06-14

Position paper: cost of capital methodology
Date : 2008-06-03

CEA response on the principle of proportionality in the Solvency II framework directive proposal
Date : 2008-04-28

CEA response on aspects of the Solvency II Framework Directive Proposal related to Insurance Groups
Date : 2008-04-28

CEA Position paper on the own funds eligibility criteria
Date : 2008-04-25

CEA position on Solvency II and pension funds
Date : 2008-04-08

CEA Guidance on QIS4 Simplification of the Market Interest Rate Risk Sub Module (Mktint interest rate risk)
Date : 2008-02-20

CEA Response to EU Commission's Draft Call for Advice on QIS4
Date : 2008-02-20

Simplifications for calculating risk margins using the cost-of-capital approach
Date : 2008-02-20

Instruments Working Paper on Marketability
Date : 2008-02-20

QIS 4 TS Comments Consolidation
Date : 2008-02-20

Joint CEA-CRO Forum letter to European Commissioner McCreevy on the Methodology of the Calculation of the MCR
Date : 2008-01-30

About the CEA

The CEA is the European insurance and reinsurance federation. Through its 33 member bodies, the national insurance associations, the CEA represents all types of insurance and reinsurance undertakings, eg pan-European companies, monoliners, mutuals and SMEs. The CEA, which is based in Brussels, represents undertakings that account for approximately 94% of total European premium income. Insurance makes a major contribution to Europe's economic growth and development. European insurers generate premium income of €1 122bn, employ one million people and invest more than €7 200bn in the economy.